"Motor-Driven Metering Pumps" T.O.C. IV

CATALOG SECTION TABS

product overview

- Introduction
- Pump selection by capacity
- Chemical resistance list
- Solenoid & Motor Pump Overview
- Analytical Instrumentation Overview

solenoid-driven metering pumps

- Concept b
- Beta b
- gamma/ X
- delta
- gamma/ XL
- Extronic

motor-driven metering pumps

- **Sigma X: Sigma/ 1**
- **Sigma X: Sigma/ 2**
- **Sigma X: Sigma/ 3**
- **ProMus**
- **Makro**
- **Hydro 2 API 675**
- **Hydro 2 API 675**
- **Orlita**
- **DULCOFLEX**

pump spare parts & accessories

- Solenoid pump spare parts
- Motor pump spare parts
- Pump accessories

DULCOMETER instrumentation

- D1Cb/c
- DACb
- Dulcometer Compact
- DMT
- MicroFlex
- MultiFlex
- AEGIS X
- AEGIS II
- SlimFlex 5

DULCOTEST sensors

- Amperometric sensors
- Potentiometric sensors
- Potentiostatic sensors
- Conductometric sensors
- Accessories

polymer blending & dry feed solutions

- ProMix™ -M (In-line Controls)
- ProMix™ -M (Batch & In-line Controls)
- ProMix™ -S
- ProMix™ -C
- ProMdry™

ProMinent® Sigma X: Sigma/1 Motor Diaphragm Metering Pumps

Overview: Sigma/ 1 control type (S1Cb)

The Sigma/1 motor diaphragm metering pumps are produced with a high-strength inner housing for parts subject to load as well as an additional plastic housing to protect against corrosion. The capacity range extends from 5.3 to 38 gph (20 - 144 l/h) and pressures up to 174 psig (12 bar). Stroke length is 0.16 in

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

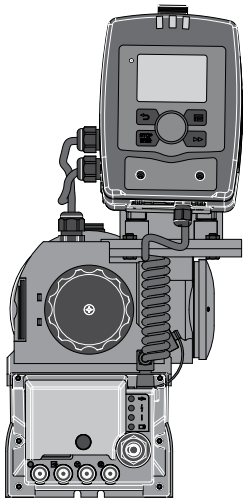
In all motor-driven metering pumps without integrated overload protection, for safety reasons, suitable overload protection must be provided during installation. (see page 148 for spare parts)

Sigma/ 1 Basic Type (S1Ba)

The Sigma/ 1 basic type is a motor-driven metering pump without internal electronics. Various NEMA 56C frame motors can be used depending upon the application requirements. The Sigma 1 Basic pump is also suitable for use with inverter duty and DC motors for varying flow requirements.

ProMinent® Sigma X: Sigma/1 Motor Diaphragm Metering Pumps

Sigma/ 1 control type (S1Cb)



For optional control via contact or analog signals (e.g. 0/4 - 20 mA) the Sigma control type results in good adaptability, even in fluctuating metering requirements.

The microprocessor control is an optimum combination of speed control and stop & go operation, i.e. it works in a wide control field with customized fine adjustment. Moreover it enables an optimum metering result thanks to the metering behavior of the metering pump being matched to the chemicals or application.

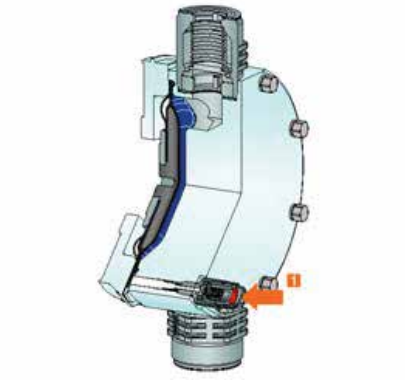
The control system measures the movement and speed profile in conjunction with the power demand. This leads to a real reduction in the actually required power, which means an increase in efficiency.

Detachable operating unit (HMI)

The operating unit (HMI) can be attached directly to the metering pump or mounted on the wall alongside the pump or completely removed. This provides the operator with a wide range of options for the integration of a metering system into the overall system that it is readily accessible and easy to use. Moreover, the removable operating unit offers additional protection against unauthorized operation of the metering pump or against changing of the pump settings.

The Sigma X features a NEW removable HMI control unit with innovative click-wheel and 4 operating buttons. An illuminated LCD display provides information about the relevant operating status. LEDs on the operating unit and the control unit indicate the active pump functions or the pump status.

Diaphragm rupture warning system



The liquid end has a patented multilayer safety diaphragm as standard and a visual diaphragm rupture indicator.

The diaphragm is coated on both sides with PTFE film. This coating ensures that no leakage to the outside occurs even if the diaphragm ruptures. If the diaphragm ruptures, feed chemical enters between the diaphragm layers and thus triggers a mechanical indication or an alarm via the sensor area. This concept ensures reliable metering - even under critical operating conditions.

ProMinent® Sigma X: Sigma/1 Motor Diaphragm Metering Pumps

Sigma/ 1 control type (S1Cb)

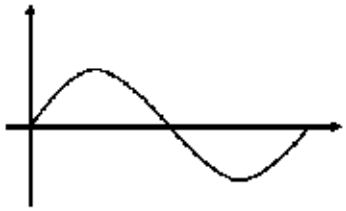


Diagram 1: Discharge stroke, suction stroke equal

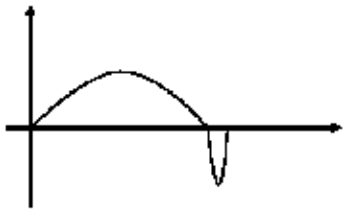


Diagram 2: long discharge stroke, short suction stroke

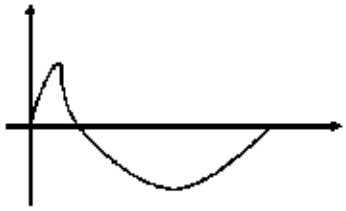


Diagram 3: short discharge stroke, long suction stroke

Metering profiles

Metering profiles ensure optimum metering results, thanks to the metering behavior of the metering pump being matched to the chemicals or application.

The stroke movement of the diaphragm pump is continuously measured and controlled, so that the stroke is executed according to the desired metering profile. The pump can be operated in normal mode **(Diagram 1)**, with optimized discharge stroke **(Diagram 2)** or with optimized suction stroke **(Diagram 3)**. Three typical metering profiles are shown schematically with the behavior over time.

In normal operating mode the time behavior for the suction stroke and the discharge stroke is similar **(Diagram 1)**. In the mode with optimized discharge stroke **(Diagram 2)** the discharge stroke is lengthened while the suction stroke is executed as quickly as possible. This setting is, for example, useful for applications that require optimum mixing behavior and optimized chemical mixing.

In the mode with the optimized suction stroke **(Diagram 3)**, the suction stroke is carried out as slowly as possible, which permits precise and trouble-free metering of viscous and gaseous media. This setting should also be chosen to minimize the NPSH value.

ProMinent® Sigma X: Sigma/1 Motor Diaphragm Metering Pumps

Specifications (S1Ba and S1Cb)

General:

Maximum stroke length:	0.16” (4.0 mm)		
Power cord:	6 feet (2 m) 2 wire + ground (supplied on control versions)		
Stroke frequency control:	S1Ba: Constant speed or optional DC/SCR drive or AC inverter S1Cb: Microprocessor control version with innovative start/stop and variable speed control proportional to set frequency or external control signal.		
Stroke counting:	Standard on S1Cb		
Materials of construction			
Housing:	Glass-filled Luranyl™ (PPE)		
Wetted materials of construction:	**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
Viscosity ranges:	**Liquid end version**	**Max. strokes/min**	**Viscosity (mPas)**
	Standard	180 0-200	
	With valve springs	130	200-500
	With valve springs and suction-side feed	90	500-1000*
	* Only when properly installed & adjusted		
Sound pressure level:	Sound pressure level LpA < 70 dB in accordance with EN ISO 20361:2010-10 at max. stroke length, max. stroke rate, max. back pressure (water)		
Drive:	Cam and spring-follower (lost motion)		
Lubrication:	Sealed grease lubricated bearings and gearing		
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 faced Viton® 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 ±2%		
Max. fluid operating temp:	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.		
Max. solids size in fluid:	0.3 mm		
Stroke length adjustment:	Manual, in increments of 1%. Motorized stroke length adjustment is available.		
Sigma/1 Basic Version			
Motor:	See available motors in Identcode		

Certified to NSF/ANSI 61

ProMinent® Sigma X: Sigma/1 Motor Diaphragm Metering Pumps

Specifications (S1Ba and S1Cb) Cont.

Sigma/1 Control Version

Control Function:	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.
Enclosure rating:	(IP 65)
Pump power requirements:	ph, 115V-230V, 50/60 Hz (internally converted to drive below motor)
Motor data:	Totally enclosed, fan cooled (IP55); class F insulation; IEC frame; 1/8 HP
(0.09 kW) 230 V, 3 phase (0.7 A)	
Relay load	
Fault relay only (option 1):	Contact load: 230 VAC, 8 A, 50/60 Hz
Operating life: > 200,000 switch functions	
Fault and pacing relay Contact load:	max. 24 V, AC/DC, max. 100 mA
(Option 3):	maximum 200,000 switch cycles
Contact closure:	100 ms (for pacing relay)
Analog output signal:	maximum impedance 300 W
Isolated 4-20 mA output signal	
BUS interface options available:	CANopen, PROFIBUS DP
Pulse contact/remote pause contact:	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.)
Max. pulse frequency:	25 pulses/sec
Contact impedance:	10 kOhm
Max. pulse memory:	65,535 pulses
Necessary contact duration:	20ms
Analog - current input burden:	Approximately 120 Ohm
Max. allowable input current:	50 mA
Power requirements:	Single phase, 115-230 VAC + 10%, 50/60 Hz

ProMinent® Sigma X: Sigma/1 S1Cb Motor Diaphragm Metering Pumps

Capacity Data (S1Ba)

Capacity data: Sigma/ 1 Basic Version

Pump version	Capacity at Max. Backpressure				Max. Stroke Rate	Output per Stroke	Max. Suction Lift		Max. Suction Pressure		Suction/ Discharge Connector		Shipping Weight w/Motor (approx.)	
S1Ba H	psig	(bar)	GPH	(L/h)	spm	mL/ stroke	ft	(m)	psig	(bar)	in	(DN)	lbs	(kg)
12017 PVT	145	(10)	5.3	(20.4)	88	3.8	23	(7)	14.5	(1)	1/2 MNPT	(10)	19.8	(9)
12017 SST	174	(12)	5.3	(20.4)	88	3.8	23	(7)	14.5	(1)	3/8 FNPT	(10)	26.5	(12)
12035 PVT	145	(10)	11	(42)	172	4	23	(7)	14.5	(1)	1/2 MNPT	(10)	19.8	(9)
12035 SST	174	(12)	11	(42)	172	4	23	(7)	14.5	(1)	3/8 FNPT	(10)	26.5	(12)
10050 PVT	145	(10)	15.8	(60)	246	4	23	(7)	14.5	(1)	1/2 MNPT	(10)	19.8	(9)
10050 SST	145	(10)	15.8	(60)	246	4	23	(7)	14.5	(1)	3/8 FNPT	(10)	26.5	(12)
10022 PVT	145	(10)	6.9	(26.4)	88	5	19.6	(6)	14.5	(1)	1/2 MNPT	(10)	19.8	(9)
10022 SST	145	(10)	6.9	(26.4)	88	5	19.6	(6)	14.5	(1)	3/8 FNPT	(10)	26.5	(12)
10044 PVT	145	(10)	13.9	(52.8)	172	5.1	19.6	(6)	14.5	(1)	1/2 MNPT	(10)	19.8	(9)
10044 SST	145	(10)	13.9	(52.8)	172	5.1	19.6	(6)	14.5	(1)	3/8 FNPT	(10)	26.5	(12)
07065 PVT	102	(7)	20.6	(78)	246	5.2	19.6	(6)	14.5	(1)	1/2 MNPT	(10)	19.8	(9)
07065 SST	102	(7)	20.6	(78)	246	5.2	19.6	(6)	14.5	(1)	3/8 FNPT	(10)	26.5	(12)
07042 PVT	102	(7)	13.3	(50)	88	9.5	9.8	(3)	14.5	(1)	3/4 MNPT	(15)	21	(9.5)
07042 SST	102	(7)	13.3	(50)	88	9.5	9.8	(3)	14.5	(1)	1/2 FNPT	(15)	29.8	(13.5)
04084 PVT	58	(4)	26.6	(100)	172	9.7	9.8	(3)	14.5	(1)	3/4 MNPT	(15)	21	(9.5)
04084 SST	58	(4)	26.6	(100)	172	9.7	9.8	(3)	14.5	(1)	1/2 FNPT	(15)	29.8	(13.5)
04120 PVT	58	(4)	38	(144)	246	9.7	9.8	(3)	14.5	(1)	3/4 MNPT	(15)	21	(9.5)
04120 SST	58	(4)	38	(144)	246	9.7	9.8	(3)	14.5	(1)	1/2 FNPT	(15)	29.8	(13.5)

