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Product overview

QUICK REFERENCE

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polymer blending systems	<ul style="list-style-type: none"> ■ ProMix™ -M (A Controls) ■ ProMix™ -M (B Controls) ■ ProMix™ -S ■ ProMix™ -C 	polymer blending systems

Introduction

Pump Installation Guide

Selection, installation, operation & accessories guidelines

When selecting, installing and operating a pump with accessories, the following guidelines should be followed:

When selecting a pump, make allowances for extra capacity and working pressure, especially if the *fluid viscosity* is higher than that of water (note: Capacities in manuals pertain specifically to water at fixed pressures).

If in doubt about the *chemical compatibility* of the liquid end materials, valves, valve balls, O-rings, suction and discharge lines and accessories, refer to the Chemical Resistance List.

The site of the metering pump should be easily accessible. The metering pump should be protected against the risk of being damaged mechanically. *High ambient temperatures, radiating heat and direct sunlight* should be avoided, if possible.

The metering pump should be provided with a *power supply* of its own. If connected in parallel to other equipment, the metering pump should be switched on and off by separate contacts, e.g. by relays or contactors. If the metering pump is paced externally, the maximum input pulse rate should match the maximum stroking rate.

All pumps are *self-priming*. The suction lift varies between 5 and 20 ft. (1.5 and 6 m), depending on the pump type (refer to Technical Data). The reduced suction lift for media having a specific gravity (density) higher than 1 can be evaluated as follows:

Effective suction lift = suction lift of water in ft
(pump capacity data) / S.G. of chemical

Note: Suction lift decreases with high altitude. Contact factory for pump selection.

Accessories and tips. . .

– The suction line should be. . .

- as short as possible.
- sloping upwards to eliminate vapor pockets.

– The discharge line should have. . .

- a drain valve when corrosive media is to be handled.

Installation Tip:

- Draining is achieved by means of a tee and bleed valve, or an adjustable pressure relief valve in the discharge line.

– A foot valve with ball check valve, ceramic weight and strainer facilitates. . .

- priming.
- prevents loss of prime.

- protects the liquid end against coarse impurities.

Installation Tip:

- Must install vertically, slightly above the bottom of the tank; directly under pump taking pump maximum suction lift into account.

Note: Pump capacity is effected if not installed properly or if plugged.

– Positive suction head (flooded suction)

- Recommended with media which tend to develop gases.
- Recommended with media which has high viscosity.

Installation Tips:

- Degassing pump must be used on suction lift applications, not flooded suction.
- Metering pump can be located at and fed from the foot of the supply tank.

– A ball-check-type injection valve

- Prevents back flow.

Installation Tip:

- Should be at the end of the discharge line; Teflon injection valves are not spring-loaded and must be oriented vertically into bottom of pipe for ball to seat.

Note: Pumps will not give consistent results without backpressure; our injection valve provides minimum backpressure when pumping into atmosphere.

– Backpressure valve

- Adjustable spring tension on a diaphragm.
- Ensures accurate metering and prevents siphoning.

Installation Tips:

- Must be in the discharge line or mounted onto the pump in the following cases:
 - ✓ When the discharge head is negligible (open-end discharge).
 - ✓ The metering pump discharges into a vacuum system or the positive suction head exceeds the discharge head.

Note: At least 15 psig differential pressure is required to provide repeatability of metering.

Introduction

Pump Installation Guide

– Pulsation dampener

- Bladder type cavity with pressure gauge.
- Required for very long discharge lines.
- Required when high-viscosity media are handled.
- Required when a smooth flow profile is required.

Installation Tips:

- Should be as close to the pump as possible.
- Set pressure at 90% of discharge line pressure.
- No further than 12 inches from the metering pump discharge, in direction of flow.

Note: Backpressure valve is required at point of injection, downstream of pulsation dampener. Consult ProMinent for verifications when discharge lines are greater than 100 feet.

– Pressure relief valve

- In form of an adjustable backpressure valve or 3-port relief valve.
- Protects metering pump against "dead head" (pumping against a closed valve).

Installation Tip:

- Must be close to the pump, upstream of the backpressure valve, for system protection.

Application Suggestions:

- Where the discharge line is hard piped.
- When pumping into high pressures.

- Where the discharge line has several check valves installed.

Note: Recommended for all motor-driven pumps.

– Viscous fluids

- Require valve springs to ensure balls seat properly.

Installation Tips:

- Should be spring-loaded for viscous media.
- The suction piping should be sized up by one pipe size and a pulsation dampener used.
- Select PVT4 series pumps with special liquid ends for extremely high viscosities. Positive suction recommended.

– Calibration column

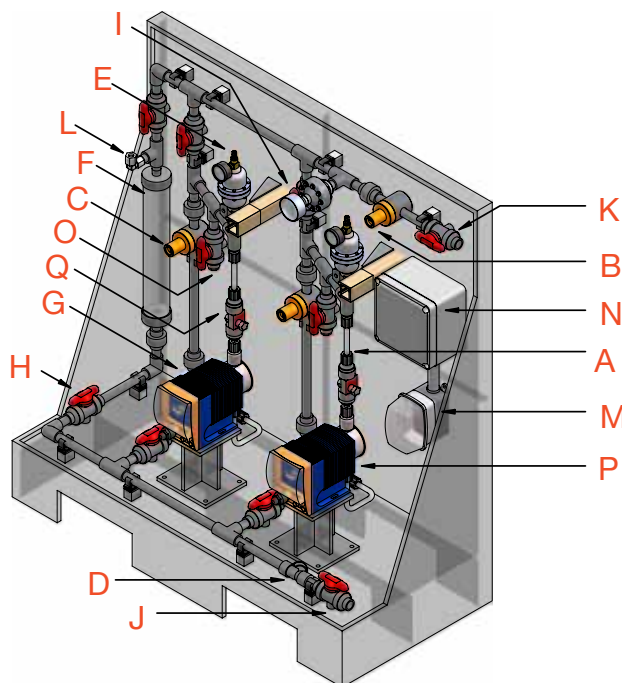
- Draw down, graduated cylinder.
- Useful for setting up metering pump to reach desired capacity.
- Single pump dosing package can be equipped with a self-filling calibration assembly for application where the pump is installed above the tank (eliminates chemical handling).

Installation Tip:

- Easy to install off the suction side of the metering pump with a ball valve to isolate from the tank.

Standard System Configuration

- A: Reinforced PVC tubing
 - B: Backpressure/anti-siphon valve
 - C: Pressure relief valve
 - D: Location of "Y" strainer (not shown)
 - E: Pulsation Dampener
 - F: Calibration Column
 - G: Metering Pump
 - H: Ball Valve
 - I: Pressure Gauge
 - J: Product Inlet
 - K: Product Outlet
 - L: Vent to Tank
 - M: Duplex Receptacle*
 - N: Termination Box*
 - O: Flush Valve
 - P: Backup Pump
 - Q: Flow Monitor
- * (M) & (N) are **not** standard: Items shown for layout purposes only.



Introduction

Pump Selection by Capacity

ProMinent Pump Model	GPD	Capacity gph	cc/Min	Max. PSIG	Std. MNPT Fittings (in.)	Manual Freq Adj	Pulse 1:01	M/D	Analog 4-20mA
beta/4b 1000	5	0.19	12	145	1/4" x 3/16"	0-180	STD	STD	N/A
gamma/L 1000	5	0.19	12	145	1/4" x 3/16"	0-180	STD	OPT	OPT
beta/4b 1601	7	0.29	18	232	1/4" x 3/16"	0-180	STD	STD	N/A
gamma/L 1601	7	0.29	18	232	1/4" x 3/16"	0-180	STD	OPT	OPT
beta/4b 2001	7	0.29	18	290	1/4" x 3/16"	0-180	STD	STD	N/A
beta/4b 1602	14	0.58	36	232	1/4" x 3/16"	0-180	STD	STD	N/A
gamma/L 1602	14	0.58	36	232	1/4" x 3/16"	0-180	STD	OPT	OPT
beta/b 2002	14	0.58	48	290	1/4" x 3/16"	0-180	STD	STD	N/A
beta/5 b 2504	18	0.77	49	363	8 x 4 mm	0-180	STD	STD	N/A
beta/4 b 1604	24	1	63	232	1/2" x 3/8"	0-180	STD	STD	N/A
ProMus (17) 3/8" Plunger	24	1	63	3500	1/4" FNPT	29-58	N/A	N/A	OPT
beta/5b 1605	26	1.1	69	232	1/2" x 3/8"	0-180	STD	STD	N/A
gamma/L 1605	26	1.1	69	232	1/2" x 3/8"	0-180	STD	OPT	OPT
gamma/L 1005	26	1.1	69	145	1/2" x 3/8"	0-180	STD	OPT	OPT
beta/4b 1005	26	1.1	69	145	1/2" x 3/8"	0-180	STD	STD	N/A
ProMus (17) 7/16" Plunger	33	1.38	87	3500	1/4" FNPT	29-58	N/A	N/A	OPT
beta/5b 1008	43	1.8	114	145	1/2" x 3/8"	0-180	STD	STD	N/A
gamma/L 1008	43	1.8	114	145	1/2" x 3/8"	0-180	STD	OPT	OPT
beta/4b 0708	46	1.9	120	101	1/2" x 3/8"	0-180	STD	STD	N/A
gamma/L 0708	46	1.9	120	101	1/2" x 3/8"	0-180	STD	OPT	OPT
ProMus (17) 3/8" Plunger	59	2.4	151	3500	1/4" FNPT	29-138	N/A	N/A	OPT
beta/5b 0713	70	2.9	183	101	1/2" x 3/8"	0-180	STD	STD	N/A
gamma/L 0713	70	2.9	183	101	1/2" x 3/8"	0-180	STD	OPT	OPT
ProMus (30) 5/8" Plunger	72	3	189	2080	1/4" FNPT	29-58	N/A	N/A	OPT
beta/4 b 0413	77	3.2	202	58	1/2" x 3/8"	0-180	STD	STD	N/A
delta 1612	77	3.2	202	232	1/2" x 3/8"	0-200	STD	OPT	OPT
ProMus (17) 7/16" Plunger	80	3.3	208	3500	1/4" FNPT	29-138	N/A	N/A	OPT
ProMus (30) 13/16" Plunger	91	3.8	240	1230	3/8" FNPT	29-43	N/A	N/A	OPT
beta/5b 0420	108	4.5	284	58	1/2" x 3/8"	0-180	STD	STD	N/A
gamma/L 0420	108	4.5	284	58	1/2" x 3/8"	0-180	STD	OPT	OPT
beta/4 b 0220	120	5	315	29	1/2" x 3/8"	0-180	STD	STD	N/A
Sigma/1 HM 12017	124	5.2	334	145	1/2"	0-88	STD	OPT	OPT
delta 1020	127	5.3	334	145	1/2" x 3/8"	0-200	STD	OPT	OPT
Sigma/1 HM 10022	164	6.8	434	145	1/2"	0-88	STD	OPT	OPT
ProMus (30) 5/8" Plunger	173	7.2	454	2080	1/4" FNPT	29-138*	N/A	N/A	OPT
delta 730	190	7.9	498	102	1/2" x 3/8"	0-200	STD	OPT	OPT
beta/5b 0232	202	8.4	530	29	1/2" x 3/8"	0-180	STD	STD	N/A
gamma/L 0232	202	8.4	530	29	1/2" x 3/8"	0-180	STD	OPT	OPT
Sigma/1 HM 12035	266	11.1	700	145	1/2"	0-172	STD	OPT	OPT
delta 450	317	13.2	833	58	1/2"	0-200	STD	OPT	OPT
Sigma/1 HM 10044	336	14	884	145	1/2"	0-172	STD	OPT	OPT
Sigma/2 HM 12050	382	15.9	1003	145	1/2"	0-87	STD	OPT	OPT
delta 280	506	21.1	1331	29	1/2"	0-200	STD	OPT	OPT
ProMus (30) 1-1/8" Plunger	506	21.1	1331	640	3/8" FNPT	29-115**	N/A	N/A	OPT
ProMus (40) 1-3/4" Plunger	614	25.6	1615	265	3/4" FNPT	29-58**	N/A	N/A	OPT
Sigma/2 HM 12090	686	28.6	1804	145	3/4"	0-156	STD	OPT	OPT
Sigma/2 HM 07120	912	38	2397	100	3/4"	0-87	STD	OPT	OPT
Sigma/3 HM 120190	1445	60.2	3798	145	1"	0-124	STD	OPT	OPT
ProMus (40) 2" Plunger	1603	66.8	4214	200	3/4" FNPT	29-115**	N/A	N/A	OPT
Sigma/2 HM 07220	1673	69.7	4397	100	3/4"	0-156	STD	OPT	OPT
ProMus (40) 2-1/4" Plunger	2030	84.6	5337	160	3/4" FNPT	29-115**	N/A	N/A	OPT
Sigma/3 HM 120270	2054	85.6	5400	145	1"	0-173	STD	OPT	OPT
Sigma/2 HM 04350	2200	92.5	5833	58	1"	0-232	STD	OPT	OPT
ProMus (40) 2-1/4" Plunger	2436	101.5	6404	160	3/4" FNPT	29-138**	N/A	N/A	OPT
Sigma/3 HM 070410	3120	130	8200	100	1-1/2"	0-86	STD	OPT	OPT
Sigma/3 HM 070580	4416	184	11600	100	1-1/2"	0-124	STD	OPT	OPT
Sigma/3 HM 040830	6336	264	16670	58	1-1/2"	0-173	STD	OPT	OPT

product overview

solenoid-driven metering pumps

motor-driven metering pumps

pump spare parts & accessories

DULCOMETER® instrumentation

DULCOTEST® sensors

polymer blending systems

Introduction

Chemical Resistance List

Resistance of liquid end materials against common chemicals at standard temperature 68°F (20°C). (May differ at other temperatures)

s	= saturated aqueous solution	n	= unknown resistance] resp. to aqueous solutions
+/0	= conditional resistance	=>	= refer to . . .	
+	= good resistance	A.C.	= any concentration	
0	= limited resistance	S	= saturated solution	
-	= no resistance	Conc.	= concentrated	
+(x%)	= good resistance to x% concentration	D	= weak solution	
*	= With glued fittings, please check the resistance of the glue.			

These classifications are the results of practical experience of the manufacturers of the raw materials. Since the resistance of the materials depends also on other factors (operating conditions, surface quality, etc.), this list cannot be more than a general information for which no responsibility is accepted. It should be particularly noted that, as a rule, the aggressiveness of a mixture is different from that of its individual components. In cases of doubt, suitable tests should be performed.

N.B. PTFE is resistant against most chemicals and solvents (excluding fluorine, metallic sodium and other alkali metals).

PVDF is resistant against most chemicals (excluding ketones, esters).

Chemical	Formula	CONC.	Acrylic	PVC	316 SS	PE	PP	Viton®	EPDM	PVDF	Teflon
Acetaldehyde	CH ₃ CHO	100%	-	-	+	+	0	-	+/-0	+	+
Acetamide	CH ₃ CONH ₂	S	+	+	+	+	+	0	+	+	+
Acetic Acid	CH ₃ COOH	100%	-	+(50%)	+	+(70%)	+	-	0	+	+
Acetic Anhydride	(CH ₃ CO) ₂ O	100%	-	-	+	0	0	-	+/-0	-	+
Acetone	CH ₃ COCH ₃	100%	-	-	+	+	+	-	-	0	+
Acetophenone	C ₆ H ₅ COCH ₃	100%	-	n	+	+	+	-	+	+	+
Acetyl Chloride	CH ₃ COCl	100%	-	+	0	-	-	+	-	-	+
Acetylacetone	C ₅ H ₈ O ₂	100%	-	-	+	+	+	-	+	-	+
Acetylene Dichloride=>	Dichloroethylene										
Acetylene Tetrachloride=>	Tetrachloroethane										
Acrylonitrile	CH ₂ =CH-CN	100%	-	-	+	+	+	-	-	+	+
Adipic Acid	C ₆ H ₁₀ O ₄	S	+	+	+	+	+	+	+	+	+
Allyl Alcohol	CH ₂ CHCH ₂ OH	96%	-	0	+	+	+	-	+	+	+
Aluminum Acetate	Al (CH ₃ COO) ₃	S	+	+	+	+	+	+	+	+	+
Aluminum Bromide	AlBr ₃	S	+	+	n	+	+	+	+	+	+
Aluminum Chloride	AlCl ₃	S	+	+	-	+	+	+	+	+	+
Aluminum Fluoride	AlF ₃	10%	+	+	-	+	+	+	+	+	+
Aluminum Hydroxide	Al (OH) ₃	S	+	+	+	+	+	+	+	+	+
Aluminum Nitrate	Al (NO ₃) ₃	S	+	+	+	+	+	+	+	+	+
Aluminum Phosphate	AlPO ₄	S	+	+	+	+	+	+	+	+	+
Aluminum Sulfate	Al (SO ₄) ₃	S	+	+	+	+	+	+	+	+	+
Ammonium Acetate	CH ₃ COONH ₄	S	+	+/-0	+	+	+	+	+	+	+
Ammonium Aluminum Sulfate	NH ₄ Al(SO ₄) ₂	S	+	+	+	+	+	+	+	+	+
Ammonium Bicarbonate	NH ₄ HCO ₃	S	+	+	+	+	+	+	+	+	+
Ammonium Carbonate	(NH ₄) ₂ CO ₃	40%	+	+	+	+	+	+	+	+	+
Ammonium Chloride	NH ₄ Cl	S	+	+	-	+	+	+	+	+	+
Ammonium Fluoride	NH ₄ F	S	+	0	0	+	+	+	+	+	+
Ammonium Hydrogen Carbonate	NH ₄ HCO ₃	A.C.	+	+	+	+	+	+	+	+	+
Ammonium Hydroxide	NH ₄ OH	S	+	+	+	+	+	-	+	+	+
Ammonium Nitrate	NH ₄ NO ₃	S	+	+	+	+	+	+	+	+	+
Ammonium Oxalate	(NH ₄) ₂ C ₂ O ₄	S	+	+	+	+	+	+	+	+	+
Ammonium Perchlorate	NH ₄ ClO ₄	10%	+	+	+	+	+	+	+	+	+
Ammonium Peroxodisulfate	(NH ₄) ₂ S ₂ O ₈	S	+	+	+(5%)	+	+	+	+	+	+
Ammonium Persulfate	(NH ₄) ₂ S ₂ O ₈	A.C.	+	+	+	+	+	+	+	+	+
Ammonium Phosphate	(NH ₄) ₃ PO ₄	A.C.	+	+	+(10%)	+	+	+	+	+	+
Ammonium Sulfate	(NH ₄) ₂ SO ₄	A.C.	+	+	+(10%)	+	+	+	+	+	+
Ammonium Sulfide	(NH ₄) ₂ S	S	+	+	n	+	+	+	+	+	+
Amyl Alcohol	C ₅ H ₁₁ OH	100%	+	+	+	+	+	-	+	+	+
Aniline	C ₆ H ₅ NH ₂	100%	-	-	+	+	+	-	+/-0	+	+
Aniline Hydrochloride	C ₆ H ₅ NH ₂ HCl	S	n	+	-	+	+	+/-0	+/-0	+	+
Antimony Trichloride	SbCl ₃	S	+	+	-	+	+	+	+	+	+
Aqua Regia	3HCl+HNO ₃	100%	-	+	-	-	-	-	0	+	+
Arsenic Acid	H ₃ AsO ₄	S	+	+	+	+	+	+	+	+	+
Barium Carbonate	BaCO ₃	S	+	+	+	+	+	+	+	+	+
Barium Chloride	BaCl ₂	S	+	+	-	+	+	+	+	+	+
Barium Hydroxide	Ba(OH) ₂	S	+	+	+	+	+	+	+	+	+
Barium Nitrate	Ba(NO ₃) ₂	A.C.	+	+	+	+	+	+	+	+	+
Barium Sulfate	BaSO ₄	A.C.	+	+	+	+	+	+	+	+	+
Barium Sulfide	BaS	A.C.	+	+	+	+	+	+	+	+	+
Beer	-	100%	+	+	+	+	+	+	+	+	+

Viton® is a registered trademark of Dupont Dow Elastomers

Introduction

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s	= saturated aqueous solution	n	= unknown resistance] resp. to aqueous solutions
+/0	= conditional resistance	=>	= refer to . . .	
+	= good resistance	A.C.	= any concentration	
0	= limited resistance	S	= saturated solution	
-	= no resistance	Conc.	= concentrated	
+(x%)	= good resistance to x% concentration	D	= weak solution	
*	= With glued fittings, please check the resistance of the glue.			

N.B. PTFE is resistant against most chemicals and solvents (excluding fluorine, metallic sodium and other alkali metals).

PVDF is resistant against most chemicals (excluding ketones, esters).

Chemical	Formula	CONC.	Acrylic	PVC	316 SS	PE	PP	Viton®	EPDM	PVDF	Teflon
Benzaldehyde	C ₆ H ₅ CHO	100%	-	-	+	0	+	+	+	+	+
Benzene	C ₆ H ₆	100%	-	-	+	0	0	0	-	+	+
Benzene Sulfonic Acid	C ₆ H ₅ SO ₃ H	10%	n	n	+	n	+	+	-	+	+
Benzoic Acid	C ₆ H ₅ COOH	S	+	+	+	+	+	+	+	+	+
Benzoyl Chloride	C ₆ H ₅ COCl	100%	-	n	0	0	0	+	+	n	+
Benzyl Alcohol	C ₆ H ₅ CH ₂ OH	100%	-	-	+	+	+	+	-	+	+
Benzyl Benzoate	C ₆ H ₅ COOC ₇ H ₇	100%	-	-	+	0	+	+	-	0	+
Benzyl Chloride	C ₆ H ₅ CH ₂ Cl	90%	-	n	+	0	0	+	-	+	+
Bleach=>	Sodium Hypochlorite										
Bleaching Powder	Ca(OCl) ₂	S	+	+	-	+	+	+	+	+	+
Borax	Na ₂ B ₄ O ₇	A.C.	+	+	+	+	+	+	+	+	+
Boric Acid	H ₃ BO ₃	S	+	+	+	+	+	+	+	+	+
Brine		S	+	+/0	+/0	+	+	+	+	+	+
Bromine	Br ₂	100%	-	-	-	-	-	-	-	+	+
Bromine Liquid	Br ₂	100%	-	-	-	-	-	-	-	+	+
Bromine Water	-	S	-	+	-	-	-	-	-	+	+
Bromo Benzene	C ₆ H ₅ Br	100%	n	n	+	0	0	0	-	+	+
Bromochloro Methane	CH ₂ BrCl	100%	-	-	+	0	-	n	+/0	+	+
Bromochlorotrifluoroethane	HCClBrCF ₃	100%	-	-	+	0	0	+	-	+	+
Butanediol	HOC ₄ H ₉ OH	10%	n	+	+	+	+	0	+	+	+
Butanetriol	C ₄ H ₁₀ O ₃	S	+	+	+	+	+	0	+	+	+
Butanol	C ₄ H ₉ OH	100%	-	+	+	+	+	0	+/0	+	+
Butyl Acetate	CH ₃ COOC ₄ H ₉	100%	-	-	+	-	0	-	+/0	+	+
Butyl Acrylate	C ₇ H ₁₃ O ₂	100%	-	-	+	+	+	-	-	+	+
Butyl Amine	C ₄ H ₉ NH ₂	100%	n	n	+	+	n	-	-	0	+
Butyl Benzoate	C ₆ H ₅ COOC ₄ H ₉	100%	-	-	+	0	0	+	+	n	+
Butyl Ether	(C ₄ H ₉) ₂ O	100%	-	-	+	+	+	-	0	+	+
Butyl Mercaptan	C ₄ H ₉ SH	100%	n	n	n	n	n	+	-	+	+
Butyl Oleate	C ₂₂ H ₄₂ O ₂	100%	n	n	+	n	n	+	+/0	+	+
Butyl Stearate	C ₂₂ H ₄₄ O ₂	100%	0	n	+	n	n	+	-	+	+
Butylaldehyde	C ₄ H ₇ CHO	100%	-	n	+	+	+	-	+/0	n	+
Butyric Acid	C ₃ H ₇ COOH	100%	+(5%)	+(20%)	+	+	+	+	+	+	+
Calcium Acetate	(CH ₃ COO) ₂ Ca	S	+	+	+	+	+	+	+	+	+
Calcium Bisulfite	Ca(HSO ₃) ₂	S	+	+	+	+	+	+	+	+	+
Calcium Carbonate	CaCO ₃	A.C.	+	+	+	+	+	+	+	+	+
Calcium Chloride	CaCl ₂	S	+	+	-	+	+	+	+	+	+
Calcium Cyanide	Ca(CN) ₂	S	+	+	n	+	+	+	+	+	+
Calcium Hydrogen Sulfite	CaHSO ₃	S	+	+	+	+	+	+	+	+	+
*Calcium Hydroxide	Ca(OH) ₂	S	+	+	+	+	+	+	+	+	+
Calcium Hypochlorite	Ca(OCl) ₂	S	+	+	-	+	0	0	+	+	+
Calcium Nitrate	Ca(NO ₃) ₂	S	+	+(50%)	+	+	+(50%)	+	+	+	+
Calcium Phosphate	Ca ₃ (PO ₄) ₂	S	+	+	+	+	+	+	+	+	+
Calcium Sulfate	CaSO ₄	S	+	+	+	+	+	+	+	+	+
Calcium Sulfide	CaS	S	+	+	n	+	+	+	+	+	+
Calcium Sulfite	CaSO ₃	S	+	+	+	+	+	+	+	+	+
Calcium Thiosulfate	CaS ₂ O ₃	S	+	+	-	+	+	+	+	+	+
Camphor	C ₁₀ H ₁₆ O	100%	-	-	+	-	+	0	-	+	+
Carbolic Acid (see Phenol)	C ₆ H ₅ OH	100%	-	0	+	0	+	+	-	+	+
Carbon Disulfide	CS ₂	100%	-	-	+	0	0	+	-	+	+
Carbon Tetrachloride	CCl ₄	100%	0	-	+	0	-	+	-	+	+
Carbonic Acid	H ₂ CO ₃	S	+	+	+	+	+	+	+	+	+

* Requires flushing.

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Resistance of liquid end materials against common chemicals at standard temperature 68°F (20°C). (May differ at other temperatures)

s	= saturated aqueous solution	n	= unknown resistance] resp. to aqueous solutions
+/o	= conditional resistance	=>	= refer to . . .	
+	= good resistance	A.C.	= any concentration	
o	= limited resistance	S	= saturated solution	
-	= no resistance	Conc.	= concentrated	
+(x%)	= good resistance to x% concentration	D	= weak solution	
*	= With glued fittings please check the resistance of the glue			

N.B. PTFE is resistant against most chemicals and solvents (excluding fluorine, metallic sodium and other alkali metals).

PVDF is resistant against most chemicals (excluding ketones, esters).

Chemical	Formula	CONC.	Acrylic	PVC	316 SS	PE	PP	Viton®	EPDM	PVDF	Teflon
Caustic Soda=>	Sodium Hydroxide										
Chloric Acid	HClO ₃	20%	+	+	-	+10%	-	0	0	+	+
Chlorine Dioxide Solution	ClO ₂ +H ₂ O	0.5%	0	+	-	0	0	0	-	+	+
Chloroacetic Acid	CH ₂ ClCOOH	A.C.	-	-	-	-	+	+	+	+	+
Chlorine Water	Cl ₂ +H ₂ O	S	+	+	-	0	0	+	+	+	+
Chlorobenzene	C ₆ H ₅ Cl	100%	-	-	+	0	+	+	-	+	+
Chloroethanol	ClCH ₂ CH ₂ OH	100%	-	-	+	+	+	-	0	0	+
Chloroethylbenzene	C ₆ H ₅ CH ₂ CH ₃	100%	-	-	+	0	0	0	-	n	+
Chlorophenol	C ₆ H ₄ OHCl	100%	n	n	+	+	+	n	-	+	+
Chlorotoluene	C ₆ H ₅ Cl	100%	-	-	+	n	n	+	-	+	+
Chloroacetone	ClCH ₂ COCH ₃	100%	-	-	+	n	n	-	+	n	+
Chlorobutadiene	C ₄ H ₅ Cl	100%	-	-	+	n	n	+	-	n	+
Chloroform	CHCl ₃	100%	-	-	+	-	0	+	-	+	+
Chlorohydrin	C ₃ H ₇ O ₂ Cl	100%	n	n	+	+	+	+	0	-	+
Chloroprene=>	Chlorobutadiene										
Chlorosulfonic Acid	SO ₂ (OH)Cl	100%	-	-	-	-	-	-	-	-	+
Chrome Sulfate	Cr ₂ (SO ₄) ₃	S	+	+	+	+	+	+	+	+	+
Chromic Acid	H ₂ CrO ₄	50%	-	+	+(10%)	+	0	+	-	+	+
Chromic Sulfuric Acid	K ₂ CrO ₄ +H ₂ SO ₄	S	-	+	n	-	-	n	n	+	+
Citric Acid	C ₆ H ₈ O ₇	S	+	+	+	+	+	+	+	+	+
Cobalt Chloride	CoCl ₂	S	+	+	-	+	+	+	+	+	+
Copper II Acetate	Cu(CH ₃ COO) ₂	S	+	+	+	+	+	+	+	+	+
Copper II Arsenite	Cu ₃ (AsO ₃) ₂	S	+	+	+	+	+	+	+	+	+
Copper II Carbonate	CuCO ₃	S	+	+	+	+	+	+	+	+	+
Copper II Chloride	CuCl ₂	S	+	+	+(1%)	+	+	+	+	+	+
Copper II Cyanide	Cu(CN) ₂	S	+	+	+	+	+	+	+	+	+
Copper II Fluoride	CuF ₂	S	+	+	+	+	+	+	+	+	+
Copper II Nitrate	Cu(NO ₃) ₂	S	+	+	+	+	+	+	+	+	+
Copper II Sulfate	CuSO ₄	S	+	+	+	+	+	+	+	+	+
Cresole	C ₆ H ₄ CH ₃ OH	100%	0	0	+	+	+	+	-	+	+
Crotonaldehyde	CH ₃ C ₂ H ₂ CHO	100%	n	-	+	+	+	-	+	+	+
Cyclohexane	C ₆ H ₁₂	100%	+	-	+	+	+	+	-	+	+
Cyclohexanol	C ₆ H ₁₁ OH	100%	0	+/0	+	+	+	+	-	+	+
Cyclohexanone	C ₆ H ₁₀ O	100%	-	-	+	+	+	-	+/0	+	+
Cyclohexyl Alcohol=>	Cyclohexanol										
Cyclohexylamine	C ₆ H ₁₃ N	100%	0	0	+	n	n	-	n	n	+
Decahydronaphthalene	C ₁₀ H ₁₈	100%	-	+/0	n	0	0	0	-	+	+
Decalin=>	Decahydronaphthalene										
Diisononyl Phthalate	C ₂₆ H ₄₂ O ₄	100%	-	-	+	+	+	n	n	+	+
Diacetone Alcohol	C ₈ H ₁₂ O ₂	100%	-	-	+	+	+	-	+	+	+
Diamine Ethylene	(CH ₂ NH ₂) ₂	100%	n	0	0	+	+	-	+	+	+
Dibromoethane	C ₂ H ₄ Br ₂	100%	-	-	+	-	n	+	-	+	+
Dibutyl Ether	C ₄ H ₉ OC ₄ H ₉	100%	0	-	+	0	0	-	0	+	+
Dibutyl Phthalate	C ₁₆ H ₂₂ O ₄	100%	-	-	+	0	+	+	+/0	+	+
Dibutylamine	(C ₄ H ₉) ₂ NH	100%	n	n	+	+	+	-	-	+	+
Dichloro Acetic Acid	Cl ₂ CHCOOH	100%	-	+	+	+	+	-	+	+	+
Dichloro Benzene	C ₆ H ₄ Cl ₂	100%	-	-	+	0	0	+	-	+	+
Dichloro Butane	C ₄ H ₈ Cl ₂	100%	-	-	+	0	0	+	-	+	+
Dichloro Butene	C ₄ H ₆ Cl ₂	100%	-	-	+	0	0	0	-	+	+
Dextrose	C ₆ H ₁₂ O ₆	A.C.	+	+	+	+	+	+	+	+	+
Dichloroethane	C ₂ H ₄ Cl ₂	100%	-	-	+	-	0	+	-	+	+
Dichloroethylene	C ₂ H ₂ Cl ₂	100%	-	-	+	-	0	0	-	+	+
Dichloroisopropyl Ether	(C ₃ H ₅ Cl) ₂ O	100%	-	-	+	0	0	0	0	n	+
Dicyclohexylamine	C ₁₂ H ₂₃ N	100%	0	0	+	+	+	-	+	n	+

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+ = good resistance

o = limited resistance

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+(x%) = good resistance to x% concentration

* = With glued fittings please check the resistance of the glue

n = unknown resistance

=> = refer to . . .

A.C. = any concentration

S = saturated solution

Conc. = concentrated

D = weak solution

resp. to aqueous solutions

N.B. PTFE is resistant against most chemicals and solvents (excluding fluorine, metallic sodium and other alkali metals).

PVDF is resistant against most chemicals (excluding ketones, esters).

Chemical	Formula	CONC.	Acrylic	PVC	316 SS	PE	PP	Viton®	EPDM	PVDF	Teflon
Diethylamine	$(C_2H_5)_2NH$	100%	–	–	+	0	+	–	+	+	+
Diethylene Glycol	$C_4H_{10}O_3$	100%	+	+	+	+	+	+	+	+	+
Diethyleneglydolethyl Ether	$C_8H_{18}O_3$	100%	n	n	+	+	+	n	+/0	+	+
Diethyl Ether	$(C_2H_5)_2O$	100%	–	–	+	0	0	–	–	+	+
Diglycolic Acid	$C_4H_6O_5$	30%	+	+	+	+	+	+	n	+	+
Dihexyl Phthalate	$C_{20}H_{26}O_4$	100%	–	–	+	+	+	–	n	+	+
Diisobutylketone	$C_8H_{18}O$	100%	–	–	+	+	+	–	+	+	+
Diisopropylketone	$C_7H_{14}O$	100%	–	–	+	+	+	–	+	+	+
Dimethyl Carbonate	$(CH_3O)_2CO$	100%	n	n	+	–	+	+	–	+	+
Dimethyl Phthalate	$C_{10}H_{10}O_4$	100%	–	–	+	+	+	–	+/0	+	+
Dimethylformamide	$HCON(CH_3)_2$	100%	–	–	+	+	+	–	+	–	+
Dimethylhydrazine	$H_2NN(CH_3)_2$	100%	n	n	+	+	+	–	+	+	+
Diocetyl Phthalate	$C_{26}H_{54}(COOC_8H_{17})_2$	100%	–	–	+	+	+	–	+/0	+	+
Dioxane	$C_4H_8O_2$	100%	–	–	+	+	0	–	+/0	0	+
Dimethyl Formic Amide	$HCON(CH_3)_2$	100%	–	–	–	0	+	0	0	–	+
Disodium Hydrogen Phosphate	Na_2HPO_4	S	+	+	+	+	+	+	+	+	+
Disulfur Dichloride	S_2Cl_2	100%	+	+	+	+	+	+	–	+	+
DMF=>	Dimethylformamide										
Engine Oils		100%	n	+/0	+	+	+	+	–	+	+
Ethanol	C_2H_5OH	100%	–	+	+	+	+	–	+	+	+
Ethanol Amine	$HOC_2H_4NH_2$	100%	0	n	+	+	+	–	+/0	+	+
Ethyl Acetate	$CH_3COOC_2H_5$	100%	–	–	+	+	+35%	–	+/0	–	+
Ethyl Acrylate	$C_2H_3COOC_2H_5$	100%	–	–	+	+	+	–	+/0	0	+
Ethyl Benzene	$C_6H_5C_2H_5$	100%	–	–	+	0	0	0	–	+	+
Ethyl Benzoate	$C_6H_5COOC_2H_5$	100%	n	–	+	+	+	+	–	0	+
Ethyl Bromide	C_2H_5Br	100%	n	n	n	+	+	+	–	+	+
Ethyl Chloride	C_2H_5Cl	100%	–	–	+	–	–	+	–	+	+
Ethyl Chloroacetate	$ClCH_2COOC_2H_5$	100%	–	0	+	+	+	+	–	+	+
Ethyl Chlorocarbonate	$ClCO_2C_2H_5$	100%	n	n	n	n	n	+	–	n	+
Ethylacetylacetate	$C_8H_{10}O_3$	100%	n	–	+	+	+	+	–	+	+
Ethylacrylic Acid	C_4H_7COOH	100%	n	n	+	+	+	n	+/0	+	+
Ethylene Dibromide	$C_2H_4Br_2$	100%	–	–	+	–	0	+	–	+	+
Ethylene Dichloride	$C_2H_4Cl_2$	100%	–	–	+	–	0	+	–	+	+
Ethylene Glycol	$C_2H_4(OH)_2$	100%	+	+	+	+	+	+	+	+	+
Ethylenglycol Ethylether	$HOC_2H_4OC_2H_5$	100%	n	n	+	+	+	n	+/0	+	+
Ethylhexanol	$C_8H_{18}O$	100%	n	+/0	+	+	+	+	+	+	+
Fatty Acids	–	100%	0	0	+	+	+	+	0	+	+
Ferric Chloride	$FeCl_3$	S	+	+	–	+	+	+	+	+	+
Ferric Nitrate	$Fe(NO_3)_3$	S	+	+	+	+	+	+	+	+	+
Ferric Phosphate	$FePO_4$	S	+	+	+	+	+	+	+	+	+
Ferric Sulfate	$Fe_2(SO_4)_3$	S	+	+	0	+	+	+	+	+	+
Ferrous Chloride	$FeCl_2$	S	+	+	–	+	+	+	+	+	+
Ferrous Sulfate	$FeSO_4$	S	+	+	+	+	+	+	+	+	+
Fluoro Benzene	C_6H_5F	100%	–	–	+	0	+	0	–	+	+
Fluoroboric Acid	$HFBO_2$	35%	+	+	0	+	+	+	+	+	+
Formaldehyde	CH_2O	40%	+	+	+	+	+	–	+/0	+	+
Formamide	$HCONH_2$	100%	+	–	+	+	+	+	+	+	+
Formic Acid	$HCOOH$	S	–	+/0	+	+	+	–	–	+	+
Freon 12,13,22,114,115	–	100%	–	+	–	–	–	–	–	0	+
Furan	C_4H_4O	100%	–	–	+	+	+	–	n	–	+
Furane Aldehyde	$C_5H_6O_2$	100%	n	n	n	n	n	–	+/0	0	+
Furfuryl Alcohol	$OC_4H_3CH_2OH$	100%	–	–	+	+	+	n	+/0	0	+

Introduction

Chemical Resistance List

Resistance of liquid end materials against common chemicals at standard temperature 68°F (20°C). (May differ at other temperatures)

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+	= good resistance	A.C.	= any concentration	
o	= limited resistance	S	= saturated solution	
-	= no resistance	Conc.	= concentrated	
+(x%)	= good resistance to x% concentration	D	= weak solution	
*	= With glued fittings please check the resistance of the glue			

N.B. PTFE is resistant against most chemicals and solvents (excluding fluorine, metallic sodium and other alkali metals).

PVDF is resistant against most chemicals (excluding ketones, esters).

Chemical	Formula	CONC.	Acrylic	PVC	316 SS	PE	PP	Viton®	EPDM	PVDF	Teflon
Gallic Acid	$C_6H_2(OH)_3COOH$	5%	+	+	+	+	+	+	+/0	+	+
Gasoline	-	100%	-	-	+	+	+	+	-	+	+
Glucose	$C_6H_{12}O_6$	S	+	+	+	+	+	+	+	+	+
Glycerol Triacetate	$C_9H_5(CH_3COO)_3$	100%	n	n	+	+	+	-	+	+	+
Glycerol	$C_3H_5(OH)_3$	100%	+	+	+	+	+	+	+	+	+
Glycine	NH_2CH_2COOH	10%	+	+	+	+	+	+	+	+	+
Glycol	$C_2H_4(OH)_2$	100%	+	+	+	+	+	+	+	+	+
Glycolic Acid	$CH_2OH COOH$	70%	+	+(37%)	-	+	+	+	+	+	+
Heptane	C_7H_{16}	100%	+	+	+	+	+	+	-	+	+
Hexanal	$C_6H_{11}CHO$	100%	n	n	+	+	+	-	+/0	+	+
Hexane	C_6H_{14}	100%	+	+	+	+	+	+	-	+	+
Hexanol	$C_6H_{11}OH$	100%	-	-	+	+	+	n	+	+	+
Hexene	C_6H_{12}	100%	n	+	+	+	+	+	-	+	+
Hydrazine Hydrate	$N_2H_4 \cdot H_2O$	S	+	+	+	+	+	n	+	+	+
Hydrazine	N_2H_4	Conc.	0	0	+	+	+	+	+	+	+
Hydrobromic Acid	HBr	50%	+	+	-	+	+	-	+	+	+
Hydrochloric Acid	HCl	38%	+(32%)	+	-	+	+	-	+	+	+
Hydrofluoric Acid	HF	80%	-	+(40%)*	-	+(40%)	+(40%)	+	0	+	+
Hydrofluosilicic Acid	H_2SiF_6	30%	+	+	0	+	+	+	+	+	+
Hydrogen Cyanide	HCN	S	+	+	+	+	+	+	+	+	+
Hydrogen Peroxide	H_2O_2	90%	+(40%)	+(40%)	+	+	+(30%)	+(30%)	+(30%)	+	+
Hydroiodic Acid	HI	S	+	+	-	+	+	-	n	+	+
Hydroquinone	$C_6H_4(OH)_2$	S	+	+	+	+	+	+	-	+	+
Hydrogen Sulfide	H_2S	S	+	+	0	+	+	+	+	+	+
Hydroxylamine Sulfate	$(NH_2OH)_2 \cdot H_2SO_4$	10%	+	+	+	+	+	+	+	+	+
Hypochlorous Acid	HOCl	S	+	+	-	0	0	+	+/0	+	+
Iodine	I_2	S	0	-	-	0	+	+	+/0	+	+
Isobutyl Alcohol	$C_4H_9CH(OH)CH_3$	100%	-	+	+	+	+	+	+	+	+
Isopropyl Chloride	$CH_3CHClCH_3$	80%	-	-	+	0	0	+	-	+	+
Isopropyl Acetate	$CH_3COOCH(CH_3)_2$	100%	-	-	+	+	+	-	+/0	+	+
Isopropyl Alcohol	$(CH_3)_2CHOH$	100%	0	+/0	+	+	+	+	+	+	+
Isopropyl Benzene	$C_6H_5CH(CH_3)_2$	100%	-	-	+	0	0	+	-	+	+
Isopropyl Ether	$C_6H_{14}O$	100%	-	-	+	0	0	-	-	+	+
Isopropanol=>	Isopropyl Alcohol										
Lactic Acid	$C_3H_6O_3$	100%	-	+	+/0	+	+	+	+(10%)	+	+
Lead II Acetate	$Pb(CH_3COO)_2$	S	+	+	+	+	+	+	+	+	+
Lead Nitrate	$Pb(NO_3)_2$	50%	+	+	+	+	+	+	+	+	+
Lead Sulfate	$PbSO_4$	S	+	+	+	+	+	+	+	+	+
Lead Tetraethyl	$Pb(C_2H_5)_4$	100%	0	+	+	+	+	+	-	+	+
Lime Milk=>	Calcium Hydroxide										
*Lime Slurry	$Ca(OH)_2$	S	+	+	+	+	+	+	+	+	+
Lithium Bromide	LiBr	S	+	+	+	+	+	+	+	+	+
Lithium Chloride	LiCl	S	+	+	+	+	+	+	+	+	+
Magnesium Carbonate	$MgCO_3$	S	+	+	+	+	+	+	+	+	+
Magnesium Chloride	$MgCl_2$	S	+	+	0	+	+	+	+	+	+
*Magnesium Hydroxide	$Mg(OH)_2$	S	+	+	+	+	+	+	+	+	+
Magnesium Nitrate	$Mg(NO_3)_2$	S	+	+	+	+	+	+	+	+	+
Magnesium Sulfate	$MgSO_4$	S	+	+	+	+	+	+	+	+	+
Maleic Acid	$C_4H_4O_4$	S	+	+	+	+	+	+	+	+	+
Malic Acid	$C_4H_6O_5$	S	+	+	+	+	+	+	+	+	+
Manganese II Chloride	$MnCl_2$	S	+	+	+	+	+	+	+	+	+

*Requires flushing.

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PVDF is resistant against most chemicals (excluding ketones, esters).

Chemical	Formula	CONC.	Acrylic	PVC	316 SS	PE	PP	Viton®	EPDM	PVDF	Teflon
Manganese Sulfate	MnSO ₄	S	+	+	+	+	+	+	+	+	+
Mercuric Chloride	HgCl ₂	S	-	+	-	+	+	+	+	+	+
Mercury	Hg	100%	+	+	+	+	+	+	+	+	+
Mercury II Chloride	HgCl ₂	S	+	+	-	+	+	+	+	+	+
Mercury II Cyanide	Hg(CN) ₂	S	+	+	+	+	+	+	+	+	+
Mercury II Nitrate	Hg(NO ₃) ₂	S	+	+	+	+	+	+	+	+	+
Mesityl Oxide	C ₆ H ₁₀ O	100%	-	-	+	n	n	-	+/-0	n	+
Methacrylic Acid	C ₅ H ₈ COOH	100%	n	n	+	+	+	0	+/-0	+	+
Methanol	CH ₃ OH	100%	-	+	+	+	+	+	+	+	+
Methoxybutanol	CH ₃ O(CH ₂) ₄ OH	100%	-	-	+	+	+	+	0	+	+
Methyl Acetate	CH ₃ COOCH ₃	60%	-	-	+	+	+	-	+/-0	+	+
Methyl Acrylate	C ₂ H ₃ COOCH ₃	100%	-	-	+	+	+	-	+/-0	+	+
Methyl Benzoate	C ₆ H ₅ COOCH ₃	100%	-	-	+	+	+	+	-	0	+
Methyl Catechol	C ₆ H ₃ (OH) ₂ CH ₃	S	+	+	+	+	+	+	-	+	+
Methyl Cellulose		S	+	+	+	+	+	+	+	+	+
Methyl Chloroacetate	ClCH ₂ COOCH ₃	100%	-	0	+	+	+	0	-	+	+
Methyl Cyclopentane	C ₅ H ₉ CH ₃	100%	+	+	+	+	+	+	-	+	+
Methyl Dichloroacetate	Cl ₂ CHCOOCH ₃	100%	-	-	+	+	+	-	n	n	+
Methyl Ethyl Ketone (MEK)	CH ₃ COC ₂ H ₅	100%	-	-	+	+	+	-	+	-	+
Methyl Glycol	C ₂ H ₄ O ₂	100%	+	+	+	+	+	-	+/-0	+	+
Methyl Isobutyl Ketone	CH ₃ COC ₄ H ₉	100%	-	-	+	+	+	-	0	-	+
Methyl Isopropyl Ketone	CH ₃ COC ₃ H ₇	100%	-	-	+	+	+	-	+/-0	-	+
Methyl Methacrylate	C ₅ H ₈ COOCH ₃	100%	-	-	+	+	+	-	-	+	+
Methyl Oleate	C ₁₇ H ₃₃ COOCH ₃	100%	n	n	+	+	+	+	+/-0	+	+
Methyl Salicylate	HOC ₆ H ₄ COOCH ₃	100%	-	-	+	+	+	n	+/-0	+	+
Methylacetyl Acetate	C ₅ H ₈ O ₃	100%	-	-	+	+	+	-	+/-0	+	+
Methylamine	CH ₃ NH ₂	32%	+	0	+	+	+	-	+	0	+
Methylene Chloride	CH ₂ Cl ₂	100%	-	-	0	-	0	+	-	0	+
Milk	-	-	+	+	+	+	+	+	+	+	+
Morpholine	C ₄ H ₉ NO	100%	-	-	+	+	+	n	n	+	+
Naphthalene	C ₁₀ H ₈	S	-	-	+	-	+	+	-	+	+
Nickel II Acetate	(CH ₃ COO) ₂ Ni	S	+	+	+	+	+	-	+	+	+
Nickel Chloride	NiCl ₂	S	+	+	-	+	+	+	+	+	+
Nickel Nitrate	Ni(NO ₃) ₂	S	+	+	+	+	+	+	+	+	+
Nickel Sulfate	NiSO ₄	S	+	+	+	+	+	+	+	+	+
Nitric Acid	HNO ₃	99%	n	+(50%)	+(90%)	+(50%)	+(50%)	+(65%)	+(40%)	0	+
Nitro Benzene	C ₆ H ₅ NO ₂	100%	-	-	+	-	+	-	-	+	+
Nitro Methane	CH ₃ NO ₂	100%	-	-	+	+	+	-	+/-0	0	+
Nitro Propane	(CH ₃) ₂ CHNO ₂	100%	-	-	+	+	+	-	+/-0	n	+
Nitro Toluene	C ₆ H ₄ NO ₂ CH ₃	100%	-	-	+	+	+	0	-	+	+
Oxalic Acid	(COOH) ₂	S	+	+	+(10%)	+	+	+	+	+	+
Octane	C ₈ H ₁₈	100%	+	+	+	+	+	+	-	+	+
Octanol	C ₈ H ₁₇ OH	100%	-	-	+	+	+	+	+	+	+
Octyl Cresole	C ₁₅ H ₂₄ O	100%	-	-	+	+	+	0	n	+	+
Oleum	H ₂ SO ₄ +SO ₃	10%	n	-	+	-	-	+	-	-	+
Perchloric Acid	HClO ₄	70%	-	+(10%)	-	+	+(10%)	+	+/-0	+	+
Pentane	C ₅ H ₁₂	100%	+	+	+	+	+	+	-	+	+
Pentanol=>	Amyl Alcohol										
Peracetic Acid	C ₂ H ₄ O ₃	50%	-	0	+	0	0	+	0	+	+
Petroleum Ether	C _n H _{2n+2}	100%	+	+/-0	+	+	+	+	-	+	+
Phenol	C ₆ H ₅ OH	100%	-	-	+	+	+	+	-	+	+
Phenyl Ethyl Ether	C ₆ H ₅ OC ₂ H ₅	100%	-	-	+	+	+	-	-	n	+
Phenyl Hydrazine	C ₆ H ₅ NHNH ₂	100%	-	-	+	0	0	0	-	+	+
Phosphoric Acid	H ₃ PO ₄	85%	+(50%)	+	+	+	+	+	+	+	+

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resp. to aqueous solutions

N.B. PTFE is resistant against most chemicals and solvents (excluding fluorine, metallic sodium and other alkali metals).

PVDF is resistant against most chemicals (excluding ketones, esters).

Chemical	Formula	CONC.	Acrylic	PVC	316 SS	PE	PP	Viton®	EPDM	PVDF	Teflon
Phosphorous Oxychloride	POCl ₃	100%	-	-	n	+	+	+	+	+	+
Phosphorous Trichloride	PCl ₃	100%	-	-	+	+	+	0	0	+	+
Phthalic Acid	C ₆ H ₄ (COOH) ₂	S	+	+	+	+	+	+	+	+	+
Picric Acid	C ₆ H ₂ (NO ₃) ₃ OH	S	+	+	+	+	+	+	+	+	+
Piperidine	C ₅ H ₁₁ N	100%	-	-	+	n	n	-	-	n	+
Polyphosphate =>	Sodium Tripolyphosphate										
Potassium Acetate	CH ₃ COOK	S	+	+	+	+	+	+	+	+	+
Potassium Aluminum Sulfate	KAl(SO ₄) ₂	S	+	+	+	+	+	+	+	+	+
Potassium Bicarbonate	KHCO ₃	40%	+	+	+	+	+	+	+	+	+
Potassium Bifluoride	KHF ₂	S	n	+	+	+	+	+	+	+	+
Potassium Bisulfate	KHSO ₄	5%	+	+	+	+	+	+	+	+	+
Potassium Bitartrate	KC ₄ H ₂ O ₆	S	+	+	+	+	+	+	+	+	+
Potassium Borate	KBO ₂	S	+	+	+	+	+	+	+	+	+
Potassium Bromate	KBrO ₃	S	+	+	+	+	+	+	+	+	+
Potassium Bromide	KBr	S	+	+	+(10%)	+	+	+	+	+	+
Potassium Carbonate	K ₂ CO ₃	S	+	+	+	+	+	+	+	+	+
Potassium Chlorate	KClO ₃	S	+	+	+	+	+	+	+	+	+
Potassium Chloride	KCl	S	+	+	-	+	+	+	+	+	+
Potassium Chromate	K ₂ CrO ₄	10%	+	+	+	+	+	+	+	+	+
Potassium Chrome Sulfate	KCr(SO ₄) ₂	S	+	+	+	+	+	+	+	+	+
Potassium Cyanate	KOCN	S	+	+	+	+	+	+	+	+	+
Potassium Cyanide	KCN	S	+	+	+(5%)	+	+	+	+	+	+
Potassium Cyanoferrate II	K ₂ Fe(CN) ₆	S	+	+	+	+	+	+	+	+	+
Potassium Cyanoferrate III	K ₃ Fe(CN) ₆	S	+	+	+	+	+	+	+	+	+
Potassium Dichromate	K ₂ Cr ₂ O ₇	S	+	+	+(25%)	+	+	+	+	+	+
Potassium Ferricyanide	K ₃ Fe(CN) ₆	S	+	+	+	+	+	+	+	+	+
Potassium Ferrocyanide	K ₄ Fe(CN) ₆	S	+	+	+	+	+	+	+	+	+
Potassium Fluoride	KF	S	+	+	+	+	+	+	+	+	+
Potassium Hydroxide	KOH	50%	n	+	+	+	+	-	+	+	+
Potassium Iodide	KI	S	+	+	+	+	+	+	+	+	+
Potassium Nitrate	KNO ₃	S	+	+	+	+	+	+	+	+	+
Potassium Perchlorate	KClO ₄	S	+	+	n	+	+	+	+	+	+
Potassium Permanganate	KMnO ₄	S	+	+	+	+	+	+	+	+	+
Potassium Persulfate	K ₂ SO ₈	S	+	+	+	+	+	+	+	+	+
Potassium Phosphate	KH ₂ PO ₄	S	+	+	+	+	+	+	+	+	+
Potassium Sulfate	K ₂ SO ₄	S	+	+	+	+	+	+	+	+	+
Potassium Sulfite	K ₂ SO ₃	S	+	+	+	+	+	+	+	+	+
Propanol	C ₂ H ₅ OH	100%	-	+	+	+	+	+	+	+	+
Propionic Acid	C ₂ H ₅ COOH	100%	0	+	+	+	+	+	+	+	+
Propionitrile	CH ₃ CH ₂ CN	100%	n	n	+	+	+	+	-	+	+
Propyl Acetate	CH ₃ COOC ₃ H ₇	100%	-	-	+	+	+	-	+/0	+	+
Propylene Glycol	CH ₃ CHOHCH ₂ OH	100%	+	+	+	+	+	+	+	+	+
Pyridine	C ₅ H ₅ N	100%	-	-	+	+	0	-	-	-	+
Pyrrole	C ₄ H ₄ N	100%	n	n	+	+	+	-	-	n	+
Salicylic Acid	HOC ₆ H ₄ COOH	S	+	+	+	+	+	+	+	+	+
Sea Water	-	-	+	+	0	+	+	+	+	+	+
Silic Acid	SiO ₂ +H ₂ O	S	+	+	+	+	+	+	+	+	+
Silver Bromide	AgBr	S	+	+	+/0	+	+	+	+	+	+
Silver Chloride	AgCl	S	+	+	-	+	+	+	+	+	+
Silver Nitrate	AgNO ₃	S	+	+	+	+	+	+	-	+	+
Soda Ash=>	Sodium Carbonate										
Sodium Acetate	CH ₃ COONa	S	+	+	+	+	+	+	+	+	+
Sodium Benzoate	C ₆ H ₅ COONa	S	+	+	+	+	+	+	+	+	+
Sodium Bicarbonate	NaHCO ₃	S	+	+	+	+	+	+	+	+	+
Sodium Bisulfate	NaHSO ₄	S	+	+	+	+	+	+	+	+	+
Sodium Bisulfite	NaHSO ₃	S	+	+	+	+	+	+	+	+	+

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Chemical	Formula	CONC.	Acrylic	PVC	316 SS	PE	PP	Viton®	EPDM	PVDF	Teflon
Sodium Borate	NaBO ₂	S	+	+	+	+	+	+	+	+	+
Sodium Bromate	NaBrO ₃	S	+	+	+	+	+	+	+	+	+
Sodium Bromide	NaBr	S	+	+	+	+	+	+	+	+	+
Sodium Carbonate	Na ₂ CO ₃	S	+	+	+/0	+	+	+	+	+	+
Sodium Chlorate	NaClO ₃	S	+	+	+	+	+	+	+	+	+
Sodium Chloride	NaCl	S	+	+	-	+	+	+	+	+	+
Sodium Chlorite	NaClO ₂	24%	+	+	+(10%)	+	+	+	+	+	+
Sodium Chromate	Na ₂ CrO ₄	S	+	+	+	+	+	+	+	+	+
Sodium Cyanide	NaCN	S	+	+	+	+	+	+	+	+	+
Sodium Dichromate	NaCr ₂ O ₇	S	+	+	+	+	+	+	+	+	+
Sodium Dithionite	Na ₂ S ₂ O ₄	S	+	+10%	+	+10%	+10%	n	n	+	+
Sodium Fluoride	NaF	S	+	+	+(10%)	+	+	+	+	+	+
Sodium Hydrogen Sulfate	NaHSO ₄	S	+	+	+	+	+	+	+	+	+
Sodium Hydrogen Sulfide	NaHSO ₃	S	+	+	+	+	+	+	+	+	+
Sodium Hydroxide	NaOH	50%	+	+	+	+	+	-	+	+	+
Sodium Hypochlorite	NaOCl	12-15%	+	+	-	+	0	0	+	+	+
Sodium Iodide	NaI	S	+	+	+	+	+	+	+	+	+
Sodium Metaphosphate	(NaPO ₃) _n	S	+	+	+	+	+	+	+	+	+
Sodium Nitrate	NaNO ₃	S	+	+	+	+	+	+	+	+	+
Sodium Nitrite	NaNO ₂	S	+	+	+	+	+	+	+	+	+
Sodium Oxalate	Na ₂ C ₂ O ₄	S	+	+	+	+	+	+	+	+	+
Sodium Perborate	NaBO ₂ +*H ₂ O ₂	S	+	+/0	+	+	+	+	+	+	+
Sodium Perchlorate	NaClO ₄	S	+	+	+(10%)	+	+	+	+	+	+
Sodium Peroxide	Na ₂ O ₂	S	+	+	+	-	+	+	+	+	+
Sodium Persulfate	Na ₂ S ₂ O ₈	S	n	+	+	+	+	+	+	+	+
Sodium Pyrosulfite	Na ₂ S ₂ O ₅	S	+	+	+	+	+	n	n	+	+
Sodium Salicylate	C ₆ H ₄ (OH)COONa	S	+	+/0	+	+	+	+	+	+	+
Sodium Silicate	Na ₂ SiO ₃	S	+	+	+	+	+	+	+	+	+
Sodium Sulfate	Na ₂ SO ₄	S	+	+	+	+	+	+	+	+	+
Sodium Sulfide	Na ₂ S	S	+	+	+	+	+	+	+	+	+
Sodium Sulfite	Na ₂ SO ₃	S	+	+	+(50%)	+	+	+	+	+	+
Sodium Tetraborate	Na ₂ B ₄ O ₇ *10H ₂ O	S	+	+	+	+	+	+	+	+	+
Sodium Thiosulfate	Na ₂ S ₂ O ₃	S	+	+	+(25%)	+	+	+	+	+	+
Sodium Tripolyphosphate	Na ₅ P ₃ O ₁₀	S	+	+	+	+	+	+/0	+	+	+
Stannic Chloride	SnCl ₄	100%	+	+	-	+	+	+	+	+	+
Stannous Chloride	SnCl ₂	S	+	+	-	+	+	+	+	+	+
Starch	(C ₆ H ₁₀ O ₅) _n	S	+	+	+	+	+	+	+	+	+
Stearic Acid	C ₁₇ H ₃₅ COOH	100%	+	+	+	+	+	+	-	+	+
Styrene	C ₆ H ₅ CHCH ₂	100%	-	-	+	0	0	0	-	+	+
Succinic Acid	C ₄ H ₆ O ₄	S	+	+	+	+	+	+	+	+	+
Sugar Syrup		S	+	+	+	+	+	+	+	+	+
Sulfuric Acid	H ₂ SO ₄	98%	+30%	+50%	+20%	+80%	+85%	+	+	+	+
Sulfurous Acid	H ₂ SO ₃	A.C.	+	+	+(10%)	+	+	+	+	+	+
Sulfuryl Chloride	SO ₂ Cl ₂	100%	-	-	n	-	-	+	0	n	+
Tannic Acid	C ₇₆ H ₅₂ O ₄₆	50%	+	+	+	+	+	+	+	+	+
Tartaric Acid	C ₄ H ₆ O ₆	S	+(50%)	+	+	+	+	+	+/0	+	+
Tetrachloroethane	C ₂ H ₂ Cl ₄	100%	-	-	+	0	0	0	-	+	+
Tetrachloroethene	C ₂ Cl ₄	100%	-	-	+	0	0	0	-	+	+
Tetrahydrofuran	C ₄ H ₈ O	100%	-	-	+	0	0	-	-	-	+
Tetrahydro Naphthalene	C ₁₀ H ₈	100%	-	-	+	0	-	+	-	+	+
Thionyl Chloride	SOCl ₂	100%	-	-	n	-	-	+	+	-	+
Thiophene	C ₄ H ₄ S	100%	n	-	+	0	0	-	-	n	+
Tin II Chloride	SnCl ₂	S	+	0	-	+	+	+	+	+	+
Tin II Sulfate	SnSO ₄	S	+	+	+	+	+	+	+	+	+
Tin IV Chloride	SnCl ₄	S	n	+	-	+	+	+	+	+	+

Introduction

Chemical Resistance List

Resistance of liquid end materials against common chemicals **at standard temperature 68°F (20°C)**. (May differ at other temperatures)

s	= saturated aqueous solution	n	= unknown resistance] resp. to aqueous solutions
+/o	= conditional resistance	=>	= refer to . . .	
+	= good resistance	A.C.	= any concentration	
o	= limited resistance	S	= saturated solution	
-	= no resistance	Conc.	= concentrated	
+(x%)	= good resistance to x% concentration	D	= weak solution	
*	= With glued fittings, please check the resistance of the glue.			

N.B. PTFE is resistant against most chemicals and solvents (excluding fluorine, metallic sodium and other alkali metals).

PVDF is resistant against most chemicals (excluding ketones, esters).

Chemical	Formula	CONC.	Acrylic	PVC	316 SS	PE	PP	Viton®	EPDM	PVDF	Teflon
Titanium Tetrachloride	TiCl ₄	100%	n	n	n	n	n	0	-	+	+
Toluene	C ₆ H ₅ CH ₃	100%	-	-	+	0	0	0	-	+	+
Toluene Diisocyanate	C ₇ H ₈ (NCO) ₂	100%	n	n	+	+	+	-	+/-	n	+
Tributyl Phosphate	(C ₄ H ₉) ₃ PO ₄	100%	n	-	+	+	+	-	+	+	+
Trichloroacetaldehyde Hydr.	CCl ₃ CH(OH) ₂	S	-	-	+	+	0	0	0	-	+
Trichloroethane	CCl ₃ CH ₃	100%	-	-	+	0	0	+	-	+	+
Trichloroethene	C ₂ HCl ₃	100%	-	-	+/-	0	0	0	-	+	+
Trichloroethylene	C ₂ HCl ₃	100%	-	-	+	0	0	0	-	+	+
Trichloroacetic Acid	CCl ₃ COOH	50%	-	+	-	+	+	-	0	+	+
Tricresyl Phosphate	(C ₆ H ₄) ₃ PO	90%	n	-	+	+	+	0	+	n	+
Triethanolamine	N(C ₂ H ₄ OH) ₃	100%	-	0	+	+	+	-	+/-	+	+
Triethyl Phosphate	(C ₂ H ₅) ₃ PO ₄	100%	n	-	+	+	+	0	+	+	+
Trisodium Phosphate	Na ₃ PO ₄	S	+	+	+	+	+	+	+	+	+
Urea	CO(NH ₂) ₂	S	+	+/-	+	+	+	+	+	+	+
Vinyl Acetate	CH ₂ CHOOCCCH ₃	100%	-	-	+	0	-	0	-	+	+
Xylene	C ₆ H ₄ (CH ₃) ₂	100%	-	-	+	0	-	0	-	0	+
Zinc Acetate	(CH ₃ COO) ₂ Zn	S	+	+	+	+	+	-	+	+	+
Zinc Chloride	ZnCl ₂	S	+	+	-	+	+	+	+	+	+
Zinc Sulfate	ZnSO ₄	S	+	+	+	+	+	+	+	+	+

Introduction

ProMinent® Warranty

1) **WARRANTY, REMEDY, DISCLAIMER:** The warranties set out in this clause shall be conditional upon fulfillment of the Purchaser's contractual obligations, including all terms of payment. For sales of completed pumps and controllers, the warranty shall be conditional upon the Purchaser completing and returning the attached Warranty Validation Card. Seller warrants that the Drive Units and DULCOMETER Controllers will be of good workmanship and material for two (2) years from the date of purchase by owner of new equipment from an authorized distributor of manufacturer, but no longer than two and one-half (2-1/2) years from the date of shipment by manufacturer. All Dulcotest sensors are warranted for (6) months from the date of shipment by manufacturer. For sales of liquid ends, Bello Zon, Bono Zon, pump accessories, standard engineered products, custom designed items and items not manufactured by ProMinent, Seller warrants that the products will be of good workmanship and material for one (1) year from the date the goods are shipped by Seller. If purchaser claims that the goods are defective, he must permit Seller's personnel at Seller's option to inspect the goods on Purchaser's property. Purchaser shall not return the goods to Seller unless Purchaser obtains prior written approval of such from Seller. If, after inspection, Seller determines that the goods are defective, Seller will repair or replace goods at Seller's option and at Seller's cost. THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS, IMPLIED AND STATUTORY INCLUDING THE WARRANTIES OF FITNESS FOR PURPOSE AND MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. The warranty provided for herein shall not apply to any goods that become defective for the following reason:

- (a) unsuitable or unreasonable use
- (b) faulty assembly, installation or servicing by the Purchaser or any third party
- (c) faulty or careless handling

2) **DISCLAIMER OF TORT LIABILITY:** purchaser specifically understands and agrees that seller shall not be liable in tort, whether based on negligence, strict liability or any other theory of tort liability, for any action or failure to act in respect to the manufacture, preparation for sale, or delivery of the goods. It is the parties' intent and the intent of this paragraph to absolve and protect seller from any and all tort liability.

3) **EXCLUSIVE REMEDY:** Purchaser specifically understands and agrees that purchaser's sole and exclusive remedy for breach of warranty, tortious conduct or any other cause of action against seller shall be the remedy provided in paragraph two (2) above.

4) **EXCLUSION OF CONSEQUENTIAL DAMAGES:** purchaser specifically understands and agrees that under no circumstances will seller be liable to purchaser for economic, special incidental or consequential damages or losses of any kind whatsoever, including but not limited to, loss of anticipated profits and any other loss caused by reason of the non-operation of the goods. This exclusion is applicable to claims for breach of warranty, tortious conduct or any other cause of action against seller.

5) **ALL TERMS AND CONDITIONS OF SALE CONTAINED IN SELLER'S ACKNOWLEDGMENT/OFFER TO SELL APPLY AND ARE IN NO WAY ALTERED BY THIS WARRANTY VALIDATION CARD.**

ProMinent Fluid Controls

RIDC Park West
136 Industry Drive
Pittsburgh, PA 15275-1014
(412)787-2484

Solenoid-Driven Metering Pump Overview

Concept^{PLUS}

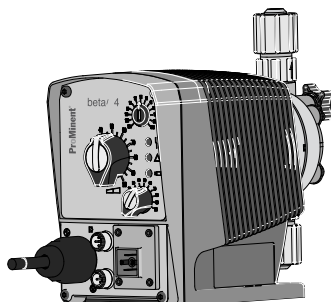


Ideal for basic chemical feed applications

[\(see page 29 for complete details\)](#)

- Solenoid driven diaphragm pump
- Capacities: 0.20 gph (0.74 lph) to 3.9 gph (14.9 lph)
- Maximum pressure: 232 psi
- Turndown: 40:1
- Manual, external contact pulse 1:1 operation
- Stroke length: 0-100% (30% minimum recommend for most repeatable accuracy)
- Stroke Frequency: 5 distinct settings (0, 25%, 50%, 75% and 100%)
- Liquid ends: NP, PP and PVT
- Adjustable bleed valve with fine adjustment for continuous degassing
- NSF/ANSI 61 approved

Beta[®]

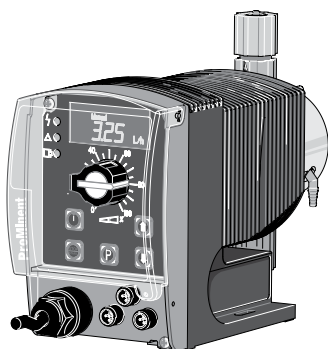


Ideal for basic chemical feed applications

[\(see page 33 for complete details\)](#)

- Solenoid driven diaphragm pump
- Capacities: 0.19 gph (0.74 lph) to 8.4 gph (32 lph)
- Maximum pressure: 363 psi
- Turndown: 100:1
- External contact input for pulse control with a range of 1:64 to 64:1
- Stroke length: 0-100% (30% minimum recommend for most repeatable accuracy)
- Stroke Frequency: 10 distinct settings @ 10% increments
- Liquid ends: NP, PP, PVT, TT and SST
- Auto degassing and high viscosity (HV) available
- NSF/ANSI 61 approved

gamma/ L



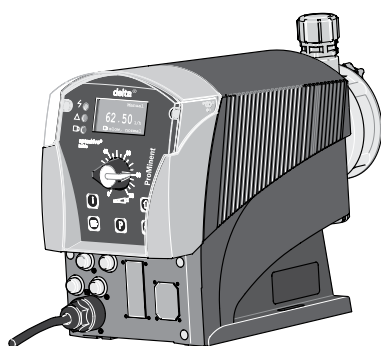
Ideal for applications requiring automation, large turndown and/or feed verification

[\(see page 40 for complete details\)](#)

- Solenoid driven diaphragm pump
- Capacities: 0.19 gph (0.74 lph) to 8.4 gph (32 lph)
- Maximum pressure: 232 psi
- Turndown: 1800:1
- Manual, external contact pulse with multiplier/divider and analog operation
- Displays gph (lph) and totalized flow (gallons or liters)
- Stroke length: 0-100% (30% minimum recommend for most repeatable accuracy)
- Stroke Frequency: digital from 1 to 180 spm
- Liquid ends: NP, PP, PVT, TT and SST
- Auto degassing and high viscosity (HV) available
- Flow verification
- 14-day programmable timer
- Profibus interface
- NSF/ANSI 61 approved

Solenoid-Driven Metering Pump Overview

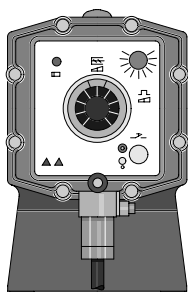
delta®



Ideal for applications requiring metering pump accuracy with minimal pulsation ([see page 50 for complete details](#))

- Solenoid driven diaphragm pump driven by optoDrive® and protected by OptoGuard®
- Capacities: 2.99 gph (11.3 lph) to 19.8 gph (75 lph)
- Maximum pressure: 363 psi
- Turndown: 36,000:1
- Manual, external contact pulse with multiplier/divider and analog operation
- Displays gph (lph) and totalized flow (gallons or liters)
- Stroke length: 0-100% (30% minimum recommend for most repeatable accuracy)
- Stroke Frequency: digital from 1 to 200 spm
- Adjustable suction and discharge stroke duration to minimize pulsation
- Liquid ends: PVT and SST
- Flow verification
- 14-day programmable timer
- Profibus and CAN-bus interface
- Integrated hydraulic monitoring identifies air lock and pressure changes
- NSF/ANSI 61 approved

EXtronic®

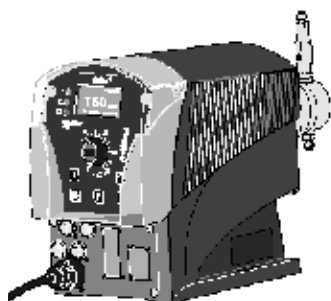


Ideal for explosion proof applications

([see page 59 for complete details](#))

- Solenoid driven diaphragm pump designed for ex-proof applications
- Capacities: 0.05 gph (0.19 lph) to 15.9 gph (60 lph)
- Class 1, Div 1, Groups B, C and D
- Maximum pressure: 363 psi
- Turndown: 1,200:1
- Manual, external contact pulse and analog operation
- Stroke length: 0-100% (30% minimum recommend for most repeatable accuracy)
- Stroke Frequency: 0 to 120 spm via potentiometer
- Liquid ends: NP, PP, TT and SST
- Auto degassing and high viscosity (HV) available

mikro delta



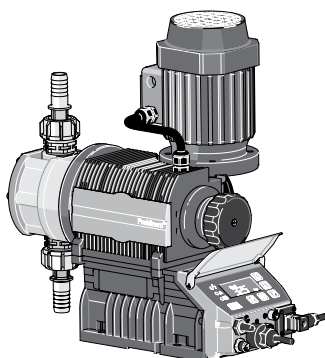
Ideal for low volume, high pressure applications

([see page 50 for complete details](#))

- Capacities: 0.04 gph (150 ml/h) to 0.4 gph (1500 ml/h)
- Maximum pressure: 870 psi (60 bar)
- Liquid ends: PTFE and SS
- Continuous or pulsing operation
- External activation by standard signal 0/4-20 mA (optional)
- Interface for PROFIBUS® or CANopen (optional)

Motor-Driven Metering Pump Overview

Sigma/1



Economical mid-range applications

[\(see page 69 for complete details\)](#)

- Mechanical diaphragm pump
- Includes 115/230 V motor
- Maximum pressure: 174 psi
- Stroke length: 0-100% (30% minimum recommend for most repeatable accuracy)
- Liquid ends: PVT and SST

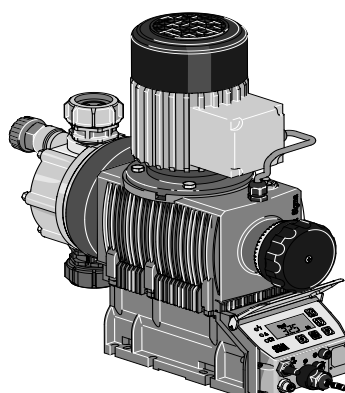
Basic Version

- Capacities: 5.2 gph (20 lph) to 38 gph (144 lph)
- Maximum pressure: 174 psi
- Turndown: 10:1

Control Version

- Microprocessor driven
- Capacities: 5.2 gph (20 lph) to 31.7 gph (120 lph)
- Turndown: up to 2000:1
- Stroke Frequency varies by model: digital from 1 to 90, 170, 200 spm
- Manual, external contact pulse with multiplier/divider and analog operation
- Displays gph (lph) and totalized flow (gallons or liters)
- Flow verification
- 14-day programmable timer
- Profibus interface

Sigma/2



Economical mid-range applications

[\(see page 79 for complete details\)](#)

- Mechanical diaphragm pump
- Maximum pressure: 174 psi
- Stroke length: 0-100% (30% minimum recommend for most repeatable accuracy)
- Liquid ends: PVT and SST

Basic Version

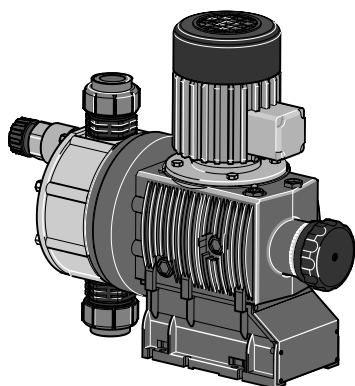
- Capacities: 15.9 gph (60 lph) to 111 gph (420 lph)
- Standard 56-C flange. Motor not included
- Turndown: 100:1 with variable speed motor
- Stroke Frequency: Only with SCR or VFD

Control Version

- Capacities: 15.9 gph (60 lph) to 92.5 gph (350 lph)
- Includes 115/230 V motor
- Turndown: up to 2000:1
- Stroke Frequency varies by model: digital from 1 to 90, 160, 200 spm
- Manual, external contact pulse with multiplier/divider and analog operation
- Displays gph (lph) and totalized flow (gallons or liters)
- Flow verification
- 14-day programmable timer
- Profibus interface

Motor-Driven Metering Pump Overview

Sigma/3



Ideal for applications requiring automation, large turndown and/or Flow verification

[\(see page 97 for complete details\)](#)

- Capacities: 46 gph (174 lph) to 264 gph (1000 lph)
- Mechanical diaphragm pump
- Maximum pressure: 174 psi
- Stroke length: 0-100% (30% minimum recommend for most repeatable accuracy)
- Liquid ends: PVT and SST

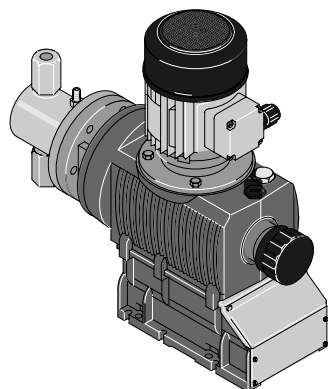
Basic Version

- Standard 56-C flange. Motor not included
- Capacities: 46 gph (174 lph) to 264 gph (1000 lph)
- Turndown: 100:1 with variable speed motor
- Stroke Frequency: Only with SCR or VFD

Control Version

- Includes 115/230 V motor
- Capacities: 46 gph (174 lph) to 264 gph (1000 lph)
- Turndown: up to 2000:1
- Stroke Frequency varies by model: digital from 1 to 90, 160, 200 spm
- Manual, external contact pulse with multiplier/divider and analog operation
- Displays gph (lph) and totalized flow (gallons or liters)
- Flow verification
- 14-day programmable timer
- Profibus interface

Sigma/2 HK



Ideal for high pressure applications requiring significant turndown

[\(see page 89 for complete details\)](#)

- Motor driven packed plunger pump
- Maximum pressure: 4600 psi
- Stroke length: 0-100% (30% minimum recommend for most repeatable accuracy)
- Liquid ends: SST

Basic Version

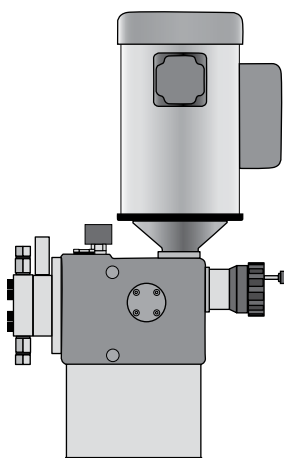
- Capacities: 0.6 gph (2.3 lph) to 20.1 gph (76 lph)
- Standard 56-C flange. Motor not included.
- Turndown: 100:1 with variable speed motor
- Stroke Frequency: Only with SCR or VFD

Control Version

- Capacities: 0.6 gph (2.3 lph) to 17.3 gph (65.4 lph)
- Includes 115/230 V motor
- Turndown: up to 2000:1
- Stroke Frequency varies by model: digital from 1 to 90, 160, 200 spm
- Manual, external contact pulse with multiplier/divider and analog operation
- Displays gph (lph) and totalized flow (gallons or liters)
- Flow verification
- 14-day programmable timer
- Profibus interface

Motor-Driven Metering Pump Overview

ProMus

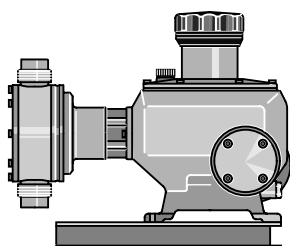


High pressure chemical process metering

[\(see page 105 for complete details\)](#)

- Hydraulic diaphragm pump
- Capacities: 0.61 gph (2.3 lph) to 101.5 gph (384.2 lph)
- Maximum pressure: 3500 psi
- Built in accordance to API 675
- Turndown: 100:1 with variable speed motor
- 115/60/1 motor included
- Stroke length: 0-100% (30% minimum recommend for most repeatable accuracy)
- Stroke Frequency: Only with SCR or VFD
- Liquid ends: PVT, SST, Hastelloy C and Alloy 20

Makro TZb



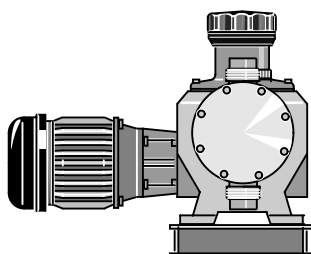
Ideal for high volume and high pressure applications

[\(see page 111 for complete details\)](#)

- Available with add-on and multi-head designs
- Capacities: 2.6 gph (10 lph) to 529 gph (2004 lph)
- Turndown: 100:1 with variable speed motor
- Motor not included
- Stroke length: 0-100% (30% minimum recommend for most repeatable accuracy)
- Stroke Frequency: Only with SCR or VFD
- Liquid ends: PP, PVC, TT, SST

TZMb

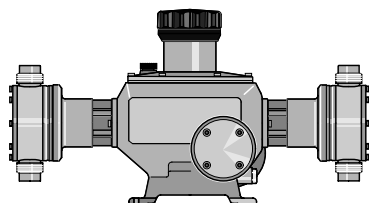
- Mechanical diaphragm pump
- Models: 82 gph (312 lph) to 529 gph (2004 lph)
- Maximum pressure: 174 psi



TZHb

(Call factory for more information)

- Hydraulic diaphragm pump
- Models: 112 gph (424 lph) to 318 gph (1204 lph)
- Maximum pressure: 232 psi



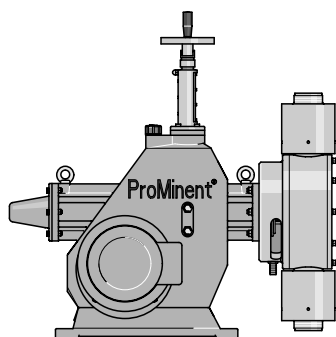
TZKb

(Call factory for more information)

- Mechanical packed plunger pump
- Models: 2.6 gph (10 lph) to 301 gph (1141 lph)
- Maximum pressure: 4627 psi
- SST only

Motor-Driven Metering Pump Overview

Makro/ 5



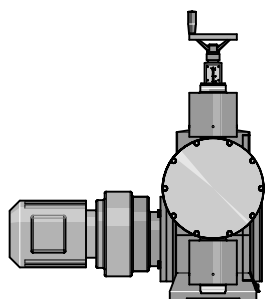
Ideal for high volume/ high pressure applications

(Call factory for more information)

- Capacities: 11 gph (44 lph) to 1618 gph (6108 lph)
- Available with add-on and multi-head designs
- Turndown: 100:1 with variable speed motor
- Motor included
- Stroke length: 0-100% (30% minimum recommend for most repeatable accuracy)
- Stroke Frequency: Only with SCR or VFD
- Liquid ends: PP, PVC, TT, SST

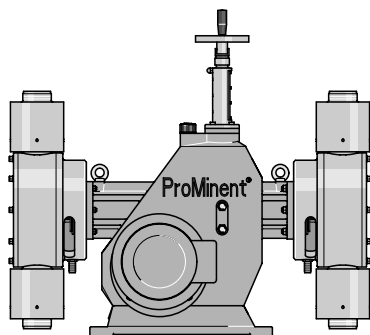
M5Ma

- Mechanical diaphragm pump
- Models: 482 gph (1812 lph) to 1076 gph (4064 lph)
- Maximum pressure: 58 psi



M5Ha

- Hydraulic diaphragm pump
- Models: 142 gph (537 lph) to 1618 gph (6108 lph)
- Maximum pressure: 362 psi

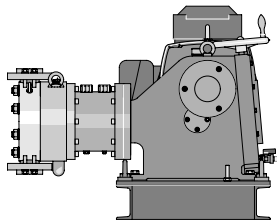


M5Ka

- Mechanical packed plunger pump
- Models: 11 gph (44 lph) to 1593 gph (6014 lph)
- Maximum pressure: 4640psi
- SST only

Motor-Driven Metering Pump Overview

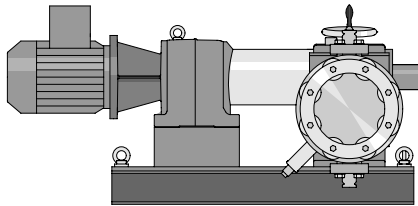
ORLITA®



Ideal for high volume applications
(Call factory for more information)

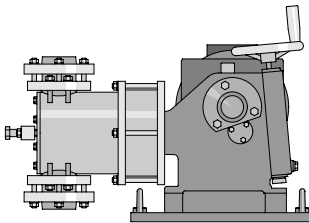
MfS

- Hydraulic diaphragm pump
- Capacities: 0.5 gph (2 l/h) to 7500 gph (28,400 l/h)
- Maximum pressure: 10,000 psi (700 bar)
- Built in accordance to API 675



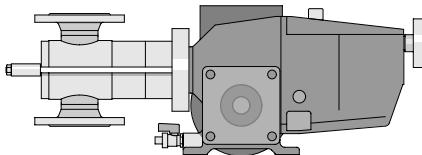
MhS

- Hydraulic diaphragm pump
- Capacities: 0.26 gph (1 l/h) to 200 gph (757 l/h)
- Maximum pressure: 44,000 psi (3000 bar)
- Stainless steel diaphragm
- Built in accordance to API 675



PS

- Plunger metering pump
- Capacities: 0.26 gph (1 l/h) to 9,800 gph (2,600 l/h)
- Maximum pressure: 5,800 psi (400 bar)
- Stainless steel only
- Built in accordance to API 675



DR

- Valveless rotary piston pump
- Capacities: 0.26 gph (1 l/h) to 1,100 gph (4,000 l/h)
- Maximum pressure: 5800 psi (400 bar)
- Stainless steel only

Motor-Driven Metering Pump Overview

DulcoFlex

Ideal for high volume applications

[\(see page 115 for complete details\)](#)

DFB



- Peristaltic pump
- Maximum flow: 385 gph
- Maximum pressure: 116 psi
- Incorporates both hose and tubing technology

DFC



- Peristaltic pump
- Maximum flow: 130 gpm
- Maximum pressure: 116 psi
- Incorporates hose technology

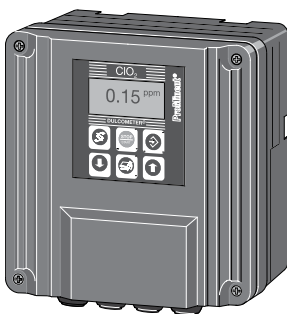
DFD



- Peristaltic pump
- Maximum flow: 225 gpm
- Maximum pressure: 232 psi
- Suction lifts up to 29 feet

Analytical Instrumentation Overview

D1C

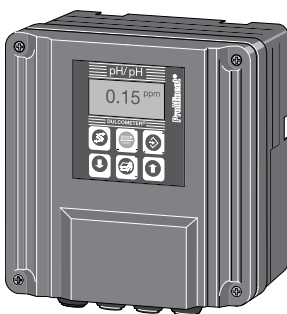


Microprocessor based single process variable analyzer

[\(see page 185 for complete details\)](#)

- Controls or measures one of 14 different variables
- Menu driven calibration with limit and control settings
- Sensor diagnostics alarms upon sensor failure
- Programmable access code
- Non-volatile memory
- Two current analog signal outputs
- Feed forward for compound loop control
- pH and temperature correcting variables
- Proportional or PID control
- Wall or panel mount available

D2C



Microprocessor based dual process variable analyzer

[\(see page 185 for complete details\)](#)

- Controls or measures two variables in one of the following combinations:
Free and Total chlorine, pH/chlorine, pH/pH, ClO₂/pH, pH/ORP
- Menu driven calibration with limit and control settings
- Sensor diagnostics alarms upon sensor failure
- Programmable access code
- Non-volatile memory
- Two current analog signal outputs
- pH and temperature correcting variables
- Proportional or PID control
- Wall or panel mount available

Dulcometer Compact



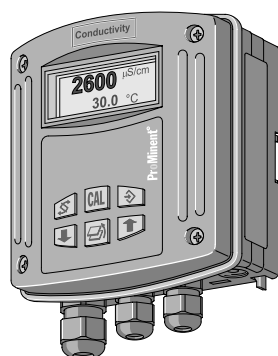
Microprocessor based single process variable analyzer

[\(see page 204 for complete details\)](#)

- Measured variables pH and ORP (can be changed on the controller)
- Operation independent of the operating language (use of abbreviations, such as CAL, PARAM, CONFIG, ERROR)
- Illuminated display
- 3 LED display operating state (relay 1 / 2 active, Error)
- Sensor monitoring for pH
- P and PID control characteristics
- Selectable control direction (raise or lower measured value)
- Pulse frequency relay for control of metering pump
- Power relay can be configured as an alarm, limit value or pulse width modulated control output for metering pumps (connection function or switch on operating voltage)
- Analog output 4-20 mA can be configured as a writer output or control output
- Digital input to switch off the control or to process a sample water limit contact by remote control
- Temperature sensor input (Pt 1000) for temperature compensation of the pH and chlorine value

Analytical Instrumentation Overview

DMT



Single process variable transmitter

[\(see page 205 for complete details\)](#)

- Measures pH, ORP, chlorine, conductivity and temperature
- Menu driven calibration
- Automatic buffer recognition (pH)
- Two-wire technology
- 12-40 VDC, loop powered
- One current analog signal output
- NEMA 4X wall mounted unit

DDC



Microprocessor based multi-variable disinfection analyzer

[\(see page 207 for complete details\)](#)

- Controls or measures up to 5 different variables
Free chlorine, Total chlorine, pH, ORP, temperature
- Display of combined chlorine
- Menu driven calibration with limit and control settings
- Integrated videographic recorder
- LAN interface
- OPC server
- 64MB SD card
- CAN bus chlorine sensors
- Intelligent analyzer with dosing time restrictions
- 5 contact inputs

Cooling Tower and Boiler Controllers

Wide range of controllers for water treatment applications

[\(see page 230 for complete details\)](#)



- Controls pH, ORP and Conductivity
- NEMA 4X enclosure
- Web Browser accessible
- Trackster 3 software
- Analog inputs and outputs
- Relay output and digital input options
- MODBUS
- Ethernet
- Control multiple Towers and Boilers
- Aquatrac flow switch
- CSA, CE, and UL rated

Solenoid-driven Metering Pumps

QUICK REFERENCE

“Solenoid-Driven Metering Pumps” T.O.C.

III

CATALOG SECTION TABS

product overview	<ul style="list-style-type: none"> ■ Introduction ■ pump selection by capacity ■ chemical resistance list ■ Solenoid & Motor Pump Overview ■ Analytical Instrumentation Overview 	product overview
solenoid-driven metering pumps	<ul style="list-style-type: none"> ■ concept PLUS ■ beta ■ gamma/L ■ delta ■ extronic ■ mikro delta 	solenoid-driven metering pumps
motor-driven metering pumps	<ul style="list-style-type: none"> ■ Sigma/ 1 ■ Sigma/ 2 ■ Sigma/ 3 ■ ProMus ■ Makro ■ Orlita ■ DulcoFlex 	motor-driven metering pumps
pump spare parts & accessories	<ul style="list-style-type: none"> ■ solenoid pump spare parts ■ motor pump spare parts ■ pump accessories 	pump spare parts & accessories
DULCOMETER® instrumentation	<ul style="list-style-type: none"> ■ D1C ■ D2C ■ Dulcometer® Compact ■ DMT ■ DDC ■ MicroFlex ■ SlimFlex ■ MultiFLEX ■ AEGIS 	DULCOMETER® instrumentation
DULCOTEST® sensors	<ul style="list-style-type: none"> ■ amperometric sensors ■ potentiometric sensors ■ potentiostatic sensors ■ conductometric sensors ■ accessories 	DULCOTEST® sensors
polymer blending systems	<ul style="list-style-type: none"> ■ ProMix™-M (A Controls) ■ ProMix™-M (B Controls) ■ ProMix™-S ■ ProMix™-C 	polymer blending systems

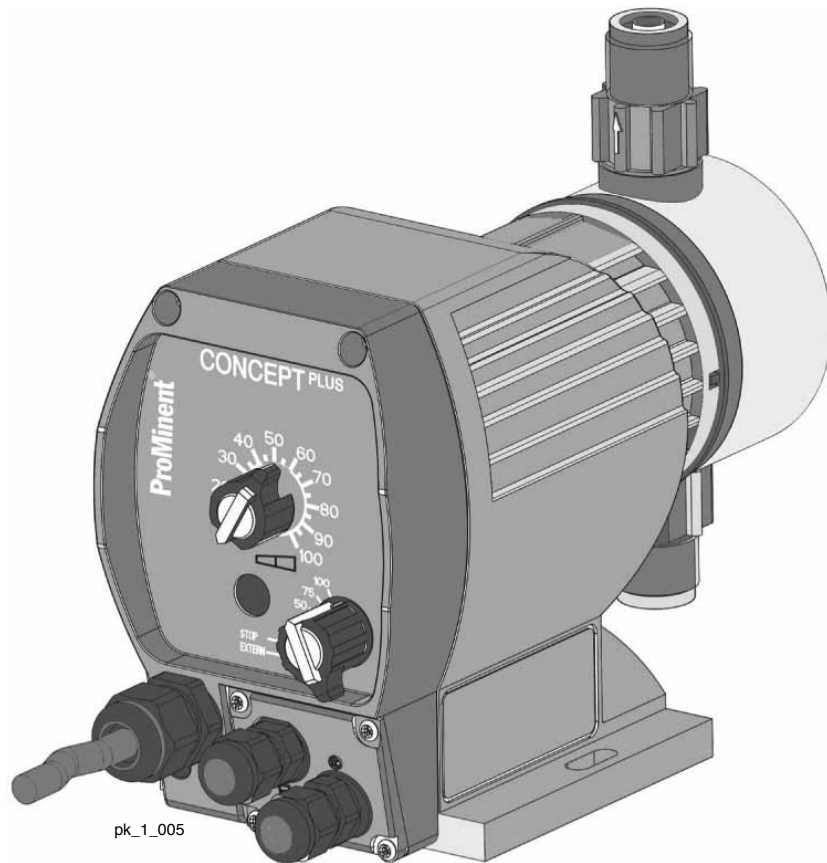
ProMinent® Concept^{PLUS} Solenoid Diaphragm Metering Pumps

Overview: Concept^{PLUS}

Ideal for basic chemical feed applications

(see [page 121](#) for spare parts)

- Capacity range of 0.20 to 3.94 gph (0.74 to 14.9 l/h) at pressures up to 232 psi (16 bar)
- Continuous stroke length adjustment from 0-100% (recommended 30-100%)
- Fixed frequency settings @ 0, 25, 50, 75, and 100%
- Low cost opens up opportunities in the most basic applications
- NP, PP, and PVT liquid ends
- Integral bleed valve simplifies priming and prevents “loss of prime”
- Common applications: Cooling towers, chlorination, and metal finishing
- NSF/ANSI 61 approved



pk_1_005

ProMinent® Concept^{PLUS} Solenoid Diaphragm Metering Pumps

Capacity Data

Pump Version	Capacity at Maximum Back Pressure					Max. Stroke Rate spm	Pre-Primed Suction Lift ft (m)		Tubing Connectors O.D. x I.D. (in)	Shipping Weight (approx.) lbs (kg)	
	psig	(bar)	U.S. GPH	(l/h)	mL/stroke						
1000	145	(10)	0.20	(0.9)	0.07	180	20	(6)	1/4" x 3/16"	3.97	(1.8)
1601	232	(16)	0.26	(1.0)	0.10	240	20	(6)	1/4" x 3/16"	3.97	(1.8)
1002	145	(10)	0.53	(2.0)	0.18	180	16	(5)	1/4" x 3/16"	3.97	(1.8)
1003	145	(10)	0.70	(2.7)	0.19	240	16	(5)	1/4" x 3/16"	3.97	(1.8)
0704	101	(7)	1.00	(3.7)	0.36	180	13	(4)	1/4" x 3/16"	3.97	(1.8)
0705	101	(7)	1.40	(5.2)	0.38	240	13	(4)	1/4" x 3/16"	3.97	(1.8)
0308	43	(3)	2.25	(9.0)	0.79	180	20	(6)	3/8" x 1/4"	3.97	(1.8)
0215	21	(2)	3.94	(14.1)	1.40	180	5	(1.5)	3/8" x 1/4"	3.97	(1.8)

(Note: Above capacities and suction lift refer to pumps tested on water at 115 VAC, 60 Hz, and an ambient temperature of 70°F (20°C). Higher specific gravity fluids will reduce suction lift. Capacities will be slightly reduced from published ratings if pumps are skid mounted).