Capacity Data (S1Cb)

Capacity data: Sigma/ 1 Control Version

Pump version	Capacity at Max. Backpressure				Max. Stroke Rate	Output per Stroke	Max. Suction Lift		Max. Suction Pressure		Suction/ Discharge Connector		Shipping Weight w/Motor (approx.)	
S1Cb H	psig	(bar)	GPH	(L/h)	spm	mL/ stroke	ft	(m)	psig	(bar)	in	(DN)	lbs	(kg)
12017 PVT	145	(10)	5.5	(21)	90	3.8	23	(7)	14.5	(1)	1/2 MNPT	(10)	19.8	(9)
12017 SST	174	(12)	5.5	(21)	90	3.8	23	(7)	14.5	(1)	3/8 FNPT	(10)	26.5	(12)
12035 PVT	145	(10)	11.1	(42)	170	4	23	(7)	14.5	(1)	1/2 MNPT	(10)	19.8	(9)
12035 SST	174	(12)	11.1	(42)	170	4	23	(7)	14.5	(1)	3/8 FNPT	(10)	26.5	(12)
10050 PVT	145	(10)	12.9	(49)	200	4	23	(7)	14.5	(1)	1/2 MNPT	(10)	19.8	(9)
10050 SST	145	(10)	12.9	(49)	200	4	23	(7)	14.5	(1)	3/8 FNPT	(10)	26.5	(12)
10022 PVT	145	(10)	7.1	(27)	90	5	19.6	(6)	14.5	(1)	1/2 MNPT	(10)	19.8	(9)
10022 SST	145	(10)	7.1	(27)	90	5	19.6	(6)	14.5	(1)	3/8 FNPT	(10)	26.5	(12)
10044 PVT	145	(10)	14	(53)	170	5.1	19.6	(6)	14.5	(1)	1/2 MNPT	(10)	19.8	(9)
10044 SST	145	(10)	14	(53)	170	5.1	19.6	(6)	14.5	(1)	3/8 FNPT	(10)	26.5	(12)
07065 PVT	102	(7)	16.6	(63)	200	5.2	19.6	(6)	14.5	(1)	1/2 MNPT	(10)	19.8	(9)
07065 SST	102	(7)	16.6	(63)	200	5.2	19.6	(6)	14.5	(1)	3/8 FNPT	(10)	26.5	(12)
07042 PVT	102	(7)	13.7	(52)	90	9.5	9.8	(3)	14.5	(1)	3/4 MNPT	(15)	21	(9.5)
07042 SST	102	(7)	13.7	(52)	90	9.5	9.8	(3)	14.5	(1)	1/2 FNPT	(15)	29.8	(13.5)
04084 PVT	58	(4)	26.7	(101)	170	9.7	9.8	(3)	14.5	(1)	3/4 MNPT	(15)	21	(9.5)
04084 SST	58	(4)	26.7	(101)	170	9.7	9.8	(3)	14.5	(1)	1/2 FNPT	(15)	29.8	(13.5)
04120 PVT	58	(4)	30.9	(117)	200	9.7	9.8	(3)	14.5	(1)	3/4 MNPT	(15)	21	(9.5)
04120 SST	58	(4)	30.9	(117)	200	9.7	9.8	(3)	14.5	(1)	1/2 FNPT	(15)	29.8	(13.5)

Materials In Contact With Chemicals

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

ProMinent® Sigma X: Sigma/1 S1Ba Motor Diaphragm Metering Pumps

Identcode Ordering System (S1Ba)

S1Ba	Drive Type:												
	H	Main Drive, Diaphragm											
		Verison Capacity:											
		12017	5.3 gph (20.4 l/h), 145 psi (10 bar)				07065	20.6 gph (78 l/h), 102 psi (7 bar)					
		12035	11 gph (42 l/h), 145 psi (10 bar)				07042	13.3 gph (50 l/h), 102 psi (7 bar)					
		10050	15.8 gph (60 l/h), 145 psi (10 bar)				04084	26.6 gph (100 l/h), 58 psi (4 bar)	**Note: For SS versions see capacity data**				
		10022	6.9 gph (26.4 l/h), 145 psi (10 bar)				04120	38 gph (144 l/h), 58 psi (4 bar)					
		10044	13.9 gph (52.8 l/h), 145 psi (10 bar)										
			Liquid end material:										
			PV	PVDF									
			SS	316 Stainless Steel									
				Seal:									
				T	PTFE seal								
					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:						
							7	PVDF clamping nut & insert					
							8	SS clamping nut & insert					
								Logo:					
								0	Standard with logo				
									Electrical Connection (± 10%):				
									S	3 ph, 230 V/400 V, 50/60 Hz			
									M	1 ph, AC, 230 V, 50/60 Hz			
									N	1 ph, AC, 115 V 60 Hz			
									K	90 VDC Permanent magnet			
									3	Without motor, B5			
										Enclosure rating:			
										0	Standard		
											Stroke sensor:		
											0	Without stroke sensor (Standard)	
											2	With Pacing relay (Consult Factory)	
												Stroke length adjustment:	
												0	Manual (Standard)
												4	W/ stroke positioning moto 4-20 mA, 230 V 50/60 Hz
												6	W/ stroke positioning motor 4-20 mA, 115 V 50/60 Hz
S1Ba	**H**	**12017**	**PV**	**T**	**A**	**0**	**7**	**0**	**S**	**0**	**0**	**0**	

ProMinent® Sigma X: Sigma/1 S1Cb Motor Diaphragm Metering Pumps

Identcode Ordering System (S1Cb)

S1Cb — Drive Type:

H — Main Drive, Diaphragm

Version: Capacity:

12017	5.5 gph (21 l/h), 145 psi (10 bar)	07065	16.6 gph (63 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	12.9 gph (49 l/h), 145 psi (10 bar)	04084	26.7 gph (101 l/h), 58 psi (4 bar)
10022	7.1 gph (27 l/h), 145 psi (10 bar)	04120	30.9 gph (117 l/h), 58 psi (4 bar)
10044	14 gph (53 l/h), 145 psi (10 bar)		

Note: For SS versions see capacity data

Liquid end material:

- PV — PVDF
- SS — Stainless Steel

Seal:

- T — PTFE seal

Diaphragm type:

- S — Multi-layer safety diaphragm w/ visual indicator
- A — Multi-layer safety diaphragm w/ pump stop function

Liquid end version:

- 0 — Without valve spring
- 1 — With 2 valve springs

Hydraulic connections:

- 7 — PVDF clamping nut & insert
- 8 — Stainless steel clamping nut & insert

Logo:

- 0 — Standard with logo

Electrical Connection (± 10%):

- U — 100 - 240 V

Cable and plug:

- 8 — Open end 3m UL/CSA 115/230V
- D — North American plug, 115 V
- X — Without cable

Relay:

- 0 — No relay
- 1 — Fault indicating relay
- 3 — Option 1 + pacing relay
- 8 — 4-20 mA output + fault/pacing relay

Control variant:

- 0 — Manual + External with pulse control (mult/div)
- 1 — Manual + External with pulse control & analog
- 6 — *Option 1 + PROFIBUS® (M12 plug)

Over Pressure Shut-off:

- 0 — Without over pressure shut-off

Operating unit (HMI):

- 0 — HMI + 1.64' (0.5m) cable
- 4 — HMI + 6.5' (2.0 m) cable
- 5 — HMI + 16.4' (5.0 m) cable
- 6 — HMI + 32.8' (10.0 m) cable
- X — Without HMI

Access Code:

- 0 — No access code
- 1 — Access code

Language:

- EN — English

Approval:

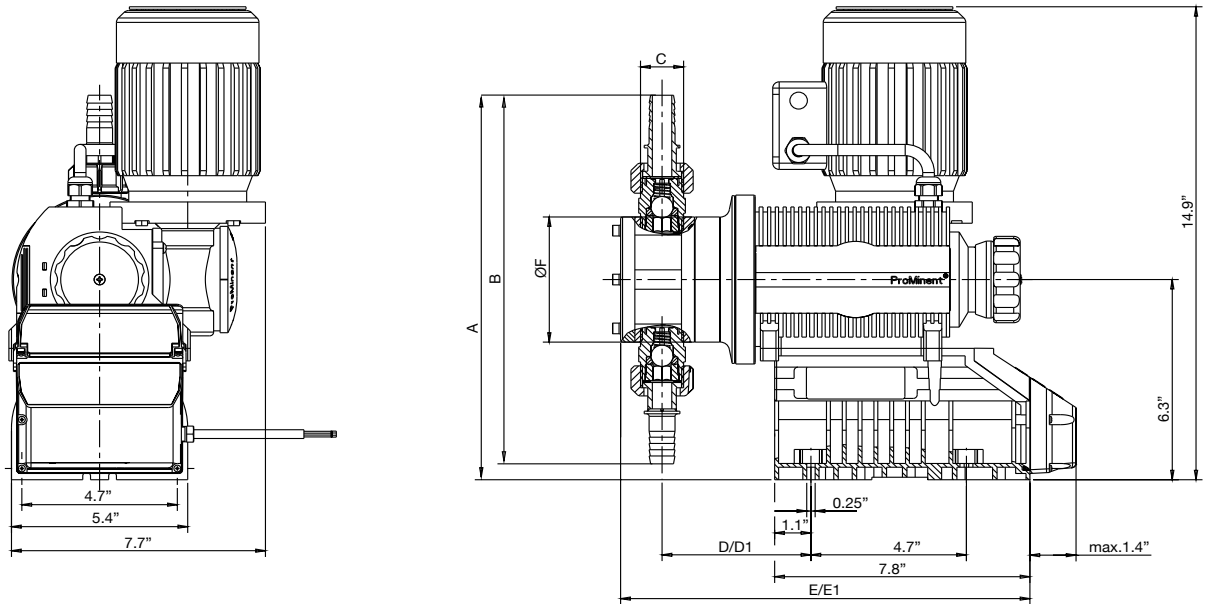
- 01 — CE

S1Cb	H	12017	PV	T	S	0	0	0	U	D	0	0	0	0	S	EN	01	

*With the option PROFIBUS®-DP no relay can be selected

ProMinent® Sigma X: Sigma/1 Motor Diaphragm Metering Pumps

Dimensional Drawing: (S1Ba)



Dimensions in inches (mm)

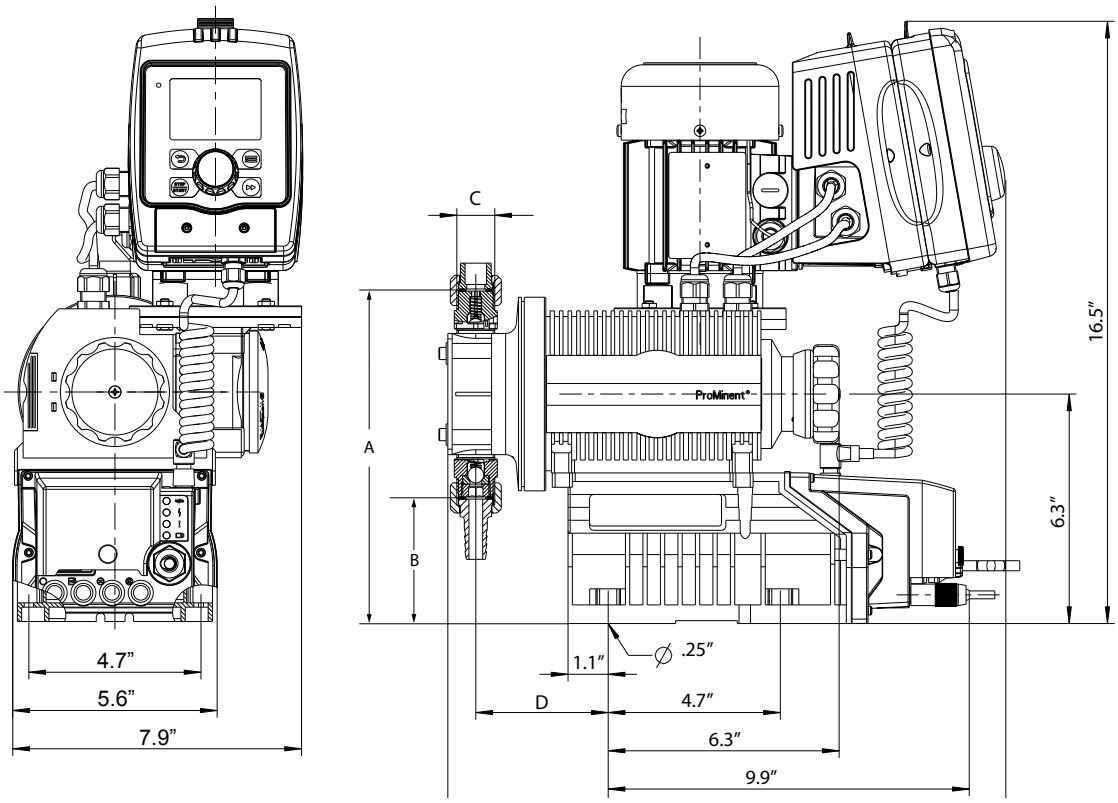
Type Sigma/ 1	A	B	Suction/ Discharge Valve Thread C*	D	D1**	E	E1**	ØF
12017, 12035, 10050, 10022, 10044, 07065								
PVT	11 (279)	9.38 (238)	1/2" MNPT	3.54 (90)	4.33 (110)	10.8 (275)	11.6 (295)	3.8 (96)
SST	9.75 (248)	7.13 (181)	1/2" FNPT	3.5 (89)	4.29 (109)	10.8 (275)	11.6 (295)	3.8 (96)
07042, 04084, 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	13.3 (337)	13.1 (332)	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 X: Sigma/1 Motor Diaphragm Metering Pumps

Dimensional Drawing: (S1Cb)



Dimensions in inches (mm)

Type Sigma 1	A	B	C*	D	E
12017, 12035, 10050					
PVT	9.2 (234)	3.4 (87)	1/2" (MNPT)	3.7 (93)	4.3 (109)
SS	9.1 (231)	3.5 (89)	3/8" (MNPT)	3.6 (92)	4.3 (109)
10022, 10044, 07065					
PVT	9.2 (234)	3.4 (87)	1/2" (MNPT)	4.6 (117)	4.3 (109)
SS	9.1 (231)	3.5 (89)	3/8" (MNPT)	4.6 (117)	4.3 (109)
07042, 04084, 04120					
PVT	9.6 (243)	3.1 (78)	3/4" MNPT	3.9 (98)	4.7 (119)
SS	9.6 (243)	3.1 (78)	1/2" (MNPT)	3.8 (97)	4.6 (118)

** Suction/ Discharge valve thread*

Piping adapters provided according to technical data

ProMinent® Sigma X: Sigma/2 Motor Diaphragm Metering Pumps

Overview: Sigma/ 2 control type (S2Cb)

The Sigma/2 motor diaphragm metering pumps are produced with a high-strength inner housing for parts subject to load as well as an additional plastic housing to protect against corrosion. The capacity range extends from 14.7 to 111 gph (56 - 420 l/h) and pressures up to 232 psig (16 bar). Stroke length is 0.20 in

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

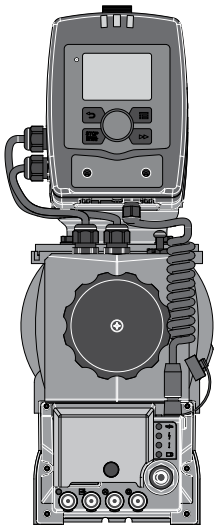
In all motor-driven metering pumps without integrated overload protection, for safety reasons, suitable overload protection must be provided during installation. (see page 148 for spare parts)

Sigma/ 2 Basic Type (S2Ba)

The Sigma/ 2 basic type is a motor-driven metering pump without internal electronics. Various NEMA 56C frame motors can be used depending upon the application requirements. The Sigma 2 Basic pump is also suitable for use with inverter duty and DC motors for
varying flow requirements.

ProMinent® Sigma X: Sigma/2 Motor Diaphragm Metering Pumps

Sigma/ 2 control type (S2Cb)



For optional control via contact or analog signals (e.g. 0/4 - 20 mA) the Sigma control type results in good adaptability, even in fluctuating metering requirements.

The microprocessor control is an optimum combination of speed control and stop & go operation, i.e. it works in a wide control field with customized fine adjustment. Moreover it enables an optimum metering result thanks to the metering behavior of the metering pump being matched to the chemicals or application.

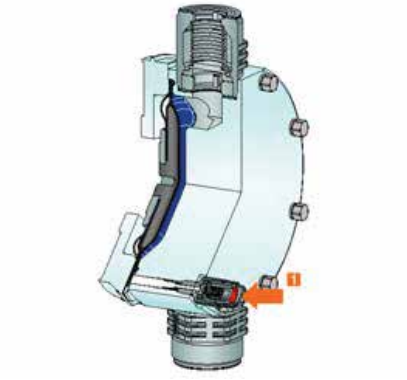
The control system measures the movement and speed profile in conjunction with the power demand. This leads to a real reduction in the actually required power, which means an increase in efficiency.

Detachable operating unit (HMI)

The operating unit (HMI) can be attached directly to the metering pump or mounted on the wall alongside the pump or completely removed. This provides the operator with a wide range of options for the integration of a metering system into the overall system that it is readily accessible and easy to use. Moreover, the removable operating unit offers additional protection against unauthorized operation of the metering pump or against changing of the pump settings.

The Sigma X features a NEW removable HMI control unit with innovative click-wheel and 4 operating buttons. An illuminated LCD display provides information about the relevant operating status. LEDs on the operating unit and the control unit indicate the active pump functions or the pump status.

Diaphragm rupture warning system



The liquid end has a patented multilayer safety diaphragm as standard and a visual diaphragm rupture indicator.

The diaphragm is coated on both sides with PTFE film. This coating ensures that no leakage to the outside occurs even if the diaphragm ruptures. If the diaphragm ruptures, feed chemical enters between the diaphragm layers and thus triggers a mechanical indication or an alarm via the sensor area. This concept ensures reliable metering - even under critical operating conditions.

ProMinent® Sigma X: Sigma/2 Motor Diaphragm Metering Pumps

Sigma/ 2 control type (S2Cb)

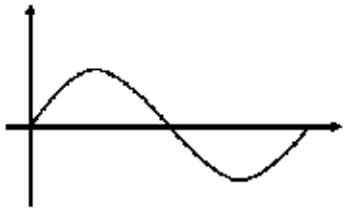


Diagram 1: Discharge stroke, suction stroke equal

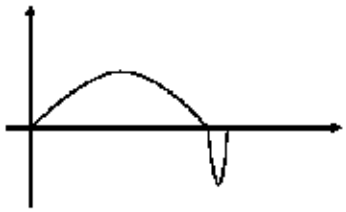


Diagram 2: long discharge stroke, short suction stroke

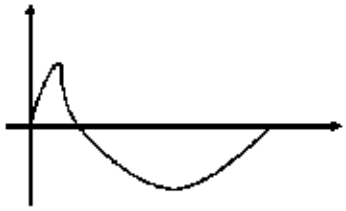


Diagram 3: short discharge stroke, long suction stroke

Metering profiles

Metering profiles ensure optimum metering results, thanks to the metering behavior of the metering pump being matched to the chemicals or application.

The stroke movement of the diaphragm pump is continuously measured and controlled, so that the stroke is executed according to the desired metering profile. The pump can be operated in normal mode **(Diagram 1)**, with optimized discharge stroke **(Diagram 2)** or with optimized suction stroke **(Diagram 3)**. Three typical metering profiles are shown schematically with the behavior over time.

In normal operating mode the time behavior for the suction stroke and the discharge stroke is similar **(Diagram 1)**. In the mode with optimized discharge stroke **(Diagram 2)** the discharge stroke is lengthened while the suction stroke is executed as quickly as possible. This setting is, for example, useful for applications that require optimum mixing behavior and optimized chemical mixing.

In the mode with the optimized suction stroke **(Diagram 3)**, the suction stroke is carried out as slowly as possible, which permits precise and trouble-free metering of viscous and gaseous media. This setting should also be chosen to minimize the NPSH value.

ProMinent® Sigma X: Sigma/2 Motor Diaphragm Metering Pumps

Specifications (S2Ba and S2Cb)

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
S2Cb: Microprocessor control version with innovative start/stop and variable speed control proportional to set frequency or external control signal.

Stroke counting: Standard on S2Cb

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:	Ceramic	SS

Viscosity ranges:

Liquid end version	Max. strokes/min	Viscosity (mPas)
Standard	180	0-200
With valve springs	130	200-500
With valve springs and suction-side feed	90	500-1000*

* Only when properly installed & adjusted

Sound pressure level: Sound pressure level LpA < 70 dB in accordance with EN ISO 20361:2010-10 at max. stroke length, max. stroke rate, max. back pressure (water)

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

Certified to NSF/ANSI 61

Sigma 2 Diaphragm:

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 ±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 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 Packed Plunger:

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 ±0.5%

Max. fluid operating temperatures:

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 X: Sigma/2 Motor Diaphragm Metering Pumps

Specifications (S2Ba and S2Cb) Cont.