External pulse contact retrofit available as an option (P/N 1022000).

Materials In Contact With Chemicals

	Pump head	Valves	O-rings	Balls
PPE	Polypropylene	Polypropylene	EPDM	ceramic
PPB	Polypropylene	Polypropylene	Viton®	ceramic
NPE	Acrylic	PVC	EPDM	ceramic
NPB	Acrylic	PVC	Viton®	ceramic
PVT	PVDF	PVDF	PTFE	ceramic

Pump diaphragm with PTFE-coating.

Note: Viton® is a registered trademark of DuPont Dow Elastomers.

ProMinent® Concept^{PLUS} Solenoid Diaphragm Metering Pumps

Identcode Ordering System

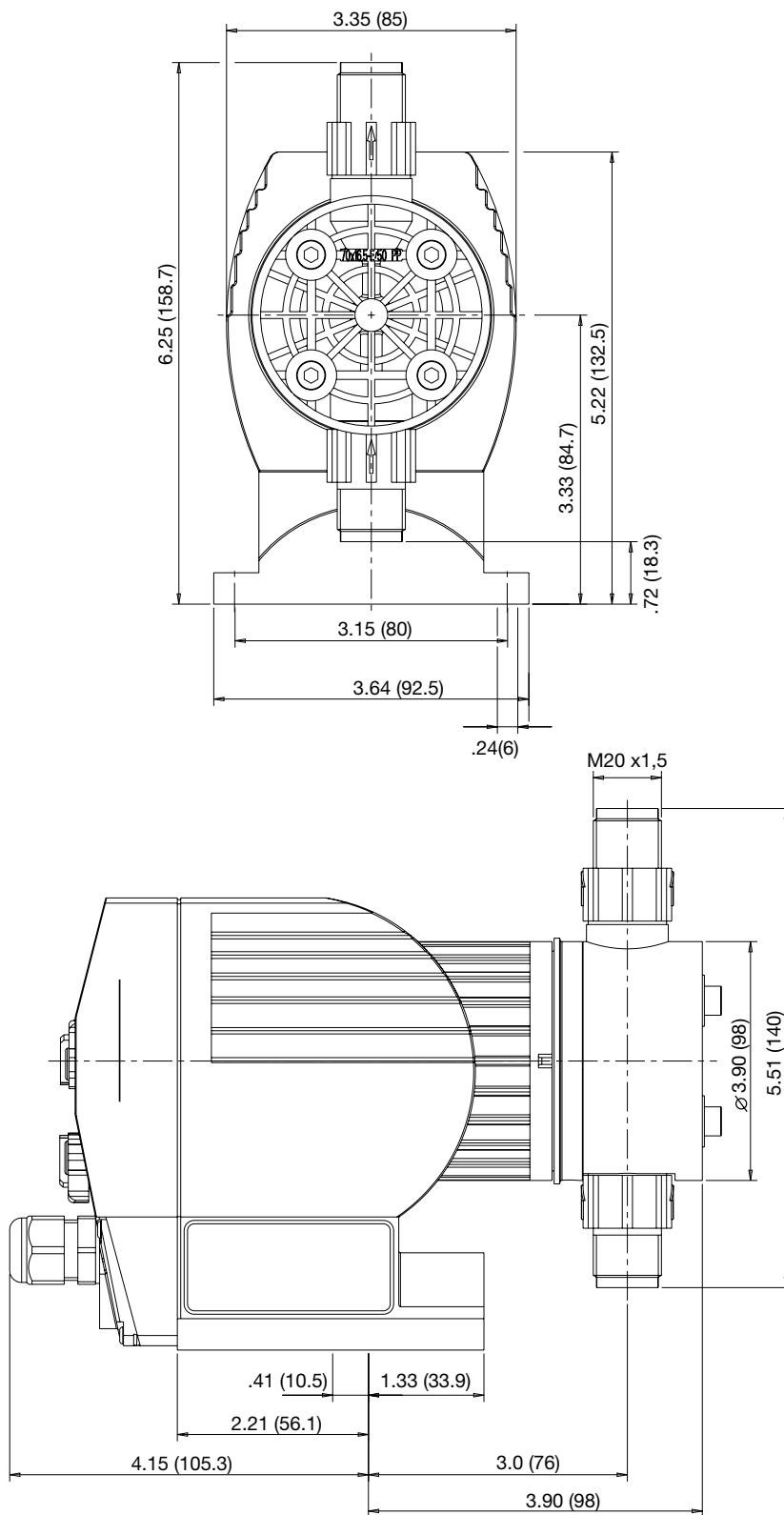
CNPa	Concept PLUS											
	Version	Capacity					Version	Capacity				
	1000	0.16 gph (0.6 l/h), 145 psi (10 bar)					0704	1.03 gph (3.9 l/h), 102 psi (7 bar)				
	1601	0.26 gph (1.0 l/h), 232 psi (16 bar)					0308	2.10 gph (8.0 l/h), 43.5 psi (3 bar)				
	1002	0.53 gph (2.0 l/h), 145 psi (10 bar)					0215	3.17 gph (13.5 l/h), 29 psi (1.5 bar)				
	1003	0.70 gph (2.7 l/h), 145 psi (10 bar)										
	Liquid end material:											
	PP	Polypropylene										
	NP	Acrylic/PVC										
	PV	PVDF										
	O-rings:											
	E	EPDM/PTFE coated, only for PP and NP self-degassing										
	B	FPM-B/PTFE coated, only on PP and NP self-degassing										
	T	PTFE/PTFE coated										
	Liquid end version:											
	0	Non-bleed version, no valve spring										
	1	Non-bleed version, with valve spring										
	2	With deaerator, no valve spring (except 0704 models)										
	3	With deaerator, with valve spring										
	Connection:											
	0	Standard according to technical data										
	B	Special connection 3/8" x 1/4"										
Logo:												
0	With ProMinent® logo											
Power Supply:												
A	1 ph 230 V 50/60 Hz (Euro plug)											
D	1 ph 115 V 50/60 Hz (US plug)											
U	1 ph 230 V 50/60 Hz (US plug) (consult factory for pricing)											
Control Option:												
0	Standard (w/o external control)											
B	Pulse control											
Accessories:												
1	With accessories (foot valve, injection valve, tubing)											
Approval:												
04	CSA											
CNPa	1000	PP	B	2	0	0	A	B	1	04		

ProMinent® Concept^{PLUS} Solenoid Diaphragm Metering Pumps

Dimensional Drawings

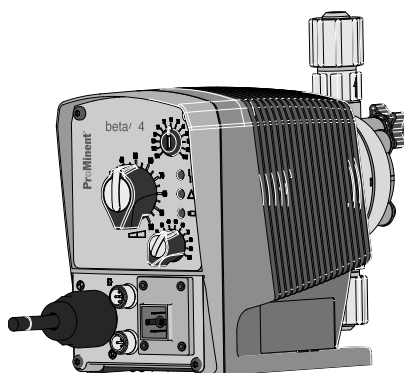
Dimensions in inches (mm).

Ranges given, actual dimension dependent on liquid end material.



ProMinent® Beta® b Solenoid Diaphragm Metering Pumps

Overview: Beta® b



Ideal for basic chemical feed applications

(see [page 121](#) for spare parts and [page 134](#) for control cables)

- Capacity range 8.4 gph (32 l/h) max, 363 psi (25 bar) max
- External contact input for pulse control with a range of 1:64-64:1
- Continuous stroke length adjustment from 0-100% (recommended 30-100%)
- Supplied in PP, Acrylic/PVC, PTFE, PVDF, SS
- Patented coarse/fine deaeration for PP, and Acrylic/PVC
- Auto-degassing liquid end in Acrylic/PVC
- HV liquid end for highly viscous media (suitable for viscosities to 3000 cPs)
- 10-setting stroke frequency adjustment from 10-100%
- External control via voltage-free contacts
- Connector for two-stage level switch
- 12-24 V DC, 24 V AC low voltage version
- LED's for operation status
- NSF/ANSI 61 approved

ProMinent® solenoid-driven metering pumps consist of two main components: the pump drive unit and the liquid end. The Beta series offers two drive (solenoid) sizes: Beta/4 (BT4b) and Beta/5 (BT5b). Operating principles and options are identical, and both units offer maximum backpressure up to 363 psig (17.5 bar). Capacity range for the Beta/4 is 0.19 to 5 gph (0.74 to 19 l/h); Beta/5 is 0.80 to 8.4 gph (2.9 to 32 l/h).

Feed rate is determined by stroke length and stroking rate: stroke length can be varied from 0 to 100% with an adjustment ratio of 10:1. The stroke length is set manually by the adjustment knob on the front of the pump.

Stroke rate can be adjusted in 10% increments between 10 and 100% via the multifunction switch. This switch is also used to select voltage-free On/Off external pulse contact, pump stop, or test (for priming).

Specifications

Drive Unit

The pump housing is constructed of fiberglass-reinforced PPE plastic to protect against corrosion, dust, and water.

The solenoid drive unit houses a short-stroke solenoid with a maximum stroke length of 0.05" (1.25 mm). It is equipped with a noise suppressing mechanism for quiet operation and the armature is the only moving part.

Operating on pulse action, each pulse generates a magnetic field in the solenoid coil. This magnetic field moves the armature, which in turn moves the diaphragm. The diaphragm pushes into the dosing head and cavity forces chemical out of the discharge valve. When the magnetic field is de-energized, a spring returns the armature and diaphragm to their original position. This return movement draws chemical into the dosing head cavity through the suction valve.

In the event of a diaphragm rupture, the liquid end has a weep hole on the bottom of the backplate to direct chemical out of the pump and away from the solenoid. An optional diaphragm failure detector can be used to stop the pump and indicate a fault.

The stroke-length adjusting mechanism is connected directly to the solenoid. Adjustment results in an accurate self-locking stroke-length setting.

Diaphragm

The diaphragm is constructed of fabric-reinforced EPDM elastomer with a plastic core and PTFE-facing. It is chemically resistant to virtually all process fluids and can be used over a wide temperature range. The Beta pump is designed with a convex diaphragm. The curved shape provides precise metering and alleviates stress placed on the diaphragm by reducing liquid end dead volume.

ProMinent® Beta® b Solenoid Diaphragm Metering Pumps

Specifications (Cont.)

The Liquid End

The Beta metering pump liquid ends are available in five material versions: Polypropylene (PP), Kynar (PVDF), Acrylic/PVC (NP), PTFE (TT), and 316 Stainless steel (SS).

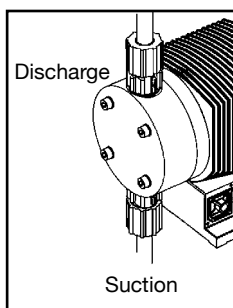
Some liquid ends are interchangeable between the BT4a and BT5a.

Options include a manual bleed valve with needle valve for easy priming, and continuous bleed of fluids that tend to off-gas (available with versions PP, PVT, and NP liquid ends).

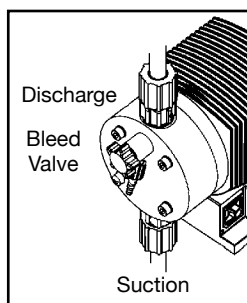
Automatic degassing liquid ends are available for PP and NP versions (except 1000 and 0232). This style liquid end discharges from the center and degasses from the top to prevent air build-up in the chamber.

High viscosity PVDF liquid ends are available for pump versions 1005, 0708, 0413, 0220, 1008, 0713, and 0420. Their metering capacity is 10-20% less than standard pump versions and recommended viscosity is up to 3000 cPs. The HV liquid ends are not self-priming; flooded suction is recommended.

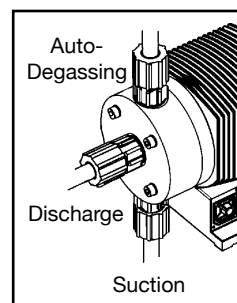
Suction and discharge ports are equipped with double-ball check valves for superior repeatability.



Liquid end without bleed valve



Liquid end with bleed valve



Auto-degassing liquid end

Power Supply

The Beta metering pumps accept a universal 100-230 volt power supply (+/- 10%), single phase, 50/60 Hz, with a 1.15 service factor. Performance is identical whether operated on 50 Hz or 60 Hz power. The power cord is detachable.

Fault Indicators

Three LED lights indicate operational status. A green light flashes during normal operation; a yellow light warns of low chemical; and a red light indicates lack of chemical or an operational error.

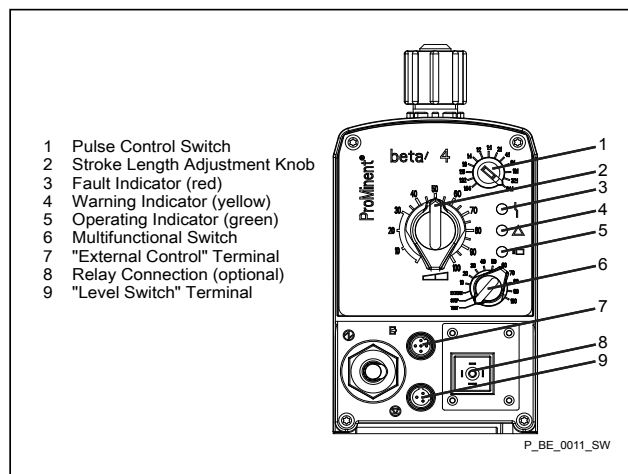
Relay Outputs

Fault annunciating relay

For low tank level (level switch), processor fault, and fuse/power supply failure.

Pacing relay

A contact closure is issued with every pump stroke (contact duration 150 ms). This allows a second ProMinent metering pump to be paced synchronously, or to totalize flow with an external stroke counter.



ProMinent® Beta® b Solenoid Diaphragm Metering Pumps

Specifications (Cont.)

Maximum stroke length:	0.05" (1.25 mm)		
Materials of construction			
Housing:	Fiberglass reinforced PPE		
Diaphragm:	PTFE-faced EPDM with plastic core		
Liquid end options:	Polypropylene, PVDF, Acrylic/PVC, PTFE, 316 SS		
Enclosure rating:	IP 65		
Motor insulation class:	F		
Power supply:	100-230 VAC, 1 phase, 50/60 Hz, +/- 10%; 12-24 VDC or 24VDC (+/- 10%)		
Check valves:	Double ball		
Metering repeatability:	When used according to operating instructions, ±2% under constant conditions and at minimum 30% stroke length		
Power cord:	6 ft (2 m)		
Relay cable (optional):	6 ft (2 m)		
Relay load			
Fault relay only (options 1 & 3):	Contact load: 250 VAC, 2 A, 50/60 Hz Operating life: > 200,000 switch functions		
Fault and pacing relay (options 4 & 5):	Contact load: 250 VAC/DC, 2 A, 50/60 Hz Operating life: > 200,000 switch functions Residual impedance in ON-position ($R_{DS(on)}$): < 8 Ω Residual current in OFF-position: < 1 μA Maximum current: < 100 mA Maximum voltage: 24 VDC Switch functions: 15x10 ⁹ Contact closure: 100 μs (for pacing relay)		
Ambient temperature range:	14°F (-10°C) to 113°F (45°C)		
Max. fluid operating temperatures:	Material	Constant	Short Term
	Acrylic/PVC	113°F (45°C)	140°F (60°C)
	Polypropylene	122°F (50°C)	212°F (100°C)
	PTFE	122°F (50°C)	248°F (120°C)
	316 SS	122°F (50°C)	248°F (120°C)
	PVDF	149°F (65°C)	212°F (100°C)
Average power drain at maximum stroking rate (Watts) / current drain at pump stroke (Amps)			
BT4a:	17W / 0.7 A or 15 A (peak current for approx. 1 μs)		
BT5a:	22W / 1.0 A or 15 A (peak current for approx. 1 μs)		
Service factor:	1.15		
Warranty:	2 years on drive, 1 year on liquid end (extended warranties available)		
Industry standards:	UL recognized, CE available for U.S.A. and Canada, NSF/ANSI 61		
Valve threads:	Metric thread for PP, NP, PVT, and TT versions. 1/2" MNPT connections are available in all materials.		
Standard Production Test:	All pumps are tested for capacity at maximum pressure prior to shipment.		
Max. solids size in fluid:	Pumps with 1/4" valves: 15μ - Pumps with 1/2" valves: 50μ		
Controlling contact (pulse):	With voltage free contact, or with semiconductor sink logic control (NPN), not source logic (PNP). With a residual voltage of <700 mV, the contact load is approximately 0.5 mA at +5 VDC. (Note: Semiconductor contacts that require >700 mV across a closed contact should not be used.) Pump ignores contacts exceeding maximum input rate.		
Necessary contact duration:	20 μs		
Recommended Viscosity:	max. 200 cPs for standard liquid end max. 500 cPs for valve with springs max. 50 cPs for auto-degassing metering pumps max. 3000 cPs for high viscosity		

ProMinent® Beta® b Solenoid Diaphragm Metering Pumps

Capacity Data

Pump Version	Capacity at Max Backpressure				Capacity at 1/2 Max Backpressure				Pre-Primed Suction Lift		Max. Stroke Rate spm	Tubing Connectors ² O.D. x I.D. inches	Shipping Weight (higher weights are for SS)			
	psig (bar)	U.S. GPH	(l/h)	ml/ stroke	psig (bar)	U.S. GPH	(l/h)	mL/ stroke	ft	(m)			lbs	(kg)		
BT4b																
1000	145	(10)	0.19	(0.74)	0.07	73	(5)	0.21	(0.82)	0.08	19.6	(6)	180	1/4 x 3/16	6.4-7.9	(2.9-3.6)
2001 ³	290	(20)	0.29	(1.1)	0.10	145	(10)	0.37	(1.40)	0.13	19.6	(6)	180	1/4 x 3/16	6.4-7.9	(2.9-3.6)
1601	232	(16)	0.29	(1.1)	0.10	116	(8)	0.37	(1.40)	0.13	19.6	(6)	180	1/4 x 3/16	6.4-7.9	(2.9-3.6)
2002 ³	290	(20)	0.58	(2.2)	0.19	145	(10)	0.66	(2.5)	0.24	19.6	(6)	180	1/4 x 3/16	6.4-7.9	(2.9-3.6)
1602	232	(16)	0.58	(2.2)	0.19	116	(8)	0.66	(2.5)	0.24	19.6	(6)	180	1/4 x 3/16	6.4-7.9	(2.9-3.6)
1604	232	(16)	1.0	(3.8)	0.33	116	(8)	1.13	(4.3)	0.40	19.6	(6)	180	1/4 x 3/16	6.8-8.6	(3.1-3.9)
0708	101	(7)	1.9	(7.1)	0.66	50.5	(3.5)	2.22	(8.4)	0.78	19.6	(6)	180	1/2 x 3/8	6.8-8.6	(3.1-3.9)
0413	58	(4)	3.2	(12.3)	1.14	29	(2)	3.75	(14.2)	1.31	9.8	(3)	180	1/2 x 3/8	6.8-8.6	(3.1-3.9)
0220	29	(2)	5.0	(19.0)	1.76	14.5	(1)	5.52	(20.9)	1.94	6.5	(2)	180	1/2 x 3/8	7.3-9.7	(3.3-4.4)
BT5b																
2504 ³	363	(25)	0.77	(2.9)	0.27	181	(12.5)	0.97	(3.7)	0.34	19.6	(6)	180	8 x 4 mm	9.9-11.7	(4.5-5.3)
1008	145	(10)	1.8	(6.8)	0.63	73	(5)	2.19	(8.3)	0.76	19.6	(6)	180	1/2 x 3/8	9.9-11.7	(4.5-5.3)
0713	101	(7)	2.9	(11.0)	1.02	50.5	(3.5)	3.46	(13.1)	1.21	13.1	(4)	180	1/2 x 3/8	9.9-11.7	(4.5-5.3)
0420	58	(4)	4.5	(17.1)	1.58	29	(2)	5.04	(19.1)	1.77	9.8	(3)	180	1/2 x 3/8	10.4-12.8	(4.7-5.8)
0232 ¹	29	(2)	8.4	(32.0)	2.96	14.5	(1)	9.56	(36.2)	3.35	6.5	(2)	180	1/2 x 3/8	11.2-14.6	(5.1-6.6)

With auto-degassing liquid ends

BT4b																
1601	232	(16)	0.16	(0.59)	0.06	116	(8)	0.21	(0.80)	0.07	5.9	(1.8)	180	1/4 x 3/16	6.4	(2.9)
1602	232	(16)	0.37	(1.4)	0.13	116	(8)	0.46	(1.74)	0.174	6.9	(2.1)	180	1/4 x 3/16	6.4	(2.9)
1604	232	(16)	0.71	(2.7)	0.25	116	(8)	.95	(3.6)	0.33	8.8	(2.7)	180	1/4 x 3/16	6.8	(3.1)
0708	101	(7)	1.74	(6.6)	0.61	50.8	(3.5)	1.98	(7.5)	0.69	6.5	(2.0)	180	1/2 x 3/8	6.8	(3.1)
0413	58	(4)	2.8	(10.8)	1.00	29	(2)	3.3	(12.6)	1.17	6.5	(2.0)	180	1/2 x 3/8	6.8	(3.1)
0220	29	(2)	4.3	(16.2)	1.50	14.5	(1)	4.7	(18.0)	1.67	6.5	(2.0)	180	1/2 x 3/8	7.3	(3.3)
BT5b																
1008	145	(10)	1.66	(6.3)	0.58	73	(5)	1.98	(7.5)	0.69	9.8	(3)	180	1/2 x 3/8	9.9	(4.5)
0713	101	(7)	2.77	(10.5)	0.97	51	(3.5)	3.2	(12.3)	1.14	8.2	(2.5)	180	1/2 x 3/8	9.9	(4.5)
0420	58	(4)	4.12	(15.6)	1.44	29	(2)	4.6	(17.4)	1.61	8.2	(2.5)	180	1/2 x 3/8	10.4	(4.7)

(Note: Above capacities and suction lift refer to pumps tested on water at 115 VAC, 60 Hz, and an ambient temperature of 70°F (20°C). Higher specific gravity fluids will reduce suction lift. Capacities will be slightly reduced from published ratings if pumps are skid mounted).

Higher viscosity fluids will reduce capacity. Liquid ends for highly viscous media have 10-20% less metering capacity and are not self-priming.

Standard connectors are 1/2" MNPT or 5/8" hose barb. Positive suction is recommended.

¹ Not available with bleed valve.

² SS versions use 1/4" female threads except models 0220, 0420, and 0232 which use 3/8" female threads.

³ Only available in SS and Acrylic liquid ends.

Universal control cable necessary for external Beta control. (see [page 134](#))

Materials In Contact With Chemicals

	Pump Head	Suction/Pressure Connector	O-rings	Balls
PPE ⁵	Polypropylene	Polypropylene	EPDM	ceramic
PPB ⁵	Polypropylene	Polypropylene	Viton®	ceramic
NPE ^{4,5}	Acrylic	PVC	EPDM	ceramic
NPB ^{4,5}	Acrylic	PVC	Viton®	ceramic
PVT ⁴	PVDF	PVDF	PTFE	ceramic
TTT	PTFE with carbon	PTFE with carbon	PTFE	ceramic
SST	316 stainless steel	316 stainless steel	PTFE	ceramic
NPT ⁴	Acrylic	PVDF	PTFE	ceramic
PPT	Polypropylene	Polypropylene	PTFE	ceramic

⁴ NSF/ANSI 61 approved

⁵ Only available in self de-gassing models

Note: Viton® is a registered trademark of DuPont Dow Elastomers.

ProMinent® Beta® b Solenoid Diaphragm Metering Pumps

Identcode Ordering System

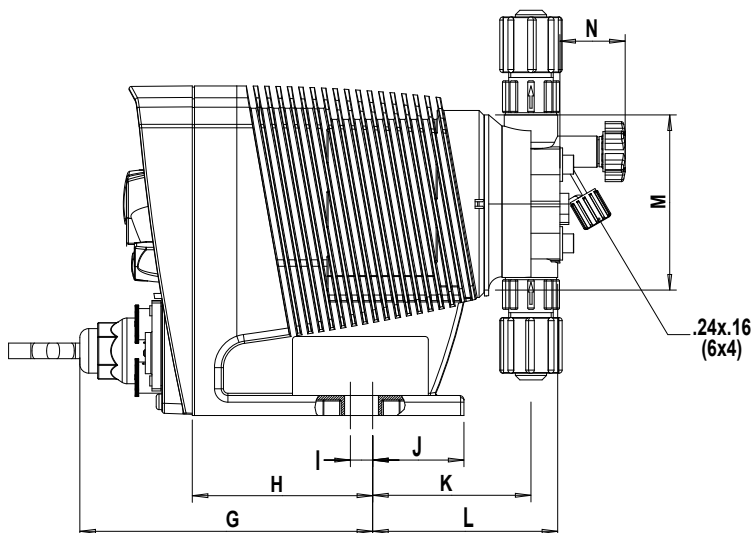
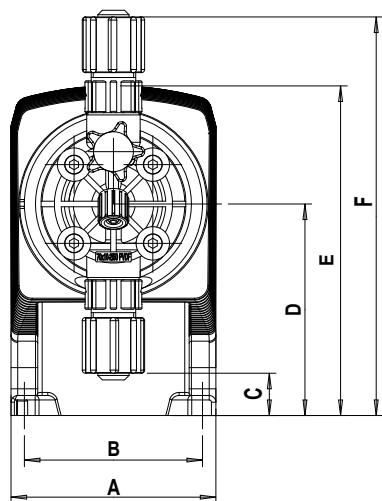
BT4b	Beta 4b												Beta 5b					
Version	Capacity							Version	Capacity					Version	Capacity			
1000	0.20 gph (0.74 l/h), 145 psi (10 bar)							1604	0.95 gph (3.60 l/h), 232 psi (16 bar)					2504	0.77 gph (2.90 l/h), 362 psi (25 bar)			
2001	0.25 gph (0.96 l/h), 290 psi, (20 bar)							0708	1.88 gph (7.10 l/h), 101 psi (7 bar)					1008	1.80 gph (6.80 l/h), 145 psi (10 bar)			
1601	0.29 gph (1.10 l/h), 253 psi (17.5 bar)							0413	3.25 gph (12.30 l/h), 58 psi (4 bar)					0713	2.91 gph (11.00 l/h), 101 psi (7 bar)			
2002	0.45 gph (1.70 l/h), 290 psi (20 bar)							0220	5.0 gph (19.0 l/h), 29 psi (2 bar)					0420	4.52 gph (17.10 l/h), 58 psi (4 bar)			
1602	0.58 gph (2.2 l/h), 253 psi (17.5 bar)														0232	8.45 gph (32.00 l/h), 29 psi (2 bar)		
Liquid end material:																		
PP		Polypropylene/PVDF, for self-degassing version Polypropylene/Polypropylene																
NP		Acrylic glass/PVDF, for self-degassing version Acrylic glass/PVC																
PV		PVDF/PVDF																
TT		PTFE/PTFE																
SS		Stainless steel																
O-rings:																		
E		EPDM/PTFE coated, only for PP and NP self-degassing																
B		FPM-B/PTFE coated, only on PP and NP self-degassing																
T		PTFE/PTFE coated																
S		Diaphragm additionally with FPM coating for siliceous media																
Liquid end version:																		
0		Non-bleed version, no valve spring, for TT, SS and type 0232 only																
1		Non-bleed version, with valve spring, for TT, SS and type 0232 only																
2		With deaerator, no valve spring, PP, PV, NP only, not type 0232																
3		With deaerator, with valve spring, PP, PV, NP only, not type 0232																
4		Version for highly viscous media, only PVT, types 1005, 1605, 0708, 1008, 0413, 0713, 0220, 0420																
9		Self-degassing for PP, NP only, not for types 1000 and 0232																
Hydraulic connections:																		
0		Standard according to technical data																
B		special-connection 3/8" x 1/4"																
Version:																		
0		Standard																
Logo:																		
0		With ProMinent® logo																
Power supply:																		
U		Universal 100-240 V																
Cable and plug:																		
A		6 ft European																
B		6 ft Swiss																
C		6 ft Australian																
D		6 ft USA																
1		6 ft open-ended																
Relay:																		
0		No relay																
1		Fault indicating relay, normally energized, 1 x changeover contact 230 V - 2 A																
3		Fault indicating relay, normally de-energized, 1 x changeover contact 230 V - 2 A																
4		As 1 + pacing relay 2 x normally open contacts 24 V - 100 mA																
5		As 3 + pacing relay 2 x normally open contacts 24 V - 100 mA																
Accessories:																		
0		No accessories																
1		With foot and injection valve, 5 ft PVC suction tubing, 10 ft PE discharge tubing																
Control type:																		
0		No lock																
1		With lock: manual operation locked when external cable plugged in																
Control variants:																		
0		Standard																
Options on request:																		
00		No options																
BT4b	1000	PP	E	0	0	0	0	U	A	0	0	0	0	00				

ProMinent® Beta® b Solenoid Diaphragm Metering Pumps

Dimensional Drawings

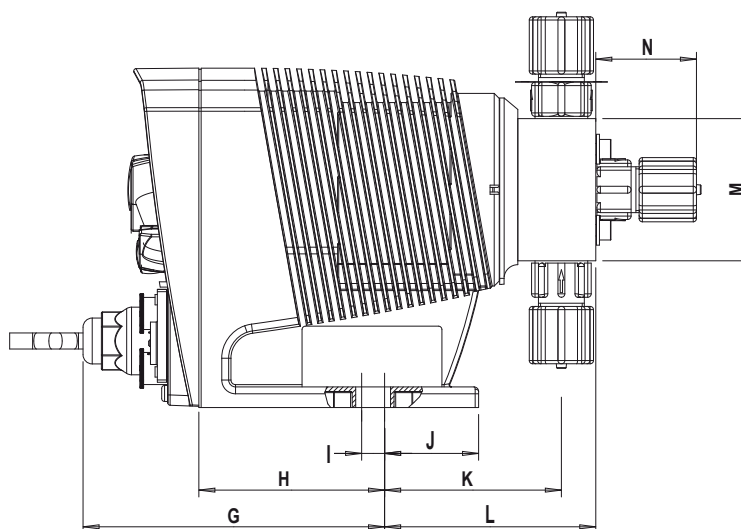
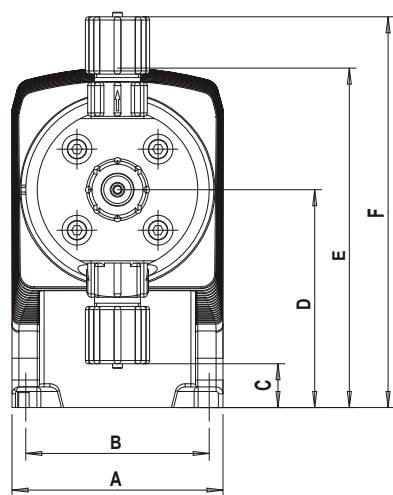
Dimensions in inches (mm).

Ranges given, actual dimension dependent on liquid end material.



Pump	A	B	C	D	E	F	G	H	I	J	K	L	M	N
BT4	3.6 (92)	3.1 (80)	.13-.75 (3.2-19)	3.7 (95)	5.8 (148)	7.0-7.8 (179-199)	5.2 (131.5)	3.2 (81)	.39 (10)	1.4 (36)	2.8-3.0 (71-76)	3.2-3.7 (83-93)	2.8-4.3 (Ø 90-Ø 110)	1.1 29.3
BT5	4.0 (102)	3.1 (80)	.13-.75 (3.2-19)	4.0 (101)	6.0 (153)	7.0-7.8 (179-199)	5.3 (135.5)	3.3 (85)	.59 (15)	1.6 (41)	2.8-3.0 (71-76)	3.2-3.7 (83-93)	2.8-4.3 (Ø 90-Ø 110)	1.1 29.3

With Auto-Degassing Liquid Ends



Pump	A	B	C	D	E	F	G	H	I	J	K	L	M	N
BT4	3.6 (92)	3.1 (80)	.30-.75 (7.5-19)	3.7 (95)	5.8 (148)	6.7-7.42 (170.5-188.5)	5.2 (131.5)	3.2 (81)	.39 (10)	1.4 (36)	2.9-3.0 (74-77)	3.5-4.2 (89-105.5)	2.8-3.5 (Ø 90-Ø 70)	1.73 43.9
BT5	4.0 (102)	3.1 (80)	.30-.75 (7.5-19)	4.0 (101)	6.0 (153)	6.7-7.42 (170.5-188.5)	5.3 (135.5)	3.3 (85)	.59 (15)	1.6 (41)	2.9-3.0 (74-77)	3.5-4.2 (89-105.5)	2.8-3.5 (Ø 90-Ø 70)	1.73 43.9

ProMinent® gamma/ L Solenoid Diaphragm Metering Pumps

Overview: gamma/ L

Ideal for applications requiring automation, large turndown and/or feed verification

(see [page 121](#) for spare parts and [page 134](#) for control cables)

- Capacity range 8.4 gph (32 l/h) max, 290 psi (20 bar) max
- Continuous stroke length adjustment from 0-100%
- Supplied in PP, Acrylic/PVC, PTFE, PVDF, SS
- Patented bleed valve on PP, PVDF, and Acrylic/PVC versions
- Auto-degassing liquid end version in Acrylic/PVC
- HV liquid end for highly viscous media (suitable for viscosities to 3000 cPs)
- Digitally accurate stroke rate via keypad and large LCD display
- Select feed rate display in strokes/min. or gph
- Programmable pressure levels
- Flow monitor input
- External Control: Voltage free contact, pulse m/d and/or 4-20 mA input
- Interface for PROFIBUS® DP ([see page 134](#))
- Two-stage float switch connector
- Optional 14-day programmable timer with software for PC programming
- 12-24 V DC, 24 V AC low voltage version
- LED's for operational status
- Concentration entry option for proportional flow metering
- NSF/ANSI 61 approved



pk_1_005

ProMinent® gamma/ L Solenoid Diaphragm Metering Pumps

Overview: gamma/ L

The gamma/L is a diaphragm-type, solenoid-driven, microprocessor based metering pump with maximum capacities to 8.4 gph (32.0 L/h) and maximum backpressure to 290 psig (20 bar).

ProMinent® solenoid-driven metering pumps consist of two main components: the pump drive unit and the liquid end.

Drive Unit

The pump housing is constructed of fiberglass-reinforced PPE plastic to protect against corrosion, dust, and water.

The solenoid drive unit houses a short-stroke solenoid with a maximum stroke length of 0.05" (1.25 mm). It is equipped with a noise suppressing mechanism for quiet operation and the armature is the only moving part.

Operating on pulse action, each pulse generates a magnetic field in the solenoid coil. This magnetic field moves the armature, which in turn moves the diaphragm. The diaphragm pushes into the dosing head and cavity forces chemical out of the discharge valve. When the magnetic field is de-energized, a spring returns the armature and diaphragm to their original position. This return movement draws chemical into the dosing head cavity through the suction valve.

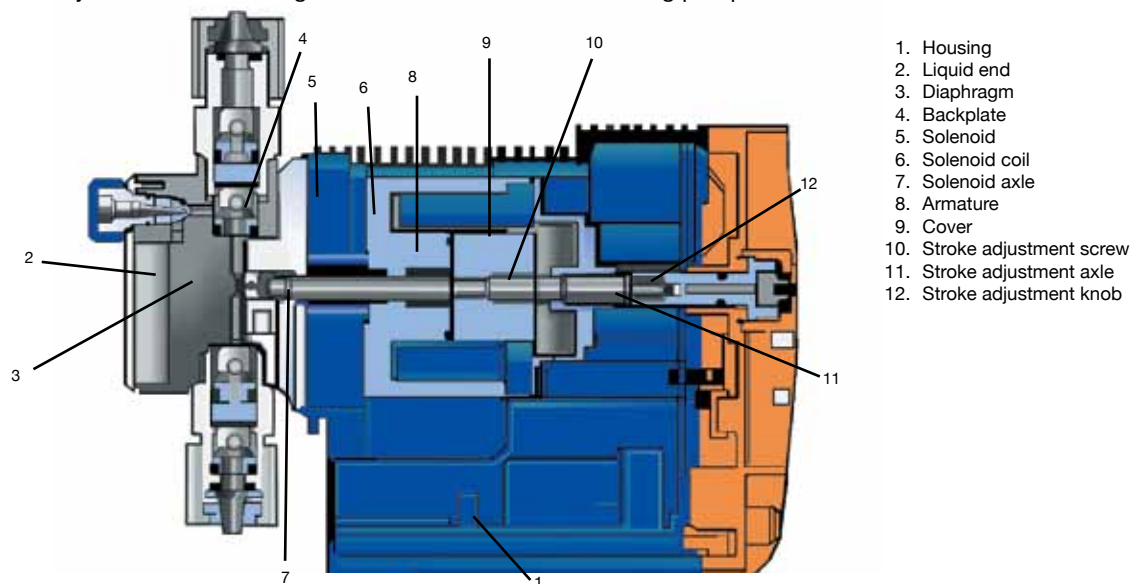
In the event of a diaphragm rupture, the liquid end has a weep hole on the bottom of the backplate to direct chemical out of the pump and away from the solenoid. An optional diaphragm failure detector can be used to stop the pump and indicate a fault.

The stroke-length adjusting mechanism is connected directly to the solenoid. Adjustment results in an accurate self-locking stroke-length setting.

Diaphragm

The diaphragm is constructed of fabric-reinforced EPDM elastomer with a plastic core and PTFE-facing. It is chemically resistant to virtually all process fluids and can be used over a wide temperature range. The gamma/ L pump is designed with a convex diaphragm. The curved shape provides precise metering and alleviates stress placed on the diaphragm by reducing liquid end dead volume.

Cutaway view of ProMinent gamma/ L solenoid-driven metering pump



ProMinent® gamma/ L Solenoid Diaphragm Metering Pumps

Overview: gamma/ L

The Liquid End

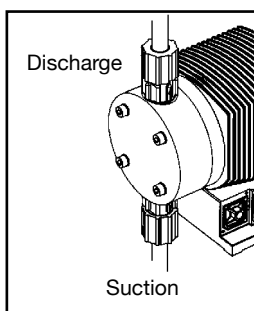
The gamma/ L metering pump liquid ends are available in five material versions: Polypropylene (PP), Kynar (PVDF), Acrylic/PVC (NP), PTFE (TT), and 316 Stainless steel (SS).

Options include a manual bleed valve with needle valve for easy priming, and continuous bleed of fluids that tend to off-gas (available with versions PP, PVT, and NP liquid ends).

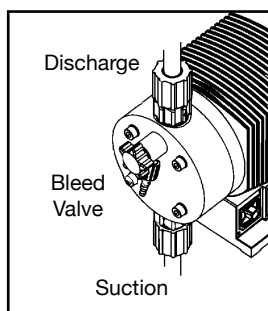
Automatic degassing liquid ends are available for PP and NP versions (except 1000 and 0232). This style liquid end discharges from the center and degasses from the top to prevent air build-up in the chamber.

High viscosity PVDF liquid ends are available for pump versions 1005, 0708, 0413, 0220, 1008, 0713, and 0420. Their metering capacity is 10-20% less than standard pump versions and recommended viscosity is up to 3000 cPs. The HV liquid ends are not self-priming; flooded suction is recommended.

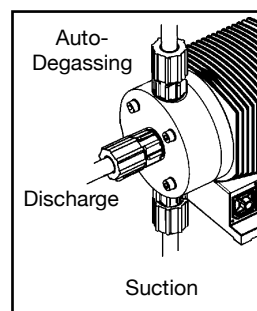
Suction and discharge ports are equipped with double-ball check valves for superior repeatability.



Liquid end without bleed valve



Liquid end with bleed valve



Auto-degassing liquid end

Power Supply

The Beta metering pumps accept a universal 100-230 volt power supply (+/- 10%), single phase, 50/60 Hz, with a 1.15 service factor. Performance is identical whether operated on 50 Hz or 60 Hz power. The power cord is detachable.

Fault Indicators

Three LED lights indicate operational status. A green light flashes during normal operation; a yellow light warns of low chemical; and a red light indicates lack of chemical or an operational error.

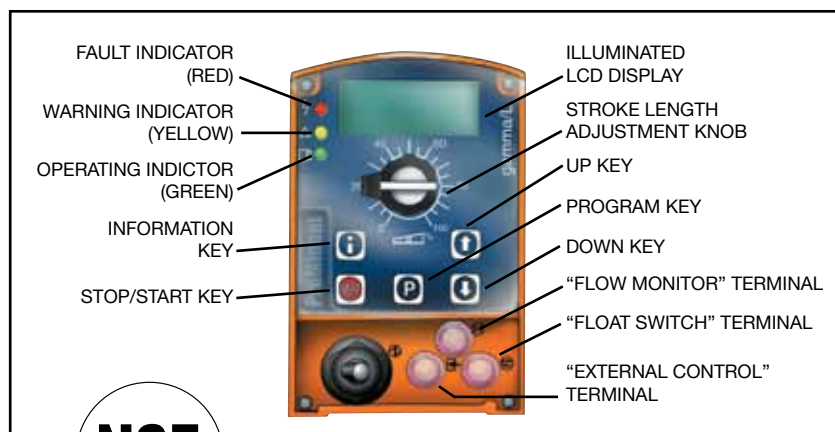
Relay Outputs

Fault annunciating relay

For low tank level (level switch), processor fault, fuse/power supply failure, Flow monitor, Analog (loss of signal), and Calibration

Pacing relay

A contact closure is issued with every pump stroke (contact duration 150 ms). This allows a second ProMinent metering pump to be paced synchronously, or to totalize flow with an external stroke counter.



ProMinent® gamma/ L Solenoid Diaphragm Metering Pumps

Standard Modes and Functions

Feed rate is determined by stroke length and stroke rate. Stroke length is manually adjustable from 1 to 100% in increments of 1% via the stroke length knob. Optimum repeatability is between 30-100% or 50-100% when using an auto-degassing liquid end.

Stroke rate can be set to a maximum of 180 strokes per minute. An illuminated LCD displays stroke length, stroke rate and an accumulative strokecounter, that can be cleared and reset.

Pump capacity output is displayed in either U.S. gph or l/h, set by the operator. Totalized capacity is also displayed in either U.S. gallons or litres.

The “i” key is used to scroll information screens for stroke rate, stroke length, stroke counter, capacity and totalized capacity. Other information is available depending on options ordered.

Basic Control Modes

Five control modes are available with the gamma/ L: manual, external contact 1:1, external contact with pulse control (multiplier/divider), batch or analog control. The basic version includes manual and external contact 1:1. The PROFIBUS® option includes all control modes, plus fieldbus connection.

In the “Manual” mode, stroke rate is controlled manually. The “Contact” external 1:1 mode allows adjustments to be made externally (e.g. by means of a pulse-type water meter for proportional chemical feed). Pulse signals are fed into the contact input of the pump by an optional control cable. Each pulse from a water meter or pulse-type controller produces one pump stroke, up to the pump’s maximum stroke rate. Over-stroking the pump is not possible.

Note: Universal Control Cable necessary for all gamma/ L control capabilities. (See Accessories [page 134](#) cables)

Standard Functions

“Calibrate”

The pump can be directly calibrated in-line to determine output on standard liquid ends and 50% to 100% on auto-degassing liquid ends. A warning indicator flashes when adjustments to the stroke volume are made outside the calibrated range of (+/- 10%) of stroke length.

“Pressure Level”

Backpressure control can be adjusted depending on maximum psig of pump version.

“Auxiliary Frequency”

An auxiliary frequency can be programmed. This default value can be enabled via an optional control cable.

“Flow”

The gamma/ L series metering pumps will monitor their own output with the optional adjustable flow monitor connected to the discharge valve. Every fluid discharge is sensed and fed back to the electronic control circuit of the pump. If insufficient fluid is discharged for a predetermined number of strokes (up to 125), the pump automatically stops and the red LED illuminates. The optional fault relay changes state to issue an alarm or activate a standby pump.

“Float Switch”

An optional two-stage ProMinent float switch can be plugged into the pump to monitor chemical levels in the source tank. An early warning is issued when the allowable minimum level is reached. The pump continues to operate while the display flashes, the yellow LED illuminates and an optional fault relay changes state to issue an alarm. If the liquid level in the supply tank drops another 3/4” (20 mm), the pump automatically shuts down, the LCD displays “Minim” and the red LED illuminates. The optional fault relay remains activated.

“Pause”

The gamma/ L series can be switched on or off via a dry contact through the optional control cable. This function operates only via the “external control” terminal.

“Stop”

The gamma/ L can be stopped by pressing the STOP/START.

“Prime”

Priming is activated by pressing both arrow keys at the same time.

Function and Errors Indicators

Three LED lights on the pump faceplate signal operational status. The green light flashes during normal operation and the yellow light warns of a situation that could lead to a fault (e.g., low chemical). If a fault occurs “ERROR” will appear on the LCD screen and the red LED light is illuminated.

ProMinent® gamma/ L Solenoid Diaphragm Metering Pumps

Optional Modes and Functions

Optional Control Modes

“Analog” Mode

With this option, the stroke rate of the gamma/L is directly proportional to the analog signal. The maximum number of strokes per minute corresponding to the analog signal range can be selected by the operator. Input signals can be set to 4-20 mA, or a custom curve.

“Contact” Mode with Pulse Control

This feature is used to “tune” the gamma/L to contact generators of any kind (e.g., pulse-type water meter or process controller), and eliminates the need for a costly external control unit. The following functions can be selected by means of the keypad.

Pulse step-up (multiply) and step-down (divide)

By simply entering a factor in the 0.01-99.99 range, the step-up or step-down ratio is set.

For example:

Step-up Factor:

99.99 1 pulse = 99.99 pump strokes

10 1 pulse = 10 pump strokes

Step-down Factor:

0.25 4 pulses = 1 pump stroke

0.01 100 pulses = 1 pump stroke

“Batch” Mode

The Batch mode is a variation of the contact operating mode. A specific number of strokes can be entered up to 65,535 strokes (whole numbers) or the feed quantity can be entered. The batch is then initiated by either pressing the “P” key on the pump face or providing a contact to the external control cable. Note: Pulse control is needed to run the batch mode.

Access Code

A programmable access code to prevent unauthorized changes to settings is available as an option.

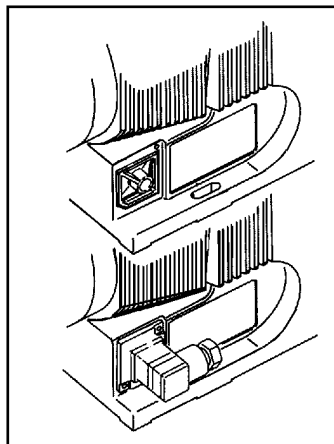
Relay outputs

Fault annunciating relay

For low tank level (float switch), loss of flow (flow monitor), system faults and fuse/power supply failure.

Fault annunciating and Pacing relay

In addition to the fault annunciating relay, a contact closure is issued with every pump stroke (contact duration 150 ms). This allows a second ProMinent metering pump to be paced synchronously, or to totalize flow with an external stroke counter.



An external panel in the base of the pump enables optional relays to be installed on-site.

4-20 mA Analog Output

A 4-20 mA analog output option is available for use with pumps that operate in the manual mode or by a

remote 4-20 mA analog signal. The 4-20 mA analog output signal is linear to pump frequency multiplied by the percentage of stroke length. The output signal is isolated and can drive up to 300 Ohms impedance. Analog output can be used for status feedback to higher level control systems for closed loop control or for monitoring chemical usage. This option is available in combination with either the fault annunciating or pacing relay.

Timer Relay

The optional integrated 14-day timer offers 81 programmable events. It can be set to hourly, daily, workdays, weekend, weekly or two-week periods with switch-on times from 1 second to two weeks. The timer can be programmed to change operation mode, frequency, and the function of two relays. All the functions can be programmed independently of one another. Up to 13 delay times can be programmed into the timer function.

The range of applications exceeds that of a “standard timer”. Typical applications are disinfection in cooling towers, process water, etc., with the ability to automatically program shock dosages or increase the concentration at a certain interval.

Fieldbus connection

Monitor and control remotely via a SCADA/PLC system using the PROFIBUS®-DP system.

Note: Relay options not available with PROFIBUS®. PROFIBUS® is not field retrofittable.

INFORMATION DISPLAYS



All modes

Stroke rate (frequency)
Stroke length (percent)
Stroke counter (N)
Capacity (gph or l/h)
Dosing quantity (gal or L)

Mode dependent

Accumulative strokes (*N)
Accumulative quantity (*gal or *L)
mA current (mA)
Pulse factor / Memory (*)
Indication of external mode (EXT)

ProMinent® gamma/ L Solenoid Diaphragm Metering Pumps

Specifications

<i>Maximum stroke length:</i>	0.05" (1.25 mm)		
<i>Materials of construction</i>			
<i>Housing:</i>	Fiberglass reinforced PPE		
<i>Diaphragm:</i>	PTFE-faced EPDM with plastic core		
<i>Liquid end options:</i>	Polypropylene, PVC, Acrylic/PVC, PTFE, 316 SS		
<i>Enclosure rating:</i>	IP 65		
<i>Motor insulation class:</i>	F		
<i>Power supply:</i>	100-230 VAC, 1 phase, 50/60 Hz, +/- 10%; 12-24 VDC or 24 VDC (+/- 10%)		
<i>Check valves:</i>	Double ball		
<i>Metering repeatability:</i>	When used according to operating instructions, ±2% under constant conditions and at minimum 30% stroke length. The minimum stroke length with auto-degassing liquid end is 50%.		
<i>Power cord:</i>	6 ft (2 m)		
<i>Relay cable (optional):</i>	6 ft (2 m)		
<i>Relay load</i>			
<i>Fault relay only (options 1 & 3):</i>	Contact load: 250 VAC, 2 A, 50/60 Hz Operating life: > 200,000 switch functions		
<i>Fault and pacing relay</i>			
<i>(Options 4 & 5):</i>	Contact load: 24 V, 2 A, 50/60 Hz Operating life: > 200,000 switch functions Residual impedance in ON-position ($R_{DS(ON)}$): < 8 W Residual current in OFF-position: < 1mA Maximum voltage: 24 VDC Maximum current: < 100 mA (for pacing relay) Switch functions: 15×10^9 Contact closure: 100 μ s (for pacing relay)		
<i>Analog output signal:</i>	Max. impedance 300 W Isolated 4-20 mA output signal		
<i>Ambient temperature range:</i>	14°F (-10°C) to 113°F (45°C)		
<i>Max. fluid operating temperatures:</i>	Material	Constant	Short Term
	Acrylic/PVC	113°F (45°C)	140°F (60°C)
	Polypropylene	122°F (50°C)	212°F (100°C)
	PVC	113°F (45°C)	140°F (60°C)
	PVDF	149°F (65°C)	212°F (100°C)
	PTFE	122°F (50°C)	248°F (120°C)
	316 SS	122°F (50°C)	248°F (120°C)
Average power drain at maximum stroke rate (Watts) / current drain at pump stroke (Amps)			
1000, 1601, 1602, 1005,			
0708, 0413, & 0220:	17W / 0.7 A or 15 A (peak current for approx. 1 μ s)		
1605, 1008, 0713, 0420 & 0230:	22W / 1.0 A or 15 A (peak current for approx. 1 μ s)		
<i>Service factor:</i>	1.15		
<i>Warranty:</i>	2 years on drive, 1 year on liquid end (extended warranties available)		
<i>Industry standards:</i>	UL Recognized in United States and Canada, CE available, NSF/ANSI 61		
<i>Valve threads:</i>	NP, PP, PVT, and TT Versions: M20 x 1.5 (provided with tubing adapters)		
<i>Standard Production Test:</i>	All pumps are tested for capacity at maximum pressure prior to shipment.		
<i>Max. solids size in fluid:</i>	Pumps with 1/4" valves: 15 μ - Pumps with 1/2" valves: 50 μ		
<i>Controlling contact (pulse):</i>	With voltage free contact, or with semiconductor sink logic control (NPN), not source logic (PNP). With a residual voltage of <0.7 V, the contact load is approximately 0.5 mA at +5 VDC. (Note: Semiconductor contacts that require >0.7 V across a closed contact should not be used.) Pump ignores contacts exceeding maximum input rate.		
<i>Necessary contact duration:</i>	20 μ S		
<i>Recommended Viscosity:</i>	max. 200 cPs for standard liquid end max. 500 cPs for valve with springs max. 50 cPs for auto-degassing liquid ends max. 3000 cPs for high-viscosity liquid ends		

ProMinent® gamma/ L Solenoid Diaphragm Metering Pumps

Capacity Data

Pump Version	Capacity at Maximum Backpressure				Capacity at 1/2 Maximum Backpressure				Pre-Primed Suction Lift		Max. Stroking Rate spm	Tubing Connectors ² O.D. x I.D. inches	Shipping Weight (higher weights are for SS)			
	psig (bar)	U.S.	l/h	ml/ stroke	psig (bar)	U.S.	l/h	ml/ stroke	ft	(m)			lbs	(kg)		
		GPH				GPH										
gamma/ L with standard liquid ends																
1000	145	(10)	0.19	(0.74)	0.07	73	(5)	0.21	(0.82)	0.08	19.6	(6)	180	1/4 x 3/16	7.5-8.6	(3.4-3.9)
2001 ³	290	(20)	0.29	(1.1)	0.10	145	(10)	0.37	(1.40)	0.13	19.6	(6)	180	1/4 x 3/16	6.4-7.9	(2.9-3.6)
1601	232	(16)	0.29	(1.1)	0.10	126	(8.75)	0.37	(1.4)	0.13	19.6	(6)	180	1/4 x 3/16	7.5-8.6	(3.4-3.9)
2002 ³	290	(20)	0.58	(2.2)	0.19	145	(10)	0.66	(2.5)	0.24	19.6	(6)	180	1/4 x 3/16	6.4-7.9	(2.9-3.6)
1602	232	(16)	0.55	(2.1)	0.19	126	(8.75)	0.66	(2.5)	0.24	19.6	(6)	180	1/4 x 3/16	7.5-8.8	(3.4-4.0)
1005	145	(10)	1.1	(4.4)	0.41	73	(5)	1.32	(5.0)	0.46	19.6	(6)	180	1/2 x 3/8	7.7-9.0	(3.5-4.1)
0708	101	(7)	1.9	(7.1)	0.66	50.5	(3.5)	2.22	(8.4)	0.78	19.6	(6)	180	1/2 x 3/8	7.7-11.0	(3.5-5.0)
0413	58	(4)	3.2	(12.3)	1.14	29	(2)	3.75	(14.2)	1.31	9.8	(3)	180	1/2 x 3/8	7.7-11.0	(3.5-5.0)
0220	29	(2)	5.0	(19.0)	1.76	14.5	(1)	5.52	(20.9)	1.94	6.5	(2)	180	1/2 x 3/8	7.7-11.0	(3.5-5.0)
1605	232	(16)	1.1	(4.1)	0.38	126	(8.75)	1.29	(4.9)	0.45	19.6	(6)	180	1/2 x 3/8	9.3-10.8	(4.2-4.9)
1008	145	(10)	1.8	(6.8)	0.63	73	(5)	2.19	(8.3)	0.76	19.6	(6)	180	1/2 x 3/8	9.5-12.8	(4.3-5.8)
0713	101	(7)	2.9	(11.0)	1.02	50.5	(3.5)	3.46	(13.1)	1.21	13.1	(4)	180	1/2 x 3/8	9.5-12.8	(4.3-5.8)
0420	58	(4)	4.5	(17.1)	1.58	29	(2)	5.04	(19.1)	1.77	9.8	(3)	180	1/2 x 3/8	9.5-12.8	(4.3-5.8)
0232 ¹	29	(2)	8.4	(32.0)	2.96	14.5	(1)	9.56	(36.2)	3.35	6.5	(2)	180	1/2 x 3/8	11.2-14.6	(5.1-6.6)

gamma/ L with auto-degassing liquid ends

1601	232	(16)	0.16	(0.59)	0.055	126	(8.75)	0.21	(0.78)	0.07	5.9	(1.8)	180	1/4 x 3/16	7.7	(3.5)
1602	232	(16)	0.37	(1.4)	0.13	126	(8.75)	0.45	(1.7)	0.16	6.9	(2.1)	180	1/4 x 3/16	7.7	(3.5)
1005	145	(10)	0.95	(3.6)	0.33	73	(5)	1.05	(4.0)	0.37	8.8	(2.7)	180	1/2 x 3/8	7.7	(3.5)
0708	101	(7)	1.74	(6.6)	0.61	50.5	(3.5)	1.98	(7.5)	0.69	6.5	(2.0)	180	1/2 x 3/8	7.7	(3.5)
0413	58	(4)	2.8	(10.8)	1.00	29	(2)	3.3	(12.6)	1.17	6.5	(2.0)	180	1/2 x 3/8	7.9	(3.6)
0220	29	(2)	4.3	(16.2)	1.50	14.5	(1)	4.7	(18.0)	1.67	6.5	(2.0)	180	1/2 x 3/8	7.9	(3.6)
1605	232	(16)	0.87	(3.3)	0.31	126	(8.75)	1.00	(3.8)	0.35	9.8	(3)	180	1/2 x 3/8	9.5	(4.3)
1008	145	(10)	1.66	(6.3)	0.58	73	(5)	1.98	(7.5)	0.69	9.8	(3)	180	1/2 x 3/8	9.5	(4.3)
0713	101	(7)	2.77	(10.5)	0.97	50.5	(3.5)	3.2	(12.3)	1.14	8.2	(2.5)	180	1/2 x 3/8	9.5	(4.3)
0420	58	(4)	4.12	(15.6)	1.44	29	(2)	4.6	(17.4)	1.61	8.2	(2.5)	180	1/2 x 3/8	9.5	(4.3)

(Note: Above capacities and suction lift refer to pumps tested on water at 115 VAC, 60 Hz, and an ambient temperature of 70°F (20°C). Higher specific gravity fluids will reduce suction lift. Capacities will be slightly reduced from published ratings if pumps are skid mounted.)

Higher viscosity fluids will reduce capacity. Liquid ends for highly viscous media have 10-20% less metering capacity and are not self-priming.

Standard connectors are 1/2" MNPT or 5/8" hose barb. Positive suction is recommended.

¹ Not available with bleed valve.

² SS versions use 1/4" female threads except models 0220, 0420, and 0232 which use 3/8" female threads.

³ Only available in SS and Acrylic liquid ends.

Universal control cable necessary for external Beta control. (see [page 134](#))

Materials In Contact With Chemicals

	Pump head	Suction/Pressure connector	O-rings	Balls
PPE	Polypropylene	Polypropylene	EPDM	ceramic
PPB	Polypropylene	Polypropylene	Viton®	ceramic
NPE	Acrylic	PVC	EPDM	ceramic
NPB	Acrylic	PVC	Viton®	ceramic
PVT	PVDF	PVDF	PTFE	ceramic
TTT	PTFE with carbon	PTFE with carbon	PTFE	ceramic
SST	stainless steel	stainless steel	PTFE	ceramic

Auto-degassing version available in PP and NP only. Supplied with Hastelloy C valve springs, PVDF valve core.

Pump diaphragm with PTFE-coating.

Note: Viton® is a registered trademark of DuPont Dow Elastomers.

ProMinent® gamma/ L Solenoid Diaphragm Metering Pumps

Identcode Ordering System

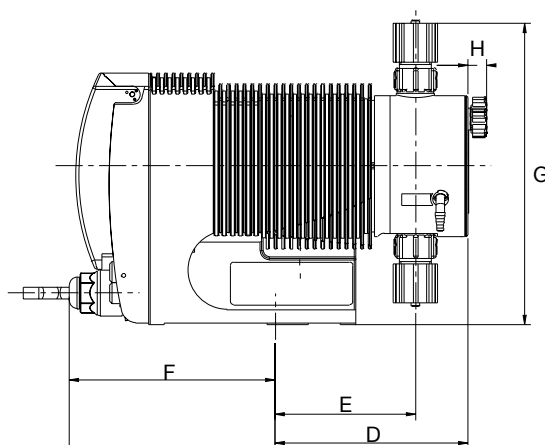
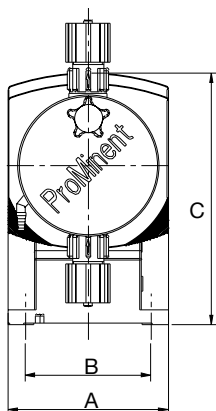
GALa	Gamma/ L															
Version	Capacity					Version	Capacity									
	1601	0.29 gph (1.1 l/h), 253 psi (17.5 bar)					0708*	1.9 gph (7.1 l/h), 101 psi (7 bar)								
	1602	0.55 gph (2.1 l/h), 232 psi (17.5 bar)					0713*	2.9 gph (11.0 l/h), 101 psi (7 bar)								
	1605*	1.1 gph (4.1 l/h), 253 psi (17.5 bar)					0413*	3.2 gph (12.3 l/h), 58 psi (4 bar)								
	1000	0.19 gph (0.74 l/h), 145 psi (10 bar)					0420*	4.5 gph (17.1 l/h), 17.1 l/h (4 bar) <i>*Versions available with high viscosity liquid ends</i>								
	1005*	1.1 gph (4.4 l/h), 145 psi (10 bar)					0220*	5.0 gph (19.0 l/h), 29 psi (2 bar)								
	1008*	1.8 gph (6.8 l/h), 145 psi (10 bar)					0232	8.4 gph (32.0 l/h), 29 psi (2 bar)								
	Liquid end material:															
	PP	Polypropylene/PVDF, for self-degassing version Polypropylene/Polypropylene														
NP	Acrylic glass/PVDF, for self-degassing version Acrylic glass/PVC															
PV	PVDF/PVDF															
TT	PTFE/PTFE															
SS	Stainless Steel															
O-rings:																
E	EDPM o-rings (PP, NP)															
B	Viton® o-rings (PP, NP)															
T	PTFE o-rings (PVDF, TT, SS)															
P	EPDM diaphragm with DPDM o-rings (PP, NP)															
V	Viton® diaphragm with Viton o-rings (PP, NP) Viton® is a registered trademark of DuPont Dow Elastomers															
Liquid end version:																
0	Non-bleed version, no valve spring, for TT, SS and type 0232 only															
1	Non-bleed version, with valve spring, for TT, SS and type 0232 only															
2	With deaerator, no valve spring, PP, PV, NP only, not type 0232															
3	With deaerator, with valve spring, PP, PV, NP only, not type 0232															
4	Version for highly viscous media, only PVT, types 1005, 1605, 0708, 1008, 0413, 0713, 0220, 0420															
9	Self-degassing for PP, NP only, not for types 1000 and 0232															
Hydraulic connections:																
0	Standard according to technical data															
6	1/2" x 3/8" tube fittings															
B	special-connection 3/8" x 1/4"															
Logo:																
0	Standard, with logo															
Electrical Connection (± 10%):																
M	12-24 VDC (versions 1000-0220)															
N	24 VDC (versions 1605-0232)															
U	Universal 100-240 V															
Cable and plug with 6ft (2m) power cord, single phase:																
A	European plug															
D	N. American plug, 115 V															
U	N. American plug, 230 V															
1	Open ended (for low voltage options M and N)															
Relay:																
0	Without relay (Required with Profibus)															
1	Fault annunciating relay, drops out															
3	Fault annunciating relay, pulls in															
4	Option 1 + pacing relay															
5	Option 3 + pacing relay															
C	Option 1 + 4-20 mA analog output															
D	Option 3 + 4-20 mA analog output															
E	Pacing relay + 4-20 mA analog output															
Accessories:																
0	Not included (for PVDF, TT, SS)															
1	With foot and injection valve, 5 ft PVC suction tubing, 10 ft PE discharge tubing															
Control Variants:																
0	Manual + External 1:1															
1	Manual + External with pulse control (multiplier/divider)															
2	Manual + External 1:1 with analog control															
3	Manual + External with pulse control & analog control															
4	Option 0 + Timer															
5	Option 3 + Timer															
P	Option 3 + PROFIBUS (Relay must be 0)															
Access Code:																
0	No Access Code															
1	Access Code															
Flow Monitor:																
0	Input for metering monitor signal (pulse)															
1	Input for maintained flow switch signal															
Pause/Float:																
0	Standard															
GALa	1601	SS	T	1	0	0	U	D	1	0	3	0	0	0		

ProMinent® gamma/ L Solenoid Diaphragm Metering Pumps

Dimensional Drawings

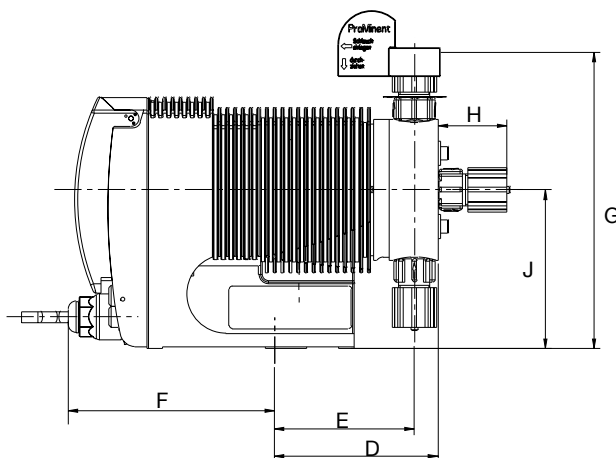
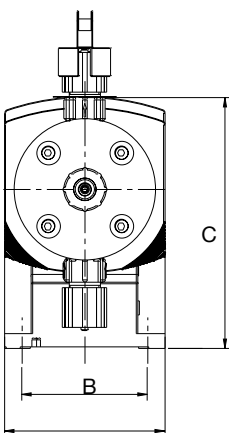
Dimensions in inches (mm).

Ranges given, actual dimension dependant on liquid end material.



Pump	A	B	C	D	E	F	G	H
GALa	4.0	3.1	6.3	3.3-4.3	2.8-3.1	5.8	6.4-8.5	0.5-0.6
	(102)	(80)	(160)	(85-110)	(71-80)	(147)	(162-217)	(12-14)

With Auto-Degassing Liquid Ends



Pump	A	B	C	D	E	F	G	H	J
GALa	4.0	3.1	6.3	3.5-3.6	2.9-3.0	5.8	6.7-7.4	1.7	4.0
	(102)	(80)	(160)	(89-92)	(74-77)	(147)	(177-189)	(44)	(101)

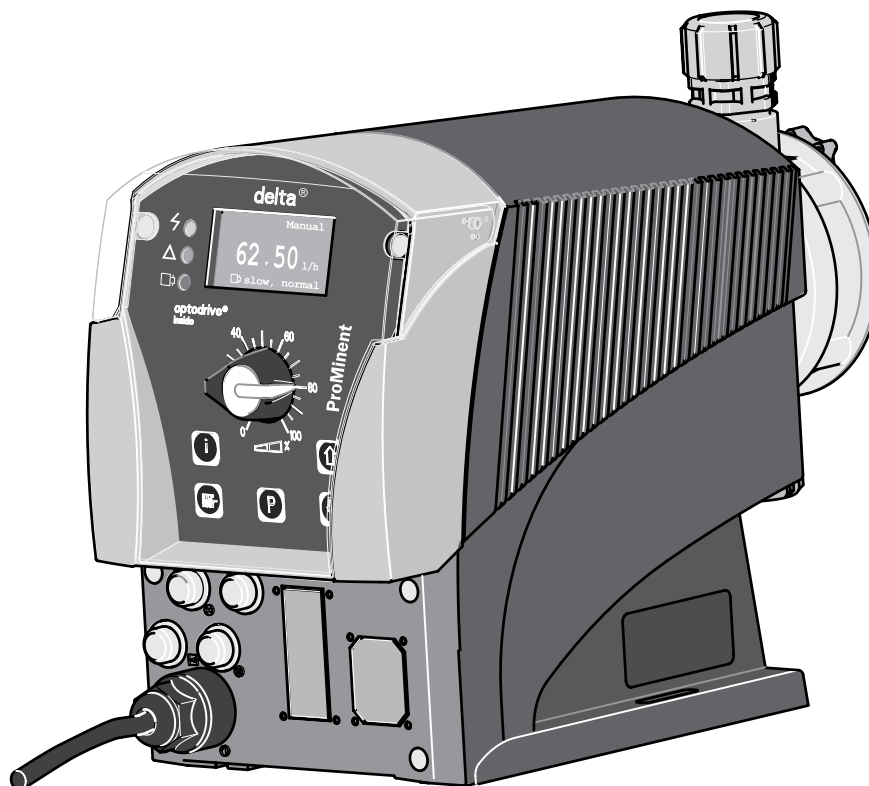
ProMinent® delta® Solenoid Diaphragm Metering Pumps

Overview: delta®

Ideal for applications requiring metering pump accuracy with minimal pulsation

(see [page 127](#) for spare parts and [page 134](#) for control cables)

- Continuous or pulsating dosing
- Configurable suction and delivery stroke duration
- Pump can be adapted to the dosing media
- Integrated optoGuard monitoring detects blocked dosing points, broken dosing lines and air or gas bubbles trapped in the dosing head
- Capacities: 2.0 gph (7.5 lph) to 19.8 gph (75.0 l/h)
- Stroke length continuously adjustable from 0 - 100% (recommended range 30 - 100%)
- Acrylic, PVDF and stainless steel material versions
- Patented bleed
- Optional detection and indication of diaphragm failure
- Adjustment and display of pump delivery from the keypad with choice of display in l/h or strokes/min
- Optional external auto-degassing solenoid kit available for outgassing media
- Large backlit graphic display
- External control options via voltage-free contacts with optional increase/reduce speed pulse
- Optional external control via standard 0/4-20 mA signal
- Interfaces for PROFIBUS® DP (see [page 134](#)) or CAN bus system
- 14-day process timer option for time and event-dependent dosing duties
- Connections for 2 stage-level switch and flow monitor
- 3 LED displays for operation and warning and error message in plain text
- Optional concentration input for volume-proportional dosing
- NSF/ANSI 61 approved



pk_1_131_2

ProMinent® delta® Solenoid Diaphragm Metering Pumps

Capacity Data

Capacity at Maximum Backpressure

delta® Type Pump	gph	(l/h)	psig	(bar)	Max. strokes/ min	Pre-primed suction lift ft (m)	Suction/Discharge connectors in	Shipping weights (higher weights are for SS) lbs (kg)
2508	2.0	(7.5)	363	(25)	200	19.6 (6)	3/8" x 1/2"	22-24 (10-11)
1608	2.1	(7.8)	232	(16)	200	16.4 (5)	3/8" x 1/4"	22-24 (10-11)
1612	3.0	(11.3)	232	(16)	200	19.6 (6)	3/8" x 1/4"	22-24 (10-11)
1020	4.8	(18.0)	145	(10)	200	16.4 (5)	1/2" x 3/8"	22-24 (10-11)
0730	7.7	(29.2)	102	(7)	200	16.4 (5)	1/2" x 3/8"	22-24 (10-11)
0450	12.9	(49.0)	58	(4)	200	9.8 (3)	5/8" ID hose barb standard*	22-24 (10-11)
0280	19.8	(75.0)	29	(2)	200	6.7 (2)	5/8" ID hose barb standard*	22-24 (10-11)

(Note: Above capacities and suction lift refer to pumps tested on water at 115 VAC, 60 Hz, and an ambient temperature of 70°F (20°C). Higher specific gravity fluids will reduce suction lift. Capacities will be slightly reduced from published ratings if pumps are skid mounted).

Higher viscosity fluids will reduce capacity. Liquid ends for highly viscous media have 10-20% less metering capacity and are not self-priming.

Standard connectors are 1/2" MNPT or 5/8" hose barb. Positive suction is recommended.

* (1/2" MNPT optional)

** (1/2" MNPT discharge side only)

Note: Universal control cable necessary for external delta control. ([see page 134](#))

Materials In Contact With Chemicals

	Pump head	Suction/Pressure connector	O-rings	Balls
PPE	Polypropylene	Polypropylene	EPDM	ceramic
PPB	Polypropylene	Polypropylene	Viton®	ceramic
NPE	Acrylic	PVC	EPDM	ceramic
NPB	Acrylic	PVC	Viton®	ceramic
PVT	PVDF	PVDF	PTFE	ceramic
TTT	PTFE with carbon	PTFE with carbon	PTFE	ceramic
SST	stainless steel	stainless steel	PTFE	ceramic

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

Note: Viton® is a registered trademark of DuPont Dow Elastomers.

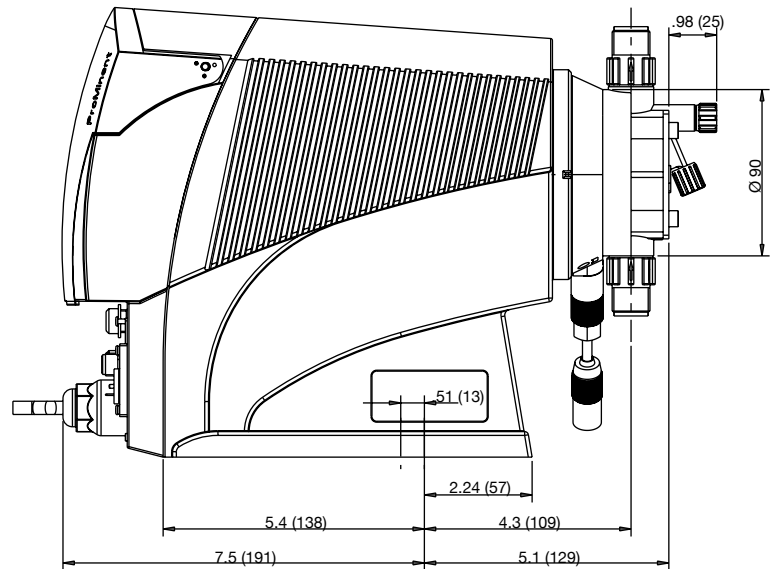
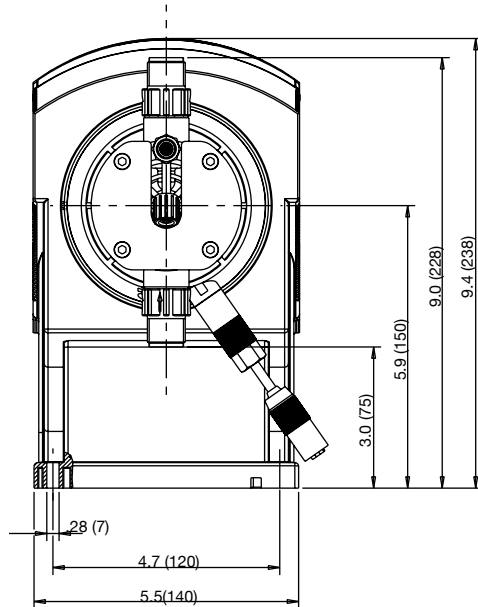
ProMinent® delta® Solenoid Diaphragm Metering Pumps

Dimensional Drawings

Dimensions in inches (mm).

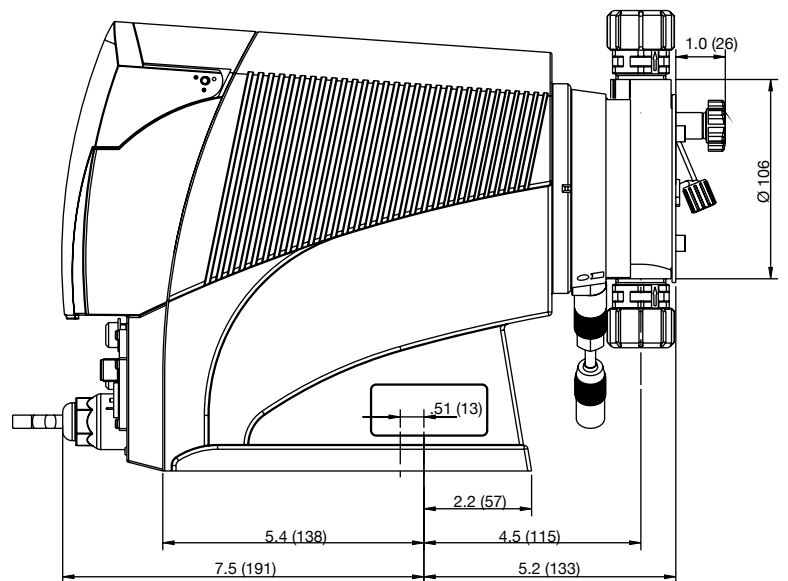
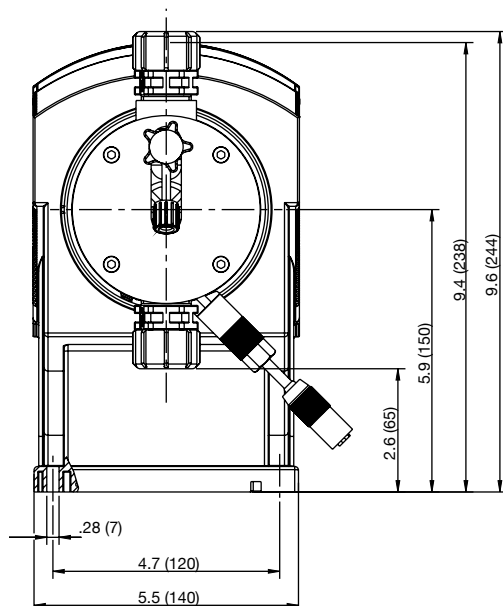
Ranges given, actual dimension dependent on liquid end material.

Dimensions of delta® type 1612 - 0730 PVT



dimensions in inches (mm)

Dimensions of delta® type 0450 - 0280 PVT

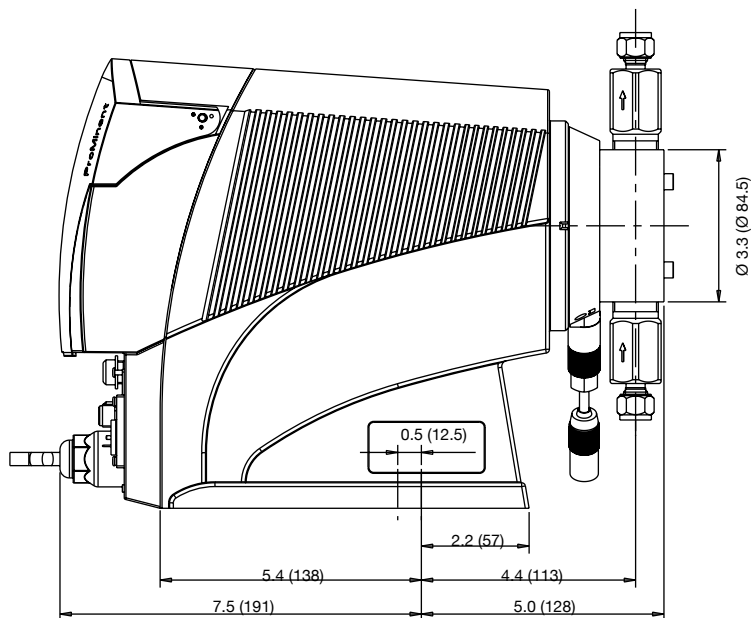
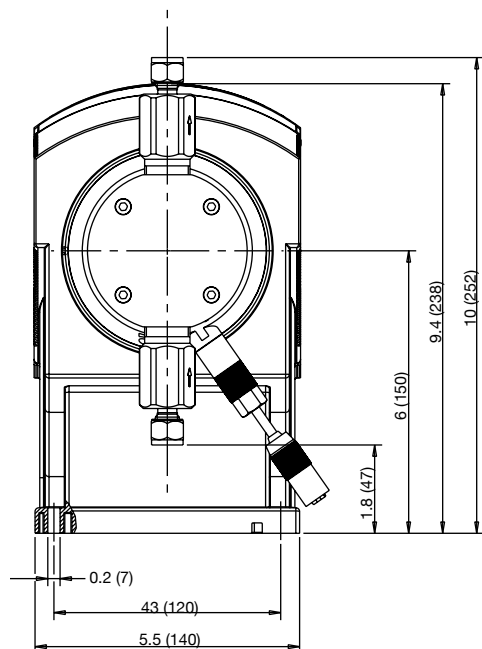


dimensions in inches (mm)

ProMinent® delta® Solenoid Diaphragm Metering Pumps

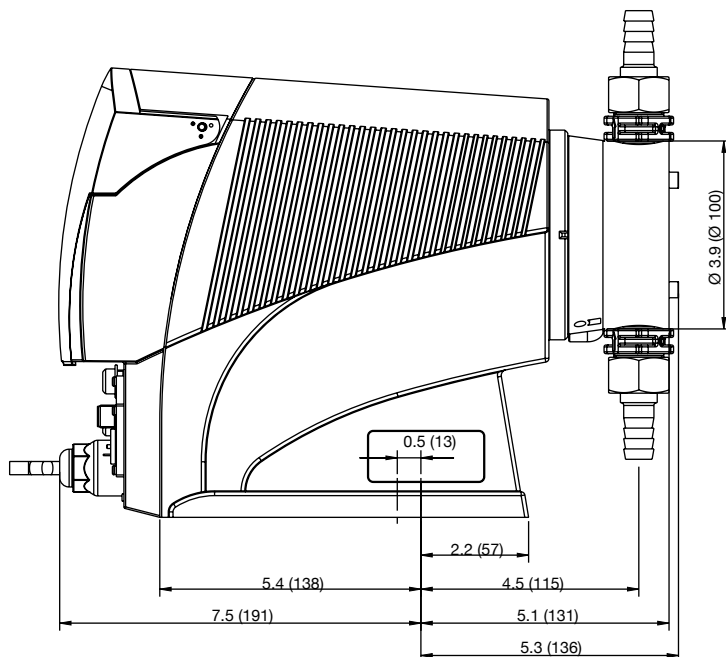
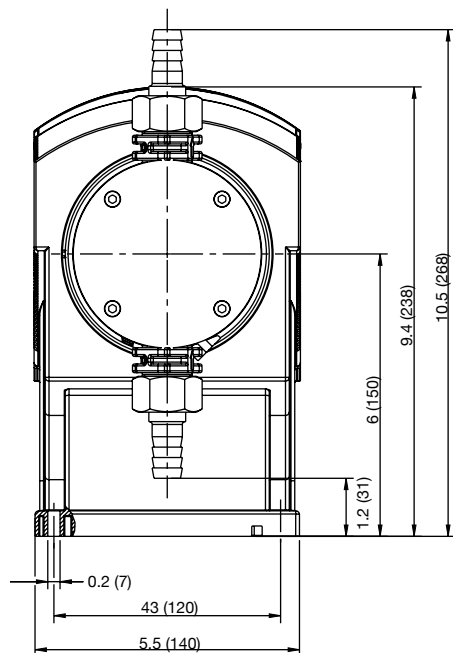
Dimensional Drawings

Dimensions of delta® type 1612 - 0730 SST



dimensions in inches (mm)

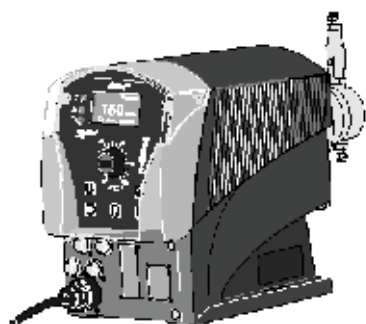
Dimensions of delta® type 0450 - 0280 SST



dimensions in inches (mm)

ProMinent® mikro delta® Piston Metering Pumps

Overview: mikro delta®



Ideal for applications requiring metering pump accuracy with minimal pulsation

- Feed rate range 0.04 gph (150 ml/h) to 0.4 gph (1500 ml/h)
- Stroke volume 1 - 250 µl
- Material versions PTFE and stainless steel
- Metering reproducibility: $\pm 0,5 \%$
- Continuous or pulsing operation
- Adaptation of the pump to the feed chemical
- Continuous stroke length adjustment from 0 - 100 %
- Adjustment and display of the feed rate, either as strokes/min or ml/h via the keyboard
- Large illuminated graphic display
- External activation via potential-free contacts with pulse step-up and step-down
- External activation by standard signal 0/4-20 mA (optional)
- Interface for PROFIBUS® or CANopen (optional)
- Interfaces for PROFIBUS® DP ([see page 134](#)) or CAN bus system
- 1 month process timer for time- and event-dependent metering tasks (optional)
- Connection for 2-stage level switch
- Optional concentration input for volume-proportional dosing
- 3 LED display for operation, warning and error messages in plain text
- Concentration input for volume-proportional metering

Further technical details on request

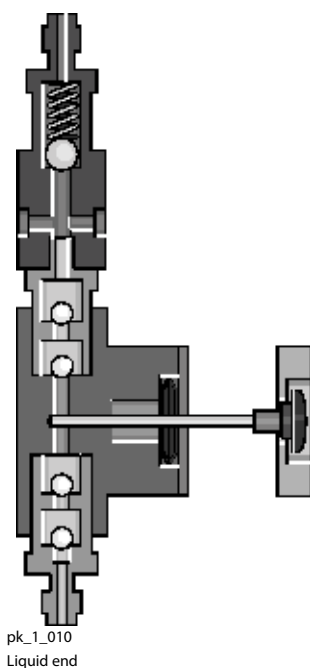
The mikro delta® is a solenoid-driven precision piston metering pump for dosing solutions in millilitre range. The controlled solenoid drive enables continuous dosing of smallest amounts and single stroke dosing up to a volume of 1 µl/stroke.

The maximum stroke length of the modified delta® solenoid drive is 5 mm. The stroke frequency is infinitely

adjustable from 1 stroke/h up to 100 strokes/min. A nearly continuous dosing can be realised from approx. 20 strokes/h, this corresponds to a stroke length of 3 minutes.

By means of the piston-type liquid ends of the preceding pump series mikro G/5 the same delivery rates are reached at half stroke length and double stroke frequency, however at higher pressure from 60 to 20 bar for stainless steel liquid ends and 10 bar for PTFE liquid ends.

The mikro delta® is available in three sizes with piston diameters of 2.5, 5 and 8 mm at a maximum stroke volume of 25, 100 and 250 µl. The sealing material is either PTFE pure white or PTFE with carbon. The material PTFE with carbon is recommended when the media to be dosed has no lubricating properties itself and traces of carbon have no disadvantage for the process. Double ball valves made of Ruby/Ceramic and the integrated back pressure valve ensure constant and pressure independent dosing from zero up to a maximum back pressure of 60 bar with a reproducibility better than 0.5 %. The dosing capacity is 1 – 250 µl/stroke and 0.001 – 1,500 ml/h



ProMinent® mikro delta® Piston Metering Pumps

Capacity Data

Capacity at Maximum Backpressure

mikro delta® Pump Type	ml/h	psig	(bar)	µl/ stroke	Pre-primed suct. lift		Suction/Discharge connectors mm	Shipping weights (higher weights are for SS)	
					ft	(m)		lbs	(kg)
100150 TT	145	145	(10)	24.2	19.6	(6)	1.75 x 1.15	22-24	(10-11)
100600 TT	580	145	(10)	96.7	19.6	(6)	1.75 x 1.15	22-24	(10-11)
101500 TT	1,480	145	(10)	246.7	13.1	(4)	3.20 x 2.40	22-24	(10-11)
600150 SS	145	870	(60)	24.2	19.6	(6)	1.75 x 1.15	22-24	(10-11)
400600 SS	580	580	(40)	96.7	19.6	(6)	1.75 x 1.15	22-24	(10-11)
201500 SS	1,480	290	(20)	246.7	13.1	(4)	3.20 x 2.40	22-24	(10-11)

(Note: Above capacities and suction lift refer to pumps tested on water at 115 VAC, 60 Hz, and an ambient temperature of 70°F (20°C). Higher specific gravity fluids will reduce suction lift. Capacities will be slightly reduced from published ratings if pumps are skid mounted).

Note: Universal control cable necessary for external delta control. [\(see page 134\)](#)

Materials In Contact With Chemicals

Version	Dosing Head	Suction/Pressure connection	Valve balls	Valve seats	Plunger	Gaskets
TTT	PTFE / carbon	PTFE / carbon	ruby	ceramic	ceramic	PTFE, White
TTG	PTFE / carbon	PTFE / carbon	ruby	ceramic	ceramic	PTFE, Graphite
SST	SS 1.4571	PTFE / carbon	ruby	ceramic	ceramic	PTFE, Graphite
SSG	SS 1.4571	PTFE / carbon	ruby	ceramic	ceramic	PTFE, Graphite

Spare Parts

Spare Plunger

Type	Part no.
100150/600150	803149
100600/400600	803181
101500/201500	803182

PTFE Packing (White)

Type	Part no.
100150/600150	485431
100600/400600	485430
101500/201500	485432

PTFE Packing (Graphite)

Type	Part no.
100150/600150	485428
100600/400600	485427
101500/201500	485429

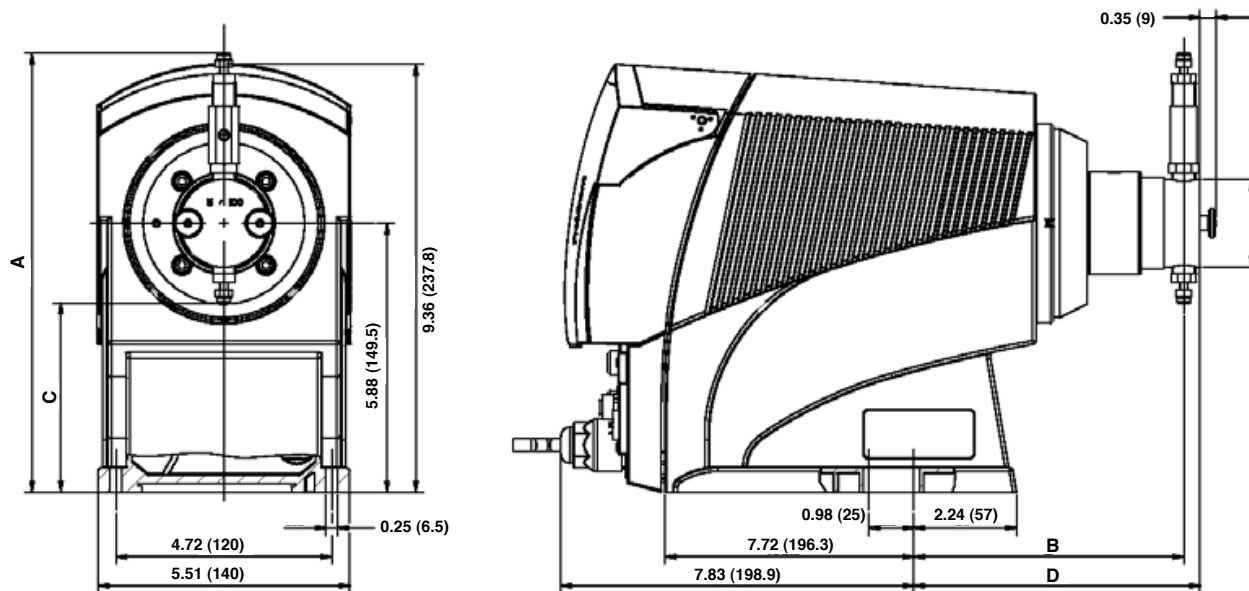
ProMinent® mikro delta® Piston Metering Pumps

Identcode Ordering System

MDLa mikro delta® series, version a																
Version		Capacity										Version		Capacity		
100150		145 ml/h, 145 psi (10 bar) *Only TT										400600		580 ml/h, 580 psi (40 bar) *Only SS		
600150		145 ml/h, 870 psi (60 bar) *Only SS										101500		1,480 ml/h, 145 psi (10 bar) *Only TT		
100600		580 ml/h, 145 psi (10 bar) *Only TT										201500		1,480 ml/h, 290 psi (20 bar) *Only TT		
Liquid end materials:																
SS		Stainless steel														
TT		PTFE with 25 % carbon														
O-rings:																
T		PTFE pure white														
G		PTFE with graphite														
Liquid end version:																
0		no valve spring														
1		with valve spring														
Connection:																
0		Standard according to technical data														
Logo:																
		with ProMinent®-Logo														
		no ProMinent®-Logo														
Power Supply (± 10%):																
U		115-230 V, 50/60 Hz														
Cable and plug with 6 ft (2 m) power cord, single phase:																
A		European plug														
D		N. American plug, 115 V														
U		N. American plug, 230 V														
Relay:																
0		no relay														
1		Fault indicating relay, normally energized, 1x changeover contact, 230 V - 8 A														
3		Fault indicating relay, normally de-energized, 1 x changeover contact, 230 V - 8														
4		A as 1 + pacing relay, 24 V - 100 mA														
5		as 3 + pacing relay, 24 V - 100 mA														
Accessories:																
		no accessories														
Control versions:																
0		manual+external contact with pulse control														
3		manual+external contact w/ pulse control+analogue 0/4-20 mA														
4		as 0 + Process Timer (1 month)														
5		as 3 + Process Timer (1 month)														
C		CANopen														
R		as 3 + PROFIBUS®-interface, M12														
Security:																
0		no access code														
1		with access code														
Language:																
EN		English														
Pause/Float:																
0		Standard														
0		Standard														
MDLa	100150	SS	T	0	0	0	U	D	0	0	0	0	0	0	EN	0

ProMinent® mikro delta® Piston Metering Pumps

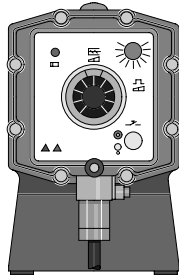
Dimensional Drawings



Type	A in (mm)	B in (mm)	C in (mm)	D in (mm)	E Ø in (mm)
Version TT					
100150	9.60 (243.9)	5.90 (150.1)	4.13 (105.1)	6.26 (159.1)	1.92 (49)
100600	9.60 (243.9)	5.90 (150.1)	4.13 (105.1)	6.26 (159.1)	1.92 (49)
101500	10.08 (256.2)	5.90 (150.1)	3.63 (92.3)	6.34 (161.1)	1.92 (49)
Version SS					
600150	10.08 (256.2)	5.90 (150.1)	3.63 (92.3)	6.34 (161.1)	1.92 (49)
400600	10.02 (254.7)	5.90 (150.1)	3.89 (99.0)	6.26 (159.1)	1.92 (49)
201500	10.08 (256.2)	5.90 (150.1)	3.63 (92.3)	6.34 (161.1)	1.92 (49)

ProMinent® EXtronic® Solenoid Diaphragm Metering Pumps

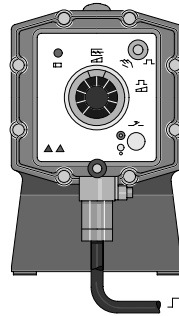
Overview: EXtronic®



pk_1_020

Control type "Internal"

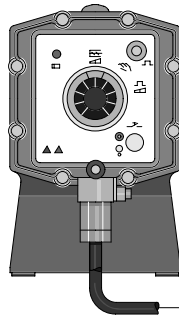
Stroke length adjustment 1:10, stroking rate adjustment 1:25, total adjustment range 1:250.



pk_1_019

Control type: "External Contact"

Stroke length adjustment 1:10, stroking rate control 0-100 % dependant upon external switch contacts. *)



0 - 20 mA

pk_1_018

Control type: "Analogue"

Stroke length adjustment 1:10, Stoke frequency control 0-100 % proportional to analogue signal 0/4-20 mA. *)

*) The electrical cables for mains connection, contact or analogue control are already connected to the pump. Observe all instructions concerning connecting and activating electrical systems.

Ideal for explosion-proof applications

(see [page 126](#) for spare parts)

The ProMinent EXtronic series represents a proven technology for metering liquid media in hazardous areas classified in accordance with Zone 1 and in fire-damp-endangered mining applications.