Sigma 2 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 = 87 SPM, 11:1 = 158 SPM, 7.25:1 = 238 SPM
Motor coupling:	Flexible coupling included with pump
Required Motor HP:	1/3 HP (0.25 kW)
Full load RPM:	1750 RPM (60 Hz)
Stroke sensor (optional):	Hall effect - requires 5 VDC

Sigma 2 Control Version

Control Function:	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 fre quency. In the start-stop mode the motor speed is constant at approximately 580 RPM.
Enclosure rating:	IP 65
Pump power requirements:	1ph, 115V-230V, 50/60 Hz (internally converted to drive below motor)
Motor data:	Totally enclosed, fan cooled (IP55); class F insulation; Manufacturer ATB; 0.25 kW (0.33 HP) 230 3 phase (1.2 A, 1690 rpm)
Relay load *Fault relay only (Option 1):*	Contact load: 250 VAC, 8 A, 50/60 Hz Operating life: > 200,000 switch functions
Fault relay with pacing relay (Option 3):	**Fault Relay** Contact load: 24 V, 8 A, 50/60 Hz Operating life: > 200,000 switch functions **Pacing relay** Residual impedance in ON-position (R_{DSOn}): < 8 Ω Residual current in OFF-position: <1µA Maximum voltage: 24 VDC Maximum current: < 100 mA (for pacing relay) Switch functions: $750x10^6$ Contact closure: 100 ms (for pacing relay)
Air Humidity	Max. air humidity*: 95% rel. humidity * non-condensing
Fuse:	Internal, 6.3 AT - (1.5 kA)
Analog output signal:	Max. impedance 300 Ω Isolated 4-20 mA output signal
Bus interface options available:	CANopen, PROFIBUS DP
Relay cable (optional):	6 feet (2 m) 3 wire (SPDT) 250 VAC, 2 A
Pulse contact/remote pause contact:	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.)
Contact input max. pulse frequency:	25 pulses/sec
Contact input impedance:	10 kOhm
Max. pulse memory:	65,535 pulses
Necessary contact duration:	20ms
Analog - current input burden:	Approximately 120 Ohm
Max. allowable input current:	50 mA
Input power requirements:	single phase, 115-230 VAC

ProMinent® Sigma X: Sigma/2 Motor Diaphragm Metering Pumps

Capacity Data (S2Ba)

Capacity data: Sigma/ 2 Basic Version

Pump Version	Capacity at Max. Backpressure				Max. Stroke Rate	Output per Stroke	Max. Suction Lift		Max. Suction Pressure		Suction/ Discharge Connector		Shipping Weight w/Motor (approx.)	
S2Ba H	**psig**	**(bar)**	**GPH**	**(L/h)**	**spm**	**mL/stroke**	**ft**	**(m)**	**psig**	**(bar)**	**in**	**(DN)**	**lbs**	**(kg)**
16050 PVT	145	(10)	15.8	(60)	87	11.4	23	(7)	44	(3)	1/2 MNPT	(15)	33	(15)
16050 SST	232	(16)	14.7	(56)	87	11.4	23	(7)	44	(3)	1/2 FNPT	(15)	44	(20)
16090 PVT	145	(10)	28.0	(106)	158	11.4	23	(7)	44	(3)	3/4 MNPT	(15)	33	(15)
16090 SST	232	(16)	25.9	(98.4)	158	11.4	23	(7)	44	(3)	1/2 FNPT	(15)	44	(20)
16130 PVT	145	(10)	41.2	(156)	238	10.9	23	(7)	44	(3)	3/4 MNPT	(15)	33	(15)
16130 SST	232	(16)	39.0	(148)	238	10.9	23	(7)	44	(3)	1/2 FNPT	(15)	44	(20)
07120 PVT	102	(7)	39.6	(150)	87	27.4	16	(5)	15	(1)	3/4 MNPT	(25)	35	(16)
07120 SST	102	(7)	39.6	(150)	87	27.4	16	(5)	15	(1)	3/4 MNPT	(25)	53	(24)
07220 PVT	102	(7)	69.7	(264)	158	27.4	16	(5)	15	(1)	3/4 MNPT	(25)	35	(16)
07220 SST	102	(7)	69.7	(264)	158	27.4	16	(5)	15	(1)	3/4 MNPT	(25)	53	(24)
04350 PVT	58	(4)	111.0	(420)	238	29.4	16	(5)	15	(1)	1 MNPT	(25)	35	(16)
04350 SST	58	(4)	111.0	(420)	238	29.4	16	(5)	15	(1)	1 MNPT	(25)	53	(24)

Capacity Data (S2Cb)

Capacity data: Sigma/ 2 Control Version

Pump Version	Capacity at Max. Backpressure				Max. Stroke Rate	Output per Stroke	Max. Suction Lift		Max. Suction Pressure		Suction/ Discharge Connector		Shipping Weight w/Motor (approx.)	
S2Cb H	**psig**	**(bar)**	**GPH**	**(L/h)**	**spm**	**mL/stroke**	**ft**	**(m)**	**psig**	**(bar)**	**in**	**(DN)**	**lbs**	**(kg)**
16050 PVT	145	(10)	16.1	(61)	90	11.4	23	(7)	29	(2)	1/2 MNPT	(15)	33	(15)
16050 SST	232	(16)	14.7	(56)	90	10.4	23	(7)	29	(2)	1/2 FNPT	(15)	44	(20)
16090 PVT	145	(10)	28.8	(109)	160	11.4	23	(7)	29	(2)	3/4 MNPT	(15)	33	(15)
16090 SST	232	(16)	26.2	(99)	160	10.3	23	(7)	29	(2)	1/2 FNPT	(15)	44	(20)
16130 PVT	145	(10)	34.6	(131)	200	10.9	23	(7)	29	(2)	3/4 MNPT	(15)	33	(15)
16130 SST	232	(16)	34.1	(129)	200	10.9	23	(7)	29	(2)	1/2 FNPT	(15)	44	(20)
07120 PVT	102	(7)	39.6	(150)	90	27.4	16	(5)	15	(1)	3/4 MNPT	(25)	35	(16)
07120 SST	102	(7)	39.6	(150)	90	27.4	16	(5)	15	(1)	3/4 MNPT	(25)	53	(24)
07220 PVT	102	(7)	71.6	(271)	160	27.7	16	(5)	15	(1)	3/4 MNPT	(25)	35	(16)
07220 SST	102	(7)	71.6	(271)	160	27.7	16	(5)	15	(1)	3/4 MNPT	(25)	53	(24)
04350 PVT	58	(4)	93.3	(353)	200	29.4	16	(5)	15	(1)	1 MNPT	(25)	35	(16)
04350 SST	58	(4)	93.3	(353)	200	29.4	16	(5)	15	(1)	1 MNPT	(25)	53	(24)

Materials In Contact With Chemicals

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

ProMinent® Sigma X: Sigma/2 Motor Diaphragm Metering Pumps

Identcode Ordering System (S2Ba)

S2Ba	Drive Type												
	H	Main Drive, Diaphragm											
		Version	Capacity:										
		16050	15.8 gph (60 l/h), 145 psi (10 bar)				07120	39.6 gph (150 l/h), 102 psi (7 bar)					
		16090	28.0 gph (106 l/h), 145 psi (10 bar)				07220	69.7 gph (264 l/h), 102 psi (7 bar)	**Note: For SS versions see capacity data**				
		16130	41.2 gph (156 l/h), 145 psi (10 bar)				04350	111 gph (420 l/h), 58 psi (4 bar)					
			Liquid end material:										
			PV	PVDF									
			SS	316 Stainless Steel									
				Seal:									
				T	PTFE seal								
					Diaphragm type:								
					S	Safety diaphragm w/ visual indicator							
					A	Safety diaphragm w/ pump stop function							
						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)	
												Stroke length adjustment:	
												0	Manual (Standard)
												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	**H**	**16050**	**PV**	**T**	**S**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	

ProMinent® Sigma X: Sigma/2 Motor Diaphragm Metering Pumps

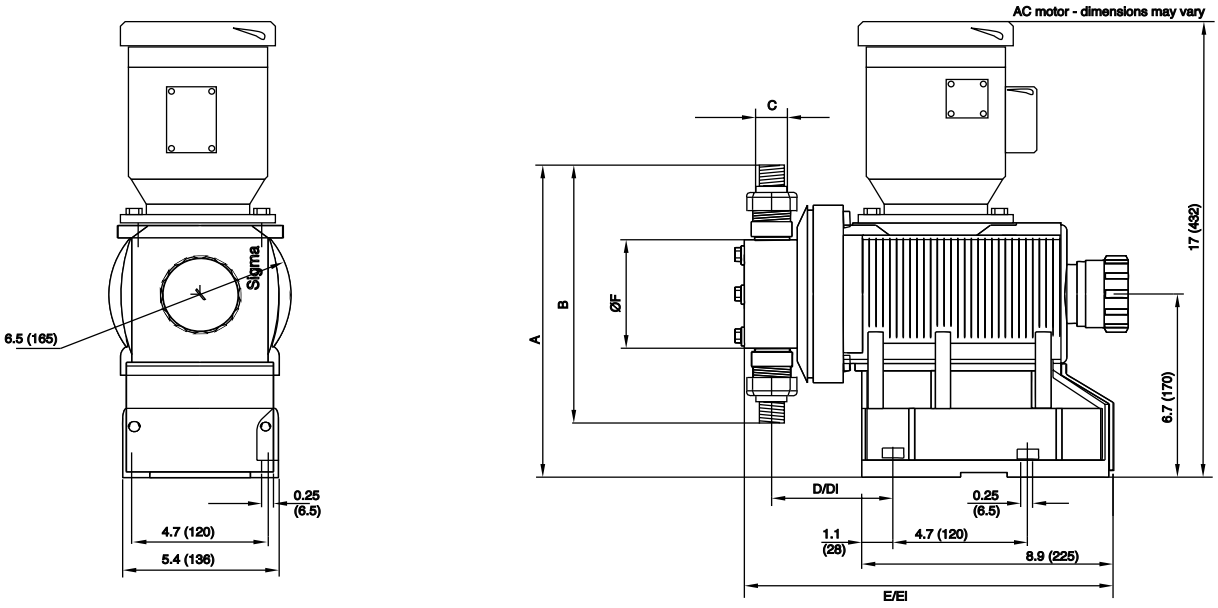
Identcode Ordering System (S2Cb)

S2Cb	Drive Type																	
	H	Main Drive, Diaphragm																
		Version: ' Capacity:																
		16050	16.1 gph (61 l/h), 145 psi (10 bar)				07120	39.6 gph (150 l/h), 102 psi (7 bar)										
		16090	28.8 gph (109 l/h), 145 psi (10 bar)				07220	71.6 gph (271 l/h), 102 psi (7 bar)	**Note: For SS versions see capacity data**									
		16130	34.6 gph (131 l/h), 145 psi (10 bar)				04350	93.3 gph (353 l/h), 58 psi (4 bar)										
			Liquid end material:															
			PV	PVDF														
			SS	Stainless Steel														
				Seal:														
				T	PTFE seals													
					Diaphragm type:													
					S	Multi-layer safety diaphragm w/ visual indicator												
					A	Multi-layer safety diaphragm w/ pump stop function												
						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	Stainless steel clamping nut & insert										
								Logo:										
								0	Standard with ProMinent logo									
									Electrical Connection (± 10%):									
									U	1ph, 115 V - 230 V 50/60Hz								
										Cable and plug:								
										8	Open end 3m UL/CSA 115/230V							
										D	North American plug, 115 V							
										X	Without cable							
											Relay:							
											0	No relay						
											1	Fault indicating relay						
											3	Option 1 + pacing relay						
											8	4-20 mA output + fault/pacing relay						
												Control variant:						
												0	Manual + External with pulse control (mult/div)					
												1	Manual + External with pulse control & analog					
												6	*Option 1 + PROFIBUS® (M12 plug)					
													Over Pressure Shut-off:					
													0	Without over pressure shut-off				
														Operating unit (HMI):				
														0	HMI + 1.64' (0.5) cable			
														4	HMI + 6.5' (2.0 m) cable			
														5	HMI + 16.4' (5.0 m) cable			
														6	HMI + 32.8' (10.0 m) cable			
														X	Without HMI			
															Access Code:			
															0	Without access code		
															1	Access code		
																Language:		
																EN	English	
																	Approval:	
																	01	CE
S2Cb	**H**	**16050**	**PV**	**T**	**S**	**0**	**0**	**0**	**U**	**D**	**0**	**0**	**0**	**0**	**0**	**EN**	**01**	

*With the option PROFIBUS®-DP no relay can be selected

ProMinent® Sigma X: Sigma/2 Motor Diaphragm Metering Pumps

Dimensional Drawing: (S2Ba)