- The new microprocessor control compensates for fluctuations in the power supply. Automatic switchover from 50 Hz to 60 Hz operation with no change in capacity.
- Operating voltage of 500V increases the scope of application for ProMinent EXtronic (e.g. in conjunction with the new EXBb M version for fire-damp-endangered areas in mining applications).
- The short-stroke solenoid drive is combined with liquid ends from the ProMinent gamma series. The material version SB material is recommended for use with flammable media.
- The control inputs "External Contact", "Analog", and "Zero Volts ON/OFF" are intrinsically safe for the EXBb-registered in accordance with EN 50020.
- The 2501 SSM/SBM type is available with diaphragm failure detection
- The capacity range extends from 0.06 gph (0.19 L/h) to 15.8 gph (60 L/h) at backpressures of up to maximum 363 psig (25 bar).

Factory Mutual Hazard Classification

Factory Mutual Research Corporation has certified that EXtronic series pumps are in compliance with explosion-proof classifications Class 1, Division 1, Groups B, C and D indoor hazardous locations; and with intrinsically safe output connections for Class 1, Division 1, Groups A, B, C, and D hazardous locations. Installation must be in accordance with manufacturer's instructions and the National Electrical Code.

CSA Approval

CSA approved for Class 1, Division 1, Groups B, C and D locations.

ProMinent EXtronic metering pumps are tested and classified in compliance with harmonized European Standards EN 50014/50018 for "flame-proof enclosure." They have the highest degree of protection in this type of enclosure class. This approval is recognized by many other countries outside the EC member states.

The short-stroke solenoid and electronic control are integrated in the pump housing. The enclosure rating in accordance with DIN 40050, even with the front cover open.

The liquid end is equipped with a registered multi-layer (Teflon coated) pump diaphragm. The liquid end is made of Acrylic, Polypropylene (PP), PTFE-Teflon, 316 stainless steel and SB for flammable chemicals to ensure maximum operating safety.

Self-bleeding liquid ends made of Acrylic (NS) and PVC (PS) are available for off-gassing fluids.

The micrometering adjusting knob for the stroke length enables precision setting of the capacity and ensures a high degree of repeatability. A comprehensive range of explosion-proof ancillary equipment and pump accessories is available.

EXBb G for use in gas and fire damp hazardous areas

Degree of protection EEx [i,a] d IIC T6

EEX - Explosion-proof equipment built in accordance with European standards

[i,a] - Intrinsically safe control input in the case of two independent faults occurring

d - Flameproof enclosure protection

IIC - Explosion Group II for all hazardous areas apart from mines (includes IIA and IIB)

T6 - Temperature class approval for gases and vapours with ignition temperature > 85°C

EXBb M for use in hazardous mining operations

Degree of protection EEX d I/IIC T6

EEX - Explosion-proof equipment built in accordance with European standards

d - Flameproof enclosure protection

IC - Explosion Group I for firedamp-endangered mines

IIC - Explosion Group II for all other hazardous areas apart from mines (includes IIA and IIB)

T6 - Temperature class approval for gases and vapors with ignition temperature > 85°C. This is the highest temperature class; it includes T1 to T5.

ProMinent® EXtronic® Solenoid Diaphragm Metering Pumps

Specifications

<i>Maximum stroke length:</i>	0.026" (0.65 mm) for pump models 1000 0.049" (1.25 mm) for all other models		
<i>Materials of construction</i>			
<i>Housing:</i>	Epoxy coated die cast aluminum		
<i>Diaphragm:</i>	PTFE faced EPDM with steel core		
<i>Liquid end options:</i>	Polypropylene, Acrylic/PVC, PTFE, 316 SS, high-viscosity Polypropylene		
<i>Enclosure rating:</i>	(IP 65); insulation class F		
<i>Power supply:</i>	500V ±6%, 50/60 Hz 230V ±10%, 50/60 Hz 115V ±10%, 50/60 Hz Mean power input at max. stroke frequency (W)/peak current consumption for metering stroke (A) at 230V, 50/60 Hz EXBb Type 1000, 1601, 1201, 0803, 1002, 0308: 23/25 W/0.9 A at 120 strokes/min. EXBb Type 2502, 1006, 0613, 0417: 54/61 W/2.1 A at 120 strokes/min. EXBb Type 2505, 1310, 1014, 0430, 0260: 77/83 W/3.1 A at 110 strokes/min.		
<i>Thermal protection:</i>	Yes		
<i>Check valves:</i>	all models double ball except single ball on PP4 (HV) models		
<i>Repeatability:</i>	When used according to operating instructions, ±2%; For type 1601 with self-degassing liquid end, ±5%.		
<i>Power cord:</i>	6 ft. (2 m) 2 wire plus ground (no plug)		
<i>External control cable:</i>	6 ft. (2 m) 2 wire		
<i>Ambient temperature range:</i>	14°F (-10°C) to 113°F (45°C)		
<i>Max. fluid operating temperatures:</i>	Material	Constant	Short Term
	Acrylic/PVC	113°F (45°C)	140°F (60°C)
	Polypropylene	122°F (50°C)	212°F (100°C)
	PTFE	122°F (50°C)	248°F (120°C)
	316 SS	122°F (50°C)	248°F (120°C)
<i>Max. allowable input current:</i>	50 mA		
<i>Warranty:</i>	Two years on drive; one year on liquid end.		
<i>Industry standards:</i>	Factory mutual (explosion-proof, intrinsically safe), CSA approved and CE approved. EN 50014/50018; VDE 0170/0171-5.78,		
<i>Standard Production Test:</i>	100% tested for rated pressure and volume		
<i>Max. solids size in fluid:</i>	Pumps with 1/4" valves: 15µ; pumps with 1/2" valve: 50µ		
<i>Controlling contact (pulse):</i>	With voltage free contact, or with semiconductor sink logic control (NPN), not source logic (PNP); with a residual voltage of <700 mV, the contact load is approximately 20 mA at +10 VDC. (Note: Semiconductor contacts that require >700 mV across a closed contact should not be used).		
<i>Necessary contact duration:</i>	100 ms		

ProMinent® EXtronic® Solenoid Diaphragm Metering Pumps

Capacity Data

Pump Version	Capacity at max. backpressure			Max. stroke rate spm	Connectors Tube/NPT fitting PP/ NP/NS/PS/TT inches	Capacity at 1/2 max. backpressure			SS1	SS2	SB1	Suction lift ft. (m)	PP/NP/TT-S weight lbs. (kg)
	psig (bar)	GPH (L/h)	mL/ stroke			psig (bar)	gph (L/h)	mL/ stroke					
1000	145 (10)	0.05 (0.19)	0.027	120	1/4 x 3/16	72.5 (5)	0.07 (0.27)	0.038	6mm Swage	1/4" FNPT	1/4" FNPT	4.9 (1.5)	27-36 (12-16)
2501	363 (25)	0.26 (1.0)	0.15	120	1/4 x 3/16	290 (20)	0.29 (1.1)	0.17	6 mm Swage	1/4" FNPT	1/4" FNPT	19.7 (6)	39 (18)
1601	232 (16)	0.26 (1.0)	0.14	120	1/4 x 3/16	116 (8)	0.34 (1.3)	0.18	6mm Swage	1/4" FNPT	1/4" FNPT	19.7 (6)	27-36 (12-16)
1201	174 (12)	0.45 (1.7)	0.23	120	1/4 x 3/16	87 (6)	0.53 (2.0)	0.28	6mm Swage	1/4" FNPT	1/4" FNPT	19.7 (6)	27-36 (12-16)
0803	116 (8)	0.98 (3.7)	0.51	120	1/4 x 3/16	58 (4)	1.03 (3.9)	0.54	6mm Swage	1/4" FNPT	1/4" FNPT	9.8 (3)	27-36 (12-16)
1002	145 (10)	0.61 (2.3)	0.31	120	1/2 x 3/8	72.5 (5)	0.71 (2.7)	0.38	8mm Swage	1/4" FNPT	1/4" FNPT	19.7 (6)	27-36 (12-16)
0308	43.5 (3)	2.27 (8.6)	1.2	120	1/2 x 3/8	21.8 (1.5)	2.72 (10.3)	1.43	8mm Swage	1/4" FNPT	1/4" FNPT	19.7 (6)	27-36 (12-16)
2502	363 (25)	0.53 (2.0)	0.28	120	1/2 x 3/8	290 (20)	0.58 (2.2)	0.31	8mm Swage	1/4" FNPT	1/4" FNPT	19.7 (6)	29-38 (13-17)
1006	145 (10)	1.59 (6.00)	0.83	120	1/2 x 3/8	72.5 (5)	1.90 (7.2)	1.00	8mm Swage	1/4" FNPT	1/4" FNPT	19.7 (6)	29-34 (13-15)
0613	87 (6)	3.46 (13)	1.82	120	1/2 x 3/8	43.5 (3)	3.94 (14.9)	2.07	8mm Swage	1/4" FNPT	1/4" FNPT	18.0 (5.5)	29-38 (13-17)
0417	50.8 (3.5)	4.60 (17.4)	2.42	120	1/2 x 3/8	29.0 (2)	4.73 (17.9)	2.49	12mm Swage	1/4" FNPT	1/4" FNPT	14.0 (4.5)	29-38 (13-17)
2505	363 (25)	1.11 (4.2)	0.64	110	1/2 x 3/8	290 (20)	1.27 (4.8)	0.73	12mm Swage	1/4" FNPT	1/4" FNPT	19.7 (6)	36-45 (16-20)
1310	189 (13)	2.77 (10.5)	1.59	110	1/2 x 3/8	87 (6)	3.14 (11.9)	1.80	12mm Swage	1/4" FNPT	1/4" FNPT	19.7 (6)	36-45 (16-20)
0814	116 (8)	3.70 (14.0)	2.12	110	1/2 x 3/8	58 (4)	4.07 (15.4)	2.33	12mm Swage	1/4" FNPT	1/4" FNPT	19.7 (6)	36-45 (16-20)
0430	50.8 (3.5)	7.13 (27.0)	4.09	110	1/2" MNPT	29.0 (2)	7.79 (29.5)	4.47	3/8" FNPT		3/8" FNPT	16.4 (5)	36-45 (16-20)
0260	21.8 (1.5)	15.8 (60.0)	9.09	110	3/4" MNPT				1/2" FNPT		1/2" FNPT	4.9 (1.5)	36-45 (16-20)

EXtronic Models for High Viscosity Fluids

1002	145 (10)	0.61 (2.3)	0.31	120	1/2" MNPT	72.5 (5)	0.71 (2.7)	0.38				0 (0)	27 (12)
1006	145 (10)	1.59 (6.0)	0.83	120	3/4" MNPT	72.5 (5)	1.90 (7.2)	1.00				0 (0)	29 (13)
1310	145 (10)	2.77 (11.0)	1.59	110	3/4" MNPT	72.5 (5)	3.14 (11.9)	1.80				0 (0)	36 (16)
0814	116 (8)	3.70 (14.0)	2.12	110	3/4" MNPT	58 (4)	4.07 (15.4)	2.33				0 (0)	36 (16)

EXtronic Models with Auto-degassing Liquid Ends

Pump Version	Capacity at Maximum Backpressure				Max. Stroking Rate spm	Connectors Tube/NPT fitting PP/ NP/NS/PS/TT inches	Suction Lift		Shipping Weight	
NS/PS EXBb	psig	(bar)	U.S. GPH	(L/h)			ft.	(m)	lbs.	(kg)
1601	232	(16)	0.17	(0.7)	120	1/4 x 3/16	5.9	(1.8)	27	(12)
1201	174	(12)	0.26	(1.0)	120	1/4 x 3/16	6.6	(2.0)	27	(12)
0803	116	(8)	0.63	(2.4)	120	1/4 x 3/16	9.2	(2.8)	27	(12)
1002	145	(10)	0.48	(1.8)	120	1/4 x 3/16	6.6	(2.0)	27	(12)

Shipping Weight for EXBb Fireproof M Version is an additional 32 lbs. (14 kg).

(Note: Above capacities and suction lift refer to pumps tested on water at 115 VAC, 60 Hz, and an ambient temperature of 70°F (20°C). Higher specific gravity fluids will reduce suction lift. Capacities will be slightly reduced from published ratings if pumps are skid mounted).

Higher viscosity fluids will reduce capacity. Liquid ends for highly viscous media have 10-20% less metering capacity and are not self-priming. Standard connectors are 1/2" MNPT or 5/8" hose barb. Positive suction recommended.

ProMinent® EXtronic® Solenoid Diaphragm Metering Pumps

Materials in Contact With Chemicals

	Liquid End	Suction/Discharge Connector	O-rings	Valve Balls (6 - 12 mm)	Balls (DN 10 and DN 15)
PP1	Polypropylene	Polypropylene	EPDM	ceramic	Borosilicate glass
PP4*	Polypropylene	Polypropylene	EPDM	-	ceramic
NP1	Acrylic	PVC	Viton®	ceramic	Borosilicate glass
NP3	Acrylic	PVC	Viton®	ceramic	-
NS3**	Acrylic	PVC	Viton®	ceramic	-
PS3**	PVC	PVC	Viton®	ceramic	-
TT1	PTFE with carbon	PTFE with carbon	PTFE	ceramic	ceramic
SS..	316 stainless steel	316 stainless steel	PTFE	ceramic	316 stainless steel

* PP4 with Hastelloy C valve springs.

** NS3 and PS3 with Hastelloy C valve springs, PVDF valve core.

Note: Viton® is a registered trademark of DuPont Dow Elastomers.

Metering pump comes with 6 ft. power cable (plug not included)

Factory Mutual System approved



Approved
(standard in Canada)



Approved

The EXtronic metering pumps are registered according to DIN-VDE 0170/0171-5.78.

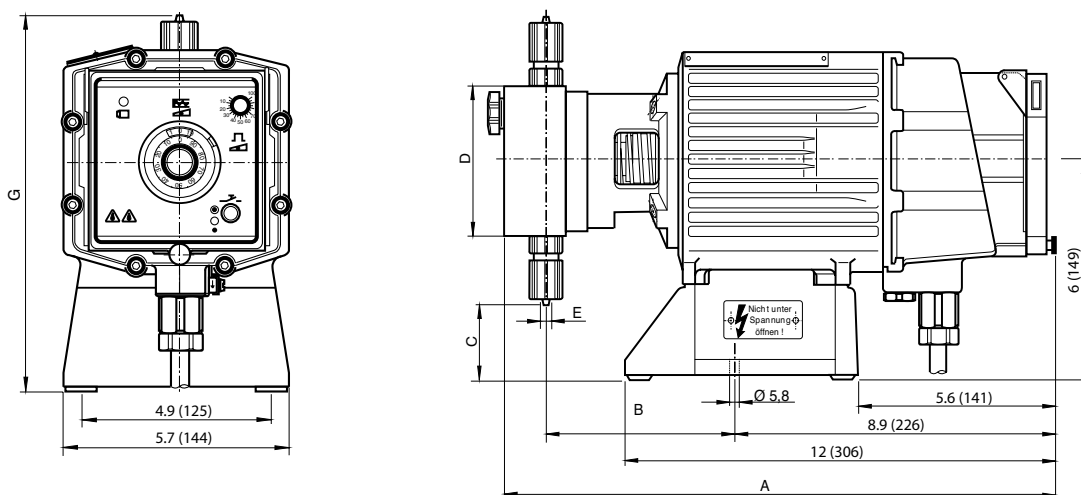
ProMinent® EXtronic® Solenoid Diaphragm Metering Pumps

Identcode Ordering System

EXBb	Enclosure Type:									
	G	Explosion protection								
	M	Fire and explosion protection: permissible liquid end material - PTFE & Stainless Steel								
	Version: Capacity:		Version: Capacity:							
	1000	0.05 gph, 145 psi	0613	3.46 gph, 87 psi	*Type 2502 & 2505 only available in SS and SB					
	1601	0.26 gph, 232 psi	0417	4.6 gph, 50.8 psi	**Type 1310 only available in NP, PP4, SS and SB					
	1201	0.45 gph, 174 psi	2501***	0.26 gph, 363 psi	***Type 2501 available in SSM and SBM only					
	0803	0.98 gph, 116 psi	2505*	1.11 gph, 363 psi	❖Type 0430 & 0260 not available in SS2					
	1002	0.61 gph, 145 psi	1310**	2.77 gph, 189 psi						
	0308	2.27 gph, 43.5 psi	0814	3.7 gph, 116 psi						
	2502*	0.53 gph, 363 psi	0430❖	7.13 gph, 50.8						
	1006	1.59 gph, 145 psi	0260❖	15.8 gph, 21.8 psi						
	Liquid end materials:									
	PP1	Polypropylene with EPDM O-rings								
	PP4	Polypropylene for high viscosity fluid with enlarged ports, with EPDM O-rings & Hastelloy C valve springs (Only for type 1002, 1006, 1310 & 0814)								
	NP1	Arcylic with PVC check valves & Viton® O-rings								
	NP3	Arcylic with PVC check valves & Viton® O-rings								
	NS3	Auto-degassing Arcylic with Viton® O-rings (Only for type 1601, 1201, 0803 & 1002)								
	PS3	Auto-degassing PVC with Viton® O-rings (Only for type 1601, 1201, 0803 & 1002)								
	TT1	Carbon-reinforced PTFE with PTFE O-rings								
	SS1	316 SS with PTFE O-rings (Only for types 0430 & 0260)								
	SS2	316 SS with PTFE O-rings, 1/4" FNPT thread								
	SB1	316 SS with PTFE O-rings, R 1/4" internal thread, R 1/2" for type 0260 (Recommended for combustible media)								
	SSM	as SS1, with diaphragm failure indicator, type 2501 only								
	SBM	as SB1, with diaphragm failure indicator, type 2501 only								
	Valve springs:									
0	Without springs									
1	With 2 springs, 316 SS, 1.4 psig (0.1 bar)									
Electrical connection:										
A	230 V 50/60 Hz 1 phase									
B	115 V 50/60 Hz 1 phase									
D	100 V 50/60 Hz 1 phase									
E	500 V 50/60 Hz 1 phase									
Control type:										
0	Stroke rate adjustment via potentiometer									
1	External contact									
2	Analog 0-20 mA									
3	Analog 4-20 mA									
4*	External contact, intrinsically safe [i,a]									
5*	Analog 0-20 mA, intrinsically safe [i,a]									
6*	Analog 4-20 mA, intrinsically safe [i,a]									
7	Manual with zero volts ON/OFF									
8	Manual with zero volts ON/OFF, intrinsically safe [i,a]									
Control variant:										
0	With potentiometer (Only for control type 0)									
1	With momentary contact push-button switch for maximum stroke rate (Not for control type 0)									
2	With spring-return change-over switch for maximum frequency rate (not for control type 0)									
Approval/Language:										
0	BVS - Europe, German, 100 V - 500 V									
1	BVS - Europe, English, 100 V - 500 V									
2	FM - USA, English, 115 V 230 V									
3	CSA - Canada, English, 115 V, 230 V									
EXBb	G	1000	PP1	0	A	0	0	0		

ProMinent® EXtronic® Solenoid Diaphragm Metering Pumps

Dimensional Drawings

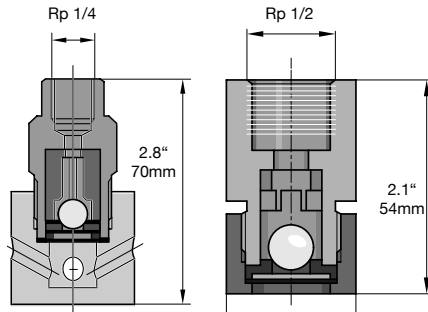


Dimensions in inches (mm)

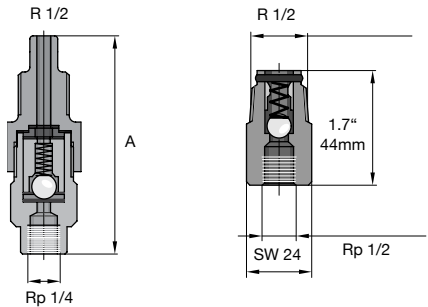
Pump		A	B	C	D	E	F	G
1000, 1601, 1201, 0803	NP1	15.4 (391)	5.4 (136)	2.7 (69)	ø70	6 x 4	ø38	9.0 (229)
1002, 0308, 2502/05, 1006	NP1	15.4 (391)	5.4 (136)	2.4 (61)	ø85	8 x 5	ø50	9.3 (237)
1310, 0613	NP1	15.4 (391)	5.4 (136)	2.0 (52)	ø100	8 x 5	ø66	9.6 (244)
0814, 0417	NP1	15.4 (391)	5.4 (136)	2.0 (52)	ø100	12 x 9	ø66	9.6 (244)
0430	NP1	15.0 (381)	5.4 (137)	1.8 (46)	ø135	DN 10	ø117	12.0 (304)
0260	NP1	15.7 (398)	5.6 (142)	.63 (16)	ø135	DN 15	ø117	12.4 (314)
1000, 1601, 1201, 0803	PP1	15.5 (393)	5.4 (136)	2.6 (67)	ø70	6 x 4	ø38	9.3 (236)
1002, 0308, 1006	PP1	15.5 (393)	5.4 (136)	2.6 (67)	ø70	8 x 5	ø50	9.3 (236)
0613	PP1	15.5 (393)	5.4 (136)	2.2 (57)	ø90	8 x 5	ø66	9.7 (246)
0814, 0417	PP1	15.5 (393)	5.4 (136)	2.2 (57)	ø90	8 x 5	ø66	9.7 (246)
0430	PP1	15.0 (381)	5.4 (137)	1.8 (46)	ø135	DN 10	ø117	12.0 (304)
0260	PP1	15.7 (398)	5.6 (142)	.63 (16)	ø135	DN 15	ø117	12.4 (314)
1002	PP4	15.3 (389)	5.4 (138)	1.8 (46)	ø85	DN 10	ø50	8.7 (222)
1006	PP4	15.3 (398)	5.7 (145)	3.0 (76)	ø85	DN 15	ø50	8.7 (222)
1310	PP4	15.3 (398)	5.7 (145)	3.0 (76)	ø85	DN 15	ø50	8.7 (222)
1014	PP4	15.3 (398)	5.7 (145)	2.7 (69)	ø100	DN 15	ø66	9.1 (229)
1000, 1601, 1202	TT1	14.9 (378)	5.3 (134)	2.9 (75)	ø60	6 x 4	ø38	8.8 (223)
0803	TT1	14.9 (378)	5.3 (134)	2.8 (70)	ø70	6 x 4	ø38	9.0 (228)
1002, 0308, 1006	TT1	15.3 (388)	5.3 (138)	1.3 (32)	ø95	8 x 5	ø66	10.5 (266)
0613	TT1	15.3 (388)	5.4 (138)	1.3 (32)	ø95	8 x 5	ø66	10.5 (266)
0814, 0417	TT1	15.3 (388)	5.4 (138)	1.3 (32)	ø95	12 x 9	ø66	10.5 (266)
0430	TT1	15.3 (388)	5.4 (137)	1.4 (35)	ø135	DN 10	ø117	10.4 (263)
0260	TT1	15.7 (398)	5.6 (142)	1.2 (31)	ø135	DN 15	ø117	10.6 (268)
1000, 1601, 1202	SS1	14.8 (376)	5.3 (134)	3.3 (84)	ø60	6 x 5	ø38	8.4 (214)
0803	SS1	14.8 (376)	5.3 (134)	3.1 (79)	ø70	6 x 5	ø38	8.6 (219)
1002, 0308, 2502/05, 1006	SS1	15.2 (386)	5.4 (138)	1.9 (48)	ø80	8 x 7	ø50	9.8 (250)
1310, 0613	SS1	15.2 (386)	5.4 (138)	1.5 (39)	ø95	8 x 7	ø66	10.2 (259)
0814, 0417	SS1	15.2 (386)	5.4 (138)	1.5 (39)	ø95	12 x 10	ø66	10.2 (259)
0430	SS1	15.2 (386)	5.4 (137)	1.4 (35)	ø135	DN 10	ø117	10.4 (263)
0260	SS1	15.4 (390)	5.6 (142)	1.1 (28)	ø135	DN 15	ø117	10.7 (271)
1000	SB1	14.7 (373)	5.3 (134)	3.4 (87)	ø70	R1/4"	ø38	8.3 (211)
1601, 1202, 0803	SB1	14.7 (373)	5.3 (134)	3.1 (79)	ø85	R1/4"	ø38	8.6 (219)
1002, 0308, 2502/05, 1006	SB1	15.0 (381)	5.4 (138)	2.2 (56)	ø80	R1/4"	ø50	9.5 (242)
1310, 0613	SB1	15.0 (381)	5.4 (138)	1.9 (48)	ø95	R1/4"	ø66	9.8 (250)
0814, 0417	SB1	15.0 (381)	5.4 (138)	1.9 (48)	ø95	R1/4"	ø66	9.8 (250)
0430	SB1	15.0 (381)	5.4 (138)	.87 (22)	ø145	R1/4"	ø117	10.8 (275)
0260	SB1	15.1 (383)	5.5 (139)	1.1 (27)	ø145	R1/2"	ø117	11.0 (279)
1601, 1202, 0803	NS3	15.1 (383)	5.4 (136)	2.6 (67)	s. Abb.	6 x 4	ø38	9.6 (243)
1002	NS3	15.1 (383)	5.4 (136)	2.6 (67)	s. Abb.	6 x 4	ø50	9.6 (243)
1601, 1202, 0803	NS3	15.1 (383)	5.4 (136)	2.6 (67)	s. Abb.	6 x 4	ø38	9.6 (243)
1002	NS3	15.1 (383)	5.4 (136)	2.6 (67)	s. Abb.	6 x 4	ø50	9.6 (243)

ProMinent® EXtronic® Solenoid Diaphragm Metering Pumps

Special Valves for EXtronic®

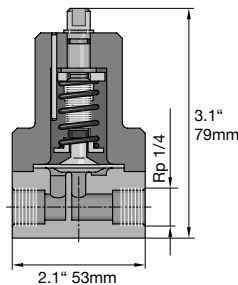


pk_1_031



pk_1_032_2

pk_1_027



pk_1_029



pk_1_028

Stainless steel 1.4404 "SB" foot valve

With filter and ball check valve, designed for use with flammable materials.

Materials: 1.4404/1.4401/PTFE/ceramic

Order No.

Connector ISO 7 Rp 1/4 SB version for ProMinent EXtronic® 809301

Connector ISO 7 Rp 1/2 SB version for ProMinent EXtronic® 924561

Stainless steel 1.4404 "SB" injection valve

Spring loaded ball check valve designed for use with flammable materials.

Materials: 1.4404/1.4401/Hastelloy C/PTFE/ceramic

Order No.

Connector ISO 7 Rp 1/4 - R 1/2, pre-pressure approx. 7.3 psi 809302

Connector ISO 7 Rp 1/2 - R 1/2, pre-pressure approx. 7.3 psi 924560

Adjustable "SB" back pressure valve

Materials: 1.4404; PTFE coated diaphragm. Connector both sides ISO 7 Rp 1/4

Order No.

Operating range approx. 14.5 - 145 psi (1-10 bar),
closed version designed for use with flammable materials. 924555

To generate a constant back pressure for accurate metering with a free outlet. Can also be used as an overflow valve.

PTFE dosing pipe

Carbon-filled, surface resistance $<10^7 \Omega$

Material	Length m	Ext. diam. x int. diam.	Permissible operating press. psi (bar)*	Order No.
PTFE	Sold by the foot	6.0 x 4.0	174 (12)	1024831
PTFE	Sold by the foot	8.0 x 5.0	232 (16)	1024830
PTFE	Sold by the foot	12.0 x 9.0	130.5 (9)	1024832

* permissible operating pressure at 68°F (20 °C) in accordance with EN ISO 7751, 1/4 of the bursting pressure, assuming chemical resistance and correct connection.

Additional ancillary equipment, i.e. foot valves, injection valves and back pressure valves in the usual material combinations, identical to gamma ancillary equipment and/or for connector DN 15 Vario ancillary equipment, see section 2.14.

Stainless steel straight threaded connectors

Swagelok system in stainless steel SS 316 (1.4401) for connection of pipework to liquid ends and valves with internal thread and for SB version.

Normal thread o-rings compounds required.

Order No.

6 mm - ISO 7 R 1/4 359526

8 mm - ISO 7 R 1/4 359527

Motor-Driven Metering Pumps

QUICK REFERENCE

“Motor-Driven Metering Pumps” T.O.C.

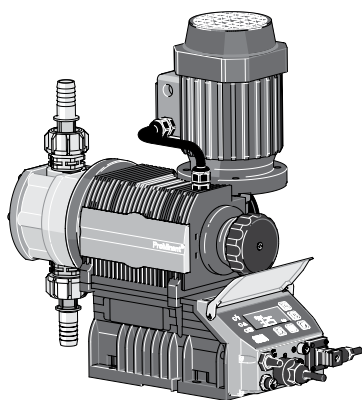
IV

CATALOG SECTION TABS

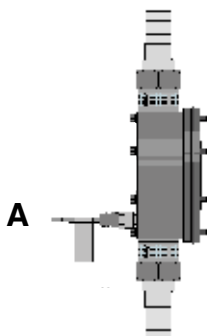
product overview	<ul style="list-style-type: none"> ■ Introduction ■ pump selection by capacity ■ chemical resistance list ■ Solenoid & Motor Pump Overview ■ Analytical Instrumentation Overview 	product overview
solenoid-driven metering pumps	<ul style="list-style-type: none"> ■ concept PLUS ■ beta ■ gamma/L ■ delta ■ extronic ■ mikro delta 	solenoid-driven metering pumps
motor-driven metering pumps	<ul style="list-style-type: none"> ■ Sigma/ 1 ■ Sigma/ 2 ■ Sigma/ 3 ■ ProMus ■ Makro ■ Orlita ■ DulcoFlex 	motor-driven metering pumps
pump spare parts & accessories	<ul style="list-style-type: none"> ■ solenoid pump spare parts ■ motor pump spare parts ■ pump accessories 	pump spare parts & accessories
DULCOMETER® instrumentation	<ul style="list-style-type: none"> ■ D1C ■ D2C ■ Dulcometer® Compact ■ DMT ■ DDC ■ MicroFlex ■ SlimFlex ■ MultiFLEX ■ AEGIS 	DULCOMETER® instrumentation
DULCOTEST® sensors	<ul style="list-style-type: none"> ■ amperometric sensors ■ potentiometric sensors ■ potentiostatic sensors ■ conductometric sensors ■ accessories 	DULCOTEST® sensors
polymer blending systems	<ul style="list-style-type: none"> ■ ProMix™-M (A Controls) ■ ProMix™-M (B Controls) ■ ProMix™-S ■ ProMix™-C 	polymer blending systems

ProMinent® Sigma/ 1 Motor Diaphragm Metering Pumps

Overview: Sigma/ 1



S1Ca



A

Ideal for Economical mid-range applications

(see [page 128](#) for spare parts and [page 134](#) for control cables)

The ProMinent® Sigma/ 1 is a mechanically actuated diaphragm metering pump. It has a capacity range of 5.3-38 gph (20-144 l/h) at a maximum back pressure of 174-58 psi (12-4 bar). The pump capacity is adjusted by varying the stroke length (4 mm) in 1% increments via a self-locking adjusting knob.

The reproducible metering accuracy is better than $\pm 2\%$ providing installation has been correctly carried out, and in the stroke length range of 30-100%. (Instructions in the operating instructions manual must be followed.)

The stable, corrosion resistant metal and plastic housing is rated IP 65. To facilitate adaptation of the pumps to the widest possible range of processing requirements we offer a choice of three gearbox ratios, three liquid end sizes, two liquid end materials and either contact or analog signal (e.g., 0/4-20 mA) control options in the form of the S1Ca Sigma controller.

For safety reasons, all motor-driven metering pumps must be equipped with adequate protection against electrical overload.

All PVDF versions are NSF/ANSI 61 approved.

Diaphragm Failure Indication (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 discharge to the outside occur if the diaphragm ruptures. When the diaphragm ruptures, feed chemical enters between the diaphragm layers and triggers a mechanical indication or an alarm via the sensor area. This concept ensures reliable metering - even under critical operating conditions.

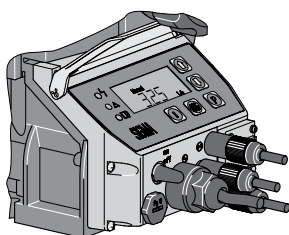
In connection with the S1Ca, continued metering, or alternatively, a stopping of the metering pump can be selected.

Sigma/ 1 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 single phase AC motor or a 3 phase motor.

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

Sigma/1 Control Type (S1Ca)



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

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

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

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

Local or remote control is possible with PROFIBUS® and/or an integrated process timer.

(see [page 134](#))

ProMinent® Sigma/ 1 Motor Diaphragm Metering Pumps

Standard Modes and Functions

Feed rate is determined by stroke length and stroke rate. Stroke length is manually adjustable from 1 to 100% in increments of 1% via the stroke length knob.

Stroke rate can be set to a maximum of 90, 170, or 200 strokes per minute (pump dependent). An illuminated LCD displays stroke length, stroke rate, and an accumulative stroke counter, that can be cleared and reset.

Pump capacity output is displayed in either U.S. gph or l/h, set by the operator. Output is accumulated and totalized capacity is also displayed in either U.S. gallons or liters.

The “i” key is used to scroll information screens for stroke rate, stroke length, stroke counter, capacity, and totalized capacity. Other information is available depending on control mode.

Control Modes

The control modes available with the Sigma/1 include manual, external contact with pulse control (multiplier/divider), batch, or analog control. The PROFIBUS® option includes all control modes, plus fieldbus connection.

In the “Manual” mode, stroke rate is controlled manually. The “Contact” external mode allows adjustments to be made externally (e.g., by means of a pulse-type water meter for proportional chemical feed.) Pulse signals are fed into the contact input of the pump by an optional control cable. Each pulse from a water meter or pulse-type controller provides the pump with an input to pump at the selected pulse ratio, up to the pump’s maximum stroke rate. Over-stroking the pump is not possible.

Standard Functions

“Calibrate”

The pump can be directly calibrated in-line to actual flow. Calibration is maintained within the stroke frequency range of 90/170/200 spm (model dependent.) A warning indicator flashes when adjustments to the stroke volume are made outside the calibrated range of +/- 10%.

“Auxiliary Frequency”

An auxiliary frequency can be programmed. This default stroking rate can be enabled via the optional control cable.

“Flow”

The Sigma/1 series metering pumps will monitor their own output, with an optional adjustable flow monitor. Every fluid discharge is sensed and fed back to the electronic control circuit of the pump. If insufficient fluid is discharged for a predetermined number of strokes (up to 125), the pump automatically stops and the red LED illuminates. The optional fault relay changes state to issue an alarm or activate a standby pump.

“Float Switch”

An optional two-stage ProMinent float switch can be plugged into the pump to monitor chemical tank levels. An early warning is issued when the allowable minimum level is reached. The pump continues to operate while the display flashes, the yellow LED illuminates and an optional collective fault relay changes state to issue an alarm. If the liquid level in the supply tank drops another 3/4” (20 mm), the pump automatically shuts down, the LCD displays “Minim” and the red LED illuminates. The optional fault relay remains activated.

“Pause”

The Sigma/1 series can be remotely started and stopped via a dry contact through the optional control cable.

“Stop”

The Sigma/1 can be stopped by pressing the STOP/START key without disconnecting from the power supply.

“Prime”

Priming is activated by pressing both arrow keys at the same time while the frequency display is showing.

Function and Error Indicators

Three LED lights on the pump faceplate signal operational status. The green light flashes during normal operation, and the yellow light warns of a situation that could lead to a fault (e.g., low chemical). If a fault occurs “error” will appear on the LCD screen and the red LED illuminates.



ProMinent® Sigma/ 1 Motor Diaphragm Metering Pumps

Optional Modes and Functions

Optional Control Modes

“Analog” Mode

With this option, the stroking rate of the Sigma/1 is directly proportional to the analog signal. For a custom range setting, the curve feature of the analog input can be selected. With this, the pump response to the analog input can be easily programmed.

“Contact” Mode with Pulse Control

This feature is used to “tune” the pump to contact generators of any kind (e.g., pulse-type water meter or process controller), and eliminate the need for a costly external control unit. The following functions can be selected by means of the keypad.

Pulse step-up (multiply) and step-down (divide)

By simply entering a factor in the 0.01-99.99 range, the step-up or step-down ratio is set.

For example:

Step-up Factor:

99.99 1 pulse = 99.99 pump strokes
10 1 pulse = 10 pump strokes

Step-down Factor:

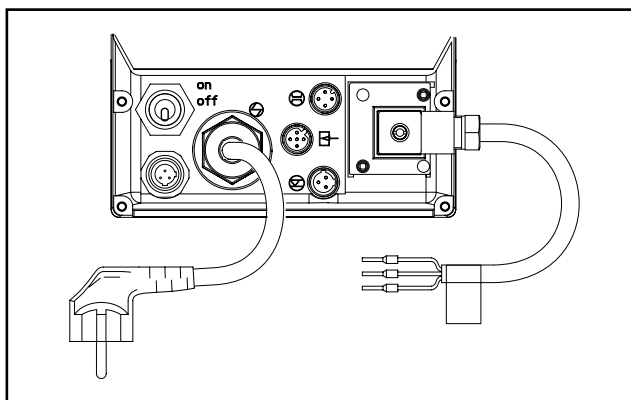
0.25 4 pulses = 1 pump stroke
0.01 100 pulses = 1 pump stroke

“Batch” Mode

The Batch mode is a variation of the contact operating mode. A number of strokes can be predetermined up to 65,535 strokes (whole numbers) or the feed quantity can be predetermined. The batch is then initiated by either pressing the “P” key on the pump face or providing a contact to the external control cable.

Access Code

A programmable access code to prevent unauthorized changes to settings is available as an option.



An external panel enables optional relays to be installed on-site.

Relay outputs

Fault annunciating relay

For low tank level (flow switch), loss of flow (flow monitor), loss of analog signal and diaphragm failure detector, system faults and fuse/power supply failure.

Fault annunciating and Pacing relay

In addition to the fault annunciating relay, a contact closure is issued with every pump stroke (contact duration 150 ms.) This allows a second ProMinent metering pump to be paced synchronously, or to totalize flow with an external stroke counter.

4-20 mA Analog Output

A 4-20 mA analog output option is available for use with pumps that operate in the manual mode or by a remote 4-20 mA analog reference signal. The 4-20 mA analog output signal is linear to pump frequency multiplied by the percentage of stroke length. The output signal is isolated and can drive up to 300 Ohms impedance. Analog output can be used for status feedback to higher level control systems for closed loop control or for monitoring chemical usage. This option is available in combination with either the fault annunciating or pacing relay.

Timer Relay

The optional integrated 2-week timer offers 81 programmable events. It can be set to hourly, daily, work days, weekend, weekly, or two-week periods with switch-on times from 1 second to two weeks. The timer can be programmed to change operation mode, frequency, and the function of two relays. All the functions can be programmed independently of one another. Up to 13 delay times can be programmed into the timer function.

The range of applications exceeds that of a “standard timer”. Typical application is disinfection in cooling towers, process water, etc. with the ability to automatically program shock dosages or increase the concentration at a certain interval.

Fieldbus connection

Monitor and control remotely via a SCADA/PLC system using the PROFIBUS®-DP system.

Note: Relay options not available with profibus and cannot be retrofitted in the field.

ProMinent® Sigma/ 1 Motor Diaphragm Metering Pumps

Specifications

General:

<i>Maximum stroke length:</i>	0.16" (4.0 mm)		
<i>Power cord:</i>	6 feet (2 m) 2 wire + ground (supplied on control versions)		
<i>Stroke frequency control:</i>	S1Ba: Constant speed or optional DC/SCR drive or AC inverter S1Ca: Microprocessor control version with innovative start/stop and variable speed control proportional to set frequency or external control signal.		
<i>Stroke counting:</i>	Standard on S1Ca		
<i>Materials of construction</i>			
<i>Housing:</i>	Glass-filled Luranyl™ (PPE)		
<i>Wetted materials of construction:</i>	Liquid End:	PVDF	316 SS
	Suct./Dis. Connectors:	PVDF	316 SS
	Seals:	PTFE/Viton®	PTFE/Viton®
	Check Balls:	Ceramic	SS
	Pressure Relief Valves:	PVDF/Viton® O-rings	SS/Viton® O-rings
<i>Drive:</i>	Cam and spring-follower (lost motion)		
<i>Lubrication:</i>	Sealed grease lubricated bearings and gearing		
<i>Warranty:</i>	Two years on drive, one year on liquid end.		
<i>Factory testing:</i>	Each pump is tested for rated flow at maximum pressure.		
<i>Industry Standard:</i>	CE approved, CSA available (standard in Canada), NSF/ANSI 61		
<i>Diaphragm materials:</i>	PTFE faced EPDM with Nylon reinforcement and steel core		
<i>Liquid end options:</i>	Polyvinylidene Fluoride (PVDF) or 316 SS, with PTFE faced Viton® seals		
<i>Check valves:</i>	Single ball check, PVDF and SS versions. Optional springs available in Hastelloy C		
<i>Repeatability:</i>	When used according to the operating instructions, better than ±2%		
<i>Max. fluid operating temperatures:</i>	Material	Constant (Max. Backpressure)	Short Term (15 min. @ max.30 psi)
	PVDF	149°F (65°C)	212°F (100°C)
	316 SS	194°F (90°C)	248°F (120°C)
<i>Diaphragm failure indication:</i>	Visual indicator is mandatory. The delivery unit has a patented multilayer safety diaphragm as standard and a visual diaphragm rupture indicator.		
<i>Max. solids size in fluid:</i>	0.3 mm		
<i>Stroke length adjustment:</i>	Manual, in increments of 1%. Motorized stroke length adjustment is available.		

Sigma/1 Basic Version

Motor: See available motors in Identcode

ProMinent® Sigma/ 1 Motor Diaphragm Metering Pumps

Specifications (Cont.)

Sigma/1 Control Version

<i>Control Function:</i>	At stroke frequencies equal to or greater than 33%, the integral AC variable frequency drive continuously varies the motor speed in a linear response to the incoming signal. At stroke frequencies less than 33%, the motor starts and stops according to a control algorithm to provide the desired stroke frequency. In the start-stop mode the motor speed is constant at approximately 580 RPM.
<i>Enclosure rating:</i>	(IP 65)
<i>Motor data:</i>	Totally enclosed, fan cooled (IP55); class F insulation; IEC frame; 1/8 HP (0.09 kW) 230 V, 3 phase (0.7 A)
<i>Relay load</i>	
<i>Fault relay only (options 1 & 3):</i>	Contact load: 250 VAC, 2 A, 50/60 Hz Operating life: > 200,000 switch functions
<i>Fault and pacing relay (options 4 & 5):</i>	Contact load: max. 24 V, AC/DC, max. 100 mA maximum 50x10 ⁶ switch cycles @ 10 V, 10 mA Contact closure: 100 ms (for pacing relay)
<i>Analog output signal:</i>	maximum impedance 300 W Isolated 4-20 mA output signal
<i>PROFIBUS® - DP fieldbus options:</i>	Transfer: RS - 485 Wiring: 2-wired, twisted, shielded Length: 3637 ft (1200 m)/328 ft (100 m) Baudrate: 9600 bits/s; 12 Mbits/s No. of participants: 32 with 127 repeaters Topology: Line Access procedure: Master/master with token ring <i>Relay cable (optional):</i> 6 feet (2 m) 3 wire (SPDT) 250 VAC, 2 A
<i>Pulse contact/remote pause contact:</i>	With voltage-free contact, or semiconductor sink logic control (not source logic) with a residual voltage of <700 mV. The contact load is approximately 0.5 mA at + 5 VDC. (Note: Semiconductor contacts that require >700 mV across a closed contact should not be used.)
<i>Max. pulse frequency:</i>	25 pulses/sec
<i>Contact impedance:</i>	10 kOhm
<i>Max. pulse memory:</i>	65,535 pulses
<i>Necessary contact duration:</i>	20ms
<i>Analog - current input burden:</i>	Approximately 120 Ohm
<i>Max. allowable input current:</i>	50 mA
<i>Power requirements:</i>	Single phase, 115-230 VAC ± 10%, 50/60 Hz

Capacity Data Notice

(The following capacities and suction lift refer to pumps tested on water at 115 VAC, 60 Hz, and an ambient temperature of 70° F (20° C). Higher specific gravity fluids will reduce suction lift. Capacities will be slightly reduced from published ratings if pumps are skid mounted).

ProMinent® Sigma/ 1 Motor Diaphragm Metering Pumps

Capacity Data

Sigma/1 Basic Version

Technical data:	60 Hz (1750 RPM) operation *Capacity at Maximum Pressure				Max. Stroke Rate	Output per Stroke	Max. Suction Lift	Max. Suction Pressure		Suction/Discharge Connector		*Shipping Weight w/Motor
Pump Version	psig	(bar)	U.S. (l/h)	gph	Stroke/min.	ml/stroke	(water) ft (m)	psig	(bar)	DN	in	(approx.) lbs (kg)
S1Ba HM												
12017 PVT	145	(10)	5.3 (20)		88	4	23 (7)	14.5	(1)	10	1/2 MNPT	19.8 (9)
12017 SST	174	(12)	5.3 (20)		88	4	23 (7)	14.5	(1)	10	3/8 FNPT	26.5 (12)
12035 PVT	145	(10)	11.1 (42)		172	4	23 (7)	14.5	(1)	10	1/2 MNPT	19.8 (9)
12035 SST	174	(12)	11.1 (42)		172	4	23 (7)	14.5	(1)	10	3/8 FNPT	26.5 (12)
10050 PVT	145	(10)	15.8 (60)		240	4	23 (7)	14.5	(1)	10	1/2 MNPT	19.8 (9)
10050 SST	145	(10)	15.8 (60)		240	4	23 (7)	14.5	(1)	10	3/8 FNPT	26.5 (12)
10022 PVT	145	(10)	6.8 (26)		88	5.1	19.6 (6)	14.5	(1)	10	1/2 MNPT	19.8 (9)
10022 SST	145	(10)	6.8 (26)		88	5.1	19.6 (6)	14.5	(1)	10	3/8 FNPT	26.5 (12)
10044 PVT	145	(10)	14 (53)		172	5.1	19.6 (6)	14.5	(1)	10	1/2 MNPT	19.8 (9)
10044 SST	145	(10)	14 (53)		172	5.1	19.6 (6)	14.5	(1)	10	3/8 FNPT	26.5 (12)
07065 PVT	102	(7)	20.6 (78)		240	5.1	19.6 (6)	14.5	(1)	10	1/2 MNPT	19.8 (9)
07065 SST	102	(7)	20.6 (78)		240	5.1	19.6 (6)	14.5	(1)	10	3/8 FNPT	26.5 (12)
07042 PVT	102	(7)	13.2 (50)		88	9.7	9.8 (3)	14.5	(1)	15	3/4 MNPT	21 (9.5)
07042 SST	102	(7)	13.2 (50)		88	9.7	9.8 (3)	14.5	(1)	15	1/2 FNPT	29.8 (13.5)
04084 PVT	58	(4)	26.7 (101)		172	9.7	9.8 (3)	14.5	(1)	15	3/4 MNPT	21 (9.5)
04084 SST	58	(4)	26.7 (101)		172	9.7	9.8 (3)	14.5	(1)	15	1/2 FNPT	29.8 (13.5)
04120 PVT	58	(4)	38 (144)		240	9.7	9.8 (3)	14.5	(1)	15	3/4 MNPT	21 (9.5)
04120 SST	58	(4)	38 (144)		240	9.7	9.8 (3)	14.5	(1)	15	1/2 FNPT	29.8 (13.5)

* Flow rates and shipping weights are for 1/8 HP standard motors. Addition of 1/3 HP or 1/2 HP motors may increase output (consult factory for details.)

Sigma/1 Control Version

Technical data:	60 Hz operation Capacity at Maximum Pressure				Max. Stroke Rate	Output per Stroke	Max. Suction Lift	Max. Suction Pressure		Suction/Discharge Connector		*Shipping Weight w/Motor
Pump Version	psig	(bar)	U.S. (L/h)	gph	Stroke/min	mL/stroke	(water) ft (m)	psig	(bar)	DN	in	(approx.) lbs (kg)
S1Ca HM												
12017 PVT	145	(10)	5.3 (20)		90	4	23 (7)	14.5	(1)	10	1/2 MNPT	19.8 (9)
12017 SST	174	(12)	5.3 (20)		90	4	23 (7)	14.5	(1)	10	3/8 FNPT	26.5 (12)
12035 PVT	145	(10)	11.1 (42)		170	4	23 (7)	14.5	(1)	10	1/2 MNPT	19.8 (9)
12035 SST	174	(12)	11.1 (42)		170	4	23 (7)	14.5	(1)	10	3/8 FNPT	26.5 (12)
10050 PVT	145	(10)	13.2 (50)		200	4	23 (7)	14.5	(1)	10	1/2 MNPT	19.8 (9)
10050 SST	145	(10)	13.2 (50)		200	4	23 (7)	14.5	(1)	10	3/8 FNPT	26.5 (12)
10022 PVT	145	(10)	6.8 (26)		90	5.1	19.6 (6)	14.5	(1)	10	1/2 MNPT	19.8 (9)
10022 SST	145	(10)	6.8 (26)		90	5.1	19.6 (6)	14.5	(1)	10	3/8 FNPT	26.5 (12)
10044 PVT	145	(10)	14 (53)		170	5.1	19.6 (6)	14.5	(1)	10	1/2 MNPT	19.8 (9)
10044 SST	145	(10)	14 (53)		170	5.1	19.6 (6)	14.5	(1)	10	3/8 FNPT	26.5 (12)
07065 PVT	102	(7)	17.2 (65)		200	5.1	19.6 (6)	14.5	(1)	10	1/2 MNPT	19.8 (9)
07065 SST	102	(7)	17.2 (65)		200	5.1	19.6 (6)	14.5	(1)	10	3/8 FNPT	26.5 (12)
07042 PVT	102	(7)	13.2 (50)		90	9.7	9.8 (3)	14.5	(1)	15	3/4 MNPT	21 (9.5)
07042 SST	102	(7)	13.2 (50)		90	9.7	9.8 (3)	14.5	(1)	15	1/2 FNPT	29.8 (13.5)
04084 PVT	58	(4)	26.7 (101)		172	9.7	9.8 (3)	14.5	(1)	15	3/4 MNPT	21 (9.5)
04084 SST	58	(4)	26.7 (101)		172	9.7	9.8 (3)	14.5	(1)	15	1/2 FNPT	29.8 (13.5)
04120 PVT	58	(4)	31.7 (120)		200	9.7	9.8 (3)	14.5	(1)	15	3/4 MNPT	21 (9.5)
04120 SST	58	(4)	31.7 (120)		200	9.7	9.8 (3)	14.5	(1)	15	1/2 FNPT	29.8 (13.5)

* Flow rates and shipping weights are for 1/8 HP standard motors. Addition of 1/3 HP or 1/2 HP motors may increase output (consult factory for details.)

Materials In Contact With Chemicals

Liquid End	Suction/Discharge connector	Valve	Seals/ ball seat	Balls
PVT	PVDF (Polyvinylidene fluoride)	PVDF (Polyvinylidene fluoride)	PTFE/PTFE	Ceramic
SST	Stainless steel	Stainless steel	PTFE/PTFE	Stainless steel

ProMinent® Sigma/ 1 Motor Diaphragm Metering Pumps

Identcode Ordering System (S1Ba)

S2Ba	Drive Type												
	HM	Main Drive, Diaphragm											
		Version: Capacity:											
		16050*	15.9 gph (60 l/h), 145 psi (10 bar)	07120	38 gph (144 l/h), 100 psi (7 bar)								
		16090*	28.5 gph (108 l/h), 145 psi (10 bar)	07220	69.7 gph (264 l/h), 100 psi (7 bar)								
		16130*	41 gph (156 l/h), 145 psi (10 bar)	04350	111 gph (420 l/h), 58 psi (4 bar)	* For PVDF versions. Maximum 145 psig (10 bar)							
		Liquid end material:											
		PV	PVDF										
		SS	316 Stainless Steel										
		O-ring:											
		T	PTFE										
		Diaphragm type:											
		A	Safety diaphragm w/ pump stop function										
		S	Safety diaphragm w/ visual indicator										
		Liquid end version:											
		0	Without valve springs										
		1	With 2 valve springs (Hastelloy C4, 1 psig)										
		Hydraulic connections:											
		0	No nuts, No inserts										
		7	PVDF clamping nut & insert										
		8	SS clamping nut & insert										
		Labeling:											
		0	Standard with logo										
		Motor mount:											
		2	Without motor, with NEMA 56C flange										
		Enclosure rating:											
		0	Standard										
		Stroke sensor:											
		0	Without stroke sensor (Standard)										
		2	With Pacing relay (Consult Factory)										
		Stroke length adjustment:											
		0	Manual (Standard)										
1	with 3P stroke positioning motor, 230 V 50/60 Hz												
2	with 3P stroke positioning motor, 115 V 50/60 Hz												
4	W/ stroke positioning motor 4-20 mA, 230 V 50/60 Hz												
6	W/ stroke positioning motor 4-20 mA, 115 V 50/60 Hz												
S2Ba	HM	12050	PV	T	0	0	7	0	2	0	0	0	

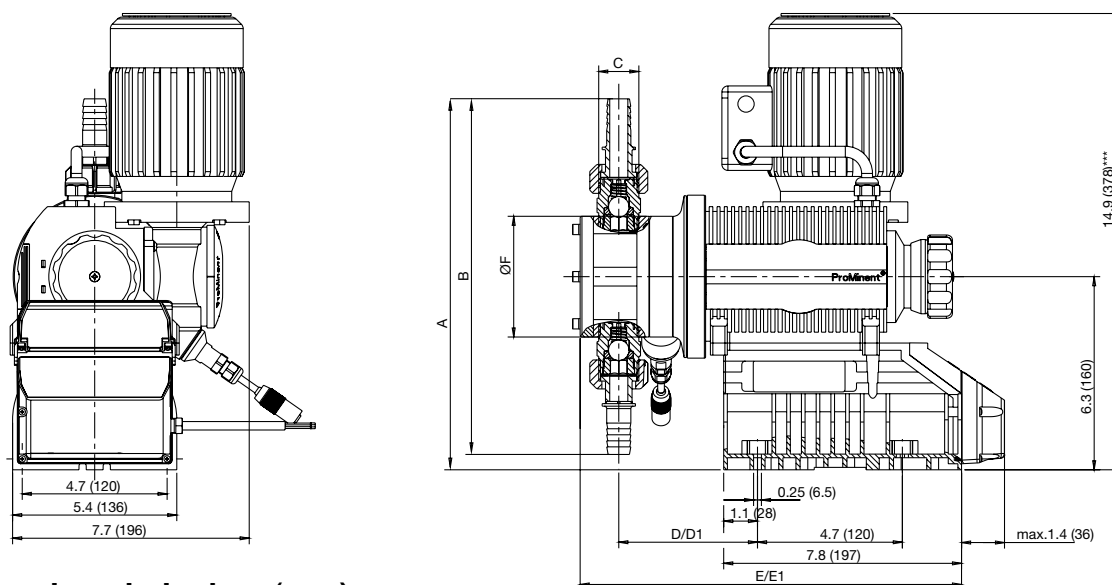
ProMinent® Sigma/ 1 Motor Diaphragm Metering Pumps

Identcode Ordering System (S1Ca)

S1Ca	Drive Type																	
	H	Main Drive, Diaphragm	Version: Capacity:															
			12017*	5.2 gph (20 l/h), 145 psi (10 bar)	07065	17.2 gph (65 l/h), 102 psi (7 bar)												
			12035*	11.1 gph (42 l/h), 145 psi (10 bar)	07042	13.2 gph (50 l/h), 102 psi (7 bar)												
			10050	13.2 gph (50 l/h), 145 psi (10 bar)	04084	26.7 gph (101 l/h), 58 psi (4 bar)	* For PVDF versions. Max. 145 psig											
			10022	6.8 gph (26 l/h), 145 psi (10 bar)	04120	31.7 gph (120 l/h), 58 psi (4 bar)	NOTE: Refer to technical data for capacities and stroke rates											
			10044	14 gph (53 l/h), 145 psi (10 bar)														
			Liquid end material:															
			PVT	PVDF with PTFE gasket														
			SST	316 Stainless Steel with PTFE gasket														
			O-ring:															
			T	PTFE														
			Diaphragm type:															
			A	Safety diaphragm w/ pump stop fuction														
			B	Safety diaphragm w/alarm indication														
			S	Safety diaphragm w/ visual indicator														
			Liquid end version:															
			0	Without valve springs														
			1	With 2 valve springs (Hastelloy C4, 1 psig)														
			Hydraulic connections:															
			7	PVDF clamping nut & insert														
			8	SS clamping nut & insert														
			Logo:															
			0	Standard with logo														
			Electrical Connection (± 10%):															
			U	1 ph, 115-230 V (± 10%), 50/60 Hz														
			Cable and plug with 6 ft (2 m) power cord, single phase:															
			A	6 ft European														
			C	6 ft Australia														
			D	6 ft USA														
			U	6 ft USA, 230 V														
			Relay:															
			0	No relay														
			1	Fault annunciating relay, drops out														
			3	Fault annunciating relay, pulls in														
			4	Option 1 + pacing relay														
			5	Option 3 + pacing relay														
			C	4-20 mA output, drops out														
			D	4-20 mA output, pulls in														
			E	4-20 mA output, pacing relay														
			Control variant:															
			0	Manual + External with pulse control (multiplier/divider)														
			1	Manual + External with pulse controls & analog control														
			4	Option 0 + Timer														
			5	Option 1 + Timer														
			P	Option 1 + PROFIBUS (Relay must be 0)														
			Access Code:															
			0	No access code														
			1	Access code														
			Flow monitor:															
0	Input for metering monitor signal (pulse)																	
1	Input for maintained flow switch signal																	
Stroke length adjustment:																		
C	Manual + Calibration																	
S1Ca	H	12017	PVT	T	A	0	7	0	U	A	0	0	0	0	C			

ProMinent® Sigma/ 1 Motor Diaphragm Metering Pumps

Dimensional Drawing: (S1Ba)



Dimensions in inches (mm)

Type Sigma/ 1	A	B	Suction/ Discharge Valve Thread C*	D	D1**	E	E1**	ØF
12017, 12035, 10050, 10022, 10044, 07065 PVT	11 (279)	9.38 (238)	1/2" MNPT	3.54 (90)	4.33 (110)	10.8 (275)	11.6 (295)	3.8 (96)
SST	9.75 (248)	7.13 (181)	3/8" FNPT	3.5 (89)	4.29 (109)	10.8 (275)	11.6 (295)	3.8 (96)
07042, 04084, 04120 PVT	11.38 (289)	10 (254)	3/4" MNPT	3.74 (95)	4.52 (115)	11.2 (285)	12 (305)	4.8 (122)
SST	10.25 (260)	8.13 (206)	1/2" FNPT	3.7 (94)	4.48 (114)	11.2 (285)	12 (305)	4.8 (122)

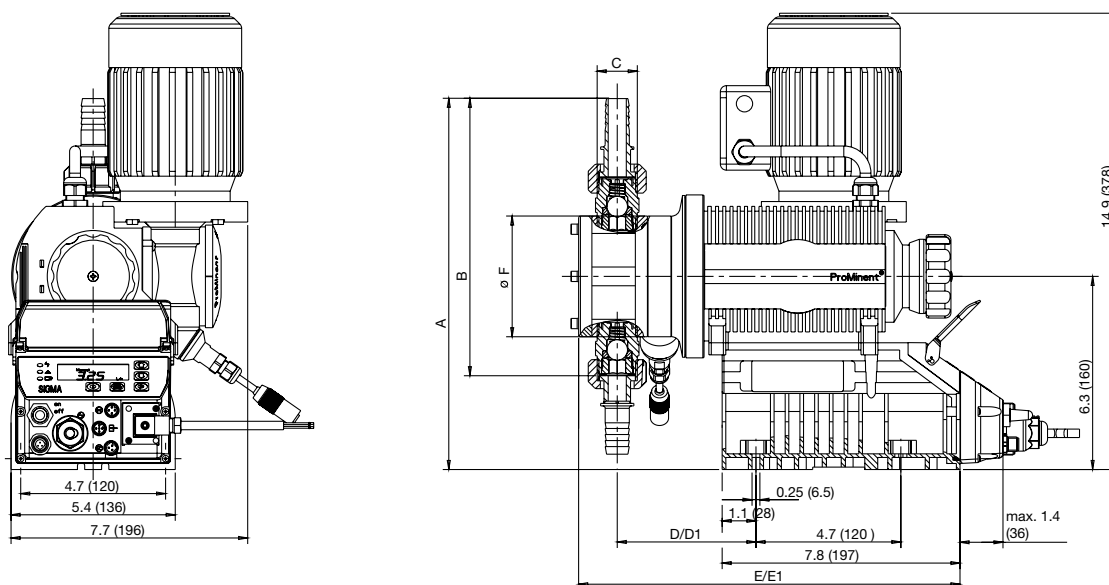
* Piping adapters provided according to technical data.

** Dimensions with diaphragm failure detector.

*** Dimension may vary depending on motor installed.

ProMinent® Sigma/ 1 Motor Diaphragm Metering Pumps

Dimensional Drawing: (S1Ca)



Dimensions in inches (mm)

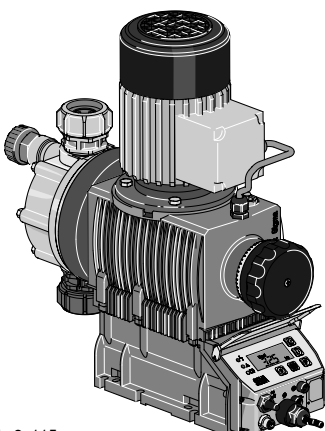
Type Sigma/ 1	A	B	Suction/ Discharge Valve Thread C*	D	D1**	E	E1**	ØF
12017, 12035, 10050, 10022, 10044, 07065 PVT	11 (279)	9.38 (238)	1/2" MNPT	3.54 (90)	4.33 (110)	10.8 (275)	11.6 (295)	3.8 (96)
SST	9.75 (248)	7.13 (181)	3/8" FNPT	3.5 (89)	4.29 (109)	10.8 (275)	11.6 (295)	3.8 (96)
07042, 04084, 04120 PVT	11.38 (289)	10 (254)	3/4" MNPT	3.74 (95)	4.52 (115)	11.2 (285)	12 (305)	4.8 (122)
SST	10.25 (260)	8.13 (206)	1/2" FNPT	3.7 (94)	4.48 (114)	11.2 (285)	12 (305)	4.8 (122)

* Piping adapters provided according to technical data.

** Dimensions with diaphragm failure detector.

ProMinent® Sigma/ 2 Motor Diaphragm Metering Pumps

Overview: Sigma/ 2



pk_2_115

Ideal for Economical mid-range applications

(see [page 128](#) for spare parts and [page 134](#) for control cables)

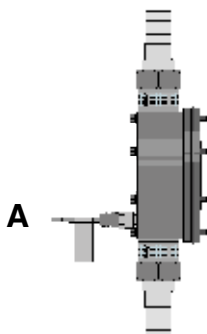
The ProMinent® Sigma/ 2 is a mechanically actuated diaphragm metering pump. It has a capacity range of 15.9-111 gph (60-420 l/h) at a maximum back pressure of 58-232 psi (16-4 bar). The pump capacity is adjusted by varying the stroke length (5 mm) in .05% increments via a self-locking adjusting knob.

The reproducible metering accuracy is better than $\pm 2\%$ providing installation has been correctly carried out, and in the stroke length range of 30-100%. (Instructions in the operating instructions manual must be followed.)

The stable, corrosion resistant metal and plastic housing is rated IP 65. To facilitate adaptation of the pumps to the widest possible range of processing requirements we offer a choice of three gearbox ratios, three liquid end sizes, two liquid end materials and either contact or analog signal (e.g., 0/4-20 mA) control options in the form of the S2Ca Sigma controller.

For safety reasons, all motor-driven metering pumps must be equipped with adequate protection against electrical overload.

All PVDF versions are NSF/ANSI 61 approved.



Diaphragm Failure Indication (A)

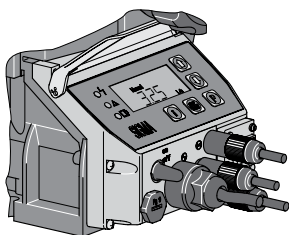
The delivery unit has a patented multilayer safety diaphragm as standard and a visual diaphragm rupture indicator. The diaphragm is coated with PTFE film on both sides, from the drive and working side. This guarantees that no discharge to the outside occur if the diaphragm ruptures. When the diaphragm ruptures, feed chemical enters between the diaphragm layers and triggers a mechanical indication or an alarm via the sensor area. This concept ensures reliable metering - even under critical operating conditions.

In connection with the S2Ca, continued metering, or alternatively, a stopping of the metering pump can be selected.

Sigma/ 2 Basic Type (S2Ba)

The ProMinent® Sigma Basic type is a motor driven metering pump with no internal electronic control system. The ProMinent® S2Ba offers a variety of different drive options in the single phase AC motors (56-C flange). Different flanges are available so that customers can use their own motor to drive the pump.

Sigma/ 2 Control Type (S2Ca)



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, LED's function as operation or fault indicators and fault indicator or pacing relays monitor the pump function.

Local or remote control is possible with PROFIBUS® and/or an integrated process timer.

(see [page 134](#))

ProMinent® Sigma/ 2 Motor Diaphragm Metering Pumps

Standard Modes and Functions

Feed rate is determined by stroke length and stroke rate. Stroke length is manually adjustable from 1 to 100% in increments of 1% via the stroke length knob.

Stroke rate can be set to a maximum of 90, 170, or 200 strokes per minute (pump dependent). An illuminated LCD displays stroke length, stroke rate and an accumulative stroke counter, that can be cleared and reset.

Pump capacity output is displayed in either U.S. gph or l/h, set by the operator. Output is accumulated and totalized capacity is also displayed in either U.S. gallons or litres.

The “i” key is used to scroll information screens for stroke rate, stroke length, stroke counter, capacity, and totalized capacity. Other information is available depending on control mode.

Control Modes

The control modes available with the Sigma/1 include manual, external contact with pulse control (multiplier/divider), batch, or analog control. The Profibus option includes all control modes, plus fieldbus connection.

In the “Manual” mode, stroke rate is controlled manually. The “Contact” external mode allows adjustments to be made externally (e.g., by means of a pulse-type water meter for proportional chemical feed.) Pulse signals are fed into the contact input of the pump by an optional control cable. Each pulse from a water meter or pulse-type controller provides the pump with an input to pump at the selected pulse ratio, up to the pump’s maximum stroke rate. Over-stroking the pump is not possible.

Standard Functions

“Calibrate”

The pump can be directly calibrated in-line to actual flow. Calibration is maintained within the stroke frequency range of 90/170/200 spm (model dependent). A warning indicator flashes when adjustments to the stroke volume are made outside the calibrated range of +/- 10%.

“Auxiliary Frequency”

An auxiliary frequency can be programmed. This default stroking rate can be enabled via the optional control cable.

“Flow”

The Sigma/2 series metering pumps will monitor their own output, with an optional adjustable flow monitor. Every fluid discharge is sensed and fed back to the electronic control circuit of the pump. If insufficient fluid is discharged for a predetermined number of strokes (up to 125), the pump automatically stops and the red LED illuminates. The optional fault relay changes state to issue an alarm or activate a standby pump.

“Float Switch”

An optional two-stage ProMinent float switch can be plugged into the pump to monitor chemical tank levels. An early warning is issued when the allowable minimum level is reached. The pump continues to operate while the display flashes, the yellow LED illuminates and an optional collective fault relay changes state to issue an alarm. If the liquid level in the supply tank drops another 3/4” (20 mm), the pump automatically shuts down, the LCD displays “Minim” and the red LED illuminates. The optional fault relay remains activated.

“Pause”

The Sigma/2 series can be remotely started and stopped via a dry contact through the optional control cable.

“Stop”

The Sigma/1 can be stopped by pressing the STOP/START key without disconnecting from the power supply.

“Prime”

Priming is activated by pressing both arrow keys at the same time while the frequency display is showing.

Function and Error Indicators

Three LED lights on the pump faceplate signal operational status. The green light flashes during normal operation, and the yellow light warns of a situation that could lead to a fault (e.g., low chemical). If a fault occurs “error” will appear on the LCD screen and the red LED illuminates.



Certified to
NSF/ANSI 61

ProMinent® Sigma/ 2 Motor Diaphragm Metering Pumps

Optional Modes and Functions

Optional Control Modes

“Analog” Mode

With this option, the stroking rate of the Sigma/2 is directly proportional to the analog signal. For a custom range setting, the curve feature of the analog input can be selected. With this, the pump response to the analog input can be easily programmed.

“Contact” Mode with Pulse Control

This feature is used to “tune” the pump to contact generators of any kind (e.g., pulse-type water meter or process controller), and eliminate the need for a costly external control unit. The following functions can be selected by means of the keypad.

Pulse step-up (multiply) and step-down (divide)

By simply entering a factor in the 0.01-99.99 range, the step-up or step-down ratio is set.

For example:

Step-up Factor:

99.99 1 pulse = 99.99 pump strokes
10 1 pulse = 10 pump strokes

Step-down Factor:

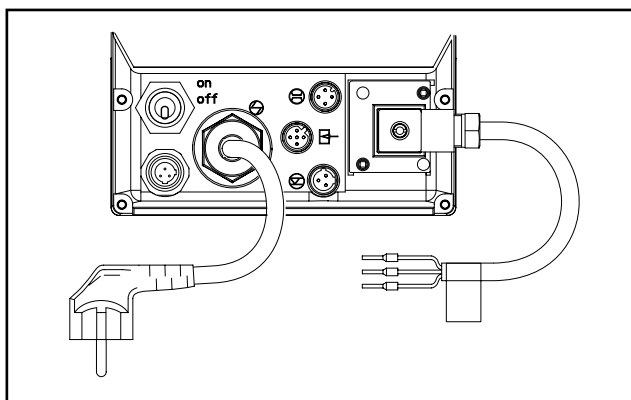
0.25 4 pulses = 1 pump stroke
0.01 100 pulses = 1 pump stroke

“Batch” Mode

The Batch mode is a variation of the contact operating mode. A number of strokes can be predetermined up to 65,535 strokes (whole numbers) or the feed quantity can be predetermined. The batch is then initiated by either pressing the “P” key on the pump face or providing a contact to the external control cable.

Access Code

A programmable access code to prevent unauthorized changes to settings is available as an option.



An external panel enables optional relays to be installed on-site.

Relay outputs

Fault annunciating relay

For low tank level (flow switch), loss of flow (flow monitor), loss of analog signal and diaphragm failure detector, system faults and fuse/power supply failure.

Fault annunciating and Pacing relay

In addition to the fault annunciating relay, a contact closure is issued with every pump stroke (contact duration 150 ms.) This allows a second ProMinent metering pump to be paced synchronously, or to totalize flow with an external stroke counter.

4-20 mA Analog Output

A 4-20 mA analog output option is available for use with pumps that operate in the manual mode or by a remote 4-20 mA analog reference signal. The 4-20 mA analog output signal is linear to pump frequency multiplied by the percentage of stroke length. The output signal is isolated and can drive up to 300 Ohms impedance. Analog output can be used for status feedback to higher level control systems for closed loop control or for monitoring chemical usage. This option is available in combination with either the fault annunciating or pacing relay.

Timer Relay

The optional integrated 2-week timer offers 81 programmable events.

It can be set to hourly, daily, work days, weekend, weekly, or two-week periods with switch-on times from 1 second to two weeks. The timer can be programmed to change operation mode, frequency, and the function of two relays. All the functions can be programmed independently of one another. Up to 13 delay times can be programmed into the timer function.

The range of applications exceeds that of a “standard timer”. Typical application is disinfection in cooling towers, process water, etc., with the ability to automatically program shock dosages or increase the concentration at a certain interval.

Fieldbus connection

Monitor and control remotely via a SCADA/PLC system using the PROFIBUS®-DP system.

Note: Relay options not available with profibus and cannot be retrofitted in the field.

ProMinent® Sigma/ 2 Motor Diaphragm Metering Pumps

Specifications

General:

Maximum stroke length: 0.196" (5.0 mm) HM; 0.6" (15 mm) HK
Power cord: 6 feet (2 m) 2 wire + ground (supplied on control versions)
Stroke frequency control: S2Ba: Constant speed or optional DC/SCR drive or AC inverter
 S2Ca: Microprocessor control version with innovative start/stop and variable speed control proportional to set frequency or external control signal.

Stroke counting: Standard on S2Ca

Materials of construction

Inner casing: Cast aluminum

Housing: Glass-filled Luranyl™ (PPE)

<i>Wetted materials of construction:</i>	Liquid End:	PVDF	316 SS
	Suct./Dis. Connectors:	PVDF	316 SS
	Seals:	PTFE	PTFE
	Check Balls:	Ceramic	SS

Drive: Cam and spring-follower (lost motion)

Lubrication: Oil lubricated

Recommended oil: ISO VG 460, such as Mobil Gear Oil 634

Oil quantity: Approximately 0.6 quart (550 mL)

Recommended oil change interval: 5,000 hours

Warranty: Two years on drive, one year on liquid end

Factory testing: **Each pump is tested for rated flow at maximum pressure.**

Industry Standard: CE approved, CSA available (standard in Canada), NSF/ANSI 61

Sigma/2 HM:

Diaphragm materials: PTFE faced EPDM with Nylon reinforcement and steel core

Liquid end options: Polyvinylidene Fluoride (PVDF) or 316 SS, with PTFE seals

Check valves: Single ball check, PVDF and SS versions.
 Optional springs available in Hastelloy C

Repeatability: When used according to the operating instructions, better than $\pm 2\%$

<i>Max. fluid operating temperatures:</i>	Material	Constant (Max. Backpressure)	Short Term (15 min. @ max.30 psi)
	PVDF	149°F (65°C)	212°F (100°C)
	316 SS	194°F (90°C)	248°F (120°C)

Diaphragm failure indication: Visual indicator is mandatory. The delivery unit has a patented multilayer safety diaphragm as standard and a visual diaphragm rupture indicator.

Separation of drive from liquid end: An air gap with secondary safety diaphragm separates the drive from the liquid end to prevent cross contamination of oil and process fluid (with or without optional diaphragm failure indication).

Max. solids size in fluid: 0.3 mm

Stroke length adjustment: Manual, in increments of 0.5%. Motorized stroke length adjustment is available.

Sigma/2 HK:

Piston materials: Ceramic oxide; packing rings of PTFE, packing spring of 316 SS.

Liquid end options: 316 SS with PTFE seals

Check valves: Double ball, stainless steel; optional springs (Hastelloy C4).

Repeatability: When used according to the operating instructions, better than $\pm 0.5\%$

<i>Max. fluid operating temperatures:</i>	Material	Constant	Short Term
	316 SS	392°F (200°C)	428°F (220°C)

Stroke length adjustment: Manual, in increments of 0.2%. Motorized stroke length control is optional.

ProMinent® Sigma/ 2 Motor Diaphragm Metering Pumps

Specifications

Sigma/ 2 Basic Version

<i>Motor mounting flange:</i>	Fits all NEMA 56C frame motors (motor not included with pump)
<i>Gear ratios and stroke frequencies (with 1725 RPM motor):</i>	20:1 = 87 SPM, 11:1 = 156 SPM, 7.25:1 = 232 SPM
<i>Motor coupling:</i>	Flexible coupling included with pump
<i>Required Motor HP:</i>	1/3 HP (0.25 kW)
<i>Full load RPM:</i>	1750 RPM (60 Hz)
<i>Stroke sensor (optional):</i>	Hall effect - requires 5 VDC

Sigma/ 2 Control Version

<i>Control Function:</i>	At stroke frequencies equal to or greater than 33%, the integral AC variable frequency drive continuously varies the motor speed in a linear response to the incoming signal. At stroke frequencies less than 33%, the motor starts and stops according to a control algorithm to provide the desired stroke frequency. In the start-stop mode the motor speed is constant at approximately 580 RPM.
<i>Enclosure rating:</i>	NEMA 3 (IP 55)
<i>Motor data:</i>	Totally enclosed, fan cooled (IP55); class F insulation; Manufacturer ATB; 0.18 kW (0.24 HP) 230 3 phase (1.9 A)
<i>Relay load</i>	
<i>Fault relay only (options 1 & 3):</i>	Contact load: 250 VAC, 2 A, 50/60 Hz Operating life: > 200,000 switch functions
<i>Fault and pacing relay (options 4 & 5):</i>	Contact load: 24 V, 2 A, 50/60 Hz Operating life: > 200,000 switch functions Residual impedance in ON-position ($R_{DS(on)}$): < 8 Ω Residual current in OFF-position: < 1 μ A Maximum voltage: 24 VDC Maximum current: < 100 mA (for pacing relay) Switch functions: 750x10 ⁶ Contact closure: 100 ms (for pacing relay)
<i>Analog output signal:</i>	max. impedance 300 Ω Isolated 4-20 mA output signal
<i>PROFIBUS® - DP fieldbus options:</i>	Transfer: RS - 485 Wiring: 2-wired, twisted, shielded Length: 3637 ft (1200 m)/328 ft (100 m) Baudrate: 9600 bits/s; 12 Mbits/s No. of participants: 32 with 127 repeaters Topology: Line Access procedure: Master/master with token ring
<i>Relay cable (optional):</i>	6 feet (2 m) 3 wire (SPDT) 250 VAC, 2 A
<i>Pulse contact/remote pause contact:</i>	With voltage-free contact, or semiconductor sink logic control (not source logic) with a residual voltage of <700 mV. The contact load is approximately 0.5 mA at + 5 VDC. (Note: Semiconductor contacts that require >700 mV across a closed contact should not be used.)
<i>Max. pulse frequency:</i>	25 pulses/sec
<i>Contact impedance:</i>	10 kOhm
<i>Max. pulse memory:</i>	65,535 pulses
<i>Necessary contact duration:</i>	20ms
<i>Analog - current input burden:</i>	Approximately 120 Ohm
<i>Max. allowable input current:</i>	50 mA
<i>Power requirements:</i>	single phase, 115-230 VAC

ProMinent® Sigma/ 2 Motor Diaphragm Metering Pumps

Capacity Data

Sigma/2 Basic Version

Technical data:	60 Hz (1750 RPM) operation Capacity at Maximum Pressure				Max. Stroke Rate	Output per Stroke	Max. Suction Lift (water)		Max. Suction Pressure		Suction/ Discharge Connector		Shipping Weight w/Motor	
Pump Version	psig	(bar)	U.S.	(l/h)	Stroke/ min	mL/ stroke	ft	(m)	psig	(bar)	DN	in	lbs	(kg)
S2Ba HM			gph											
16050 PVT	145	(10)	15.9	(60)	87	11.4	23	(7)	44	(3)	15	1/2 MNPT	33	(15)
16050 SST	232	(12)	15.2	(57)	87	11.4	23	(7)	44	(3)	15	1/2 FNPT	44	(20)
16090 PVT	145	(10)	28.5	(108)	156	11.4	23	(7)	44	(3)	15	3/4 MNPT	33	(15)
16090 SST	232	(12)	27	(103)	156	11.4	23	(7)	44	(3)	15	1/2 FNPT	44	(20)
16130 PVT	145	(10)	41	(156)	232	10.9	23	(7)	44	(3)	15	3/4 MNPT	33	(15)
16130 SST	232	(12)	39.6	(150)	232	10.9	23	(7)	44	(3)	15	1/2 FNPT	44	(20)
07120 PVT	100	(7)	38	(144)	87	27.4	16	(5)	15	(1)	25	3/4 MNPT	35	(16)
07120 SST	100	(7)	38	(144)	87	27.4	16	(5)	15	(1)	25	3/4 MNPT	53	(24)
07220 PVT	100	(7)	69.7	(264)	156	27.7	16	(5)	15	(1)	25	3/4 MNPT	35	(16)
07220 SST	100	(7)	69.7	(264)	156	27.7	16	(5)	15	(1)	25	3/4 MNPT	53	(24)
04350 PVT	58	(4)	111	(420)	232	29.4	16	(5)	15	(1)	25	1 MNPT	35	(16)
04350 SST	58	(4)	111	(420)	232	29.4	16	(5)	15	(1)	25	1 MNPT	53	(24)

Sigma/2 Control Version

Technical data:	60 Hz operation Capacity at Maximum Pressure				Max. Stroke Rate	Output per Stroke	Max. Suction Lift (water)		Max. Suction Pressure		Suction/ Discharge Connector		Shipping Weight w/Motor	
Pump Version	psig	(bar)	U.S.	(l/h)	Stroke/ min	ml/ stroke	ft	(m)	psig	(bar)	DN	in	lbs	(kg)
S2Ca HM			GPH											
16050 PVT	145	(10)	15.9	(60)	90	11.4	23	(7)	44	(3)	15	1/2 MNPT	33	(15)
16050 SST	232	(12)	15.9	(60)	90	11.4	23	(7)	44	(3)	15	1/2 FNPT	44	(20)
16090 PVT	145	(10)	28.5	(108)	160	11.4	23	(7)	44	(3)	15	3/4 MNPT	33	(15)
16090 SST	232	(12)	28.5	(108)	160	11.4	23	(7)	44	(3)	15	1/2 FNPT	44	(20)
16130 PVT	145	(10)	34.3	(130)	200	10.9	23	(7)	44	(3)	15	3/4 MNPT	33	(15)
16130 SST	232	(12)	34.3	(130)	200	10.9	23	(7)	44	(3)	15	1/2 FNPT	44	(20)
07120 PVT	100	(7)	38	(144)	90	27.4	16	(5)	15	(1)	25	3/4 MNPT	35	(16)
07120 SST	100	(7)	38	(144)	90	27.4	16	(5)	15	(1)	25	3/4 MNPT	53	(24)
07220 PVT	100	(7)	69.7	(264)	160	27.7	16	(5)	15	(1)	25	3/4 MNPT	35	(16)
07220 SST	100	(7)	69.7	(264)	160	27.7	16	(5)	15	(1)	25	3/4 MNPT	53	(24)
04350 PVT	58	(4)	92.5	(350)	200	29.4	16	(5)	15	(1)	25	1 MNPT	35	(16)
04350 SST	58	(4)	92.5	(350)	200	29.4	16	(5)	15	(1)	25	1 MNPT	53	(24)

(Note: Capacities and suction lift refer to pumps tested on water at 115 VAC, 60 Hz, and an ambient temperature of 70° F (20° C). Higher specific gravity fluids will reduce suction lift. Capacities will be slightly reduced from published ratings if pumps are skid mounted).

Materials In Contact With Chemicals

Liquid End	Suction/Discharge connector	Valve	Seals/ ball seat	Balls
PVT	PVDF (Polyvinylidene fluoride)	PVDF (Polyvinylidene fluoride)	PTFE/PTFE	Ceramic
SST	Stainless steel	Stainless steel	PTFE/PTFE	Stainless steel

ProMinent® Sigma/ 2 Motor Diaphragm Metering Pumps

Identcode Ordering System (S2Ba)

S2Ba	Drive Type												
	HM	Main Drive, Diaphragm											
		Version: Capacity:											
		16050*	15.9 gph (60 l/h), 145 psi (10 bar)	07120	38 gph (144 l/h), 100 psi (7 bar)								
		16090*	28.5 gph (108 l/h), 145 psi (10 bar)	07220	69.7 gph (264 l/h), 100 psi (7 bar)								
		16130*	41 gph (156 l/h), 145 psi (10 bar)	04350	111 gph (420 l/h), 58 psi (4 bar)	* For PVDF versions. Maximum 145 psig (10 bar)							
		Liquid end material:											
		PV	PVDF										
		SS	316 Stainless Steel										
		O-ring:											
		T	PTFE										
		Diaphragm type:											
		A	Safety diaphragm w/ pump stop function										
		S	Safety diaphragm w/ visual indicator										
		Liquid end version:											
		0	Without valve springs										
		1	With 2 valve springs (Hastelloy C4, 1 psig)										
		Hydraulic connections:											
		0	No nuts, No inserts										
		7	PVDF clamping nut & insert										
		8	SS clamping nut & insert										
		Logo:											
		0	Standard with logo										
		Motor mount:											
		2	Without motor, with NEMA 56C flange										
		Enclosure rating:											
		0	Standard										
		Stroke sensor:											
		0	Without stroke sensor (Standard)										
		2	With Pacing relay (Consult Factory)										
		Stroke length adjustment:											
		0	Manual (Standard)										
		1	with 3P stroke positioning motor, 230 V 50/60 Hz										
		2	with 3P stroke positioning motor, 115 V 50/60 Hz										
		4	W/ stroke positioning motor 4-20 mA, 230 V 50/60 Hz										
		6	W/ stroke positioning motor 4-20 mA, 115 V 50/60 Hz										
S2Ba	HM	12050	PV	T	0	0	7	0	2	0	0	0	

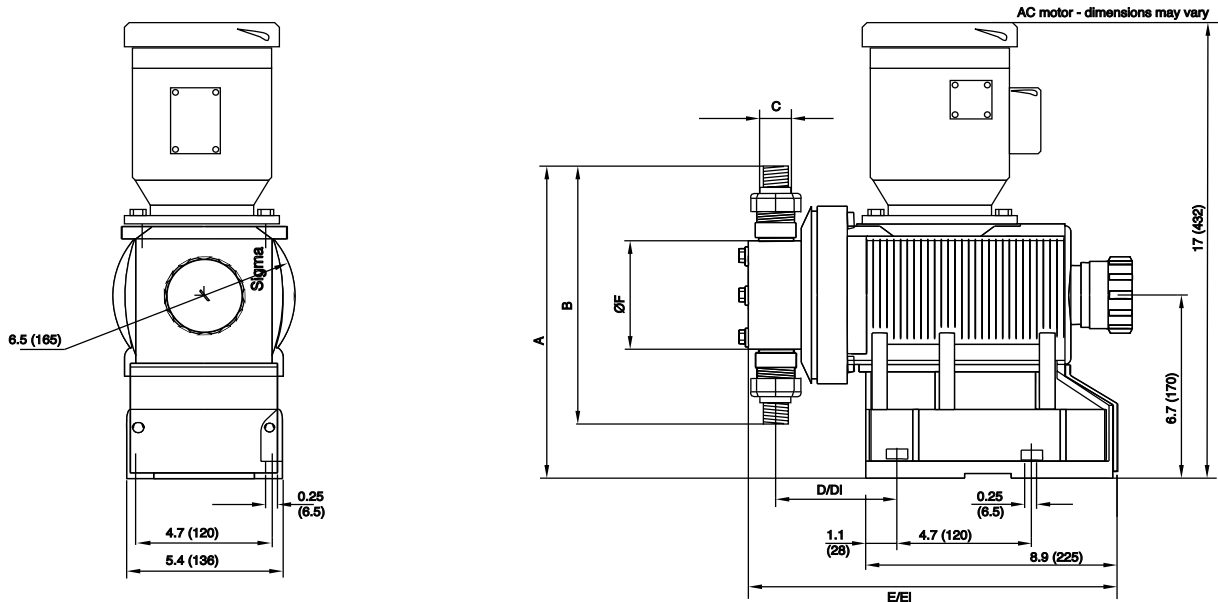
ProMinent® Sigma/ 2 Motor Diaphragm Metering Pumps

Identcode Ordering System (S2Ca)

S2Ca	Drive Type														
	HM	Main Drive, Diaphragm													
		Version: Capacity:													
		16050*	15.9 gph (60 l/h), 145 psi (10 bar)	07120	38 gph (144 l/h), 100 psi (7 bar)										
		16090*	28.5 gph (108 l/h), 145 psi (10 bar)	07220	69.7 gph (264 l/h), 100 psi (7 bar)	* For PVDF versions. Maximum 145 psig									
		16130**	34.3 gph (130 l/h), 145 psi (10 bar)	04350**	92.5 gph (350 l/h), 58 psi (4 bar)	** Maximum 200 strokes per minute									
		Liquid end material:													
		PVT	PVDF with PTFE												
		SST	316 Stainless Steel with PTFE												
		Diaphragm type:													
		4	Oxide ceramics												
		A	Safety diaphragm w/ pump stop fuction												
		B	Safety diaphragm w/ alarm indication												
		S	Safety diaphragm w/ visual indicator												
		Liquid end options:													
		0	Without valve springs												
		1	With 2 valve springs (Hastelloy C4, 1 psig)												
		Hydraulic connections:													
		0	No nuts, No inserts												
		7	PVDF clamping nut & insert												
		8	SS clamping nut & insert												
		Logo:													
		0	Standard with logo												
		Electrical Connection (± 10%):													
		U	1 ph, 115-230 V ± 10%, 50/60 Hz												
		Cable and plug with 6 ft (2 m) power cord, single phase:													
		A	European plug, 230 V												
		D	N. American plug, 115 V												
		U	N. American plug, 230 V												
		Relay:													
		0	No relay												
		1	Fault annunciating relay, drops out												
		3	Fault annunciating relay, pulls in												
		4	Option 1 + pacing relay												
		5	Option 3 + pacing relay												
		C	4-20 mA output, drops out												
		D	4-20 mA output, pulls in												
		E	4-20 mA output, pacing relay												
		Control variant:													
		0	Manual + External with pulse control (multiplier/divider)												
		1	Manual + External with pulse controls & analog control												
		4	Option 0 + Timer												
		5	Option 1 + Timer												
		P	Option 1 + PROFIBUS (Relay must be 0)												
		Access Code:													
		0	No access code												
		1	Access code												
		Flow monitor:													
		0	Input for metering monitor signal (pulse)												
		1	Input for maintained flow switch signal												
		Stroke length adjustment:													
		C	Manual + Calibration												
		0	stroke length adjust. Manual												
SC2a	HM	12050	PVT	0	0	0	0	U	A	0	0	0	0	C	

ProMinent® Sigma/ 2 Motor Diaphragm Metering Pumps

Dimensional Drawing: (S2Ba)



Dimensions in inches (mm)

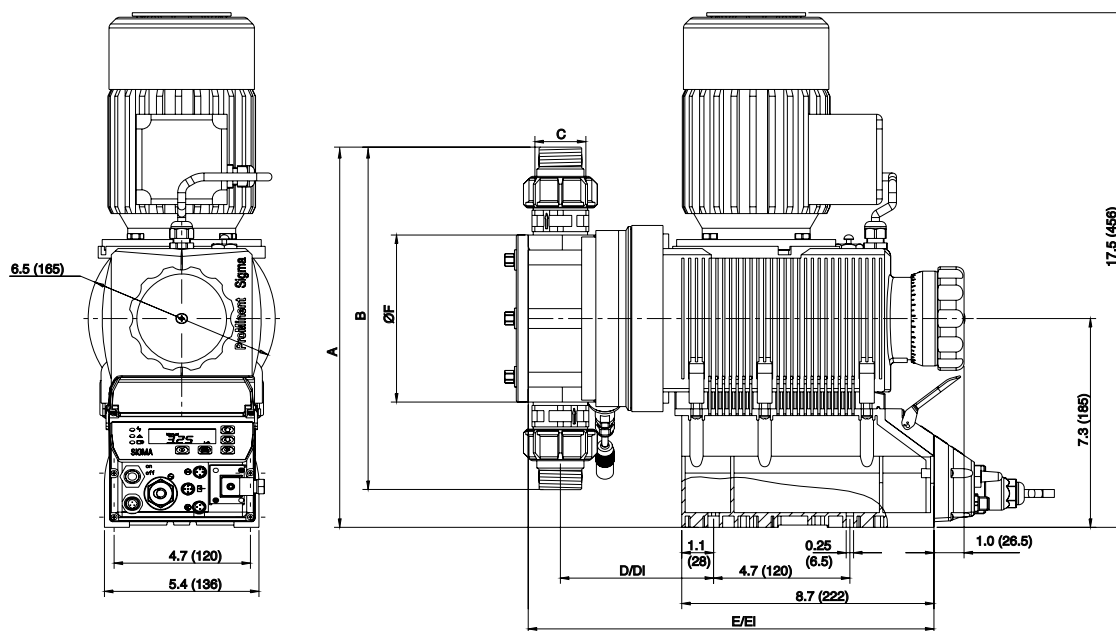
Type Sigma/ 2	A	B	Suction/ Discharge Valve Thread C*	D	D1**	E	E1**	ØF
16050, 16090, 16130								
PVT	10.1 (257)	6.95 (177)	DN 15	4.1 (104)	4.9 (124)	13.0 (329)	13.7 (349)	4.0 (101)
SST	10.9 (276)	8.2 (208)	DN 15	4.1 (104)	4.9 (124)	13.0 (329)	13.7 (349)	4.0 (101)
07120, 07220								
PVT	13.3 (337)	13.1 (332)	DN 25	4.5 (115)	5.3 (135)	13.4 (340)	14.2 (360)	5.8 (148)
SST	13.3 (337)	13.1 (332)	DN 25	4.5 (115)	5.3 (135)	13.4 (340)	14.2 (360)	5.8 (148)
04350								
PVT	14.3 (362)	14.1 (358)	DN 25	4.5 (115)	5.3 (135)	13.4 (340)	14.2 (360)	5.8 (148)
SST	14.3 (362)	14.1 (358)	DN 25	4.5 (115)	5.3 (135)	13.4 (340)	14.2 (360)	5.8 (148)

* Piping adapters provided according to technical data.

** Dimensions with diaphragm failure detector.

ProMinent® Sigma/ 2 Motor Diaphragm Metering Pumps

Dimensional Drawing: (S2Ca)



Dimensions in inches (mm)

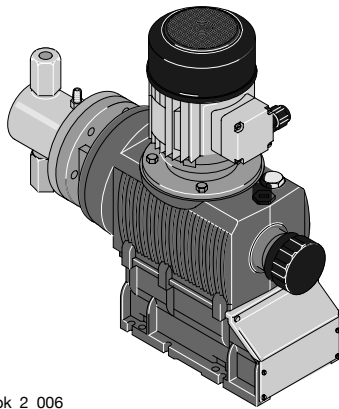
Type Sigma/2	Suction/ Discharge Valve Thread							
	A	B	C*	D	D1**	E	E1**	ØF
16050, 16090, 16130								
PVT	10.6 (272)	6.95 (177)	DN 15	4.1 (104)	4.9 (124)	12.8 (326)	13.6 (346)	4.0 (101)
SST	10.4 (288)	8.2 (208)	DN 15	4.1 (104)	4.9 (124)	12.8 (326)	13.6 (346)	4.0 (101)
07120, 07220								
PVT	13.9 (352)	13.1 (332)	DN 25	4.5 (115)	5.3 (135)	13.3 (337)	14.1 (357)	5.8 (148)
SST	13.9 (352)	13.1 (332)	DN 25	4.5 (115)	5.3 (135)	13.3 (337)	14.1 (357)	5.8 (148)
04350								
PVT	14.9 (377)	14.1 (358)	DN 25	4.5 (115)	5.3 (135)	13.3 (337)	14.1 (357)	5.8 (148)
SST	14.9 (377)	14.1 (358)	DN 25	4.5 (115)	5.3 (135)	13.3 (337)	14.1 (357)	5.8 (148)

* Piping adapters provided according to technical data.

** Dimensions with diaphragm failure detector

ProMinent® Sigma/ 2 HK Plunger Metering Pumps

Overview: Sigma/2 HK



pk_2_006

Ideal for high pressure applications requiring significant turndown

The ProMinent® Sigma/ 2 HK is a motor driven plunger metering pump has a high strength metal-lined housing for those components subject to load, and an additional plastic housing to protect against corrosion. It has a capacity range of 0.6-20.1 gph (60-420 l/h) at a maximum back pressure of 174-4,640 psi (12-320 bar). The pump capacity is adjusted by varying the stroke length 0.2 in (5 mm) in .2% increments via a self-locking adjusting knob.

The reproducible metering accuracy is better than $\pm 2\%$ providing installation has been correctly carried out, and in the stroke length range of 30-100%. (Instructions in the operating instructions manual must be followed.)

The stable, corrosion resistant metal and plastic housing is rated IP 65. To facilitate adaptation of the pumps to the widest possible range of processing requirements we offer a choice of three gearbox ratios, three liquid end sizes, two liquid end materials and either contact or analog signal (e.g., 0/4-20 mA) control options in the form of the S2Ca Sigma controller.

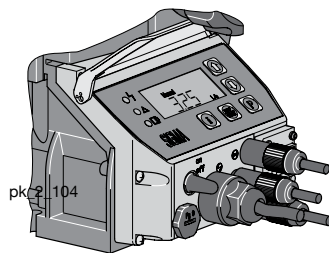
For safety reasons, all motor-driven metering pumps must be equipped with adequate protection against electrical overload.

Sigma/ 2 HK Basic Type (S2Ba)

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 single phase AC motor or a 3 phase motor.

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

Sigma/ 2 HK Control Type (S2Ca)



pk_2_104



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, LED's function as operation or fault indicators and fault indicator or pacing relays monitor the pump function.

Local or remote control is possible with PROFIBUS® and/or an integrated process timer.

[\(see page 134\)](#)

pk_2_103

ProMinent® Sigma/ 2 HK Plunger Metering Pumps

Specifications

General:

<i>Maximum stroke length:</i>	0.196" (5.0 mm) HM; 0.6" (15 mm) HK		
<i>Power cord:</i>	6 feet (2 m) 2 wire + ground (supplied on control versions)		
<i>Stroke frequency control:</i>	S2Ba: Constant speed or optional DC/SCR drive or AC inverter S2Ca: Microprocessor control version with innovative start/stop and variable speed control proportional to set frequency or external control signal.		
<i>Stroke counting:</i>	Standard on S2Ca HK		
<i>Materials of construction</i>			
<i>Inner casing:</i>	Cast aluminum		
<i>Housing:</i>	Glass-filled Luranyl™ (PPE)		
<i>Wetted materials of construction:</i>	Liquid End:	PVDF	316 SS
	Suct./Dis. Connectors:	PVDF	316 SS
	Seals:	PTFE	PTFE
	Check Balls:	Glass	SS
<i>Drive:</i>	Cam and spring-follower (lost motion)		
<i>Lubrication:</i>	Oil lubricated		
<i>Recommended oil:</i>	ISO VG 460, such as Mobil Gear Oil 634		
<i>Oil quantity:</i>	Approximately 0.6 quart (550 ml)		
<i>Recommended oil change interval:</i>	5,000 hours		
<i>Warranty:</i>	Two years on drive, one year on liquid end		
<i>Factory testing:</i>	Each pump is tested for rated flow at maximum pressure.		
<i>Industry Standard:</i>	CE approved, CSA available (standard in Canada)		

Sigma/ 2 HK:

<i>Piston materials:</i>	Ceramic oxide; packing rings of PTFE, packing spring of 316 SS		
<i>Liquid end options:</i>	316 SS with PTFE seals		
<i>Check valves:</i>	Double ball, stainless steel; optional springs (Hastelloy C).		
<i>Repeatability:</i>	When used according to the operating instructions, better than ±0.5%		
<i>Max. fluid operating temperatures:</i>	Material	Constant	Short Term
	316 SS	392°F (200°C)	428°F (220°C)
<i>Stroke length adjustment:</i>	Manual, in increments of 0.2%. Motorized stroke length control is optional.		

ProMinent® Sigma/ 2 HK Plunger Metering Pumps

Specifications

Sigma/2 HK Basic Version

<i>Motor mounting flange:</i>	Fits all NEMA 56C frame motors (motor not included with pump)
<i>Gear ratios and stroke frequencies (with 1725 RPM motor):</i>	20:1 = 87 SPM, 11:1 = 156 SPM, 7.25:1 = 232 SPM
<i>Motor coupling:</i>	Flexible coupling included with pump.
<i>Required Motor HP:</i>	1/3 HP (.25 kW)
<i>Full load RPM:</i>	1750 RPM (60 Hz)
<i>Stroke sensor (optional):</i>	Hall effect - requires 5 VDC

Sigma/ 2 HK Control Version

<i>Control Function:</i>	At stroke frequencies equal to or greater than 33%, the integral AC variable frequency drive continuously varies the motor speed in a linear response to the incoming signal. At stroke frequencies less than 33%, the motor starts and stops according to a control algorithm to provide the desired stroke frequency. In the start-stop mode the motor speed is constant at approximately 580 RPM.
<i>Enclosure rating:</i>	NEMA 3 (IP 55)
<i>Motor data:</i>	Totally enclosed, fan cooled (IP55); class F insulation; Manufacturer ATB; 0.18 kW (0.24 HP) 230 3 phase (1.9 A)
<i>Relay load</i>	
<i>Fault relay only (options 1 & 3):</i>	Contact load: 250 VAC, 2 A, 50/60 Hz Operating life: > 200,000 switch functions
<i>Fault and pacing relay (options 4 & 5):</i>	Contact load: 24 V, 2 A, 50/60 Hz Operating life: > 200,000 switch functions Residual impedance in ON-position ($R_{DS(on)}$): < 8 Ω Residual current in OFF-position: < 1 μ A Maximum voltage: 24 VDC Maximum current: < 100 mA (for pacing relay) Switch functions: 750x10 ⁶ Contact closure: 100 ms (for pacing relay)
<i>Analog output signal:</i>	maximum impedance 300 Ω Isolated 4-20 mA output signal
<i>PROFIBUS® - DP fieldbus options:</i>	Transfer: RS - 485 Wiring: 2-wired, twisted, shielded Length: 3637 ft (1200 m)/328 ft (100 m) Baudrate: 9600 bits/s; 12 Mbits/s No. of participants: 32 with 127 repeaters Topology: Line Access procedure: Master/master with token ring
<i>Relay cable (optional):</i>	6 feet (2 m) 3 wire (SPDT) 250 VAC, 2 A
<i>Pulse contact/remote pause contact:</i>	With voltage-free contact, or semiconductor sink logic control (not source logic) with a residual voltage of <700 mV. The contact load is approximately 0.5 mA at + 5 VDC. (Note: Semiconductor contacts that require >700 mV across a closed contact should not be used.)
<i>Max. pulse frequency:</i>	25 pulses/sec
<i>Contact impedance:</i>	10 kOhm
<i>Max. pulse memory:</i>	65,535 pulses
<i>Necessary contact duration:</i>	20ms
<i>Analog - current input burden:</i>	Approximately 120 Ohm
<i>Max. allowable input current:</i>	50 mA
<i>Power requirements:</i>	single phase, 115-230 VAC

ProMinent® Sigma/ 2 HK Plunger Metering Pumps

Capacity Data

Sigma/2 HK Basic Version

Technical data:	60 Hz (1750 RPM) operation Capacity at Maximum Pressure				Max. Stroke Rate	Output per Stroke	Max. Suction Lift (water)		Max. Suction Pressure	Suction/ Discharge Connector	Shipping Weight w/Motor
Pump Version S2Ba HK	psig	(bar)	U.S. gph	(l/h)	Stroke/min	ml/stroke	ft	(m)	psig (bar)	in FNPT	lbs (kg)
32002 SST	4640	(320)	0.6	(2.3)	84	0.46	16	(5)	2175 (150)	1/4	53 (24)
23004 SST	3335	(230)	1.2	(4.8)	153	0.52	16	(5)	2175 (150)	1/4	53 (24)
10006 SST	1450	(100)	2.0	(7.6)	233	0.55	16	(5)	2175 (150)	1/4	53 (24)
14006 SST	2030	(140)	1.8	(7.1)	84	1.42	13	(4)	870 (60)	1/4	53 (24)
10011 SST	1450	(100)	3.4	(13.1)	153	1.43	13	(4)	870 (60)	1/4	53 (24)
05016 SST	725	(50)	5.2	(20)	233	1.43	13	(4)	870 (60)	1/4	53 (24)
07012 SST	1015	(70)	3.9	(14.8)	84	2.90	13	(4)	435 (30)	1/4	53 (24)
04522 SST	652	(45)	7.0	(27.6)	153	2.91	13	(4)	435 (30)	1/4	53 (24)
02534 SST	363	(25)	10.7	(40.8)	233	2.92	13	(4)	435 (30)	1/4	53 (24)
04022 SST	580	(40)	7.0	(26.5)	84	5.26	13	(4)	218 (15)	3/8	55 (25)
02541 SST	363	(25)	13.0	(49.2)	153	5.37	13	(4)	218 (15)	3/8	55 (25)
01264 SST	174	(12)	20.1	(76)	233	5.45	13	(4)	218 (15)	3/8	55 (25)

Sigma/ 2 HK Control Version

Technical data:	60 Hz operation Capacity at Maximum Pressure				Max. Stroke Rate	Output per Stroke	Max. Suction Lift (water)		Max. Suction Pressure	Suction/ Discharge Connector	Shipping Weight w/Motor
Pump Version S2Ca HK	psig	(bar)	U.S. gph	(l/h)	Stroke/min.	ml/stroke	ft	(m)	psig (bar)	in. FNPT	lbs (kg)
32002 SST	4640	(320)	0.6	(2.3)	84	0.46	16	(5)	2175 (150)	1/4	53 (24)
23004 SST	3335	(230)	1.2	(4.8)	153	0.52	16	(5)	2175 (150)	1/4	53 (24)
10006 SST	1450	(100)	1.7	(6.5)	200	0.55	16	(5)	2175 (150)	1/4	53 (24)
14006 SST	2030	(140)	1.8	(7.1)	84	1.42	13	(4)	870 (60)	1/4	53 (24)
10011 SST	1450	(100)	3.4	(13.1)	153	1.43	13	(4)	870 (60)	1/4	53 (24)
05016 SST	725	(50)	4.5	(17.2)	200	1.43	13	(4)	870 (60)	1/4	53 (24)
07012 SST	1015	(70)	3.9	(14.8)	84	2.90	13	(4)	435 (30)	1/4	53 (24)
04522 SST	652	(45)	7.0	(27.6)	153	2.91	13	(4)	435 (30)	1/4	53 (24)
02534 SST	363	(25)	9.2	(35.0)	200	2.92	13	(4)	435 (30)	1/4	53 (24)
04022 SST	580	(40)	7.0	(26.5)	84	5.26	13	(4)	218 (15)	3/8	55 (25)
02541 SST	363	(25)	13.0	(49.2)	153	5.37	13	(4)	218 (15)	3/8	55 (25)
01264 SST	174	(12)	17.3	(65.4)	200	5.45	13	(4)	218 (15)	3/8	55 (25)

(Note: Capacities and suction lift refer to pumps tested on water at 115 VAC, 60 Hz, and an ambient temperature of 70°F (20°C). Higher specific gravity fluids will reduce suction lift. Capacities will be slightly reduced from published ratings if pumps are skid mounted).

Materials In Contact With Chemicals

	Liquid End	Suction/ Discharge connector	Seals	Valve Balls	Ball Seat
SST	Stainless steel	Stainless steel	PTFE/PTFE	Ceramic	Stainless steel

ProMinent® Sigma/ 2 HK Plunger Metering Pumps

Identcode Ordering System (S2Ba HK)

S2Ba	Drive Type											
	HK	Main Drive/Plunger										
		Version: Capacity:										
		32002	0.6 gph (2.3 l/h), 4640 psi (320 bar)					04522	7.0 gph (27.6 l/h), 652 psi (45 bar)			
		14006	1.8 gph (7.1 l/h), 2030 psi (140 bar)					02541	13.0 gph (49.2 l/h), 363 psi (25 bar)			
		07012	3.9 gph (14.8 l/h), 1015 psi (70 bar)					10006	2.0 gph (7.6 l/h), 1450 psi (100 bar)			
		04022	7.0 gph (26.5 l/h), 580 psi (40 bar)					05016	5.2 gph (20 l/h), 725 psi (50 bar)			
		23004	1.2 gph (4.8 l/h), 3335 psi (230 bar)					02534	10.7 gph (40.8 l/h), 363 psi (25 bar)			
		10011	3.4 gph (13.1 l/h), 1450 psi (100 bar)					01264	20.1 gph (76 l/h), 174 psi (12 bar)			
		Liquid end material:										
		SS	316 Stainless Steel									
		O-ring:										
		T	PTFE seal									
		Plunger assembly:										
		4	Plunger (Ceramic)									
		Liquid end version:										
		0	Without valve springs									
		1	With 2 valve springs (Hastelloy C4, 1 psig)									
		Hydraulic connections:										
		0	Standard (In accordance with technical data)									
		Logo:										
		0	Standard with logo									
		Motor mount:										
		2	Without motor, with NEMA 56C flange									
		Enclosure rating:										
		0	Standard									
		Stroke sensor:										
		0	Without stroke sensor (Standard)									
		1	With Pacing relay (Consult Factory)									
		Stroke length adjustment:										
		0	Manual (Standard)									
		1	with 3P stroke positioning motor, 230 V 50/60 Hz									
		2	with 3P stroke positioning motor, 115 V 50/60 Hz									
		4	W/ stroke positioning motor 4-20 mA, 230 V 50/60 Hz									
		6	W/ stroke positioning motor 4-20 mA, 115 V 50/60 Hz									
S2Ba	HK	32002	SS	T	4	0	0	0	2	0	0	0

ProMinent® Sigma/ 2 HK Plunger Metering Pumps

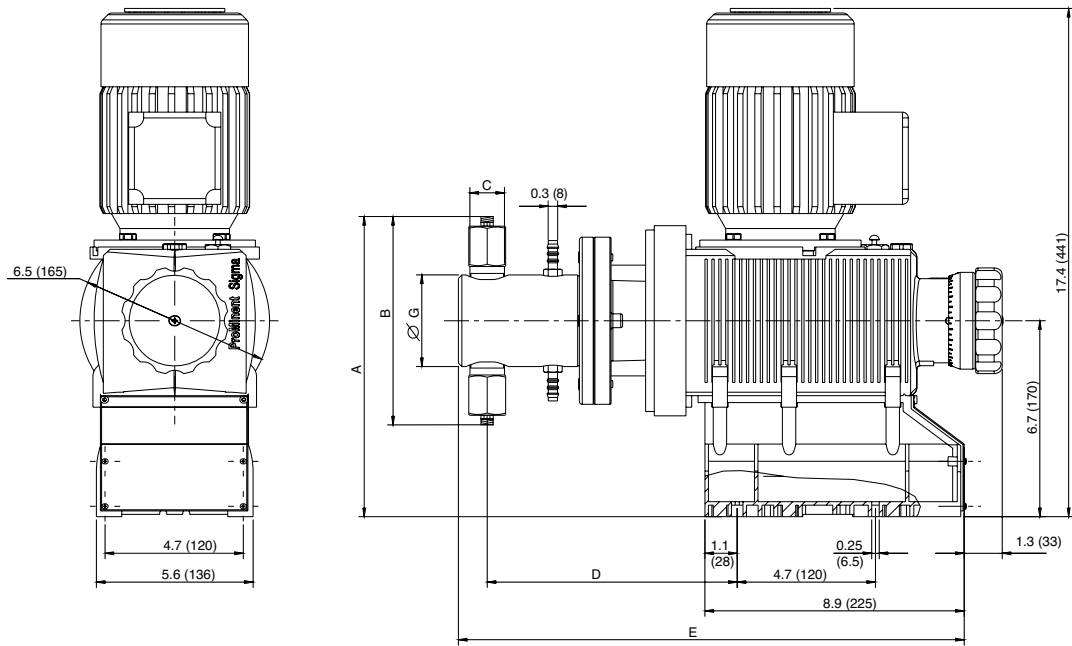
Identcode Ordering System (S2Ca HK)

Sigma/2 Control (HK)

S2Ca	Drive Type															
HK	Main drive/Plunger															
	Version: Capacity:															
	32002	0.6 gph, 4640 psi, 2.3 l/h, 320 bar	04522	7.0 gph, 652 psi, 27.6 l/h, 45 bar												
	14006	1.8 gph, 2030 psi, 7.1 l/h, 140 bar	02541	13.0 gph, 363 psi, 49.2 l/h, 25 bar												
	07012	3.9 gph, 1015 psi, 14.8 l/h, 70 bar	10006	1.7 gph, 1450 psi, 6.5 l/h, 100 bar												
	04022	7.0 gph, 580 psi, 26.5 l/h, 40 bar	05016	4.5 gph, 725 psi, 17.2 l/h, 50 bar												
	23004	1.2 gph, 3335 psi, 4.8 l/h, 230 bar	02534	9.2 gph, 363 psi, 35.0 l/h, 25 bar												
	10011	3.4 gph, 1450 psi, 13.1 l/h, 100 bar	01264	17.3 gph, 174 psi, 65.4 l/h, 12 bar												
	Liquid end material:															
	SS	316 Stainless Steel														
	Seal material:															
	T	PTFE seal														
	Plunger:															
	4	Plunger (Ceramic)														
	Liquid end version:															
	0	Without valve springs														
	1	With 2 valve springs (Hastelloy C, 1 psig)														
	Hydraulic connections:															
	0	Standard (In accordance with technical data)														
	Logo:															
	0	Standard with logo														
	Electrical Connection:															
	U	1 ph, 115-230 V ± 10%, 50/60 Hz														
	Cable and plug with 6 ft (2 m) power cord, single phase:															
	A	6 ft European														
	D	6 ft USA														
	U	6 ft USA, 230 V														
	Relay:															
0	No relay															
1	Fault annunciating relay, drops out															
3	Fault annunciating relay, pulls in															
4	Option 1 + pacing relay															
5	Option 3 + pacing relay															
Control variant:																
0	Manual + External with pulse control (multiplier/divider)															
1	Manual + External with pulse controls & analog control															
4	Option 0 + Timer															
5	Option 1 + Timer															
P	Option 1 + PROFIBUS (Relay must be 0)															
Access Code:																
0	No access code															
1	Access code															
Flow monitor:																
0	Input for metering monitor signal (pulse)															
Stroke length adjustment:																
0	Manual															
SC2a	HK	32002	SS	T	4	0	0	0	0	U	A	0	0	0	0	0

ProMinent® Sigma/ 2 HK Plunger Metering Pumps

Dimensional Drawing: (S2Ba HK)



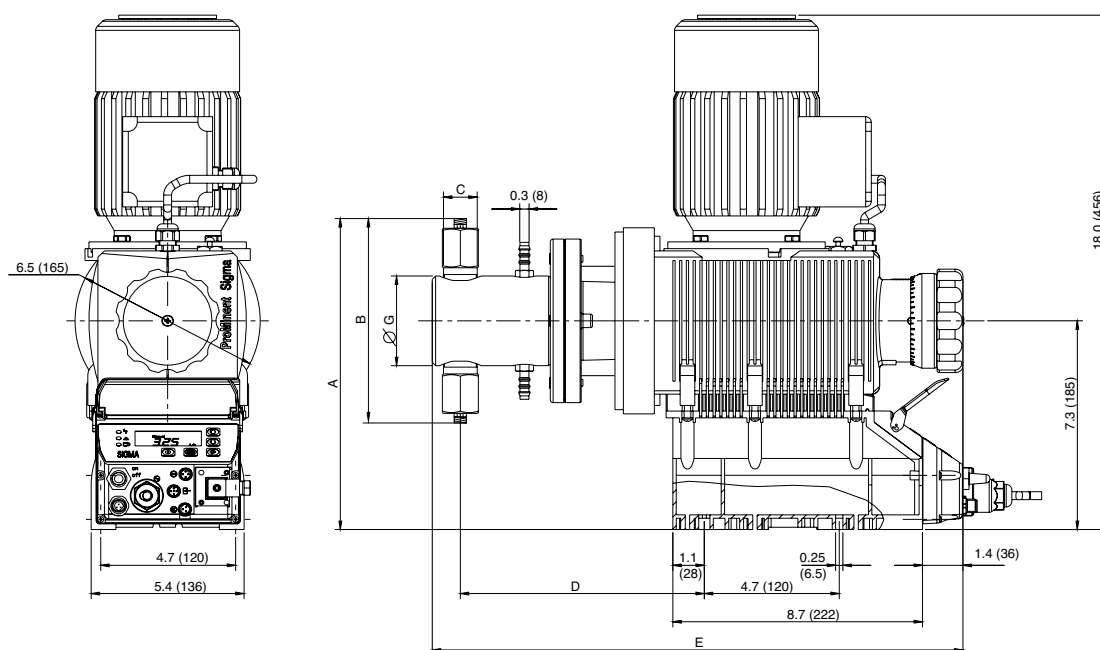
The S2Ba HK models offer other motors, and height dimensions may vary.

Dimensions in inches (mm)

Model	Connector	A	B	C	D	E	ØG
32002	1/4"	10.9	8.5	R1/4"	8.5	17.3	3.1
23004	DN 8	(277)	(216)		(217)	(439)	(79.5)
10006							
14006	1/4"	10.9	8.5	R1/4"	8.5	17.3	3.1
10011	DN 8	(277)	(216)		(217)	(439)	(79.5)
05016							
07012	1/4"	10.9	8.5	R1/4"	8.5	17.3	3.1
04522	DN 8	(277)	(216)		(217)	(439)	(79.5)
02534							
04022	3/8"	11	8.8	R3/8"	8.5	17.3	3.1
02541	DN 10	(279)	(223)		(217)	(439)	(79.5)
01264							

ProMinent® Sigma/ 2 HK Plunger Metering Pumps

Dimensional Drawing: (S2Ca HK)



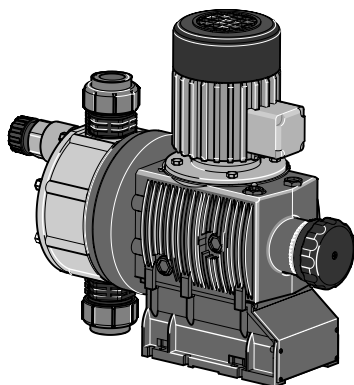
The S2Ba HK models offer other motors, and height dimensions may vary.

Dimensions in inches (mm)

Model	Connector	A	B	C	D	E	ØG
32002	1/4"	11.5	8.5	R1/4"	8.5	17.3	3.1
23004	DN 8	(292)	(216)		(217)	(439)	(79.5)
10006							
14006	1/4"	11.5	8.5	R1/4"	8.5	17.3	3.1
10011	DN 8	(292)	(216)		(217)	(439)	(79.5)
05016							
07012	1/4"	11.5	8.5	R1/4"	8.5	17.3	3.1
04522	DN 8	(292)	(216)		(217)	(439)	(79.5)
02534							
04022	3/8"	11.6	8.8	R3/8"	8.5	17.3	3.1
02541	DN 10	(294)	(223)		(217)	(439)	(79.5)
01264							

ProMinent® Sigma/ 3 Motor Diaphragm Metering Pumps

Overview: Sigma/ 3



pk_2_071

Ideal for applications requiring automation, large turndown and/or feed verification

(see [page 128](#) for spare parts and [page 134](#) for control cables)

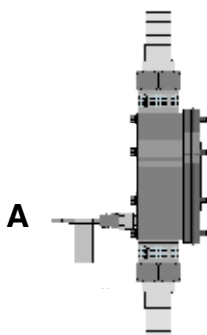
The ProMinent® Sigma/ 3 is a mechanically actuated diaphragm metering pump. It has a capacity range of 46-264 gph (174-1000 l/h) at a maximum back pressure of 58-174 psi (4-12 bar). The pump capacity is adjusted by varying the stroke length (5 mm) in .05% increments via a self-locking adjusting knob.

The reproducible metering accuracy is better than $\pm 2\%$ providing installation has been correctly carried out, and in the stroke length range of 30-100%. (Instructions in the operating instructions manual must be followed.)

The stable, corrosion resistant metal and plastic housing is rated IP 65. To facilitate adaptation of the pumps to the widest possible range of processing requirements we offer a choice of three gearbox ratios, three liquid end sizes, two liquid end materials and either contact or analog signal (e.g., 0/4-20 mA) control options in the form of the S2Ca Sigma controller.

For safety reasons, all motor-driven metering pumps must be equipped with adequate protection against electrical overload.

All PVDF versions are NSF/ANSI 61 approved.



Diaphragm Failure Indication (A)

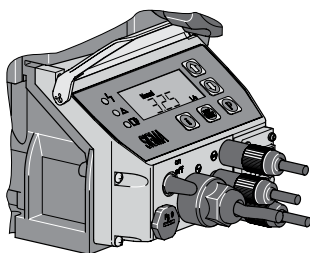
The delivery unit has a patented multilayer safety diaphragm as standard and a visual diaphragm rupture indicator. The diaphragm is coated with PTFE film on both sides, from the drive and working side. This guarantees that no discharge to the outside occur if the diaphragm ruptures. When the diaphragm ruptures, feed chemical enters between the diaphragm layers and triggers a mechanical indication or an alarm via the sensor area. This concept ensures reliable metering - even under critical operating conditions.

In connection with the S2Ca, continued metering, or alternatively, a stopping of the metering pump can be selected.

Sigma/ 3 Basic Type (S3Ba)

The ProMinent® Sigma Basic type is a motor driven metering pump with no internal electronic control system. The ProMinent® S3Ba offers a variety of different drive options in the single phase AC motors (56-C flange). Different flanges are available so that customers can use their own motor to drive the pump.

Sigma/ 3 Control Type (S3Ca)



pk_2_104

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.

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



(see [page 134](#))

pk_2_003

ProMinent® Sigma/ 3 Motor Diaphragm Metering Pumps

Specifications

General:

Maximum stroke length: 0.236" (6.0 mm)
 Power cord: 6 foot (2 m) 2 wire + ground (supplied on control version)
 Stroke frequency control: S3Ba: Constant speed or optional DC/SCR drive or AC inverter
 S3Ca: Microprocessor control version with innovative start/stop and variable speed control proportional to set frequency or external control signal.

Stroke counting: Standard on S3Ca

Materials of construction

Inner casing: Cast aluminum
 Housing: Glass-filled Luranyl™ (PPE)

Wetted materials of construction:	Liquid End:	PVDF	316 SS
Suct./Dis. Connectors:	PVDF	316 SS	
	Seals:	PTFE	PTFE
	Check Balls: DN 25	Glass	SS
	Check Plates: DN 32	Hastelloy C	Hastelloy C

Drive: Cam and spring-follower (lost motion)

Lubrication: Oil lubricated

Recommended oil: ISO VG 460, such as Mobil Gear Oil 634s

Oil quantity: Approximately 0.95 quart (900 mL)

Recommended oil change interval: 5,000 hours

Warranty: Two years on drive, one year on liquid end.

Factory testing: **Each pump is tested for rated flow at maximum pressure.**

Industry Standard: CE approved, CSA available (standard in Canada), NSF/ANSI 61

Diaphragm materials: PTFE faced EPDM with Nylon reinforcement and steel core

Liquid end options: Polyvinylidene Fluoride (PVDF) or 316 SS with PTFE

Check valves: DN 25 valves - Single ball check, PVDF and SS versions.
 Optional springs available (Hastelloy C4)
 DN 32 valves - Plate valves, with Hastelloy C4 plates and springs in both PVDF and SS valves.

Repeatability: When used according to the operating instructions, better than $\pm 2\%$

Max. fluid operating temperatures:	Material	Constant (Max. Backpressure)	Short Term (15 min. @ max.30 psi)
	PVDF	149°F (65°C)	212°F (100°C)
	316 SS	194°F (90°C)	248°F (120°C)

Diaphragm failure indication: Visual indicator is mandatory. The delivery unit has a patented multilayer safety diaphragm as standard and a visual diaphragm rupture indicator.

Separation of drive from liquid end: An air gap with secondary safety diaphragm separates the drive from the liquid end to prevent cross contamination of oil and process fluid (with or without optional diaphragm failure indication).

Max. solids size in fluid: 0.3 mm

Stroke length adjustment: Manual, in increments of 0.5%. Motorized stroke length adjustment available.



ProMinent® Sigma/ 3 Motor Diaphragm Metering Pumps

Specifications

Basic Version

Motor mounting flange:	Fits all NEMA 56C frame motors (motor not included with pump)
Gear ratios and stroke frequencies (with 1725 RPM motor):	20:1 = 86 SPM, 14:1 = 124 SPM, 10.1: = 173 SPM
Motor coupling:	Flexible coupling included with pump.
Required Motor HP:	3/4 HP (.55 kW)
Full load RPM:	1750 RPM (60 Hz)
Stroke sensor (optional):	Hall effect - requires 5 VDC

Control Version

<i>Control Function:</i>	At stroke frequencies equal to or greater than 33%, the integral AC variable frequency drive continuously varies the motor speed in a linear response to the incoming signal. At stroke frequencies less than 33%, the motor starts and stops according to a control algorithm to provide the desired stroke frequency. In the start-stop mode the motor speed is constant at approximately 580 RPM.
<i>Enclosure rating:</i>	NEMA 3 (IP 55)
<i>Motor data:</i>	Totally enclosed, fan cooled (IP55); class F insulation; Manufacturer ATB; 0.37 kW (0.5 HP) 230 3 phase (1.9 A)
<i>Thermal overload protection:</i>	Thermal cutout switches off at 284°F (140°C).
<i>Relay cable (optional):</i>	6 foot (2 m) 3 wire (SPDT) 250 VAC, 2 A
<i>Relay load</i>	
<i>Fault relay only (options 1 & 3):</i>	Contact load: 250 VAC, 2 A, 50/60 Hz Operating life: > 200,000 switch functions
<i>Fault and pacing relay (options 4 & 5):</i>	Contact load: 24 V, 2 A, 50/60 Hz Operating life: > 200,000 switch functions Residual impedance in ON-position ($R_{DS(on)}$): < 8 Ω Residual current in OFF-position: < 1 μ A Maximum voltage: 24 VDC Maximum current: < 100 mA (for pacing relay) Switch functions: 750x10 ⁶ Contact closure: 100 ms (for pacing relay)
<i>Analog output signal:</i>	max. impedance 300 Ω Isolated 4-20 mA output signal
<i>Profibus - DP fieldbus options:</i>	Transfer: RS - 485 Wiring: 2-wired, twisted, shielded Length: 3637 ft. (1200 m)/328 ft. (100 m) Baudrate: 9600 bits/s; 12 Mbits/s No. of participants: 32 with 127 repeaters Topology: Line Access procedure: Master/master with token ring
<i>Pulse contact/ Remote pause contact:</i>	With voltage-free contact, or semiconductor sink logic control (not source logic) with a residual voltage of <700 mV. The contact load is approximately 0.5 mA at + 5 VDC. (Note: Semiconductor contacts that require >700 mV across a closed contact should not be used).
<i>Max. pulse frequency:</i>	25 pulses/sec
<i>Contact impedance:</i>	10 kOhm
<i>Max. pulse memory:</i>	65,535 pulses
<i>Necessary contact duration:</i>	20ms
<i>Analog - current input burden:</i>	Approximately 120 Ohm
<i>Max. allowable input current:</i>	50 mA
<i>Power requirements:</i>	115 VAC or 230 VAC single phase

ProMinent® Sigma/ 3 Motor Diaphragm Metering Pumps

Capacity Data

Capacity at Maximum Backpressure					Max. Stroke Rate	Output per Stroke	Recomm. Motor HP	Max Suction Lift (water)	Max. Suction Pressure	Suction/ Discharge Connector	Approximate Shipping Weight w/ Motor
Pump type S3Ba/S3Ca	psig (bar)	U.S. GPH	Stroke/min. (S3B/S3C)	Stroke/min. (S3B/S3C)	mL/stroke	HP	ft. (m)	psig (bar)	in. MNPT	DN	lbs. (kg)
120145 PVT	145 (10)	46	(174)	86/90	31.5	3/4	16 (5)	29 (2)	1	25	49 (22)
120145 SST	174 (12)	46	(174)	86/90	31.5	3/4	16 (5)	29 (2)	1	25	57 (26)
120190 PVT	145 (10)	60.2	(228)	124/120	31.5	3/4	16 (5)	29 (2)	1	25	49 (22)
120190 SST	174 (12)	60.2	(228)	124/120	31.5	3/4	16 (5)	29 (2)	1	25	57 (26)
120270 PVT	145 (10)	85.6	(324)	173/180	31.5	3/4	16 (5)	29 (2)	1	25	49 (22)
120270 SST	174 (12)	85.6	(324)	173/180	31.5	3/4	16 (5)	29 (2)	1	25	57 (26)
070410 PVT	100 (7)	130	(492)	86/90	95.1	3/4	13 (4)	14.5 (1)	1-1/2	32	53 (24)
070410 SST	100 (7)	130	(492)	86/90	95.1	3/4	13 (4)	14.5 (1)	1-1/2	32	64 (29)
070580 PVT	100 (7)	184	(696)	124/120	95.1	3/4	13 (4)	14.5 (1)	1-1/2	32	53 (24)
070580 SST	100 (7)	184	(696)	124/120	95.1	3/4	13 (4)	14.5 (1)	1-1/2	32	64 (29)
040830 PVT	58 (4)	264	(1000)	173/180	95.1	3/4	10 (3)	14.5 (1)	1-1/2	32	53 (24)
040830 SST	58 (4)	264	(1000)	173/180	95.1	3/4	10 (3)	14.5 (1)	1-1/2	32	64 (29)

(Note: Capacities and suction lift refer to pumps tested on water at 115 VAC, 60 Hz, and an ambient temperature of 70°F (20°C). Higher specific gravity fluids will reduce suction lift. Capacities will be slightly reduced from published ratings if pumps are skid mounted).

Universal control cable necessary for external Sigma control. (see [page 134](#))

Materials In Contact With Chemical

Material	Suction/discharge connector Liquid end	Seals	DN 25 Valve balls	Valve seats	Seals	DN 32 Valve Plate/ Spring	Valve seats
PVT	PVDF (Polyvinylidene fluoride)	PTFE	Glass	PTFE	PTFE	Ceramic/ Hast. C + CTFE**	PTFE
SST	Stainless steel	PTFE	Stainless steel	PTFE	PTFE	Stainless steel	PTFE

ProMinent® Sigma/ 3 Motor Diaphragm Metering Pumps

Identcode Ordering System (S3Ba)

S3Ba Drive Type

H	Main Drive, Diaphragm											
Version: Capacity:												
120145	46 gph, 145 psi, 174 l/h, 10 bar	070410	130 gph, 100 psi, 492 l/h, 7 bar									
120190	60.2 gph, 145 psi, 228 l/h, 10 bar	070580	184 gph, 100 psi, 696 l/h, 7 bar									
120270	85.6 gph, 145 psi, 324 l/h, 10 bar	040830	264 gph, 58 psi, 1000 l/h, 4 bar									
Liquid end material:												
PV	PVDF											
SS	316 Stainless Steel											
O-ring:												
T	PTFE											
Diaphragm type:												
A	Safety diaphragm w/ pump stop fuctiontandard diaphragm											
S	Safety diaphragm w/ visual indicator											
Liquid end version:												
0	Without valve springs											
1	With 2 valve springs (Hastelloy C4, 1 psig)											
Hydraulic connections:												
7	PVDF clamping nut & insert											
8	SS clamping nut & insert											
Logo:												
0	Standard with logo											
Motor mount:												
2	Without motor, with NEMA 56C flange											
Enclosure rating:												
0	Standard											
Stroke sensor:												
0	Without stroke sensor (Standard)											
2	With Pacing relay (Consult Factory)											
Stroke length adjustment:												
0	Manual (Standard)											
1	with 3P stroke positioning motor, 230 V 50/60 Hz											
2	with 3P stroke positioning motor, 115 V 50/60 Hz											
4	W/ stroke positioning motor 4-20 mA, 230 V 50/60 Hz											
6	W/ stroke positioning motor 4-20 mA, 115 V 50/60 Hz											
S3Ba	H	120145	PV	T	0	0	7	0	2	0	0	0

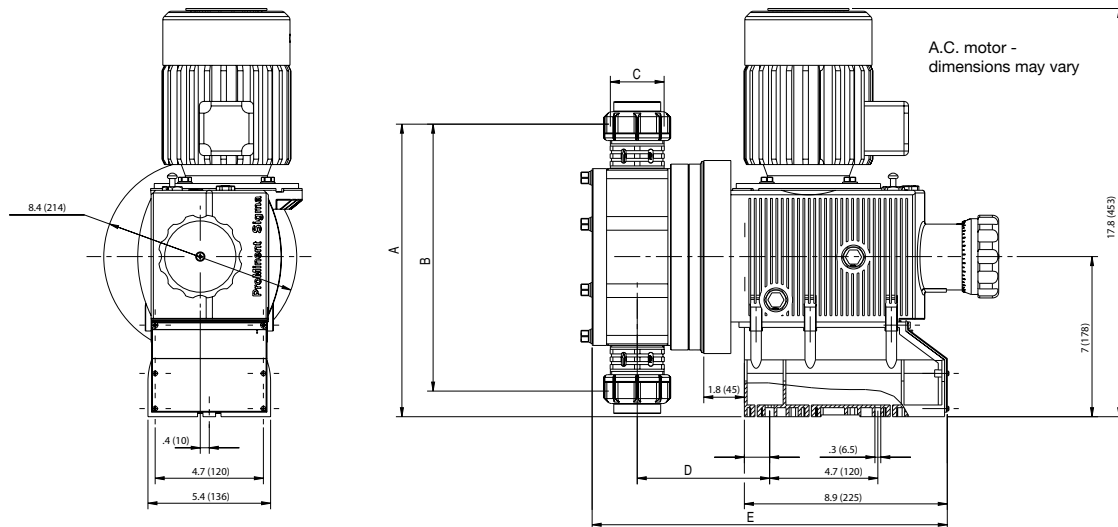
ProMinent® Sigma/ 3 Motor Diaphragm Metering Pumps

Identcode Ordering System (S3Ca)

S3Ca Drive Type														
	H	Main drive/Diaphragm												
		Version: Capacity:												
		120145	46 gph, 145 psi, 174 l/h, 10 bar	070410	130 gph, 100 psi, 492 l/h, 7 bar									
		120190	60.2 gph, 145 psi, 228 l/h, 10 bar	070580	184 gph, 100 psi, 696 l/h, 7 bar									
		120270	85.6 gph, 145 psi, 324 l/h, 10 bar	040830	264 gph, 58 psi, 1000 l/h, 4 bar									
		Liquid end material:												
		PVT	PVDF with PTFE											
		SST	316 Stainless steel with PTFE											
		Diaphragm type:												
		0	Standard diaphragm, PTFE											
		1	With double diaphragm and failure detector (NC contact opens on fault)											
		2	With double diaphragm and failure detector (alarm & continues to operate)											
		Liquid end version:												
		0	Without valve springs											
		1	With 2 valve springs (Hastelloy C4, 1 psig)											
		Hydraulic connections:												
		7	PVDF clamping nut & insert											
		8	SS clamping nut & insert											
		Logo:												
		0	Standard with logo											
		Electrical Connection (± 10%):												
		W	1 ph, 115-230 V ± 10%, 50/60 Hz											
		Cable and plug with 6 ft (2 m) power cord, single phase:												
		A	European plug, 230 V											
		D	N. American plug, 115 V											
		U	N. American plug, 230 V											
		Relay:												
		0	No relay											
		1	Fault annunciating relay, drops out											
		3	Fault annunciating relay, pulls in											
		4	Option 1 + pacing relay											
		5	Option 3 + pacing relay											
		C	Option 1 + 4-20 mA output											
		D	Option 3 + 4-20 mA output											
		E	Pacing relay + 4-20 mA output											
Control variant:														
0	Manual + External with pulse control (multiplier/divider)													
1	Manual + External with pulse controls & analog control													
4	Option 0 + Timer													
5	Option 1 + Timer													
P	Option 1 + Profibus (Relay must be 0)													
Access Code:														
0	No access code													
1	Access code													
Flow monitor:														
0	Input for metering monitor signal (pulse)													
1	Input for maintained flow switch signal													
Stroke length adjustment:														
C	Manual + Calibration													
S3Ca	H	120145	PVT	0	0	7	0	W	A	0	0	0	0	C

ProMinent® Sigma/ 3 Motor Diaphragm Metering Pumps

Dimensional Drawing: (S3Ba)



Dimensions in inches (mm)

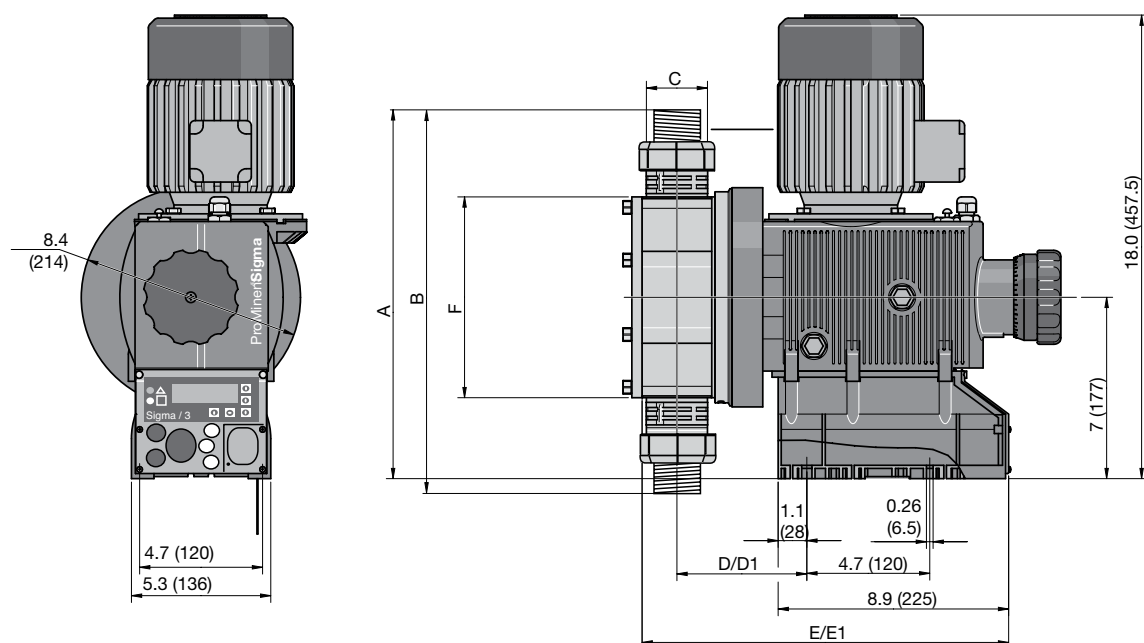
Type Sigma/3	A	B	Suction/ Discharge Valve Thread C*	D	D1**	E	E1**	F
121045, 120190, 120270 PVT	14.1 (358)	14.3 (364)	1" MNPT	4.7 (120)	5.5 (140)	13.6 (346)	14.4 (366)	6.1 (156)
SST	14.1 (358)	14.3 (364)	1" MNPT	4.8 (121)	5.6 (141)	13.7 (349)	14.5 (369)	6.1 (156)
070410, 070580, 040830 PVT	15.9 (403)	17.8 (453)	1-1/2" MNPT	5.0 (127)	5.7 (147)	14.0 (358)	14.8 (378)	8.1 (206)
SST	15.3 (387)	16.9 (430)	1-1/2" MNPT	5.0 (127)	5.7 (147)	14.0 (358)	14.8 (378)	8.1 (206)

* Piping adapters provided according to technical data.

** Dimensions with diaphragm failure detector.

ProMinent® Sigma/ 3 Motor Diaphragm Metering Pumps

Dimensional Drawing: (S3Ca)



Dimensions in inches (mm)

Type Sigma/3	A	B	Suction/ Discharge Valve Thread C*	D	D1**	E	E1**	F
121045, 120190, 120270								
PVT	14.1 (358)	14.3 (364)	1" MNPT	4.7 (120)	5.5 (140)	13.6 (346)	14.4 (366)	6.1 (156)
SST	14.1 (358)	14.3 (364)	1" MNPT	4.8 (121)	5.6 (141)	13.7 (349)	14.5 (369)	6.1 (156)
070410, 070580, 040830								
PVT	15.9 (403)	17.8 (453)	1-1/2" MNPT	5.0 (127)	5.7 (147)	14.0 (358)	14.8 (378)	8.1 (206)
SST	15.3 (387)	16.9 (430)	1-1/2" MNPT	5.0 (127)	5.7 (147)	14.0 (358)	14.8 (378)	8.1 (206)

* Piping adapters provided according to technical data.

** Dimensions with diaphragm failure detector.

ProMinent® ProMus Hydraulic Diaphragm Metering Pumps

Overview: ProMus

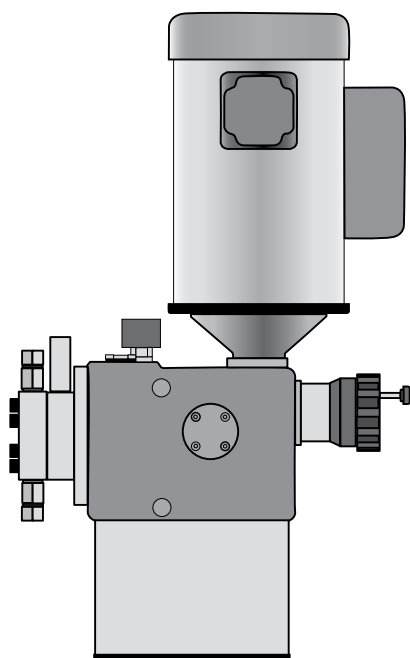
High pressure chemical process metering

(see [page 131](#) for spare parts)

The ProMus is a motor driven metering pump with a hydraulically actuated diaphragm. The drive case and the hydraulic unit are filled with a liquid that functions as a hydraulic coupling. A plunger connects the drive case with the hydraulic unit. The dosing diaphragm separates the hydraulic part of the pump from the dosing unit. The movement of the diaphragm depends on the amount of liquid displaced by the plunger.

ProMus Design Specifications

The ProMinent ProMus is a motor driven metering pump incorporating a hydraulically balanced Teflon diaphragm. The drive case is cast iron incorporating a worm gear set (5 Ratios available) driving a rotating eccentric. The locking stroke adjuster varies the flow from 100% to 0% in 1% increments. The pump is built in accordance to API 675 standards. The hydraulic system transfers the rotating eccentric motion to diaphragm movement by way of a reciprocating plunger (8 plunger diameters available). The plunger and diaphragm are hydraulically coupled (no mechanical connection). Coupling compliance is precisely controlled by a mechanically actuated replenishment valve, which senses diaphragm position to admit coupling fluid as required. The coupling fluid is automatically degassed to maintain accuracy and drive case is protected from overload by a simple acting relief valve. The hydraulic system is separated from the fluid end by a Teflon diaphragm completely isolating the pumped fluid from the surroundings. The liquid end is currently available in PVDF, Stainless Steel, Hastelloy C and Alloy 20.



ProMus Benefits

- Flow rates from 0.23 gph (0.87 L/h) to 101 gph (382 L/h) and Pressures up to 3500 psi (241 bar)
- Hydraulically actuated diaphragm ensuring a sealed pumping system for corrosive or toxic chemicals with superior leak protection
- Built in accordance to API 675 standards suitable for heavy industrial applications and specifications
- Robust cast iron drive construction ideal for applications such as boiler feeds, catalyst feed, dye injection and petrochemicals
- Flexible design for a wide range of applications including water treatment and high pressure chemical refining
- Fast and easy field maintenance with minimal downtime

ProMinent® ProMus Hydraulic Diaphragm Metering Pumps

Specifications

Pump type:	Hydraulically actuated diaphragm type liquid end
Maximum stroke length:	20mm
Materials of construction:	
Housing:	Cast iron
Diaphragm:	Flat Teflon
Required Motor HP:	1/2 HP (if 12.5:1 gear is selected 3/4 hp might be used)
Full load RPM:	1725
Drive:	Uses a hydraulic piston and mechanically actuated Oil replenishment valve to transfer the reciprocating Motion to a flat Teflon diaphragm
Gear ratios:	5 gear ratios; 12.5:1, 15:1, 30:1, 40:1, 50:1*, 100:1* Note: minimum stroke rate is 29 spm
Motor mounting flange:	Fits all NEMA 56 C frame motors (Optional IEC 71 with B5 flange)
Motor coupling:	Direct coupled to worm gear shaft
Check valves:	PVDF/PTFE: size 17 double inlet & outlet; sizes 30/40 single inlet & outlet Metal: 1) single inlet & outlet 2) double inlet & outlet 3) single inlet & double outlet (Double ball needed for pressures over 500 psi)
Repeatability:	Steady state flow accuracy is +/- 1% over turndown Ratio of 10:1
Max fluid operating temp:	constant: 195 F (90 C) short term 250 F (120 C)
Max solids size :	0.3mm; if larger than this provisions must be made to remove them prior to suction inlet
Max viscosity:	200 mPas
Recommend oil:	Mobilube SCH 75w-90
Oil quantity:	1.5 quart (1.42 l)
Oil change interval:	Every 5000 hours
Stroke length adjustment:	Manual adjustment. Automatic stroke length adjustment via 4 to 20 mA available as an option
Pressure relief:	Integrated pressure relief to protect pump. External pressure relief must be used to protect system
Warranty:	2 years on drive, 1 year on liquid end
Factory testing:	each pump is tested for capacity at rated pressure
Maximum inlet pressure:	14.5 psi (1 bar)

*50:1 and 100:1 are not available for 50 Hz operation

ProMinent® ProMus Hydraulic Diaphragm Metering Pumps

Capacity Data

Plunger (in.)	At 60 Hz (1750 rpm)				Capacity at Max. Backpressure		Gear Ratio	Max. Stroke Rate	At 50 Hz (1458 rpm) Capacity at Max. Backpressure				Typical suct./dis. Connection		
	psig		Bar		U.S.				Stroke/		Max.		FNPT/ BSP (metal)	MNPT/ BSP (PVDF)	
	(PVDF)	(PVDF)	(metal)	(metal)	GPH	(l/h)			min.	GPH	(l/h)	min			Bar
Size 17	3/8"	230	16	3500	241	0.2	(0.87)	100	18	-	-	-	-	-	-
	3/8"	230	16	3500	241	0.61	(2.3)	50	35	-	-	-	-	-	-
	3/8"	230	16	3500	241	0.76	(2.8)	40	43	0.63	2.45	36	241	1/4	1/4
	3/8"	230	16	3500	241	1.02	(3.8)	30	58	0.85	3.29	48	241	1/4	1/4
	3/8"	230	16	3500	241	2.03	(7.6)	15	115	1.69	6.56	96	241	1/4	1/4
	3/8"	230	16	3500	241	2.44	(9.2)	12.5	138	2.03	7.88	115	241	1/4	1/4
	7/16"	230	16	3500	241	0.83	(3.1)	50	35	-	-	-	-	-	-
	7/16"	230	16	3500	241	1.04	(3.9)	40	43	0.87	3.36	36	241	1/4	1/4
	7/16"	230	16	3500	241	1.38	(5.2)	30	58	1.15	4.46	48	241	1/4	1/4
	7/16"	230	16	3500	241	2.77	(10.4)	15	115	2.31	8.94	96	241	1/4	1/4
	7/16"	230	16	3500	241	3.32	(12.5)	12.5	138	2.77	10.72	115	241	1/4	1/4
	Size 30	5/8"	230	16	2080	143	1.8	(6.8)	50	35	-	-	-	-	-
5/8"		230	16	2080	143	2.2	(8.5)	40	43	1.87	7.26	36	143	1/4	1/2
5/8"		230	16	2080	143	3.0	(11.3)	30	58	2.50	9.68	48	143	1/4	1/2
5/8"		230	16	2080	143	6.0	(22.7)	15	115	5.00	19.37	96	143	1/4	1/2
5/8"		230	16	2080	143	7.2	(27.2)	12.5	138	6.00	23.24	115	143	1/4	1/2
13/16"		230	16	1230	85	3.0	(11.5)	50	35	-	-	-	-	-	-
13/16"		230	16	1230	85	3.8	(14.3)	40	43	3.17	12.27	36	85	3/8	1/2
13/16"		230	16	1230	85	5.1	(19.1)	30	58	4.22	16.37	48	85	3/8	1/2
13/16"		230	16	1230	85	10.1	(38.2)	15	115	8.45	32.73	96	85	3/8	1/2
13/16"		230	16	1230	85	12.2	(46.1)	12.5	138	10.14	39.28	115	85	3/8	1/2
1-1/8"		230	16	640	44	6.3	(24.0)	50	35	-	-	-	-	-	-
1-1/8"		230	16	640	44	7.9	(30.0)	40	43	6.61	25.61	36	44	3/8	1/2
1-1/8"		230	16	640	44	10.6	(40.1)	30	58	8.81	34.14	48	44	3/8	1/2
1-1/8"		230	16	640	44	21.1	(79.8)	15	115	17.62	68.29	96	44	3/8	1/2
1-1/8"		230	16	640	44	25.4	(96.1)	12.5	138	21.15	81.95	115	44	3/8	1/2
Size 40	1-3/4"	230	16	265	18	15.4	(58.2)	50	35	-	-	-	-	-	-
	1-3/4"	230	16	265	18	19.2	(72.6)	40	43	15.99	61.97	36	18	3/4	3/4
	1-3/4"	230	16	265	18	25.6	(96.9)	30	58	21.32	82.62	48	18	3/4	3/4
	1-3/4"	230	16	265	18	51.2	(193.8)	15	115	42.64	165.24	96	18	3/4	3/4
	1-3/4"	230	16	265	18	61.4	(232.4)	12.5	138	51.17	198.29	115	18	3/4	3/4
	2"	200	14	200	14	20.1	(76.0)	50	35	-	-	-	-	-	-
	2"	200	14	200	14	25.1	(95.0)	40	43	20.89	80.94	36	14	3/4	3/4
	2"	200	14	200	14	33.4	(126.4)	30	58	27.85	107.91	48	14	3/4	3/4
	2"	200	14	200	14	66.8	(252.8)	15	115	55.70	215.83	96	14	3/4	3/4
	2"	200	14	200	14	80.2	(303.5)	12.5	138	66.84	258.99	115	14	3/4	3/4
	2-1/4"	160	11	160	11	25.4	(96.1)	50	35	-	-	-	-	-	-
	2-1/4"	160	11	160	11	31.7	(119.9)	40	43	26.43	102.43	36	11	3/4	3/4
	2-1/4"	160	11	160	11	42.3	(160.1)	30	58	35.25	136.58	48	11	3/4	3/4
	2-1/4"	160	11	160	11	84.6	(327.8)	15	115	70.49	273.16	96	11	3/4	3/4
	2-1/4"	160	11	160	11	101.5	(384.2)	12.5	138	84.59	327.79	115	11	3/4	3/4

- not available for 50 Hz operation

(Note: Capacities and suction lift refer to pumps tested on water at 115 VAC, 60 Hz, and an ambient temperature of 70°F (20°C). Higher specific gravity fluids will reduce suction lift. Capacities will be slightly reduced from published ratings if pumps are skid mounted).

Materials In Contact With Chemicals

Material	Liquid End	Suction/Discharge connector	Seals/ball seat	Valve Balls
SS	stainless steel	stainless steel	PTFE/SS	stainless steel
A2	alloy 20	alloy 20	PTFE/A2	alloy 20
HC	hastelloy C	hastelloy C	PTFE/HC	hastelloy C
PVT	PVDF	PVDF	PTFE/PVDF	ceramic

ProMinent® ProMus Hydraulic Diaphragm Metering Pumps

Identcode Ordering System ProMus

ProMus1	Pump Version:											
	17A	Size 17 liquid end with 3/8" Plunger					30C	Size 30 liquid end with 1-1/8" Plunger				
	17B	Size 17 liquid end with 7/16" Plunger					40A	Size 40 liquid end with 1-3/4" Plunger				
	30A	Size 30 liquid end with 5/8" Plunger					40B	Size 40 liquid end with 2" Plunger				
	30B	Size 30 liquied end with 13/16" Plunger					40C	Size 40 liquid end with 2-1/4" Plunger				
	Liquid end material:											
	SS1	316 Stainless steel Single ball check										
	SS2	316 Stainless steel Double ball check (*Needed for applications above 500 psi)										
	SS3	316 St. steel Single inlet, Double outlet (Rcmd. for Flooded suction w/ discharge pressure above 500 psi)										
	PVT	PVDF/PTFE size 17 Double inlet & outlet; sizes 30/40 Single inlet & outlet										
	Connectors:											
	0	NPT										
	1	BSP taper										
	7	MNPT PVDF Standard (PVT LE only)										
	Gear ratio:											
	1	12.5:1 56C										
	2	15:1 56C										
	3	30:1 56C										
	4	40:1 56C										
	5	50:1 56C										
	6	12.5:1 IEC (IEC 71 with B5 flange)										
	7	15:1 IEC (IEC 71 with B5 flange)										
	8	30:1 IEC (IEC 71 with B5 flange)										
	9	40:1 IEC (IEC 71 with B5 flange)										
	11	100:1 (17A 3/8 plunger only) 56C										
	Motor:											
	X	No motor included										
	D	Standard motor (1/2 HP, 115V, single phase, TEFC, NEMA 56C										
	Base:											
	0	Standard Base										
	Stroke Adjustment:											
	1	Manual stroke adjustment										
	7	Explosion proof NEMA 7										
	Internal relief valve:											
	A	3500 psi/size 17										
	B	2080 psi/size 17										
	C	1230 psi/size 17										
	D	640 psi/size 17										
	E	300 psi/size 17										
	F	2080 psi/size 30										
	G	1230 psi/size 30										
	H	640 psi/size 30										
	I	265 psi/sizes 30 & 40										
	J	200 psi/sizes 30 & 40										
	K	160 psi (30B, C & 40)										
	Hydraulic oil:											
0	Standard											
ProMus1	17A	SS1	0	1	X	0	1	A	0			

ProMinent® ProMus Hydraulic Diaphragm Metering Pumps

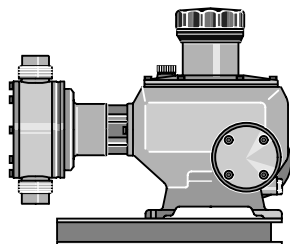
Data required to size ProMus Pump:

Complete this data sheet and fax it to ProMinent Pittsburgh at (412) 787-0704 or ProMinent Canada at (519) 836-5226 for a review of the system hydraulics and recommendations on pump and accessory specifications.

Desired capacity min./max.	GPH (l/h) _____
Available power supply	_____ V, _____ Hz, _____ phase
Working temperature min./max.	°F (°C) _____
Description of process fluid	_____
Concentration %	_____
Solids content %	_____
Absolute viscosity, cP	_____
Vapor pressure at working temperature	psig (bar) _____
Remarks (e.g. abrasive, developing gases and fumes, flammable, corrosive)	_____ _____
Suction conditions:	
Suction lift min./max., or	ft. (m) _____
Positive suction head min./max., or	ft. (m) _____
Pressure in chemical tank	psig (bar) _____
Length of suction line	ft. (m) _____
Size (I.D.) of suction line	in. (mm) _____
Number of valves and fittings in suction line	_____
Discharge conditions:	
Back-pressure min./max.	psig (bar) _____
Discharge head min./max.	ft. (m) _____
Negative discharge head min./max.	ft. (m) _____
Length of discharge line	ft. (m) _____
Size (I.D.) of discharge line	in. (mm) _____
Number of valves and fittings in discharge line	_____

ProMinent® Makro TZ Diaphragm Metering Pumps

Overview: Makro TZ

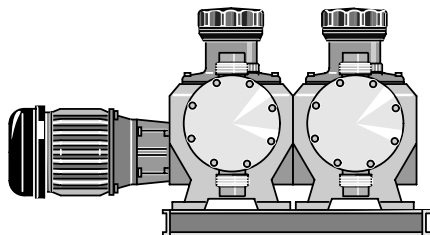


Ideal for high volume and high pressure applications

(see [page 132](#) for spare parts)

The ProMinent® Makro TZMb is a mechanically or hydraulically actuated motor driven diaphragm metering pump.

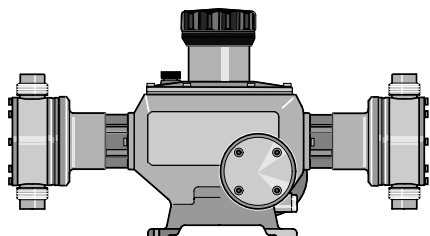
The stroke length can be adjusted by means of the shift ring mechanism from 0-10 mm (TZMb), with 0.5 % accuracy. The 5-speed gearbox is encased in a cast, seawater resistant, acrylic resin lacquered housing. Liquid ends are available in different material combinations to suit differing applications. The suction lift varies according to the density and viscosity of the medium, the dimension of the pipework and the pump stroke rate. Reproducibility of metering is better than ± 2 % in the stroke length range from 30 % -100 % subject to defined conditions and correct installation. (You must follow the instructions in the operating instruction manual).



pk_2_013

ProMinent® Makro TZ TZMbA Add-On Pumps

The ProMinent® Makro TZ main diaphragm metering pump can be converted to a duplex or triplex pump with the ProMinent® Makro TZ add-on diaphragm pump (several add-on pumps can be operated at reduced back pressure). Multiplex pumps can also be retrofitted by the operator; all the necessary components and fittings are included with the TZMbA. Different stroke rates can be achieved with the add-on pump independently of the main pump as each TZMbA has its own reducing gear. The main power end can be fitted for this purpose with a more powerful drive motor. A base frame is required when using add-on power ends.



pk_2_014

ProMinent® Makro TZ Double Head Version TZMbD/TZMbB

The double head version of the ProMinent® Makro TZ is similar to the simplex pump. It is, however, fitted with a second liquid end.

The liquid ends work in push-pull mode by means of a coupling element in the gearbox.

ProMinent® Makro TZ Diaphragm Metering Pumps

Capacity Data (TZMbH)

with 1800 rpm motor at 60 Hz						Max. Stroke Frequency	- Suction Lift	Connection Suction Discharge Side	Shipping Weight
Pump Capacity at Max. backpressure									PP, PC/TT,SS
Pump type	gph	l/h	psi	bar	ml/stroke	strokes/min.	ft (m)	in (DN)	lb (kg)
TZMbH									
120260	82	312	174	12	60	86	13.1 (4)	1 (25)	102/119 (46/54)
120340	108	408	174	12	60	115	13.1 (4)	1 (25)	102/119 (46/54)
120430	136	516	174	12	60	144	13.1 (4)	1 (25)	102/119 (46/54)
120510	162	612	174	12	60	173	13.1 (4)	1 (25)	102/119 (46/54)
120650	-	-	174	12	60	-	13.1 (4)	1 (25)	102/119 (46/54)
070430	136	516	100	7	99	86	11.5 (3.5)	1 1/2 (32)	110/141 (50/64)
070570	180	684	100	7	99	115	11.5 (3.5)	1 1/2 (32)	110/141 (50/64)
070720	228	864	100	7	99	144	11.5 (3.5)	1 1/2 (32)	110/141 (50/64)
070860	272	1032	100	7	99	173	11.5 (3.5)	1 1/2 (32)	110/141 (50/64)
071070	-	-	100	7	99	-	11.5 (3.5)	1 1/2 (32)	110/141 (50/64)
040840	266	1008	58	4	194	86	9.8 (3)	2 (40)	124/177 (56/80)
041100	348	1320	58	4	194	115	9.8 (3)	2 (40)	124/177 (56/80)
041400	443	1680	58	4	194	144	9.8 (3)	2 (40)	124/177 (56/80)
041670	529	2004	58	4	194	173	9.8 (3)	2 (40)	124/ 177 (56/80)
042100	-	-	58	4	194	-	9.8 (3)	2 (40)	124/177 (56/80)

Stroke length 10 mm

The admissible priming pressure on the suction side is 50 % of the maximum back pressure.

(Note: Capacities and suction lift refer to pumps tested on water at 115 VAC, 60 Hz, and an ambient temperature of 70°F (20°C). Higher specific gravity fluids will reduce suction lift. Capacities will be slightly reduced from published ratings if pumps are skid mounted).

Materials In Contact With Chemical In Version

		DN 25 Ball Valves			DN 32/DN 40 Plate Valves**			
Pump Head	Suction/ Dis-charge Connector	Seals	Valve Balls		Valve Seat	Seals	Valve Plate/ Valve Spring	Valve Seat
PPT Polypropylene	PVDF	PTFE	Ceramic		PTFE	PTFE	Ceramic/ Hast. C + CTFE**	PTFE
PCT PVC	PVDF	PTFE	Ceramic		PTFE	PTFE	Ceramic/ Hast. C + CTFE**	PTFE
TTT PTFE with carbon	PTFE with carbon	PTFE	Ceramic		PTFE	PTFE	Ceramic/ Hast. C + CTFE**	PTFE
SST Stainless steel	Stainless steel	PTFE	Stainless steel		PTFE	PTFE	Stainless steel Hast. C + CTFE*	PTFE

Multi-layer safety diaphragm with PTFE coating.

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

Custom designs available to order.

ProMinent® DulcoFlex Series

Overview: DulcoFlex DFB



The DulcoFlex DFB is a versatile peristaltic pump, which incorporates both hose and tubing technology. The unique roller design offers a lubricant-free housing unlike typical shoe pumps. With pressures up to 116 psi and flow rates to 385 gph, the DFB is a great choice for pumping difficult fluid such as slurries and abrasive chemicals.

Feature & Benefits

- 10, 13, 16, 19, 22 mm tubing pumps (30psi)
- 10, 13, 16, 22 mm reinforced hose pumps (116psi)
- Flows to 385 gph (6.5 gpm)
- Halar coating available for the toughest chemicals
- Disaster proof hose connections
- Roller Technology - Lower hose Stress
- Easy maintenance
- Reinforced hose
- Can run dry
- Self priming
- Great for solids
- Reversible
- No seals
- No valves

DulcoFlex DFB Capacities

	DFB10	DFB13	DFB16	DFB19	DFB22
Compression	Roller	Roller	Roller	Roller	Roller
Connection	3/8"	3/8"	3/4"	1"	1"
Capacity gal/rev	0.006	0.01	0.024	0.032	0.066
Max Flow gph	52	84	210	270	385
Reinforced Hoses	Natural Rubber Nitrile EPDM Hypalon Natural Rubber Food Grade Nitrile Food Grade			Not Available in this model.	Same as DFB10-16 models.
Max Pressure Reinforced Hose	116 psi	116 psi	116 psi	N/A	116 psi
Tubing	Norprene	Norprene	Norprene Tygon	Norprene Tygon	Norprene
Max Pressure Tubing	30 psi	30 psi	30 psi	30 psi	30 psi

(Note: Capacities and suction lift refer to pumps tested on water at 115 VAC, 60 Hz, and an ambient temperature of 70°F (20°C). Higher specific gravity fluids will reduce suction lift. Capacities will be slightly reduced from published ratings if pumps are skid mounted).

ProMinent® DulcoFlex Series

Overview: DulcoFlex DFC



The DulcoFlex DFC is a hose pump designed for difficult pumping applications. It incorporates a roller design which eliminates the need for cumbersome lubricants, unlike typical shoe pumps. The DFC can reach pressures up to 116 psi and flow rates up to 130 gpm and is ideal for difficult industrial and municipal applications.

Feature & Benefits

- Sizes: 30, 40, 50, 60, 70mm
- Flows to 130 gpm
- Disaster proof hose connections
- Roller Technology - Lower hose stress
- Easy maintenance
- Reinforced hose
- Can run dry
- Self priming
- Great for solids handling
- Reversible
- No seals
- No valves

DulcoFlex DFC Capacities

	DFC30	DFC40	DFC50	DFC60	DFC70
Compression	Roller	Roller	Roller	Roller	Roller
Connection	1 ¼"	1 ½"	1 ½"	2"	3"
Capacity gal/rev	0.11	0.24	0.39	0.82	2.08
Max Flow gpm	12	20	30	82	130
Reinforced Hoses	EPDM Hypalon Nitrile Buna Rubber		Natural Rubber Natural Rubber Food Grade Nitrile Buna Rubber Food Grade		
Max Pressure Reinforced Hose	116 psi	116 psi	116 psi	116 psi	116 psi
Tubing	N/A	Norprene	N/A	N/A	N/A
Max Pressure Tubing	N/A	30 psi	N/A	N/A	N/A

(Note: Capacities and suction lift refer to pumps tested on water at 115 VAC, 60 Hz, and an ambient temperature of 70°F (20°C). Higher specific gravity fluids will reduce suction lift. Capacities will be slightly reduced from published ratings if pumps are skid mounted).

ProMinent® DulcoFlex Series

Overview: DulcoFlex DFD



The DulcoFlex DFD is a hose pump designed for pressures up to 232 psi and flow rates up to 225 gpm. The unique shoe design is made of steel for smoother and cooler compression. The DFD uses safe DulcoLube oil for the shoe lubrication. With suction lifts up to 29 feet, the DulcoFlex DFD is a great choice for difficult pumping applications.

Feature & Benefits

- Sizes: 25, 32, 40, 60, 70, 100mm
- Flows to 225 gpm
- Suction lifts up to 29 ft.
- Disaster proof hose connections
- DulcoLube food grade glycerin lubricant
- Designed heat sink fins for cooler operation
- Steel shoes for a smoother and cooler compression
- Run dry capabilities

DulcoFlex DFD Capacities

	DFD25	DFD32	DFD40	DFD60	DFD70	DFD100
Compression	Shoe	Shoe	Shoe	Shoe	Shoe	Shoe
Connection	1"	1 ½"	1 ½"	2 ½"	3"	4"
Capacity gal/rev	0.08	0.16	0.37	0.85	1.76	5.28
Max Flow gpm	12	20	30	84	130	225
Reinforced Hoses	Natural Rubber			Hypalon		
	Nitrile Buna Rubber			Natural Rubber Food Grade		
	EPDM			Nitrile Buna Rubber Food Grade		
Max Pressure Reinforced Hose	232 psi	232 psi	232 psi	232 psi	232 psi	232 psi

(Note: Capacities and suction lift refer to pumps tested on water at 115 VAC, 60 Hz, and an ambient temperature of 70°F (20°C). Higher specific gravity fluids will reduce suction lift. Capacities will be slightly reduced from published ratings if pumps are skid mounted).

Pump Spare Parts & Accessories

QUICK REFERENCE

“Pump Spare Parts & Accessories” T.O.C.

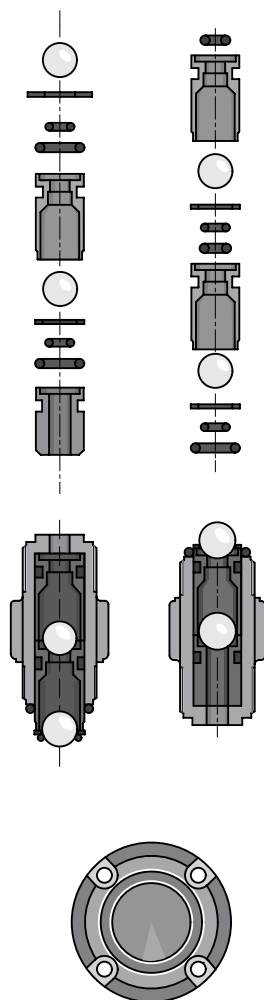
VI

CATALOG SECTION TABS

product overview	<ul style="list-style-type: none"> ■ Introduction ■ pump selection by capacity ■ chemical resistance list ■ Solenoid & Motor Pump Overview ■ Analytical Instrumentation Overview 	product overview
solenoid-driven metering pumps	<ul style="list-style-type: none"> ■ concept PLUS ■ beta ■ gamma/L ■ delta ■ extronic ■ mikro delta 	solenoid-driven metering pumps
motor-driven metering pumps	<ul style="list-style-type: none"> ■ Sigma/ 1 ■ Sigma/ 2 ■ Sigma/ 3 ■ ProMus ■ Makro ■ Orlita ■ DulcoFlex 	motor-driven metering pumps
pump spare parts & accessories	<ul style="list-style-type: none"> ■ solenoid pump spare parts ■ motor pump spare parts ■ pump accessories 	pump spare parts & accessories
DULCOMETER® instrumentation	<ul style="list-style-type: none"> ■ D1C ■ D2C ■ Dulcometer® Compact ■ DMT ■ DDC ■ MicroFlex ■ SlimFlex ■ MultiFLEX ■ AEGIS 	DULCOMETER® instrumentation
DULCOTEST® sensors	<ul style="list-style-type: none"> ■ amperometric sensors ■ potentiometric sensors ■ potentiostatic sensors ■ conductometric sensors ■ accessories 	DULCOTEST® sensors
polymer blending systems	<ul style="list-style-type: none"> ■ ProMix™ -M (A Controls) ■ ProMix™ -M (B Controls) ■ ProMix™ -S ■ ProMix™ -C 	polymer blending systems

Solenoid Pump Spare Parts

beta/a, concept^{PLUS} and gamma/L



pk_1_008

Complete liquid ends include pump head, valves, mounting screws, diaphragm and backplate. Spare parts kits include:

PP, PC, PV, & NP Liquid Ends

- 1 Diaphragm
- 1 Suction Valve
- 1 Discharge Valve
- 2 Connector Sets
- 2 Valve Balls
- 1 Set O-rings

TT Liquid Ends

- 1 Diaphragm
- 1 Suction Valve
- 1 Discharge Valve
- 2 Connector Sets
- 2 Valve Balls
- 1 Set O-rings
- 2 Ball Seat Discs

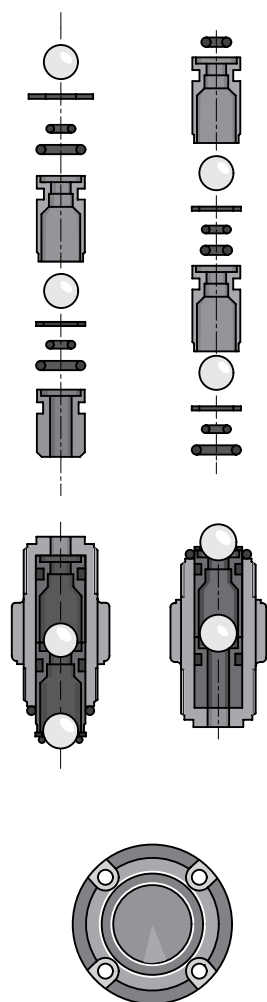
SS Liquid Ends

- 1 Diaphragm
- 4 Valve Balls
- 1 Set O-rings
- 4 Ball Seat Discs

Liquid End Version	Material Code	Complete Liquid End	Spare Parts Kit	Spare Valves Only (connector sets not included)		
				Suction	Discharge	Diaphragm
1000	PPE	1002057	1001644	792644	740350	1000244
	PPB	1002065	1001652	792646	740351	1000244
	PCE	1002365	1001713	792119	740349	1000244
	NPE	1002193	1001713	792119	740349	1000244
	PCB	1002358	1001721	792026	740348	1000244
	NPB	1002201	1001721	792026	740348	1000244
	TTT	1002345	1001737	809407	809406	1000244
	SST	1002557	1002549	809424	809423	1000244
	PVT	1023134	1023107	1023128	1023127	1000244
1601	PPE	1002058	1001645	792644	740350	1000245
	PPB	1002066	1001653	792646	740351	1000245
	PCE	1002366	1001714	792119	740349	1000245
	NPE	1002194	1001714	792119	740349	1000245
	PCB	1002359	1001722	792026	740348	1000245
	NPB	1002202	1001722	792026	740348	1000245
	TTT	1002346	1001738	809407	809406	1000245
	SST	1002558	1002550	809424	809423	1000245
	PVT	1023135	1023108	1023128	1023127	1000245
1602	PPE	1002059	1001646	792644	740350	1000246
	PPB	1002067	1001654	792646	740351	1000246
	PCE	1002367	1001715	792119	740349	1000246
	NPE	1002195	1001715	792119	740349	1000246
	PCB	1002360	1001723	792026	740348	1000246
	NPB	1002203	1001723	792026	740348	1000246
	TTT	1002347	1001739	809407	809406	1000246
	SST	1002559	1002551	809424	809423	1000246
	PVT	1023136	1023109	1023128	1023127	1000246
1005	PPE	1002060	1001647	792644	740350	1000247
	PPB	1002068	1001655	792646	740351	1000247
	PCE	1002368	1001716	792119	740349	1000247
	NPE	1002196	1001716	792119	740349	1000247
	PCB	1002361	1001724	792026	740348	1000247
	NPB	1002204	1001724	792026	740348	1000247
	PVT HV	1018072	1019066	1002267	1002267	1000247
	TTT	1002348	1001740	809407	809406	1000247
	SST	1002560	1002552	809424	809423	1000247
	PVT	1023137	1023110	1023126	1023125	1000247
0708	PPE	1002061	1001648	1001437	1001441	1000248
	PPB	1002069	1001656	1001436	1001440	1000248
	PCE	1002369	1001717	1001435	1001439	1000248
	NPE	1002197	1001717	1001435	1001439	1000248
	PCB	1002362	1001725	1001434	1001438	1000248
	NPB	1002205	1001725	1001434	1001438	1000248
	PVT HV	1018073	1019067	1002267	1002267	1000248
	TTT	1002349	1001741	809445	809444	1000248
	SST	1002561	1002553	809497	809496	1000248
	PVT	1023138	1023111	1023126	1023125	1000248
0413	PPE	1002062	1001649	1001437	1001441	1000249
	PPB	1002070	1001657	1001436	1001440	1000249
	PCE	1002370	1001718	1001435	1001439	1000249

Solenoid Pump Spare Parts

beta/a and gamma/L

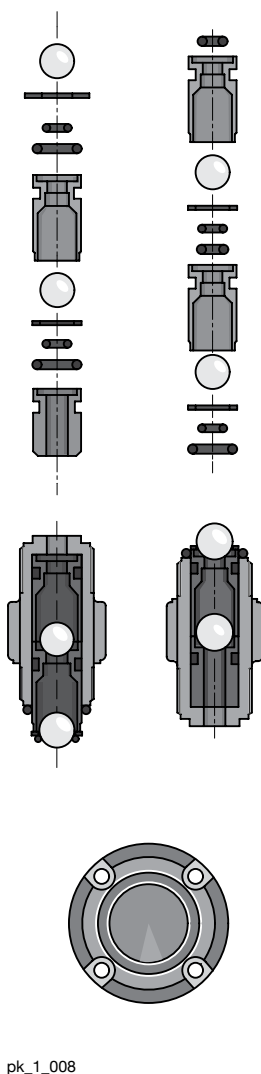


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Liquid End Version	Material Code	Complete Liquid End	Spare Parts Kit	Spare Valves Only (connector sets not included)		
				Suction	Discharge	Diaphragm
0413 (cont.)	NPE	1002198	1001718	1001435	1001439	1000249
	PCB	1002363	1001726	1001434	1001438	1000249
	NPB	1002206	1001726	1001434	1001438	1000249
	PVT HV	1018084	1019069	1002267	1002267	1000249
	TTT	1002350	1001742	809445	809444	1000249
	SST	1002562	1002554	809497	809496	1000249
	PVT	1023139	1023112	1023126	1023125	1000249
0220	PPE	1002063	1001650	1001437	1001441	1000250
	PPB	1002071	1001658	1001436	1001440	1000250
	PCE	1002371	1001719	1001435	1001439	1000250
	NPE	1002199	1001719	1001435	1001439	1000250
	PCB	1002364	1001727	1001434	1001438	1000250
	NPB	1002207	1001727	1001434	1001438	1000250
	PVT HV	1018085	1019070	1002267	1002267	1000250
	TTT	1002351	1001754	809445	809444	1000250
	SST	1002563	1002555	1002547	1002548	1000250
	PVT	1023140	1023113	1023126	1023125	1000250
	PPE	1002060	1001647	792644	740350	1000247
1605	PPB	1002068	1001655	792646	740351	1000247
	PCE	1002368	1001716	792119	740349	1000247
	NPE	1002196	1001716	792119	740349	1000247
	PCB	1002361	1001724	792026	740348	1000247
	NPB	1002204	1001724	792026	740348	1000247
	PVT HV	1018072	1019066	1002267	1002267	1000247
	TTT	1002348	1001740	809407	809406	1000247
	SST	1002560	1002552	809424	809423	1000247
	PVT	1023137	1023110	1023126	1023125	1000247
	PPE	1002061	1001648	1001437	1001441	1000248
	PPB	1002069	1001656	1001436	1001440	1000248
1008	PCE	1002369	1001717	1001435	1001439	1000248
	NPE	1002197	1001717	1001435	1001439	1000248
	PCB	1002362	1001725	1001434	1001438	1000248
	NPB	1002205	1001725	1001434	1001438	1000248
	PVT HV	1018073	1019067	1002267	1002267	1000248
	TTT	1002349	1001741	809445	809444	1000248
	SST	1002561	1002553	809497	809496	1000248
	PVT	1023138	1023111	1023126	1023125	1000248
	PPE	1002062	1001649	1001437	1001441	1000249
	PPB	1002070	1001657	1001436	1001440	1000249
	PCE	1002370	1001718	1001435	1001439	1000249
0713	NPE	1002198	1001718	1001435	1001439	1000249
	PCB	1002363	1001726	1001434	1001438	1000249
	NPB	1002206	1001726	1001434	1001438	1000249
	PVT HV	1018084	1019069	1002267	1002267	1000249
	TTT	1002350	1001742	809445	809444	1000249
	SST	1002562	1002554	809497	809496	1000249
	PVT	1023139	1023112	1023126	1023125	1000249
0420	PPE	1002063	1001650	1001437	1001441	1000250
	PPB	1002071	1001658	1001436	1001440	1000250
	PCE	1002371	1001719	1001435	1001439	1000250
	NPE	1002199	1001719	1001435	1001439	1000250
	PCB	1002364	1001727	1001434	1001438	1000250
	NPB	1002207	1001727	1001434	1001438	1000250
	PVT HV	1018085	1019070	1002267	1002267	1000250
	TTT	1002351	1001754	809445	809444	1000250
	SST	1002563	1002555	1002547	1002548	1000250
	PVT	1023140	1023113	1023126	1023125	1000250
	PPE	1002064	1001651	1001437	1001441	1000251
0232	PPB	1002072	1001659	1001436	1001440	1000251
	PCE	1002609	1001720	1001435	1001439	1000251
	NPE	1002200	1001720	1001435	1001439	1000251
	PCB	1002608	1001728	1001434	1001438	1000251
	NPB	1002208	1001728	1001434	1001438	1000251
	TTT	1002352	1001755	809445	809444	1000251
	SST	1002564	1002556	1002547	1002548	1000251
	PVT	1023141	1023124	1023126	1023125	1000251

Solenoid Pump Spare Parts

beta/a and gamma/L Auto-degassing



For Auto-degassing pumps.

Complete liquid ends include pump head, valves, mounting screws, diaphragm and back plate. Spare parts kits include:

PP & NP

Liquid Ends

- | | |
|-------------------|------------------------|
| 1 Diaphragm | 2 Valve Balls |
| 1 Suction Valve | 1 Set O-rings |
| 1 Discharge Valve | 1 Vent Valve, Complete |
| 2 Connector Sets | |

Liquid End Version	Material Code	Complete Liquid End	Spare Parts Kit	Spare Valves Only (connector sets not included)			Diaphragm
				Suction	Discharge	Vent	
GALa							
1601	PPE	1002393	1001756	792644	1001067	1001063	1000245
	PPB	1002392	1001762	792646	1001066	1001062	1000245
	NPE	1002248	1001660	792119	1001065	1001061	1000245
	NPB	1002242	1001666	792026	1001064	1001060	1000245
1602	PPE	1002395	1001757	792644	1001067	1001063	1000246
	PPB	1002394	1001763	792646	1001066	1001062	1000246
	NPE	1002249	1001661	792119	1001065	1001061	1000246
	NPB	1002243	1001667	792026	1001064	1001060	1000246
1005	PPE	1002399	1001758	792644	1001067	1001063	1000247
	PPB	1002398	1001764	792646	1001066	1001062	1000247
	NPE	1002250	1001662	792119	1001065	1001061	1000247
	NPB	1002244	1001668	792026	1001064	1001060	1000247
0708	PPE	1002397	1001759	1001437	1001071	1001063	1000248
	PPB	1002396	1001765	1001436	1001070	1001062	1000248
	NPE	1002251	1001663	1001435	1001069	1001061	1000248
	NPB	1002245	1001669	1001434	1001068	1001060	1000248
0413	PPE	1002401	1001760	1001437	1001071	1001063	1000249
	PPB	1002400	1001766	1001436	1001070	1001062	1000249
	NPE	1002252	1001664	1001435	1001069	1001061	1000249
	NPB	1002246	1001670	1001434	1001068	1001060	1000249
0220	PPE	1002403	1001761	1001437	1001071	1001063	1000250
	PPB	1002402	1001767	1001436	1001070	1001062	1000250
	NPE	1002253	1001665	1001435	1001069	1001061	1000250
	NPB	1002247	1001671	1001434	1001068	1001060	1000250
1605	PPE	1002399	1001758	792644	1001067	1001063	1000247
	PPB	1002398	1001764	792646	1001066	1001062	1000247
	NPE	1002250	1001662	792119	1001065	1001061	1000247
	NPB	1002244	1001668	792026	1001064	1001060	1000247
1008	PPE	1002397	1001759	1001437	1001071	1001063.5	1000248
	PPB	1002396	1001765	1001436	1001070	1001062.7	1000248
	NPE	1002251	1001663	1001435	1001069	1001061.9	1000248
	NPB	1002245	1001669	1001434	1001068	1001060.1	1000248
0713	PPE	1002401	1001760	1001437	1001071	1001063.5	1000249
	PPB	1002400	1001766	1001436	1001070	1001062.7	1000249
	NPE	1002252	1001664	1001435	1001069	1001061.9	1000249
	NPB	1002246	1001670	1001434	1001068	1001060.1	1000249
0420	PPE	1002403	1001761	1001437	1001071	1001063.5	1000250
	PPB	1002402	1001767	1001436	1001070	1001062.7	1000250
	NPE	1002253	1001665	1001435	1001069	1001061.9	1000250
	NPB	1002247	1001671	1001434	1001068	1001060.1	1000250

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Solenoid Pump Spare Parts

beta/b

Complete liquid ends include pump head, valves, mounting screws, diaphragm and backplate. Spare parts kits include:

PP, PC, PV, & NP Liquid Ends

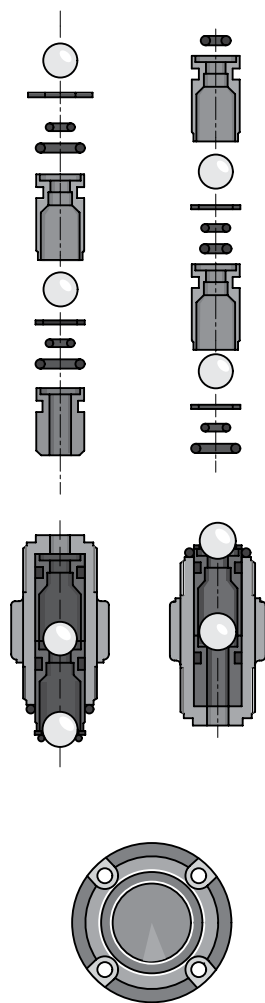
- 1 Diaphragm
- 1 Suction Valve
- 1 Discharge Valve
- 2 Connector Sets
- 2 Valve Balls
- 1 Set O-rings

TT Liquid Ends

- 1 Diaphragm
- 1 Suction Valve
- 1 Discharge Valve
- 2 Connector Sets
- 2 Valve Balls
- 1 Set O-rings
- 2 Ball Seat Discs

SS Liquid Ends

- 1 Diaphragm
- 4 Valve Balls
- 1 Set O-rings
- 4 Ball Seat Discs



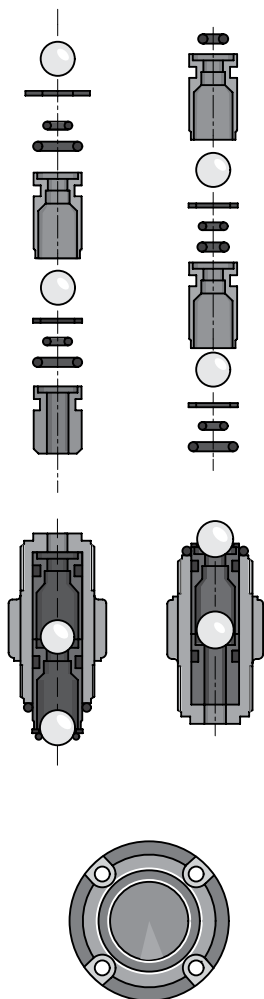
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Liquid End Version	Material Code	Complete Liquid End	Spare Parts Kit	Spare Valves Only (connector sets not included)		
				Suction	Discharge	Diaphragm
1000	PPT	1035317	1023107	1023128	1023127	1000244
	NPT	1034560	1023107	1023128	1023127	1000244
	PVT	1023134	1023107	1023128	1023127	1000244
	TTT	1002345	1001737	809407	809406	1000244
	SST	1002557	1002549	809424	809423	1000244
1601	PPT	1035318	1023108	1023128	1023127	1000245
	NPT	1034561	1023108	1023128	1023127	1000245
	PVT	1023135	1023108	1023128	1023127	1000245
	TTT	1002346	1001738	809407	809406	1000245
	SST	1002558	1002550	809424	809423	1000245
2001	NPT	1034561	1023108	1023128	1023127	1000245
	SST	1002558	1002550	809424	809423	1000245
1602	PPT	1035319	1023109	1023128	1023127	1000246
	NPT	1034562	1023109	1023128	1023127	1000246
	PVT	1023136	1023109	1023128	1023127	1000246
	TTT	1002347	1001739	809407	809406	1000246
	SST	1002559	1002551	809424	809423	1000246
2002	NPT	1034562	1023109	1023128	1023127	1000246
	SST	1002559	1002551	809424	809423	1000246
1604	PPT	1035320	1035332	1023128	1023127	1034612
	NPT	1034563	1035332	1023128	1023127	1034612
	PVT	1035298	1035332	1023128	1023127	1034612
	TTT	1034582	1035330	809407	809406	1034612
	SST	1035325	1035331	809424	809423	1034612
	PVT HV	1035326	1035342	x	x	1034612
0708	PPT	1035321	1023111	1023126	1023125	1000248
	NPT	1034564	1023111	1023126	1023125	1000248
	PVT	1023138	1023111	1023126	1023125	1000248
	TTT	1002349	1001741	809445	809444	1000248
	SST	1002561	1002553	809497	809496	1000248
	PVT HV	1018073	1019067	1002267	1002267	1000248
0413	PPT	1035322	1023112	1023126	1023125	1000249
	NPT	1034565	1023112	1023126	1023125	1000249
	PVT	1023139	1023112	1023126	1023125	1000249
	TTT	1002350	1001742	809445	809444	1000249
	SST	1002562	1002554	809497	809496	1000249
	PVT HV	1018084	1019069	1002267	1002267	1000249
0220	PPT	1035323	1023113	1023126	1023125	1000250
	NPT	1034566	1023113	1023126	1023125	1000250
	PVT	1023140	1023113	1023126	1023125	1000250
	TTT	1002351	1001754	809445	809444	1000250
	SST	1002563	1002555	1002547	1002548	1000250
	PVT HV	1018085	1019070	1002267	1002267	1000250
2504	NPT	1034563	1035332	1023128	1023127	1034612
	SST	1035325	1035331	809424	809423	1034612
1008	PPT	1035321	1023111	1023126	1023125	1000248
	NPT	1034564	1023111	1023126	1023125	1000248
	PVT	1023138	1023111	1023126	1023125	1000248
	TTT	1002349	1001741	809445	809444	1000248
	SST	1002561	1002553	809497	809496	1000248
	PVT HV	1018073	1019067	1002267	1002267	1000248

beta/b continued

Liquid End Version	Material Code	Complete Liquid End	Spare Parts Kit	Spare Valves Only (connector sets not included)		
				Suction	Discharge	Diaphragm
0713	PPT	1035322	1023112	1023126	1023125	1000249
	NPT	1034564	1023112	1023126	1023125	1000249
	PVT	1023139	1023112	1023126	1023125	1000249
	TTT	1002350	1001742	809445	809444	1000249
	SST	1002562	1002554	809497	809496	1000249
	PVT HV	1018084	1019069	1002267	1002267	1000249
0420	PPT	1035323	1023113	1023126	1023125	1000250
	NPT	1034566	1023113	1023126	1023125	1000250
	PVT	1023140	1023113	1023126	1023125	1000250
	TTT	1002351	1001754	809445	809444	1000250
	SST	1002563	1002555	1002547	1002548	1000250
	PVT HV	1018085	1019070	1002267	1002267	1000250

beta/b Auto-degass



pk_1_008

For Auto-degassing pumps.