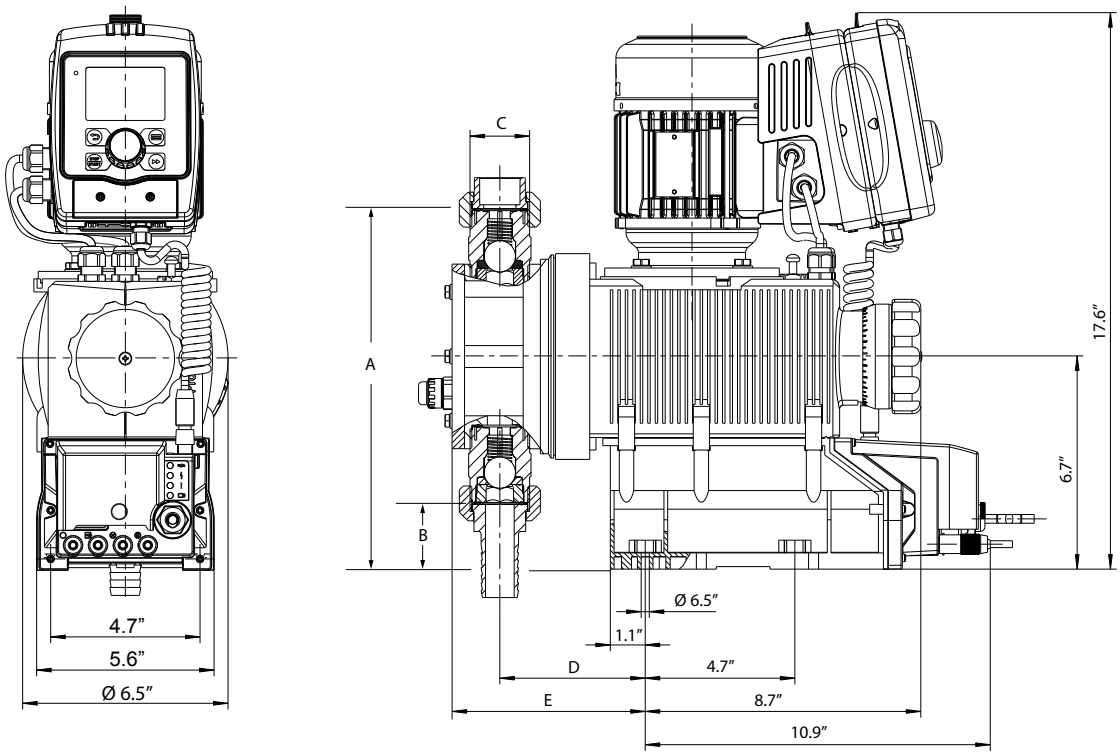
Dimensions in inches (mm)

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.

Dimensional Drawing: (S2Cb)



Dimensions in inches (mm)

Type Sigma 2	A	B	C*	D	E
16050, 16090, 16130					
PVT	10.1 (257)	6.95 (177)	DN 15	4.4 (111)	5.7 (144)
SS	10.9 (276)	8.2 (208)	DN 15	4.3 (110)	5.2 (133)
07120, 07220					
PVT	13.3 (337)	2.04 (52)	DN 25	4.6 (117)	6.1 (155)
SS	13.3 (337)	2.08 (53)	DN 25	4.6 (117)	5.8 (147)
04350					
PVT	14.3 (362)	2.04 (52)	DN25	4.6 (117)	6.1 (155)
SS	14.3 (362)	2.08 (53)	DN25	4.6 (117)	5.8 (147)

** Suction/ Discharge valve thread*

Piping adapters provided according to technical data

ProMinent® Sigma/ 2 HK Plunger Metering Pumps

Overview: Sigma/2 HK

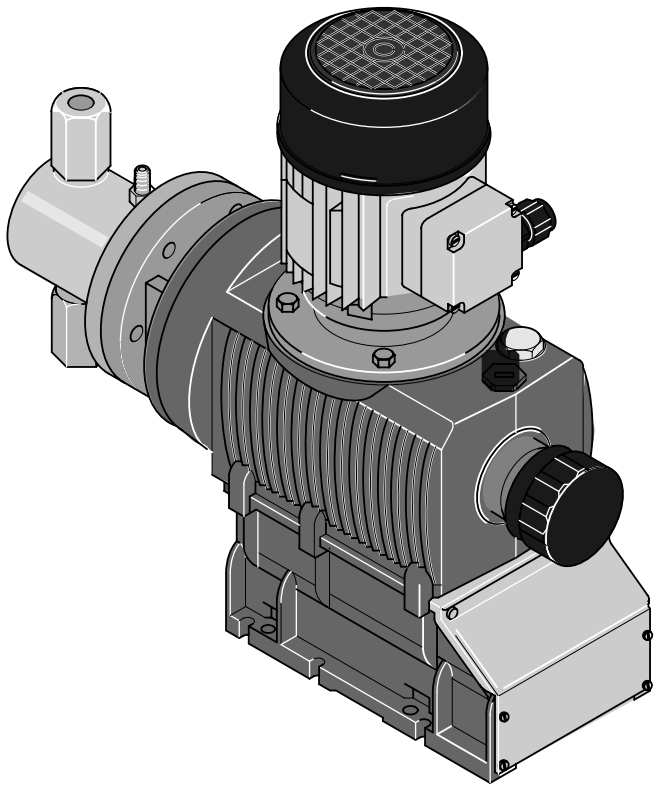
Ideal for high pressure applications requiring significant turndown

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 15.9-111.0 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 ±1% providing installation has been correctly carried out, and in the stroke length range of 10-100%. (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. 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.



ProMinent® Sigma/ 2 HK Plunger Metering Pumps

Specifications

General:

Maximum stroke length:	0.6” (15 mm) HK
Stroke frequency control:	S2Ba: Constant speed or optional DC/SCR drive or AC inverter
Materials of construction	
Inner casing:	Cast aluminum
Housing:	Glass-filled Luranyl™ (PPE)
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)
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.
Repeatability:	When used according to the operating instructions, better than ±0.5%

Max. fluid operating temperatures:	**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.
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 = 87 SPM, 11:1 = 156 SPM, 7.25:1 = 232 SPM
Motor coupling:	Flexible coupling included with pump.
Required Motor HP:	1/3 HP (.25 kW)
Full load RPM:	1750 RPM (60 Hz)
Stroke sensor (optional):	Hall effect - requires 5 VDC

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 MNPT	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)

Identcode Ordering System (S2Ba HK)

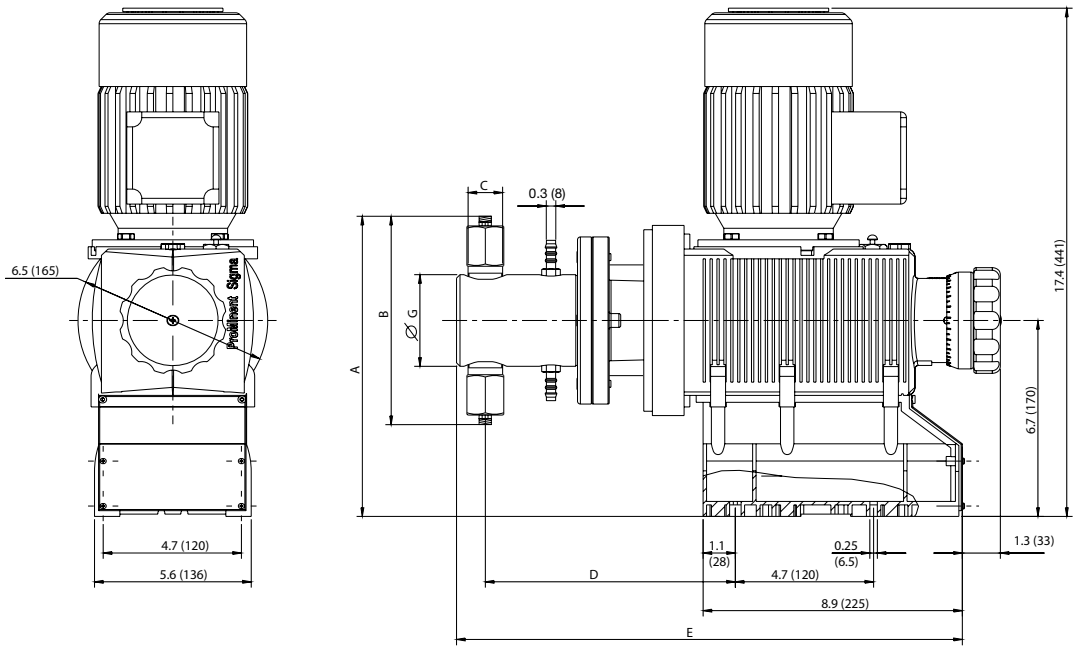
S2Ba	Drive Type												
	HK	Main Drive/Plunger											
		Version: Capacity:											
		32002	0.6 gph (2.3 l/h), 4640 psi (320 bar)				04522	7.0 gph (27.6 l/h), 652 psi (45 bar)					
		14006	1.8 gph (7.1 l/h), 2030 psi (140 bar)				02541	13.0 gph (49.2 l/h), 363 psi (25 bar)					
		07012	3.9 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									
				Seal:									
				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

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

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 23004 10006	1/4” DN 8	10.9 (277)	8.5 (216)	R1/4”	8.5 (217)	17.3 (439)	3.1 (79.5)
14006 10011 05016	1/4” DN 8	10.9 (277)	8.5 (216)	R1/4”	8.5 (217)	17.3 (439)	3.1 (79.5)
07012 04522 02534	1/4” DN 8	10.9 (277)	8.5 (216)	R1/4”	8.5 (217)	17.3 (439)	3.1 (79.5)
04022 02541 01264	3/8” DN 10	11 (279)	8.8 (223)	R3/8”	8.5 (217)	17.3 (439)	3.1 (79.5)

ProMinent® Sigma X: Sigma/3 Motor Diaphragm Metering Pumps

Overview: Sigma/ 3 (S3Cb)

The Sigma/3 motor diaphragm metering pumps are produced with a high-strength metal inner housing for parts subject to load as well as an additional plastic housing to protect against corrosion. The capacity range extends from 46 to 274.7 gph (174 - 1040 l/h) and pressures up to 174 psig (12 bar). Stroke length is 0.24 in.

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

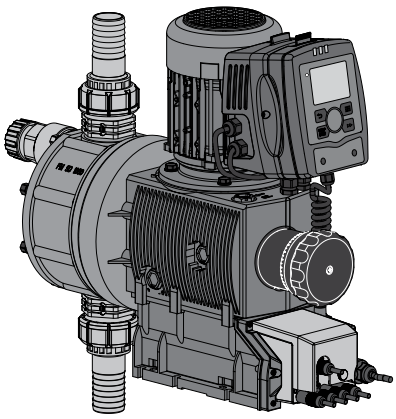
In all motor-driven metering pumps without integrated overload protection, for safety reasons, suitable overload protection must be provided during installation. (see page 148 for spare parts)

Sigma/ 3 Basic Type (S3Ba)

The Sigma/ 3 basic type is a motor-driven metering pump without internal electronics. Various NEMA 56C frame motors can be used depending upon the application requirements. The Sigma 3 Basic pump is also suitable for use with inverter duty and DC motors for varying flow requirements.

ProMinent® Sigma X: Sigma/3 Motor Diaphragm Metering Pumps

Sigma/ 3 control type (S3Cb)



For optional control via contact or analog signals (e.g. 0/4 - 20 mA) the Sigma control type pump results in good adaptability, even in fluctuating metering requirements.

The microprocessor control is an optimum combination of speed control and stop & go operation, i.e. it works in a wide control field with customized fine adjustment. Moreover it enables an optimum metering result thanks to the metering behavior of the metering pump being matched to the chemicals or application.

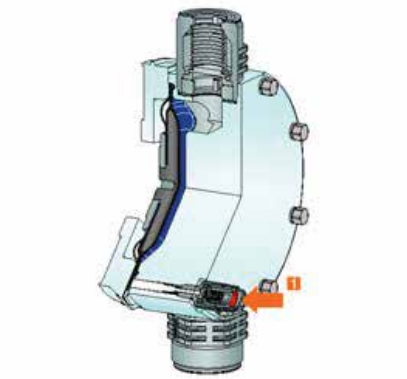
The control system measures the movement and speed profile in conjunction with the power demand. This leads to a real reduction in the actually required power, which means an increase in efficiency.

Detachable operating unit (HMI)

The operating unit (HMI) can be attached directly to the metering pump or mounted on the wall alongside the pump or completely removed. This provides the operator with a wide range of options for the integration of a metering system into the overall system that it is readily accessible and easy to use. Moreover, the removable operating unit offers additional protection against unauthorized operation of the metering pump or against changing of the pump settings.

The Sigma X features a NEW removable HMI control unit with innovative click-wheel and 4 operating buttons. An illuminated LCD display provides information about the relevant operating status. LEDs on the operating unit and the control unit indicate the active pump functions or the pump status.

Diaphragm rupture warning system



The liquid end has a patented multilayer safety diaphragm as standard and a visual diaphragm rupture indicator.

The diaphragm is coated on both sides with PTFE film. This coating ensures that no leakage to the outside occurs even if the diaphragm ruptures. If the diaphragm ruptures, feed chemical enters between the diaphragm layers and thus triggers a mechanical indication or an alarm via the sensor area. This concept ensures reliable metering - even under critical operating conditions.

ProMinent® Sigma X: Sigma/3 Motor Diaphragm Metering Pumps

Sigma/ 3 control type (S3Cb)

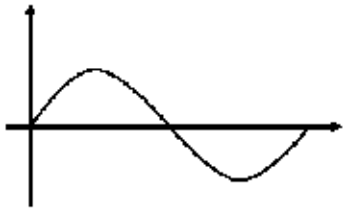


Diagram 1: Discharge stroke, suction stroke equal

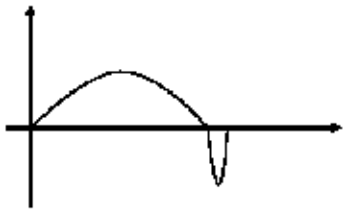


Diagram 2: long discharge stroke, short suction stroke

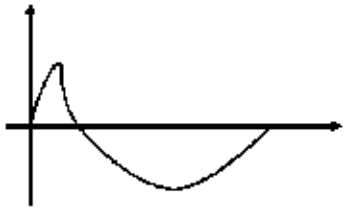


Diagram 3: short discharge stroke, long suction stroke

Metering profiles

Metering profiles ensure optimum metering results, thanks to the metering behavior of the metering pump being matched to the chemicals or application.

The stroke movement of the diaphragm pump is continuously measured and controlled, so that the stroke is executed according to the desired metering profile. The pump can be operated in normal mode **(Diagram 1)**, with optimized discharge stroke **(Diagram 2)** or with optimized suction stroke **(Diagram 3)**. Three typical metering profiles are shown schematically with the behavior over time.

In normal operating mode the time behavior for the suction stroke and the discharge stroke is similar **(Diagram 1)**. In the mode with optimized discharge stroke **(Diagram 2)** the discharge stroke is lengthened while the suction stroke is executed as quickly as possible. This setting is, for example, useful for applications that require optimum mixing behavior and optimized chemical mixing.

In the mode with the optimized suction stroke **(Diagram 3)**, the suction stroke is carried out as slowly as possible, which permits precise and trouble-free metering of viscous and gaseous media. This setting should also be chosen to minimize the NPSH value.

ProMinent® Sigma X: Sigma/3 Motor Diaphragm Metering Pumps

Specifications (S3Ba and S3Cb)

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 S3Cb: Microprocessor control version with innovative start/stop and variable speed control proportional to set frequency or external control signal.
Stroke counting:	Standard on S3Cb
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

Viscosity ranges:

Liquid end version	Max. strokes/min	Viscosity (mPas)
Standard	180	0-200
With valve springs	130	200-500
With valve springs and suction-side feed	90	500-1000*

* Only when properly installed & adjusted

Sound pressure level:	Sound pressure level LpA < 70 dB in accordance with EN ISO 20361:2010-10 at max. stroke length, max. stroke rate, max. back pressure (water)
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 ±2%

Certified to NSF/ANSI 61

Max. fluid operating temperatures:

Material	Constant (Max. Backpressure)	Short Term (15 min. @ max.30 psi)	Minimum temperature
PVDF	149˚F (65˚C)	212˚F (100˚C)	14˚F (-10°C)
316 SS	194˚F (90˚C)	248˚F (120˚C)	14˚F (-10°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 X: Sigma/3 Motor Diaphragm Metering Pumps

Specifications (S3Ba and S3Cb) Cont.

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

Control Function:	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 fre quency. In the start-stop mode the motor speed is constant at approximately 580 RPM.
Enclosure rating:	IP 65
Pump power requirements:	1ph, 115V-230V, 50/60 Hz (internally converted to drive below motor)
Motor data:	Totally enclosed, fan cooled (IP55); class F insulation; Manufacturer ATB; 0.55 kW (0.75 HP) 230 3 phase (2.5 A, 1710 rpm)
Relay load *Fault relay only (Option 1):*	Contact load: 250 VAC, 8 A, 50/60 Hz Operating life: > 200,000 switch functions
Fault relay with pacing relay (Option 3):	**Fault Relay** Contact load: 24 V, 100 mA, 50/60 Hz Operating life: > 200,000 switch functions **Pacing relay** Residual impedance in ON-position (R_{DSOn}): < 8 Ω Residual current in OFF-position: <1µA Maximum voltage: 24 VDC Maximum current: < 100 mA (for pacing relay) Switch functions: $750x10^6$ Contact closure: 100 ms (for pacing relay)
Air Humidity	Max. air humidity*: 95% rel. humidity * non-condensing
Fuse:	Internal, 6.3 AT - (1.5 kA)
Analog output signal:	Max. impedance 300 Ω Isolated 4-20 mA output signal
Bus interface options available:	CANopen, PROFIBUS DP
Relay cable (optional):	6 feet (2 m) 3 wire (SPDT) 250 VAC, 2 A
Pulse contact/remote pause contact:	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.)
Contact input max. pulse frequency:	25 pulses/sec
Contact input impedance:	10 kOhm
Max. pulse memory:	65,535 pulses
Necessary contact duration:	20ms
Analog - current input burden:	Approximately 120 Ohm
Max. allowable input current:	50 mA
Input power requirements:	single phase, 115-230 VAC

ProMinent® Sigma X: Sigma/3 Motor Diaphragm Metering Pumps

Capacity Data (S3Ba)

Capacity data: Sigma/ 3 Basic Version

Pump Version S3Ba H	Capacity at Max. Backpressure psig	(bar)	GPH	(L/h)	Max. Stroke Rate spm	Output per Stroke mL/stroke	Max. Suction Lift (water) ft	(m)	Max. Suction Pressure psig	(bar)	Suction/ Discharge Connector in	(DN)	Shipping Weight w/Motor (approx.) lbs	(kg)
120145 PVT	145	(10)	45.9	(174)	86	33.7	16	(5)	29	(2)	1 MNPT	(25)	49	(22)
120145 SST	174	(12)	45.9	(174)	86	33.7	16	(5)	29	(2)	1 MNPT	(25)	57	(26)
120190 PVT	145	(10)	66.3	(251)	124	33.7	16	(5)	29	(2)	1 MNPT	(25)	49	(22)
120190 SST	174	(12)	66.3	(251)	124	33.7	16	(5)	29	(2)	1 MNPT	(25)	57	(26)
120270 PVT	145	(10)	92.7	(351)	173	33.8	16	(5)	29	(2)	1 MNPT	(25)	49	(22)
120270 SST	174	(12)	92.7	(351)	173	33.8	16	(5)	29	(2)	1 MNPT	(25)	57	(26)
070410 PVT	102	(7)	129.9	(492)	86	95.1	13	(4)	14.5	(1)	1-1/2 MNPT	(32)	53	(24)
070410 SST	102	(7)	129.9	(492)	86	95.1	13	(4)	14.5	(1)	1-1/2 MNPT	(32)	64	(29)
070580 PVT	102	(7)	183.8	(696)	124	95.1	13	(4)	14.5	(1)	1-1/2 MNPT	(32)	53	(24)
070580 SST	102	(7)	183.8	(696)	124	95.1	13	(4)	14.5	(1)	1-1/2 MNPT	(32)	64	(29)
040830 PVT	58	(4)	264.1	(1000)	173	95.1	10	(3)	14.5	(1)	1-1/2 MNPT	(32)	53	(24)
040830 SST	58	(4)	264.1	(1000)	173	95.1	10	(3)	14.5	(1)	1-1/2 MNPT	(32)	64	(29)

Capacity Data (S3Cb)

Capacity data: Sigma/ 3 Control Version

Pump Version S3Cb H	Capacity at Max. Backpressure psig	(bar)	GPH	(L/h)	Max. Stroke Rate spm	Output per Stroke mL/stroke	Max. Suction Lift (water) ft	(m)	Max. Suction Pressure psig	(bar)	Suction/ Discharge Connector in	(DN)	Shipping Weight w/Motor (approx.) lbs	(kg)
120145 PVT	145	(10)	48.1	(182)	90	33.7	16	(5)	29	(2)	1 MNPT	(25)	49	(22)
120145 SST	174	(12)	48.1	(182)	90	33.7	16	(5)	29	(2)	1 MNPT	(25)	57	(26)
120190 PVT	145	(10)	64.2	(243)	120	33.7	16	(5)	29	(2)	1 MNPT	(25)	49	(22)
120190 SST	174	(12)	64.2	(243)	120	33.7	16	(5)	29	(2)	1 MNPT	(25)	57	(26)
120270 PVT	145	(10)	96.4	(365)	180	33.8	16	(5)	29	(2)	1 MNPT	(25)	49	(22)
120270 SST	174	(12)	96.4	(365)	180	33.8	16	(5)	29	(2)	1 MNPT	(25)	57	(26)
070410 PVT	100	(7)	132.1	(500)	90	95.1	13	(4)	14.5	(1)	1-1/2 MNPT	(32)	53	(24)
070410 SST	100	(7)	132.1	(500)	90	95.1	13	(4)	14.5	(1)	1-1/2 MNPT	(32)	64	(29)
070580 PVT	100	(7)	177	(670)	120	95.1	13	(4)	14.5	(1)	1-1/2 MNPT	(32)	53	(24)
070580 SST	100	(7)	177	(670)	120	95.1	13	(4)	14.5	(1)	1-1/2 MNPT	(32)	64	(29)
040830 PVT	58	(4)	274.7	(1040)	180	95.1	10	(3)	14.5	(1)	1-1/2 MNPT	(32)	53	(24)
040830 SST	58	(4)	274.7	(1040)	180	95.1	10	(3)	14.5	(1)	1-1/2 MNPT	(32)	64	(29)

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 (Polyvinylidenefluoride)	PTFE	Glass	PTFE	PTFE	Ceramic/ Hast. C + CTFE**	PTFE
SST	Stainless steel	PTFE	Stainless steel	PTFE	PTFE	Stainless steel	PTFE

ProMinent® Sigma X: Sigma/3 Motor Diaphragm Metering Pumps

Identcode Ordering System (S3Ba)

S3Ba	Drive Type											
	H	Main Drive, Diaphragm										
		Version: Capacity:										
		120145	45.9 gph (174 l/h), 145 psi (10 bar)									
		120190	66.3 gph (251 l/h), 145 psi (10 bar)									
		120270	92.7 gph (351 l/h), 145 psi (10 bar)									
		070410	129.9 gph (492 l/h), 100 psi (7 bar)									
		070580	183.8 gph (696 l/h), 100 psi (7 bar)									
		040830	264.1 gph (1000 l/h), 58 psi (4 bar)									
		Note: For SS versions see capacity data										
			Liquid end material:									
			PV	PVDF								
			SS	316 Stainless Steel								
				Seal:								
				T	PTFE							
					Diaphragm type:							
					S	Safety diaphragm w/ visual indicator						
					A	Safety diaphragm w/ pump stop fuction						
						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)
												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**	**S**	**0**	**7**	**0**	**2**	**0**	**0**	**0**

ProMinent® Sigma X: Sigma/3 Motor Diaphragm Metering Pumps

Identcode Ordering System (S3Cb)

S3Cb — Drive Type

H — Main Drive, Diaphragm

Version: Capacity:

120145	48.1 gph (182 l/h), 145 psi (10 bar)	070410	132.1 gph (500 l/h), 100 psi (7 bar)
120190	64.2 gph (243 l/h), 145 psi (10 bar)	070580	177 gph (670 l/h), 100 psi (7 bar)
120270	96.4 gph (365 l/h), 145 psi (10 bar)	040830	274.7 gph (1040 l/h), 58 psi (4 bar)

Note: For SS versions see capacity data

Liquid end material:

- PV — PVDF max. 145 psi (10 bar)
- SS — Stainless Steel

Seal:

- T — PVDF with PTFE/Viton® seal

Diaphragm type:

- S — Multi-layer safety diaphragm w/ visual indicator
- A — Multi-layer safety diaphragm w/ pump stop function

Liquid end version:

- 0 — Without valve springs
- 1 — With 2 valve springs (Hastelloy C4, 1 psig)

Hydraulic connections:

- 0 — Standard connection
- 7 — PVDF clamping nut & insert
- 8 — Stainless steel clamping nut & insert

Logo:

- 0 — Standard with ProMinent logo

Electrical Connection (± 10%):

- U — 1ph, 115 V - 230 V 50/60Hz

Cable and plug:

- 8 — Open end 3m UL/CSA 115/230V
- D — North American plug, 115 V
- X — Without cable

Relay:

- 0 — Without relay
- 1 — Fault annunciating relay
- 3 — Option 1 + Pacing Relay
- 8 — Option 3 + 4-20 mA output

Control variant:

- 0 — Manual + External with pulse control (mult/div)
- 1 — Manual + External with pulse control & analog
- 6 — *Option 1 + PROFIBUS® (M12 Plug)
- 7 — Option 1 + CANopen

Over Pressure Shut-off:

- 0 — Without over pressure shut-off

Operating unit (HMI):

- 0 — HMI + 1.64' (0.5m) cable
- 4 — HMI + 6.5' (2.0 m) cable
- 5 — HMI + 16.4' (5.0 m) cable
- 6 — HMI + 32.8' (10.0 m) cable
- X — Without HMI

Access Code:

- 0 — Without access code
- 1 — Access code

Language:

- EN — English

Approval:

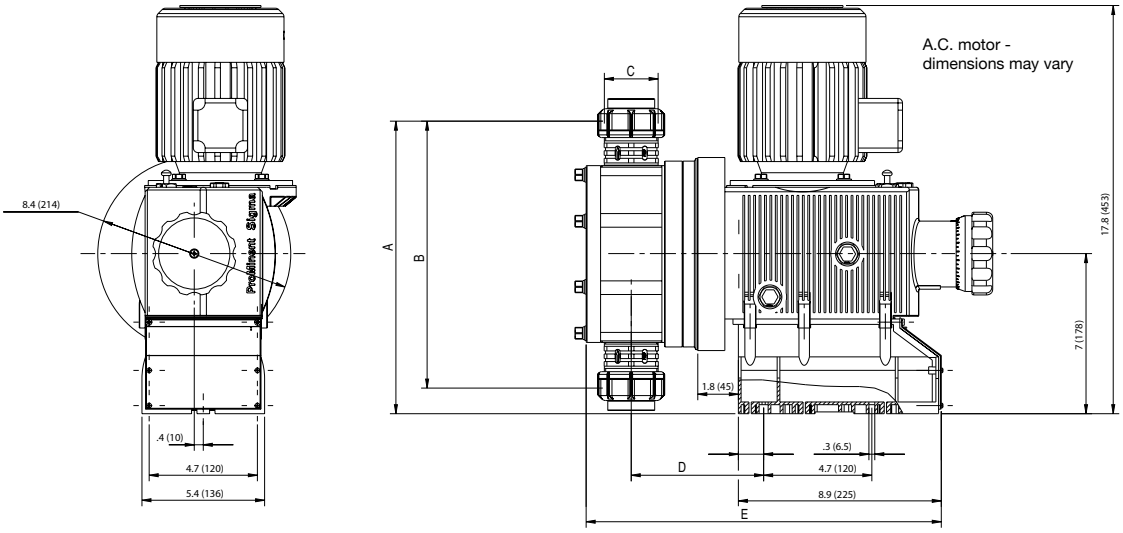
- 01 — CE

S3Cb	H	120145	PV	T	S	0	0	0	U	D	0	0	0	0	0	EN	01

*With the option PROFIBUS®-DP no relay can be selected

ProMinent® Sigma X: Sigma/3 Motor Diaphragm Metering Pumps

Dimensional Drawing: (S3Ba)



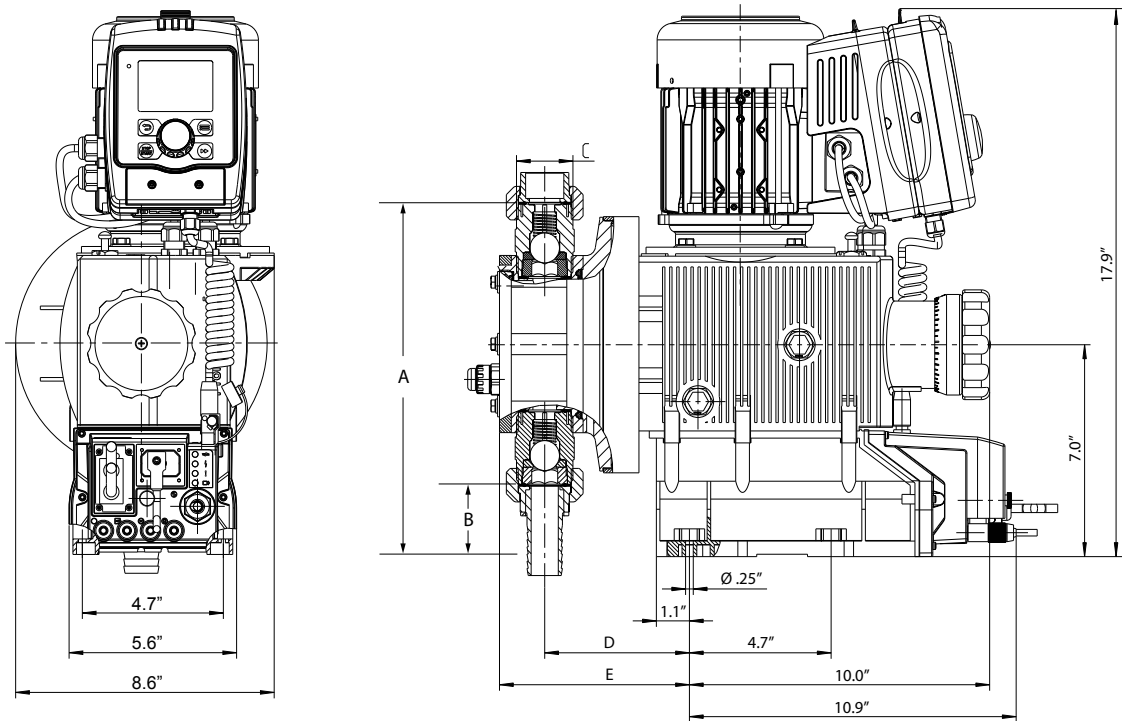
Dimensions in inches (mm)

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 X: Sigma/3 Motor Diaphragm Metering Pumps

Dimensional Drawing: (S3Cb)



Dimensions in inches (mm)

Type Sigma 3	A	B	C*	D	E
121045, 120190, 120270					
PVT	10.1 (257)	6.95 (177)	DN 15	4.4 (111)	5.7 (144)
SS	10.9 (276)	8.2 (208)	DN 15	4.3 (110)	5.2 (133)
070410, 070580, 040830					
PVT	13.3 (337)	13.1 (332)	DN 25	4.6 (117)	6.1 (155)
SS	13.3 (337)	13.1 (332)	DN 25	4.6 (117)	5.8 (147)

** Suction/ Discharge valve thread*

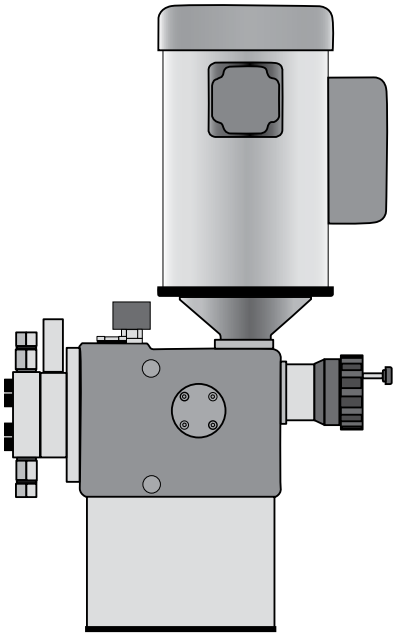
Piping adapters provided according to technical data

ProMinent® ProMus
Hydraulic Diaphragm Metering Pumps

Overview: ProMus

High pressure chemical process metering

(see page 149 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 plun¬ger (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 18 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 : to suction inlet	0.3mm; if larger than this provisions must be made to remove them prior
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: used to protect system	Integrated pressure relief to protect pump. External pressure relief must be
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

Capacity Data: ProMus

	Capacity at Max. Backpressure 60 Hz (1750 rpm)							Max. Stroke Rate	Capacity at Max. Backpressure 50 Hz (1458 rpm)				Typical suct./dis. Connection	
Plunger	(in.)	psig (PVDF)	Bar (PVDF)	psig (SS2)	Bar (SS2)	GPH	(L/h)	Gear Ratio	Stroke/ min.	GPH	(L/h)	Stroke/ min.	Bar (SS2)	FNPT/ BSP (SS2)	MNPT/ BSP (PVDF)
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

* ProMus30ASS2 Identity Code have a 1/4" FNPT outlet and a 3/8" FNPT Inlet

Materials In Contact With Chemicals

Liquid end materials in contact with media

Material	Pump head	Suction/Pressure 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)				
				10	50:1 56C 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 Requirements To Size a ProMus Pump

Complete this data sheet and fax it to ProMinent Pittsburgh at (412) 787-0704 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® Hydro/ 2 API 675 Hydraulic Diaphragm Metering Pumps

Overview: Hydro/ 2 API 675 (HA2a)

For flexible metering with excellent process reliability in the medium pressure range.
Capacity range of single pump: 1.85 - 24.0 gph; 145.0 - 1450.4 psi

As the new member of the Hydro product range, the hydraulic diaphragm metering pump Hydro/ 2 API 675 (HA2a) meets the requirements of API 675. The pumps stand out on account of their full-motion drive and automatic bleeding. There are a variety of drives, including some for use in areas at risk from explosion.