Complete liquid ends include pump head, valves, mounting screws, diaphragm and back plate. Spare parts kits include:

PP & NP Liquid Ends

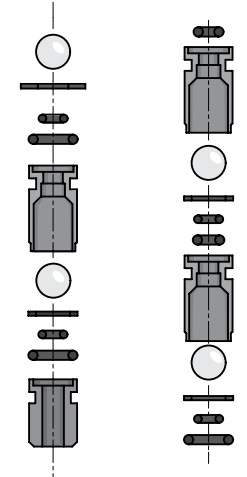
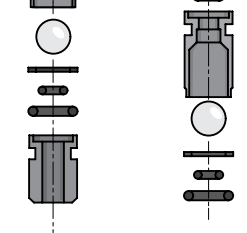
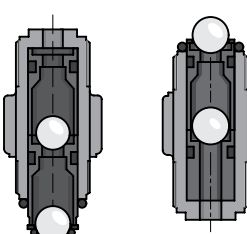
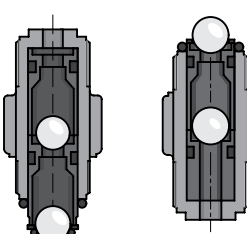
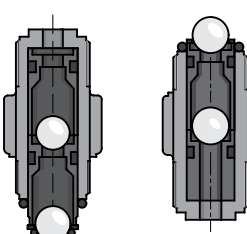
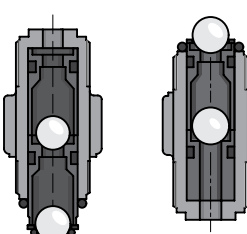
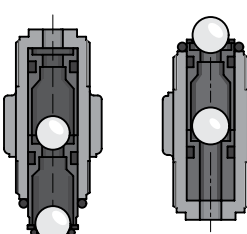
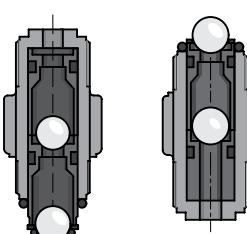
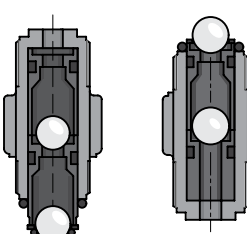
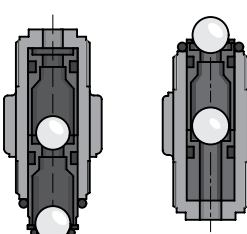
1 Diaphragm	1 Suction Valve	1 Discharge Valve	2 Valve Balls
2 Connector Sets	1 Set O-rings	1 Vent Valve, Complete	

Liquid End Version	Material Code	Complete Liquid End	Spare Parts Kit	Spare Valves Only (connector sets not included)			Diaphragm
				Suction	Discharge	Vent	
1601	NPE	1002248	1001660	792119	1001065	1001061	1000245
	NPB	1002242	1001666	792026	1001064	1001060	1000245
	PPE	1002393	1001756	792644	1001067	1001063	1000245
	PPB	1002392	1001762	792646	1001066	1001062	1000245
1602	NPE	1002249	1001661	792119	1001065	1001061	1000246
	NPB	1002243	1001667	792026	1001064	1001060	1000246
	PPE	1002395	1001757	792644	1001067	1001063	1000246
	PPB	1002394	1001763	792646	1001066	1001062	1000246
1604	NPE	1035299	1035333	792119	1001065	1001061	1034612
	NPB	1035300	1035334	792026	1001064	1001060	1034612
	PPE	1035301	1035335	792644	1001067	1001063	1034612
	PPB	1035302	1035336	792646	1001066	1001062	1034612
0708	NPE	1002251	1001663	1001435	1001069	1001061	1000248
	NPB	1002245	1001669	1001434	1001068	1001060	1000248
	PPE	1002397	1001759	1001437	1001071	1001063	1000248
	PPB	1002396	1001765	1001436	1001070	1001062	1000248
0413	NPE	1002252	1001664	1001435	1001069	1001061	1000249
	NPB	1002246	1001670	1001434	1001068	1001060	1000249
	PPE	1002401	1001760	1001437	1001071	1001063	1000249
	PPB	1002400	1001766	1001436	1001070	1001062	1000249
0220	NPE	1002253	1001665	1001435	1001069	1001061	1000250
	NPB	1002247	1001671	1001434	1001068	1001060	1000250
	PPE	1002403	1001761	1001437	1001071	1001063	1000250
	PPB	1002402	1001767	1001436	1001070	1001062	1000250
1008	NPE	1002251	1001663	1001435	1001069	1001061	1000248
	NPB	1002245	1001669	1001434	1001068	1001060	1000248
	PPE	1002397	1001759	1001437	1001071	1001063	1000248
	PPB	1002396	1001765	1001436	1001070	1001062	1000248
0713	NPE	1002252	1001664	1001435	1001069	1001061	1000249
	NPB	1002246	1001670	1001434	1001068	1001060	1000249
	PPE	1002401	1001760	1001437	1001071	1001063	1000249
	PPB	1002400	1001766	1001436	1001070	1001062	1000249
0420	NPE	1002253	1001665	1001435	1001069	1001061	1000250
	NPB	1002247	1001671	1001434	1001068	1001060	1000250
	PPE	1002403	1001761	1001437	1001071	1001063	1000250
	PPB	1002402	1001767	1001436	1001070	1001062	1000250

Solenoid Pump Spare Parts

EXtronic

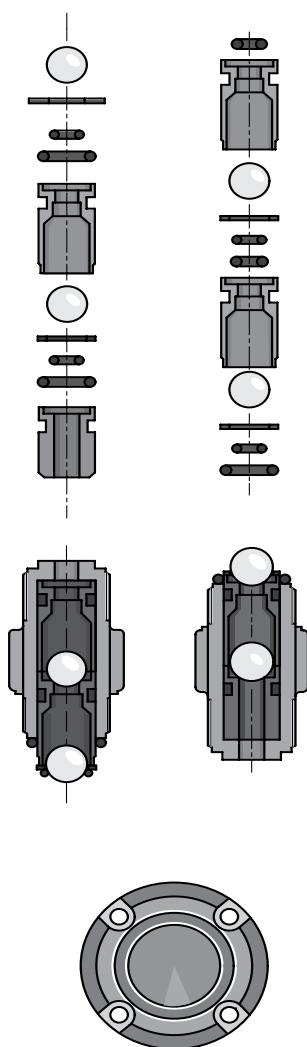
EXtronic Spare Parts Kits

	Liquid end version	Material Code	Spare Parts Kit	Diaphragm
	1000	PP1	740357	811452
		NP3	740354	811452
		TT	912674	811452
		SS2	912675	811452
	1601	PP1	740361	811453
		NP3	740358	811453
		NS3/PS3	792033	811453
		TT	912678	811453
		SS2	912679	811453
	1201	PP1	740380	811454
		NP3	740362	811454
		NS3/PS3	792034	811454
		TT	912682	811454
		SS2	912683	811454
	0803	PP1	740384	1002510
		NP3	740381	1002510
		NS3/PS3	792035	1002510
		TT	912686	1002510
		SS2	912687	1002510
	1002/2502	PP1	740388	811456
		NP3	740385	811456
		NS3/PS3	792036	811456
		TT	912690	811456
		SS2	912691	811456
		HV/PP4 (Type 1002)	910174	811456
	0308/1006/2505	PP1	740497	1002511
		NP1	740498	1002511
		TT	912694	1002511
		SS2	912695	1002511
		HV/PP4 (Type 1006)	910940	1002511
	0613/1310	PP1	740504	811458
		NP1	740505	811458
		TT1	912698	811458
		SS2	912699	811458
		HV/PP4 (Type 1310)	910942	811458
	0417/0814	PP1	740501	811459
		NP1	740502	811459
		TT	910978	811459
		SS2	910980	811459
		HV/PP4 (Type 0814)	910944	811459
	0430/0230-DN 10	PP1	740507	811460
		NP1	740508	811460
		TT	910994	811460
		SS1	910996	811460
	0260			811461

pk_1_008

Solenoid Pump Spare Parts

delta®



Spare parts kits for delta®, consisting of:

- 1 diaphragm
- 1 suction valve set
- 1 discharge valve set
- 2 ball valves
- 1 set of O-rings
- 1 connector set

Liquid End Version	Material Code	Complete Liquid End	Spare Parts Kit	Diaphragm
1612	NPE	1030540	1030536	1000248
	NPB	1030542	1030525	1000248
	PVT	1025140	1027081	1000248
	SST	1027074	1027086	1000248
1020	NPE	1030541	1030537	1000249
	NPB	1030543	1030526	1000249
	PVT	1025141	1027082	1000249
	SST	1027075	1027087	1000249
0730	NPE	1030618	1030621	1000250
	NPB	1030609	1030612	1000250
	PVT	1025142	1027083	1000250
	SST	1027076	1027088	1000250
0450	PVT	1025143	1027084	1000251
	SST	1027077	1027089	1000251
0280	PVT	1025184	1027085	1025075
	SST	1027078	1027090	1025075
1608	NPE	1030619	1030620	1030353
	NPB	1030610	1030611	1030353
	SST	1030228	1030225	1030353
2508	NPE	1030619	1030620	1030353
	NPB	1030610	1030611	1030353
	SST	1030228	1030225	1030353

Note: Stainless steel version without suction and discharge valve sets.

product overview

solenoid-driven metering pumps

motor-driven metering pumps

pump spare parts & accessories

DULCOMETER® instrumentation

DULCOTEST® sensors

polymer blending systems

Motor Pump Spare Parts

Sigma 1,2 & 3 (New Multi-layer safety diaphragm)

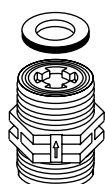
Complete liquid ends include pump head, valves, mounting screws, diaphragm and backplate. Clamping nuts and inserts are not included with complete liquid ends, complete valves or spare parts kits. Spare parts kits include:

PVT Liquid ends

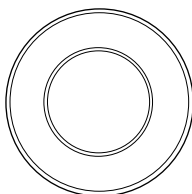
- 1 Diaphragm
- 1 Suction valve
- 1 Discharge valve
- 2 Valve balls
- 1 Set of o-rings

SST Liquid ends

- 1 Diaphragm
- 2 Valve balls
- 1 Set of o-rings, complete
(sleeve rings, ball seat rings)



Valve
Complete



Material Code	Liquid End Complete	Spare Parts Kit	Valve Complete	Diaphragm
<u>12017, 12035, 10050 with Liquid end FM 50</u>				
PVT	1030104	1035964	1002267	1030114
SST	1030106	1035966*	809459	1030114
<u>10022, 10044, 07065 with Liquid end FM 65</u>				
PVT	1030105	1035967	1002267	1030115
SST	1030107	1035969*	809459	1030115
<u>07042, 04084, 04120, with Liquid end FM 120</u>				
PVT	1036214	1035961	792517	1035828
SST	1036215	1035963	809404	1035828
<u>16050 with Liquid end FM 130</u>				
PVT	1029763	1035951	792517	1029771
SST	1029764	1035957*	809404	1029771
<u>16090, 16130 with Liquid end FM 130</u>				
PVT	7781515	1035951	792517	1029771
SST	1029764	1035957*	809404	1029771
<u>07120, 07220 with Liquid end FM 350</u>				
PVT	1029761	1035953	740615	1033422
SST	1029762	1035960*	803708	1033422
<u>04350 with Liquid end FM 350</u>				
PVT	7781516	1035953	740615	1033422
SST	7781517	1035960*	803708	1033422
<u>120145, 120190, 120270, with Liquid end FM 330 - DN 25</u>				
PVT	1029585	1034678	740615	1029604
SST	1029586	1034679*	803708	1029604
<u>070410, 070580, 040830, with Liquid end FM 1000 - DN 32</u>				
PVT	1029578	1034681	1020031	1029603
SST	1029587	1034682*	1002811	1029603

*SS complete without spare valves

Motor Pump Spare Parts

Sigma 1, 2 & 3 (Old Style Standard diaphragm)

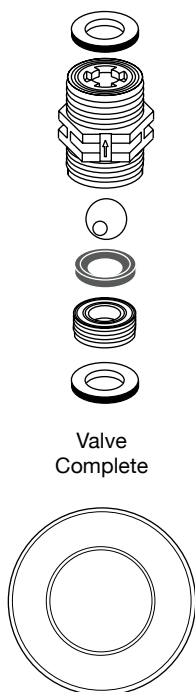
Complete liquid ends include pump head, valves, mounting screws, diaphragm and backplate. Clamping nuts and inserts are not included with complete liquid ends, complete valves or spare parts kits. Spare parts kits include:

PVT Liquid ends

- 1 Diaphragm
- 1 Suction valve
- 1 Discharge valve
- 2 Valve balls
- 1 Set of o-rings

SST Liquid ends

- 1 Diaphragm
- 2 Valve balls
- 1 Set of o-rings, complete (sleeve rings, ball seat rings)



Material Code	Liquid End Complete	Spare Parts Kit	Valve Complete	Diaphragm
12017, 12035, 10050 with Liquid end FM 50				
PVT	1010560	1010541	1002267	1010279
SST	1010561	1010555	809459	1010279
SST*		1010554		1010279
10022, 10044, 07065 with Liquid end FM 65				
PVT	1010562	1010542	1002267	1010282
SST	1010563	1010557	809459	1010282
SST*		1010556		1010282
07042, 04084, 04120 with Liquid end FM 120				
PVT	1010565	1010543	792517	1010285
SST	1010566	1010559	809404	1010285
SST*		1010558		1010285
16050 with Liquid end FM 130				
PVT	792755	740324	792517	792495
SST	792761	740328	809404	792495
SST*		740326		
16090, 16130 with Liquid end FM 130				
PVT	7792755	740324	792517	792495
SST	792761	740328	809404	792495
SST*		740326		
07120, 07220 with Liquid end FM 350				
PVT	792756	740325	740615	792496
SST	792762	740329	803708	792496
SST*		740327		
04350 with Liquid end FM 350				
PVT	7792756	740325	740615	792496
SST	792762	740329	803708	792496
SST*		740327		
120145, 120190, 120270, with Liquid end FM 330 - DN 25				
PVT	1005298	1005308	740615	1004604
SST	1005300	1005312	803708	1004604
SST*		1005310		1004604
070410, 070580, 040830, with Liquid end FM 1000 - DN 32				
PVT	1005297	1005309	1020031	1002835
SST	1005299	1005313	1002811	1002835
SST*		1005311		1002835

*SS complete without spare valves

Liquid End Version		Material Code	Complete Liquid End	Spare Parts Kit	Valve Suction (Spare valves only)	Complete Discharge	Packing set
Sigma HK							
08	(For pump versions 32002, 23004, & 10006)	S	1000584	1001572	803792	803793	1000565
12.5	(For pump versions 14006, 10011, & 05016)	S	910420	910470	803792	803793	485401
25	(For pump versions 07012, 04522, & 02534)	S	910421	910471	803792	803793	485402
50	(For pump versions 04022, 02541, & 01264)	S	910422	910472	803794	803795	485403

Motor Pump Spare Parts

Meta

Complete liquid ends include pump head, valves, mounting screws, diaphragm and backplate. Spare parts kits include:

Standard kit for PP, TT and PVC material versions:

- 1 Pump diaphragm
- 1 Suction valve, complete
- 1 Discharge valve, complete
- 2 Valve balls
- 1 Set of o-rings (complete w/O-rings & ball-seat discs)

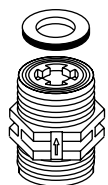
Standard kit for SS (316 stainless steel) version:

- 1 Pump diaphragm
- 2 Valve balls
- 1 Set of o-rings (complete w/sleeve rings & ball-seat discs)

Standard kit for MTKa version:

- 1 Pump diaphragm
- 4 Valve balls
- 4 Ball-seat discs
- 2 PTFE/graphite piston packing rings
- 2 Piston guides
- 14 Flat o-rings
- 2 O-rings

Note: Union nut and NPT inserts are not included in the spare parts kit.



MTMa
Valve
Complete

Liquid End Version	Material Code	Complete Liquid End	Spare Parts Kit	Valve Complete	Diaphragm
Meta MTMaH/MTMaA					
130 (For pump versions 12065, 12086, 12108 & 12130)	PCA	910402	910454	803703	811470
	PCE	7910402	7910454	7803703	811470
	PPE	910401	910451	803701	811470
	TTT	910403	910457	803705	811470
	SST	910404	910474	803707	811470
	SST	910404	910460*	803707	811470
260 (For pump versions 10130, 09173, 07216, 06260, 10173, 10216, 10260, 10200, 10263 & 10330)	PCA	910408	910455	803703	811471
	PCE	7910409	7910455	7803703	811471
	PPE	910407	910452	803701	811471
	TTT	910409	910458	803705	811471
	SST	910410	910475	803707	811471
	SST	910410	910461*	803707	811471
530 (For pump versions 05265, 04253, 03441, 03530, 05540, 05530, 04400, 04527, 03662, & 03790)	PCA	910414	910456	803704	811472
	PCE	7910415	7910456	7803705	811472
	PPE	910413	910453	803702	811472
	TTT	910415	910459	803706	811472
	SST	910416	910476	803708	811472
	SST	910416	910462*	803708	811472
	††PPT 6 mm	7910413	1001568	740615	811472
	††PCT 6 mm	7910414	1001568	740615	811472

*SS complete without spare valves

†For pump versions 10200, 10263, 10333

††For pump versions 04400, 04527, 03662

Liquid End Version	Material Code	Complete Liquid End	Spare Parts Kit	Valve Suction (Spare valves only)	Valve Discharge (Spare valves only)	Packing set
Meta MTKaH/MTKaA						
12.5 (For pump versions 10812, 21012, 21606, 24006, 16208, 22508, 12190 & 21610)	SS	910420	910470	803792	803793	485401
25 (For pump versions 10213, 11313, 07617, 10617, 06122, 10222, 05126 & 09926)	SS	910421	910471	803792	803793	485402
50 (For pump versions 05425, 06025, 04033, 05633, 03241, 05441, 02749 & 05249)	SS	910422	910472	803794	803795	485403

Motor Pump Spare Parts

ProMus

Description	Part No.
Rebuild Kit for Manual Stroke Adjuster	852751
Rebuild Kit for Nema 7 Electric Stroke Adjuster	852753
Rebuild Kit for Sz 17 Hydraulics 3/8 Plunger	853755
Rebuild Kit for Sz 17 Hydraulics 7/16 Plunger	853756
Rebuild Kit for Sz 30 Hydraulics 5/8 Plunger	854756
Rebuild Kit for Sz 30 Hydraulics 13/16 Plunger	854757
Rebuild Kit for Sz 30 Hydraulics 1 1/8 Plunger	854758
Rebuild Kit for Sz 40 Hydraulics 1 3/4 Plunger	855754
Rebuild Kit for Sz 40 Hydraulics 2 Plunger	855755
Rebuild Kit for Sz 40 Hydraulics 2 1/4 Plunger	855756
Liquid End Spare Parts Kits Size 17	
Spare Parts Kit for Size 17 with 316 SS single ball	853502
Spare Parts Kit for Size 17 with 316 SS double ball for suct. & disch.	853503
Spare Parts Kit for Size 17 with 316 SS double ball for disch.	853505
Spare Parts Kit for Size 17 with Alloy 20 single ball	853582
Spare Parts Kit for Size 17 with Alloy 20 double ball for suct. & disch.	853583
Spare Parts Kit for Size 17 with Alloy 20 double ball for disch.	853585
Spare Parts Kit for Size 17 with Hastelloy C single ball	853662
Spare Parts Kit for Size 17 with Hastelloy C double ball for suct. & disch.	853663
Spare Parts Kit for Size 17 with Hastelloy C double ball for disch.	853665
Spare Parts Kit for Size 17 with PVT double ball	853908
Liquid End Spare Parts Kits Size 30	
Spare Parts Kit for Size 30 with 316 SS single ball	854501
Spare Parts Kit for Size 30 with 316 SS double ball for suct. & disch.	854503
Spare Parts Kit for Size 30 with 316 SS double ball for disch., 30/17	854505
Spare Parts Kit for Size 30 with 316 SS double ball for disch., 30/30	854507
Spare Parts Kit for Size 30 with 316 SS double ball for suct. & disch., 30/17	854509
Spare Parts Kit for Size 30 with Alloy 20 single ball	854601
Spare Parts Kit for Size 30 with Alloy 20 double ball for suct. & disch., 30/30	854603
Spare Parts Kit for Size 30 with Alloy 20 double ball for disch., 30/17	854605
Spare Parts Kit for Size 30 with Alloy 20 double ball for disch., 30/30	854607
Spare Parts Kit for Size 30 with Alloy 20 double ball for suct. & disch., 30/17	854609
Spare Parts Kit for Size 30 with Hastelloy C single ball	854801
Spare Parts Kit for Size 30 with Hastelloy C double ball for suct. & disch., 30/30	854803
Spare Parts Kit for Size 30 with Hastelloy C double ball for disch., 30/17	854805
Spare Parts Kit for Size 30 with Hastelloy C double ball for disch., 30/30	854807
Spare Parts Kit for Size 30 with Hastelloy C double ball for suct. & disch., 30/17	854809
Spare Parts Kit for Size 30 with PVT single ball	854908
Liquid End Spare Parts Kits Size 40	
Spare Parts Kit for Size 40 with 316 SS single ball	855501
Spare Parts Kit for Size 40 with Alloy 20 single ball	855504
Spare Parts Kit for Size 40 with Hastelloy C single ball	855507
Spare Parts Kit for Size 40 with PVT single ball	855908

Motor Pump Spare Parts

Makro TZMa

Spare parts kits for ProMinent Makro series metering pumps include pump diaphragm, valve balls, valve components and all required o-rings.

Standard kit for PP, NP-Acrylic and PVC material versions:

- 1 Pump diaphragm
- 1 Suction valve, complete
- 1 Discharge valve, complete
- 2 Valve balls
- 1 Set of o-rings, complete

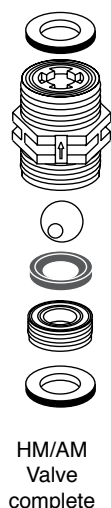
Standard kit for TT-PTFE material version:

- 1 Pump diaphragm
- 1 Suction valve, complete
- 1 Discharge valve, complete
- 2 Valve balls
- 2 Ball-seat discs or valve assembly
- 1 Set of o-rings, complete

Standard kit for SS (stainless steel) version:

- 1 Pump diaphragm
- 2 Valve balls
- 1 Set of o-rings, complete

Note: Union nut and NPT inserts are not included in the spare parts kit.

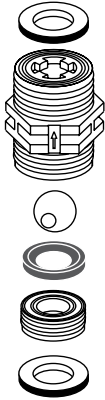


Liquid end Type	Material Code	Complete Liquid end	Spare Parts Kit	Valve Complete	Diaphragm
FM-130 DN 20	PPE	910401	910451	803701	811470
	PCB	910402	910454	803703	811470
	TTT	910403	910457	803705	811470
	SST	910404	910474 910460*	803707	811470
FM-260 DN 20	PPE	910407	910452	803701	811471
	PCB	910408	910455	803703	811471
	TTT	910409	910458	803705	811471
	SST	910410	910475 910461*	803708	811471
FM-530 DN 25	PPE	910413	910453	740615	811472
	PCB	910414	910456	740615	811472
	TTT	910415	910459	740615	811472
	SST	910416	910476 910462*	803708	811472
FM-1500 & 2100 DN 40	PPE	1001245	1001573	1023799	811473
	PCB	1001244	1001574	1023799	811473
	TTT	1001246	1001575	1023799	811473
	SST	1001247	1001577 1001576*	1004178	811473
FMH-70-20	PPE		911903	1023799	1007298
	PCB		911901	1023799	1007298
	TTT		911905	1023799	1007298
	SST		911907 911908*	1004178	1007298
FMH-90-20	PPE		911904	1023799	1007298
	PCB		911902	1023799	1007298
	TTT		911906	1023799	1007298
	SST		911909 911910*	1004178	1007298

*SS with 2 valves, complete

Motor Pump Spare Parts

Makro TZMb



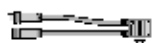






Material Code	Spare Parts Kit	Suction/Discharge Valves	Diaphragm
<u>120260, 120340, 120430, 120510, 120650 (FM670 - DN25)</u>			
PCT/PPT/TTT	1025164	740615	1022887
SST	1022896	803708	1022887
SST*	1022895	-	1022887
<u>070430, 070570, 070720, 070860, 071070</u>			
PCT/PPT/TTT	1025167	1020031	1022900
SST	1022917	1002811	1022900
SST*	1022916	-	1022900
<u>040840, 041100, 041400, 041670, 042100</u>			
PCT/PPT/TTT	1025169	1023799	1022921
SST	1022930	1004178	1022921
SST*	1022929	-	1022921

* Without Checkvalves

Pump & Systems Accessories

PROFIBUS® Adapters

	Description		Figure	Part No.
 fig. 1	Y-adapter 2 x M12 x 1 male/female	9 pin, Sub-D plug	1	1005838
 fig. 2	9 pin, Sub-D plug			
 fig. 3	Adapter 1 x M12 x 1 male	9 pin, Sub-D plug	2	1005839
 fig. 4	Y-adapter 2 x M12 x 1 male/female	M12 x 1	3	1024216
 fig. 5	Adapter 1 x M12 x 1 male	M12 x 1	4	1024219
 fig. 5	PROFIBUS® Y-adapter	M12 x 1	5	1036621
 fig. 5	PROFIBUS® termination resistance, plug-in	M12 x 1	5	1036621

Control Cables

Required for external control of ProMinent metering pumps including:

- beta
- gamma/ L
- delta
- Sigma/ 1 control
- Sigma/ 2 control
- Sigma/ 3 control

Description	Part No.
Universal control cable, 5-wire, 6 ft. (2 m)	1001300
Universal control cable, 5-wire, 15 ft. (5 m)	1001301
Universal control cable, 5-wire, 30 ft. (10 m)	1001302
Universal control cable, 5-wire, 150 ft. (50 m)	1032811

(SEE DETAILED WIRING DIAGRAMS NEXT PAGE)

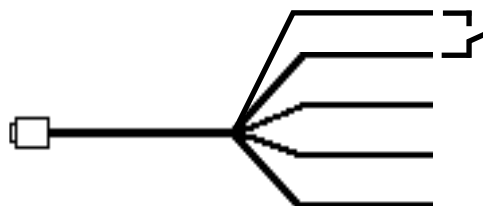
Pump & Systems Accessories

Control Cable Diagrams

Remote On/Off

BROWN and BLACK wires must be connected together via an ON/OFF contact or shorted together. When the contact is closed between the BLACK & BROWN wires, the pump will run. When the contact is open, the pump will stop.

***Note:** If ON/OFF control is the only control feature being used, WHITE, BLUE & GREY wires are not used and should be cut back.



BROWN: Remote On/Off*

BLACK: Common*

GREY: Auxiliary Frequency

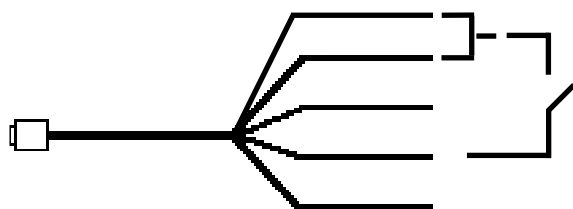
WHITE: Pulse

BLUE: Analog

Pulse Control

Pulse control will allow the pump to run in proportion to a pulsing potential free contact closure.

***Note:** BROWN and BLACK wires have to be connected together via an ON/OFF contact or shorted together. If the GREY wire is not used it should be cut back. The BLUE wire is not used and should be cut back.



BROWN: Remote On/Off*

BLACK: Common (PC)*

GREY: Auxiliary Frequency

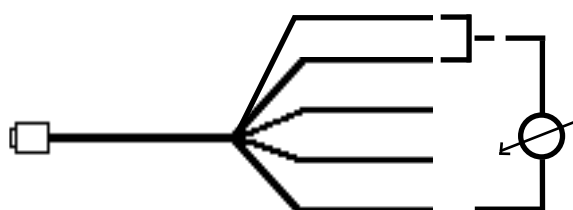
WHITE: Pulse (PC)

BLUE: Analog

Analog Control (not available with beta metering pumps)

Analog control runs in proportion to an analog signal such as 4 - 20 mA.

***Note:** BROWN and BLACK wires must be connected together via an ON/OFF contact or shorted together. The BLACK wire is negative and the BLUE wire is positive. If GREY wire is not used it should be cut back. The WHITE wire is not used and should be cut back.



BROWN: Remote On/Off*

BLACK: Common (-)*

GREY: Auxiliary Frequency

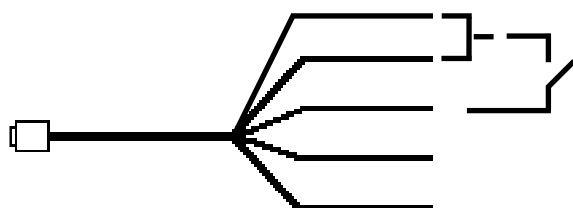
WHITE: Pulse

BLUE: Analog (+)

Auxiliary Frequency

Auxiliary frequency will allow the pump to default to a predetermined stroking frequency regardless of which operating mode the pump is in. The pump defaults to this stroking frequency as long as a contact is closed between the black and grey wires of the universal control cable.

***Note:** BROWN and BLACK wires must be connected together via an ON/OFF contact or shorted together.



BROWN: Remote On/Off*

BLACK: Common (AUX)*

GREY: Auxiliary Frequency (AUX)

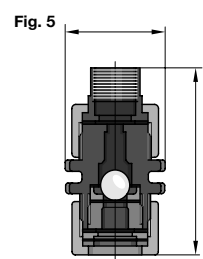
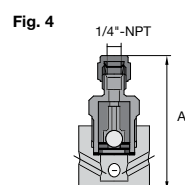
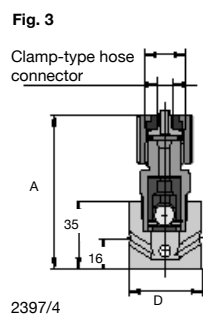
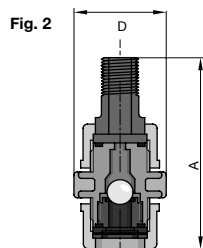
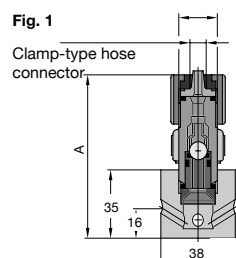
WHITE: Pulse

BLUE: Analog

Pump & Systems Accessories

Foot Valves

To be installed at the inlet of the suction line to improve priming and protect pump against coarse impurities. With ceramic* weight, strainer and ball check valve (must be mounted vertically for ball check function).



Dimensions inches (mm)

	Dim "A"	Dim "D"	Part No.
Polypropylene			
Valve body of PP, o-rings of EPDM (PP1, PPE)			
Connection 1/4" x 3/16" tubing (Fig 1)	3-1/4 (83)	1-3/8 (35)	924558
Connection 1/2" x 3/8" tubing (Fig 1)	3-1/4 (83)	1-3/8 (35)	924566
Connection 1/2" MNPT for 0423/0230 (Fig 2)	3-7/8 (98)	1-3/8 (35)	809465
Connection 3/8" PPE Foot Valve			7924552

Valve body of PP, o-rings of Viton® (PP2, PPB)

Connection 1/4" x 3/16" tubing (Fig 1)	3-1/4 (83)	1-3/8 (35)	7924558
Connection 1/2" x 3/8" tubing (Fig 1)	3-1/4 (83)	1-3/8 (35)	7809470
Connection 1/2" MNPT for 0423/0230 (Fig 2)	3-7/8 (98)	1-3/8 (35)	7809465
Connection 3/8" PPB Foot Valve			7924553

Valve body of PP, o-rings of EPDM-high viscosity (PP4)

Connection 1/2" MNPT (Fig 2)	4 (102)	1-5/8 (42)	7924516
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Valve body of PP, o-rings of Viton®-high viscosity (PP5)

Connection 1/2" MNPT (Fig 2)	4 (102)	1-5/8 (42)	7809471
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PVC

Valve body of PVC, o-rings of EPDM

Connection 1/4" x 3/16" tubing (Fig 1)	3-1/8 (79)	1-3/8 (35)	7924547
Connection 1/2" x 3/8" tubing (Fig 1)	3-1/4 (83)	1-3/8 (35)	7924549
Connection 1/2" MNPT (Fig 2)	3-7/8 (98)	1-3/8 (35)	7809464
Connection 3/8" NPE Foot Valve			7924550

Valve body of PVC, o-rings of Viton®

Connection 1/4" x 3/16" tubing (Fig 1)	3-1/8 (79)	1-3/8 (35)	924557
Connection 1/2" x 3/8" tubing (Fig 1)	3-1/4 (83)	1-3/8 (35)	924565
Connection 1/2" MNPT (Fig 2)	3-7/8 (98)	1-3/8 (35)	809464
Connection 3/8" NPB Foot Valve			7924551

PVT

Valve body of PVDF, seals of PTFE

Connection 1/4" x 3/16" tubing (Fig 1)	3-1/8 (79)	1-3/8 (35)	1024705
Connection 1/2" x 3/8" tubing (Fig 1)	3-1/4 (83)	1-3/8 (35)	1024827

PTFE

Valve body and seals of PTFE (TT1)

Connection 1/4" x 3/16" tubing (Fig 3)	3-1/4 (83)	1-1/2 (38)	809455
Connection 1/2" x 3/8" tubing (Fig 3)	3-1/2 (89)	1-1/2 (38)	809473
Connection 1/2" MNPT (not illustrated)	3-7/8 (98)	1-1/2 (38)	809466

SS

Valve body of stainless steel, seals of PTFE

Connection 1/4" FNPT (SS2) (Fig 4)	2-5/8 (67)	1-1/2 (38)	924567
Connection 3/8" FNPT (SS1) (Fig 5)	2-5/8 (67)	1-1/2 (38)	809467

***Note:** For fluoride, (hydrofluosilicic acid) or when plastic is required to replace standard ceramic weight.

PVC foot valve weight

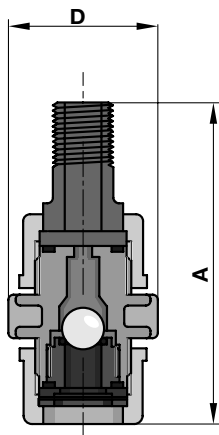
7404007

Viton® is a registered trademark of Dupont Dow Elastomers

Pump & Systems Accessories

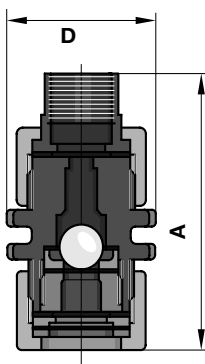
Foot Valves

Fig. 1



2165/4

Fig. 2



1521/4

Polypropylene (Fig. 1) - Valve body of PP, o-rings of EPDM (PP1)

Connection	Dimensions inches (mm)		Part No.
	Dim "A"	Dim "D"	
1/2" MNPT (DN 10) (delta, Sigma 1 and Sigma 2)	3-7/8 (98)	1-1/2 (38)	809465
3/4" MNPT (DN 15) (Sigma 1 and Sigma 2)	4 (102)	1-3/4 (44)	924516
3/4" MNPT (DN 20) (Sigma 2)	5 (127)	2-1/4 (57)	803721
1" MNPT (DN 25) (Sigma 2, Sigma 3 and Makro)	5-1/4 (133)	2-1/2 (63)	803722
1-1/2" MNPT (DN 40) (Sigma 3 and Makro)	6-1/2 (165)	3-1/2 (89)	1004204

PVC (Fig. 1) - Valve body of PVC, o-rings of Viton® (NP1)

1/2" MNPT (DN 10) (delta, Sigma 1 and Sigma 2)	3-7/8 (98)	1-1/2 (38)	809464
3/4" MNPT (DN 15) (Sigma 1 and Sigma 2)	4 (102)	1-3/4 (44)	924515
3/4" MNPT (DN 20) (Sigma 2)	5 (127)	2-1/4 (57)	803723
1" MNPT (DN 25) (Sigma 2, Sigma 3 and Makro)	5-1/4 (133)	2-1/2 (63)	803724
1-1/2" MNPT (DN 40) (Sigma 3 and Makro)	6-1/2 (165)	3-1/2 (89)	1004193

PTFE/PTFE (Fig. 1) Valve body and seals of PTFE (TT1)

1/2" MNPT (DN 10) (delta, Sigma 1 and Sigma 2) (PTFE/PTFE)	3-7/8 (98)	1-3/8 (35)	809466
3/4" MNPT (DN 15) (Sigma 1 and Sigma 2) (PTFE/PTFE)	4-1/8 (105)	1-3/4 (44)	924517
3/4" MNPT (DN 20) (Sigma 2) (PTFE/PTFE)	4-3/4 (121)	2-1/4 (57)	803725
1" MNPT (DN 25) (Sigma 2, Sigma 3 and Makro) (PTFE/PTFE)	5-3/8 (137)	2-1/2 (63)	803726
1-1/2" MNPT (DN 40) (Sigma 3 and Makro) (PTFE/PTFE)	6-1/2 (165)	3-1/2 (89)	1004205

PVDF/PTFE (Fig. 1) Valve body of PVDF and seals of PTFE

1/2" MNPT (DN 10) (delta, Sigma 1 and Sigma 2) (PVDF/PVDF)	3-7/8 (98)	1-3/8 (35)	7803720
3/4" MNPT (DN 15) (Sigma 1 and Sigma 2) (PVDF/PVDF)	4-1/8 (105)	1-3/4 (44)	7803721
3/4" MNPT (DN 25) (Sigma 2, Sigma 3 and Makro) (PVDF/PVDF)	4-3/4 (121)	2-1/4 (57)	7803722
1" MNPT (DN 25) (Sigma 2, Sigma 3 and Makro) (PVDF/PVDF)	5-3/8 (137)	2-1/2 (63)	7803723
1-1/2" MNPT (DN 32) (PVDF/PVDF)			1006434

SS - Valve body of stainless steel, seals of PTFE

3/8" FNPT (DN 10) (delta, Sigma 1 and Sigma 2)	2-3/4 (70)	1-1/2 (38)	809467
1/2" FNPT (DN 15) (Sigma 1 and Sigma 2)	3 (76)	1-3/4 (44)	924518
3/4" MNPT (DN 20) (Sigma 2)	4-1/2 (114)	2-1/8 (54)	803727
1" MNPT (DN 25) (Sigma 2, Sigma 3 and Makro)	5-1/8 (130)	2-1/2 (63)	803728
1-1/2" MNPT (DN 32)			1006435
1-1/2" MNPT (DN 40) (Sigma 3 and Makro)	6-1/4 (159)	3-1/8 (79)	1004206
1/4" FNPT	2-3/4 (70)	1-1/2 (38)	803730
3/8" FNPT	2-3/4 (70)	1-1/2 (38)	803731

* See Figure 1, ** See Figure 2

Pump & Systems Accessories

Injection Valves

To connect the pump discharge line to the point of injection for installation in any position, except PTFE version without spring to be installed in a vertical position discharging upward. All valves except PTFE include a 7 psig (0.5 bar) Hastelloy-C spring.

Caution: Injection valves and injection lances should not be used as isolating elements or for antisiphon protection!

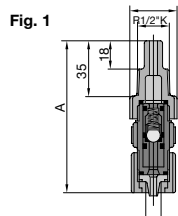
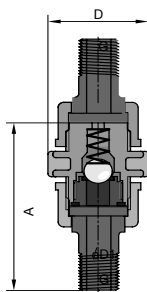


Fig. 1
Clamp-type
hose connector
2399/4



1447/4

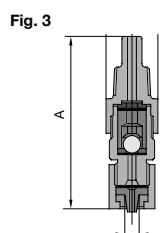


Fig. 3
Clamp-type
hose connector
2400/4

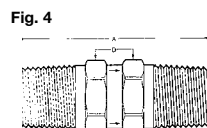


Fig. 4
1/4" NPT SS2

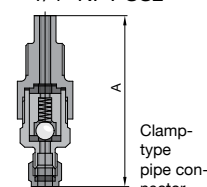


Fig. 5
Clamp-type
pipe con-
nector

Polypropylene

Valve body of PP, o-rings of EPDM (PP1, PPE)

	Dim "A" inches (mm)	Part No.
Connection 1/4" x 3/16" tubing x 1/2" MNPT injection end (Fig 1)	3-7/8 (98)	924681
Connection 1/2" x 3/8" tubing x 1/2" MNPT injection end (Fig 1)	3-7/8 (98)	924596
Connection 1/2" MNPT for 0423/0230 (Fig 2)	5-1/4 (133)	809461
Connection 3/8" PPE Injection Valve		7924586

Valve body of PP, o-rings of Viton® (PP2, PPB)

Connection 1/4" x 3/16" tubing x 1/2" MNPT injection end (Fig 1)	3-7/8 (98)	7924681
Connection 1/2" x 3/8" tubing x 1/2" MNPT injection end (Fig 1)	3-7/8 (98)	7809478
Connection 1/2" MNPT for 0423/0230 (Fig 2)	5-1/4 (133)	7809461
Connection 3/8" PPB Injection Valve		7924587

Valve body of PP, o-rings of EPDM-high viscosity (PP4)

Connection 1/2" MNPT for PP4 (Fig 2)	5-3/8 (137)	7924521
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Valve body of PP, o-rings of Viton®-high viscosity (PP5)

Connection 1/2" MNPT for PP5 (Fig 2)	5-3/8 (137)	7809462
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PVC

Valve body of PVC, o-rings of EPDM

Connection 1/4" x 3/16" tubing x 1/2" MNPT injection end (Fig 1)	3-3/4 (95)	7924580
Connection 1/2" x 3/8" tubing x 1/2" MNPT injection end (Fig 1)	3-7/8 (98)	7924582
Connection 1/2" MNPT (Fig 2)	5-3/8 (137)	7809460
Connection 3/8" NPE Injection Valve		7924583

Valve body of PVC, o-rings of Viton®

Connection 1/4" x 3/16" tubing x 1/2" MNPT injection end (Fig 1)	3-3/4 (95)	924680
Connection 1/2" x 3/8" tubing x 1/2" MNPT injection end (Fig 1)	3-7/8 (98)	924595
Connection 1/2" MNPT (Fig 2)	5-3/8 (137)	809460
Connection 3/8" NPB Injection Valve		7924584

PTFE

Body and o-rings of PTFE

Connection 1/4" x 3/16" tubing x 1/2" MNPT injection end (Fig 3)	4-1/8 (105)	809488
Connection 1/2" x 3/8" tubing x 1/2" MNPT injection end (Fig 3)	4-1/4 (108)	809481
Connection 1/2" MNPT (not illustrated)		809462

SS

Valve body of stainless steel, seals of PTFE (SS1 & SS2)

Poppet check valve, connection 1/4" MNPT x 1/4" MNPT, spring-loaded, adjustable by internal hex nut from 3-50 psig (0.2-3.5 bar) (Fig 4)

1-5/8 (42)	7914587
	7914588

Optional adapter for above valve 1/4" FNPT x 1/2" MNPT (Fig 5)

Ball check valve, connection 1/4" FNPT inlet to 1/2" MNPT discharge, 7 psig (0.5 bar) spring (Fig 5)

3-1/2 (89)	924597
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Ball check valve, connection 3/8" FNPT inlet to 1/2" MNPT discharge, 7 psig (0.5 bar) spring (not illustrated) (SS1) (for 0423 & 0230 only)

3-1/2 (89)	809463
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PVT

Valve body of PVDF, seals of PTFE

Connection 1/4" x 3/16" tubing x 1/2" MNPT injection end (Fig 1)	3-3/4 (95)	1024708
Connection 1/2" x 3/8" tubing x 1/2" MNPT injection end (Fig 1)	3-7/8 (98)	1024714

Pump & Systems Accessories

Injection Valves

Injection valves

To connect the pump discharge line to the point of injection for installation in any position, except PTFE version without spring to be installed in a vertical position discharging upward. All valves except PTFE and Sigma/Meta/Makro HK have 7 psig (0.5 bar) Hastelloy-C spring.

Caution: Injection valves and injection lances should not be used as isolating elements or for antisiphon protection!

Fig. 1

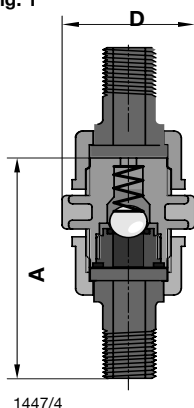


Fig. 2

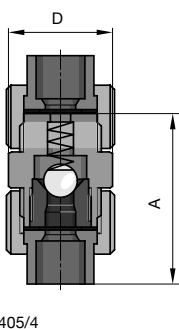
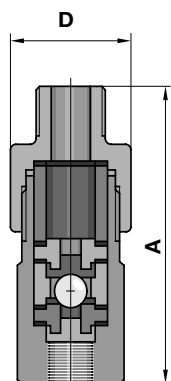


Fig. 3



Threaded Connection

Dimensions inches (mm)

Dim "A" Dim "D" Part No.

Polypropylene (Fig. 1) Valve body of PP, o-rings of EPDM (PP1)

1/2" MNPT (DN 10)	5-1/4 (133)	1-1/2 (38)	809461
3/4" MNPT (DN 15)	5-3/8 (137)	1-3/4 (44)	924521
3/4" MNPT (DN 20)	6-3/4 (171)	2-1/4 (57)	803710
1" MNPT (DN 25)	7-1/8 (181)	2-3/8 (60)	803711
1-1/2" MNPT (DN 40)	8-1/4 (210)	3-1/2 (89)	804761

PVC (Fig. 1) - Valve body of PVC, o-rings of Viton® (NP)

1/2" MNPT (DN 10)	5-3/8 (137)	1-1/2 (38)	809460
3/4" MNPT (DN 15)	5-3/8 (137)	1-5/8 (42)	924520
3/4" MNPT (DN 20)	6-3/4 (171)	2-1/4 (57)	803712
1" MNPT (DN 25)	7-1/8 (181)	2-3/8 (60)	803713
1-1/2" MNPT (DN 40)	8-1/4 (210)	3-1/2 (89)	804760

PTFE/PTFE (Fig. 1) - Valve body and seals of PTFE (TT1)

1/2" MNPT (DN 10)	(PTFE/PTFE)	4-7/8 (124)	1-3/8 (35)	809462
3/4" MNPT (DN 15)	(PTFE/PTFE)	5-1/2 (140)	1-3/4 (44)	924522
3/4" MNPT (DN 20)	(PTFE/PTFE)	6-7/8 (175)	2-1/4 (57)	803714
1" MNPT (DN 25)	(PTFE/PTFE)	7-1/4 (184)	2-1/2 (63)	803715
1-1/2" MNPT (DN 40)	(PTFE/PTFE)	8-1/4 (210)	3-1/2 (89)	804762

PVDF/PTFE (Fig. 1) - Valve body of PVDF and seals of PTFE

1/2" MNPT (DN 15)	(PVDF/PVDF)	4-7/8 (124)	1-3/8 (35)	7803724
3/4" MNPT (DN 15)	(PVDF/PVDF)	5-1/2 (140)	1-3/4 (44)	7803725
3/4" MNPT (DN 25)	(PVDF/PVDF)	6-7/8 (175)	2-1/4 (57)	7803726
1" MNPT (DN 25)	(PVDF/PVDF)	7-1/4 (184)	2-1/2 (63)	7803727
1-1/2" MNPT (DN 32)	(PVDF/PVDF)			1002783

SS - Valve body of stainless steel, seals of PTFE

3/8" FNPT (DN 10)	3-1/8 (79)	1-3/8 (35)	809463
1/2" FNPT (DN 15)	3-1/2 (89)	1-3/4 (44)	924523
3/4" MNPT (DN 20)	6-1/2 (165)	2-1/8 (54)	803716
1" MNPT (DN 25)	7-1/4 (184)	2-1/2 (63)	803717
1-1/2" MNPT (DN 40)	8-1/4 (210)	3-1/8 (79)	804763
1-1/2" MNPT (DN 32)			1002801

High pressure valves for HK pumps (Fig. 3)

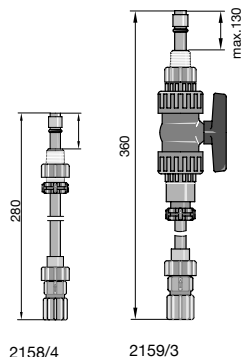
1/4" MNPT by 1/2" MNPT (DN 8)	4 (83)	1-5/8 (42)	803732
3/8" MNPT by 1/2" MNPT (DN 10)	4 (83)	1-5/8 (42)	803733

Pump & Systems Accessories

Injection Lances

Length of insertion variable from 3/4" to 6-1/2" (20 mm...165 mm) for large diameter pipes. Consisting of spring-loaded ball check injection valve, adjustable insertion pipe and elastomeric sleeve over injection port for backflow prevention. Materials: Hastelloy C spring, Ceramic valve ball, EPDM and silicon o-rings. Max. working pressure 87 psig (6 bar). Requires 1/2" FNPT pipe tap.

Note: For units with isolating valve, the valve may not be closed until the insertion pipe has been pulled out through the valve. Call factory for 3/4" and 1" connection.



Polypropylene (EPDM o-rings)

Connection 1/4" x 3/16" tubing to 1/2" MNPT

Part No.

1021530

Connection 1/2" x 3/8" tubing to 1/2" MNPT

1021530

same, but with ball-type isolating valve

Connection 1/4" x 3/16" tubing to 1/2" MNPT

1021531

Connection 1/2" x 3/8" tubing to 1/2" MNPT

1021531

PVC (Viton® o-rings)

Connection 1/4" x 3/16" tubing to 1/2" MNPT

1021528

Connection 1/2" x 3/8" tubing to 1/2" MNPT

1021528

same, but with ball-type isolating valve

Connection 1/4" x 3/16" tubing to 1/2" MNPT

1021529

Connection 1/2" x 3/8" tubing to 1/2" MNPT

1021529

Note: For brass 3/4" and 1" corporation stops, please call factory.

In-line check valve for tubing



Polypropylene

With connectors on both ends for installation in flexible tubing, valve body of PP, o-rings of EPDM, with valve ball, spring-loaded with Hastelloy C spring, 7 psig (0.5 bar).

By using different Connector Sets, different sizes of tubing from 1/4" to 1/2" can be connected with each other.

Connection for tubing 1/4" x 3/16"

809434

Connection for tubing 1/2" x 3/8"

809436

PVC

With connectors on both ends for installation in flexible tubing, valve body of PVC, o-rings of Viton®, with valve ball, spring-loaded with Hastelloy C spring, 7 psig (0.5 bar).

By using different Connector Sets, different sizes of tubing from 1/4" to 1/2" can be connected with each other.

Connection for tubing 1/4" x 3/16"

809417

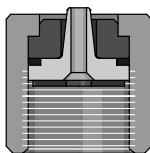
Connection for tubing 1/2" x 3/8"

809415

1856/4

Pump & Systems Accessories

Connector Sets



2181/4

Description

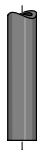
PP/VITON® for hose type 1/4" x 3/16"
 PP/VITON® for hose type 1/2" x 3/8"
 PP/VITON® for hose type 3/8" x 1/4"
 PP/EPDM for hose type 1/4" x 3/16"
 PP/EPDM for hose type 1/2" x 3/8"
 PP/EPDM for hose type 1/4" x 1/2"
 PP/EPDM for hose type 3/8" x 1/4"
 PVC/Viton® for hose type 1/4" x 3/16"
 PVC/Viton® for hose type 1/2" x 3/8"
 PVC/Viton® for hose type 1/4" x 1/2"
 PVC/Viton® for hose type 3/8" x 1/4"
 PVC/EPDM for hose type 1/4" x 3/16"
 PVC/EPDM for hose type 1/2" x 3/8"
 PVC/EPDM for hose type 3/8" x 1/4"
 PTFE for hose type 1/4" x 3/16"
 PTFE for hose type 1/2" x 3/8"
 PVT for hose type 1/4" x 3/16"
 PVT for hose type 1/2" x 3/8"
 PVT for hose type 3/8" x 1/4"
 PVT for hose type 8x4 mm (single only)

Part No.

790872
 740133
 7817168
 790885
 740132
 817163
 7817151
 817050
 817055
 817068
 7817051
 790871
 740160
 7817049
 817201
 791199
 1023246
 1024584
 7781457
 7500416

Tubing

Suction and discharge tubing



1052/4

Max. Operating . Pressure Rating (psig)

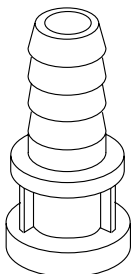
PVC soft 1/4" x 3/16" (for suction side only)
 PVC soft 1/2" x 3/8" (for suction side only)
 PVC fabric reinforced 1/4" x 1/2"
 PE 1/4" x 3/16"
 PE 1/2" x 3/8"
 PE 3/8" x 1/4"
 Teflon (FEP) 1/4" x 3/16"
 Teflon (FEP) 1/2" x 3/8"
 Teflon (FEP) 8 x 4 mm

7
 7
 232
 100
 100
 100
 100
 363

Part No.

7037004
 7037009
 37032
 7037005
 7037010
 7037011
 7037426
 7037428
 1033166

Hose Barbs



Material (all 1/2" DN 10)

PP
 PVC
 PTFE
 316 SS

Part No.

800657
 800554
 811572
 810536

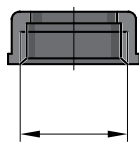
Material (all 3/4" DN 15)

PP
 PVC
 PTFE
 316 SS

800655
 811407
 811424
 810567

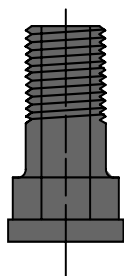
Pump & Systems Accessories

Union Nuts & Inserts



Union nut

1031/4



Threaded insert

1486/4

Pump

High Viscosity

Makro

Makro

Makro

Makro

Makro

Makro

Makro

Makro

Makro

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Makro

Union Nut	Threaded Insert	Union Nut	Threaded Insert	Union Nut	Threaded Insert
Material	Material	Thread	Thread	Part No.	Part No.
PP	PP	DN 10	1/2" MNPT	358613	7358402
PP	PP	DN 20	3/4" MNPT	358615	1017381
PP	PP	DN 25	1" MNPT	358616	1017382
PP	PP	DN 40	1-1/2" MNPT	358618	7358611
PVC	PVC	DN 20	3/4" MNPT	356564	1017381
PVC	PVC	DN 25	1" MNPT	356565	1017382
PVC	PVC	DN 40	1-1/2" MNPT	356567	7358613
PVDF	PTFE	DN 20	3/4" MNPT	358815	1017381
PVDF	PTFE	DN 25	1" MNPT	358816	1017382
PVDF	PTFE	DN 40	1-1/2" MNPT	358818	7358615
PVDF	PTFE	DN 10	1/2" MNPT	358813	7358634
PVDF	PTFE	DN 15	3/4" MNPT	358814	1017380
PVDF	PTFE	DN 20	3/4" MNPT	358815	1017381
PVDF	PTFE	DN 25	3/4" MNPT	358816	7358645
PVDF	PTFE	DN 25	1" MNPT	358816	1017382
PVDF	PTFE	DN 32	1-1/2" MNPT	1003639	1017383
SS	SS	DN 10	3/8" FNPT	805270	7805285
SS	SS	DN 15	1/2" FNPT	805271	7805286
SS	SS	DN 20	3/4" MNPT	805272	7358609
SS	SS	DN 25	3/4" MNPT	805273	7358646
SS	SS	DN 25	1" MNPT	805273	7358610
SS	SS	DN 32	1-1/2" MNPT	805274	7358648
SS	SS	DN 40	1-1/2" MNPT	805275	7358617

Seals

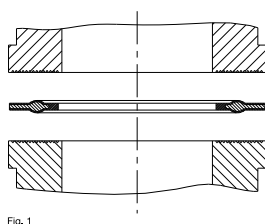


Fig. 1

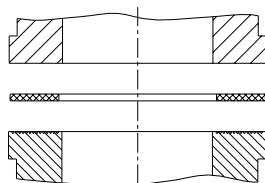


Fig. 2

Molded composite seal

M20 x 1.5

DN10

DN15

DN20

DN25

DN32

DN40

DN50

PTFE, P/N

1021686

1019364

1019365

1019366

1019367

1019353

1019368

1019369

Flat Seal

DN10

DN15

DN25

DN32

DN40

DN50

Viton®, P/N

1019315

1019317

1019319

1019321

1019323

1019325

EPDM, P/N

1019314

1019316

1019318

1019320

1019322

1019324

Pump & Systems Accessories

Gaskets

Gaskets

Virgin White Teflon gaskets for PTFE

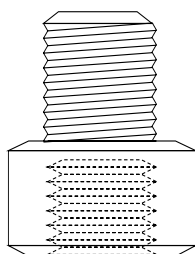
Part No.

DN 10	Vario/Sigma	483957
DN 15	Sigma/Vario	483921
DN 20	Meta/Sigma	483922
DN 32	Sigma	7744320
DN 40	Makro	483951

Note: The material make-up of the standard gaskets are teflon with a Viton® center. For applications using chemicals that react negatively with Viton®, the above gaskets are needed.

Tubing Adapters

Adapters

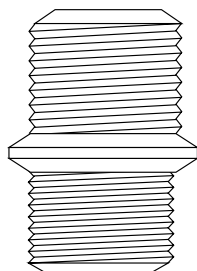


M20 x 1.5 Female by 1/2" MNPT

PVC	7744060
PVDF	7358652

M20 x 1.5 Female Socketweld

PVC	7740129
CPVC	7740881
PVDF	7745882



M20 x 1.5 Male by 1/2" MNPT

PVC	7358228
PVDF	7358660

M20 x 1.5 Male Socketweld

PVC	7740130
CPVC	7745158
PVDF	7745598



Right-angled PVC threaded connector

Connector for the beta and gamma/L auto-degassing liquid ends required when mounting multifunction valves; optionally used to direct discharge flow upwards. Angle union 90°.

Type PCB (PVC/Viton®)	1003318
Type PCE (PVC/EPDM)	1003472



Tubing fold preventer

Fits on top of the beta and gamma/L auto-degassing liquid ends, used to prevent a fold in the bypass line which is fed back to the tank. This is required when using soft tubing, however rigid tubing is standard.

for tubing size (mm)

1/4" x 3/16" (6mm)	1001844
--------------------	---------

Pump & Systems Accessories

Backpressure Valves

Pressure Relief Valves

Backpressure, antisiphon and pressure relief valves



In-line pressure relief valve (3 port)



Backpressure valve (2 port)



Backpressure valve on tee for pressure relief

Backpressure (2-port) valves may be used in-line to provide a constant discharge pressure for protection from siphoning, or they may be teed off of the discharge line for pressure relief, discharging back to the source tank or to the pump suction line to create a bypass.

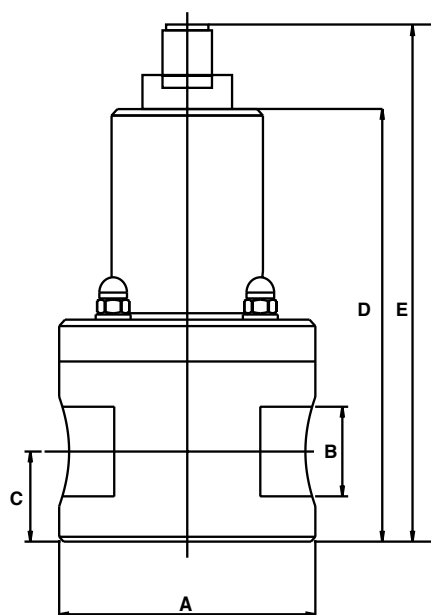
Pressure relief (3-port) valves are mounted in the discharge line, featuring a separate relief port which discharges back to the source tank or to the pump suction line to create a bypass.

Backpressure valves provide several functions: they improve repeatability by providing a constant discharge pressure; they provide antisiphon protection for discharge into pressurized water lines or vacuums, or where suction head exceeds discharge head; and they minimize pulsation when used in conjunction with a pulsation dampener.

In-line backpressure/antisiphon and pressure relief valves

These adjustable backpressure (2-port) and pressure relief (3-port) valves have FNPT ports and require tubing adapters for use with flexible tubing.

Can be adjusted with screwdriver.



Dimensions in inches (mm)

A	B	C	D	E
2.6 (65)	1/4 NPT	1.2 (31)	4.9 (125)	6.2 (158)
2.6 (65)	1/2 NPT	1.2 (31)	4.9 (125)	6.2 (158)
3.5 (88)	3/4 NPT	1.1 (28)	5.4 (136)	6.7 (169)
3.9 (98)	1 NPT	1.4 (36)	5.7 (145)	7.0 (178)
4.6 (118)	1-1/2 NPT	2.2 (56)	9.0 (229.5)	10.3 (260.5)
4.6 (118)	2 NPT	2.2 (56)	9.0 (229.5)	10.3 (260.5)

Pump & Systems Accessories

Backpressure Valves

Pressure Relief Valves

1/4" FNPT valves

Material

PP
PVC
PVDF
316 SS

Backpressure Valve (2-port)

1009444
1009445
1009446
1009447

Pressure Relief Valve (3-port)

1009452
1009453
1009454
1009455

Tubing Adapters

(1 required per valve port): 1/4" x 3/16" tubing x 1/4" MNPT

PP/EPDM
PP/Viton®
PVC/EPDM
PVC/Viton®

Part No.

7500060
7500058
7500064
7500062

1/2" FNPT valves

Material

PP
PVC
PVDF
316 SS

Backpressure Valve (2-port)

1006846
1006850
1006854
1008796

Pressure Relief Valve (3-port)

1006858
1006862
1006866
1008800

Tubing Adapters

(1 required per valve port): 1/2" x 3/8" tubing x 1/2" MNPT

PP/EPDM
PP/Viton®
PVC/EPDM
PVC/Viton®

Part No.

7500061
7500059
7500065
7500063

3/4" FNPT valves

Material

PP
PVC
PVDF
316 SS

Backpressure Valve (2-port)

1006847
1006851
1006855
1008797

Pressure Relief Valve (3-port)

1006859
1006863
1006867
1008801

1" FNPT valves

PP
PVC
PVDF
316 SS

1006848
1006852
1006856
1008798

1006860
1006864
1006868
1008802

1-1/2" FNPT valves

PP
PVC
PVDF
316 SS

1006849
1006853
1006857
7302243

1006861
1006865
1006869
7302261

2" FNPT valves

PP
PVC
PVDF
316 SS

1009448
1009449
1009450
7302247

1009456
1009457
1009458
7302265

Spare Parts Sets

Contains 1 of each: compression spring, diaphragm, spring plate, and pressure adj. disc.

SPK 1/4" - 1/2"
SPK 3/4" - 1"
SPK 1-1/2" - 2"

1035446
1035447
1035448

1035446
1035447
1035448

Spare diaphragms

1/4" - 1/2" valve PTFE/EPDM
3/4" - 1" valve PTFE/EPDM
1-1/2" - 2" valve PTFE/EPDM

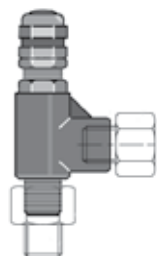
1006813
1006814
1006815

1006813
1006814
1006815

Pump & Systems Accessories

Pressure Relief Valves

Pressure relief valves



1112/4

High pressure relief valve, adjustable, 1/4" and 1/2" NPT for Sigma/ Meta/Makro HK and ProMus pumps

Can also be used as a backpressure valve for < 30 gph (113 L/h).

These valves are without springs, which must be ordered separately.

Materials: Stainless steel/Viton®

Connection: 1/4" NPT male and female thread

Part No.

7202505

Materials: Stainless steel/EPDM

Connection: 1/4" NPT male and female thread

7744507

Spring: psig (bar)

Color:

50 - 350	(3.5 - 25)	blue	7202519
350 - 750	(25 - 50)	yellow	7202520
750 - 1500	(50 - 100)	violet	7202525
1500 - 2250	(100 - 155)	orange	7202524
2250 - 3000	(155 - 205)	brown	7202523
3000 - 4000	(205 - 275)	white	7202522
4000 - 5000	(275 - 340)	red	7202521

Materials: Stainless steel/Viton®

Connection: 1/2" NPT male and female thread

7744508

Materials: Stainless steel/EPDM

Connection: 1/2" NPT male and female thread

7744509

Spring: psig (bar)

Color:

50 - 350	(3.5 - 25)	blue	7744510
350 - 750	(25 - 50)	yellow	7744511
750 - 1500	(50 - 100)	violet	7744512

Pump & Systems Accessories

Pulsation Dampeners

Pulsation dampeners operate on the principle that gas is compressible and fluid is not. The pulsation dampener consists of an air chamber containing compressed air, a fluid chamber connected to the pump's suction or discharge line, and a bladder or bellows which separates the air and fluid.

Some models are flow-through design, with two ports so they can be mounted directly on the pump suction or discharge line. Other models are single port design, to be teed off of the pump suction or discharge line. Flow-through models may also be used in a tee if one port is capped.

All models feature a Schrader (bicycle) valve and pressure gauge for charging the air chamber on-site.

PVDF/Nordel pulsation dampeners are recommended for sodium hydroxide (caustic) applications. Viton® pulsation dampeners are recommended for sodium hypochlorite applications.

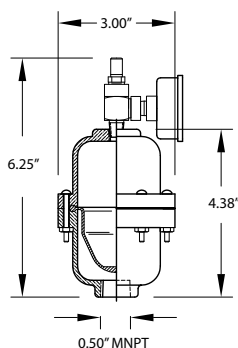
Multiply the pump's displacement per stroke (mL) times 26 to get minimum pulsation dampener volume (mL) to achieve 90% reduction in pulsation.

We recommend using pressure relief valves with the pulsation dampeners.

General Specifications

Maximum pressure:	150 psig (polypro, PVDF and PTFE), 300 psig (SS)
Temperature range:	
Nordel bladder:	-60°F to 280°F (-51°C to 138°C)
Viton® bladder:	30°F to 350°F (-1°C to 177°C)
HYPALON® bladder:	-20°F to 275°F (-29°C to 135°C)
PTFE bellows:	40°F to 220°F (4°C to 104°C)
Polypro housing :	32°F to 175°F (0°C to 79°C)
PVC housing:	32°F to 140°F (0°C to 60°C)
PVDF housing:	10°F to 250°F (-12°C to 121°C)
PTFE housing:	-20°F to 125°F (-29°C to 52°C)
SS housing:	32°F to 200°F (0°C to 93°C)

*Teflon bellows are smaller in volume



10 CU IN
(164 mL)

131 mL (8 cu. in.) Models

SS housing: 3/8" FNPT, 1 port	
PTFE bellows	3 (1.4)
PVDF housing: 1/2" FNPT, 1 port	
PTFE bellows	1 (0.9)

164 mL (10 cu. in.) Models

CPVC housing: 1/2" FNPT, 1 port				
Nordel bladder (EPDM)	1 (0.9)	RC-10X-E50	III	7744096
Viton® bladder	1 (0.9)	RC-10X-V50	III	7744097
HYPALON® bladder	1 (0.9)	RC-10X-H50	III	7744098
Polypro housing: 1/2" FNPT, 1 port				
Nordel bladder (EPDM)	1 (0.9)	CTP1005 ND 5	III	7744102
PVDF housing: 1/2" FNPT, 1 port				
Nordel bladder (EPDM)	1 (0.9)	CTK1005 ND 5	III	7744100
Viton® bladder	1 (0.9)	CTK1005 V 5	III	7744099

Viton® and HYPALON® are registered trademarks of DuPont Dow Elastomers

product overview

solenoid-driven metering pumps

motor-driven metering pumps

pump spare parts & accessories

DULCOMETER® instrumentation

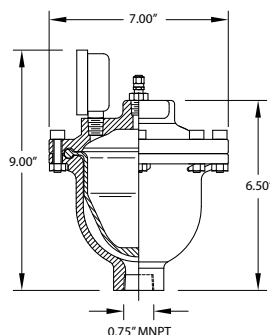
DULCOTEST® sensors

polymer blending systems

Pump & Systems Accessories

Pulsation Dampeners

Pulsation dampeners (cont.)



36 CU IN
(600 mL)

262 mL (16 cu. in.) Models

PVC housing: 3/4" FNPT, 1 port

PTFE bellows

PVDF housing: 3/4" FNPT, 1 port

PTFE bellows

SS housing: 3/4" FNPT, 1 port

PTFE bellows

600 mL (36 cu. in.) Models

PVC housing: 3/4" FNPT, 1 port

Nordel bladder

Viton® bladder

HYPALON® bladder

Polypro housing: 3/4" FNPT, 1 port

Nordel bladder

PVDF housing: 3/4" FNPT, 1 port

Viton® bladder

SS housing: 3/4" FNPT, 1 port

Viton® bladder

1147 mL (70 cu. in.) Models

PVC housing: 3/4" FNPT, 1 port

PTFE bellows

SS housing: 3/4" FNPT, 1 port

PTFE bellows

PVDF housing: 3/4" FNPT, 1 port

PTFE bellows

1393 mL (85 cu. in.) Models

PVC housing: 3/4" FNPT, 1 port

Nordel bladder

Viton® bladder

HYPALON® bladder

PVDF housing: 3/4" FNPT, 1 port

Nordel bladder (EPDM)

Viton® bladder

1998 mL (122 cu. in.) Models

PVC housing: 2" FNPT, 1 port

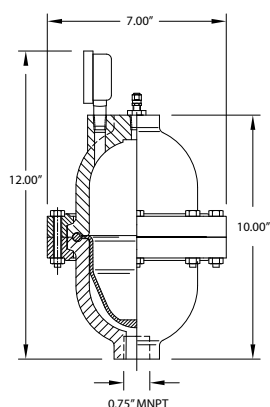
PTFE bellows

2867 mL (175 cu. in.) Models

PVC housing: 2" FNPT, 1 port

HYPALON® bladder

Shipping Wt. lbs (kg)	Model	Bladder Size	Part No.
7 (3.2)	CT1311 T	II	7744211
7 (3.2)	CT1401 T	II	7253234
11 (5.0)	CT3120 T	II	7253237
7 (3.2)	CT1311 ND	II	7253232
7 (3.2)	CT1311 V	II	7253233
7 (3.2)	CT1311 H	II	7740946
6 (2.7)	CT1301 ND	II	7253230
7 (3.2)	CT1401 V	II	7253235
11 (5.0)	CT3120 V	II	7253238
10 (4.5)	CT311 T	II	7253229
14 (6.4)	CT3020 T	II	7253206
8 (3.6)	CT401 T	II	7253219
6 (2.7)	CT311 ND	II	7253221
6 (2.7)	CT311 V	II	7253220
6 (2.7)	CT311 H	II	7740947
7 (3.2)	CT401 ND	II	7253209
8 (3.6)	CT401 V	II	7253210
16 (7.3)	CT911 T	I	7253228
13 (5.9)	CT911 H	I	7740948

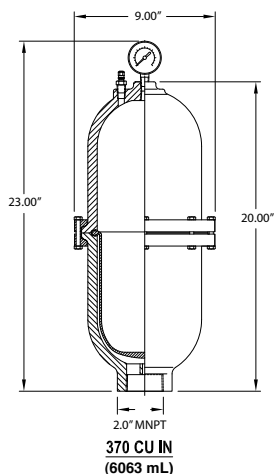


85 CU IN
(1393 mL)

Pump & Systems Accessories

Pulsation Dampeners

Pulsation dampeners (cont.)



5822 mL (355 cu. in.) Models

PVC housing: 2" FNPT, 1 port

PTFE bellows

PVDF housing: 2" FNPT, 1 port

PTFE bellows

SS housing: 2" FNPT, 1 port (Fig. 4)

PTFE bellows

6063 mL (370 cu. in.) Models

PVC housing: 2" FNPT, 1 port (Fig. 4)

Nordel bladder

Viton® bladder

Polypro housing: 2" FNPT, 1 port (Fig. 4)

Viton® bladder

Note: Other sizes and materials available upon request.

Shipping Wt. lbs (kg)	Model	Bladder Size	Part No.
18 (8.2)	CT111 T	I	7253227
21 (9.5)	CT201 T	I	7253215
40 (18.1)	CT2400 T	I	7253211
16 (7.3)	CT111 ND	I	7253222
16 (7.3)	CT111 V	I	7253218
15 (6.8)	CT101 V	I	7253213

High pressure (1000psi) pulsation dampeners for ProMus pumps only.

66 mL (4 cu. in.) Models

316 Stainless Steel housing: 3/8" FNPT, 1 port (not illustrated)
Nordel bladder (EPDM)

164 mL (10 cu. in.) Models

Hastelloy C housing: 3/8" FNPT, 1 port (not illustrated)
Viton® bladder

316 Stainless Steel housing: 3/8" FNPT, 1 port (not illustrated)
Nordel bladder (EPDM)

600 mL (36 cu. in.) Models

316 Stainless Steel housing: 3/8" FNPT, 1 port (not illustrated)
Nordel bladder (EPDM)

Model	Bladder Size	Part No.
H1120 ND	III	7744387
H1080 V	III	7744382
H1020 ND	III	7744388
H3120 ND	II	7744389

Pump & Systems Accessories

Pulsation Dampeners

	Model	Bladder Size	Part No.
Nordel (EPDM) bladders	1000-28	III	7740208
	401-28	II	7740202
	201-28	I	7740205
Viton bladders	1000-31	III	7740209
	401-25	II	7740203
	201-25	I	7740206
Hypalon bladders	1000-30	III	7740959
	401-30	II	7740960
	201-30	I	7740961
PTFE bellows	301-10	II	7740204
	101-10	I	7740207

High pressure charging hose

Charging hose consists of an 8 foot (2.4 m) length of 5000 psi hose with a 1/4" NPT (M) fitting at one end, for connection to a nitrogen bottle regulator and a charging adapter with purge valve and gauge at the other end.

	Model	Part No.
1/4" air inlet and 1/8" fill valve	701-00	7744376

Inlet stabilizers

An inlet stabilizer will improve flow conditions to the inlet side of a pump and protect and extend the service life of all inlet system components. Inlet stabilizers must be mounted as close to the pump's inlet connection as possible, and no more than 10 pipe diameters away. All units include a 30-0-30 vacuum/pressure gauge, air venturi, and ball valve for charging bladder chamber. Units must be sized similar to pulsation dampeners, i.e. 26 x (mL/stroke) = minimum required inlet stabilizer volume. **Note:** Requires a compressed air supply be available for initial bladder charging and periodic readjustment as necessary.

	Model	Size	Part No.
1393 mL (85 cu. in.) Models (for 3/4" models)			
PVC housing:			
Viton® bladder	J3111V	II	7740859
HYPALON® bladder	J3111H	II	7744305
Nordel bladder (EPDM)	J3111ND	II	7744306
PVDF housing:			
Viton® bladder	J401V	II	7740860
6063 mL (370 cu. in.) Models (for 2" models)			
PVC housing:			
Viton® bladder	J1111V	I	7744307
HYPALON® bladder	J1111H	I	7744308
Nordel bladder (EPDM)	J1111ND	I	7744309
PVDF housing:			
Viton® bladder	J201V	I	7744310

Materials shown are in contact with process fluid.

Other material and sizes are available. Please consult factory.

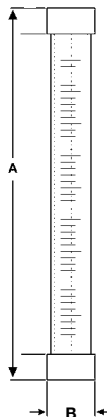
Pump & Systems Accessories

Calibration Columns

Calibration columns

Clear PVC calibration columns

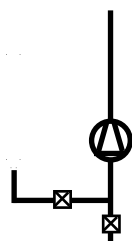
Cylinder size	Fitting size	Dimensions (inches)		Threaded base removable top	Threaded both ends
		A	B		
100 mL	1/2" NPT	10.75	1.39	7500137	7500127
250 mL	1/2" NPT	11.51	1.89	7500138	7500128
500 mL	1/2" NPT	12.75	2.39	7500139	7500129
1000 mL	1/2" NPT	16.75	2.77	7500130	7500135
2000 mL	1" FNPT	20.67	3.52	7500140	7500131
4000 mL	1" FNPT	22.66	4.52	7500141	7500132
10,000 mL	2" FNPT	23.16	6.91	7500134	7500133
20,000 mL	2" FNPT	42.69	6.91	7500142	7500136



Typical Application of calibration columns

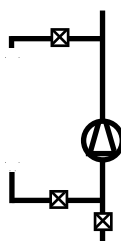
Column w/removable top

Note: Top must be removed during calibration



Column threaded both ends

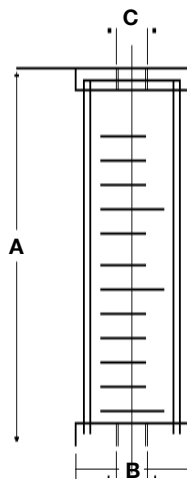
Note: If plumbed as shown, a vent hole must be drilled into the top of the calibration column



Borosilicate Glass calibration columns with Viton® o-rings for Sulfuric Acid Applications

Glass cylinder with acrylic outer shield and 1/2" (316 SS) or 3/4" (PVDF, PVC) thick end flanges. All cylinders are bolted together using stainless steel rods with Viton O-rings for the glass seal and Buna N O-rings for the acrylic seal.

Cylinder size	Fitting size	Dimensions (inches)			Part No.
		A	B	C	
100 mL	1/2" CPVC	10.0	3.0	1/2	7500151
100 mL	1/2" PVDF	10.0	3.0	1/2	7500152
100 mL	1/2" SS	9.5	3.0	1/2	7500153
250 mL	1/2" CPVC	12.5	3.5	1/2	7500154
250 mL	1/2" PVDF	12.5	3.5	1/2	7500155
250 mL	1/2" SS	12.0	3.5	1/2	7500156
500 mL	1/2" CPVC	14.5	4.0	1/2	7500157
500 mL	1/2" PVDF	14.5	4.0	1/2	7500158
500 mL	1/2" SS	14.0	4.0	1/2	7500159
1000 mL	1/2" CPVC	16.75	4.75	1/2	7500160
1000 mL	1/2" PVDF	16.75	4.75	1/2	7500161
1000 mL	1/2" SS	16.25	4.75	1/2	7500162
2000 mL	1" CPVC	18.75	5.5	1	7500163
2000 mL	1" PVDF	18.75	5.5	1	7500164
2000 mL	1" SS	18.25	5.5	1	7500165
4000 mL	1" CPVC	22.5	6.5	1	7500166
4000 mL	1" PVDF	22.5	6.5	1	7500167
4000 mL	1" SS	22.0	6.5	1	7500168



Flow Monitor

Ultra-sound Flow Meter DulcoFlow®

Used for the measurement of pulsing flows ranging from 0.02-3.20 gph. All parts that come into contact with the feed chemical are made from PVDF, ensuring that even aggressive feed chemicals can be measured without a problem. The device is installed approximately 12" inches downstream of the pump in the metering line. Interfering influences, such as air bubbles, are detected and transmitted to the DulcoFlow® unit as an error message. The use of the delta is only fast with metering stroke versions.

Alongside the recording and measurement of flows, the flow meter DulcoFlow® can also be used to monitor individual metering strokes, if "Contact output" is selected for signal output in the identity code. In this case, the device is calibrated to the lifting volume set on the pump. A lower and an upper limit can be entered and if the figure falls below or exceeds these limits, no feedback is transmitted to the pump. As a result, this generates an error message.

The device is designed for wall or panel mounting.

- The cumulative volume can be calculated in gallons or liters
- Direct display of the flow and number of strokes recorded
- 2 LEDs for stroke feedback and operating status
- Analog output or frequency output for flow volume
- Contact output for direct connection to the metering pump (single stroke monitoring)



Technical data

Measuring range:	0.02-3.20 gph
Accuracy:	< 2% during calibrated
Analog output:	4-20 mA (recording or control)
Frequency output:	Configurable, max. 10 kHz
Protection class:	IP 65
Power supply:	100-230 V AC / 50/60 Hz
Max. viscosity of fluid:	2000 cP
Dimensions:	7.22" x 4.76" x 4.38" (HxWxD)
Measurable volume:	0.03 ml/stroke to approx. 1ml/stroke

Media to be measured

Connector:	Hose connection with nominal width 1/2" x 3/8"
Medium pressure:	44-232 psi <i>*(minimum 44 psi needed for consistent measurement)</i>
Medium temperature:	14-113 °F

**A backpressure valve is recommended*

Note: Max. distance from the pump discharge to the DulcoFlow unit is 12" inches.

Identcode Ordering System

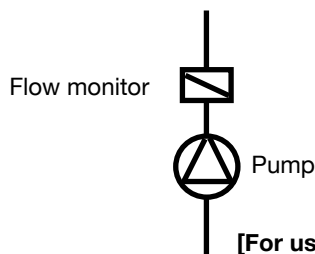
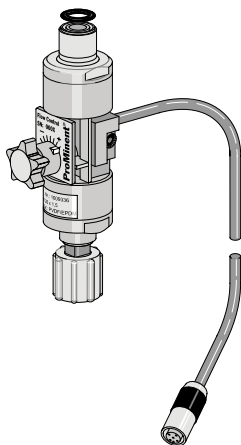
DFMa	Series Version:									
	05	beta, gamma/L 1000 - 0413/0716, delta 1608 - 1612								
		Seal Material:								
		T	PTFE							
			Connection:							
			1	1/4" x 3/16"						
				2	3/8" x 1/4"					
					3	1/2" x 3/8"				
			Electrical Connection:							
			D	N. American Plug 115 V						
				Signal Output:						
				1	4-20 mA output					
					2	Contact Output				
				Design:						
			0	with ProMinent logo						
				Accessories:						
0	without accessories									
DFMa	05	E	1	D	0	0	0			

Pump & Systems Accessories

Metering Monitors

Adjustable metering monitor "Flow Control"

Supplied with connection cable for assembly directly to liquid end. Monitors individual strokes according to the float and orifice principle. The partial quantity of chemical flowing past the float is adjusted from the total stroke volume via the adjusting screw so that an alarm relay is actuated if the flow falls 20%. The user can select the number of incomplete strokes permitted (between 1 and 125) in accordance with the actual process requirements.



[For use with low-viscosity (water-like) fluids only].

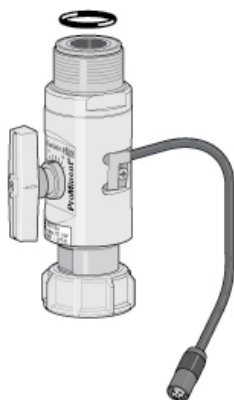
Materials:

Flow meter: PVDF
 Float: PTFE-coated
 O-rings: Viton® B/EPDM

For gamma/L series in material versions PP, PVDF, NP and TT.

Flow Control	Material	Pump type	Part No.
Flow Control type I	PVDF, EPDM	1000, 1601, 1602	1009229
Flow Control type II	PVDF, EPDM	1005, 1605, 0708, 1008, 0413 0713, 0220, 0420, 0232	1009336
Flow Control type I	PVDF, Viton® B	1000, 1601, 1602	1009335
Flow Control type II	PVDF, Viton® B	1005, 1605, 0708, 1008, 0413 0713, 0220, 0420, 0232	1009338

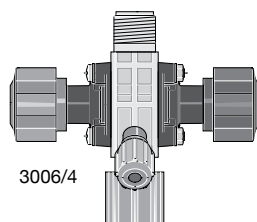
For Sigma HM with connection cable for assembly to liquid end.



Flow Control	Material	Pump type	Part No.
Flow Control type III (Sigma/ 1)	PVDF, EPDM	12017, 10022, 12035, 10044 10050, 07065	1021168
	PVDF, Viton® B	12017, 10022, 12035, 10044 10050, 07065	1021169
Flow Control type III (Sigma/ 1 & 2)	PVDF, EPDM	07042, 04084, 04120, 12050 12090, 12130	1021170
	PVDF, Viton® B	07042, 04084, 04120, 12050 12090, 12130	1021171
Flow Control type IV (Sigma/ 2 & 3)	PVDF, EPDM	07120, 04350, 120145, 120190 120270	1021164
	PVDF, Viton® B	07120, 04350, 120145, 120190 120270	1021165
Flow Control type V (Sigma/ 3)	PVDF, EPDM	07410, 07580, 04830	1021166
	PVDF, Viton® B	07410, 07580, 04830	1021167

Pump & Systems Accessories

Multifunction Valve



ProMinent's multifunction valve is operated by means of smooth-action rotary knobs which automatically return to their initial position when released. Made of PVDF, it can be used in feed systems for virtually all chemicals. The multifunction valve is mounted directly on the liquid end of the pump for backpressure, antisiphon, pressure relief, priming, and draining the discharge line. The inlet thread is female M20 x 1.5 and the discharge is male M20 x 1.5.

ProMinent's multifunction valve has the following functions:

- Backpressure valve, opening pressure approximately 22 psi (1.5 bar)
- Relief valve, opening pressure approximately 87, 145 or 232 psi (6, 10 or 16 bar)
- Admission aid in existing backpressure, no need to de-pressurize pipes
- Pressure relief, e.g. prior to servicing

Warning: Backpressure valves are not intended as completely sealed units!

Materials in contact with chemicals:

Valve body	PVDF
Diaphragm	PTFE-coated
O-rings	Viton® or EPDM
DN 10 adapter	PVC

Technical data:

Type	Relief opening pressure	Application range by size	Part No.
Size I (M20 x 1.5)	232 psi (16 bar)	alpha all types	792011
Size I	145 psi (10 bar)	beta & gamma/L type 1000, 1601,	791715
Size I	87 psi (6 bar)	1602, 1605, 1005, 1008, 0708, 0413, 0220	1005745
Size II (M20 x 1.5)	145 psi (10 bar)	beta & gamma/L type 1605, 1008,	792203
Size II	87 psi (6 bar)	0713, 0420, 0232	740427
Size III (DN 10)	145 psi (10 bar)		792215

Note: Multifunction valves mounted to stainless steel liquid ends require below adapters. **Cannot adjust pressure; fixed factory setting.*

Connector Set for SS version pumps

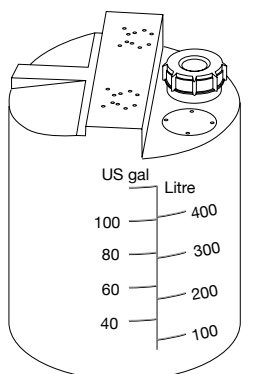
Adapter with o-rings, for use with SS2 liquid ends: 1/4" MNPT x Male M20 x 1.5 adapter, PVDF	7358651
Adapter with o-rings, for use with SS2 liquid ends: 3/8" MNPT x Male M20 x 1.5 adapter, PVDF	7358659

* Viton® is a registered trademark of DuPont Dow Elastomers

Pump & Systems Accessories

Tanks

Chemical tanks



15, 26, 70, 132 gallon capacity

Made of translucent UV-stabilized polyethylene, with gallon/litre scale, screw cap. Mounting platforms for ProMinent metering pumps and mixers. All tanks are specifically developed to maximize toughness. These tanks are impact, stress, and chemical resistant. Maximum allowable temperature 180°F (82°C). Tank opening (screw cap) diameter for 15 - 132 gal.: 6.5".

Tank opening (screw cap) diameter for 220 and 300 gal.: 5-1/4".

Capacity		O.D.		Height		Empty Weight		Part No.
gallon	(litre)	in.	(mm)	in.	(mm)	lb.	(kg)	
15	(60)	18	(445)	22	(559)	11	(5.0)	791994
26	(100)	20	(500)	30	(760)	17	(7.7)	1001490
70	(265)	26	(661)	42.5	(11079.5)	37	(17)	1023175
132	(500)	32	(820)	47	(1190)	54	(24.5)	791997
220	(830)	42	(1067)	41	(1041)	55	(25.0)	7809688
300	(1100)	43	(1092)	59	(1499)	70	(31.7)	7809687

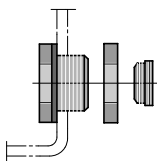
Note: pump mounting kit needed for all tanks (part no. 7500124)

Accessories for Tanks:

Lock and key for screw-on cap

200683

PVC tank drain fitting with plug



1077/4

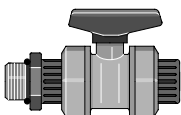
1/2" FNPT as an additional connection for chemical tanks. To be used as an open drain with plug or for addition of optional 1/2" ball valve fitting. Fits 1 3/8" opening.

Part No.

PVC with Viton® seal	7745801
PVC with EPDM seal	7740771

3/4" FNPT as an additional connection for chemical tanks. To be used as an open drain with plug or for addition of optional 3/4" ball valve fitting. Fits 1-3/8" opening.

PVC with Viton® seal	7745802
PVC with EPDM seal	7741477



2424/4

PVC ball valve

1/2" PVC ball valve with 1/2" FNPT connections for all chemical tanks with 1/2" PVC tank drain fittings.

PVC with Viton® seal	7000309
PVC with EPDM seal	7000311

3/4" PVC ball valve with 3/4" FNPT connections for all chemical tanks with 3/4" PVC tank drain fittings.

PVC with Viton® seal	7741668
PVC with EPDM seal	7741485

Pump & Systems Accessories

Mixers

U.S. Mixers

Fig. 1

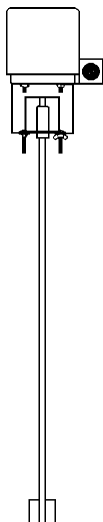
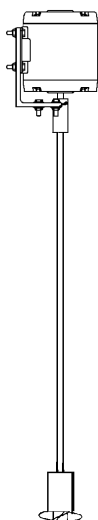


Fig. 2



Electric mixers

Note: with any tank-mounted mixer, the inertia of fluid rotating in a polyethylene tank may cause the tank to move when the fluid level is low. Provision should be made to anchor the tank or to automatically shut the mixer off when the fluid level is low.

For U.S. only. For Canada mixers, see below.

High speed mixer for water-like fluids in 15, 26 or 66 U.S. gallon tanks (Fig. 1):

Motor: 1/20 HP, 1550/1725 RPM, 115 VAC, 60 Hz, 1 ph., TEFC, with 8' Type SJ power cord, no on/off switch.

Shaft: 316 SS shaft/impeller (epoxy coated)

Mount: Four hole mounting flange with bolt holes, set at 5° angle for mounting directly on tank top.

Accessories: 1" diameter PVC metering pump suction pipe with bulkhead fitting for mounting to tank top.

Shipping weight: 9 lbs. (4 kg)

For 26 gallon tank (19" shaft)

For 66 gallon tank (34" shaft)

Shaft only (19" replacement)

Shaft only (34" replacement)

Part No.

7818588

7818589

7818590

7818591

High speed mixer for water-like fluids in 132 to 300 gallon tanks (Fig. 2):

Motor: 1/4 HP, 1725 RPM, 115/230 VAC, 60 Hz, TEFC. Power cord not included.

Shaft: 316 SS shaft/propeller. Shaft length: 36" (may be cut down for smaller tanks)

Mount: Bracket with bolt holes, for mounting directly on tank top.

Shipping weight: 27 lbs. (12 kg)

Shaft only (36" replacement)

7818592

7744506

Slow speed mixer for water-like fluids in 15, 26 or 66 gallon tanks:

Motor: 1/3 HP, 60 RPM, 115 VAC, 50/60 Hz, 1 ph., TEFC. Power cord not included.

Shaft: 316 SS shaft w/ 1 set of impellers. Shaft length is 44" (may be cut).

Mount: Bracket w/ 4 bolt holes for mounting directly on tank top.

Shipping weight: 32 lbs.

7818594

Note: Motor not thermally protected.

Mixer mounting kit for 15 gallon tanks:

Polyethylene flange adapter for mounting mixers to metric flange. Includes all necessary hardware.

7744385

Mixer mounting kit for 26, 66, and 132 gallon tanks:

Polyethylene flange adapter for mounting mixers to metric flange. Includes all necessary hardware.

7744319

*(Other mixers available upon request)

Canada Mixers

High speed mixer for water-like fluids in 15, 26 or 66 gallon tanks:

Motor: 1/20 HP

Mount: includes mounting bracket

Shaft: 316 SS shaft and propeller

7356679

High speed mixer for water-like fluids in 132 to 300 gallon tanks:

Motor: 1/4 HP

Mount: includes PVC mounting flange

Shaft: 316 SS shaft and propeller

7818565

Note: Both mixers for Canada only.

Pump & Systems Accessories

Float Switches

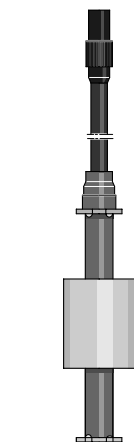
Float switches, two stage Float switch, two-stage: for beta, gamma/ L and delta pumps
(includes ceramic weight - do not use ceramic weight for fluoride service)

To monitor the fluid level in the chemical tank. Two-stage function, first stage is early warning annunciation, second stage will shut down pump after an additional drop in the fluid level of approximately 1.2" (30 mm).

With 3-pole round connector, suitable for direct connection to ProMinent gamma series.

Technical data:

Max. contact load 60 V, 0.3 A, 5 W/5 VA, temperature range -13°F to 167°F (-25°C to 75°C).



2380/4

Materials:

Part No.

PP body, foamed PP float 7/8" (21 mm) dia., PE cable

PP with 3-pole round connector	cable length	6 ft. (2 m)	7142093
		15 ft. (5 m)	7142095

PVC body, foamed PP float 7/8" (21 mm) dia., PE cable

PVC with 3-pole round connector	cable length	6 ft. (2 m)	7142043
		15 ft. (5 m)	7142038

PVDF body, foamed PVDF float 1" (25 mm) dia., PE cable

PVDF with 3-pole round connector	cable length	6 ft. (2 m)	7792639
		15 ft. (5 m)	7792640

Ceramic weight for float switch

1.53" dia. x 1.26" with oval opening .51" x 1.06"
(39 mm x 32 mm) (13 mm x 27 mm)

404004



1086/4

With two-stage float switches with round connector, the weight is slid into position from below after the float has been removed.

Note: Not for use in fluoride application (e.g. hydrofluosilicic acid).

Pump & Systems Accessories

Float Switches

Float switches, single stage **Float switch, single-stage: for Concept^{PLUS}** (includes ceramic weight – do not use ceramic weight for fluoride service)



For minimum level indication with simultaneous shutdown of the metering pump.

Technical data:

Max. contact load 60 V, 0.3 A, 5 W/5 VA, temperature range -13°F to 167°F (-25°C to 75°C).

Materials:

PP body, foamed PP float 7/8" (21 mm) dia., PE cable

PP with flat connector

cable length	6 ft.	(2 m)
	15 ft.	(5 m)

790412

790470

PVC body, foamed PP float 7/8" (21 mm) dia., PE cable

PVC with flat connector

cable length	6 ft.	(2 m)
	15 ft.	(5 m)

790414

790468

PVDF body, PVDF float 1" (25 mm) dia., PE cable

PVDF with flat connector

cable length	6 ft.	(2 m)
	15 ft.	(5 m)

790416

790472

2820/4

Float switch weights



Ceramic weight

1.53" dia. x 1.26" with oval opening .51" x 1.06"
(39 mm x 32 mm) (13 mm x 27 mm)

404003

Note: Not for use in fluoride applications (e.g. hydrofluosilicic acid), use PVC weight.

PVC weight

For bottom of foot valve in fluoride applications.

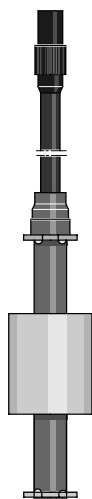
7404007

1086/4

Pump & Systems Accessories

Float Switches

Float switches, two stage for Sigma Control pumps



2380/4

Float switch, two-stage (includes ceramic weight - do not use ceramic weight for fluoride service)

To monitor the fluid level in the chemical tank. Two-stage function, first stage is early warning annunciation, second stage will shut down pump after an additional drop in the fluid level of approximately 1.2" (30 mm).

With 3-pole round connector, suitable for direct connection to ProMinent Vario series.

Technical data:

Max. contact load 60 V, 0.3 A, 5 W/5 VA, temperature range -13°F to 167°F (-25°C to 75°C).

Materials:

Part No.

PP body, foamed PP float 7/8" (21 mm) dia., PE cable			
PP with 3-pole round connector	cable length	6 ft. (2 m)	7142093
		15 ft. (5 m)	7142095
PVC body, foamed PP float 7/8" (21 mm) dia., PE cable			
PP with 3-pole round connector	cable length	6 ft. (2 m)	7142043
		15 ft. (5 m)	7142038
PVDF body, foamed PVDF float 1" (25 mm) dia., PE cable			
PP with 3-pole round connector	cable length	6 ft. (2 m)	7142006
		15 ft. (5 m)	7142007

Float switches, single stage for Makro and Sigma basic pumps



2820/4

Float switch, single-stage (includes ceramic weight - do not use ceramic weight for fluoride service)

For minimum level indication in source tank. May be used to stop pump at motor starter or variable speed drive, or trigger alarm. May be used with relay combination.

Technical Data:

Max. contact load 60 V, 0.3 A, 5 W/5 VA, temperature range -13°F to 167°F (-25°C to 75°C).

Materials:

Part No.

PP body, foamed PP float 7/8" (21 mm) dia., PE cable			
PP with 2 loose cable ends	cable length	15 ft. (5 m)	790412
PVC body, foamed PP float 7/8" (21 mm) dia., PE cable			
PVC with flat connector	cable length	15 ft. (5 m)	790468
PVDF body, PVDF float 1" (25 mm) dia., PE cable			
PVDF with flat connector	cable length	15 ft. (5 m)	790472

Float switch weights

PVC weight

For bottom of foot valve for fluoride applications.

7404007

For fluoride, (hydrofluosilicic acid) or when plastic is required to replace standard ceramic weight.

Pump & Systems Accessories

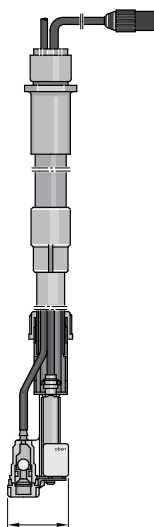
Suction Assemblies

Suction assemblies, two-stage: for beta, gamma/ L and delta pumps

Including foot valve, rigid supporting pipe, suction line and float switch with 6 ft. (2 m) cable. For use in drums or tanks with mixers, which could tangle flexible suction tubing or float switch cables.

two-stage: with 3-pole *round connector*, for early warning and eventual pump shut-down for gamma.

PP version: EPDM o-rings, PE suction line



Adjustable PP suction assembly, with bulkhead fitting for 1" opening and 2-stage float switch

For ProMinent pumps with PP foot valve, PE suction hose, PP supporting pipe and union. PP two-stage float switch with 3-pole round connector

Adjustable length (foot valve to bulkhead)

26" to 41" (660 mm to 1040 mm) for 26 - 220 gallon (140 - 830 L) tanks

Requires 1.0" hole in top of tank for bulkhead fitting

PP version

Suction line

1/4" x 3/16"

1/2" x 3/8"

Part No.

790368

790370

2798/R

Pump & Systems Accessories

Suction Assemblies

Suction assemblies, single-stage: for Concept^{PLUS}

Including foot valve, rigid supporting pipe, suction line and float switch with 6 ft. (2 m) cable. For use in drums or tanks with mixers, which could tangle flexible suction tubing or float switch cables.

PP version: PP float switch, PE suction line

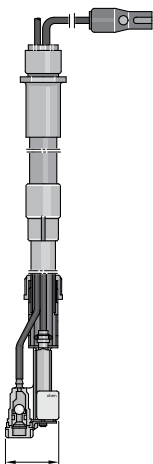
PVC version: PVC float switch, PE suction line

Adjustable PP suction assembly, with bulkhead fitting for 1" opening and single-stage float switch for tanks

With PP foot valve, PE suction hose, PP supporting pipe and union.

Size II 26" to 41" (660 mm to 1040 mm) for 26 - 220 gal. (140 - 830 L) tank

Requires 1.0" hole in top of tank for bulkhead fitting



2798/F

PP version

Part No.

Suction line

1/4" x 3/16"

790356

1/2" x 3/8"

790358

PVC version

Part No.

Suction line

1/4" x 3/16"

790350

1/2" x 3/8"

790352

product
overview

solenoid-driven
metering pumps

motor-driven
metering pumps

pump spare parts &
accessories

DULCOMETER®
instrumentation

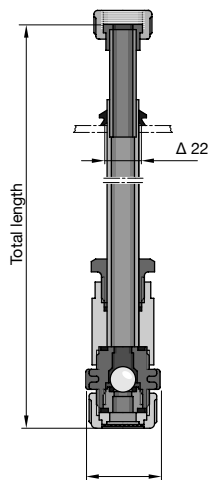
DULCOTEST®
sensors

polymer blending
systems

Pump & Systems Accessories

Suction Assemblies

Suction assemblies: for Sigma Basic and Makro pumps



PP without float switch

Size of connection		Max. tank size gallons (liters)	Max. length inches (mm)	Part No.
PP-DN 10 - 1/2"	Sigma	220 (830)	up to 52"(1320)	790389
PP-DN 15 - 3/4"	Sigma	220 (830)	up to 52" (1320)	790394
PP-DN 20 - 3/4"	Makro	220 (830)	up to 52"(1320)	790395
PP-DN 25 - 1"	Sigma/Makro	220 (830)	up to 52"(1320)	790396
PP-DN 32 - 1-1/2"	Sigma	-	-	1005524

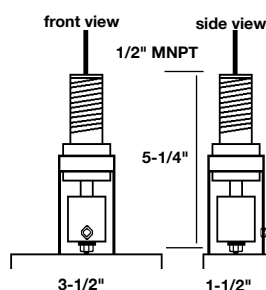
PVC without float switch

Size of connection		Max. tank size gallons (liters)	Max. length inches (mm)	
PVC-DN 10 - 1/2"	Sigma	220 (830)	up to 52"(1320)	790387
PVC-DN 15 - 3/4"	Sigma	220 (830)	up to 52"(1320)	790391
PVC-DN 20 - 3/4"	Makro	220 (830)	up to 52"(1320)	790392
PVC-DN 25 - 1"	Sigma/Makro	220 (830)	up to 52"(1320)	790393
PVC-DN 32 - 1-1/2"	Sigma	-	-	1005525

Note: This fitting is a compression fitting, pipe can be cut to desired length.

2801/3

Diaphragm-failure Detector



Diaphragm-failure detector

To trip an alarm and/or switch the metering pump off in case of diaphragm failure. In a failure, fluid drains out a weep hole in the backplate, through a tube to the detector column. The float switch in the column trips with 10 mL. of fluid. Comprising of a float switch PVC/PE, clear PVC column, tube connectors and connecting tube. Switch closure, max. contact rating 60 VAC, 300 mA, 5 W.

1/2" MNPT conduit connection. Shipped with loose ends on cable.

Part No.

N/O
N/C

7803640
7803650



Signal horn

115 V, 60 Hz, 95 dB, NEMA 4X (e.g. in conjunction with fault annunciating relay or relay combination)

7705004



Amber signal strobe light

115 V, 60 Hz, NEMA 4X (e.g. for use in conjunction with fault annunciating relay or relay combination)

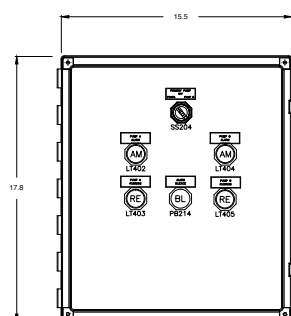
7914785

Pump & Systems Accessories

Universal Switchover Box

One, two, three or four pump terminal boxes are TYPE 4X polycarbonate boxes with terminals for Power and control / alarm cable connections for all pumps respectively. Terminal box can be connected to PFC control panels for Local or Remote operation of the pumps, customer has access to all functions of PFC Solenoid and control version pumps via the terminal box including Dry contact start and 4-20mA speed reference as well as the Alarm contact status and Analog feedback for each pump.

Next Generation



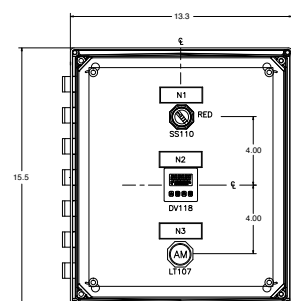
Type 4X Polycarbonate PLC operated switchover control with ability to Single switch over or 3 attempt switchover prior to stopping the process. , Alternating primary pump or non alternating primary selection, Accepts Remote Start and 4-20mA or Pacing signals, external interlock contacts N.O and N.C. , Provides Alarm, Running and 4-20mA feedback for each pump, leak detection status available when appropriate pump option selected. Output available for customer supplied audible alarm. Optional duplex receptacle available. Functions are selectable via jumper installed by customer

Part No.

CP2_120VAC Auto S/O:
(17.8"x15.5")

7746095
(replaces p/n 7951130)

One Pump SCADA Panel

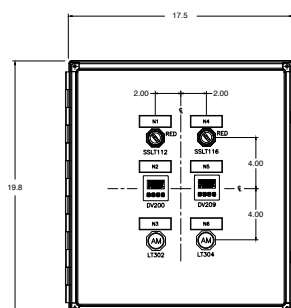


TYPE 4X Single Pump Local control panel for customer SCADA interface. Dry contact Start & 4-20mA speed reference from SCADA in Remote mode, status to SCADA include Alarm, Pump Running, & analog feedback of pump output. Enclosure dimensions (15.5"x13.3")

Part No.

7745681

Two Pump SCADA Panel



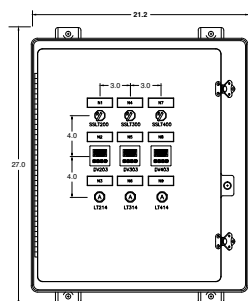
TYPE 4X Dual Pump Local control panel for customer SCADA interface. Each pump receives dry contact Start & 4-20mA speed reference from SCADA in Remote mode, status to SCADA include Alarm, Pump Running, & analog feedback of pump output for each pump. Enclosure dimensions (19.8"x17.5")

7745682

Pump & Systems Accessories

Universal Switchover Box

Three Pump SCADA Panel



TYPE 4X Three Pump Local control panel for customer SCADA interface. Each pump receives dry contact Start & 4-20mA speed reference from SCADA in Remote mode, status to SCADA include Alarm, Pump Running, & analog feedback of pump output for each pump. Enclosure dimensions (27"x 21.2")

7746598

Terminal Box Kit, 1 Pump, Non-GFI Receptacle

(Consists of P/N: 7745824* + Additional Components for Receptacle)

Part No

7745878

Terminal Box Kit, 1 Pump, GFI Receptacle

(Consists of P/N: 7745824 + Additional Components for Receptacle)

(NOT TO BE UTILIZED WITH SIGMA CONTROL SERIES PUMPS)

7745879

Terminal Box Kit, 2 Pump, Non-GFI Receptacle

(Consists of P/N: 7745262* + Additional Components for Receptacle)

7745800

Terminal Box Kit, 2 Pump, GFI Receptacle

(Consists of P/N: 7745262* + Additional Components for Receptacle)

(NOT TO BE UTILIZED WITH SIGMA CONTROL SERIES PUMPS)

7745881

Terminal Box Kit, 3 Pump, Non-GFI Receptacle

(Consists of P/N: 7745263* + Additional Components for Receptacle)

7746097

Terminal Box Kit, 3 Pump, GFI Receptacle

(Consists of P/N: 7745263* + Additional Components for Receptacle)

(NOT TO BE UTILIZED WITH SIGMA CONTROL SERIES PUMPS)

7746098

Terminal Box Kit, 4 Pump, Non-GFI Receptacle

(Consists of P/N: 7746128* + Additional Components for Receptacle)

7746099

Terminal Box Kit, 4 Pump, GFI Receptacle

(Consists of P/N: 7746128* + Additional Components for Receptacle)

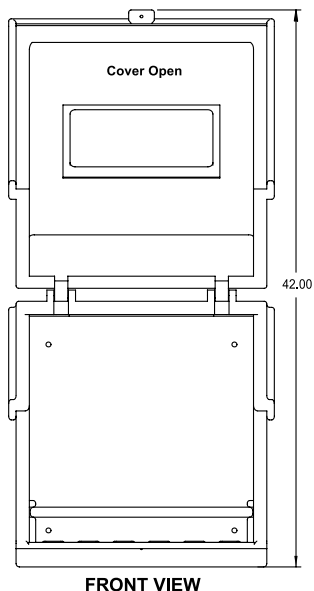
(NOT TO BE UTILIZED WITH SIGMA CONTROL SERIES PUMPS)

7746100

* Terminal Box Only

Pump Shelves and Stands

Pump Shelf with Containment



Safely contains up to 2 ProMinent® pumps and adds spill containment protection. Can be purchased with or without protective cover. Pump tubing can be run through holes on either side of shelf base. Cover includes viewing window. Cannot be used for hard piped applications.

Materials of Construction: Polyethylene

Shipping weight (w/o pumps): 15 lbs.

Height: 19"

Width: 19"

Depth: 16.5"

Hinge: Plated Steel

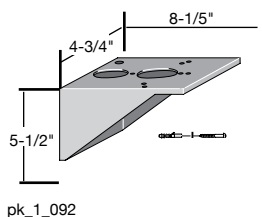
Drain: 1/4" FNPT

Description Part Numbers

Shelf w/cover 7500374

Shelf only 7500365

Cover only 7500364

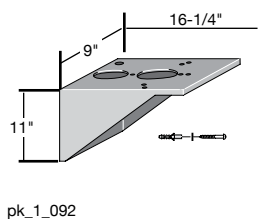


Wall mounting bracket for solenoid pumps

Part No.

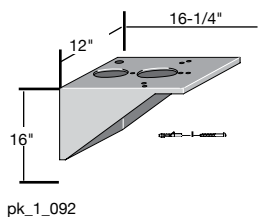
Made of fiberglass-reinforced PPE, with wall-plugs and screws, accepting a concept, gamma and beta. Pumps can be mounted either parallel or perpendicular to the wall.

810164



Wall mounting bracket for delta pump

1028798



Wall mounting bracket for Sigma pumps

Polypro wall bracket mounts pumps so that diaphragm is parallel to the wall.

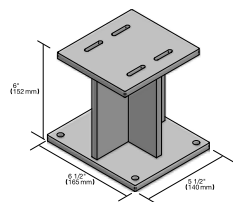
7803799

Pump & Systems Accessories

Pump Shelves and Stands

Floor mounting bracket for solenoid pumps

Polypropylene floor mounting bracket accepts pumps parallel to the floor.

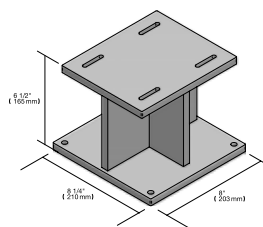


6" PP floor mounting bracket

1028758

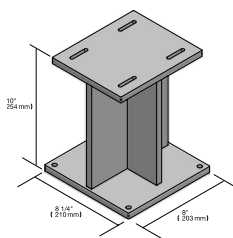
Floor mount bracket for Motor pumps

Polypropylene floor mounting bracket accepts pumps parallel to the floor.



6-1/2" PP floor mounting bracket

1028759

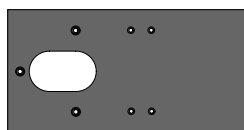


10" PP floor mounting bracket

1028760

Adapter plate

With fixtures, for vertical wall-mounting of beta or gamma pumps with auto-degassing liquid ends. Used with PPE wall console.



PP adapter plate

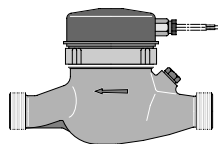
1003030

pk_1_121

Pump & Systems Accessories

Water Meters

Pulse-type water meters for potable water



1137/4

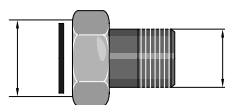
Contact water meter – US GPH Scale

max. operation temperature 104° F.

Pipe Coupl. Size in.	Min. Flow Rate in			Max. Flow Rate in			Press. Loss Max. Flow Rate		Part No.
	GPM	GPH	(L/h)	GPM	GPH	(L/h)	psig	(bar)	
3/4"	0.5	30	(113)	20	1200	(4542)	14.5	(1)	7500076
1"	0.6	36	(136)	50	3000	(11356)	14.5	(1)	7500077
1-1/2"	1.0	60	(227)	100	6000	(22712)	14.5	(1)	7500078
2"	2.0	120	(454)	130	7800	(29526)	14.5	(1)	7500079

Note: Price includes two screw fittings.

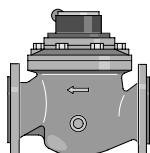
*Please specify pulse rate desired



1139/4

Screw fittings in brass with packing for water meters (price per unit)

3/4"	7359021
1"	7359022
1-1/2"	7359023
2"	7359024



1138/4

Contact water meter – US GPH, 3"...6" flanged

max. operation temperature 104°F.

Min. Flow Rate in			Max. Thru-Put		Pipe Flange Size in.	Install. Length in.	Standard Gallon/ Pulse	Weight lb. (kg)	Part No.
GPM	GPH	(L/h)	GPM	GPH					
2.6	156	(590)	650	39000	3" ASA	9" (225 mm)	10	42 (19)	7304512
11	660	(2498)	1875	112500	6" ASA	12" (298 mm)	25	89 (40)	7304514

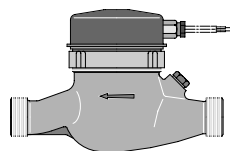
Pump & Systems Accessories

Water Meters

Pulse-type water meters, 3/4"...2" NPT fittings – Liter Scale

Max. working temperature 40°C, max. contact load 100 mA, 24 V

Max. flow rate = Q_{\max} , nominal flow rate = Q_n



1137/4

Qmax = Qn NG = Nominal size (m³/h)	Connections in.	Overall length w/o unions mm	Standard K factor	Part No.
5	3/4"	190 mm (7.5")	1	304434
10	1"	260 mm (10.2")	1.5	304435
20	1-1/2"	300 mm (11.8")	2	304436
30	2"	270 mm (10.6")	4	304438

Note: Price includes two screw fittings.

*Please specify pulse rate desired

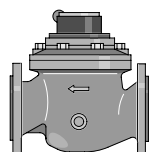
Other pulse rates available (liters per pulse out)

.05	1	5	40	300
.1	1.5	10	50	400
.25	2	15	100	500
.3	2.5	20	150	1000
.4	3	25	200	1500
.5	4	30	250	2000

Pulse-type water meters, 3"...6" flanged

Max. working temperature 40°C, max. contact load 100 mA, 24 V

Max. flow rate = Q_{\max} , nominal flow rate = Q_n



1138/4

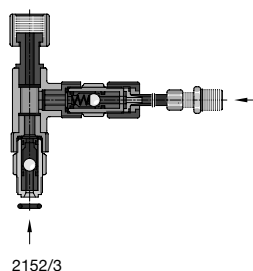
Qmax/Qn (m³/h)	Connections in.	Overall length mm	Pulse spacing	Part No.
110/55	3" ASA	225 mm (9")	Please call	304439
180/90	4" ASA	251 mm (10")		304442
350/175	6" ASA	298 mm (12")		304443

Pump & Systems Accessories

Flushing Devices

Flushing devices

Fig. 1



To flush and clean liquid end, discharge line and injection valve, and to protect against deposits and crystallization. Manual or timer-controlled device. To be fitted to the suction connector of the metering pump (also suitable for retrofitting). The automatic version comprises flushing device, timer, solenoid valve and the required connectors.

Flushing device, manual, High Viscosity version

Part No.

For tubing connectors 1/4" x 3/16" and 1/2" x 3/8" (Fig. 1)

809909

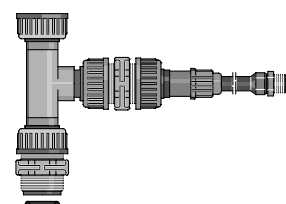
For 1/2" MNPT connection for g/4 PP4/5, g/5 0423 and 0230 (Fig. 2)

7809917

For 1/2" MNPT connection for g/5 PP4/5 series

7809919

Fig. 2



Flushing device, manual, PVC version

For tubing connectors 1/4" x 3/16" and 1/2" x 3/8" (Fig. 1)

809925

For 1/2" MNPT connection for g/5 0423 and 0230 (Fig. 2)

7809926

Note: Call for info on automatic devices.

2160/3

product
overview

solenoid-driven
metering pumps

motor-driven
metering pumps

pump spare parts &
accessories

DULCOMETER®
instrumentation

DULCOTEST®
sensors

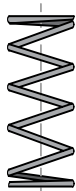
polymer blending
systems

Pump & Systems Accessories

Valve Springs

Valve springs

Fig. 1



pk_1_103

Fig. 2



pk_1_104

You may spring-load the valve balls in the pump suction and/or discharge valves to improve the valve function and increase the repeatability. Particularly recommended when pumping viscous fluids of more than 50 cPs (mPa).

Discharge valve springs may be used instead of an external backpressure valve to improve repeatability when discharging to an open tank. Suction valve springs in excess of 1 psig (0.05 bar) make priming difficult; and in excess of 7 psig (0.5 bar) makes pumping impossible, except where suction pressure exceeds spring pressure.

Not recommended for antisiphon protection – use a diaphragm-type backpressure valve for antisiphon protection. There is no labor charge for installing the valve springs into the pump valves or injection valves.

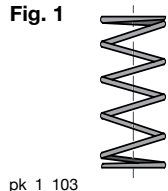
	Pressure Rating Material of psig (bar)		Construction	Part No.
Suction and Discharge Valves Model #'s: BT/4 & G/L 1000, 1601, 1602, 1005, 1605 (Fig. 1)	1	(0.05)	316 SS	469406
	14	(1.0)	316 SS	469401
Suction and Discharge Valves, and Injection Valves Model #'s: BT/4 & G/L 0708, 0413, 0220, 1008, 0713, 0420, 0232 (Fig. 2) All standard delta liquid ends	1	(0.05)	Hastelloy C	469403
	7	(0.5)	Hastelloy C	469404
	7	(0.5)	PVDF-coated Hastelloy C	818590
	14	(1.0)	Hastelloy C	469413
	14	(1.0)	PVDF-coated Hastelloy C	818536
	29	(2.0)	Hastelloy C	469410
Suction and Discharge Valves Model #'s: G/b 1002 PP4/PP5, 0423, 0230, plus Injection Valves: Models 0423, 0230	1	(0.05)	Hastelloy C	469114
	1	(0.05)	302 SS	7469401
	7	(0.5)	Hastelloy C	469115
	7	(0.5)	PVDF-coated Hastelloy C	818515
	14	(1.0)	Hastelloy C	469119
Suction and Discharge Valves: Model #'s: G/b 1006, 1310, 0813 PP4/PP5 only, plus Injection Valves: Models 1006, 1310 and 0813 PP4/PP5	1	(0.05)	Hastelloy C	469107
	1	(0.05)	302 SS	7469404
	7	(0.5)	Hastelloy C	469108
	7	(0.5)	PVDF-coated Hastelloy C	818516
	14	(1.0)	Hastelloy C	469116
Discharge Valves Model #'s (<u>w/ auto-degassing</u>): BT/4 & G/L 1601, 1602, 1005, and 1605	21	(1.5)	Hastelloy C	791052

Pump & Systems Accessories

Valve Springs

Valve springs

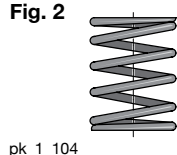
Fig. 1



You may spring-load the valve balls in the pump suction and/or discharge valves to improve the valve function and increase the repeatability. Particularly recommended when pumping viscous fluids of more than 50 cPs (mPa).

Discharge valve springs may be used instead of an external backpressure valve to improve repeatability when discharging to an open tank. Suction valve springs in excess of 1 psig (0.05 bar) make priming difficult; and in excess of 7 psig (0.5 bar) makes pumping impossible, except where suction pressure exceeds spring pressure.

Fig. 2



Not recommended for antisiphon protection – use a diaphragm-type backpressure valve for antisiphon protection.

There is no labor charge for installing the valve springs into the pump valves or injection valves.

Pump Model	Spring Pressure Rating psig (bar)		Material of Construction	Part No.
DN 10 valves: Vario models 12017, 12026, 12042, 10025, 09039, 07063 Sigma/1, Hydro	1	(0.05)	Hastelloy C	469114
	7	(0.5)	Hastelloy C	469115
	7	(0.5)	PVDF-coated Hastelloy C	818515
	14	(1.0)	Hastelloy C	469119
	1	(0.05)	302 SS	7469401
DN 15 Valves: Vario models 06047, 105075, 04120 Sigma/1 Sigma/2 models 12050, 12090, 12130 Hydro	(0.05)	Hastelloy C	469107	
	7	(0.5)	Hastelloy C	469108
	7	(0.5)	PVDF-coated Hastelloy C	818516
	14	(1.0)	Hastelloy C	469116
	1	(0.05)	302 SS	7469404
DN 20 Valves: Meta/Makro models with 3/4" connectors	1	(0.05)	Hastelloy C	469451
	7	(0.5)	Hastelloy C	469409
	7	(0.5)	PVDF-coated Hastelloy C	818517
	14	(1.0)	Hastelloy C	469135
	1	(0.05)	302 SS	7469402
DN 25 Valves: Meta/Makro models with 1" connectors Sigma/2 models 07120, 07220, 04350	1	(0.05)	Hastelloy C	469452
	7	(0.5)	Hastelloy C	469414
	7	(0.5)	PVDF-coated Hastelloy C	818518
	14	(1.0)	Hastelloy C	469136
	1	(0.05)	302 SS	7469403
DN 40 Valves: Meta/Makro models with 1-1/2" connectors	7	(0.5)	Hastelloy C	469104
	7	(0.5)	PVDF-coated Hastelloy C	818519
	14	(1.0)	Hastelloy C	469137
Meta/Makro HK pumps with 1/4" connectors	1	(0.05)	316 SS	469461
Makro HK pumps with 3/8" connectors	1	(0.05)	316 SS	469462

Pump & Systems Accessories

Motors

AC and DC Motors

AC motors

All AC motors are recognized by Underwriters Laboratories component approval program, and Canadian Standards Association.

All motors are 1725 RPM, C-faced, and 60 Hz. Manufacturer may vary.

					Part No.
1/3 HP	TEFC	56-C	115/208-230V	1 phase	7951046
1/3 HP	TEFC	56-C	208-230/460V	3 phase	7951048
1/2 HP	TEFC	56-C	115/208-230V	1 phase	7951021
1/2 HP	TEFC	56-C	208-230/460V	3 phase	7951023
3/4 HP	TEFC	56-C	115/208-230V	1 phase	7951060
3/4 HP	TEFC	56-C	208-230/460V	3 phase	7951061
1 HP	TEFC	56-C	208-230/460V	3 phase	7951024
1-1/2 HP	TEFC	56-C w/base	115/208-230V	1 phase	7951025
1-1/2 HP	TEFC	56-C w/base	208-230/460V	3 phase	7951026
3 HP	TEFC	***184TC	230V	1 phase	7951141
3 HP	TEFC	***182TC	208-230/460V	3 phase	7951142

*** Must use adapter (see below)

AC explosion-proof motors

Corrosion resistant epoxy finish. Positively locked drive end bearing.
UL and CSA approved for Class I, Group D or Class II, Group F and G.
UL approved cast conduit box-standard.
Manufacturer may vary.

				Part No.
1/3 HP	56-C	115/208-230V	1 phase	7951014
1/3 HP	56-C	208-230/460V	3 phase	7951013
1/3 HP	56-C	115/208-230V	1 phase	*7500344
1/2 HP	56-C	208-230/460V	3 phase	**7746261
1/2 HP	56-C	115/208-230V	1 phase	7951006
1/2 HP	56-C	208-230/460V	3 phase	7951005
3/4 HP	56-C	115/208-230V	1 phase	7951004
3/4 HP	56-C	208-230/460V	3 phase	7951003
1 HP	56-C	208-230/460V	3 phase	7744983
1-1/2 HP	56-C w/base	208-230/460V	3 phase	7951002
3 HP	***182TC	208-230/460V	3 phase	7951001

* For use with Sigma/1 basic pumps only. Includes necessary mounting hardware.

** Sigma/1 basic Explosion-Proof motors for VFD applications. Includes necessary mounting hardware.

*** Must use adapter (see below)

Adapter *** (Required when using motors with 184TC or 182TC face)

Mounting flange and motor shaft coupling (Makro pumps w/3 HP, AC motors)	7951144
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DC motors

Permanent magnet 1750 rpm.

					Part No.
1/3 HP	TENV	90 V	56-C	Sigma	7951078
1/2 HP	TENV	90 V	56-C	Meta	7951079
3/4 HP	TEFC	90 V	56-C	Sigma/3, Meta, Makro, Hydro	7951080
1-1/2 HP	TEFC	180 V	145-TC	Makro, Hydro	7951081
3 HP	TEFC	180 V	184-C	Makro	7951140

Pump & Systems Accessories

Variable Speed Drives

AC Inverter

Provides variable motor speed with three-phase AC motors by adjusting the frequency (Hz) output to the motor. Motor not included with inverter. See motor section for three-phase motors. Features NEMA 4X enclosure with keypad and display of percent load or output voltage. Selectable for local or remote operation via 4-20 mA signal. Minimum speed 3-30 Hz.

Specifications

For 1/4 to 1/2 HP motors with line voltage 208-240 VAC, 3 phase, 60 hz	7746667
3 phase vac output: 2.3 amps max.	
Weight: 5.07 lbs (2.3 kg)	
Dimensions: (H x W x D) 9.137 x 6.34 x 6.89" (232 x 161 x 175 mm)	
For up to 1 HP motors with line voltage 208-240 VAC, 3 phase, 60 hz	7746668
3 phase vac output: 4.3 amps max.	
Weight: 5.07 lbs (2.3 kg)	
Dimensions: (H x W x D) 13.3 x 11 x 6.25" (338 x 280 x 159 mm)	
For up to 2 HP motors with line voltage 208-240 VAC, 3 phase, 60 hz	7746669
3 phase vac output: 7.0 amps max.	
Weight: 5.07 lbs (2.3 kg)	
Dimensions: (H x W x D) 9.137 x 6.34 x 6.89" (232 x 161 x 175 mm)	
For up to 1 HP motors with line voltage 380-480 VAC, 3 phase, 60 hz	7746670
3 phase vac output: 2.2 amps max.	
Weight: 5.07 lbs (2.3 kg)	
Dimensions: (H x W x D) 9.137 x 6.34 x 6.89" (232 x 161 x 175 mm)	
For up to 2 HP motors with line voltage 380-480 VAC, 3 phase	7746671
3 phase vac output: 4.1 amps max.	
Weight: 5.07 lbs (2.3 kg)	
Dimensions: (H x W x D) 9.137 x 6.34 x 6.89" (232 x 161 x 175 mm)	

(For 3 HP and larger drives contact Customer Service)

Inverter Duty Rated Motors

1/3 HP	TEFC	230/460 VAC	56C	3 phase	7951146
1/2 HP	TEFC	230/460 VAC	56C	3 phase	7951145
3/4 HP	TEFC	230/460 VAC	56C	3 phase	7951147
1 HP	TENV	230/460 VAC	143TC	3 phase	7744373
1-1/2 HP	TENV	230/460 VAC	145TL	3 phase	7951149
3 HP	TENV	230/460 VAC	*184TC	3 phase	7951143

* Must use adapter (see below)

Adapter * (Required when using motors with 184TC or 182TC face)

Mounting flange and motor shaft coupling (Makro pumps w/3 HP, AC motors)	7951144
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Pump & Systems Accessories

Variable Speed Drives

Dart DC SCR Drives with Motors (253 G Model)

Dart DC SCR drives with motors

DC SCR variable speed motor and drive system, 1725 RPM max., AC line input voltage 120 (for 90 VDC motors) or 240 VAC (for 180 VDC motors), 1 phase, 50/60 Hz.

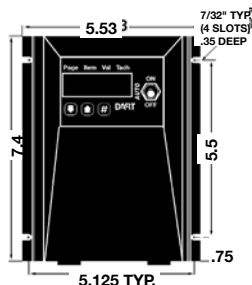
1/3 HP to 1/2 HP models with 56C frame TENV motors.

3/4 HP to 1-1/2 HP models with 56C/143TC frame TEFC motors.

Manual mode: Output voltage to motor is proportional to potentiometer setting between 20% and 100%. **In manual mode, setting 0 VDC output = 20% setting on potentiometer.**

Auto mode: Output voltage to motor is proportional to external 4-20 mA input (20 mA = 100%, 4 mA = 0%). Linearity is excellent between 100% and 10% (20 to 5.6 mA), and drops off below 10%. With manual/off/auto (external) switch. NEMA 4/12 enclosure.

1/3 HP SCR drive w/90 VDC motor	} (requires 115/230 VAC input, 1 phase)	Part No. 7951015
1/2 HP SCR drive w/90 VDC motor		7951010
3/4 HP SCR drive w/90 VDC motor		7951011
1-1/2 HP SCR drive w/180 VDC motor (requires 208-240 VAC input, 1 phase)		7951020



Dart DC SCR drives and motors with tach feedback (253 G Model)

DC SCR variable speed motor, tachometer and drive system, 1725 RPM max., AC line input voltage 120 or 240 VAC, 1 phase, 50/60 Hz. DC output 90 or 180 volts.

1/3 HP to 1/2 HP models with DC 56C frame TENV motors; 3/4 HP to 1-1/2 HP models with DC 56C/143TC frame TEFC motors. Tachometer mounted between motor C-face and pump flange.

Includes long motor coupling to accommodate tach.

Manual mode: Digital RPM control by up/down keypad, LED read-out in RPM or programmable engineering units (e.g. percent, strokes/min., flow rate, etc.). Actual RPM measured by tach corresponds to manual setpoint. Minimum speed 8 RPM.

External mode: Actual RPM measured by tach is proportional to analog 4-20 mA input (20 mA = 100%, 4 mA = 0%). Minimum speed 8 RPM.

1/3 HP SCR drive w/90 VDC motor and tach (requires 115 VAC input)	7951090
1/2 HP SCR drive w/90 VDC motor and tach (requires 115 VAC input)	7951094
3/4 HP SCR drive w/90 VDC motor and tach (requires 115 VAC input)	7951095
1-1/2 HP SCR drive w/180 VDC motor and tach (requires 230 VAC input)	7951096

Pump & Systems Accessories

Variable Speed Drives

Dart DC SCR drive without Motor

Part No.

Variable speed drive for controlling the voltage output to DC motors.
Motor not included with SCR. See motor section for selection.

Dart 253 G Series Variable Speed DC Control

2 HP Max, 90/180 VDC Out, 120/240 VAC In, SCR Drive, 253-200E-7-4X 7740941
(with 120 VAC Input, drive rating is 1 HP @ 90 VDC to motor)

Dart MDII Series Programmable Drives (requires tachometer, below)

2 HP Max, 90/180 VDC Out, 120/240 VAC In, SCR Drive, MD30-E-7 7951120
(with 120 VAC Input, drive rating is 1 HP @ 90 VDC to motor)

56C - Faced tachometers for Dart MDII Drives above

MADISON TACH & RING GEAR KIT ARTS-01-Z-0-1-M00-060-0.625 7745669
MADISON TACH RING GEAR 0.625 SHAFT - ONLY 7746657
MADISON TACH & RING GEAR KIT ATRS-01-Z-0-1-M00-060-0.875 7746656
MADISON TACH RING GEAR 0.875 SHAFT - ONLY 7746396

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Pump & Systems Accessories

Motors - Canadian

AC Motors *(for Canadian customers only)

AC motors

All AC Motors are approved by CSA.

All motors are 1725 RPM, 60 Hz, manufacturers may vary.

Horsepower	Enclosure	Frame	AC Voltage	Phase	Part No.
1/3 HP	TEFC	56 C	115 / 208-230	1 phase	7901317
1/3 HP	TEFC	56 C	208-230 / 460	3 phase	7901329
1/3 HP	TEFC	56 C	575	3 phase	7901323
1/2 HP	TEFC	56 C	115 / 208-230	1 phase	7901318
1/2 HP	TEFC	56 C	208-230 / 460	3 phase	7901330
1/2 HP	TEFC	56 C	575	3 Phase	7901324
3/4 HP	TEFC	56 C	115 / 208-230	1 phase	7901319
3/4 HP	TEFC	56 C	208-230 / 460	3 phase	7901331
3/4 HP	TEFC	56 C	575	3 phase	7901325
1 HP	TEFC	56 C	115 / 208-230	1 phase	7901320
1 HP	TEFC	56 C	208-230 / 460	3 phase	7901332
1 HP	TEFC	56 C	575	3 phase	7901326
1-1/2 HP	TEFC	56 C	115 / 208-230	1 phase	7901321
1-1/2 HP	TEFC	56 C	208-230 / 460	3 phase	7901333
1-1/2 HP	TEFC	56 C	575	3 phase	7901327
3 HP*	TEFC	182 TC	208-230 / 460	3 phase	7901334
3 HP*	TEFC	184 C	575	3 phase	7901322
3 HP*	TEFC	182 TC	575	3 phase	7901328

* Must use adapter (see below)

AC explosion-proof motors

All motors come with an explosion proof conduit box and built in overload protection.

CSA approved for Class I Group C and D, or Class II Group F and G.

Manufacturer may vary.

Horsepower	Enclosure	Frame	AC Voltage	Phase	Part No.
1/3 HP	EXP	56 C	115 / 208-230	1 phase	7901335
1/3 HP	EXP	56 C	208-230 / 460	3 phase	7901339
1/3 HP	EXP	56 C	575	3 phase	7901340
1/2 HP	EXP	56 C	115 / 208-230	1 phase	7901336
1/2 HP	EXP	56 C	208-230 / 460	3 phase	7901341
1/2 HP	EXP	56 C	575	3 phase	7901342
3/4 HP	EXP	56 C	115 / 208-230	1 phase	7901337
3/4 HP	EXP	56 C	208-230 / 460	3 phase	7901343
3/4 HP	EXP	56 C	575	3 phase	7901344
1 HP	EXP	56 C	115 / 208-230	1 phase	7901338
1 HP	EXP	56 C	208-230 / 460	3 phase	7901345
1 HP	EXP	56 C	575	3 phase	7901346
1-1/2 HP	EXP	56 C	208-230 / 460	3 phase	7901347
1-1/2 HP	EXP	56 C	575	3 phase	7901348

***Flange Adapter** (Required for installing 3 HP motors or motors with 182/184 frames)

Mounting flange and motor shaft coupling (Makro pumps w/3 HP, AC motors) 7951144

Pump & Systems Accessories

Variable Speed Drives - Canadian

Provides variable motor speed with three phase AC Motors by adjusting the frequency (Hz) output to the motor. The motor is not included with the inverter. Choose the motor from the AC Inverter Duty Rated Motors section following the listing of Inverters. Push button keypad and display for Hertz, RPM, % Frequency.

All Inverter AC output voltage is 3 phase.

Maximum Motor HP	AC Input	Phase	AC Output	Dim. (mm) H x W x D	Enclosure	Part No.
1/2 HP	120/240	1 ph	230 V 2.2 A	200 x 200 x 95	NEMA 4	7901357
1/2 HP	200/240	3 ph	230 V 2.2 A	200 x 155 x 110	NEMA 4	7901360
1 HP	120/240	1 ph	230 V 4 A	200 x 200 x 125	NEMA 4	7901363
1 HP	200/240	3 ph	230 V 4 A	200 x 155 x 110	NEMA 4	7901366
1 HP	400/480	3 ph	460 V 2 A	200 x 155 x 110	NEMA 4	7901369
1 HP	590	3 ph	575 V 1.6 A	200 x 155 x 110	NEMA 4	7901372
1-1/2 HP	120/240	1 ph	230 V 5.2 A	200 x 200 x 125	NEMA 4	7901375
1-1/2 HP	200/240	3 ph	230 V 5.2 A	200 x 200 x 125	NEMA 4	7901378
2 HP	200/240	3 ph	230 V 6.8 A	200 x 200 x 125	NEMA 4	7901381
2 HP	400/480	3 ph	460 V 3.4 A	200 x 200 x 125	NEMA 4	7901384
2 HP	590	3 ph	575 V 2.7 A	200 x 200 x 125	NEMA 4	7901387
3 HP	200/240	3 ph	230 V 9.6 A	200 x 200 x 150	NEMA 4	7901390
3 HP	400/480	3 ph	460 V 4.8 A	200 x 200 x 125	NEMA 4	7901393
3 HP	590	3 ph	575 V 3.9 A	200 x 200 x 125	NEMA 4	7901396

AC Inverter Duty Rated Motors *(for Canadian customers only)

HP	Enclosure	Frame	AC Voltage	Phase	Part No.
1/3 HP	TEFC	56 C	230/460	3 phase	7902404
1/3 HP	TEFC	56 C	575	3 phase	7902407
1/2 HP	TEFC	56 C	230/460	3 phase	7902405
1/2 HP	TEFC	56 C	575	3 phase	7902408
3/4 HP	TEFC	56 C	230/460	3 phase	7902406
3/4 HP	TEFC	56 C	575	3 phase	7902409
1 HP	TEFC	56 C	208-230 / 460	3 phase	7901332
1 HP	TEFC	56 C	575	3 phase	7901326
1-1/2 HP	TEFC	56 C	208-230 / 460	3 phase	7901333
1-1/2 HP	TEFC	56 C	575	3 phase	7901327
3 HP*	TEFC	182 TC	208-230 / 460	3 phase	7901334
3 HP*	TEFC	184 C	575	3 phase	7901322
3 HP*	TEFC	182 TC	575	3 phase	7901328

* Flange Adapter 7951144 Required for installing 3 HP motors or motors with 182/184 frames.

Pump & Systems Accessories

Variable Speed Drives - Canadian

DC Motors *(for Canadian customers only)

DC motors

Permanent magnet 1750 RPM.

<u>Horsepower</u>	<u>Enclosure</u>	<u>Frame</u>	<u>AC Voltage</u>	<u>Part no.</u>
1/3 HP	TEFC	0 – 90 VDC	56 C	7902413
1/2 HP	TEFC	0 – 90 VDC	56 C	7902412
3/4 HP	TEFC	0 – 90 VDC	56 C	7356703
1-1/2 HP	TEFC	0 – 180 VDC	56 C	7902411

The SCR control does not come with a motor. Select the required DC motor from the DC motor list.

The KB Penta DC Drive is used to control the DC voltage to DC motors. This controls the speed of the motor. The DC voltage is variable from 0 – 90 VDC or 0 – 180 VDC which represents 0 to approximately 1750 RPM motor speed. Features of this drive include: Manual –OFF – Auto selector switch; Speed pot for manual motor speed control; Auto motor speed control via an isolated 4 – 20 mA input. Single phase line input voltage is selectable as 120 VAC (for 0 – 1 HP motors 0 – 90 VDC) or 230 VAC (for 0 – 2 HP motors 0 – 180 VDC).

For motors 0 – 1 HP, 120 VAC in 0 – 90 VDC out

For motors 0 – 2 HP, 230 VAC in 0 – 180 VDC out

KB Penta DC Drive SCR Controller

7356704

Economy KB Penta AC Drive *(for Canadian customers only)

This lower cost AC inverter can control motor speed on AC motors up to 1 HP. It has a selectable 115 VAC or 230 VAC input and generates a 230 VAC 3 phase 3.6 A output. Features include switch selectable manual / auto operation, Manual speed control via local potentiometer and Auto speed control via a 4 – 20 mA input. Motor is not included with the drive, select the motor from the AC Inverter Duty Rated Motor list.

Dimensions (mm) 241 x 140 x 148 (H x W x D)

Economy KB Penta AC Drive

7902410

Pump & Systems Accessories

Stroke-positioning Motors

Stroke positioning motors must be field wired to remove power when the pump drive motor is stopped. For automatic stroke-length control with positioning motor, controlled by a standard process signal.

With standard process signal input 4-20 mA, corresponding to 0-100% stroke length.

Power supply: 115 V or 230 V, 60 Hz, 1 phase.

Manual/automatic mode selector switch.

Spring-return switch for manual stroke-length adjustment.

Mechanical stroke-length indicator.

Positioning time about 1 second per 1% stroke length

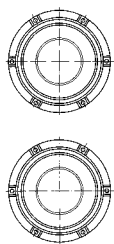
Stroke-positioning control system 4-20 mA

	110 V	230 V
Sigma 1	7781491	-
Sigma/2 HM (5 mm)	1018894	1018893
Sigma/3	1006504	1006505
Sigma/2 HK	1018890	1018889
Makro	1020798	-
ProMus (Nema 7)	852752	852752

Viton® Diaphragms

Motor Pump diaphragms

ProMinent pump diaphragm made from a steel core with Viton® facing. Particularly suited for media tending to crystalize, such as silicate.



1047_4_1

Viton® for pump type:	Max. working pressure	Part No.
Sigma/1 12017, 12035, 10050	87 psi (6 bar)	1010281
Sigma/1 10022, 10044, 07065	87 psi (6 bar)	1010284
Sigma/1 07042, 04084, 04120	87 psi (6 bar)	1010287
Sigma/2 12050, 12090, 12130	87 psi (6 bar)	1018953
Sigma/2 07120, 07220, 04350	87 psi (6 bar)	1018984
Sigma/3 120145, 120190, 120270, 120330	87 psi (6 bar)	1006564
Sigma/3 070410, 070580, 040830, 041030	87 psi (6 bar)	1006566
Meta/Makro 130	87 psi (6 bar)	7811470
Meta/Makro 260	87 psi (6 bar)	7811471

Viton® is a registered trademark of Dupont Dow Elastomers

Pump & Systems Accessories

Valve Balls

Valve Balls	Material	Dimensions in. (mm)		Part No.
For use with 4.8 mm valve	PTFE	1/4"	(4.8)	7404205
	SS	1/4"	(4.8)	7404233
	Ceramic	1/4"	(4.8)	404201
For use with 9.5 mm valve only	PTFE	1/2"	(9.5)	7404206
	SS	1/2"	(9.5)	7404240
For use with 9.2 mm (standard) valve	Ceramic	1/2"	(9.2)	404281

Special valve balls

For metering pumps and accessories if standard materials are unsuitable.



11.1 mm dia. for DN 10 (Vario/ Sigma)

Part No.

PTFE (1/2" MNPT connection)

7404207

Ceramic (1/2" MNPT connection)

404277

SS (3/8" FNPT connection)

404243



16 mm dia. for DN 15 (Vario/ Sigma)

PTFE (3/4" MNPT connection)

7404208

Ceramic (3/4" MNPT connection)

404275

SS (1/2" FNPT connection)

404244

pk_1_102

20 mm dia. for valve dia. 3/4" DN 20 (Meta, Makro)

PTFE

404256

Ceramic

404273

SS

404246

25 mm dia. for valve dia. 1" DN 25 (Sigma, Meta, Makro)

PTFE

404257

Ceramic

404274

SS

404247

38.1 mm dia. for valve dia. 1-1/2" DN 40 (Makro)

PTFE

404261

Ceramic

404278

SS

7404260

Pump & Systems Accessories

Deaeration Valve Assembly

Introduction

Some chemicals "off-gas" (ie. decompose) when the pump is sitting idle; the gas accumulates and may cause the pump to lose prime. ProMinent's deaeration valve assembly can help evacuate gases accumulated in the liquid end of the pump automatically even against system backpressure.

The deaeration valve assembly operates by allowing any accumulated gases to exit, through the bleed valve. A small amount of liquid along with the expelled gases are channeled through the bleed valve and bypassed back to the supply tank. When gas is present in the deaeration valve the resistance to flow through the bleed valve is relatively low. When the deaeration valve becomes full of liquid the resistance to flow through the deaeration valve increases dramatically, forcing the majority of the liquid to pass through the main discharge line.

Installation

A. General

Install the pump in accordance with the instructions contained in the pump operating manual. The deaeration valve assembly must be installed directly on the outlet side of the discharge check valve.

B. Routing of Bypass Line

The bypass line should be routed back to the top of the chemical storage tank. Install the pump so the bypass line is not submerged in the chemical. It is not recommended to pipe into the calibration columns because they will overflow after a short period.

Warning: install the bypass line so any bypassed air/gas is not rerouted into the suction line.

C. Calibration

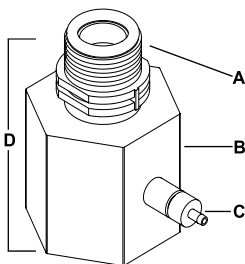
In calibrating the pump, use a graduated cylinder as the fluid source. You must collect any fluid returned through the bypass during the calibration and subtract it from the quantity drawn into the suction line.

Maintenance

- Ensure the pump connections are correct and tight
- Maintain a clean liquid end with no buildup of chemical crystalline material. Especially check the bleed valve and discharge ball checks.

Replacing the bleeder valve O-ring:

- Unscrew the bleeder valve and carefully remove the O-ring with a small screwdriver
- Fit a new O-ring into the valve port and screw in the bleeder valve and tighten to 2.2-2.6 ft. lb. torque



Size	Valve MNPT/ PVT (A)	Deaeration Valve/CPVC (B)	Air Relief Valve (C)	Deaeration Valve Complete (D)
DN 10	1002267	7740147	914596	7744259
DN 15	792517	7744695	914596	7744260
DN 20	792518	7744248	914596	7744249
DN 25	740615	7744986	914596	7744987
DN 32	1020031	7745133	914596	7745134

DULCOMETER® Instrumentation

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“DULCOMETER® Instrumentation” T.O.C.

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ProMinent® D1C and D2C Analyzers

Overview: D1C and D2C

An Introduction to Process Measurement and Control

Process control in water treatment involves measurement of a variable related to water quality, combined with automation of chemical feed equipment or other physical/chemical processes to keep the measured value as close as possible to the desired setpoint or between high and low control limits.

ProMinent's approach combines the functions of an analyzer and a controller into one instrument, dedicated to a specific water quality parameter to simplify calibration and operation.

Each ProMinent DULCOTEST® sensor measures a specific water quality parameter and sends an electronic signal back to a DULCOMETER® controller. The operator calibrates that sensor to a known standard. It then displays any changes that are measured in that parameter within the sensor's range.

Measured Value Outputs

Up to two outputs are available. DULCOMETER® controllers offer the ability to continuously record measured values to document water quality or to send to another control device. Analog 4-20 mA or 0-20 mA measured value outputs are proportional to the measuring range of the sensor or spannable to provide greater detail within a smaller range, for connection to a chart recorder, datalogger or distributed control system [D1C/D2C controllers and DULCOMETER® transmitters (monitor only)]

Control Outputs

Different control outputs are available to control virtually any type of actuating device.

Setpoint relays change state (open or close contact) when the measured value drops below or exceeds the setpoint to start a process control device or alarm, and shut it off when the setpoint is reached (D1C or D2C).

Analog control outputs (4-20 or 0-20 mA) can drive a variable speed analog control device, such as a DC SCR drive or AC inverter, according to the control action used (D1C or D2C).

Pulse outputs are brief contact closures to pace pulse-input metering pumps corresponding to the control action used (D1C).

Modulating relay outputs cause a relay to open and close according to the control action used.

These are used with solenoid valves or constant-speed motor-

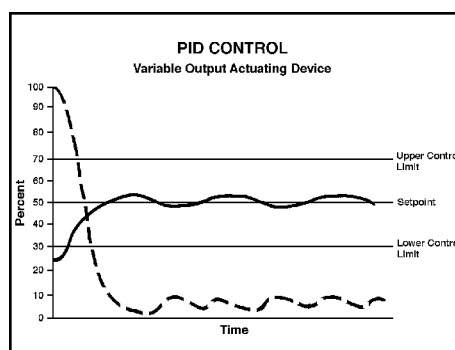
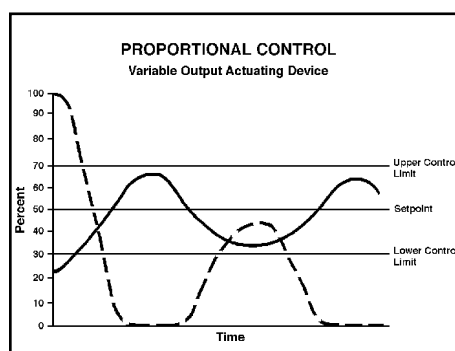
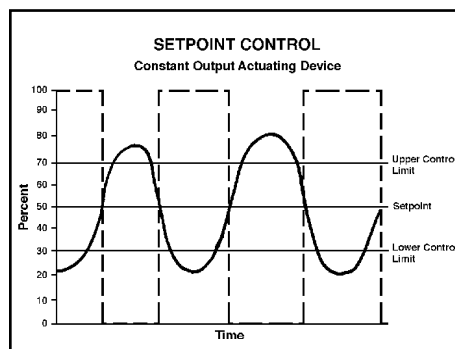
driven metering pumps. Minimum on-times may be set to prevent overheating of motors (D1C or D2C).

3P relays provide two relay outputs to control a bi-directional actuator (such as a stroke length controller on a metering pump) with provision for feedback potentiometer from the actuator to display the position according to the control action used (D1C or D2C).

CONTROL ACTION RESPONSE IN ONCE-THROUGH SYSTEMS

Note: Actuating device output increases measured value in example (e.g. chlorine feed)

— Measured value (as percent of measurement range)
- - - Actuating device output (as percent)



Control Actions

A variety of control actions are available to suit the application and budget. Any variable control output listed above may be used with any of the control actions listed below.

Setpoint Control

Setpoint control uses a setpoint relay to start a constant output pump or open a solenoid valve when the measured value drops below (or exceeds) the setpoint. Once the measured value reaches setpoint again, the pump stops or the valve closes. This always results in overshooting the setpoint because of the lag time between the point of chemical addition and the point of measurement. This can waste chemicals and cause excessive variation on either side of the setpoint. It is suited only for closed systems or batch applications where tight control is not required (D1C or D2C).

ProMinent® D1C and D2C Analyzers

Overview: D1C and D2C

Proportional Control

Proportional control gives an output that is directly proportional to the measured value's deviation from the setpoint. The farther from setpoint, the greater the output of the actuating device, and the closer to setpoint, the lesser the output. Proportional control is suitable for closed systems or batch applications where more precise control is required. The proportional bandwidth may be spanned to set the distance from setpoint at which the actuating device is operating at maximum output. A small bandwidth results in maximum output at a measured value close to setpoint, and may cause overshooting. A large bandwidth may result in long time periods required until the setpoint is reached (D1C or D2C).

PID Control

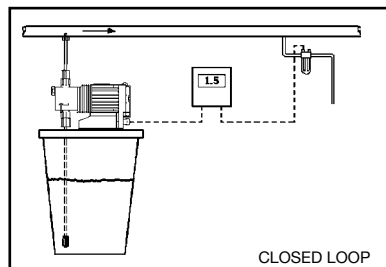
PID control combines proportional, integral and derivative control actions, or any combination thereof.

Integral control considers the time interval of deviation and increases output when the deviation exceeds a programmed time interval. Derivative control considers the rate of change of deviation and increases the output when the rate of deviation exceeds a programmed rate. PID control ensures the least deviation from setpoint possible (D1C, D2C).

Control Techniques

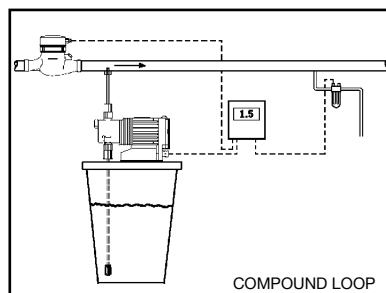
The control technique used depends on the location of the sensor in relation to the actuating device, the presence of other inputs which may effect the measured value, or the requirement for secondary actuating devices to handle large swings. Some common control techniques are described below.

Closed loop control is where the sensor is located downstream of the actuating device and measures changes caused by the device. The controller varies the device's output to maintain the desired setpoint. This is usually used in recirculating or batch applications,

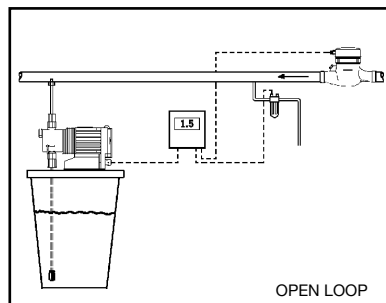


or once-through systems with constant flow rate. The sensor must be located far enough downstream to ensure that any physical/chemical changes are complete, whether measuring pH, oxidant residuals or other variables (D1C or D2C).

Compound loop control combines

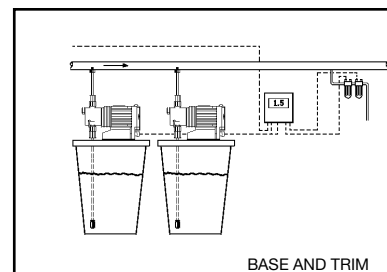


the closed loop signal from the sensor with a second (disturbance) input, normally water flow rate, and changes the actuating device's output in response to both variables. This is typically used in once-through applications with varying flow rates (D1C).



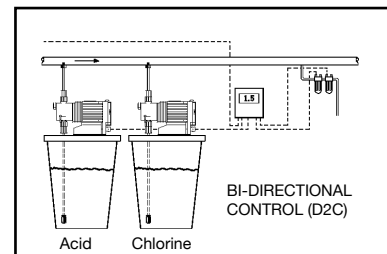
With open loop control, the sensor is upstream of the actuating device and a control signal changes the actuating device's output. Usually, this is only used when the resulting measured value would be outside of the sensor's measuring range (D1C or D2C).

Base and trim control uses two actuating devices to bring large fluctuations into control very quickly, yet provide tight control under normal operation. A variable output actuating device is normally used



with proportional or PID control for the trim or fine tuning. A constant output device would be started by a setpoint relay for the base load to make fast changes in the event of large fluctuations that the trim device cannot handle (D1C or D2C).

Bi-directional control of two opposing actuating devices, such as pumps for acid and base in a pH control application, is possible with one controller (D1C or D2C). To prevent repeated corrections caused by overshooting on both sides, a deadband may be programmed (between two setpoints) in which both actuating devices are stopped (D1C or D2C).



PROPORTIONAL CONTROL ONLY (BATCH LINE)

ProMinent® D1C and D2C Analyzers

Specifications

Temperature data (Panel Mount)

Permissible ambient temperature

Basic version:

Control panel installation: 32° to 122°F (0° to 50°C)
Installation in wall-mounted housing: 23° to 113°F (-5° to 45°C)

Extended version (with status feed-back or with correction value via mA or with disturbance variable via mA):

Control panel installation: 32° to 113°F (0° to 45°C)
Installation in wall-mounted housing: 23° to 104°F (-5° to 40°C)
Control panel installation: 14° to 158°F (-10° to 70°C)

Permissible storage temperature:

Material data/chemical resistance:

Part	Material
Housing and frame	PPO GF 10
Rear panel	PPE GF 20
Membrane keypad	Polyester film PET
Seal, outside	Cellular rubber CR
Seal, inside	Silicon-based sealing compound
Retaining clip and screws	Galvanized steel

Temperature data (Wall Mount)

Permissible ambient temperature

Basic version:

23° to 122°F (-5° to 50°C)
Installation in wall-mounted housing: 23° to 113°F (-5° to 45°C)

Extended version (with status feed-back or with correction value via mA or with disturbance variable via mA):

23° to 104°F (-5° to 40°C)
14° to 158°F (-10° to 70°C)

Permissible storage temperature:

Material data/chemical resistance:

Part	Material
Housing	Luranyl PPE GF 10
Membrane keypad	Polyester film PET
Housing seal	Cellular rubber CR
Outer seal	Cellular rubber CR
Retaining bracket	Galvanized steel
M5 screws	A2

Standards:

Supply voltage in accordance with DIN IEC 38
Electrical safety in accordance with EN 61010-1
Electromagnetic emitted interference in accordance with EN 55011 Gr.1/C1.A
CSA special inspection

Electrical data:

Rated voltage: Max. power input:

Panel Mount

115/230 VAC, 50/60 Hz
140 mA at 115 V
70 mA at 230 V

Wall Mount

115/230 VAC, 50/60 Hz
120 mA at 115 V
60 mA at 230 V

Internal fuse protection:

Fine-wire fuse 5 x 20 mm
250 V slow-blow
100-115 V = 315 mA
200-230 V = 160 mA

Fine-wire fuse 5 x 20 mm
250 V slow-blow
100-115 V = 315 mA
200-230 V = 160 mA

Rated voltage: Max. power input:

100/200 VAC, 50/60 Hz
150 mA at 100 V
75 mA at 200 V

Internal fuse protection:

Fine-wire fuse 5 x 20 mm
250V slow-blow
100-115 V = 315 mA
200-230 V = 160 mA

Electrical data for both wall mount and panel mount D1C's

Rated voltage: Internal fuse protection:

24 VDC or 24 VAC, 50/60 Hz (low voltage operation only)
Fine-wire fuse 5 x 20 mm
250 V slow-blow, 100-115 V = 315 mA, 200-230 V = 160 mA

ProMinent® D1C and D2C Analyzers

Specifications

product overview	Sensor input via SN6 socket:	Input impedance: $> 10^{12} \text{ W}$ Input impedance with reference electrode with respect to: Device ground: $< 1 \text{ kW}$ Input range: $\pm 1 \text{ V}$ Accuracy: $\pm 0.5\%$ of input range Resolution: 0.0625% of input range Connection facility for one potential equalization electrode (solution ground). As an alternative, two connection terminals can be connected with a wire jumper.
	Sensor input via terminals:	Input impedance: $> 5 \times 10^{11} \text{ W}$ Input impedance with reference electrode with respect to: Device ground: $< 1 \text{ kW}$ Input range: $\pm 1 \text{ V}$ Accuracy: $\pm 0.5\%$ of input range Resolution: 0.0625% of input range Connection facility for one potential equalization electrode (solution ground). As an alternative, two connection terminals can be connected with a wire jumper.
	Standard signal input for measured variable:	Input range: $0/4 \dots 20 \text{ mA}$ (programmable) Input impedance: 50 W (Panel Mount) and (Wall Mount) Accuracy: 0.5% of input range Resolution: $0.014/0.012 \text{ mA}$ Supply voltage and current for external electronics: $20 \text{ V} \pm 0.5 \text{ V}$, 20 mA
	Standard signal input for correction measured value or disturbance variable mA:	Galvanically isolated from remaining inputs and outputs Insulation voltage: 500 V Input range: $0/4 \dots 20 \text{ mA}$ (programmable) Input resistance: 50 W Accuracy: 0.5% of input range Resolution: $0.014/0.012 \text{ mA}$ Supply voltage and current for external electronics: $23 \text{ V} \pm 1 \text{ V}$, 20 mA (Panel) $19 \text{ V} \pm 1.5 \text{ V}$, 20 mA (Wall)
	Pt100 input:	Input range: $32^\circ \text{ to } 212^\circ \text{ F}$ ($0^\circ \text{ to } 100^\circ \text{ C}$) Accuracy: $\pm 0.5^\circ \text{ C}$ Resolution: 0.1° C
	Digital inputs:	Common reference potential with respect to each other and with the RS 232 interface, but galvanically isolated from remaining inputs and outputs Insulation voltage: 500 V (Wall Mount only) Disturbance variable: Up to 10 Hz or up to 500 Hz (as per identity code/programmable)
	Status signaling input:	Galvanically isolated from remaining inputs and outputs Insulation voltage: 500 V Potentiometer to be connected: $800 \text{ W} \dots 10 \text{ kW}$ Accuracy (without potentiometer error): 1% of input range Resolution: 0.5% of input range
	Current output:	Galvanically isolated from remaining inputs and outputs Insulation voltage: 500 V (Wall Mount only) Output range: $0/4 \dots 20 \text{ mA}$ (programmable) Maximum load: 600 W Accuracy: 0.5% of output range with respect to displayed value
	Frequency outputs (Reed relay)	Type of contact: n/o contact, interference suppressed with varistors Load capacity: 100 V peak , $0.5 \text{ A switching current}$ (Panel Mount) 25 V peak , $0.5 \text{ A switching current}$ (Wall Mount)
	for pump control:	Contact service life: $> 50 \times 10^6$ switching operations at contact load 10 V , 10 mA Max. frequency: 8.33 Hz (500 strokes/min) Closing time: 100 ms
solenoid-driven metering pumps	Power relay output for alarm signaling:	Type of contact: Changeover contact, interference suppressed with varistors Load capacity: 250 VAC , 3 A , 700 VA Contact service life: $> 50 \times 10^6$ switching operations (Panel Mount) $> 20 \times 10^6$ switching operations (Wall Mount)

ProMinent® D1C and D2C Analyzers

Specifications

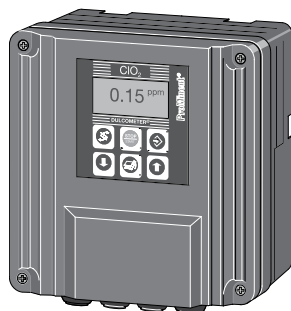
<i>Power relay output</i>	Type of contact:	n/o contact, interference suppressed with varistors
<i>for control variable output</i>	Load capacity:	250 VAC, 3 A, 700 VA
<i>or limit value signaling:</i>	Contact service life:	>20 x 10 ⁶ switching operations

Electrotechnical Safety/Radio Interference Protection:

	EC low voltage directive (73/23/EEC) subsequently 93/44/EEC
	EC EMC directive (89/336/EEC) subsequently 92/31/EEC
	Supply voltage in accordance with DIN IEC 38
	Electrical safety in accordance with EN 61010-1
	Electromagnetic emitted interference in accordance with EN 55011 Gr. 1/CI B
	Noise immunity in accordance with IEC 801-2, -3, -4 or DIN VDE 0843, Part 2, Part 3, Part 4 or EN 50082-2
EN 60335-1:	Safety of electrical devices for domestic use
EN 50081-1:	EMC, emitted interference, residential
EN 50082-2:	EMC, noise immunity, industrial
EN 60555-2:	EMC, reactions in power supply networks, harmonics
EN 60555-3:	EMC, reactions in power supply networks, voltage fluctuations

ProMinent® D1C and D2C Analyzers

Technical Data



Wall Mount



Panel Mount

Measurement range:

Type of connection mV:

pH 0.00 ... 14.00

ORP +1000 mV

Type of connection mA:

Chlorine: 0.00...0.500/2.00/5.00/10.0/20.0/50.0/100.0 ppm

Chlorine dioxide: 0.00...0.500/2.00/10.0/20.0 ppm

Chlorite: 0.02...0.50/0.1...2 ppm

Bromine: 0.02...2.0/0.1...10.0 ppm

Ozone: 0.00...2,00 ppm

Hydrogen peroxide, sensor PER1: 2.0...200.0/20...2,000 ppm

Hydrogen peroxide, sensor PEROX: 0...20/200/2,000 ppm, 1 vol.%

Peracetic acid: 1...20/10...200/100...2,000 ppm

Dissolved oxygen: 0.1...10/0.1...20 ppm

pH: 0.00...14.00

ORP: 0...+1000 mV

Conductivity: 0...20/200/1,000 mS/cm

Resolution:

pH: 0.01 pH / ORP: 1 mV

Amperometric 0.001/0.01 ppm/l/0.1 %

Accuracy:

0.5 % from measurement range

Measurement input:

SN6 (input resistance > 0.5 x 10¹² Ω)

Correction variable:

pH (Cl₂ version only)

Temperature via Pt 100 (pH and conductivity only)

Correction range temp.:

50 - 113 °F (10 - 45°C) (pH and conductivity only)

Correction range pH:

7.0 - 8.5 pH (ClO₂ version only)

Disturbance signals:

Additive/multiplicative

Control characteristic:

P/PID control

Control:

2-way control

Signal current output:

1 x electrically isolated 0/4-20 mA

max. load 450 Ω

Adjustable range and direction (measured, correction and control variable)

Control outputs:

2 reed contacts (pulse rate, for pump control)

2 relays (pulse length, 3P or limit value)

1 x 0/4-20 mA

Alarm relay:

250 V~3 A, 700 VA changeover contact

Power supply:

90 - 253 V, 50/60 Hz

Ambient temperature:

Wall mounted: 23 - 122°F (-5 - 50°C)

Mounting

- **Wall mount:** Nonmetallic enclosure with protective gland-style strain relief cable sockets

Dimensions: 7.79"H x 7.87"W x 3.00"D (198 mm x 200 mm x 76 mm)

Weight: Approx. 2.6 lbs. (1.2 kg) Shipping Weight: 4.4 lbs. (2.0 kg)

Mounting: Detachable wall mount bracket

Protection class: NEMA 4X (IP 65)

- **Panel mount:**

Dimensions: 3.78"H x 3.78"W x 5.70"D (96 mm x 96 mm x 145 mm)

Protection class: NEMA 3 (IP 54) when mounted in panel

ProMinent® D1C and D2C Analyzers

Typical Applications

pH - Control acid and/or base feed via metering pumps or valves to adjust pH

ORP - Control hypochlorite metering pump to maintain oxidant residual; or control sulfonator or bisulfite metering pump for dechlorination

Free Chlorine - Control chlorination or hypochlorite metering pump to maintain residual

Total Chlorine - Control chlorination or hypochlorite metering pump to maintain residual; or control sulfonator or bisulfite metering pump for dechlorination

Bromine - Control tablet brominator via solenoid valve; or bromine solution metering pump to maintain residual

Conductivity - Control conductivity through valve on blowdown/makeup for rinse bath, boiler or cooling tower

Dissolved Ozone - Control ozone generator output to maintain residual

Dissolved Oxygen - Control aeration units to limit energy usage or for nitrification/denitrification

Chlorite - Control chlorite as a by-product of the chlorine dioxide process

Fluoride - Monitor fluoride concentration in potable water

Chlorine Dioxide - Control chlorine dioxide generator output to maintain residual

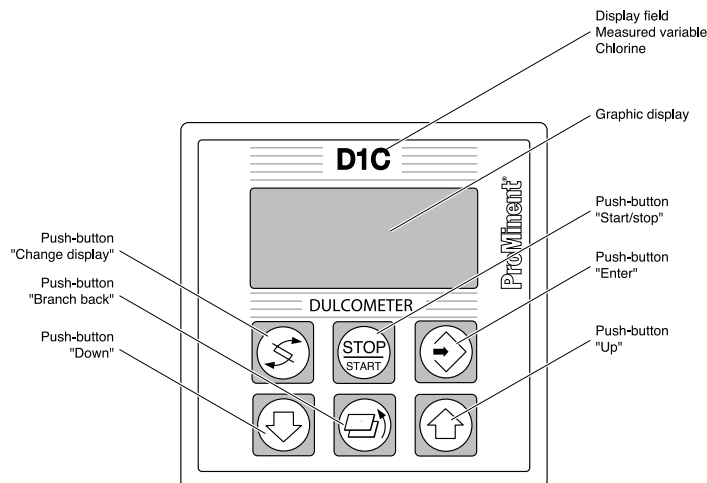
Temperature - Control heater or heat exchanger to maintain bath temperature or process cooling

Analog Signal Inputs - Control virtually any measureable and adjustable process where the measuring device has an analog output and the adjusting device may be controlled by one of the D1C's available control outputs

Peracetic Acid - Monitor or control concentration to ensure disinfection

Hydrogen Peroxide - Control peroxide metering pump for oxidation or advanced oxidation (AOX) systems

User Interface



	CHANGE DISPLAY menu button To change over within a menu level and to change from one variable to another within a menu point.
	START/STOP menu button Start/stop of control and metering function.
	ENTER menu button To accept, confirm or save a displayed value or status. For alarm acknowledgement.

	UP menu button To increase a displayed numerical value and to change variables (flashing display)
	BRANCH BACK menu button To exit operating menu (back to start of relevant setting).
	DOWN menu button To decrease a displayed numerical value and to change variables (flashing display).

ProMinent® D1C and D2C Analyzers

Identcode Overview (D1C/ D2C)

NOTE: OPTIONS ARE NOT IDENTICAL FOR THE D1C / D2C CONTROLLERS. REFER TO THE IDENTITY CODE.

SERIES:

D1C = Single variable controller

D2C = Dual variable controller

SERIES VERSION:

A = Standard

MOUNTING:

W = Wall mount enclosed in NEMA 4X non-metallic housing. Includes detachable mounting plate in back to allow easy removal from wall. Features five Pg11 and five Pg7 glands for wiring power cord, relays, SN6 connectors, etc.

D = Panel mount (no enclosure). Fits 3.78" x 3.78" (9.6 cm x 9.6 cm) opening, 5.70" (145 mm) depth. The unit must be mounted in an enclosure suitable for the environment. The controllers's membrane switch face and gasketed frame provide NEMA 3 (IP 54) protection; mounting hardware included. For optional wall mount enclosure for the panel mount controller, see PN 790235.

OPERATING VOLTAGE:

0 = 230 VAC, 50/60 Hz, 1 phase

1 = 115 VAC, 50/60 Hz, 1 phase

4 = 24 V AC/DC

Note: Power cord not included with unit. For 115 V US power cord, see PN 741203.

D1C MEASURED VARIABLES:

P = pH: For wall mount, use connection 2 (SN6) for push-and-twist connectors with pH sensors. For panel mount, use terminal connection 5 for same sensors. For distances between 30 and 300 feet from sensor to controller, add impedance converter, PN 305350. For distances > 300 feet from sensor to controller or with stray currents, use connection 1 with signal converter pH-V1 (PN 809126) giving 4-20 mA output.

R = Oxidation Reduction Potential: For wall mount, use connection 2 (SN6) for push-and-twist connectors with ORP sensors. For panel mount, use terminal connection 5 for same sensors. For distances between 30 and 300 feet from sensor to D1C, add impedance converter, PN 305350. For distances > 300 feet from sensor to D1C or with stray currents, use connection 1 with signal converter RH-V1 (PN 809127) giving 4-20 mA output.

C = Chlorine; use connection 1. For free chlorine (hypochlorous acid) measurement, use CLE-3-mA sensors. See "correcting value" for optional pH correction on free chlorine. For total chlorine, use CTE-mA sensors.

B = Bromine; use connection 1 and bromine BRE 1-mA-10 ppm sensor.

L = Conductivity; use connection 1 for conductivity cells with transducer giving 4-20 mA output. Use connection 3 for standard conductivity cells.

Z = Ozone; use connection 1 and OZE 3-mA-2 ppm sensor.

X = Dissolved Oxygen; Use connection 1 and DO1-mA-20 ppm sensor.

D = Chlorine Dioxide; use connection 1 and CDE 2-mA - 0.5 ppm, 2 ppm or 10 ppm sensors, or the CDP with PT 100.

S = Standard signal 0/4-20 mA. Use connection 1 with any measuring device that outputs a 0-20 or 4-20 mA signal corresponding to the measured value. Display is as a percent of input current.

A = Peracetic Acid; use connection 1 with PAA transducer (PN 741128).

H = Hydrogen Peroxide; use connection 1 with Perox transducer (PN 741129).

F = Fluoride; SN6 with transducer and connection 1

I = Chlorite; use connection 1

D2C MEASURED VARIABLES:

PC = pH/chlorine: See above descriptions for each variable.

PR = pH/Oxidation Reduction Potential: See above descriptions for each variable. (Requires Signal Converter PN 809127)

PP = pH/pH: See above descriptions for each variable. (Requires Signal Converter PN 809126) Variable 1 can be controlled, Variable 2 is for monitoring.

CC = Free Chlorine/Total chlorine: See above descriptions for each variable.

PD = pH/chlorine dioxide: See above descriptions for each variable. (Requires Signal Converter PN 809126) Variable 1 can be controlled, Variable 2 is for monitoring.

CONNECTION FOR SENSOR INPUT (FOR VARIABLE 1 CONNECTION ON D2C CONTROLLERS):

1 = Standard signal 0/4-20 mA

2 = SN6 plug connector for pH (P) or ORP (R). Usually, this is only used with the wall mount since SN6 plugs cannot pass through cable glands on a panel mount enclosure.

3 = Terminal for standard conductivity cell (L)

4 = Terminal for PT 100 temperature sensor (T)

5 = Terminal for mV input on standard pH (P) or ORP (R) sensors

CORRECTING VALUE:

0 = None

1 = pH for free chlorine (total chlorine does not require pH correction); corrects CLE sensor's hypochlorous acid (HOCl) measurement by chlorine dissociation curve to display free chlorine (HOCl + OCl⁻). The correcting pH input must be a 4-20 mA signal, requiring signal converter PH-V1 (PN 809126).

2 = Temperature for P or L via terminal for PT-100 sensor. Required for accurate pH measurement when operating at extreme pH values and high temperatures. Required for accurate conductivity measurement at varied temperatures. (Temperature monitoring only for other variables)

3 = Temperature for P or L via 0/4-20 mA signal; used with signal converter PT-100-V1 (PN 809128) and PT-100 sensor. Feed Forward control is not possible with this option. (Temperature monitoring only for other variables)

4 = Manual temperature entry for P or L (no sensor); used where temperature is constant.

ProMinent® D1C and D2C Analyzers

Identcode Overview (D1C/ D2C)

FEED FORWARD CONTROL - The D1C's control output is based on measured value; however, with feed forward control, a signal from a flow meter proportions the control output considering both the measured value and process flow rate. This eliminates the need for both variable speed drives and stroke positioners on compound loop control metering pumps. Several types of signals may be accepted proportional to process flow:

0 = None

1 = 0/4-20 mA signal (such as from a magmeter or open channel flow meter) Note: cannot be used for chlorine measurement with pH compensation (D1C)

2 = 0-500 Hz signal (such as from a paddlewheel sensor)

3 = 0-10 Hz (0-600 pulses/min.) signal (such as from a pulse-type water meter)

PAUSE CONTACT - The pause contact allows the controller to continue monitoring measured value, but stops control outputs when the NC contact is opened. This may be used to stop metering when a main water pump is stopped, or when water flow in the sample line to the sensor is blocked as signaled by the DGMa rotameter:

0 = None (D1C); Pause contact (D2C)

1 = Pause contact (D1C)

ANALOG OUTPUTS (0/4-20 mA) - Analog outputs can be programmed as a control output or a measured value output for recording. Up to 2 analog outputs are possible except for Hydrogen Peroxide and Peracetic Acid controllers.

0 = None

1 = Measured value; normally used for chart recorder, datalogger or DCS.

2 = Control action; normally used to control a variable speed drive or actuator.

3 = Measured correcting value; normally used for recording or as input to a second D1C.

4 = Two current outputs (Not for measured variables A and H)

RELAY OUTPUTS:

G = Alarm + 2 limit relays: limits may be on either side of setpoint, or both limits may alarm on one side, such as low limit and low, low limit. May be used to start a constant rate feeder for simple setpoint control, or a baseline feeder to handle large swings with trim pump on the control output.

M = Alarm + 2 control relays: used to start and stop constant speed pumps or to open and close solenoid valves for opposing functions. Modulating output corresponds to the control action selected (proportional or PID). The minimum "on-time" period may be adjusted from 1 to 9,999 seconds.

R = Alarm + 2 positioner relays with positioner feedback from 1 kOhm feedback potentiometer. Positioner status displayed on LCD. Used for ProMinent 3P stroke positioning motors or valve positioners. Output corresponds to the control action selected (proportional or PID).

PUMP PACING - gives pulse outputs for controlling 1 or 2 metering pumps:

0 = None

2 = Outputs for one or two pulse-control metering pumps (spannable from 0-500 pulses per minute); for opposing functions. Pulse (dry contact) output corresponds to the control action selected (proportional or PID).

CONTROL ACTION:

0 = None; for use as monitor or setpoint relay controller only.

1 = Proportional control; used for batch processes, where output signal is proportional to the measured variable such that the farther from setpoint the greater the output; the closer to setpoint the lesser the output.

2 = PID control; used for once-through or difficult to control processes, providing proportional, integral and derivative control actions, or a combination thereof.

INTERFACE:

0 = None

LANGUAGE - Note that it is possible to change among other languages in the field, as indicated in parentheses:

†E = English (D, F, N)

†D = German (E, F, N)

†F = French (D, E, N)

H = German (F, I, S)

S = Spanish (D, I, F)

I = Italian (D, F, S)

Call for other available languages.

†Languages available for measured variables A and H

NOTE: Power cord not included.

Power cord, 6 ft. (2 m) 115 VAC
PN - 741203

Power cord, 6 ft. (2 m) 230 VAC
PN - 7724015

ProMinent® D1C and D2C Analyzers

Identcode Ordering System D1C (Version a)

D1C	Series											
	A											
	Type of Mounting:											
	W Wall Mount											
	D Panel Mount											
	Operating Voltage:											
	0 230 V, 50/60 Hz											
	1 115 V, 50/60 Hz											
	4 24 V AC/DC											
	Measured Variables:											
	0 None											
	A Peracetic acid											
	B Bromine											
	C Chlorine											
	D Chlorine dioxide											
	F Fluoride											
	H Hydrogen peroxide											
	L Conductivity											
	I Chlorite											
	P pH											
	R ORP (Redox)											
	S 0/4-20 mA norm signal											
	X Dissolved oxygen											
	Z Ozone											
	Connection for Sensor Input:											
	1 Standard signal 0/4-20 mA, all measured variables											
	2 SN6 plug (mounting type "W" only)											
	3 Terminal for standard conductivity cell (L)											
	4 Terminal for PT 100 temperature sensor											
	5 Terminal for mV signal (From pH or ORP sensor cable)											
	6 Terminal for inductive conductivity sensors											
	7 Standard signal 0/4-20 mA (for PAA and H2O2 25mm sensors)											
	Correcting variable: (Not available for measured variables A&H)											
	0 None											
	1 pH for free chlorine via 4-20 mA signal											
	2 Temperature correction terminal for P or L (Temp. For all other variables)											
	3 Temperature correction terminal for 4-20 mA signal for P&L (Temp. For all other variables)											
	4 Manual temperature input for P&L											
	Feed forward control:											
	0 None											
	1 4-20 mA signal											
	2 0-500 Hz signal											
	3 0-10 Hz signal											
	Pause contact:											
	0 None											
	1 Pause contact											
	Analog signal output (0/4-20 mA):											
	0 None											
	1 Measured value											
	2 Control action											
	3 Measured correcting value											
	4 Two current outputs											
	Relay Outputs:											
	G Alarm and 2 limit relays											
	M Alarm and 2 control relays											
	R Alarm and positioner relays w/ position feedback potentiometer											
	Pump pacing:											
	0 None											
	2 Two pulse control outputs											
	Control Action:											
	0 None											
	Language:											
	00 Language neutral											
D1C	B	W	6	0	1	0	0	0	0	G	0	00

ProMinent® D1C and D2C Analyzers

Identcode Ordering System D1C (Version b & c)

D1C Series	
B	Wall mount version
C	Panel mount version
Type of Mounting:	
W	Wall mounting (IP 65, D1Cb only)
D	Panel mounting (IP 54, D1Cc only)
Execution:	
00	w/h LCD + keypad, w/h PM - Logo
Operating Voltage:	
6	90 - 253 VAC 50/60 Hz
4	24 V AC/DC (only D1Cc)
Approvals:	
01	CE approval
Hardware add-on I:	
0	None
Hardware add-on II:	
0	None
1	RC protection for power relays (only D1Cb)
External connection:	
0	None
Preset software functions:	
V	Preset software functions
Measured Variables:	
0	None
A	Peracetic acid
B	Bromine
C	Chlorine
D	Chlorine dioxide
F	Fluoride
H	Hydrogen peroxide
L	Conductivity via mA transducer
I	Chlorite
P	pH
R	ORP (Redox)
S	0/4-20 mA norm signal
X	Dissolved oxygen
Z	Ozone
T	Temperature via mA transducer
*Must include signal converter (pn. 809128)	
Connection of measured variable:	
1	Standard signal 0/4-20 mA, all measured variables
2	SN6 plug (mounting type "W" D1Cb only)
5	mV input for pH/redox via guard terminal
Correction variable:	
0	None
2	Temperature Pt 100 / Pt 1000 (pH/conductivity)
4	Manual temperature input (pH/conductivity)
Control inputs:	
0	None
1	Pause
Signal Output	
0	None (Standard)
1	4-20 analog output
Relay Outputs:	
G	Alarm and 2 limit relays or 2 timer relays
M	Alarm and 2 limit relays or 2 relays
Pump pacing:	
0	No pumps
2	Two pumps
Control Action:	
0	None
1	Proportional control
2	PID control
Language:	
00	Language neutral
D1C	B W 00 6 01 0 0 0 0 V 0 1 0 0 0 0 G 0 0 00

ProMinent® D1C and D2C Analyzers

Identcode Ordering System (D2C)

D2C Series Version:													
D2C	A	Standard	Type of mounting:										
			W	Wall mounting (IP 65)									
			D	Panel mounting (IP 65)									
			Operating voltage:										
			0	230 V, 50/60 Hz		NOTE: Power cord not included with unit. For 115 V US & Canada power cord, see PN. 741203							
			1	115 V, 50/60 Hz									
			4	24 V AC/DC									
			Measured variables:										
			PC	pH/chlorine									
			PR	pH/redox									
			PP	pH/pH									
			CC	Free chlorine/Total chlorine									
			PD	pH/chlorine dioxide									
			Connection for sensor input:										
			1	Standard signal 0/4-20 mA									
			2	SN6 plug (From pH or ORP sensor cable)									
			5	Terminal for mV signal (From pH or ORP sensor cable)									
			Correcting value:										
			0	None									
			2	Temperature for P via terminal (Pt 100) for pH only									
			4	Manual temperature setting for P or L									
			Pause contact:										
			0	None									
			Analog signal output:										
			0	None									
			4	2 Programmable 0/4-20 mA standard signal outputs									
			Relay outputs:										
			G	Alarm + 2 limit relays									
			M	Alarm + 2 solenoid valve relay (pulse length control)									
			Control action:										
			1	Proportional control									
			2	PID control									
			Interface:										
			0	None									
			Language: (Other languages available)										
			E	English									
			D2C	A	W	0	PC	1	0	0	0	G	1

ProMinent® D1C and D2C Analyzers

Fluoride Monitoring System

The D1C fluoride monitoring system incorporates the first buffer or reagent-free, ion specific sensor with a DULCOMETER® D1C fluoride monitor. The monitor features upper and lower limit relays with alarm, and analog output for recording.

Note: The fluoride D1C is for monitoring only.

Measuring Principle & Application

The D1C fluoride monitoring system is based on the principles of potentiometric measuring using a reagent-free, ion specific sensor & reference electrode. The fluoride sensor features a continuous electrode activation function, ensuring long-term stability of the measurement without the need for frequent recalibration or conditioning chemicals. The fluoride sensor automatically compensates temperature, but a temperature sensor is also used to compensate for fluctuation during application.

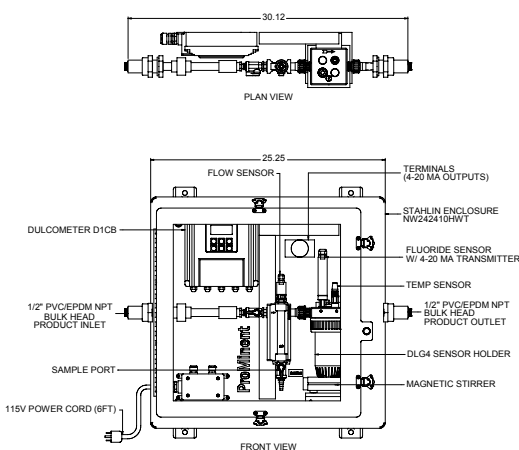
The fluoride sensor is recommended for use in water treatment only (patent pending). We recommend installation at atmospheric pressure.

Measuring Ranges & Operating Conditions of Fluoride Sensor

Measurement Range:	0.05 to 10 ppm fluoride
pH Operating Range:	5.5 to 8.5
Temperature Range:	34 to 95°F (1 to 35°C)
Max. Operating Pressure:	101.5 psi (7 bar) Note: the maximum admissible operating pressure for the monitoring system is 14.5 psi (1 bar) determined by the in-line sensor housing.
Sensor Response Rate T₉₀:	approx. 30 seconds
Reproducible Measuring Accuracy:	0.1 ppm
Measurement Water Flow Rate:	16 gph (60 L/h)

Fluoride Monitoring System

Part No.
7744836



- D1C Fluoride Monitor
- Fluoride sensor: FLE 010 SE with PG 13.5 male threaded connector & SN6 plug
- Reference electrode REFP-SE with PG 13.5 male connector & SN6 plug
- Temperature sensor: PT 100 SE with PG 13.5 connector & SN6 plug
- 4-20 mA Measurement transducer: FV1 for connection to fluoride monitor & reference electrode
- DLG IV In-line sensor housing: with PG 13.5 threaded connector
- Sample outlet
- Magnetic stirrer and magnet
- PVC piping with ball stop/adjusting valve, rotameter with limit contact, sampling tap
- Sample inlet
- 115V Power cord, connectors from monitor to sensors
- PP Backpanel

Options

Stand Base	7744837
NEMA 4X enclosed	7744711
Heater	7744722
Sun shield	7744723

ProMinent® D1C and D2C Analyzers

Fluoride Monitoring System Accessories

Replacement Sensors

FLEP 010 Fluoride Sensor with PG 13.5 male threaded connector and SN6 plug	1028279
REFP-SE Reference Electrode with PG 13.5 male connector and SN6 plug	1018458
PT 100 SE Temperature Sensor with PG 13.5 male connector and SN6 plug	305063
FPV1 4-20 mA Measurement Transducer for connection to fluoride monitor and reference electrode	1028280

Fluoride Photometer

The D2TA or D2TB Photometer (see page 229) can be used to calibrate the fluoride monitor.

Measurement Range:	DT2A	0.05 to 2 mg/L fluoride
	DT2B	0.05 to 2 mg/L fluoride
		0.05 to 6 mg/L free or total chlorine
		0.01 to 11 mg/L chlorine dioxide

D2TA kit with carry case	1010383
D2TB kit with carry case	1010394

ProMinent® D1C and D2C Analyzers

Overview: Hydrogen Peroxide and Peracetic Acid

Measuring principle

The Perox measuring systems are based on amperometric/potentiostatic measuring principles incorporating several special features compared to conventional measuring technologies. The platinum [hydrogen peroxide (H_2O_2) measurement] or gold (peracetic acid measurement) working electrode with a small surface area is covered by a microporous membrane cap to achieve a degree of selectivity and independence from flow influences. The entire stainless steel shaft of the Perox sensor serves as the counter-electrode. This represents the complete sensor section for H_2O_2 measurement; a reference pH electrode is also required for peracetic acid measurement.

A special, continuous electrode activation facility which represents the actual know-how, ensures long-term stability of the measurement without the need for frequent recalibration.

Since all amperometric measure-

ment methods are relatively dependent of temperature, we recommend additional temperature compensation with the Pt 100 sensor if temperature fluctuations occur during applications. With the Pt 100, H_2O_2 measurement is a 2-electrode system while peracetic acid measurement is based on a 3-electrode system.

Applications

The environmentally-friendly substance hydrogen peroxide is used to an increasing extent in process control applications as an oxidizing or reduction agent. Examples of applications where continuous Perox H_2O_2 measurement control is used either alone or in advanced oxidation systems (with ozone, UV or Fenton's reagent) are:

- Odor control scrubbers
- Ground water purification
- Drinking water oxidation
- Utility water/cooling water disinfection
- Dechlorination, e.g. in chemical

processes

- Landfill leachate treatment
- Biotechnology
- Vat dying/textile industry
- Swimming pool water disinfection

Peracetic acid as a disinfectant is used in the following industries:

- Food and beverage
- Cosmetics
- Pharmaceuticals
- Medicine

Continuous measurement and control is necessary wherever more demanding requirements are made with regard to disinfection and quality assurance.

Increasing the peracetic acid concentration in CIP processes as well as concentration control in bottle cleaning machines are typical applications of Perox peracetic acid measurement.

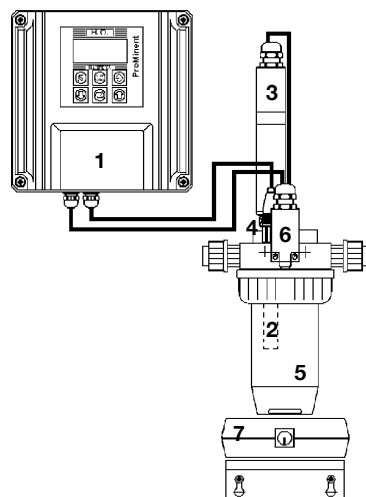
Operating conditions

Measuring ranges and applications	H ₂ O ₂	Peracetic acid
Measuring range (selectable) mg/l	1 - 20 / 10 - 200 / 100 - 2000	10 - 200 / 100 - 2000
pH range	pH 2.5 - 10	pH 1 - 8
Temperature range	32 - 104°F (0 - 40°C)	41 - 95°F (5 - 35°C)
Permissible changes in temperature	less than 0.9°F (0.5°C) per minute	
Sensor response rate T_{90} approx.	20 seconds	2 minutes
Reproducible measuring accuracy	better than 2% referred to end value of measuring range	
Min. conductivity of measurement solution at:		
measuring range 20 mg/L	50 µS/cm	-
measuring range 200 mg/L	200 µS/cm	500 µS/cm
up to 1000 mg/L	500 µS/cm	2000 µS/cm
up to 2000 mg/L	1000 µS/cm	4000 µS/cm
Measurement water flow rate	recommended 16 gph (60 L/h)	
Max. operating pressure	29 psig (2 bar)	

Depending on the application, other parameters or water constituents may be of significance. For instance, higher concentrations of surface-active substances, such as fats or tensides, or suspended solids can have a detrimental effect on the measurement.

ProMinent® D1C and D2C Analyzers

Hydrogen Peroxide Analyzers

Recommended Hydrogen Peroxide System
(descriptions follow)

Part No.

1 D1C H ₂ O ₂ Controller (1)	
1 Hydrogen Peroxide Sensor: H 2.10 P, complete with membrane cap (2)	792976
1 Perox signal converter: Perox-micro-H 1.20-mA (3)	741129
1 Connection between Perox signal converter and limit sensor Three-wire cable, priced per foot (specify length)	791948
1 Temperature Sensor: Pt 100 SE (4)	305063
1 Connection between the temperature sensor and the controller: (Based on distance between the controller and temperature sensor)	
Up to 30 ft. SN6 open end cable 6 ft. (2 m) long	305030
15 ft. (5 m) long	305039
30 ft. (10 m) long	305040
Over 30 ft. Signal converter 4-20 mA Pt 100 V1	809128
Two-wire cable - priced per foot (specify length)	7740215
1 DLG-PER In-line sensor housing (5) (includes limit sensor with 2 n/o contacts) (6)	1000165
1 Connection between the limit switch on the DLG-PER and the controller: Two-wire cable - priced per foot (specify length)	7740215
1 Magnetic stirrer 115 VAC (7)	7790915
1 Stirrer Magnet	7790916
1 Compact stand (PE, UV protected, black)	7740000
1 Power Cord, 6 ft.	741203

Accessories:

Replacement membrane cap: M 2.0 P for H ₂ O ₂ sensor	792978
Polishing paste for sensor, 3 oz. (90 g) tube	559810

Note: We can also provide measuring and control instruments mounted and wired, e.g. on PVC board or in a control cabinet. See PCM Systems in Feed & Control Packages section.

Sensors: Hydrogen Peroxide Measurement

The H₂O₂ sensor shaft is made of stainless steel (counter and reference electrode) with a platinum working electrode. Installation length 4.7" (120 mm), 0.5" (12 mm) Ø, PG 13.5 internal thread and SN6 plug connection.

H 2.10 P, complete with membrane cap	792976
--------------------------------------	--------

Temperature sensor Pt 100 for temperature compensation of H₂O₂ measurement; necessary when temperature fluctuations can occur in the measurement medium.

Pt 100 SE	305063
-----------	--------

A coaxial measuring line with an SN6 connector is required for direct connection of a temperature sensor:

SN6 open end 6 ft. (2 m) long	305030
SN6 open end 15 ft. (5 m) long	305039
SN6 open end 30 ft. (10 m) long	305040

When distances between the measuring unit and sensor exceed 30 ft. (10 m), it is recommended to use a temperature signal converter which transmits the temperature signal via a 2-wire connection at 4-20 mA. Temperature compensation input should be taken into consideration when selecting the D1C-Perox controller from the identity code.

Signal converter 4-20 mA Pt 100 V1	809128
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Two-wire cable for connection between point-of-use signal converter 4-20 mA and controller - priced per foot (specify length).	7740215
--	---------

ProMinent® D1C and D2C Analyzers

Hydrogen Peroxide Analyzers

Perox Signal Converter

The signal converter controls and activates the hydrogen peroxide sensor and evaluates the sensor signal. It is screw-mounted directly on the head of the sensor.

The signal converter has a length of approx. 8.1" (205 mm) and a 1.25" (32 mm) Ø.

Signal converter for H₂O₂ measurement

A changeover switch for the three measuring ranges 1 - 20, 10 - 200 and 100 - 2000 mg/L H₂O₂ is located on the inside.

Part No.

Perox-micro-H 1.20-mA

741129

In-line Sensor Housing

The DLG-PER in-line sensor housing must be used for hydrogen peroxide measurement where all (max. 3) individual sensors are installed in a measuring cup. A limit sensor must also be used which switches off the power supply for the signal converter when the measuring cup is removed. The DLG-PER in-line sensor housing features a body made of rigid PVC with a transparent polyamide cup and measurement water connection with 1/2" MNPT fittings.

DLG-PER In-line sensor housing
(includes limit sensor with 2 n/o contacts)

1000165

Two-wire cable for connection between the limit switch on the DLG-PER
and the controller - priced per foot (specify length)

7740215

For calibration of the DLG-PER in-line sensor housing, we recommend a
magnetic stirrer to facilitate flow independent calibration.

Magnetic stirrer 115 VAC

7790915

Stirrer magnet

7790916

Mounting bracket for magnetic stirrer PVC
(includes screws with wall anchor)

1000166

Accessories/Spare Parts

Replacement membrane cap:

M 2.0 P for H₂O₂

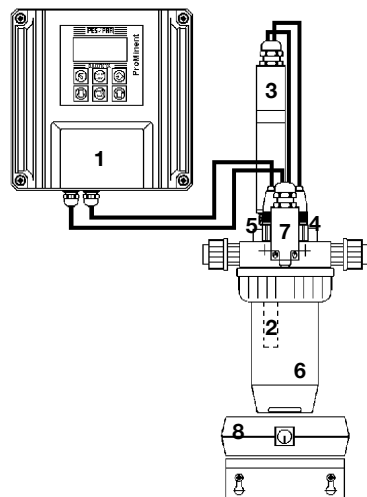
792978

Polishing paste for Perox sensor, 3 oz. (90 g) tube

559810

ProMinent® D1C and D2C Analyzers

Peracetic Acid Analyzers

Recommended Peracetic Acid System
(descriptions follow)

	Part No.
1 D1C PAA Controller (1)	
1 Peracetic Acid Sensor: P2.10 B, complete with membrane cap (2)	809150
1 Perox signal converter: Perox-micro-P 1.30-mA (3)	741128
1 Connection between Perox signal converter and limit sensor Three-wire cable, priced per foot (specify length)	791948
1 pH Sensor: REFP - SE (4)	1000505
1 Temperature Sensor: Pt 100 SE (5)	305063
1 Connection between the temperature sensor and the controller: (Based on distance between the controller and temperature sensor)	
Up to 30 ft. SN6 open end cable 6 ft. (2 m) long	305030
15 ft. (5 m) long	305039
30 ft. (10 m) long	305040
Over 30 ft. Signal converter 4-20 mA Pt 100 V1	809128
Two-wire cable - priced per foot (specify length)	7740215
1 DLG-PER In-line sensor housing (6)	1000165
(includes limit sensor with 2 n/o contacts) (7)	
1 Connection between the limit switch on the DLG-PER and the controller: Two-wire cable - priced per foot (specify length)	7740215
1 Magnetic stirrer 115 VAC (8)	7790915
1 Stirrer Magnet	7790916
1 Compact stand (PE, UV protected, black)	7740000
1 Power Cord, 6 ft.	741203

Accessories:

Replacement membrane cap: M 2.0 B for peracetic acid sensor	809154
Polishing paste for sensor, 3 oz. (90 g) tube	559810

Note: We can also provide measuring and control instruments mounted and wired, e.g. on PVC board or in a control cabinet. See PCM Systems in Feed & Control Packages section.

Sensors: Peracetic Acid Measurement

The peracetic acid sensor shaft is made of stainless steel (counter electrode) with a gold working electrode. Installation length 4.7" (120 mm), 0.5" (12 mm) Ø.

P 2.10 B, complete with membrane cap	809150
--------------------------------------	--------

A pH sensor is also required as a reference electrode for peracetic acid measurement

REFP - SE	1000505
-----------	---------

Temperature sensor Pt 100 for temperature compensation of peracetic acid measurement; necessary when temperature fluctuations can occur in the measurement medium.

Pt 100 SE	305063
-----------	--------

A coaxial measuring line with an SN6 connector is required for direct connection of a temperature sensor:

SN6 open end	6 ft. (2 m) long	305030
SN6 open end	15 ft. (5 m) long	305039
SN6 open end	30 ft. (10 m) long	305040

When distances between the measuring unit and sensor exceed 30 ft. (10 m), it is recommended to use a temperature signal converter which transmits the temperature signal via a 2-wire connection at 4-20 mA. Temperature compensation input should be taken into consideration when selecting the D1C-Perox controller from the identity code.

Signal converter 4-20 mA Pt 100 V1	809128
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Two-wire cable for connection between point-of-use signal converter 4-20 mA and controller - priced per foot (specify length).

7740215

ProMinent® D1C and D2C Analyzers

Peracetic Acid Analyzers

Perox Signal Converter

The signal converter controls and activates the peracetic acid sensor and evaluates the sensor signal. It is screw-mounted directly on the head of the sensor.

The signal converter has a length of approx. 8.1" (205 mm) and a 1.25" (32 mm) Ø.

Signal converter for peracetic acid measurement

A changeover switch for the two measuring ranges 10 - 200 and 100 - 2000 mg/L peracetic acid is located on the inside; the standard scope of delivery includes a measuring line with SN6 plug connector to facilitate connection to the reference electrode.

Part No.

Perox-micro-P 1.30-mA

741128

In-line Sensor Housing

The DLG-PER in-line sensor housing must be used for peracetic acid measurement where all (max. 3) individual sensors are installed in a measuring cup. A limit sensor must also be used which switches off the power supply for the signal converter when the measuring cup is removed. The DLG-PER in-line sensor housing features a body made of rigid PVC with a transparent polyamide cup and measurement water connection with 1/2" MNPT fittings.

DLG-PER In-line sensor housing
(includes limit sensor with 2 n/o contacts) 1000165

Two-wire cable for connection between the limit switch on the DLG-PER
and the controller - priced per foot (specify length) 7740215

For calibration of the DLG-PER in-line sensor housing, we recommend a
magnetic stirrer to facilitate flow independent calibration.

Magnetic stirrer 115 VAC 7790915

Stirrer magnet 7790916

Mounting bracket for magnetic stirrer PVC
(includes screws with wall anchor) 1000166

Accessories/Spare Parts

Replacement membrane cap:
M 2.0 B for peracetic acid 809154

Polishing paste for Perox sensor, 3 oz. (90 g) tube 559810

ProMinent® Compact Controller

Overview: Compact



DULCOMETER
Compact

The Measuring Transducer DULCOMETER® Compact with control function for the measured variables pH and redox provides basic functions for applications in water treatment. It has a fixed configuration with the following features.

Summary of advantages:

- Measured variables pH and ORP (can be changed on the controller)
- Operation independent of the operating language (use of abbreviations, such as CAL, PARAM, CONFIG, ERROR)
- Illuminated display
- 3 LED display operating state (relay 1 / 2 active, Error)
- Sensor monitoring for pH
- P and PID control characteristics
- Selectable control direction (raise or lower measured value)
- Pulse frequency relay for control of metering pump
- Power relay can be configured as an alarm, limit value or pulse width modulated control output for metering pumps (connection function or switch on operating voltage)
- Analog output 4-20 mA can be configured as a writer output or control output
- Digital input to switch off the control or to process a sample water limit contact by remote control
- Temperature sensor input (Pt 1000) for temperature compensation of the pH and chlorine value

Applications

- Waste water treatment
- Treatment of drinking water
- Swimming pool water treatment

Technical Data

Measurement range:	pH: 0.00 - 14 ORP: -1000 - +1000 mV
Resolution:	pH: 0.01 pH ORP: 1 mV
Correction variable:	Temperature for pH via Pt 1000
Correction range:	32 - 248 °F, (0 - 120 °C)
Control characteristic:	P/PID
Control:	1-way controller with selectable control direction (raise/lower)
Signal current output:	1 x 4-20 mA galvanically isolated max. load 400 Ω Range and assignment (measured or actuating variable) can be set
Control outputs:	1 pulse frequency output for control of the metering pump 1 relay (alarm or limit value relay or pulse length control) 1 x analog output 4-20 mA
Electrical connection:	90 - 253 V ~
Ambient temperature:	14 - 140 °F, (-10 - +60 °C)
Enclosure rating:	IP 67
Dimensions:	135 x 125 x 75 mm (H x W x D)
Weight:	1.10 lbs, (0.5 kg)

Part no.

Compact controller for pH/ORP

1035638

ProMinent® DMT Transmitters

Overview: DMT

DULCOMETER® DMT type transmitters are compact 2-wire transmitters for measured variables pH, redox, chlorine, conductive conductivity, temperature. Easily combined with programmable memory controllers.

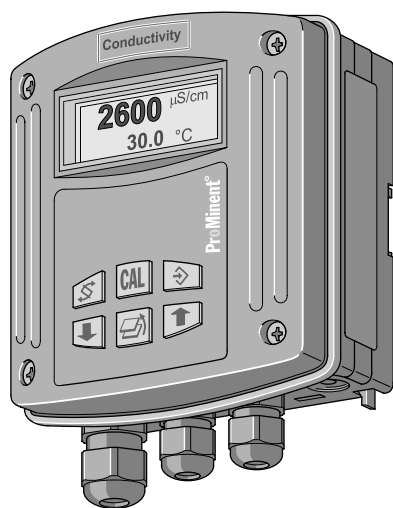
Summary of advantages:

- Reliable measurement
- High level of operating safety, e.g. probe monitoring (pH), electrical isolation
- Simple flexible installation
- Full text user guidance
- Automatic buffer recognition (pH)
- Autoranging (conductivity)
- Compact design
- Switch between pH, redox and temperature

Applications:

process control, food and beverage industry, chemical and pharmaceutical industries, water treatment, waste water treatment, power plant

Technical Data



pk_5_001



Measurement range:	pH -1.00 - 15.00 -1200...+1200 mV redox voltage 0.01...50.0 ppm/l chlorine -20 - +150 °C 1 µS/cm - 200 mS/cm (autoranging)
Cell constant:	0.006...12.0/cm for conductivity
Resolution:	pH 0.01 1 mV 0.1 % from measurement range for chlorine 0.1 °C Conductivity 1/1000 of display value (min. 0.001 µS/cm)
Reproducibility:	0.5 % from measurement range
Measurement input:	mV terminal (pH, redox); input resistance >5 x 10 ¹¹ Ω Chlorine terminal (DMT chlorine probes) Pt 100/1000 terminal Conductivity terminal (2 or 4 wire connector)
Correction variable:	Temperature via Pt 100/1000 (pH, chlorine, conductivity)
Correction range:	chlorine: 5 - 45 °C, pH: 0 - 100 °C, Cond: 0 - 100 °C
Current output:	4 - 20 mA, fault current 23 mA
Supply voltage:	16 - 40 V DC
Feed voltage:	2-wire transmitter, 16 - 40 V DC, nominal 24 V PROFIBUS® DP version, 16 - 30 V DC, nominal 24 V communication interface:
Communication interface:	PROFIBUS® DP (wall-mounted version only)
Ambient temperature:	-5 - +55 °C
Climatic conditions:	up to 95 % relative humidity (non-condensing)
Enclosure rating:	IP 65 (wall/pipe mounted) IP 54 (control panel installation)
Display:	graphical display
Housing:	PPE
Dimensions:	125 x 135 x 75 mm (WxHxD)
Weight:	approx. 450 g

A complete measuring station comprises the following:

- Measuring transducer DMTa (see Identcode)
- In-line probe housing: DGMa..., DLG III ..., immersible in-line probe housing
- Chlorine sensor
- Assembly set for chlorine sensor
- pH sensor
- Redox sensor
- Temperature sensor Pt 100 /Pt 1000
- Conductivity sensor
- Sensor cable
- PROFIBUS®-DP connection accessories

ProMinent® DMT Transmitters

Identcode Ordering System

DMT	Version:													
	A													
		Type of Mounting:												
		W	Wall mounted (also rail mounted)											
		S	Control panel installation¹											
		Logo:												
		0	With ProMinent® logo											
		Electrical connection:												
		9	Ring main 4-20 mA (two wire technology), operating voltage 16-40 V DC, nominal 24 V DC											
		5	PROFIBUS® DP, operating voltage 16 - 30 V DC, nominal 24 V DC (only if communication interface = PROFIBUS® DP)											
		Communication interface:												
		0	None											
		4	PROFIBUS® DP (assembly type W only)											
		Measured variable 1:												
		P	pH											
		R	Redox											
		T	Temperature											
		C	Chlorine											
		L	Conductivity											
		Measured variable 2 (Correcting value):												
		1	Temperature Pt 1000 / Pt 100											
		0	None (in the case of measured variable T)											
		Enclosure rating:												
		0	Standard											
		Language:												
		E	English											
		Presetting A, probe:												
		0	Standard ProMinent® buffer solution pH 4-7-10											
		Presetting B, probe:												
		0	Autom. Temperature measurement (standard)											
		1	Manual temperature measurement											
		2	Autom./manual temperature measurement											
		9	No temperature measurement											
		Presetting C, output:												
		0	Prop. Measured variable (standard)											
		Presetting C:												
			0											
DMT	A	W	0	9	0	P	1	0	E	0	0	0	0	0

ProMinent® DDC Analyzers

Overview: DDC



pk_5_045

The Multi-channel Measuring and Control System DULCOMARIN® II has the following features:

- 5.7", 1/4 VGA color display for ease of operation
- Integrated data logger with screen recorder: Directly view the measured data on the controller
- SD card and card reader included: simply transmit measured data to the PC as standard
- Control of one to 16 drinking water systems or filtration circuits in swimming pools
- CAN bus system: Simple wiring and can be subsequently upgraded
- Visualization*: Simple with embedded web server* and standard web browser
- LAN port*: Simple connection to PC or PC network or internet
- Operation possible using Apple® iPod or iPad (WLAN access point needed)
- Intelligent sensors: with CANopen bus, save the sensor data and stay within the optimum measuring range thanks to auto ranging
- Intelligent metering pumps: using CANopen bus obtain information on operating parameters, such as for instance: chemicals levels and pump capacity in the metering range of 0.19-272 gph (0.74 - 1,030 l/h)
- Standby metering pump for disinfectant (automatic switchover in the event of low level and pump malfunction)

Area of application drinking water (and general applications)

Using a power input module (I module), the following measuring parameters can be measured via 4-20 mA and displayed. These values are also available on the data logger/screen recorder, the web and OPC server:

- Flow (as disturbance variable for pH and chlorine control)
- UV intensity
- Conductivity
- Chlorine dioxide
- Chlorite
- Ammonia
- Fluoride

Pt100 resistance thermometer via a transducer

Display and control of free chlorine and total available chlorine

OPC server*: Simple connection to superordinate visualization systems

*optional

Area of application swimming pools

Remote calibration possible using Apple® iPod or iPad (WLAN access point needed)

Energy and chemical savings thanks to new EcoMode

Integral filter control

Bound chlorine: is reliably minimized via controller output and corresponding systems

OPC server*: Simple connection to superordinate visualization systems

Control of pool temperature via standard temperature controller (Pt100x needed)

High chlorination or night setback by means of contact via second parameter set

The decentralized modular DULCOMARIN® II system is designed for use in public swimming pools in compliance with DIN 19643. The system can be configured to meet the demand for a compact DULCOMARIN® II compact system or as a decentralized modular system DULCOMARIN® II DULCO®-Net.

The areas of application are determined in the identcode

Every drinking water measurement system or every filtration circuit features its own on-site calibration option for all measured variables.

What is the Eco!Mode operating mode?

Eco!Mode enables the circulation capacity to be reduced if the DIN hygienic parameters pH, redox, free and bound chlorine are within the permitted limits.

A circulation pump with frequency converter with an analog input is needed for this.

This reduction can be enabled depending on the DIN hygienic parameters, time and activation via a remote control input. A combination of the criteria is also possible. If the DIN hygienic parameters can no longer be met, then the circulation capacity is raised again to nominal capacity.

Lowering the pump capacity saves energy, thereby reducing CO₂ emissions.

Furthermore, when a set redox potential is reached, for instance 780 mV, signaling good disinfection of the water, then chlorine metering is either reduced gradually or in one step. If the DIN hygienic parameters can no longer be met, then chlorine metering is raised again to its standard set point.

What is a web server?

A web server is a software application that is implemented by the DULCOMARIN® II.

The web server provides web pages with information about measurements, control, sensor calibration and controller configuration to a PC with web browser (e.g. Microsoft® Internet Explorer).

The web server can be used to provide simple visualization of the DULCOMARIN® II without special visualization software being needed on the PC. The web server is independent of the PC operating system.

The DULCOMARIN® II is connected to a PC via a LAN/Ethernet port and the connection can be made directly, via a network or via the internet. The cables needed for direct connection to a PC or network are included.

Commercially available standard network components can be used for the cabling, router and WLAN access points etc.

The same information is available via the web server as on the DULCOMARIN® II itself, for instance the set points of all control variables can be changed, the various controller can be switched off and the pool/system names can be entered. Exceptions to this are the controller settings and bus configuration that can only be entered directly on the controller itself.

What is OPC?

OPC stands for Openness, Productivity, Collaboration (formerly OLE for Process Control) and designates a uniform and manufacturer-independent software interface. OPC Data Access (OPC DA) is based on Windows technology COM (Component Object Model) and DCOM (Distributed Component Object Model). In contrast, OPC XML is based on the internet standards XML, SOAP, and HTTP.

OPC is used wherever sensors, controllers, and controls from various manufacturers are used to form a common, flexible network. Without OPC, two devices require precise knowledge of the communication options of the other device to be able to exchange data. Extensions and replacement are therefore correspondingly difficult. With OPC, an OPC-compliant driver for each device has to be written only once. Ideally this driver is provided by the manufacturer. An OPC driver can be integrated easily in any major control and monitoring system without needing much in the way of adaptation.

ProMinent provides an OPC server/driver for the Multi-channel Measuring and Control System DULCOMARIN® II.

The examples shown below are suitable for applications in drinking water treatment and swimming pool systems.

The multi-channel measuring and control system DULCOMARIN®II is suitable to control 1 to 16 filtration circuits or drinking water systems. The following bus modules are available for the control:

M module (measurement and controlling):

- Measurement and control of the pH value
- Measurement and display (optional control) of the ORP
- Measurement and display of the temperature of the sample water
- Sample water monitoring
- Measurement of free chlorine
- Measurement of combined chlorine (optional, calculated from total chlorine and free chlorine)

Chlorine sensors:

- Measurement of free chlorine and temperature
- Measurement of total available chlorine and temperature
- Measurement of combined chlorine as differential chlorine measurement

A module (controlling of metering pumps, analog outputs):

- 3 frequency outputs to control metering pumps for pH correction, disinfection and flocculent metering
- 3 contact inputs to process pump alarm relays or tank fill level monitoring
- 4 freely programmable analog outputs 4-20 mA for pH, ORP, free chlorine, combined chlorine or temperature

P module (controlling of peristaltic pumps, power supply of bus modules):

- Power relay pulse length control for pH value (e.g. controlling of peristaltic pump)
- Power relay pulse length control of disinfectant (e.g. controlling of chlorine electrolysis plant)
- Power relay limit value output to minimize combined chlorine
- Alarm relay
- Power supply of bus modules

N module (power supply of bus modules):

- Power supply of bus modules with no further function

R module (controlling of chlorine gas metering units):

- Controlling of a chlorine gas metering unit and processing of a position feedback potentiometer (0-10 kΩ) (only possible as external module)

Metering pumps with CANopen interface of the type Beta®, delta®, Sigma/ 1, Sigma/ 2, and Sigma/ 3

- Direct connection to the bus
- When using Beta®/4aCANopen metering pumps, the A module is not required (provided no current outputs are required).

I module (current input module)

- 2 current inputs active/passive (e.g. to connect 2-wire measuring transducers)
- 1 current inputs passive (e.g. to connect a magnetically-inductive flow meter)
- 2 digital inputs for sample water alarm and pause control

G module (limit value and alarm module)

- 2 potential-free changeover relays to signal alarm states
- Connected to other units via the main bus cable using the T-distributor and 0.5m CAN connection cable supplied

ProMinent® DDC Analyzers

Technical Data

Measurement range:	pH:	-1 - 15
	Redox:	-1200 - +1200 mV
	Chlorine free:	0.01 - 10 ppm
	Chlorine total:	0.01 - 10 ppm
	Combined chlorine:	0.01 - 2 ppm
Temperature:	Pt 100 or Pt 1000, 28 to 302 °F (-20 to +150 °C)	
Resolution:	0.01 pH / 1 mV / 0.01 ppm / 0.1 °C	
Reproducibility:	0.5 % of the measurement range (at 25 °C)	
Measurement inputs:	pH and Redox via terminal mV	
	Chlorine via CANopen Bus	
Control type:	P/PI/PID-control	
Control:	Acid or alkali, chlorine	
Digital inputs:	Voltage free inputs (sample water, pause, 3 pump faults)	
Signal current		
outputs:	4 x 0/4-20 mA (electrically isolated for each measured variable) Max. burden 600 Ω , range adjustable	
Control outputs:	Reed contacts, acid, alkali and chlorine (pulse rate for actuation of metering pumps) 2 relays (pulse length) make/break switches for actuation of solenoid valves or peristaltic pumps 250 V~, 3 A	
Alarm relay:	250 V ~3 A, 700 VA make/break switches	
Interfaces:	LAN, RS 232 as configuration interfaces, SD-expansion slot (for SD cards)	
Power supply:	85 - 265 V~, 50/60 Hz	
Ambient temp. :	23 to 118°F (-5 to 45 °C)	
Storage temp. :	14 to 158°F (-10 to 70 °C)	
Enclosure rating:	IP 65	
Climate:	Admissible relative humidity: 95% non condensing	
	DIN IEC 60068-2-30	
Dimensions:	342 x 227 x 78 mm (WxHxD)	

Guaranteed CANopen specifications, all devices:

All devices meet the standardized CAN specification for hardware 2.0 (ISO99-1, ISO99-2). This includes the CAN protocol (ISO 11898-1) and details about the physical application layer in accordance with ISO 11898-2 (high speed CAN to 1Mbit/sec.) and ISO 11898-3 (Low speed CAN to 125kBit/sec).

The device complies with the CAN-Open specification CIA-DS401, the basis of the European standard EN50325-4. It complies with the controller device profile CiA-404.

ProMinent® DDC Analyzers

Identcode Ordering System

DULCOMARIN® II DXC range

DXCa	Mounting type									
	W	Wall mounted (IP 65)								
	S	Control cabinet (IP 54)								
	Version									
	0	with operating elements								
	D	with operating elements for use in drinking water/disinfection applications								
	Communication interfaces									
	0	None								
	5	Embedded Web Server, LAN including 5m LAN patch cable 1:1, LAN coupling, 5m crossover cable ¹								
	6	OPC server + embedded web server, LAN including 5m LAN patch cable 1:1, LAN coupling, 5m crossover cable								
	Options									
	0	None								
	1	Videographic recorder with data logger including SD card and USB card reader for PC								
	Module 1:									
	M	M module, measurement module for pH, ORP, temperature								
	A	A module, control module: 3 pump and 4 analog outputs								
	I	I module, current input module, 3 mA, 2 digital inputs								
	Module 2:									
	0	Not in use								
	A	A module, control module: 3 pump and 4 analog outputs								
	M	M module, measuring module pH, ORP, temperature								
	I	I module, current input module, 3 mA, 2 digital inputs								
	Module 3:									
	P	P module, mains power module, 1 alarm relay, 3 solenoid valve relays								
	N	N module, mains power module without relay								
	Application:									
	S	Swimming pool								
	D	Drinking water/disinfection								
	Preset language:									
	EN	English								
	Approvals:									
	01	CE-mark								
DXCa	W	0	0	0	M	0	P	S	EN	1

The Identcode describes the **DULCOMARIN® II compact** controller.

- 1 The supplied cable is intended for the connection to a hub, switch, router, or Internet.
For a direct connection of the DULCOMARIN® II to a PC/MAC, the supplied LAN coupling and the crossover cable cat. 5 are required.
The maximum LAN cable length is approx. 100 m.
To operate the Web server on a PC we recommend using Microsoft Internet Explorer 5 or higher as browser.
The following components are supplied in the DXCa package:
1 T-distributor, 1 connecting cable CAN,
1 termination resistor coupling and
1 termination resistor plug,
1 SC card, 1 card reader for PC.

Important note when ordering multi-channel measuring and control systems for drinking water and pool water applications:

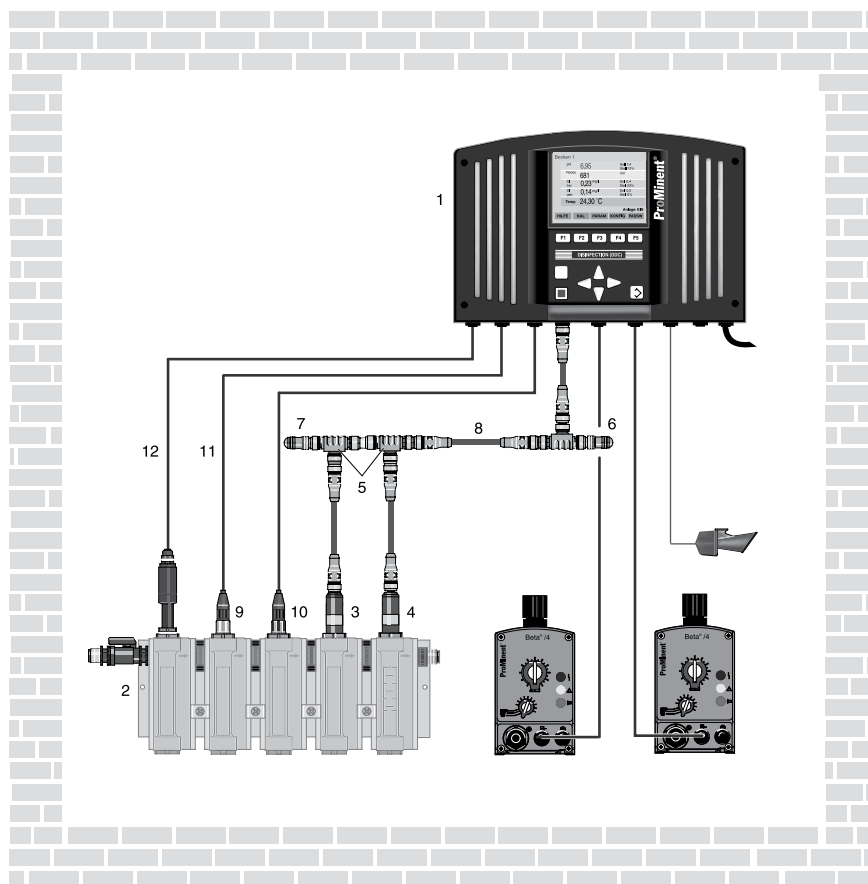
Drinking water application: In the identcode, a "D" for "Drinking water/disinfection" must be selected under "Version" and "Application". The description "System" will appear in the controller menu for the different drinking water lines.

Swimming pool water applications: In the identcode, a "0" for "with operating elements" must be selected under "Version" and the an "S" for "Swimming pool" under "Application". The description "Tank" will appear in the controller menu for the different filter circuits.

All adjustment options and the use of the different modules are identical with both applications.

ProMinent® DDC Analyzers

Configuration



pk_5_020

The measurement and control system shown above for a single system comprises the following components (without metering equipment):

Item	Quantity	Name	Part No.
1	1	DULCOMETER® (DDC) central unit with actuator and measurement modules DXCa W 0 0 0 M A P 0 EN 01	
2	1	DULCOTEST® in-line probe housing DGMa 3 2 2 T 0 0 0	
3	1	Chlorine sensor CTE 1-CAN-10 ppm	1023427
4	1	Chlorine sensor CLE 3.1-CAN-10 ppm	1023426
5	3	T-distributors M12 5 pole CAN	1022155
6	1	Load resistor M12-coupler	1022154
7	1	Load resistor M12-plug	1022592
8	5	Connecting cable - CAN M12 5 (pole). 1.5 ft (0.5 m)	1022137
9	1	pH electrode	As per application
10	1	Redox electrode	As per application
11	2	Coaxial cable, 6 ft. (2 m) - SN6 - pre-assembled*	1024106
12	6 ft. (2 m)	2 wire cable	7740215

* other lengths available

ProMinent® DDC Analyzers

DULCO®-Net

The DULCOMETER® (DDC) DULCO®-Net control system uses the CANopen – BUS as the medium for transmission of the data between the measurement and actuator units and the sensors and the central unit.

In its maximum expanded form the system can control up to 16 systems, i.e. 16 measurement units and 16 dosing units and corresponding sensors can be operated from a single central unit.

For this purpose a central unit is combined with the number of measurement and dosing units required for the application.

A M12 T-distributor is required for connection to any CANopen device (sensors module, actuator module, metering pumps and chlorine sensors). This connects the device to the main bus via a stub cable.

The sum of the lengths of all stub cables in a CANopen system cannot exceed 45 ft. (15 m.)

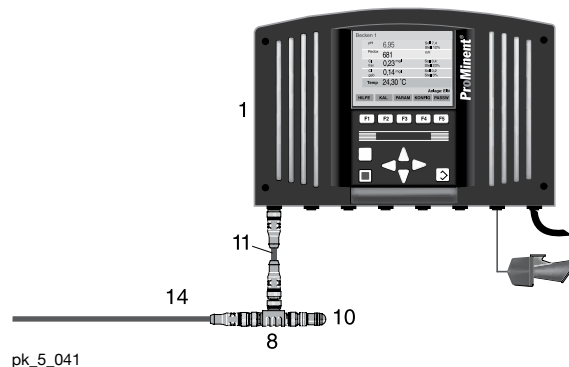
DULCOMETER® (DDC) DULCO®-Net and compact can both be easily expanded later.

What components make up a DULCOMETER® (DDC) DULCO®-Net system?

A DULCOMETER® (DDC) DULCO®-Net system comprises:

- One central unit **and** an individual combination of the following components:
- Measurement unit
- Dosing unit without main power module
- Dosing unit with main power module (optional)
- Chlorine gas dosing unit

Central unit



The central unit can be installed anywhere, e.g. in a control room or in the office. It serves as an input/output module (for viewing and configuring individual modules) and has the following functions: screen recorder, interface, Embedded Web Server and power supply. The central unit may optionally incorporate a sensor and an actuator module. The central unit is connected with the other units via the main Bus. CAN connection cables are used for this purpose. The main Bus of the first unit must be connected with a M 12 load resistor coupling and the final unit with a M 12 load resistor plug.

A unit always consists of a module, a T-connector and a CAN stub connection cable, 1.5 ft. (0.5 m) long.

The central unit in the above example comprises the following components:

Item	Quantity	Name	Part No.
1	1	DULCOMETER® (DDC) Central unit DXCa W 0 5 1 M A P 0 EN	
8	1	T-distributor M12 5 pole. CAN	1022155
1	1	Connecting cable - CAN M12 5 pole. 0.5 m	1022137
14	1	Connecting cable - CAN M12 5 pole 5 m	1022141
10	1	M 12 load resistor coupling	1022154

ProMinent® DDC Analyzers

DULCO®-Net

The multi-channel measuring and control system DULCOMARIN®II DULCO®-Net in the maximum configuration can control 16 drinking water systems/filtration circuits, i.e. the required external modules for 16 pools can be connected to the central unit and operated. The following options are given.

Measurement and controlling of:

- Up to 16 times:
- pH value
- ORP
- free chlorine
- combined chlorine (calculated)
- Temperature of the sample water

Additionally in the drinking water application (via I module):

- Flow rate (as disturbance for pH and chlorine control)
- UV intensity
- Conductivity
- Chlorine dioxide
- Chlorite
- Ammonia
- Fluoride
- Pt100 resistance thermometer via transducer

Other inputs and outputs:

- Up to 16 times:
- 3 frequency outputs to control metering pumps for pH correction, disinfection and flocculent metering
- 3 contact inputs to process pump alarm relays or tank fill level monitoring
- 4 freely programmable analogue outputs 0/4-20 mA (for pH, ORP, free chlorine, combined chlorine or temperature)
- 3 power relays pulse length control of pH value, of the disinfectant and minimization of combined chlorine (e.g. controlling of a peristaltic pump and chlorine electrolysis plant and UV plant)
- Controlling of a chlorine gas metering unit
- 3 Beta®/4CANopen metering pumps

Developed by Bosch and known from the automotive industry, the very fail safe CAN bus with CANopen protocol is used to transfer data between the different bus modules. The maximum length of the main bus train is 400 meters.

For connecting any bus module (M module, A module, P module, N Module, Beta®/4CANopen metering pumps and CAN chlorine sensors), a T-distributor is used which connects the units with the main bus train via a spur line.

T-distributor and spur line are included in the modules' delivery scope.

All bus modules are supplied with 24 V operating voltage via the CAN bus (except Beta®/4CANopen metering pumps, P modules, N modules. These require a separate power supply).

For this reason, additional P or N modules that supply operating voltage for the bus modules on the bus are required depending on the size of the installation (number of filtration circuits to be controlled). The central unit always includes a power supply unit (N or P module).

How many additional N or P modules do you require?

Number filtration circuits	Additional N or P modules	Number filtration circuits	Additional N or P modules
1	-	9	4
2	-	10	5
3	1	11	5
4	2	12	6
5	2	13	6
6	3	14	7
7	3	15	7
8	4	16	8

The DULCOMARIN®II compact and DULCO®-Net can be upgraded subsequently by simply connecting bus modules

ProMinent® DDC Analyzers

DULCO®-Net

Which components are included in a DULCOMARIN®II DULCO®-Net system?

A DULCOMARIN®II DULCO®-Net system consists of one:

Central unit DXCa with controls and the individual combination of the following components:

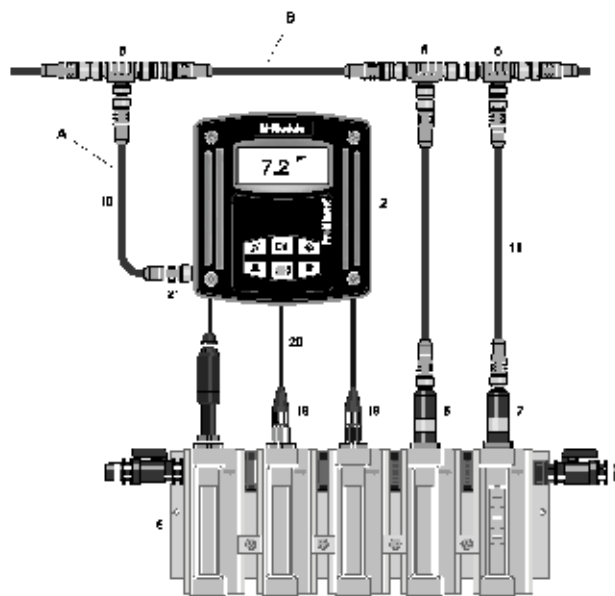
- M module:** DXMaM (measurement and controlling)
- A module:** DXMaA (controlling of metering pumps, analog outputs)
- P module:** (module in DXCa housing to supply power to modules and alarm relays, power relays to control e.g. peristaltic pumps)
- N Module:** DXMaN (power supply of external modules with no further function)
- R module:** DXMaR (controlling of chlorine gas metering units with position feedback processing)
- I module:** (processing of sensor signals above 4-20 mA)

The maximum main bus length is 16 inches!

ProMinent® DDC Analyzers

M Module (Measuring Module)

- A Stub cable
B Main BUS cable



pk_5_042

The M module with its illuminated graphic display and keypad displays the measured values and allows all sensors for the corresponding filter circuit to be calibrated on site.

The following measurements can be taken:

- pH value
- ORP potential
- **free chlorine** and **total available chlorine** (optional or combined chlorine is (calculated) and **sample water temperature** using the **temperature probe in the chlorine sensor** or optionally using a separate **Pt100/Pt1000 resistance thermometer**

The M module has 3 digital inputs for:

- sample water monitoring
- controlling breaks in filter backwashing
- Parameter changeover for Eco!Mode
- The M module is connected to the other bus modules via the main bus cable, using the T-distributor supplied and the 0.5 m CAN connection cable.

The M module in the above example comprises the following components:

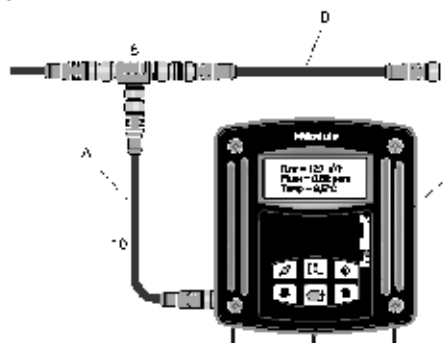
Item	Number	Name	Part No.
2	1	M module DXMa M W 0 S EN 01	DXMa M W 0 S DE 01
5	1	In-line probe housing DGMa 3 2 2 T 0 0 0	DGMa 3 2 2 T 0 0 0
6	1	Chlorine sensor CTE 1-CAN-10 ppm	1023427
7	1	Chlorine sensor CLE 3.1-CAN-10 ppm	1023426
8	3	T-distributors M12 5 pole CAN	included in delivery
10	1	Connecting cable - CAN M12 5 (pole) 0.5 m	included in delivery
11	2	Connection cable - CAN M12 5 (pole) 0.5 m	included in delivery
18	1	pH sensor PHES 112 SE	150702
		PHES 112 SE	150092
19	1	ORP sensor RHES-Pt-SE	150703
20	2	Cable combination coax 2m-SN6-pre-assembled*	1024106
21	2m	Signal lead, sold by the meter 2 x 0.25 mm ² Ø 4 mm	725122

* other lengths available

ProMinent® DDC Analyzers

I Module (Current Input Module)

- A Stub cable
B Main BUS cable



AP_DC_001_SW

The I module with its illuminated graphic display and keypad is a current input module capable of processing 3 standard signals from sensors and two digital signals.

It can be used together with the multi-channel controller DULCOMARIN® II in drinking water and swimming pool applications. All measured variables are available in the screenwriter and web and OPC®server.

Two analog inputs are provided as 2-wire inputs and one as passive input.

The inputs can process the following values as 4-20 mA standard signals:

- Turbidity
- Flow
- UV intensity
- Conductivity (via DMTa transducer)
- Chlorine dioxide*
- Chlorite
- Ammonia
- Fluoride
- Pt100 resistance thermometer via a transducer
- Dissolved oxygen
- Hydrogen peroxide *

The I module has 2 digital inputs for:

- sample water monitoring and
- pause control

The flow information can be used as an interference variable for the control of chlorine, pH correction and chlorine dioxide.

* these measured variables can also be controlled

The I module is connected to other bus modules via the main bus cable using the T-distributor and 0.5 m CAN connection cable supplied.

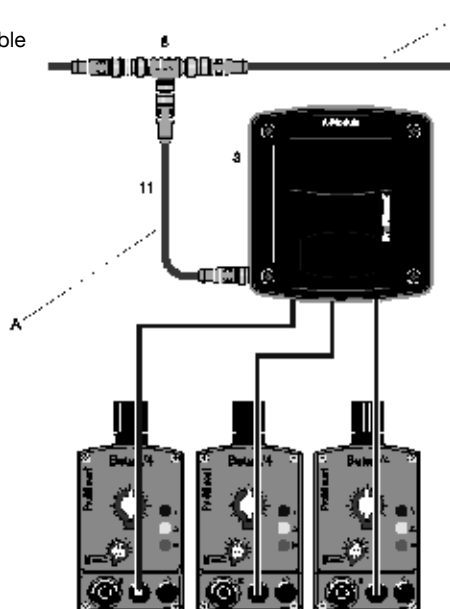
The I module in the above example consists of the following components:

Item	Number	Name	Part No.
2	1	I module DXMa I W 0 D EN 01	-
8	1	T-distributors M12 5P CAN	included in delivery
10	1	Connecting cable - CAN, M12, 5 (pole), 0.5 m	included in delivery

ProMinent® DDC Analyzers

Actuator Module

- A Stub cable
B Main BUS cable



pk_5_043

The A module permits the control of up to three metering pumps via pulse frequency. Possible metering combinations are:

- pH lowering and disinfectant and flocculent or
- pH raising and disinfectant and flocculent or
- pH lowering and pH raising and disinfectant

It includes 3 digital inputs to evaluate the alarm relay of metering pumps, 4 freely programmable standard signal outputs 0/4-20 mA to document measured values, or as control outputs.

For this connection, the T-distributor and the CAN connecting cable 0.5 m include in the scope of delivery are used.

To be noted: If Beta®/4CANopen metering pumps are used, no A modules are required!

The A module in the above example consists of the following components (without metering equipment):

Item	Quantity	Designation	Order No.
3	1	A module DXMa A W 20 00 01	
8	1	T-distributor M12 5P CAN	included in delivery
11	1	Connecting cable - CAN M12 5 (pole) 1.5 ft. (0.5 m)	included in delivery

The A module is connected to other units via the main bus train.

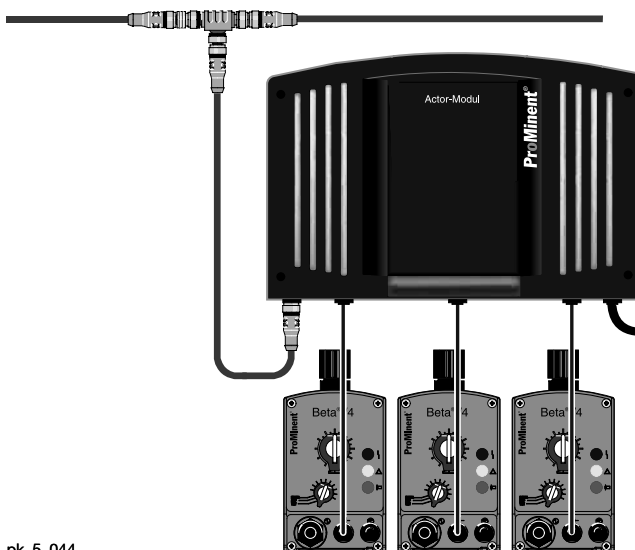
For connection to units which are not electrically isolated (e.g. PLC), an isolating amplifier, e.g. order no. 1033536, is required!

ProMinent® DDC Analyzers

The Combination Module

Actuator module with power supply:

- A Stub cable
- B Main BUS cable



pk_5_044

Combination A module and P module

Up to three different modules can be connected to the combination module (DXCa without controls). The function of the combination module is based on the function of the individual modules (see description above). The modules in the combination module are operated via the DXCa central unit.

The module is connected to the other bus modules via the main bus cable using the T-distributor supplied and the 0.5 m CAN connection cable.

See the table below for the various fitting options:

Module position 1	Module position 2	Module position 3
M module	M module	P module
M module	M module	N module
A module	A module	P module
A module	A module	N module
M module	A module	P module
M module	A module	N module

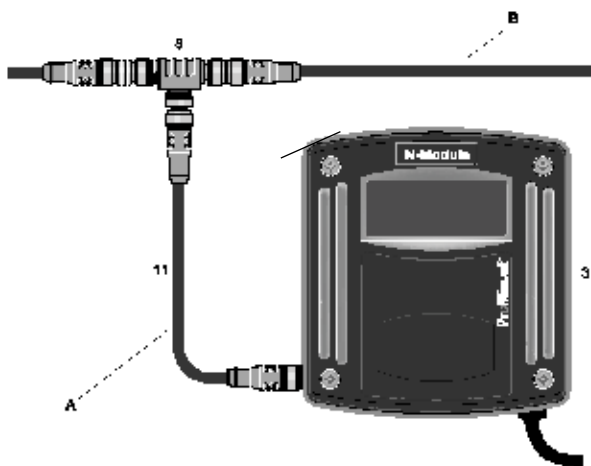
The combination in the above example consists of the following components (without chemical fluid handling):

Item	Number	Name	Order No.
3	1	Control module DXCa W 2 0 0 0 A P S 00 01	
8	1	T-distributor M12 5 pole CAN	included in delivery
11	1	Connecting cable - CAN M12 5 pole 1.5 ft. (0.5 m)	included in delivery

ProMinent® DDC Analyzers

N Module (Power Supply Module)

- A Stub cable
B Main BUS cable



pk_5_043_C_power

The N module (power supply) is used to supply the bus modules with power and has no further function.

The number of N modules required can be seen from the table below. If P modules are used in a system, the number of N modules is reduced accordingly. The central unit always includes a power supply unit (N or P module).

How many additional N or P modules do you require?

Number filtration circuits	Additional N or P modules	Number filtration circuits	Additional N or P modules
1	-	9	4
2	-	10	5
3	1	11	5
4	2	12	6
5	2	13	6
6	3	14	7
7	3	15	7
8	4	16	8

The N module requires power supply for operation and is connected to the other bus modules via the main bus train. For this connection, the T-distributor and the CAN connecting cable 0.5 m included in the scope of delivery are used.

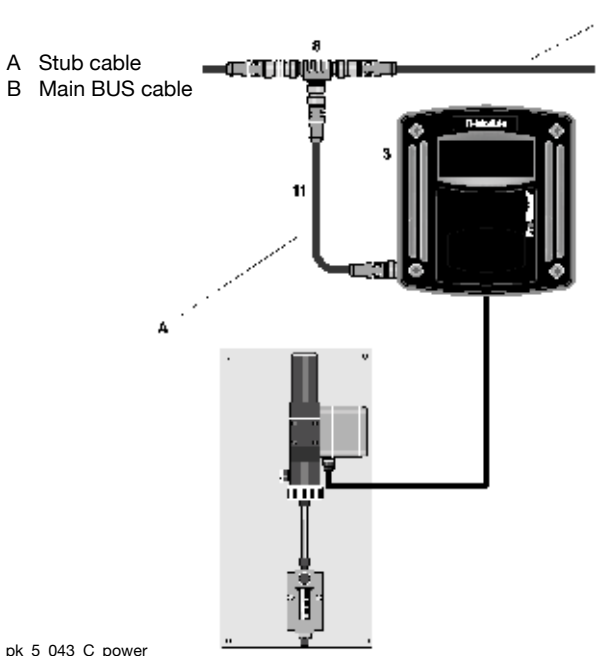
The power module in the above example comprises the following components:

Item	Number	Designation	Part No.
3	1	Power-module DXMa N W 2 0 00 01	
8	1	T-distributor M12 5 Pol. CAN	included in delivery
11	1	Connecting cable - CAN M12 5 (pole)	included in delivery
		1.5 ft. (0.5 m)	

If you have any questions, please contact our sales department.

ProMinent® DDC Analyzers

R Module (Control Module For Chlorine Gas Metering Units)



The R module permits the control of chlorine gas metering units which are equipped with a position feedback potentiometer.

It includes 2 power relays for opening and closing and an input for a position feedback potentiometer 1-10 k Ω .

The R module is connected to other units via the main bus train.

For this connection, the T-distributor and the CAN connecting cable 0.5 m included in the scope of delivery are used.

The R module in the above example consists the following components (without chlorine gas metering unit):

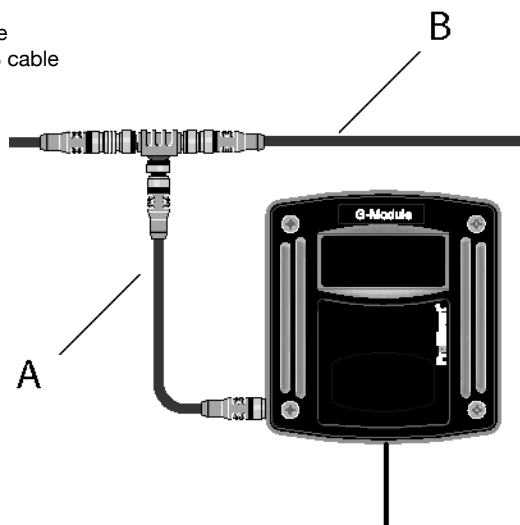
Item	Number	Designation	Part No.
3	1	R module DXMa R W 2 0 0 0 01	
8	1	T-distributor M12 5 P CAN	included in delivery
11	1	Connecting cable - CAN, M12, 5 (pole) 1.5 ft. (0.5 m)	included in delivery

If you have any questions, please contact our sales department.

ProMinent® DDC Analyzers

G Module (Limit Value and Alarm Module)

- A Stub cable
B Main BUS cable



P_DM_0024_SW3

The G module is a limit value and alarm emitting module with 2 potential-free changeover relays to signal alarm states. Each of the two relays has ten different setting options to monitor measured values for minimum and maximum values and, should the values exceed or fall below these limits, this then effects the relay. Both relays have the same setting options, thereby enabling for pre-warnings or shutdowns to be generated by the use of different delay periods.

The G module is connected to the other units via the main bus cable using the T-distributor and 0.5m CAN connection cable supplied.

The G module in the above example consists the following components:

Item	Number	Designation	Order No.
3	1	G module DXMa R W 2 0 0 0 01	
8	1	T-distributor M12 5 pin CAN	included in delivery
11	1	Connecting cable - CAN, M12, 5 pin 1.5 ft. (0.5 m)	included in delivery

If you have any questions, please contact our sales department.

ProMinent® DDC Analyzers

Identcode Ordering System CANopen Modules

Measurement Module for DULCOMARIN® II Series DXM

DXMa	Module:					
	M	M module, measuring module: pH, ORP, temperature				
	A	A module, control module: 3 pump and 4 analog outputs				
	R	R module, control module: chlorine gas metering unit with feedback				
	N	N module, mains power module without relay				
	P	P module, mains power module with relay, only mounting type "O"				
	I	I module, current input module, 3 mA inputs, 2 digital inputs				
	G	G module				
	Installation:					
	0	No housing, only P module (IP 00)				
	W	Wall mounting (IP 65)				
	E	Retrofit module (installation module for DXCa, IP 20)				
	Version:					
	0	With controls (only M module, mounting type W)				
	2	Without controls				
	3	Without controls (only mounting type "E" and "H")				
	Application:					
	0	Standard				
	S	Swimming pool (only M module)				
	D	Drinking water/disinfection (only I module)				
Language default:						
EN	English					
Approvals:						
00	No approval, only P module without housing					
01	CE mark					
DXMa	M	0	0	0	EN	0

Please note the following:

Upgrade modules for existing systems require a software update for the existing system. A Software Update Kit is needed to avoid any possible incompatibility between the different modules.

The update kit is free of charge and one is also needed when ordering more than one upgrade module. The kit includes a SD memory card with the current software for the DULCOMARIN II and a description about how to perform the software update.

Order No.

Update kit/DXC and modules

1031284

ProMinent® DDC Analyzers

Spare parts and upgrade sets

Internal spare parts and upgrade sets for the DULCOMARIN® II cannot be ordered using the part number printed on the modules!

Modules have to be fully replaced (the exception to this is the N module).

The electrical unit for the central unit can only be replaced by a complete processor spare part.

Please use only the following identcodes when ordering identcodes:

Replacement central units

Replacement central unit: DXCAC001000#DE01 (without communications interface, # = please state "S" for applications in swimming pools and "D" for applications relating to drinking water).

Replacement central unit: DXCAC051000#DE01 (with web server, # = please state "S" for applications in swimming pools and "D" for applications relating to drinking water).

Replacement central unit: DXCAC061000#DE01 (with OPC and web server, # = please state "S" for applications in swimming pools and "D" for applications relating to drinking water).

External modules (replacement or upgrade modules):

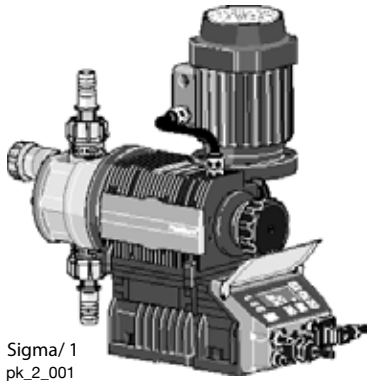
- M module: DXMa M W 0 S EN 01 (with display)
- A module: DXMa AW2 0 00 01 (without display)
- N module: DXMa N W 2 0 00 01 (without display)
- R module: DXMa R W2 0 00 01 (without display)
- G module: DXMa G W2 0 00 01 (without display)
- P module: DXCa W 2 00 00 PS 00 01 (without display in large DXC housing)
- I module: DXMa I W 0 D D E 01 (with display)
- I module: DXMa I W 2 D 0 0 0 1 (without display)

Internal modules (replacement or upgrade modules):

- M M module: DXMa M E3S 00 01
- M A module: DXMa A E30 00 01
- M P module: DXMa P03 00 00
- M I module: DXMa I E 3 D 00 01
- M N module: Order no. 732485, electrical set DXMaN 24 V/1A

ProMinent® DDC Analyzers

Diaphragm Metering pumps compatible with CANopen bus



Sigma/ 1
pk_2_001

CANopen bus interface for DULCOMARIN® II

Feed rate range 0.19-9 gph (0.74-34 l/h), 29-232 psi (2-16 bar)

Stroke length continuously adjustable between 0-100% (recommended 30-100%)

Transmission of the stroke length setting from DULCOMARIN II

Material versions PP, plexiglass/PVC

Patented coarse / fine bleed valve for PP and plexiglass/PVC

Self-bleeding liquid end version in PP and plexiglass/PVC

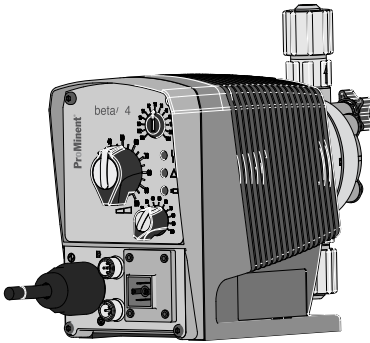
Port for 2-phase level switch

Version for extra-low voltage 12/24 V DC, 24 V AC

4 LED display for operation, warning and error messages

Alarm for stroke length changes $> \pm 10\%$

Transmission of level alarm without alarm relay via the bus



P_BE_0002_SW
Beta®



P_DE_0002_SW
delta®

ProMinent® DDC Analyzers

Complete System

Number and type of modules required for a given number of pools

Number filtration circuits	Central unit DXCa	P module	M module	A module	Additional N or P module (power supply)	Sensor free chlorine unit)	Sensor total chlorine - (optional)
1	1	1	1	1	-	1	1
2	1	1	2	2	-	2	2
3	1	1	3	3	1	3	3
4	1	1	4	4	2	4	4
5	1	1	5	5	2	5	5
6	1	1	6	6	3	6	6
7	1	1	7	7	3	7	7
8	1	1	8	8	4	8	8
9	1	1	9	9	4	9	9
10	1	1	10	10	5	10	10
11	1	1	11	11	5	11	11
12	1	1	12	12	6	12	12
13	1	1	13	13	6	13	13
14	1	1	14	14	7	14	14
15	1	1	15	15	7	15	15
16	1	1	16	16	8	16	16

* No A module if metering pumps with CANopen are used.

The above modules include all CAN bus connecting elements (T-distributor and spur line).

The T-distributors can also be directly coupled.

For distributed systems, CAN cable must be ordered by the meter with the by the meter connecting kit.

Order no.

CAN (by the meter) - connection kit*

1026589

Connecting cable - CAN (by the meter)*

1022160

* The CAN by-the-meter connecting kit consists of a CAN coupling M12 5P and a CAN connector M12 5P and a wiring diagram.

The by-the-meter connecting cable can be configured into a cable of individual length using the CAN by-the-meter connecting kit.

One CAN by-the-meter connecting kit is required for each cable to be configured.

The connecting cables CAN M12 5P 0.5m (pump 1 m) supplied with the sensors and modules must be used for the spur lines.

If you have any questions, please contact our sales department.

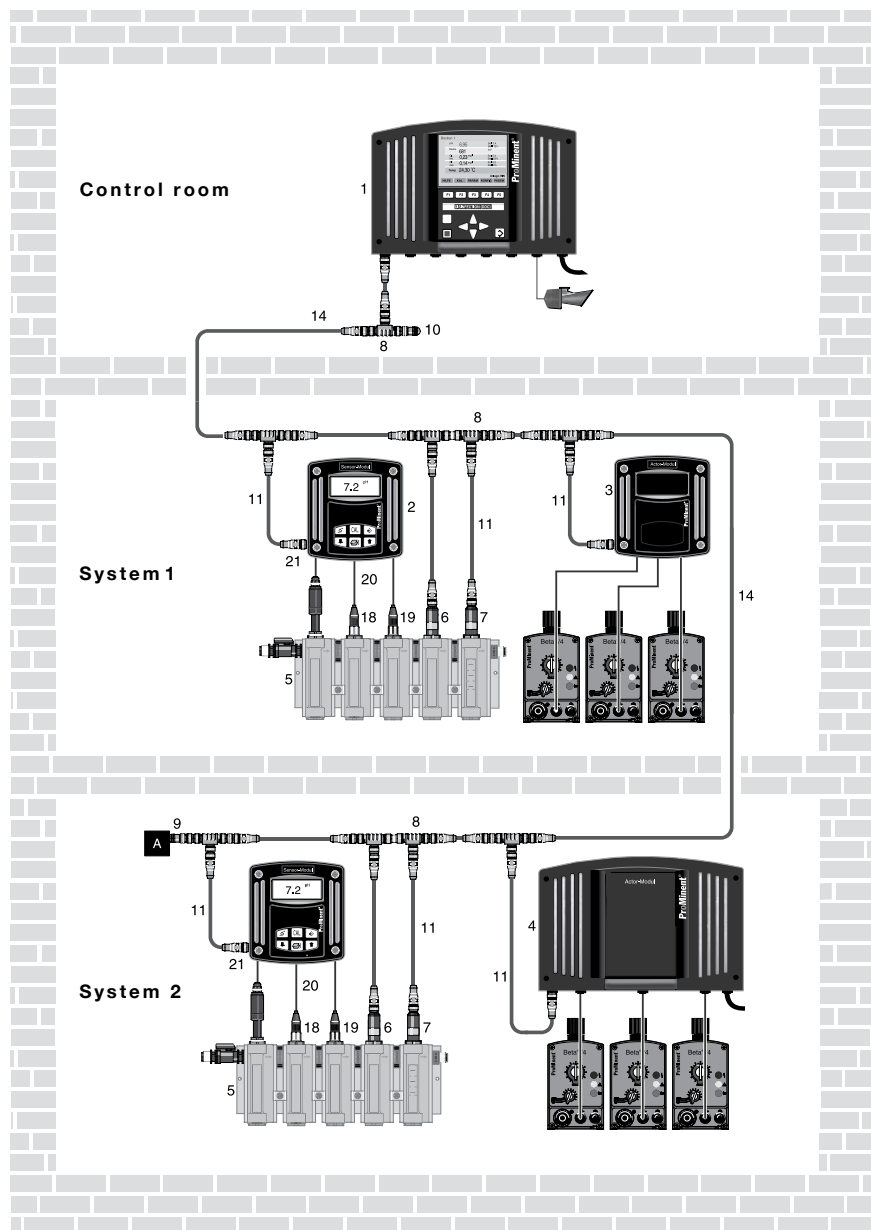
Caution:

The maximum main bus length (not including stubs) may be 400 m at the most.

ProMinent® DDC Analyzers

Complete System

Example of configuration for two control systems:



pk_5_022

ProMinent® Measurement Simulator

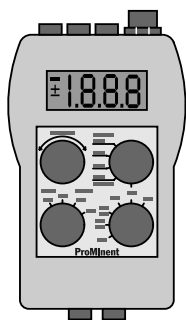
Overview: Simulator

- Simulation of pH and mV signals
- Simulation of Pt 100/Pt 1000 (25 °C and 80 °C)
- Simulation and measurement of mA signals

Applications:

testing DULCOMETER® devices, service and laboratory

Technical Data



pk_5_108

Measurement range U_+ : 5...30 V DC (measures the supply voltage for external passive 4...20 mA transmitters)

Simulation: pH 2.00...12.00
 ± 1000 mV
 0...20 mA
 Pt 100, Pt 1000 (25 °C and 80 °C)

Simulation output: SN6 banana socket

Battery: 9 V battery pack

Operating life: Approx. 150 hours

Weight: Approx. 265 g (with battery)

Enclosure rating: IP 20

Ambient temperature: 0...40 °C

Accessories: 9 V battery, signal lead kit

Part No.

1004042

ProMinent® Portable DT Photometer

Overview: Photometer

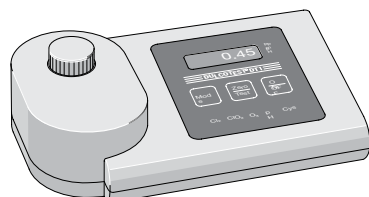
Photometer DT1, DT2, DT3 and DT4

- Portable compact Photometer
- Simple to operate with support text
- Reliable, simple measurement of chlorine, chlorine dioxide, fluoride, chlorite, H₂O₂, bromine, ozone, pH and cyanuric acid
- Self-diagnostic

Applications:

swimming pool, drinking water, process water

Technical Data



pk_5_021

Measurement range of DT1:	0.05...6.0 mg/l free chlorine (DPD 1) + total chlorine (DPD3) 0.1...13.0 mg/l bromine (DPD 1) 0.05...11 mg/l chlorine dioxide (DPD 1) 0.03...4.0 mg/l ozone (DPD 4) pH 6.5...8.4 (phenol red) 1...80 mg/l cyanuric acid
Measurement range of DT2B:	0.05...2.0 mg/l fluoride 0.05...6.0 mg/l free chlorine and total chlorine 0.05...11.0 mg/l chlorine dioxide
Measurement ranges, DT3:	1 - 50 / 40 - 500 mg/l hydrogen peroxide
Measurement ranges, DT4:	0.03 - 2.5 mg/l chlorite, 0.05 - 11 mg/l chlorine dioxide, 0.05 - 6 mg/l chlorine
Measuring tolerance:	Dependent upon measured value and measuring method
Battery:	9 V battery (approx. 600 x 4-minute measurement cycles)
Ambient temperature:	41 - 104° F (5 - 40 °C)
Relative humidity:	30 - 90 % (non-condensing)
Housing material:	ABS
Keypad:	Polycarbonate
Dimensions:	7.5 x 4.3 x 2.2 in (190 x 110 x 55 mm (LxWxH))
Weight:	approx. 1 lb. (0.4 kg)

	Part No.
Type DT1 photometer , complete with carrying case	1003473
Type DT2B photometer , complete with carrying case	1010394
Type DT3 photometer , complete with carrying case	1023143
Type DT4 photometer , complete with carrying case	1022736

Photometers supplied with accessories, container vessels and reagents.

Consumable items:	Part No.
DPD 1 buffer, 15 ml	1002857
DPD 1 reagent, 15 ml	1002858
DPD 3 solution, 15 ml	1002859
Phenol red tablets R 175 (100 in each)	305532
Cyanuric acid tablets R 263 (100 in each)	305531
SPADNS reagent, 250 ml for fluoride detection	1010381
Calibration standard fluoride 1 mg/l for calibration of photometer (fluoride detection)	1010382
3 spare cells: round cells with covers for DPD phenol red and cyanuric acid detection (DT1 and DT2B)	1007566
3 spare cells for fluoride detection (DT2A and B)	1010396
DPD reagents set, 15 ml each: 3 x DPD 1 buffer, 1 x DPD 1 reagent, 2 x DPD 3 solution	1007567
Chlorine dioxide tablets Nr. 1 R 127	501317
Chlorine dioxide tablets Nr. 2 R 128	501318

Spare parts

Chlorite meter:

Foamer for expulsion of chlorine dioxide (DT4)	1022754
3 No. spare cuvettes for chlorite determination	1007566

H₂O₂ meter:

Reagent for H ₂ O ₂ (DT3), 15 ml	1023636
Spare cuvettes, 5 No., for H ₂ O ₂ (DT3)	1024072

ProMinent® Cooling Tower & Boiler Controllers

MicroFLEX Controllers



ProMinent's microFLEX controller is the perfect economical solution that provides the latest in water management technology for Cooling Towers and Boilers. The microFLEX water treatment controller offers a worry-free thermal flow switch that does not require any user adjustments. It also integrates built-in diagnostics with real-time monitoring in a compact design (5.9"W x 5.9"H x 3.5"D).

Features

- **Models:** Boiler, Cooling, Condensate diverter, Closed loop – reverse conductivity
- **Inhibitor Modes:** Bleed & Feed, Bleed then Feed, Percent Time, Meter Volume
- **Inputs:** Conductivity, Meter, System status
- **Outputs:** Two Powered Relays
- **Standard:** Single point calibration, 2 Line – 16 Character LCD, Built-In Diagnostics NEMA 4X Enclosure, CE Approved, 5 Key Universal Keypad
- **Options:** Web Browser Interface for remote view and configuration or Dry contact alarm or 4-20mA out on conductivity

Identcode Ordering System

MicroFLEX 2 Series

M02	Series Version:					
M02	A	MicroFLEX 2 Controller Version A: Two relay controller with conductivity and temperature inputs, single inhibitor feed based on water meter input, bleed or % time with overfeed protection, flow switch/status input, 2 line display and 5 key universal keypad.				
		Application:				
		COIN	Cooling Tower			
		BBIN	Boiler			
		CLAH	Closed loop reverse conductivity			
		CMAH	Condensate monitor			
		Expansion Option:				
		XX	None			
		CL	4-20 mA output on conductivity			
		LB	Ethernet networking			
AR	Dry contact alarm relay					
		Remote communications:				
		0	None			
		Approvals:				
			01	Standard		
M02	A	COIN	XX	0	01	

ProMinent® Cooling Tower & Boiler Controllers

SlimFLEX Controllers



ProMinent's SlimFLEX water treatment controller provides the latest in water management technology. With available options, the SlimFLEX controller is designed to provide the highest degree of control and flexibility with low cost.

Features

- Model: Cooling Tower - four powered relays: Inhibitor, bleed & two timed biocides
- Inhibitor Modes: Bleed & Feed, Bleed then Feed, Percent Time, Meter Volume
- Biocide Modes: Daily, weekly or monthly program
- Inputs: Conductivity, Meter, System status. Optional pH or ORP
- Standard: Single point calibration, 2 Line – 16 Character LCD, Built-In Diagnostics NEMA 4X Enclosure, CE Approved, 5 Key Universal Keypad
- Options: Web Browser Interface for remote view and configuration or Dry contact alarm or 4-20mA out on conductivity, pH control or ORP control (Replaces one timed biocide)

Identcode Ordering System

SlimFLEX 4 Series

S4T	Series Version:					
S4T	A	SlimFLEX 4 Tower Controller Version A: Four relay cooling controller with single inhibitor feed based on water meter input, bleed or % time with overfeed protection, conductivity based bleed relay, two application relays (below), flow switch/status input, 2 line display and 5 key universal keypad.				
		Base:				
		COIN	Conductivity control - selectable inhibitor feed			
			Application Relays:			
			TBTB	Dual biocide timers		
			OXTB	ORP control and biocide timer		
			PHTB	pH control and biocide timer		
			Expansion Option:			
			XX	None		
			CL	4-20 mA output on conductivity		
			LB	Ethernet networking		
			AR	Dry contact alarm relay		
			Remote communications:			
			0	None		
Approvals:						
	01	Standard				
S4T	A	COIN	TBTB	XX	0	01

ProMinent® Cooling Tower & Boiler Controllers

MultiFLEX Controllers



ProMinent's MultiFLEX water treatment controllers exemplify the latest in water management technology. Packed with features, the MultiFLEX line of products are designed to provide the highest degree of control and flexibility. With one MultiFLEX you can control and monitor multiple towers, multiple boilers, or tower/boiler combos.

Features

- Control up to 4 Towers at once
- Control up to 8 Boilers at once
- Web Browser Accessible
- LAN Accessible
- Up to 14 Analog Inputs
- Twelve Digital Inputs
- Ten Relay Outputs
- Works with Trackster 3 Software
- 4 Line, 20 Character Backlit Display
- Easily Upgraded with Plug-in Modules
- Fully Programmable
- Ethernet with user definable static IP address
- NEMA 4X Enclosure
- 120 or 240VAC 50/60Hz, Switch Selectable
- CE Approved
- Supports "Percentage Time Bleed & Feed" ■

ProMinent® Cooling Tower & Boiler Controllers

Identcode Ordering System (M5)

MultiFLEX 5 Series

M05	Series Version:												
A	MultiFLEX 5 Controller Version A: Includes 5 universally controlled powered (120/240VAC) relays, 6 status/water meter digital inputs, 7 analog input/output channels, a 4 line 20 character back lit display, 5 key universal keypad and an Ethernet port with Browser communications. Can be programmed for cooling, boiler, process or mixture of all on one unit.												
Application:													
B	Boiler												
T	Tower, combination, or monitor												
X	Custom application with factory configuration												
I/O Expansion Slot 'A' and 'B'. (*options marked are tower only):													
XX	None						RR*	Dual ORP - Relay					
B1	Single Boiler Conductivity with Blowdown Relay						O2*	Dual ORP - Monitor					
BM	Single Boiler Conductivity - Monitor						OP*	ORP and pH - Relay					
B2	Dual Boiler Conductivity with Blowdown Relay						MM*	ORP and pH - Monitor					
BB	Dual Boiler Conductivity - Monitor						CR*	Single corrosion rate					
CC	Boiler Condensate Conductivity/Temp - Relay						DC*	Dual corrosion rate					
CN	Boiler Condensate Conductivity/Temp - Monitor						CI	Single 4-20 mA Input - Relay					
PC	Single Boiler Condensate pH - Relay						IM	Single 4-20 mA Input - Monitor					
PN	Single Boiler Condensate pH - Monitor						2I	Dual 4-20 mA Input 1 relay					
CO*	Cooling Tower Conductivity/Temp - Relay						I2	Dual 4-20 mA Input 2 relays					
CM*	Cooling Tower Conductivity/Temp - Monitor						2M	Dual 4-20 mA Input Monitor					
PH*	Single Cooling Tower pH - Relay						II	Dual 4-20 mA Input (isolated) 1 relay					
PM*	Single Cooling Tower pH - Monitor						I3	Dual 4-20 mA Input (isolated) 2 relays					
PP*	Dual Cooling Tower pH - Relay						I4	Dual 4-20 mA Input (isolated) Monitor					
P2*	Dual Cooling Tower pH - Monitor						IO	Single 4-20 mA Output					
PT*	Single pH/Temp (Temperature compensated pH)						OO	Dual 4-20 mA Output					
OR*	Single ORP - Relay						RS	Rate to Stroke driver					
OM*	Single ORP - Monitor												
I/O Expansion Slot 'C' and 'D':													
XX	Use same selection options as expansion slot 'A' and 'B'												
I/O Expansion Slot 'E' and 'F':													
XX	Use same selection options as expansion slot 'A' and 'B'												
I/O Expansion Slot 'G':													
XX	Same choices as Slot A/B except only single expansion card options allowed												
Pre-wired power relay plug box:													
0	None			3	Three outlets								
1	One outlet			4	Four outlets								
2	Two outlets			5	Five outlets								
Inhibitor powered relays (tower only):													
0	None			3	Three								
1	One			4	Four								
2	Two												
Timed biocide powered relays:													
0	None			3	Three								
1	One			4	Four								
2	Two												
Internal boiler treatment:													
0	None			3	Three								
1	One			4	Four								
2	Two												
Remote communications:													
0	None												
P	Phone modem communications with data logging												
Feed verifications:													
0	None			3	Feed verification (3)								
1	Feed verification (1)			4	Feed verification (4)								
2	Feed verification (2)												
Operating Voltage:													
A	115 VAC 50/60 Hz												
B	230 VAC 50/60 Hz												
M05	A	B	XX	XX	XX	XX	0	0	0	0	0	0	A

ProMinent® Cooling Tower & Boiler Controllers

Identcode Ordering System (M10)

MultifLEX 10 Series

M10	Series Version:																
A	MultiFLEX 10 Controller Version A: Includes 10 universally controlled powered (120/240VAC) relays, 12 status/water meter digital inputs, 14 analog input/output channels, 4 line 20 character backlit display, 5 key universal keypad and an Ethernet port with Browser communications. Can be programmed for cooling, boiler, process or a mixture of all on one unit.																
	Application:																
	B	Boiler															
	T	Tower, combination, or monitor															
	X	Custom application with factory configuration															
	I/O Expansion Slot 'A' and 'B'. (*options marked are tower only):																
	XX	None							RR*	Dual ORP - Relay							
	B1	Single Boiler Conductivity with Blowdown Relay							O2*	Dual ORP - Monitor							
	BM	Single Boiler Conductivity - Monitor							OP*	ORP and pH - Relay							
	B2	Dual Boiler Conductivity with Blowdown Relay							MM*	ORP and pH - Monitor							
	BB	Dual Boiler Conductivity - Monitor							CR*	Single corrosion rate							
	CC	Boiler Condensate Conductivity/Temp - Relay							DC*	Dual corrosion rate							
	CN	Boiler Condensate Conductivity/Temp - Monitor							CI	Single 4-20 mA Input - Relay							
	PC	Single Boiler Condensate pH - Relay							IM	Single 4-20 mA Input - Monitor							
	PN	Single Boiler Condensate pH - Monitor							2I	Dual 4-20 mA Input 1 relay							
	CO*	Cooling Tower Conductivity/Temp - Relay							I2	Dual 4-20 mA Input 2 relays							
	CM*	Cooling Tower Conductivity/Temp - Monitor							2M	Dual 4-20 mA Input Monitor							
	PH*	Single Cooling Tower pH - Relay							I1	Dual 4-20 mA Input (isolated) 1 relay							
	PM*	Single Cooling Tower pH - Monitor							I3	Dual 4-20 mA Input (isolated) 2 relays							
	PP*	Dual Cooling Tower pH - Relay							I4	Dual 4-20 mA Input (isolated) Monitor							
	P2*	Dual Cooling Tower pH - Monitor							IO	Single 4-20 mA Output							
	PT*	Single pH/Temp (Temperature compensated pH)							OO	Dual 4-20 mA Output							
	OR*	Single ORP - Relay							RS	Rate to Stroke driver							
	OM*	Single ORP - Monitor															
	I/O Expansion Slot 'C' and 'D':																
	XX	Use same selection options as expansion slot 'A' and 'B'															
	I/O Expansion Slot 'E' and 'F':																
	XX	Use same selection options as expansion slot 'A' and 'B'															
	I/O Expansion Slot 'G' and 'H':																
	XX	Use same selection as expansion slot 'A' and 'B'															
	I/O Expansion Slot 'I' and 'J':																
	XX	Use same selection options as expansion slot 'A' and 'B'															
	I/O Expansion Slot 'K' and 'L':																
	XX	Use same selection options as expansion slot 'A' and 'B'															
	I/O Expansion Slot 'M' and 'N':																
	XX	Use same selection options as expansion slot 'A' and 'B'															
	Pre-wired power relay plug box:																
	0	None			6	Six outlets											
	1	One outlet			7	Seven outlets											
	2	Two outlets			8	Eight outlets											
	3	Three outlets			9	Nine outlets											
	4	Four outlets			A	Ten outlets											
	5	Five outlets															
	Inhibitor powered relays (tower only):																
	0	None			3*	Three											
1*	One			4*	Four												
2*	Two																
Timed biocide powered relays:																	
0	None			3	Three												
1	One			4	Four												
2	Two																
Internal boiler treatment:																	
0	None			5	Five												
1	One			6	Six												
2	Two			7	Seven												
3	Three			8	Eight												
4	Four																
Remote communications:																	
0	None																
P	Phone modem communications with data logging																
Feed verifications:																	
0	None																
1	Feed verification (1)																
2	Feed verification (2)																
3	Feed verification (3)																
4	Feed verification (4)																
Operating Voltage:																	
A	115 VAC 50/60 Hz																
B	230 VAC 50/60 Hz																
M10	A	B	XX	XX	XX	XX	XX	XX	XX	0	0	0	0	0	0	A	

ProMinent® Cooling Tower & Boiler Controllers

AEGIS Controllers



ProMinent's AEGIS controller provides the latest in technology and is the perfect economical solution for process, cooling, boiler and waste water treatment applications.

Features

- Inhibitor Feed Using PPM Setpoints
- Volumetric Timer Controls
- Relay Mirroring
- Ethernet Communications
- Optional MODBUS
- Industrial and Commercial Series
- Plug and Play Upgrades
- Works with Trackster 3 Software
- Aquatrac Thermal Flow Switch
- Easily Upgradeable with Plug-in Modules
- Program Chemical Feed
- CE Approved
- NEMA 4X Enclosure
- Variable Frequency Pump Controls
- Data Logging
- Drum Level Alarms
- ProMinent Pump integration

Advantages & Benefits

Variable Frequency Pump Controls: Accurate and precise chemical feed using pulse outputs. Can also select On/Off control if desired.

Data Logging: Data history provides sensor minimum, maximum and average. Also records pump run times, pump feed volume, calculated drum levels, water meter volume, tower run time.

Aquatrac Exclusive Thermal Flow Switch: Aquatrac's exclusive design does not require user adjustment or calibration. Operates on 1GPM flow rate with no moving parts.

ProMinent Pump Integration: Select from popular ProMinent pump models built into the Aegis programming for accurate ppm feed, tank level and feed volume.

Feed Inhibitor using ppm setpoints: Accurate and precise inhibitor feed by simply inputting desired ppm level based on inhibitor chemistry. Use with make-up water meter.

Plug and Play Onsite Upgrades: The Aegis features Plug and Play technology allowing the user to perform simple onsite upgrades and scalability.

Program chemical feed based on drop tests: Program chemical feed by entering results of system testing using ppm, ml or drop tests. Enter the new value and desired alarm setpoints for worry-free chemical feed and control.

Drum Level Alarms: Provide low level alarms without the use of level sensors. The Aegis calculates volume fed and subtracts from tank inventory.

Communications: Ethernet, MODBUS, land phone line

ProMinent® Cooling Tower & Boiler Controllers

Identcode Ordering System AEGIS

[illegible]

ProMinent® Cooling Tower & Boiler Controllers

Aquatrac Accessories

Analog Sensors	Controller	
	Choice	Part No.
ORP Sensor Package - Chlorination with cable, Tee and probe holder	B,C, D	7760768
ORP Electrode, flat faced double junction 100 psi @175°F - cable required PN 1036595	B,C,D	7761399
PHED Sensor Package with cable, Tee and probe holder	B,C,D	7760729
pH Electrode, flat faced double junction 100 psi @ 175°F - cable required PN 1036595	B,C,D	7760998
Conductivity/Temperature Electrode 125 psi @125°F with Tee - Cooling applications	B,C,D	7760200
Aquatrac Conductivity/Temperature/Thermal Flow Switch CTF (Cooling)	A,B,D	7760021
Corrosion Rate Electrode, Admiralty	C,D	7760748
Corrosion Rate Electrode, Carbon Steel	C,D	7760746
Corrosion Rate Electrode, Copper	C,D	7760747
Corrosion Rate Electrode, Cupro-Nickle	C,D	7760750
Corrosion Rate Electrode, Stainless Steel	C,D	7760749
Corrosion Rate Electrode, Zinc	C,D	7760745
Aquatrac Thermal Flow Switch 100psi @125°F	A,B,C,D	7760175
Conductivity Electrode 3/4" NPT 250psi steam max (Boiler - standard sensor)	A,C,D	7760002
Conductivity/Temperature Electrode 250psi steam max 3/4" NPT 4 wire (Condensate)	A,C,D	7760191
pH Electrode, 1/2" NPT SS, 230°F max (Condensate)	B,C,D	7760465
High Pressure Flow Switch 1.5GPM, 400 psi max 3/4" NPT , Bronze	A,B,C,D	7760203
Water Meters		
3/4" Contacting head water meter, 1GPC, 3/4" FNPT	B,C,D	7760518
1" Contacting head water meter, 10GPC, 1" FNPT	B,C,D	7760515
1 1/2" Contacting head water meter, 100 GPC, 1" FNPT	B,C,D	7760516
2" Contacting head watermeter 100GPC, 2"FNPT	B,C,D	7760517
3/4in Paddlewheel Water Meter Sensor. Supplied in PVC pipe section.	B,C,D	7760514
1in Paddlewheel Water Meter Sensor. Supplied in PVC pipe section.	B,C,D	7760508
1.5" Paddlewheel Water Meter Sensor. Supplied in PVC pipe section.	B,C,D	7760509
2" Paddlewheel Water Meter Sensor. Supplied in PVC pipe section.	B,C,D	7760510
3" Paddlewheel Water Meter Sensor. Supplied in PVC pipe section.	B,C,D	7760511
4" Paddlewheel Water Meter Sensor. Supplied in PVC pipe section.	B,C,D	7760512
Solenoids and Valves		
1/2" Solenoid valve for cooling application. 150 psi max	A B,C,D	7760212
3/4" Solenoid valve for cooling application. 150 psi max	A,B,C,D	7760213
1" Solenoid valve for cooling application. 150 psi max	A,B,C,D	7760214
Needle valve 1/2", rated 250 psi steam, color coded shaft, numbered handle	A,B,C,D	7760006
Orifice Union, 1/2" NPT, 250 psi steam, with four orifice plates	A,B,C,D	7760109
Motorized blowdown valve 1/2"NPT, 120VAC, 250psi steam	A,B,D	7760217
Motorized blowdown valve 3/4"NPT, 120VAC, 250psi steam	A,B,D	7760218
Motorized blowdown assembly, 1/2"NPT, 120VAC 250psi steam w/needle valve and T	A,B,D	7760013

A - microFLEX **B** - SlimFlex **C** - multiFLEX **D** - AEGIS

DULCOTEST® Sensors**QUICK REFERENCE****“DULCOTEST® Sensors” T.O.C.****IX****CATALOG SECTION TABS**

product overview	<ul style="list-style-type: none"> ■ Introduction ■ pump selection by capacity ■ chemical resistance list ■ Solenoid & Motor Pump Overview ■ Analytical Instrumentation Overview 	product overview
solenoid-driven metering pumps	<ul style="list-style-type: none"> ■ concept PLUS ■ beta ■ gamma/L ■ delta ■ extronic ■ mikro delta 	solenoid-driven metering pumps
motor-driven metering pumps	<ul style="list-style-type: none"> ■ Sigma/ 1 ■ Sigma/ 2 ■ Sigma/ 3 ■ ProMus ■ Makro ■ Orlita ■ DulcoFlex 	motor-driven metering pumps
pump spare parts & accessories	<ul style="list-style-type: none"> ■ solenoid pump spare parts ■ motor pump spare parts ■ pump accessories 	pump spare parts & accessories
DULCOMETER® instrumentation	<ul style="list-style-type: none"> ■ D1C ■ D2C ■ Dulcometer® Compact ■ DMT ■ DDC ■ MicroFlex ■ SlimFlex ■ MultiFLEX ■ AEGIS 	DULCOMETER® instrumentation
DULCOTEST® sensors	<ul style="list-style-type: none"> ■ amperometric sensors ■ potentiometric sensors ■ potentiostatic sensors ■ conductometric sensors ■ accessories 	DULCOTEST® sensors
polymer blending systems	<ul style="list-style-type: none"> ■ ProMix™-M (A Controls) ■ ProMix™-M (B Controls) ■ ProMix™-S ■ ProMix™-C 	polymer blending systems

DULCOTEST® Sensors

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

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

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

Potentiometric DULCOTEST® Sensors

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

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

Amperometric DULCOTEST® Sensors

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

DULCOTEST® Sensors for Electrolytic Conductivity

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

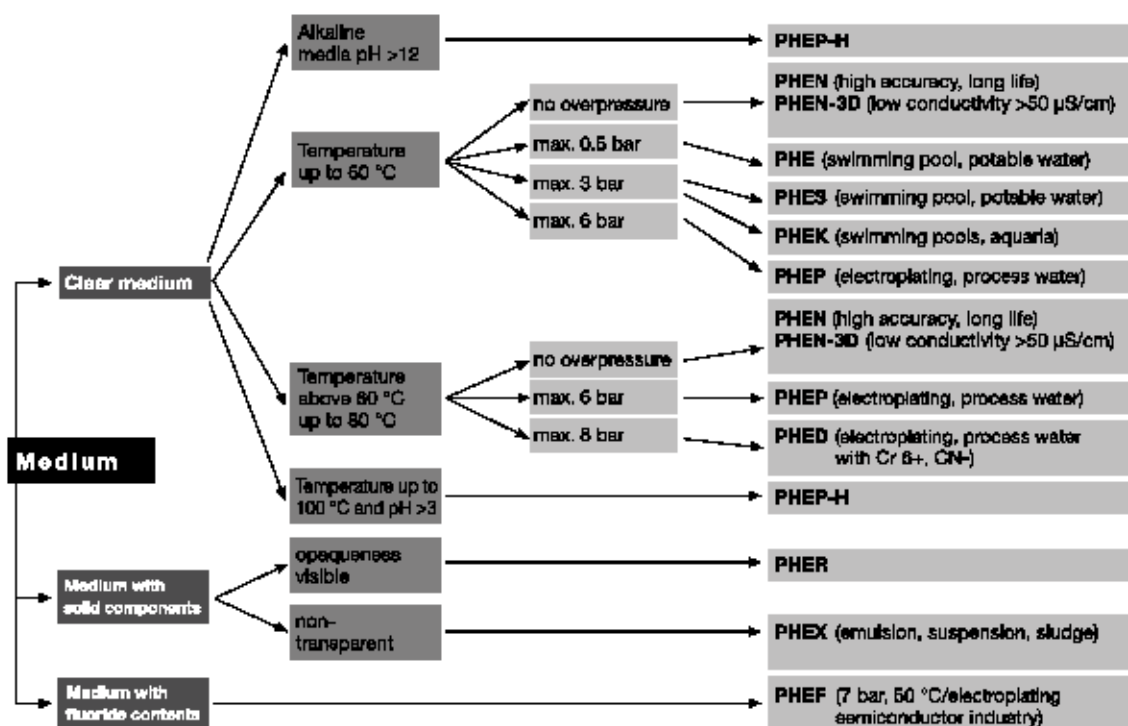
- From simple conductometric 2-electrodes through to inductive high-end sensors
- Precise and reliable measurement for efficient process control and maximum process reliability
- Long service life and long maintenance intervals reduce downtimes and increase the availability of the measured values
- Completely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



ProMinent® DULCOTEST® Sensors

Overview: Sensors

Selection Guide DULCOTEST® pH Sensors



Selection Guide: Amperometric Sensors

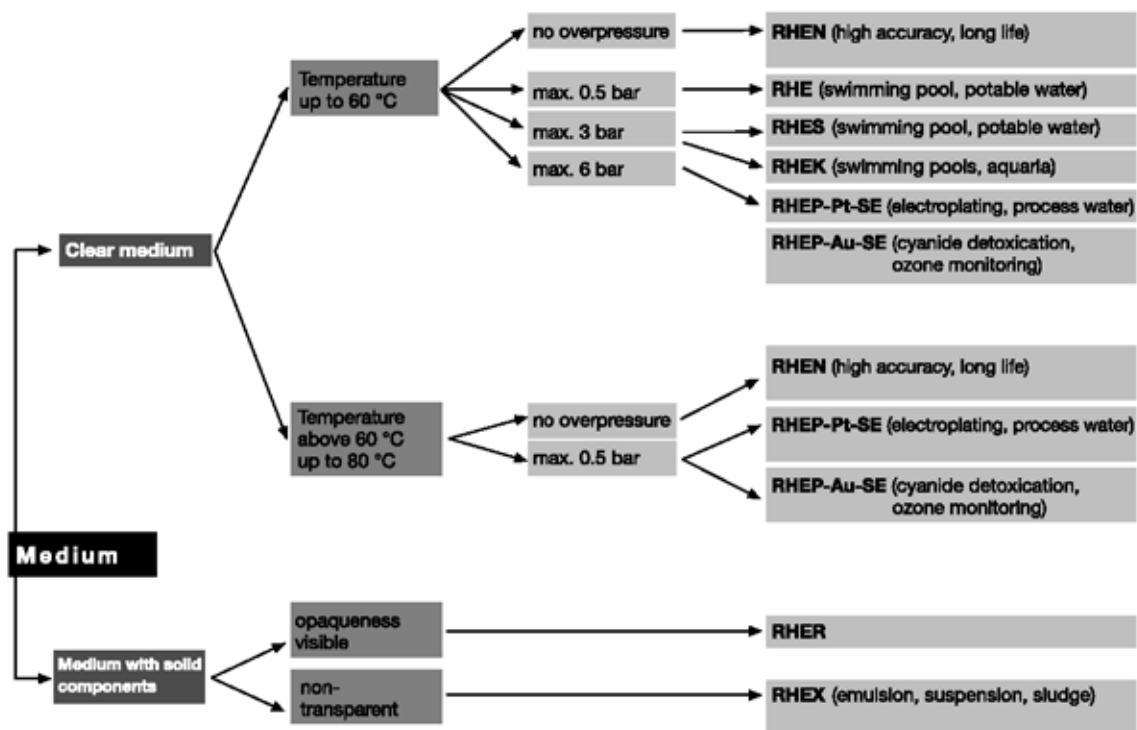
Measured variable	Applications	Graduated measuring range	Connection to DULCOMETER®	Sensor type
Free chlorine	Drinking water, swimming pool	0.01–100 ppm	D1C, D2C, ProMcon	CLE 3-mA-xppm, CLE 3.1-mA-xppm
Free chlorine	Drinking water, swimming pool water, in situ electrolysis (without diaphragm)	0.02–10 ppm	D1C, D2C, ProMcon	CLO 1-mA-xppm
Free chlorine	Hot water up to 70 °C (legionella), in situ electrolysis (without diaphragm)	0.02–2 ppm	D1C, D2C, ProMcon	CLO 2-mA-2ppm
Free chlorine	Drinking water, swimming pool	0.01–50 ppm	DMT	CLE 3-DMT-xppm
Free chlorine	Drinking water, swimming pool	0.01–10 ppm	DULCOMARIN® II	CLE 3-CAN-xppm, CLE 3.1-CAN-xppm
Free chlorine	Drinking water, swimming pool	0.05–5 ppm	COMPACT	CLB 2-µA-xppm
Free chlorine	Cooling water, process water, waste water, water with higher pH values (stable)	0.01–10 ppm	D1C, D2C, ProMcon	CBR 1-mA-xppm
Total available chlorine	Swimming pool water with chlorine-organic disinfectants	0.02–10 ppm	D1C, D2C, ProMcon	CGE 2-mA-xppm
Total available chlorine	Swimming pool water with chlorine-organic disinfectants	0.01–10 ppm	DULCOMARIN® II	CGE 2- CAN-xppm
Total chlorine	Drinking, service, process and cooling water	0.01–10 ppm	D1C, D2C, ProMcon	CTE 1-mA-xppm
Total chlorine	Drinking, service, process and cooling water	0.01–10 ppm	DMT	CTE 1-DMT-xppm
Total chlorine	Drinking, service, process and cooling water	0.01–10 ppm	DULCOMARIN® II	CTE 1-CAN-xppm
Combined chlorine	Swimming pool water	0.02–2 ppm	D2C	CTE 1-mA-2 ppm + CLE 3.1-mA-2 ppm
Combined chlorine	Swimming pool water	0.01–10 ppm	DULCOMARIN® II	CTE 1-CAN-xppm + CLE 3.1-CAN-xppm

ProMinent® DULCOTEST® Sensors

Overview: Sensors

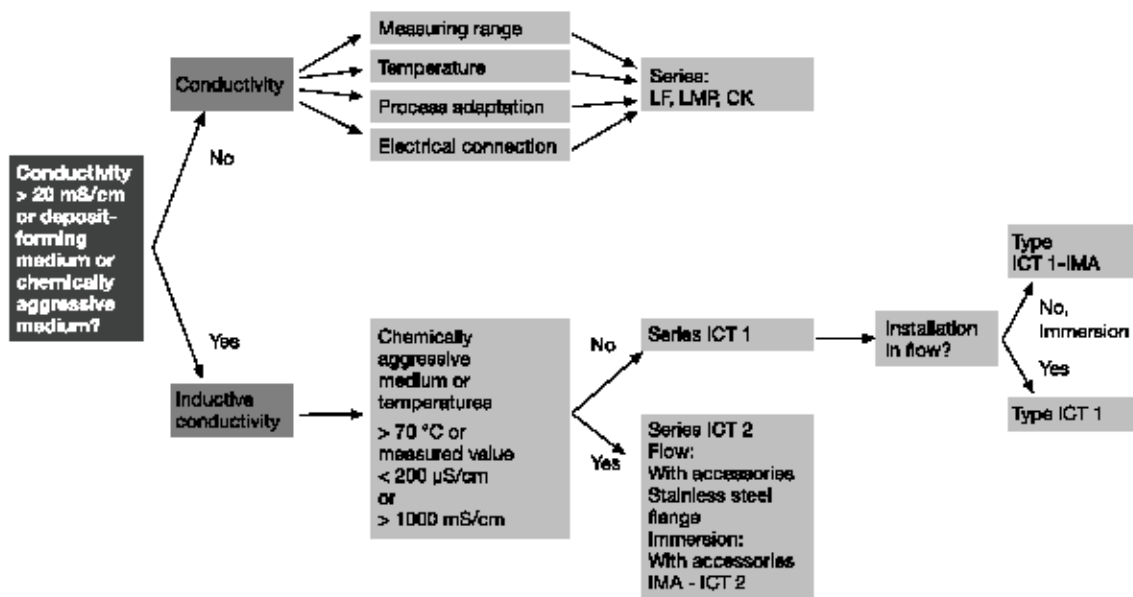
Measured variable	Applications	Graduated measuring range	Connection to DULCOMETER®	Sensor type
Total available bromine	Cooling water, swimming pool water, whirlpool water, bromine with bromorganic disinfectants (e.g. BCDMH)	0.2–10 ppm	D1C, ProMcon	BRE 1-mA-xppm
Total available bromine	Cooling water, swimming pool water, whirlpool water, bromine with inorganic bromine compounds (e.g. NaBr/HOCl)	0.2–10 ppm	D1C, ProMcon	BRE 2-mA-xppm
Total available bromine	Cooling water, swimming pool water, whirl- pool water with mine compounds	0.02-10 ppm	DULCOMARIN® II	BRE 3-CAN-10 ppm
Free and bound bromine	Cooling water, process water, waste water, water with higher pH values (stable)	0.02-20 ppm	D1C, ProMcon	CBR 1-mA-xppm
Chlorine dioxide	Drinking water	0.01–10 ppm	D1C, D2C, DULCOMARIN® II	CDE 2-mA-xppm
Chlorine dioxide	Bottle washer system	0.02–2 ppm	D1C, D2C, DULCOMARIN® II	CDP 1-mA
Chlorine dioxide	Hot water up to 60 °C, cooling water, waste water, irrigation water	0.01-10 ppm	D1C, D2C, DULCOMARIN® II	CDR 1-mA-xppm
Chlorite	Drinking, wash water	0.02–2 ppm	D1C, DULCOMARIN® II	CLT 1-mA-xppm
Ozone	Drinking, service, process, swimming pool water	0.02–2 ppm	D1C, ProMcon	OZE 3-mA-xppm
Dissolved oxygen	Drinking, surface water	2–20 ppm	D1C	DO 1-mA-xppm
Dissolved oxygen	Activated sludge tank, sewage treatment plant	0.1–10 ppm	D1C	DO 2-mA-xppm
Peracetic acid	CIP, antiseptic food filling process	1–2,000 ppm	D1C	PAA 1-mA-xppm
Hydrogen peroxide	Clear water, fast control	1–2,000 ppm	PEROX controller	Perox sensor PEROX-H2.10-P
Hydrogen peroxide	Process, swimming pool water	0.5–2,000 ppm	D1CA, ProMcon	PER1-mA-xppm

Selection Guide DULCOTEST® ORP Sensors



Overview: Sensors

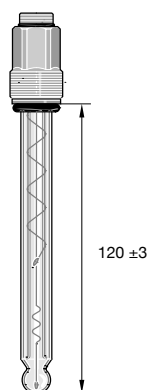
Selection Guide DULCOTEST® Conductivity Sensors



ProMinent® DULCOTEST® Sensors

pH Sensors With SN6 or Vario Pin

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



pk_6_016

PHES 112 SE

pH range: 1-12

Temperature: 32-140 °F (0-60 °C)

Max. pressure: 7.25 psi (0.5 bar)

Min. conductivity: >150 µS/cm

Diaphragm: Ceramic

Installation length: 4.72" (120 ±3 mm), thread PG 13.5

Typical applications: Swimming pool, atmospheric pressure installation, potable water, lightly contaminated waste water.

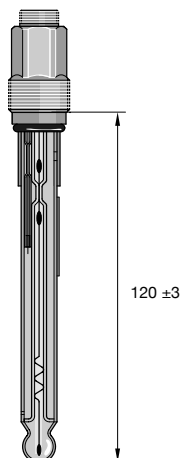
Part No.

PHES 112 SE

150702

ProMinent® DULCOTEST® Sensors

pH Combination Sensors With SN6



pk_6_019

PHEP 112 SE

pH range: 1-12

Temperature: 32-176 °F (0-80 °C)

Max. pressure: 87 psi (6 bar)

Min. conductivity: >150 µS/cm

Diaphragm: Ceramic

Installation length: 4.72" (120 ±3 mm), thread PG 13.5

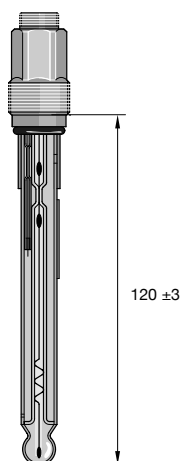
Mounting hole: min Ø 0.6" (14.5 mm)

Typical uses: Swimming pools under pressure for higher temperatures and pressures, portable and industrial water, lightly soiled wastewater and the electroplating and chemical industries

Part No.

PHEP 112 SE

150041



pk_6_019

PHEP-H 314 SE

pH range: 3-14 (Note: use below pH 3 shortens the service life)

Temperature: 32-212 °F (0-100 °C)

Max. pressure: 87 psi (6 bar) at 77 °F (25 °C)

43.5 psi (3 bar) at 212 °F (100 °C)

Min. conductivity: 150 µS/cm

Diaphragm: ceramic

Insertion length: 4.72" (120 ±3 mm), screw-in thread PG 13.5

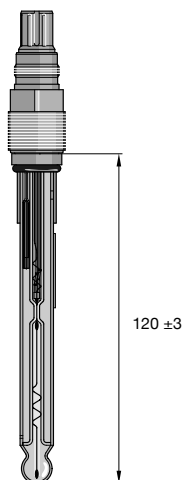
Shank diameter: 0.47" (12 mm) min. diam.

Typical applications: monitoring or control of chemical processes with neutral to highly-alkaline media and temperatures up to 100 °C

Part No.

PHEP-H 314 SE

1024882



pk_6_068

PHEPT 112 VE

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

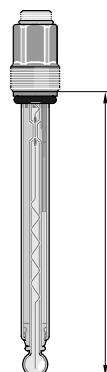
Part No.

PHEPT 112 VE

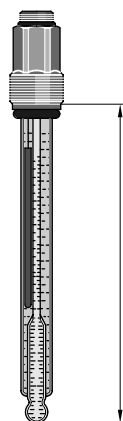
1004571

ProMinent® DULCOTEST® Sensors

pH Combination Sensors With SN6



pk_6_018



pk_6_017

PHER 112 SE

pH range: 1-12

Temperature: 32-176 °F (0-80 °C)

Max. pressure: 87 psi (6 bar)

Min. conductivity: >50 µS/cm

Electrolyte with solid KCl supply (salt rings in the reference electrolyte)

Diaphragm: PTFE ring diaphragm

Installation Length: 4.72" (120 ±3 mm)

Typical applications: Municipal and industrial wastewater, process water, water in the chemical and paper manufacturing industries. General, for water with suspended solid content.

Part No.

PHER 112 SE

1001586

PHEX 112 SE

pH range: 1-12

Temperature: 32-212 °F (0-100 °C)

Max. pressure: 232 psi (16 bar) at 77 °F (25 °C); 87 psi (6 bar) at 212 °F (100 °C)

Min. conductivity: >500 µS/cm

Diaphragm: Circular gap diaphragm (solid electrolyte)

Installation length: 4.72" (120 ±3 mm)

Typical applications: Waste water, industrial water, process chemistry, emulsions, suspensions, fluids containing protein and sulphide (not for chlorine/fluoride or when subject to temperature fluctuations). General, for water with a high suspended solid content.

Not suitable for use in clear water

Part No.

PHEX 112 SE

305096

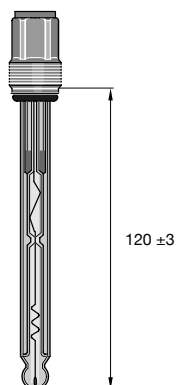
PHEX 112 SE Same as above but length 8.9" (225 ±3 mm)

150061

ProMinent® DULCOTEST® Sensors

pH Combination Sensors With SN6

pk_6_022

**PHED 112 SE**

pH range: 1-12

Temperature: 32-176 °F (0-80 °C)

Max. pressure: 116 psi (8 bar)

Min. conductivity: >150 µS/cm

Diaphragm: Double junction

Installation length: 4.72" (120 ±3 mm)

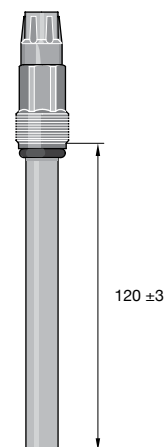
Typical applications: Potable, industrial water, lightly contaminated waste water, cooling tower water

Part No.

PHED 112 SE

741036

pk_6_007

**PHEF 012 SE**

pH range: 1-12

Temperature: 32-122 °F (0-50 °C)

Max. pressure: 100 psi/7 bar

Min. conductivity: >150 µS/cm

Diaphragm: HDPE ring diaphragm, flat (Double Junction)

Glass membrane: flat membrane glass, largely resistant to hydrofluoric acid solutions

Electrode shaft: epoxy

Typical applications: achieves a significantly longer service life in hydrofluoric acidic fluids as compared to standard pH electrodes, e.g. in wastewaters from the chip industry or electroplating applications.

The electrode is protected against dirt by the flat glass membrane and the circumferential flat PE diaphragm.

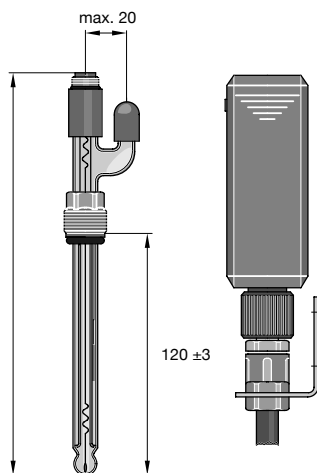
HF

Part No.

PHEF 012 SE

1010511

pk_6_021

**PHEN 112 SE**

pH range: 1-12

Temperature: 32-176 °F (0-80 °C)

Max. pressure: Atmospheric pressure

Min. conductivity: >150 µS/cm

Diaphragm: Ceramic

KCl electrolyte, refillable

Installation Length: 4.72" (120 ±3 mm)

Typical applications: Waste water

Supplied without PE storage container and tubing

Part No.

PHEN 112 SE

305090

Accessories:

PE storage container with connectors and tubing

305058

We recommend installation approx. 1.5 - 3 ft. (0.5-1 m) above sample fluid level

KCl solution 3 molar

250 ml

791440

KCl solution 3 molar

1000 ml

791441

ProMinent® DULCOTEST® Sensors

pH Combination Sensors With SN6

PHEN 112 SE 3D

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

Part No.

PHEN 112 SE 3D	150078
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pH range: 0-12
 Temperature: 32-176 °F (0-80 °C)
 Max. pressure: Atmospheric pressure operation
 Min. conductivity: >150 µS/cm
 Diaphragm: Ceramic
 KCl electrolyte, refillable
 No internal mounting thread
 Typical applications: Manual measurement in laboratory

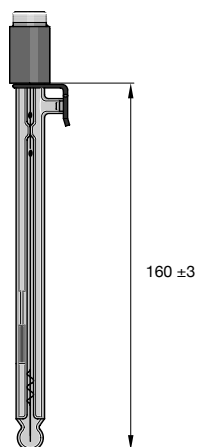
Part No.

PHEN 112 SL	305078
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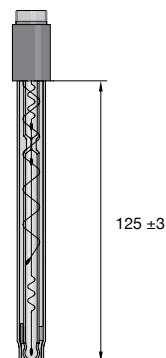
As above but
 Min. conductivity: >50 µS/cm
 Diaphragm: 3 ceramic diaphragms
 Typical applications: Laboratory, lower conductivity

Part No.

PHEN 112 SL 3D	791508
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pk_6_020



pk_6_023

PHEK 112 SE

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

Part No.

PHEK 112 SE	305051
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PHEK-L 112 SE

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

Part No.

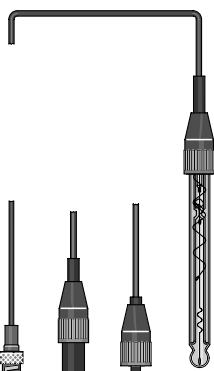
PHEK-L 112 SE	1034918
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ProMinent® DULCOTEST® Sensors

pH Sensors with Fixed Cable

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

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



pk_6_024

B D S

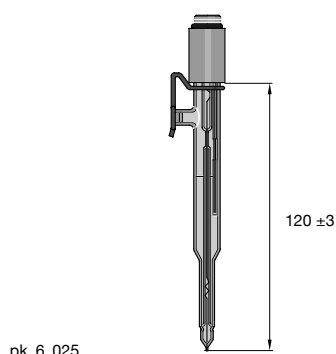
Type PHES 112 F

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

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

ProMinent® DULCOTEST® Sensors

pH Combination Sensors With SN6

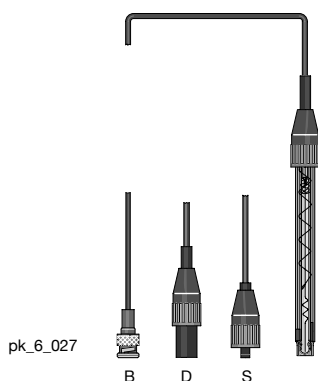


PHEE 112 S

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

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

pH Combination Sensors With Fixed Cable

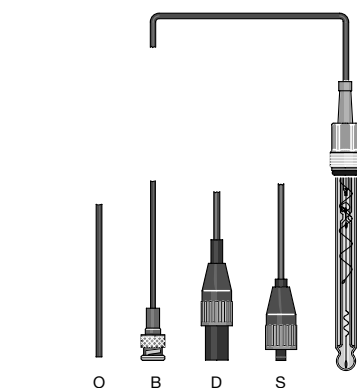


Type PHEK 112 F

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

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

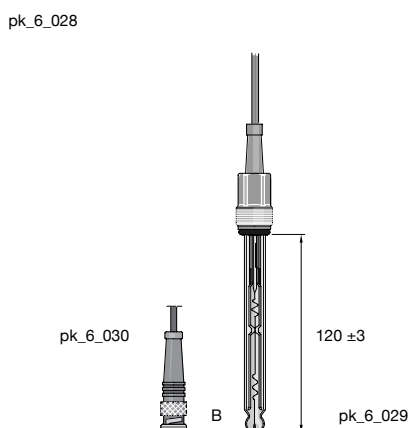
Further types on request.



Type PHE 112 FE

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

Further types on request.



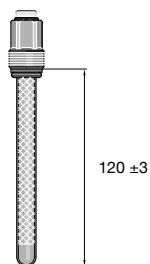
Type PHED 112 FE

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

Further types on request.

ProMinent® DULCOTEST® Sensors

Temperature Sensors



Temperature range: 0...100 °C

Max. pressure: 10 bar

Typical applications: Temperature measurement and pH temperature correction

	Part No.
Pt 100 SE	305063
Pt 1000 SE	1002856

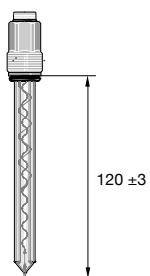
pk_6_026

ORP Identcode Description

Identity Code Description (Type description)

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

ORP Combination Sensors With SN6

**RHES-Pt-SE**

Temperature: 32-140 °F (0-60 °C)

Max. pressure: 7.3 psi (0.5 bar)

Min. conductivity: >150 µS/cm

Diaphragm: Ceramic

Installation length: 4.72" (120 ± 3 mm)

Typical applications: Swimming pool, atmospheric pressure installation, potable water, lightly contaminated water

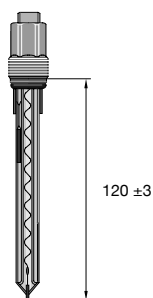
	Part No.
RHES-Pt-SE	150703

pk_6_031

ProMinent® DULCOTEST® Sensors

ORP Combination Sensors With SN6

pk_6_035



RHEP-Pt-SE

Temperature: 32-176 °F (0-80 °C)
 Max. pressure: 87 psi (6 bar)
 Min. conductivity: >150 µS/cm
 Diaphragm: Ceramic
 Installation length: 4.72" (120 ±3 mm)
 Mounting hole: min. Ø 0.57" (14.5 mm)

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

Part No.

RHEP-Pt-SE	150094
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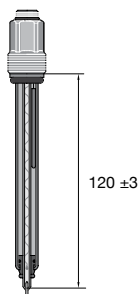
RHEP-Au-SE

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

Part No.

RHEP-Au-SE	1003875
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pk_6_034



RHER-Pt-SE

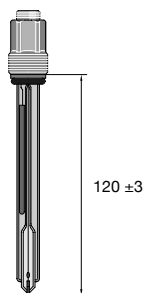
Temperature: 32-176 °F (0-80 °C)
 Max. pressure: 87 psi (6 bar)
 Min. conductivity: >50 µS/cm
 Electrolyte with KCl supplement (salt rings in the reference electrolyte)
 Diaphragm: PTFE ring diaphragm
 Installation length: 4.72" (120 ±3 mm)

Typical applications: Municipal and industrial waste water, drinking and industrial water, chemical industry, paper manufacture, food industry. General, for water with distinct suspended solid content.

Part No.

RHER-Pt-SE	1002534
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pk_6_033



RHEX-Pt-SE

Temperature: 32-212 °F (0-100 °C)
 Max. pressure: 232 psi (16 bar) at 77 °F (25 °C); 87 psi (6 bar) at 212 °F (100 °C)
 Min. conductivity: >500 µS/cm
 Diaphragm: circular gap (solid electrolyte)
 Installation length: 4.72" (120 ±3 mm)

Typical applications: Waste water, industrial water, process chemistry, emulsions, suspensions, fluids containing protein and sulphite (not chlorine/fluoride or when subject to temperature fluctuations). General, for water with high suspended solid content.

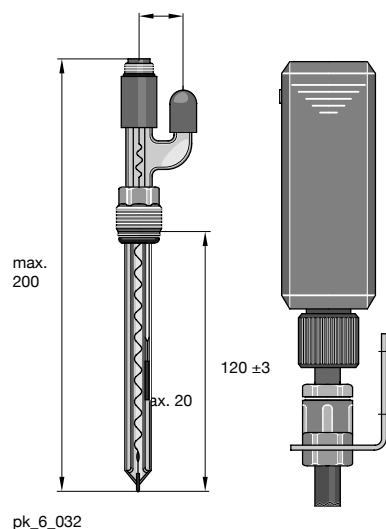
Not suitable for clear media

Part No.

RHEX-Pt-SE	305097
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ProMinent® DULCOTEST® Sensors

ORP Combination Sensors With SN6

**RHEN-Pt-SE**

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

Part No.

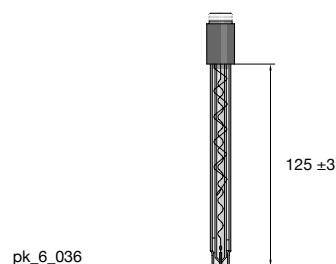
RHEN-Pt-SE	305091
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Accessories:

PE storage container with connectors and tubing	305058
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We recommend installation approx. 1.6 - 3.3 ft. (0.5-1 m) above sample fluid level.

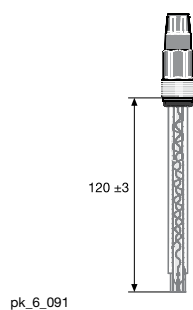
KCl solution 3 molar	250 ml	791440
KCl solution 3 molar	1000 ml	791441

**RHEK-Pt-S**

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

Part No.

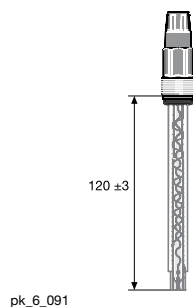
RHEK-Pt-S	305052
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**RHEK-Pt-SE**

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

Part No.

RHEK-Pt-SE	1028459
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**RHEK-L-Pt-SE**

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

Part No.

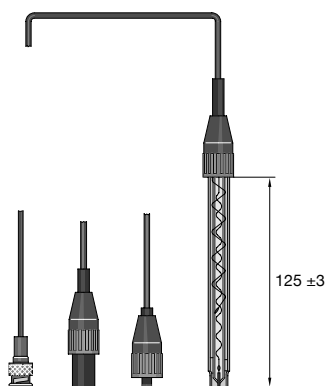
RHEK-L-Pt-SE	1034919
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ProMinent® DULCOTEST® Sensors

ORP Sensors With Fixed Cable

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

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

**Type RHES-Pt-F**

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

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

Type RHEK-Pt-F

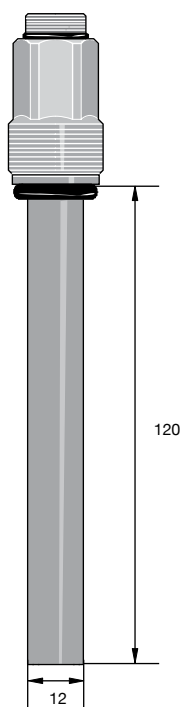
ORP sensor with plastic shaft, Pt electrode with cover.
Fixed coax cable and device plug, no internal mounting thread.

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

ProMinent® DULCOTEST® Sensors

Fluoride Sensors

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



pk_6_095

FLEP 010

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

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

Part No.

FLEP 010 (fluoride sensor)*	1028279
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Accessories

4-20 mA measurement transducer FPV1**	1028280
Sensor cable	7740215
Reference electrode, REFP-SE	1018458
Temperature sensor, Pt 100	305063
Polishing paste	559810

* replaces fluoride sensor (part no. 1010311)

** replaces transducer (part no. 1009962)

ProMinent® DULCOTEST® Sensors

Overview: Amperometric Sensors

For optimum functioning of chlorine, bromine, chlorine dioxide and ozone sensors please note the following guidelines:

- Use DULCOMETER® measurement and control systems.
- Install only in ProMinent® DGM or DLG III in-line probe fittings.
- Defined flow between 7.9-15.8 gph (30-60 l/h).
- Chlorine measurement must only take place when pH is stable.
- Regular calibration with a Photometer (e.g. Type DT 1).

Important:

Amperometric sensors are not electrically isolated. When installing in external appliances (e.g. PLC), you should electrically isolate the supply voltage and the analog input signal.

Summary of features:

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

Measured variable	Applications	Graduated measuring range	DULCOMETER®	Sensor type
Free chlorine	Drinking water, swimming pool	0.01–100 ppm	D1C, D2C, ProMcon	CLE 3-mA-xppm, CLE 3.1-mA-xppm
Free chlorine	Drinking water, swimming pool water, in situ electrolysis (without diaphragm)	0.02-10 ppm	D1C, D2C, ProMcon	CLO 1-mA-xppm
Free chlorine	Hot water up to 70 °C (legionella), in situ electrolysis (without diaphragm)	0.02-2 ppm	D1C, D2C, ProMcon	CLO 2-mA-2ppm
Free chlorine	Drinking water, swimming pool	0.01–50 ppm	DMT	CLE 3-DMT-xppm
Free chlorine	Drinking water, swimming pool	0.01–10 ppm	DULCOMARIN® II	CLE 3-CAN-xppm, CLE 3.1-CAN-xppm
Free chlorine	Drinking water, swimming pool	0.05-5 ppm	COMPACT	CLB 2-μA-xppm
Free chlorine	Cooling water, process water, waste water, water with higher pH values (stable)	0.01-10 ppm	D1C, D2C, ProMcon	CBR 1-mA-xppm
Total available chlorine	Swimming pool water with chlorine-organic disinfectants	0.02–10 ppm	D1C, D2C, ProMcon	CGE 2-mA-xppm
Total available chlorine	Swimming pool water with chlorine-organic disinfectants	0.01–10 ppm	DULCOMARIN® II	CGE 2- CAN-xppm
Total chlorine	Drinking, service, process and cooling water	0.01–10 ppm	D1C, D2C, ProMcon	CTE 1-mA-xppm
Total chlorine	Drinking, service, process and cooling water	0.01–10 ppm	DMT	CTE 1-DMT-xppm
Total chlorine	Drinking, service, process and cooling water	0.01–10 ppm	DULCOMARIN® II	CTE 1-CAN-xppm
Combined chlorine	Swimming pool water	0.02–2 ppm	D2C	CTE 1-mA-2 ppm + CLE 3.1-mA-2 ppm
Combined chlorine	Swimming pool water	0.01–10 ppm	DULCOMARIN® II	CTE 1-CAN-xppm + CLE 3.1-CAN-xppm
Total available bromine	Cooling water, swimming pool water, whirl-pool water, bromine with bromorganic disinfectants (e.g. BCDMH)	0.2–10 ppm	D1C, ProMcon	BRE 1-mA-xppm
Total available bromine	Cooling water, swimming pool water, whirl-pool water, bromine with inorganic bromine compounds (e.g. NaBr/HOCl)	0.2–10 ppm	D1C, ProMcon	BRE 2-mA-xppm
Total available bromine	Cooling water, swimming pool water, whirl-pool water with bromorganic or inorganic bromine compounds	0.02-10 ppm	DULCOMARIN® II	BRE 3-CAN-10 ppm
Free and bound bromine	Cooling water, process water, waste water, water with higher pH values (stable)	0.02-20 ppm	D1C, ProMcon	CBR 1-mA-xppm

ProMinent® DULCOTEST® Sensors

Overview: Amperometric Sensors

Measured variable	Applications	Graduated measuring range	Connection to DULCOMETER®	Sensor type
Chlorine dioxide	Drinking water	0.01–10 ppm	D1C, D2C, DULCOMARIN® II	CDE 2-mA-xppm
Chlorine dioxide	Bottle washer system	0.02–2 ppm	D1C, D2C, DULCOMARIN® II	CDP 1-mA
Chlorine dioxide	Hot water up to 60 °C, cooling water, waste water, irrigation water	0.01–10 ppm	D1C, D2C, DULCOMARIN® II	CDR 1-mA-xppm
Chlorite	Drinking, wash water	0.02–2 ppm	D1C, DULCOMARIN® II	CLT 1-mA-xppm
Ozone	Drinking, service, process, swimming pool water	0.02–2 ppm	D1C, ProMcon	OZE 3-mA-xppm
Dissolved oxygen	Drinking, surface water	2–20 ppm	D1C	DO 1-mA-xppm
Dissolved oxygen	Activated sludge tank, sewage treatment plant	0.1–10 ppm	D1C	DO 2-mA-xppm
Peracetic acid	CIP, antiseptic food filling process	1–2,000 ppm	D1C	PAA 1-mA-xppm
Hydrogen peroxide	Clear water, fast control	1–2,000 ppm	PEROX controller	Perox sensor PEROX-H2.10-P
Hydrogen peroxide	Process, swimming pool water	0.5–2,000 ppm	D1CA, ProMcon	PER1-mA-xppm

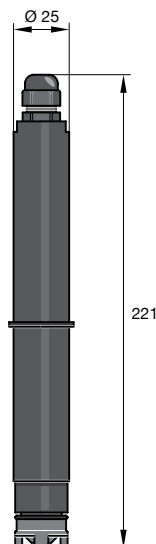
Overview: Amperometric Sensors Selection Guide

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

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

ProMinent® DULCOTEST® Sensors

Chlorine Sensors



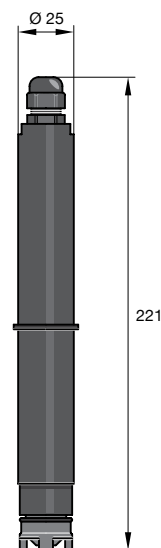
pk_6_039

Measurement of free chlorine

CLE 3-mA

Measured variable:	Free chlorine (hypochlorous acid HOCl)
Analysis:	DPD 1
pH range:	5.5-8.0 (up to pH 8.5 with D1C pH correction)
Temperature range:	41-113 °F (5-45 °C) temperature compensated
Max. pressure:	14.5 psi (1 bar)
Flow:	7.9-14.9 gph (30-60 l/h) in DGM or DLG III
Power supply:	16-24 V DC (two-wire technology)
Output signal:	4-20 mA = measurement range (un-calibrated) Warning: no electrical isolation!
Typical applications:	CLE 3-mA-0.5 ppm, potable water CLE 3-mA-2/5/10 ppm, swimming pool, potable, industrial, process water (surfactant free)
Measurement and control devices:	D1C, D2C, DULCOMARIN® (2/10 ppm only)
In-line probe housing:	DGM, DLG III

	Part No.
CLE 3-mA-0.5 ppm set, with 100 ml electrolyte	792927
CLE 3-mA-2 ppm set, with 100 ml electrolyte	792920
CLE 3-mA-5 ppm set, with 100 ml electrolyte	1033392
CLE 3-mA-10 ppm set, with 100 ml electrolyte	792919
CLE 3-mA-20 ppm set, with 100 ml electrolyte	1002964
CLE 3-mA-50 ppm set, with 100 ml electrolyte	1020531
CLE 3-mA-100 ppm set with 100 ml electrolyte	1022786



pk_6_039

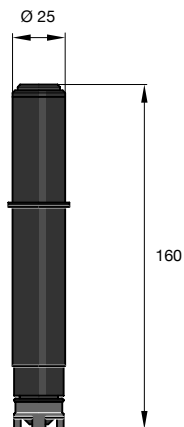
CLE 3.1-mA

Measured variable:	free chlorine (hypochlorous acid HOCl) where there is a high rate of combined chlorine and/or in the case of pH values up to 8.5 (with D1C pH correction)
Reference method:	DPD1
Measurement range:	0.01-0.50 mg/l (CLE 3.1-mA-0.5 ppm) 0.02-2.00 mg/l (CLE 3.1-mA-2 ppm) 0.01-5.00 mg/l (CLE 3.1-mA-5 ppm) 0.1-10.0 mg/l (CLE 3.1-mA-10 ppm)
pH range:	5.5-8.0 (up to pH 8.5 with D1C pH correction)
Temp. range:	41-113 °F (5-45 °C) temperature compensated
Max. pressure:	14.5 psi (1 bar)
Inflow:	7.9-14.9 gph (30-60 l/h) in the DGM or DLG III
Supply voltage:	16-24 V DC (two wire technology)
Output signal:	4-20 mA = measurement range (uncalibrated) Important: not electrically isolated!
Typical applications:	swimming pool, industrial and process water with higher proportions of combined chlorine and/or higher pH values to pH 8.5
Measurement and control equipment:	D1C, D2C, DULCOMARIN®
In-line probe housing:	DGM, DLG III

	Part No.
CLE 3.1-mA-0.5 ppm set, with 100 ml electrolyte	1020530
CLE 3.1-mA-2 ppm set, with 100 ml electrolyte	1018369
CLE 3.1-mA-5 ppm set, with 100 ml electrolyte	1019398
CLE 3.1-mA-10 ppm set, with 100 ml electrolyte	1018368

ProMinent® DULCOTEST® Sensors

Chlorine Sensors



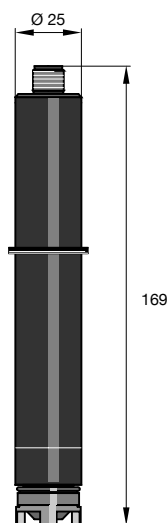
pk_6_042

CLE 2.2-4P

Measured variable: **Free chlorine, (hypochlorous acid HOCl)**
 Reference method: DPD1
 Measurement range: 0.1-20 mg/l
 Remaining data as for CLE 3-mA
 In-line probe housing: DGM, DLG III

Part No.

CLE 2.2-4P set, with 100 ml electrolyte	914958
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pk_6_038

CLE 3-DMT

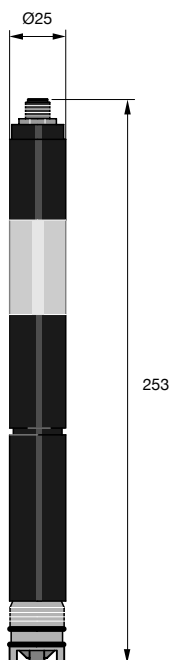
Measuring cell for use with the DMT "chlorine" measurement transducer.

Measured variable: **Free chlorine (hypochlorous acid HOCl)**
 Reference method: DPD1
 Measurement range: 0.01-5.0 mg/l
 0.05-50 mg/l
 Supply: From the DMT measurement transducer (3.3 VDC)
 Output signal: Un-calibrated, not temperature compensated
 Temp. measurement: Via integrated Pt 1000: compensation carried out in DMT
 Measuring cell output: 5-pin plug
 Other data as for CLE-3 mA.

Part No.

CLE 3-DMT-5 ppm set with 100 ml electrolyte	1005511
CLE 3-DMT-50 ppm set with 100 ml electrolyte	1005512

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



pk_6_096

CLE 3-CAN

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

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

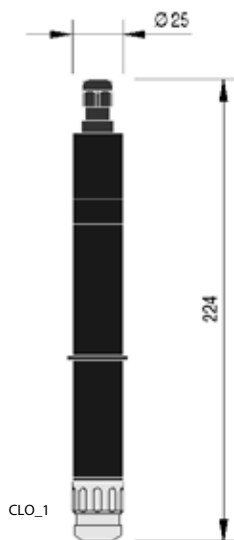
Part No.

CLE 3-CAN-10 ppm set with 100 ml electrolyte	1023425
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Note: You require assembly kit (Part No. 815079) for the initial installation of the chlorine sensors into the DLM III in-line probe housing.

ProMinent® DULCOTEST® Sensors

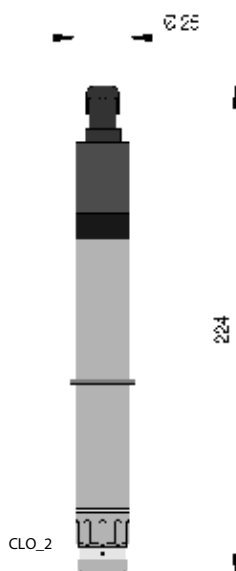
Chlorine Sensors



CLO 1-mA

Measured variable:	Free chlorine (hypochlorous acid HOCl)
Reference method:	DPD1
pH range:	5-9 ppm
Temperature:	41-113 °F (5-45 °C)
Max. pressure:	116 psi (8 bar)
Intake flow:	7.9-15.9 gph (30-60 l/h) (in DGM or DGL III), constant flow as flow-dependent signal
Power supply:	16-24 V DC (2-wire)
Output signal:	4-20 mA = Measuring range, temperature-compensated, uncalibrated, not electrically isolated
Typical applications:	Swimming pool, uncontaminated drinking water and industrial service water, and can also be used together with diaphragm-free electrolysis processes
Measurement and control equipment:	D1C, D2C
In-line probe fitting:	DGM, DLG III to 140 °F (60 °C), special fitting for 140-158 °F (60-70 °C) on request
Measuring principle:	amperometric, 3 electrodes, no diaphragm

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



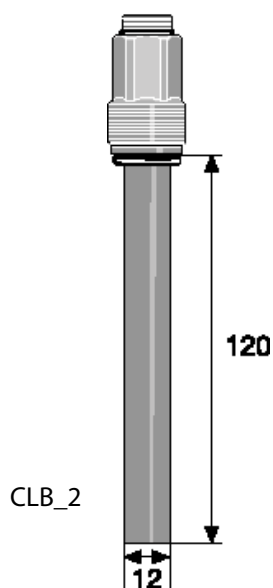
CLO 2-mA

Measured variable:	Free chlorine (hypochlorous acid HOCl)
Reference method:	DPD1
pH range:	5-9 ppm
Temperature:	41-158 °F (5-45 °C)
Max. pressure:	116 psi (8 bar)
Intake flow:	7.9-15.9 gph (30-60 l/h) (in DGM or DGL III), constant flow as flow-dependent signal
Power supply:	16-24 V DC (2-wire)
Output signal:	4-20 mA = Measuring range, temperature-compensated, uncalibrated, not electrically isolated
Typical applications:	Hot water up to 158 °F (70 °C), combatting legionella, uncontaminated drinking water and industrial service water, can, also be used together with diaphragm-free electrolysis processes
Measurement and control equipment:	D1C, D2C
In-line probe fitting:	DGM, DLG III to 140 °F (60 °C), special fitting for 140-158 °F (60-70 °C) on request
Measuring principle:	amperometric, 3 electrodes, no diaphragm

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

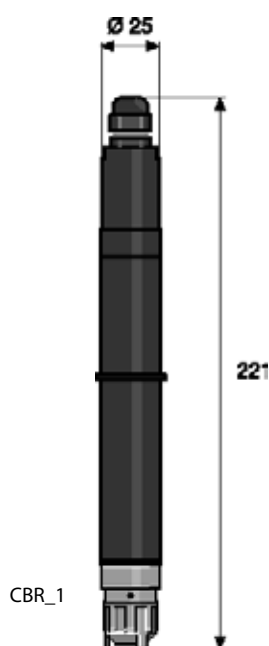
ProMinent® DULCOTEST® Sensors

Chlorine Sensors

**CLB 2-µA**

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

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

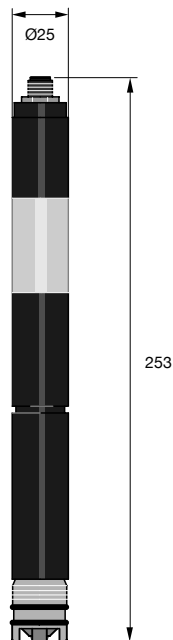
**CBR 1-mA**

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

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

ProMinent® DULCOTEST® Sensors

Chlorine Sensors



pk_6_096

CLE 3.1-CAN

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

Measured variable: **free chlorine (hypochlorous acid) with high proportion of bound chlorine and/or pH value up to 8.5 (with pH correction via D1C)**

Reference method: DPD 1

Measurement range: 0.01 -10 mg/l

Power supply: via CAN-interface (11-30 V)

Temperature measurement: via installed digital semiconductor element

Output signal: uncalibrated, temperature compensated, electrically isolated

Compatibility: CAN-Open bus systems

Additional data see CLE 3.1-mA

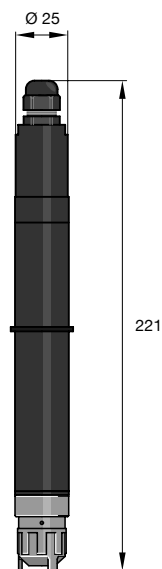
Part No.

CLE 3.1-CAN-10 ppm set with 100 ml electrolyte

1023426

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

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



pk_6_040

CGE 2-mA

Measured variable: **Total available chlorine: sum of organically combined chlorine (e.g. combined in cyanuric acid) and free chlorine**

Reference method: DPD1

Measurement range: 0.02-2.00 mg/l (CGE 2-mA-2 ppm)
0.1-10.0 mg/l (CGE 2-mA-10 ppm)

pH range: 5.5-9.5

Temperature range: 41-113 °F (5-45 °C) temperature compensated

Max. pressure: 43.5 psi (3 bar)

Flow: 7.9-15.9 gph (30-60 l/h) in DGM or DLG III

Power supply: 16-24 V DC (two-wire technology)

Output signal: 4-20 mA = measurement range (un-calibrated)

Warning: no electrical isolation!

Typical applications: Swimming pools and in water with high pH-value

Measurement and control devices: D1C, D2C, DULCOMARIN®

In-line probe housing: DGM, DLG III

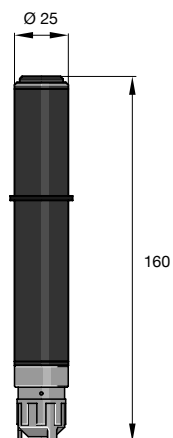
Part No.

CGE 2-mA-2 ppm set, with 50 ml electrolyte

792843

CGE 2-mA-10 ppm set, with 50 ml electrolyte

792842



pk_6_041

CGE 2-4P-10 ppm

Measured variable: **Organic combined chlorine and free chlorine**

Reference method: DPD1

Measurement range: 0.1-10.0 mg/l

Remaining data as for CGE 2-mA

Measurement and control devices: D_4a (metering pump with integrated controller)

In-line probe housing: DGM, DLG III

Part No.

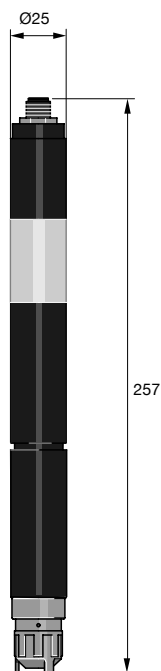
CGE 2-4P-10 ppm set, with 50 ml electrolyte

792838

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

ProMinent® DULCOTEST® Sensors

Chlorine Sensors



pk_6_084

CGE 2-CAN

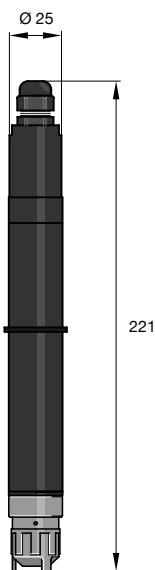
Probe for connection to a CANopen interface (e.g. DULCOMARIN® II swimming pool controller)

Measured variable:	total available chlorine: sum of organically combined chlorine (e.g. combined in cyanuric acid) and free chlorine
Reference method:	DPD1
Range:	0.01-10.00 ppm
pH range:	5.5-9.5
Temp. range:	5-45 °C (temperature compensated)
Max. pressure:	3 bar
Incident flow:	30-60 l/h (with DGMa or DLG III)
Supply:	via CAN interface (11-30 V)
Temperature measurement:	via built-in digital semiconductor device
Output signal:	calibrated, temperature-compensated, electrically-isolated
Compatibility:	CANopen bus systems
See CGE 2-mA for other information	

Part No.

CGE 2-CAN-10 ppm c/w with 100 ml of electrolyte	1024420
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Note: a mounting kit (Part No. 815079) is required for the initial installation of the chlorine probe in the DLG III in-line probe housing.



pk_6_040

Measured variable of total chlorine**CTE 1-mA**

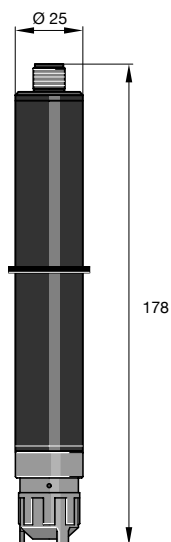
Measured variable:	total chlorine
Reference method:	DPD4
Measurement range:	0.01...0.50 mg/l (CTE 1-mA-0.5 ppm) 0.02... 2.00 mg/l (CTE 1-mA-2 ppm) 0.05... 5.00 mg/l (CTE 1-mA-5 ppm) 0.1... 10.0 mg/l (CTE 1-mA-10 ppm)
pH range:	5.5...9.5
Temperature range:	5...45 °C (temperature compensated)
Max. pressure:	3 bar
Flow:	30...60 l/h (in DGM or DLG III)
Power supply:	16...24 V DC (two-wire technology)
Output signal:	4...20 mA = measurement range (un-calibrated) Warning: no electrical isolation!
Typical applications:	CTE 1-mA-0.5 ppm, potable water CTE 1-mA-2/5/10 ppm: Potable, process, industrial and cooling water. In swimming pools in combination with CLE 3.1 for determining combined chlorine.
Measurement and control devices:	D1C, DULCOMARIN® (2/10 ppm only)
In-line probe housing:	DGM, DLG III

Part No.

CTE 1-mA-0.5 ppm set, with 50 ml electrolyte	740686
CTE 1-mA-2 ppm set, with 50 ml electrolyte	740685
CTE 1-mA-5 ppm set, with 50 ml electrolyte	1003203
CTE 1-mA-10 ppm set, with 50 ml electrolyte	740684

ProMinent® DULCOTEST® Sensors

Chlorine Sensors



pk_6_015

CTE 1-DMT

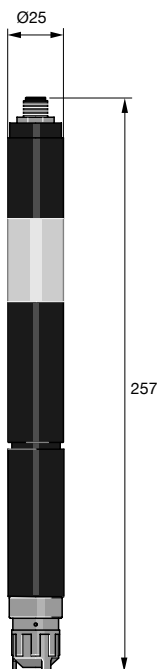
Measuring cell for use with the DMT "chlorine" measurement transducer.

Measured variable:	Total chlorine
Reference method:	DPD4
Measurement range:	0.01-10.0 mg/l
Power supply:	From the DMT measurement transducer (3.3 VDC)
Output signal:	Un-calibrated, not temperature compensated
Temperature measurement:	Via integrated Pt 1000: compensation carried out in DMT
Sensor output:	5-pin plug
Other data as for CTE 1 mA	

Part No.

CTE 1-DMT-10 ppm set with 50 ml electrolyte	1007540
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Note: An assembly set 815079 is required for DLG III for initial installation of chlorine measuring cells.



pk_6_084

CTE 1 -CAN

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

Measured variable:	total chlorine
Reference method:	DPD 4
Measurement range:	0.01 -10 mg/l
Power supply:	via CAN interface (11-30 V)
Temperature measurement:	via installed digital semiconductor element
Output signal:	uncalibrated, temperature compensated, electrically isolated
Compatibility:	CAN-Open bus systems
Additional data see CLE 3-mA	

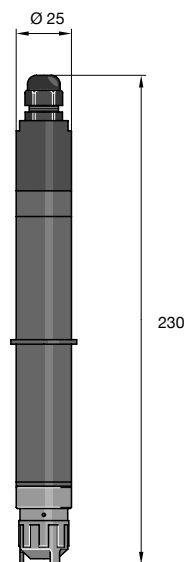
Part No.

CTE 1-CAN-10 ppm set with 100 ml electrolyte	1023427
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Note: You require assembly kit (Part No. 815079) for the initial installation of the chlorine sensors into the DLM III in-line probe housing

ProMinent® DULCOTEST® Sensors

Bromine Sensors



pk_6_074

The following bromating agents are used as disinfectants:

organic brominating agent

- a) DBDMH (1.3-dibrom-5.5-dimethyl-hydantoin) e. g. sold as Albrom 100®
 - b) BCDMH (1-bromine-3-chlorine-5.5-dimethyl-hydantoin) e.g. sold as Brom-Sticks®
- These bromating agents are solid and are metered as saturated solutions via brominators.

Inorganic free bromine

Free bromine is produced via the so-called Acti-Brom process® (Nalco) chlorine bleach + acid + sodium bromide.

For measuring DBDMH or free bromine as a bromating agent in the measurement range: 0.2 -10 ppm bromine the BRE 2-mA-10 ppm sensor is recommended along with DPD1-method calibration.

Alternatively, to measure BCDMH in the same measurement range, the BRE 1-mA-10 ppm sensor is recommended along with DPD4-method calibration.

Typical applications are in swimming pools, jacuzzis and cooling systems. Particularly in cooling systems the quality of the sample water must be tested and, where applicable, compatibility with other chemicals employed (e.g. corrosion inhibitors). Dissolved copper (>0.1 mg/l) will interfere with the measurement.

Photometric DPD measurement is the recommended method for calibrating the bromine sensor (e.g. with DT 1), calculated and displayed as bromine. If bromine is determined as "chlorine" with DPD, note when selecting the measurement range that you need to lower the result by a factor of 2.25.

Bromine measured variable

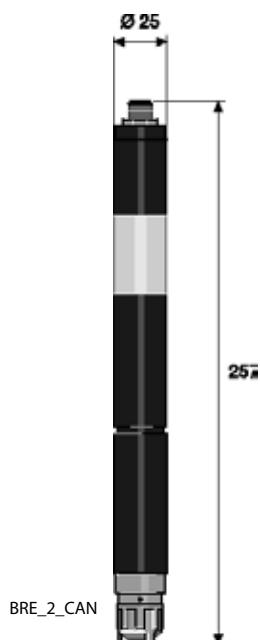
Measured variable:	Total available bromine (free and organic bound bromine)
Bromine chemicals:	DBDMH (1.3-dibromine 5.5-dimethyl hydantoin) BCDMH (1-bromine-3-chlorine-5.5-dimethyl hydantoin), free bromine
Reference method:	DBDMH, free bromine: DPD1 BCDMH: DPD4
Measurement range:	DBDMH free bromine: 0.2-10.0 mg/l with type BRE 2-mA-10 ppm BCDMH: 0.2-10.0 mg/l with type BRE 1-mA-10 ppm
pH dependence:	if pH 7 changes to pH 8 the sensor sensitivity is reduced accordingly a) in the case of DBDMH and free bromine by approx. 10 % b) in the case of BCDMH by approx. 25 %
Temperature range:	41-113 °F (5-45 °C)
Max. pressure:	43.5 psi (3 bar)
Sample flow:	7.9-15.9 gph (30-60 l/h) in DGM or DLG III
Voltage:	16-24 V DC (two-wire technology)
Output signal:	4-20 mA = measurement range (not calibrated) Warning: not electrically isolated!
Typical applications:	Swimming pools / whirlpools and cooling water; can also be used in seawater
Measurement and control device:	D1C-bromine
In-line probe housing:	DGM, DLG III

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

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

ProMinent® DULCOTEST® Sensors

Bromine Sensors



BRE 3-CAN

Sensor for connection to CAN interface

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

Measured variable: **Total available bromine**

Reference method: DBDMH, free bromine: DPD1

BCDMH: DPD4

pH dependence: if pH changes from pH 7 to pH 8, the sensor sensitivity is reduced

a) in the case of DBDMH and free bromine by approx. 10 %

b) in the case of BCDMH by approx. 25 %

Temperature: 41-113 °F (5-45 °C)

Max. pressure: 43.5 psi (3 bar)

Intake flow: 7.9-15.9 gph (30-60 l/h) (in DGM or DGL III)

Supply Voltage: Via CAN interface (11-30 V)

Output signal: Uncalibrated, temperature-compensated, electrically isolated

Typical applications: Swimming pools/whirlpools and cooling water; can also be used in seawater

Measurement and control equipment: DULCOMARIN® II

In-line probe fitting: DGM, DLG III

Measuring principle: amperometric, 2 electrodes, diaphragm covered

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

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

CBR 1-mA

Measured variable: **Free chlorine (hypochlorous acid HOCl), free bromine, bound-bromine**

Reference method: DPD1

pH range: 5-9.5 ppm

Temperature: 41-113 °F (5-45 °C)

Max. pressure: 14.5 psi (1 bar)

Intake flow: 7.9-15.9 gph (30-60 l/h) (in DGM or DGL II)

Power supply: 16-24 V DC (2-wire)

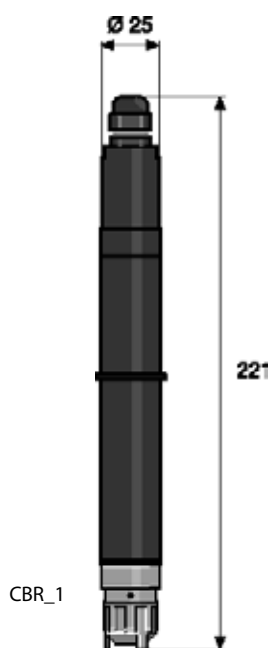
Output signal: 4-20 mA = Measuring range, temperature-compensated, uncalibrated, not electrically isolated

Typical applications: Cooling water, Process water, Waste water, Water with high higher pH values (stable pH)

Measurement and control equipment: D1C

In-line probe fitting: DGM, DLG III

Measuring principle: amperometric, 2 electrodes, diaphragm-covered



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

* Measuring range based on chlorine. The upper and lower limits of the measuring range are increased by a factor of 2.25 when measuring bromine, e.g. CBR 1-mA-0.5 ppm: 0.0225-1.125 ppm.

ProMinent® DULCOTEST® Sensors

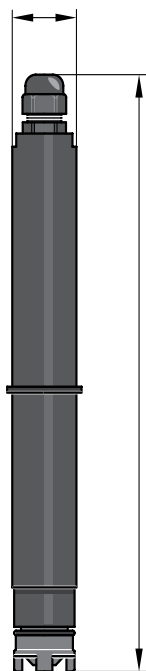
Chlorine Dioxide Sensor Overview

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

Chlorine Dioxide Sensors

CDE 2-mA

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



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

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

CDE 2.1-mA

Technical data: as Type CDE 2-mA, but maximum temperature 140 °F (60 °C)
Typical application: chlorine dioxide treatment to combat legionella

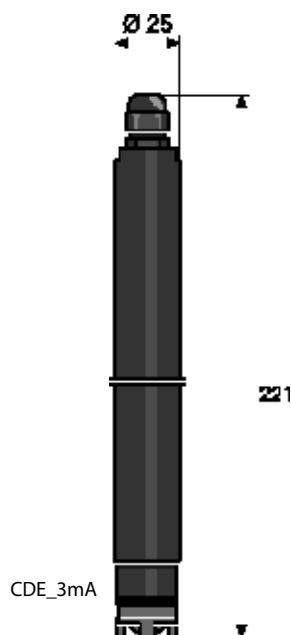
CDE 2.1-mA

0.5 ppm comes complete with 100 ml of electrolyte
Order on request

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

ProMinent® DULCOTEST® Sensors

Chlorine Dioxide Sensors



CDE 3-mA

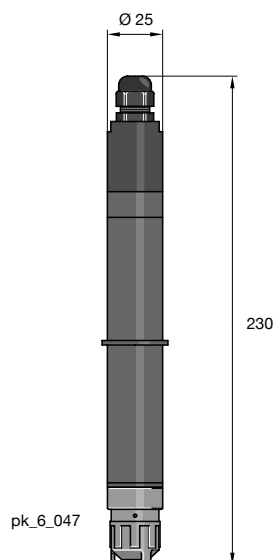
Measured variable:	Chlorine dioxide (ClO₂)
Reference method:	DPD1
pH range:	4-11 ClO ₂ stability range
Cross sensibility:	Ozone, compared with chlorine <2%
Temperature:	41-140 °F (5-60 °C)
Max. pressure:	14.5 psi (1 bar) no pressure surges
Intake flow:	7.9-15.9 gph (30-60 l/h) in DGM
Supply voltage:	16-24 V DC (two-wire technology)
Output signal:	4-20 mA ≈ measuring range, temperature-compensated, uncalibrated, not electrically isolated
Type application:	chlorine dioxide treatment of uncontaminated warm water to combat legionellae
Measuring and control device:	D1C
In line probe fitting:	DGM, DLG III
Measuring principle	amperometric, 2 electrodes, diaphragm-covered

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

Chlorine dioxide sensors complete with electrolyte, 100 ml

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

Chlorine Dioxide Sensors



CDP 1-mA-2 ppm (ClO₂-process probe)

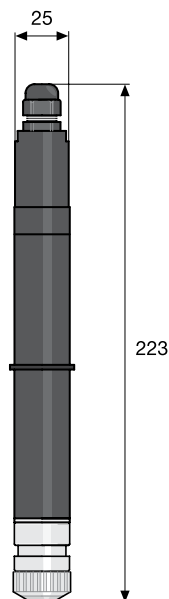
Applications:	Bottle washing machines and water containing surfactants
Measured variable:	Chlorine dioxide (ClO₂)
Reference method:	DPD1
Measurement range:	0.02-2.00 mg/l
pH range:	5.5-10.5
Temperature range:	50-113 °F (10-45 °C) short term periods 131 °F (55 °C) with external temperature correction via Pt 100 (no internal temperature correction!)
Temperature variation speed:	Up to 10 K/min
Max. pressure:	43.5 psi (3 bar) no pressure surges
Flow:	7.9-15.9 gph (30-60 l/h) in DGM
Supply voltage:	16-24 V DC (two-wire technology)
Output signal:	4-20 mA = measurement range (un-calibrated) Warning: no electrical isolation!
Type application:	Process water containing surfactants (bottle washing machines)
Measuring and control device:	D1C with automatic temperature compensation only
In line probe housing:	the following is recommended (see fig.) Probe housing quote on request.

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

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

ProMinent® DULCOTEST® Sensors

Chlorine Dioxide Sensors



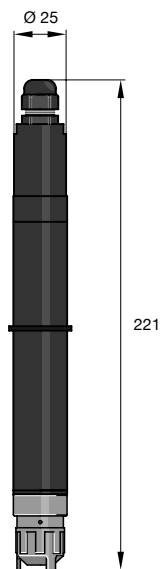
pk_6_083

CDR 1-mA-2 ppm

Measured variable:	Chlorine dioxide (ClO₂)
Reference method:	DPD1
pH range:	1-10
Temperature range:	1-131 °F (-17-7 °C) short term periods 140 °F (60 °C)
Max. pressure:	44 psi (3 bar) no pressure surges
Response time T ₉₀ :	2-3 min
Intake flow:	8-16 gph (30-61 l/h)
Supply Voltage:	16-24 VDC
Output signal:	4-20 mA (temperature compensated, not calibrated)
Measuring and control device:	D1C
In line probe housing:	DGMa / DLGIII

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

Chlorite Sensors



pk_6_040

Measured variable chlorite CLT 1-mA

Measured variable:	chlorite anion (ClO₂⁻)
Reference method:	DPD method Chlorite in presence of chlorine dioxide
Measurement range:	0.020-0.500 mg/l (CLT 1-mA-0.5 ppm) 0.10-2.00 mg/l (CLT 1-mA-2 ppm)
pH range:	6.5-9.5
Temp. Range:	33.8-104 °F (1-40 °C) temperature compensated
max. pressure:	1 bar
Intake flow:	7.9-15.9 gph (30-60 l/h) in DGM or DLG III
Power supply:	16-24 V DC (two-wire)
Output signal:	4-20 mA = measurement range (uncalibrated) Important not electrically isolated!
Model Use:	Monitoring potable water treated with chlorine dioxide or similar. Selective measurement of chlorite in presence of chlorine dioxide, chlorine and chlorate is also possible.
Measurement and control equipment:	D1C
In-line probe housing:	DGM, DLG III

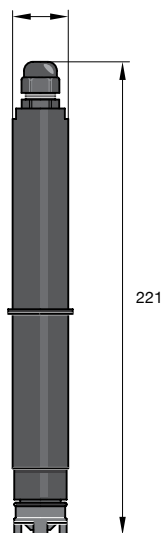
	Part No.
CLT 1-mA-0.5 ppm set with 50 ml electrolyte	1021596
CLT 1-mA-2 ppm set with 50 ml electrolyte	1021595

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

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

ProMinent® DULCOTEST® Sensors

Ozone Sensors



pk_6_039

OZE 3-mA

Measured variable:	Ozone (O₃)
Reference method:	DPD4
Measurement range:	0.02-2.00 mg/l
pH range:	Ozone stability range
Temperature range:	41-104 °F (5-40 °C) temperature compensated, no significant Temperature fluctuations
Max. pressure:	1 bar
Flow:	7.9-15.9 gph (30-60 l/h) in DGM or DLG III
Power supply:	16-24 VDC (two-wire technology)
Output signal:	4-20 mA = measurement range (un-calibrated) Warning: no electrical isolation!
Typical applications:	Swimming pools, potable, industrial, process water, surfactant free
Measurement and control devices:	D1C
In-line probe housing:	DGM , DLG III

Part No.

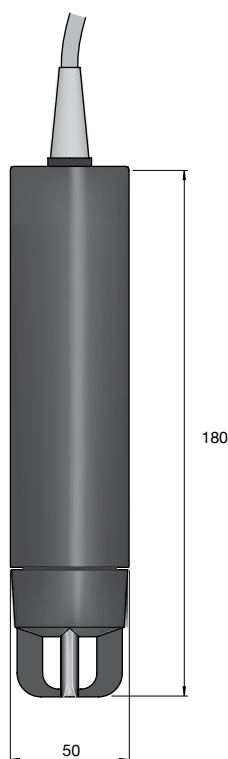
OZE 3-mA-2 ppm set, with 100 ml electrolyte

792957

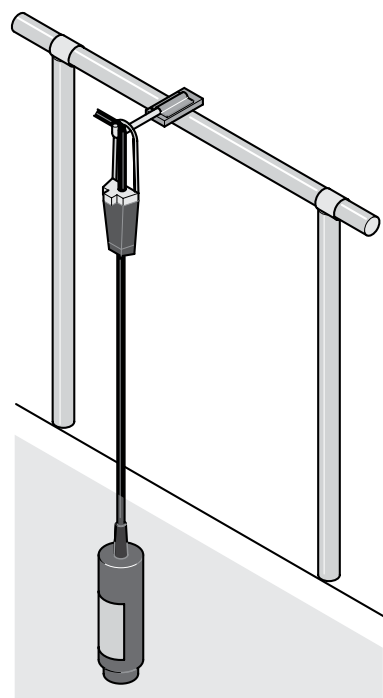
Note: You require assembly kit Part No. 815079 for the initial installation of the ozone sensors into the DLM III in-line probe housing.

ProMinent® DULCOTEST® Sensors

Dissolved Oxygen Sensors



pk_6_050_1



pk_6_011

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

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

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

DO 1-mA

Measured variable:	dissolved oxygen
Calibration:	of oxygen in air
Measurement range:	0-20 mg/l
Reproducibility of measurement:	± 0.5 % of measurement limit value
Temp. range:	32-122 °F (0 -50 °C)
Max. pressure:	14.5 psi (1 bar)
Velocity of sample water:	minimum: 0.16 ft./s (0.05 m/s)
Enclosure rating:	IP 68
Power supply:	12-30 V DC
Output signal:	4-20 mA. Measurement range calibrated, temperature corrected and electrically isolated
Process integration:	a) immersion, suspended on cable with or without mountain bracket for cable b) Immersion of immersion pipe <ol style="list-style-type: none"> 1. Immersion pipe with 1.97“ (50 mm) outside diameter and 1-1/4“ (31.75 mm) internal thread (provided by the customer). Connection via immersion pipe adapter 2. PVC immersion pipe with 1.97“ (50 mm) outside diameter (provided by the customer). Connection via standard PVC adhesive union (provided by the customer). c) In-flow operation to order

Typical applications

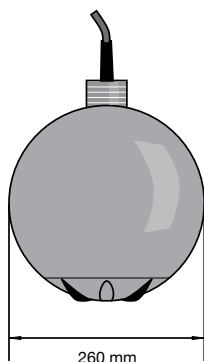
Fish and shrimp farming. Conditioning of water in large aquaria in zoological systems. Control of oxygen input in waterworks Appraisal of the biological status of surface waters

DO 1-mA-20 ppm

Part No.
1020532

ProMinent® DULCOTEST® Sensors

Dissolved Oxygen Sensors



pk_6_051

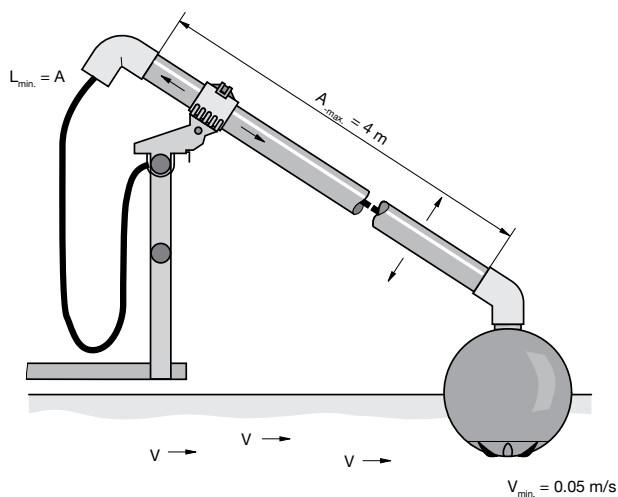
DO 2-mA

Measured variable:	dissolved oxygen
Calibration:	of oxygen in air
Measurement range:	0-10 mg/l
Reproducibility of measurement:	± 0.5 % of measurement limit value
Temp. Range:	32-122 °F (0 -50 °C)
Max. pressure:	14.5 psi (1 bar)
Velocity of sample water:	minimum: 0.16 ft./s (0.05 m/s)
Enclosure rating:	IP 68
Supply voltage:	12-30 V DC
Output signal:	4-20 mA. Measurement range calibrated, temperature corrected and electrically isolated

Process integration: as float with venturi grooves to increase the flow of sample water for the self-cleaning of the sensor part. Supplied with adapter for connection to PVC-pipes with outside diameter: 1.97" (50 mm) and railing bracket, also for PVC pipes with outside diameter: 1.97" (50 mm). The customer must provide the straight PVC tube and a 45 ° standard elbow for gluing to PVC pipes (outside diameter 50 mm).

Typical application Control of the oxygen input in activated sludge pools (sewage plant) for the purpose of energy conservation

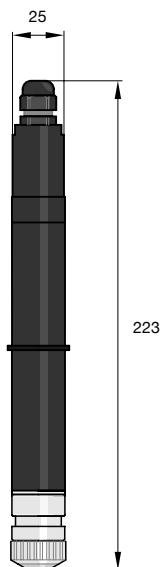
DO 2-mA-10 ppm

Part No.
1020533


pk_6_012

ProMinent® DULCOTEST® Sensors

Peracetic Acid Sensors



pk_6_083

The DULCOTEST® PAA 1 sensor models are membrane-covered amperometric 2-electrode sensors for the selective measurement of peracetic acid. Peracetic acid is used as a disinfectant particularly in the food and beverage industries as well as in the cosmetic, pharmaceutical and medical industries. The continuous measurement and control of the peracetic acid is essential to comply with demanding disinfection requirements and for quality control. Unlike with the sensors in the earlier Perox PES system the PAA 1-mA can be used with the D1Ca controller. Commissioning and maintenance is greatly simplified. The sensors can even be used in the presence of surfactants (tensides).

PAA 1-mA

Measured variable:	peracetic acid
Reference method:	titration
Measurement range	10-200 mg/l (PAA 1-mA-200 ppm) 100-2000 mg/l (PAA 1-mA- 2000 ppm)
pH range:	1-9 (peracetic acid stability range)
Temp. range:	33.8113 °F (1-45 °C) temperature compensated
Admissible temperature fluctuation:	0.3 °/min
Response time T_{90}	3 min.
Max. Pressure.:	14.5 psi (3 bar) at 86 °F (30 °C), in DGM
Intake flow:	7.9-15.9 gph (30- 60 l/h) with DGM or DLG III in-line probe housing
Power supply	16-24 V DC (two wire)
Output signal:	4-20 mA measurement range (uncalibrated) Important not electrically isolated
Typical application:	scouring in Cleaning in Place (CIP) and rinsing systems, also designed for use in the presence of cationic and an-ionic tensides. Selective measurement of peracetic acid as well as hydrogen peroxide is possible.
Measurement and control equipment:	D1C
In-line probe housing:	DGM, DLG
PAA 1-mA-200ppm	Part No. 1022506
PAA 1-mA-2000ppm	1022507

ProMinent® DULCOTEST® Sensors

Hydrogen Peroxide Sensors

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

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

Sensors are selected using the following decision table:

Requirement	Type	Type
	PER1	PEROX
Probe matrix contaminated by dirt or chemicals	suitable due to impermeable diaphragm	more susceptible due to permeable diaphragm
Electrical interference due to interference potentials in the measured medium	immune as counter electrode is separated from process	more susceptible as counter electrode is in the medium
Temperature range	up to 122 °F (50 °C)	up to 104 °F (40 °C)
Ease of handling during installation and maintenance	suitable due to temperature compensation and transducer integrated in sensor	separate temperature sensor and transducer
Response time for H ₂ O ₂ for fast control	sluggish T ₉₀ = 6-8 min	fast T ₉₀ = 20 s
Rapid temperature changes	sluggish due to integrated temperature sensor	fast due to separate temperature sensor
Long process cycles with no H ₂ O ₂ present	unsuitable	suitable due to pulsed polarisation technology
Range can vary in phases by several orders of magnitude, or is not clear at time of ordering	selection of suitable sensor necessary	suitable as range can be manually selected at the sensor transducer
Cost per channel	lower	higher

ProMinent® DULCOTEST® Sensors

Hydrogen Peroxide Sensors

Operating conditions

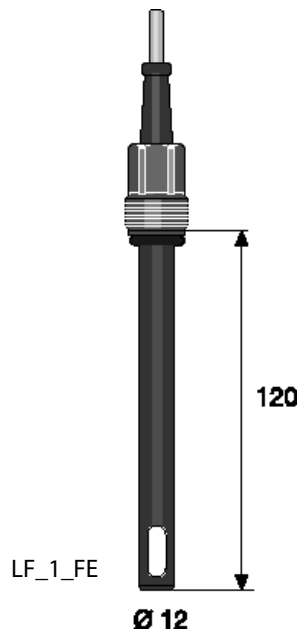
Requirement	Type PER1	Type PEROX
Measured variable	hydrogen peroxide	hydrogen peroxide
Calibration	photometric with DT4 hand-held photometer, see Chap. 5.4.4	photometric with DT4 hand-held photometer, see Chap. 5.4.4
Ranges	2.0-200.0 mg/l 20-2.000 mg/l different sensors	1-20, 10-200, 100-2000 selectable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

Part No.

Perox sensor PEROX-H2.10-P	792976
Perox transducer PEROX-micro-H1.20-mA	1034100
PER 1- mA - 200 ppm	1022509
PER - mA - 2000 ppm	1022510
PER 1- mA - 50 ppm	1030511

ProMinent® DULCOTEST® Sensors

Conductivity Sensors



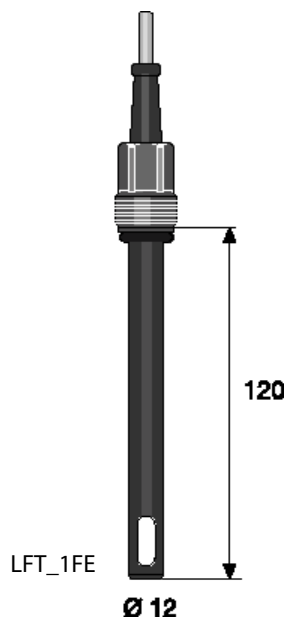
LF 1 FE

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

Part No.

LF 1 FE

741152



LFT 1 FE

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

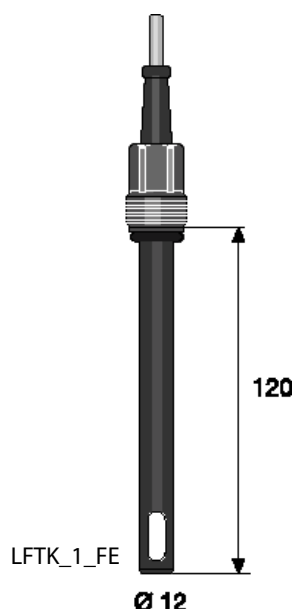
Part No.

LFT 1FE

1001374

ProMinent® DULCOTEST® Sensors

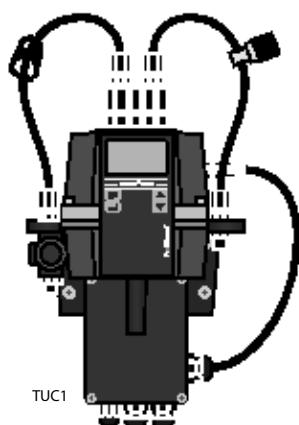
Conductivity Sensors

**LFTK 1 FE**

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

Part No.**LFTK 1 FE****1002821**

Measuring Points for Turbidity



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

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

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

ProMinent® DULCOTEST® Sensors

Measuring Points for Turbidity

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

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

Spare parts

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

Accessories

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

Sensor Accessories

Measurement Transmitter 4 - 20 mA (Two Wire)

Advantages:

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

Typical applications:

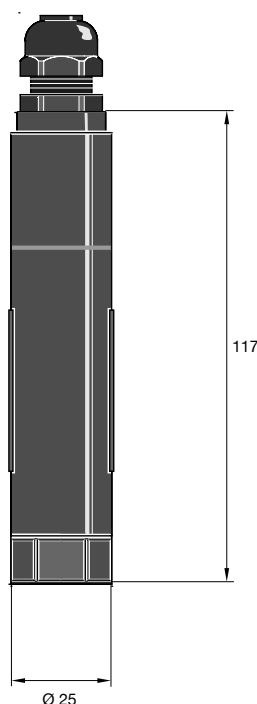
Measurement signal transfer over large distances, or to transfer signals subject to disturbance (e.g. pH, redox) in conjunction with D1C, D2C and DULCOMARIN® measurement and control systems, or for direct connection to PC/PLC.

pH measurement transmitter 4-20 mA, type pH V1

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

Part No.

809126



pk_5_064

Redox measurement transmitter 4-20 mA, type RH V1

Technical data as for pH transmitter, but:

Measurement range:	0...1000 mV
Accuracy:	better than ± 0.5 mV (typical ± 3 mV)
Input resistance:	$> 5 \times 10^{11} \Omega$
Signal output:	4...20 mA \approx 0...+1000 mV not electrically isolated

Part No.

809127

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

Technical data as for pH transmitter, but:

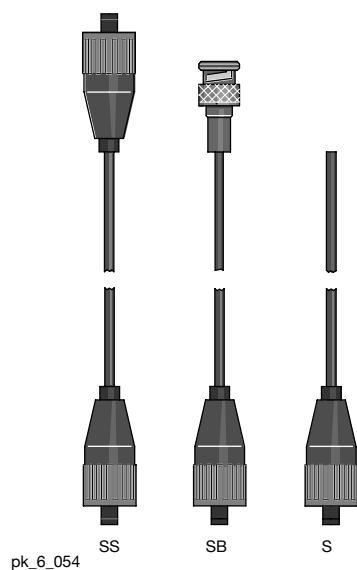
Measurement range:	0...100 °C
Accuracy:	better than ± 0.5 °C (typical ± 0.3 °C)
Input resistance:	$\sim 0 \Omega$
Signal output:	4...20 mA \approx 0...+100 °C not electrically isolated

Part No.

809128

Sensor Accessories

Signal Cables



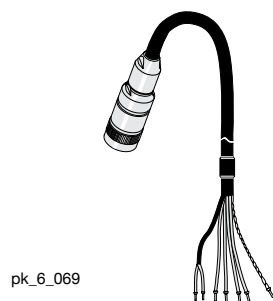
General guidelines:

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

Signal leads for pH/ORP measurement

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

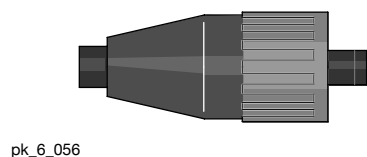
Design	Description	Part No.
2 x SN6	coax Ø 5 mm 3 ft. (0.8 m) - SS	305077
	coax Ø 5 mm 6 ft. (2.0 m) - SS	304955
	coax Ø 5 mm 15 ft. (5.0 m) - SS	304956
	coax Ø 5 mm 30 ft. (10.0 m) - SS	304957
SN6 - open end	coax Ø 5 mm 6 ft. (2.0 m) - S	305030
	coax Ø 5 mm 15 ft. (5.0 m) - S	305039
	coax Ø 5 mm 30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



Signal leads for electrodes with Vario Pin plug

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

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



SN6 coax connector

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

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



LK coax signal cable

For pH and ORP measurements.

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

Sensor Accessories

Signal Cables



pk_1_085

Signal leads for DMT type chlorine measuring cells

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

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

Cable accessories for CAN-type chlorine sensors

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



pk_6_054

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

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

Sensor adapters

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



pk_6_055

LKT signal lead for conductivity measuring cells

4-core, shielded, Ø 6.2 mm

	Part No.
Please specify length with order.	723712

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

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

	Part No.
Please specify length with order.	7740215

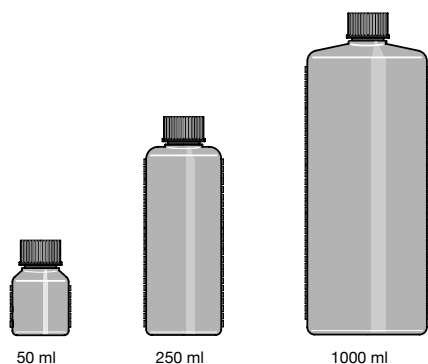
Sensor Accessories

Buffer Solutions

pH quality buffer solutions

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

Alkaline buffer solutions can react with CO₂ if left open. This will affect their values, therefore close after use. Buffer solutions should be replaced after a maximum of three months after opening. The solution contains a biocide to prevent bacteria forming.



50 ml

250 ml

1000 ml

pk_6_058

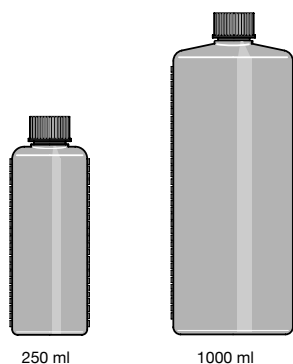
		Part No.
pH 4.0 - red	50 ml	506251
	250 ml	791436
	1000 ml	506256
pH 5.0	50 ml	506252
	250 ml	791437
	1000 ml	506258
pH 7.0 - green	50 ml	506253
	250 ml	791437
	1000 ml	506258
pH 9.0	50 ml	506254
	1000 ml	506259
pH 10.0 - blue	50 ml	506255
	250 ml	791438
	1000 ml	506260

ORP quality buffer solutions

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

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

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



250 ml

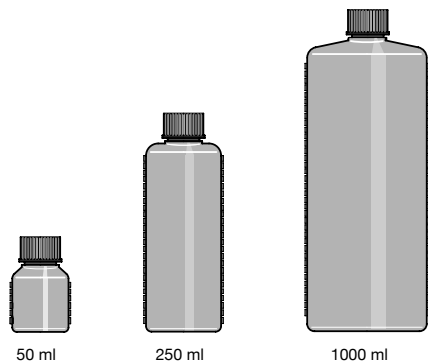
1000 ml

pk_6_058

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

3 molar KCl solutions

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



50 ml

250 ml

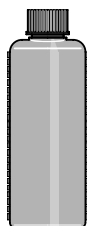
1000 ml

pk_6_058

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

Sensor Accessories

Electrolyte Solutions



250 ml

pk_6_058

Cleaning solutions

Pepsin/hydrochloric acid cleaning solutions:

For cleaning pH electrode diaphragms contaminated with protein.

Part No.

250 ml	791443
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Conductivity calibration solution

For the accurate calibration of conductivity sensors we recommend using calibration solutions with known conductivity levels.

Part No.

Buffer sol. LF 1413 mS/cm	250 ml	1027655
Buffer sol. LF 1413 mS/cm	1000 ml	1027656
Buffer sol. LF 12,88 mS/cm	250 ml	1027657
Buffer sol. LF 12,88 mS/cm	1000 ml	1027658

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

Part No.

CLE all chlorine measuring cells electrolyte, 100 ml	506270
CDM 1 type chlorine dioxide measuring cells electrolyte, 100 ml	506271
CDE chlorine dioxide measuring cells electrolyte, 100 ml	506272
OZE ozone measuring cells electrolyte, 100 ml	506273
Electrolyte for measuring cells types CGE/CTE/BRE, 50 ml	792892
Electrolyte for chlorine dioxide measuring cells type CDP, 100 ml	1002712
Electrolyte for peracetic acid sensors, type PAA 1, 100 ml	1023896
Electrolyte for chlorine probes, Type CLT 1, 50 ml	1022015



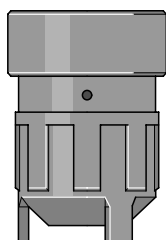
pk_6_061

Membrane Caps

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

Part No.

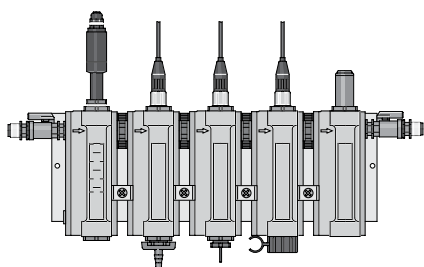
Membrane cap for types CLE II T, CDM 1 and OZE 1	790486
Membrane cap for types: CLE 2.2, CLE 3, CDE 1.2, CDE 2, OZE 2 and OZE 3: this membrane cap is marked with a red dot	790488
Membrane cap for CGE/CTE 1 (2/5/10 ppm) and BRE 1 this membrane cap is orange	792862
Membrane cap for CTE 1 (0.5 ppm); this membrane cap is blue	741274
Membrane cap for CDP 1; this membrane cap is black	1002710
Membrane cap for PAA 1	1023895
Membrane cap for CLT 1	1021824
Accessory set for CGE 2/CTE 1 (2/5/10 ppm) and BRE 1 (2 membrane caps + 50 ml electrolyte)	740048
Accessory set CTE 1 (0.5 ppm) (2 membrane caps + 50 ml electrolyte)	741277
Accessory set for CDP 1 (2 membrane caps + 100 ml electrolyte)	1002744
Accessory kit CLT 1	1022100
Accessory kit PAA 1	1024022



pk_6_075

Sensor Accessories

DGMa Sensor Housings



pk_6_066

DGM modular in-line probe housing

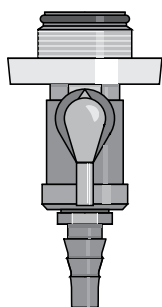
To accept conductivity, Pt 100, pH or ORP probes with PG 13.5 screw-in thread, or amperometric sensors with R 1" screw-in thread.

Advantages:

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

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

Material:	Transparent PVC (all modules) FPM (seals) PP (calibration cup) PVC white (mounting panel)
Max. temperature:	140 °F, (60 °C)
Max. pressure:	87 psi, (6 bar) / 86 °F, (30 °C) 14.5 psi, (1 bar) / 140 °F, (60 °C) 29 psi, (2 bar), (with flow monitor, 86 °F, (30 °C))
Flow volume:	Up to 21 gph, (80 l/h), (10.5 gph, (40 l/h recommended))
Flow sensor:	Reed contact max. switch power 3 W max. switch voltage 175 V max. switch current 0.25 A max. operating current 1.2 A max. contact resistance 150 mΩ
Switch hysteresis:	approx. 20 %
Enclosure rating:	IP 65
Applications:	Potable, swimming pool water or water of similar quality with no suspended solids
Assembly:	Max. 5 modules pre-assembled onto baseboard: more than 5 modules, pre-assembled onto baseboard as custom version, priced accordingly. FPM = Fluorine Rubber



pk_6_071

Sampling tap for DGM

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

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

Expansion modules for DGM

For simple retrofit to an existing DGM.

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

Sensor Accessories

DGMa Identcode

DGM	Series Version:						
	A	Series					
		Flow monitor module:					
		0	None				
		1	With l/h scale				
		2	With gph scale				
		3	With flow monitor, l/h scale				
		4	With flow monitor, gph scale				
		Number of PG 13.5 modules:					
		0	None				
		1	One PG 13.5 module				
		2	Two PG 13.5 modules				
		4	Three PG 13.5 modules				
		4	Four PG 13.5 modules				
		Number of 25 mm modules:					
		0	None				
	1	One 25 mm module*					
	2	Two 25 mm modules*					
	Material:						
	T	Transparent PVC					
	Seal material:						
	0	Viton®					
Connections:							
0	1/2" x 3/8" tubing adapters						
1	PVC half-union connections with 1/4" MNPT adapter						
DGM	A	0	0	0	T	0	0

Recommended accessories:

Part No.

reference potential plug with SS pin	791663
flow sensor (spare)	791635
calibration cup (spare)	791229

Sampling Tap for PG 13.5 module	1004737
Sampling Tap for 25 mm module	1004739

Mounting set for 15 mm (PHEP/RHEP)	791219
Mounting set for 25 mm module (CLE, CTE, CGE, CDE, CDP, OZE)	791818

Bubble disperser for Cl sensor	740207
Bubble disperser for pH/ORP sensors	791703

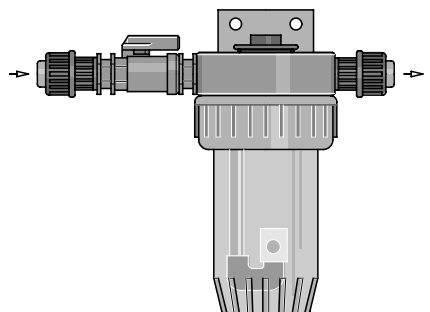
Sensor Accessories

DLG Sensor Housings

DLG III type in-line probe housing

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

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



pk_6_063

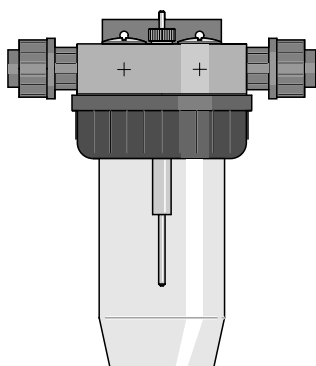
Material:	Rigid PVC
Transparent housing cup:	Polyamide
Ball valve material:	Rigid PVC
Max. pressure:	1 bar
Max. temperature:	55 °C

Part No.

DLG III A with PVC hose connectors for 8/5 mm Ø PE tubing	914955
DLG III B with PVC adhesive connectors for 16 mm Ø DN 10 pipe	914956
Assembly kit for fitting amperometric sensors	815079

DLG IV type in-line probe housing

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



pk_6_070

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

Part No.

DLG IV PVC for Ø 16/DN 10 pipe work connector	1005332
DLG IV PP for Ø 16/DN 10 pipe work connector	1005331

Sensor Holders

CPVC holder (for pH/ORP)

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

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

Stainless steel universal in-line sensor holder with 3/4" MNPT, 5" (127 mm) long body.	7305022
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PG 13.5 Submersible holder (for pH/ORP)

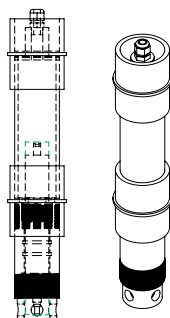
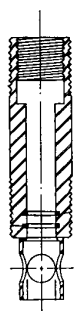
CPVC Waterproof sensor holder with 1-1/2" NPT, 5" (127 mm) long body.	7744693
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CPVC holder (for 25 mm sensors)

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

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

QUICK REFERENCE

“Polymer Blending Systems” T.O.C.

IX

ProMinent®

CATALOG SECTION TABS

product overview	<ul style="list-style-type: none"> ■ Introduction ■ pump selection by capacity ■ chemical resistance list ■ Solenoid & Motor Pump Overview ■ Analytical Instrumentation Overview 	product overview
solenoid-driven metering pumps	<ul style="list-style-type: none"> ■ concept PLUS ■ beta ■ gamma/L ■ delta ■ extronic ■ mikro delta 	solenoid-driven metering pumps
motor-driven metering pumps	<ul style="list-style-type: none"> ■ Sigma/ 1 ■ Sigma/ 2 ■ Sigma/ 3 ■ ProMus ■ Makro ■ Orlita ■ DulcoFlex 	motor-driven metering pumps
pump spare parts & accessories	<ul style="list-style-type: none"> ■ solenoid pump spare parts ■ motor pump spare parts ■ pump accessories 	pump spare parts & accessories
DULCOMETER® instrumentation	<ul style="list-style-type: none"> ■ D1C ■ D2C ■ Dulcometer® Compact ■ DMT ■ DDC ■ MicroFlex ■ SlimFlex ■ MultiFLEX ■ AEGIS 	DULCOMETER® instrumentation
DULCOTEST® sensors	<ul style="list-style-type: none"> ■ amperometric sensors ■ potentiometric sensors ■ potentiostatic sensors ■ conductometric sensors ■ accessories 	DULCOTEST® sensors
polymer blending systems	<ul style="list-style-type: none"> ■ ProMix™-M (A Controls) ■ ProMix™-M (B Controls) ■ ProMix™-S ■ ProMix™-C 	polymer blending systems

ProMinent® ProMix™-M (A Controls)

Overview: ProMix™-M (A Controls)



The ProMinent® ProMix™ is a pre-engineered polymer mixing system with intuitive controls. Designed as an in-line or make wwdown unit, the ProMix™ is engineered to meet liquid polymer applications utilizing diaphragm or progressive cavity pump technologies. The unique mixing regime delivers a highly activated polymer solution to every application with optimum performance.

Feature & Benefits

- LCD display with touchpad control
- 4-20mA input to pace pump
- Remote start/stop
- General alarm contacts
- Adjustable flush settings
- True multi-zone mixing chamber that delivers a tapered energy profile for proper polymer activation
- Unique injection check valve with easy access for cleaning
- Diaphragm and progressive cavity pump options
- System protection against loss of water flow
- Precise activated polymer solution delivery
- Open design for easy maintenance

Specifications

- | | | | |
|----------------------------|-----------------|---------------------|--|
| ■ Water Inlet: | 1-1/2" FNPT | ■ Power Supply: | 120 VAC, 1 Phase, 60Hz |
| ■ Polymer Inlet: | 1/2" or 1" FNPT | ■ Current Load: | 20 Amp for (DA) models
30 Amp for (PA) models |
| ■ Product Outlet: | 1-1/2" FNPT | ■ Drain Connection: | 1/4" |
| ■ Max. Chamber Pressure: | 150 PSIG | | |
| ■ Max. Operating Pressure: | 100 PSIG | | |

ProMinent® ProMix™-M (A Controls)

Capacity Data

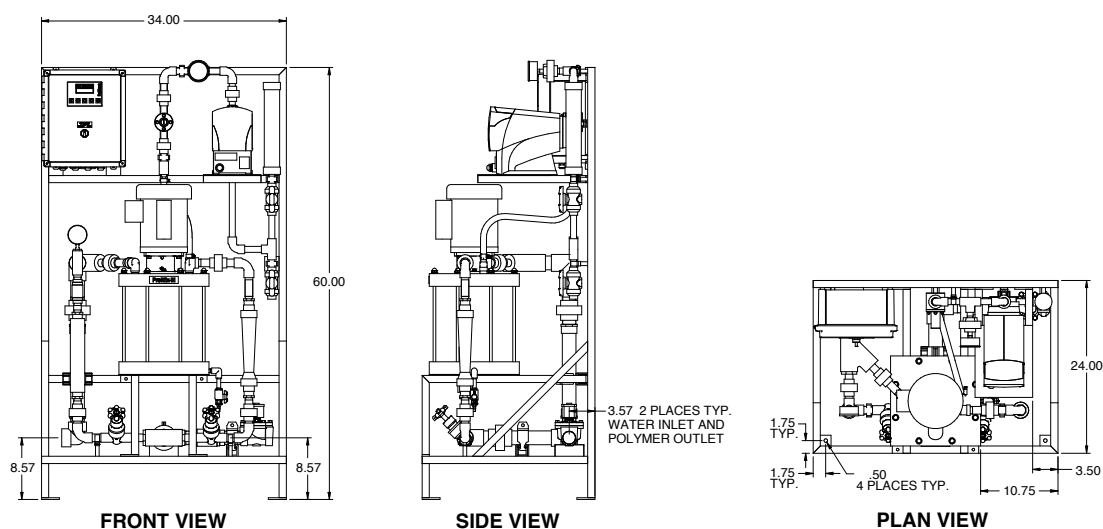
ProMix™ -M (A Controls)	Number Model	Primary Dilution		Secondary Dilution		Polymer Pump (gph)	Max Pump Pressure
		gph	(gpm)	gph	(gpm)		
7746635	PROMIX-M_0-300x2-2.4DA	300	(5)	300	(5)	2.4	100 psi
7746636	PROMIX-M_0-600x2-4.0DA	600	(10)	600	(10)	4.0	100 psi
7746637	PROMIX-M_0-600x2-6.2DA	600	(10)	600	(10)	6.2	100 psi
7746638	PROMIX-M_0-600x2-10.0DA	600	(10)	600	(10)	10.0	58 psi
7746639	PROMIX-M_0-1200x2-6.2DA	1200	(20)	1200	(20)	6.2	100 psi
7746640	PROMIX-M_0-1200x2-10.0DA	1200	(20)	1200	(20)	10.0	58 psi
7746641	PROMIX-M_0-1500x2-6.2DA	1500	(25)	1500	(25)	6.2	100 psi
7746642	PROMIX-M_0-1500x2-10.0DA	1500	(25)	1500	(25)	10.0	58 psi
7746643	PROMIX-M_0-300x2-5.0PA	300	(5)	300	(5)	5.0	100 psi
7746644	PROMIX-M_0-600x2-5.0PA	600	(10)	600	(10)	2.5	100 psi
7746645	PROMIX-M_0-600x2-10.0PA	600	(10)	600	(10)	10.0	100 psi
7746646	PROMIX-M_0-1200x2-10.0PA	1200	(20)	1200	(20)	10.0	100 psi
7746647	PROMIX-M_0-1200x2-24.0PA	1200	(20)	1200	(20)	24.0	100 psi
7746648	PROMIX-M_0-1500x2-10.0PA	1500	(25)	1500	(25)	10.0	100 psi
7746649	PROMIX-M_0-1500x2-24.0PA	1500	(25)	1500	(25)	24.0	100 psi

Nomenclature of Units:

DA = Diaphragm Pump w/A Controls

PA = Progressive Cavity Pump w/A Controls

Dimensional Drawings



ProMinent® ProMix™-M (B Controls)

Overview: ProMix™-M (B Controls)



The ProMinent® ProMix™ is a pre-engineered polymer mixing system with intuitive controls. Designed as an in-line or make down unit, the ProMix™ is engineered to meet liquid polymer applications utilizing diaphragm or progressive cavity pump technologies. The unique mixing regime delivers a highly activated polymer solution to every application with optimum performance.

Feature & Benefits

- LCD display with touchpad control
- Primary & secondary flow display
- 4-20mA input to pace pump
- Remote start/stop
- General alarm contacts
- System browser view
- Maintains desired concentration based on primary and secondary dilution water flow
- Ethernet communications and datalogging
- True multi-zone mixing chamber that delivers a tapered energy profile for proper polymer activation
- Unique injection check valve with easy access for cleaning
- Diaphragm and progressive cavity pump options
- System senses loss of water flow and neat polymer flow
- Precise activated polymer solution delivery
- Open design for easy maintenance
- System alarm and running lights

Specifications

- Water Inlet: 1-1/2" FNPT
- Polymer Inlet: 1/2" or 1" FNPT
- Product Outlet: 1-1/2" FNPT
- Max. Chamber Pressure: 150 PSIG
- Max. Operating Pressure: 100 PSIG
- Power Supply: 120 VAC, 1 Phase, 60Hz
- Current Load: 20 Amp for (DB) models
30 Amp for (PB) models
- Drain Connection: 1/4"

ProMinent® ProMix™-M (B Controls)

Capacity data

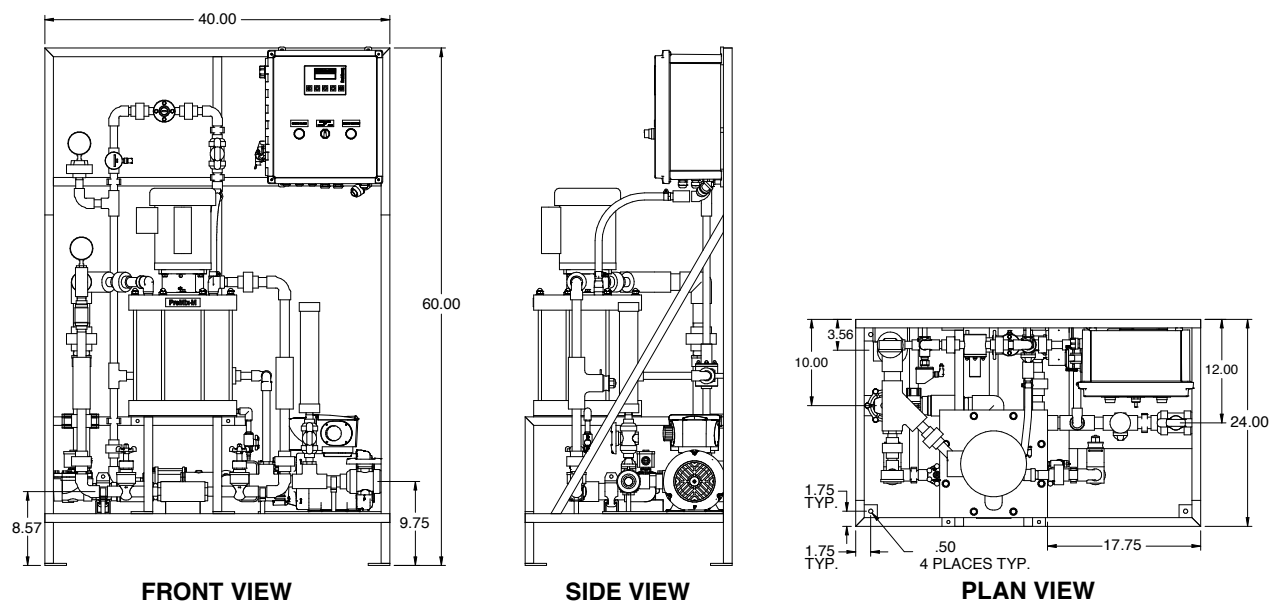
ProMix™ -M P/N	Model Number	Primary Dilution		Secondary Dilution		Polymer Pump gph	Max Pump Pressure
		gph	(gpm)	gph	(gpm)		
7746543	M_0-300x2-2.4DB	300	(5)	300	(5)	2.4	100 psi
7746544	M_0-600x2-4.0DB	600	(10)	600	(10)	4.0	100 psi
7746545	M_0-1500x2-6.2DB	1500	(25)	1500	(25)	6.2	100 psi
7746546	M_0-1500x2-10.0DB	1500	(25)	1500	(25)	10.0	58 psi
7746547	M_0-1500x2-5.0PB	1500	(25)	1500	(25)	5.0	100 psi
7746548	M_0-1500x2-10.0PB	1500	(25)	1500	(25)	10.0	100 psi
7746549	M_0-1500x2-24.0PB	1500	(25)	1500	(25)	24.0	100 psi

Nomenclature of Units:

DB = Diaphragm Pump w/B Controls

PB = Progressive Cavity Pump w/B Controls

Dimensional Drawings



ProMinent® ProMix™-S

Overview: ProMix™-S



The ProMinent ProMix™ is a pre-engineered polymer mixing system made for the water and wastewater markets. Designed as an in-line unit, the ProMix™ can be customized to meet most liquid polymer applications utilizing tubing pump technology. The unique mixing chamber allows for complete make down of the neat or diluted polymer to guarantee problem-free injection.

Feature & Benefits

- Open design for easy maintenance
- True multi-zone mixing regime for proper polymer activation
- Unique injection check valve with easy access for cleaning
- Adjustable auto flush settings
- System protection against loss of water flow
- Precise activated polymer solution delivery
- LCD display with touchpad control
- 4-20mA input to pace pump
- Remote start/stop
- General alarm contacts

Specifications

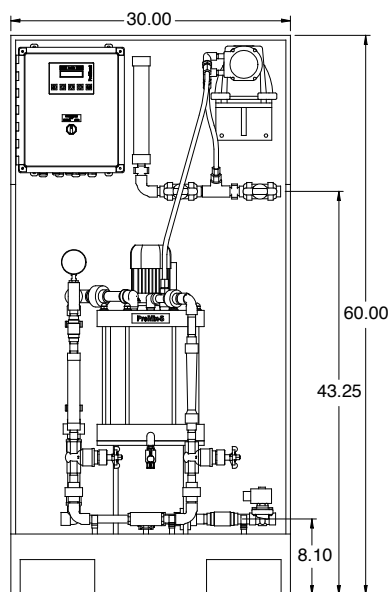
- Water Inlet: 3/4" FNPT
- Polymer Inlet: 1/2" FNPT
- Product Outlet: 3/4" FNPT
- Max. Chamber Pressure: 150 PSIG
- Max. Operating Pressure: 100 PSIG
- Power Supply: 120 VAC, 1 Phase, 60Hz
- Current Load: 15 Amp
- Drain Connection: 1/4"

ProMinent® ProMix™-S

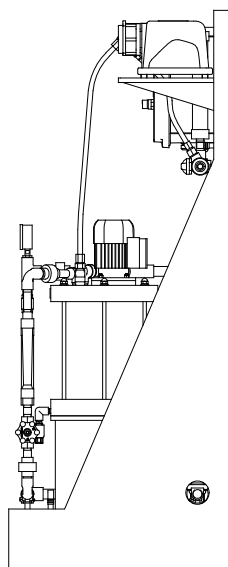
Capacity data

ProMix™-S Series P/N	Model Number	Primary Dilution gph	Primary Rotameter (gpm)	Secondary Dilution gph	Secondary Rotameter (gpm)	Peristaltic Pump gph	Max Pump Pressure psi
7746602	60-0.21TA	60	1	-	-	0.21	100 psi
7746603	60x2-0.71TA	60	1	60	1	0.71	100 psi
7746604	180x2-0.71TA	180	3	120	2	0.71	100 psi
7746605	180x2-1.67TA	180	3	120	2	1.67	80 psi
7746606	300x2-2.50TA	300	5	300	5	2.50	25 psi
7746607	300x2-3.54TA	300	5	300	5	3.54	25 psi

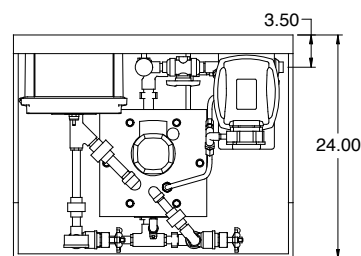
Dimensional Drawings



FRONT VIEW



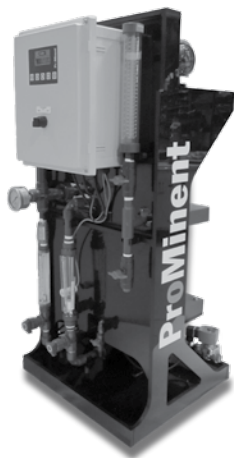
SIDE VIEW



PLAN VIEW

ProMinent® ProMix™-C

Overview: ProMix™-C



The ProMinent ProMix™ is a pre-engineered polymer mixing system made for the water and wastewater markets. Designed as an in-line unit, the ProMix™ can be customized to meet most liquid polymer applications utilizing tubing pump technology. The unique mixing chamber allows for complete make down of the neat or diluted polymer to guarantee problem-free injection.

Feature & Benefits

- Open design for easy maintenance
- True multi-zone mixing regime for proper polymer activation
- Unique injection check valve with easy access for cleaning
- Adjustable auto flush settings
- System protection against loss of water flow
- Precise activated polymer solution delivery
- LCD display with touchpad control
- 4-20mA input to pace pump
- Remote start/stop
- General alarm contacts

Specifications

- Water Inlet: 3/4" FNPT
- Polymer Inlet: 1/2" FNPT
- Product Outlet: 3/4" FNPT
- Max. Chamber Pressure: 150 PSIG
- Max. Operating Pressure: 100 PSIG
- Power Supply: 120 VAC, 1 Phase, 60Hz
- Current Load: 15 Amp
- Drain Connection: 1/4"

ProMinent® ProMix™-C

Capacity data

ProMix™-C Series P/N	Model Number	Primary Dilution gph	Primary Rotameter (gpm)	Secondary Dilution gph	Secondary Rotameter (gpm)	Peristaltic Pump gph	Max Pump Pressure psi
7746772	60-0.21TA	60	1	-	-	0.21	100 psi
7746773	60x2-0.71TA	60	1	60	1	0.71	100 psi
7746774	180x2-0.71TA	180	3	120	2	0.71	100 psi
7746775	180x2-1.67TA	180	3	120	2	1.67	80 psi
7746776	300x2-2.50TA	300	5	300	5	2.50	25 psi
7746777	300x2-3.54TA	300	5	300	5	3.54	25 psi

Dimensional Drawings