Your benefits:

Excellent process safety and reliability:

- PTFE multi-layer diaphragm with integral diaphragm rupture warning system
- Integral hydraulic relief valve
- Metering reproducibility is better than ± 1% within the 20-100% stroke volume range under defined conditions and with proper installation

Excellent flexibility:

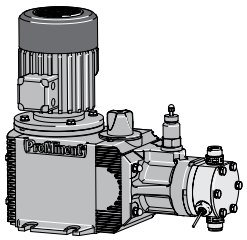
- The modular construction with single and double head versions permits a wide range of applications, with the double head designs being operated in push-pull mode
- It is possible to combine up to 5 metering units, even with different pump capacities, in multiple pump systems
- 5 different gear ratios are available

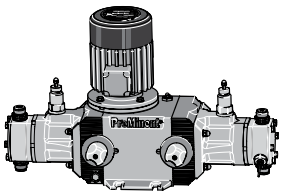
Technical Details:

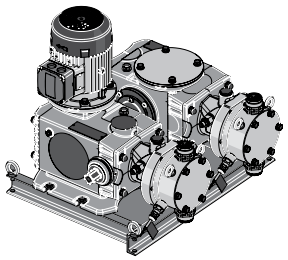
- Stroke length: 15 mm, Rod force: 2,000 N
- Stroke volume adjustment range: 0 – 100%
- Stroke volume adjustment: manually by scaled rotary dial (optionally with electric actuator or control drive)
- Metering reproducibility is better than ± 1% in the 20 to 100% stroke volume range under defined conditions and with correct installation
- PTFE multi-layer diaphragm with electric diaphragm rupture warning system via a contact
- Integrated hydraulic relief and bleed valve
- Wetted materials: PVDF, PTFE+25% carbon, stainless steel 1.4571, Hastelloy C.
- A wide range of power end versions is available: three-phase standard or 1-phase AC motor, motors for use in Exe and Exde areas, different flange designs for use in customer-specific motors
- Degree of protection: IP 55, ISO Class F
- Design in compliance with API 675 among others

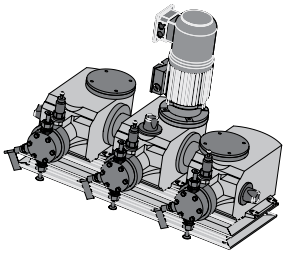
Field of application:

- Oil and gas industry
- Volume-proportional metering of chemicals/additives in the treatment of boiler feed water
- Metering of reactants and catalysts in the chemical industry
- Level-dependent metering of auxiliary agents in industrial production engineering, for instance hot wax metering in the production of adhesive strips


Hydro pump


Hydro double head pump


Hydro externally mounted pump


Hydro triplex pump

ProMinent® Hydro/ 2 API 675 Hydraulic Diaphragm Metering Pumps

Capacity Data: (HA2a)

Capacity data[1]: Hydro/ 2 API 675 (HA2a)											
Plunger Max.	Pressure	Max. Pump capacity in gph at strokes/Min (60 Hz)				Theor. Stroke volume	Suction Lift	Connection on suction/ discharge side		Shipping Weight w/Motor (approx.)	
		Stroke frequency									
⌀	psig	72	149	180	224	mL/ stroke	ft	PVDF*	SST	lbs	(kg)
16	1,450	–	–	2.6 - 2.6	3.2 - 3.4	3.0	9.8	1/2" MNPT	SS flange 1/2" / ANSI - DN 10	68.3	(31)
16	928	–	2.6 - 3.0	3.2 - 4.1	3.8 - 5.1	3.0	9.8	1/2" MNPT	SS flange 1/2" / ANSI - DN 10	68.3	(31)
16	580	–	3.2 - 4.1	3.8 - 4.9	4.3 - 6.1	3.0	9.8	1/2" MNPT	SS flange 1/2" / ANSI - DN 10	68.3	(31)
16	363	–	3.8 - 4.5	4.4 - 5.5	5.4 - 7.1	3.0	9.8	1/2" MNPT	SS flange 1/2" / ANSI - DN 10	68.3	(31)
16	145	2.2 - 2.4	4.1 - 5.1	4.7 - 6.1	5.7 - 7.7	3.0	9.8	1/2" MNPT	SS flange 1/2" / ANSI - DN 10	68.3	(31)
18	928	–	3.8 - 4.9	5.8 - 5.8	7.7 - 7.7	3.8	9.8	1/2" MNPT	SS flange 1/2" / ANSI - DN 10	68.3	(31)
18	580	2.2 - 2.5	4.1 - 5.8	6.7 - 6.7	8.2 - 9.0	3.8	9.8	1/2" MNPT	SS flange 1/2" / ANSI - DN 10	68.3	(31)
18	363	2.5 - 2.8	5.1 - 6.1	7.3 - 7.7	8.2 - 9.6	3.8	9.8	1/2" MNPT	SS flange 1/2" / ANSI - DN 10	68.3	(31)
18	145	2.4 - 3.2	5.1 - 6.7	7.3 - 8.3	9.1 - 10.6	3.8	9.8	1/2" MNPT	SS flange 1/2" / ANSI - DN 10	68.3	(31)
22	580	2.2 - 2.4	6.3 - 7.9	8.6 - 9.0	11.6 - 13.3	5.7	9.8	1/2" MNPT	SS flange 1/2" / ANSI - DN 10	68.3	(31)
22	362	2.2 - 2.6	6.3 - 7.9	7.9 - 10.6	11.1 - 13.7	5.7	9.8	1/2" MNPT	SS flange 1/2" / ANSI - DN 10	68.3	(31)
22	145	2.5 - 3.2	5.3 - 9.0	9.5 - 14.8	11.6 - 13.3	5.7	9.8	1/2" MNPT	SS flange 1/2" / ANSI - DN 10	68.3	(31)
26	363	6.3 - 6.9	11.1 - 15.3	12.7 - 18.6	20.6 - 22.7	7.9	9.8	1/2" MNPT	SS flange 1/2" / ANSI - DN 10	68.3	(31)
26	145	6.3 - 7.4	9.5 - 16.0	11.1 - 19.3	12.7 - 24.0	7.9	9.8	1/2" MNPT	SS flange 1/2" / ANSI - DN 10	68.3	(31)

1- SPECIFIC FLOW RATE AND PRESSURE MUST BE PROVIDED UPON ORDER

* Liquid end PVDF version Max. 363 psi (25 bar)

The permitted design of the rate flow is possible in the stated range with pump selection in accordance with API 675 (adjustment range 1:10).

Example: Considering plunger 16 mm, pressure 25 bar (363 psi) and stroke rate 180 stroke/min gives (4.4) – 5.5 gph; the adjustment range of 1:10 is met for a flow rate between 4.4 and 5.5 gph.

Materials In Contact With Chemicals

Material	Dosing Head	Suction/ pressure connection	Seals/ ball seat	Balls
SST	Stainless steel 1.457/1.4404	Stainless stell 1.4581	PTFE/ZrO_2 (DN 15 - stainless steal 1.4404	Ceramic
PVT*	PVDF (polyvinylidene fluoride)	PVDF (polyvinylidene fluoride)	PTFE/ PTFE	Ceramic
HCT	Hastelloy C	Hastelloy C	PTFE/ Hastelloy C	Ceramic
TTT	PTFE + 25% carbon	PVDF (polyvinylidene fluoride)	PTFE/ PTFE	Ceramic

Spare Parts: (HA2a)

Plunger ⌀	Pressure	Connection suction / discharge side		Allocated to Type HP2a	Spare Diaphragm S1, P1	Spare Diaphragm H1	Spare Part Set S1	Spare Part Set P1	Spare Part Set H1
							See below for content	See below for content	See below for content
mm	psi (bar)	PVDF	SST	Type / Liquid end					
16	1450.0 (100)	1/2" MNPT	SS flange 1/2" / ANSI - DN 10*	Type 100..../FMH 25	1005545	1006481	1029260	1005548	1009571
16	928.2 (64)	1/2" MNPT	SS flange 1/2" / ANSI - DN 10*	Type 100..../FMH 25	1005545	1006481	1029260	1005548	1009571
16	580.1 (40)	1/2" MNPT	SS flange 1/2" / ANSI - DN 10*	Type 100..../FMH 25	1005545	1006481	1029260	1005548	1009571
16	363.0 (25)	1/2" MNPT	SS flange 1/2" / ANSI - DN 10*	Type 100..../FMH 25	1005545	1006481	1029260	1005548	1009571
16	145.0 (10)	1/2" MNPT	SS flange 1/2" / ANSI - DN 10*	Type 100..../FMH 25	1005545	1006481	1029260	1005548	1009571
18	928.2 (64)	1/2" MNPT	SS flange 1/2" / ANSI - DN 10	Type 064.../FMH 25	1005545	1006481	1005549	1005548	1009571
18	580.1 (40)	1/2" MNPT	SS flange 1/2" / ANSI - DN 10	Type 064.../FMH 25	1005545	1006481	1005549	1005548	1009571
18	363.0 (25)	1/2" MNPT	SS flange 1/2" / ANSI - DN 10	Type 064.../FMH 25	1005545	1006481	1005549	1005548	1009571
18	145.0 (10)	1/2" MNPT	SS flange 1/2" / ANSI - DN 10	Type 064.../FMH 25	1005545	1006481	1005549	1005548	1009571
22	580.1 (40)	1/2" MNPT	SS flange 1/2" / ANSI - DN 10	/ FMH 60	1005546	1006482	1005553	1005552	1009573
22	363.0 (25)	1/2" MNPT	SS flange 1/2" / ANSI - DN 10	/ FMH 60	1005546	1006482	1005553	1005552	1009573
22	145.0 (10)	1/2" MNPT	SS flange 1/2" / ANSI - DN 10	/ FMH 60	1005546	1006482	1005553	1005552	1009573
26	363.0 (25)	1/2" MNPT	SS flange 1/2" / ANSI - DN 10	Type 025... /FMH 60	1005546	1006482	1005553	1005552	1009573
26	145.0 (10)	1/2" MNPT	SS flange 1/2" / ANSI - DN 10	Type 025... /FMH 60	1005546	1006482	1005553	1005552	1009573

**Version SST with double ball valve, valve connector on suction-pressure with female thread Rp 1/4 and external thread G 3/4 - DN 10*

Spare part set includes:

S1/H1 1 spare diaphragm cpl., 1 set of seals, 2 vavle balls, (4 valve balls for version with double ball valves)

P1 1 spare diaphragm cpl., 1 suction valve cpl, 1 discharge valve cpl., 2 valve balls, 1 set of seals

ProMinent® Hydro/ 2 API 675 Hydraulic Diaphragm Metering Pumps

Identcode: (HA2a)

HA2a

Drive

V	Simplex (vertical)	T	Triplex
D	Simplex double head		
U	Duplex		

Plunger:

016	Plunger D 16	026	Plunger D 26
018	Plunger D 18		
022	Plunger D 22		

Stroke frequency 60 Hz - Operation:

072	72 Strokes/min; 60 Hz	180	180 Strokes/min 60 hz
149	140 Strokes/min; 60 Hz	214	214 Strokes/min 60 Hz

Pressure stage:

A	145 psi (10 bar)	H	928.2 psi (64 bar)
D	362.6 psi (25 bar)	J	1450.3 psi (100 bar)
E	580.2 psi (40 bar)		

Material:

S1	Standard stainless steel; PTFE	T1	PTFE + Carbon; PTFE
H1	Hastelloy C; PTFE		
P1	PVDF; PTFE		

Valve design:

0	Without valve springs/ for plunger D=16 SST and HCT double ball valves
1	With valve springs/ for plunger D=16 SST and HCT double ball valves

Diaphragm rupture signal:

0	Standard	2	Visual indicator
1	Without		

Hydraulic connection:

0	Standard
F	Flange ANSI

Electrical power supply:

4	no motor, w/motor flange NEMA 56 C
0	Add on drive

Stroke length adjustment:

0	Standard stroke length adjustment
C	Stroke control motor 0-20 mA; 115 V; 60 Hz
D	Stroke control motor 4-20 mA; 115 V; 60 Hz

Temperature:

0	-4 °F - 104 °F / -4 °F - 194 °F (SS;HC) 122 °F (PTFE) 140 °F (PVDF)
1	14 °F - 122 °F / -4 °F - 194 °F (SS;HC) 122 °F (PTFE) 140 °F (PVDF)
2	-13 °F - 104 °F / -13 °F - 194 °F (SS;HC) 122 °F (PTFE) 149 °F (PVDF)

Paint:

0P	C3 Standard textured paint - RAL 2003	3P	C5 Offshore - RAL 2003
1P	C3 Standard gloss paint - RAL 2003		
2P	C4 Outdoor - RAL 2003		

Testing:

S1	Standard performance test	A2	API cpl. Test + NPSH/NPIP
S2	Standard performance test + 3.1 Certificate		
A1	API cpl. Test		

Certification:

0	CE	3	CE + EAC + ATEX
1	CE + ATEX		
2	CE + EAC		

Documentation:

EN	English

Units:

0	bar, l/h
1	psi, gph
2	kPa, l/h

HA2a	**V**	**016**	**072**	**A**	**S1**	**0**	**0**	**0**	**4**	**0**	**0**	**0P**	**S1**	**0**	**EN**	**1**

ProMinent® Hydro/ 3 API 675 Hydraulic Diaphragm Metering Pumps

Overview: Hydro/ 3 API 675 (HA3a)

For flexible metering with excellent process reliability in the medium pressure range.
Capacity range of single pump: 3.96 – 53.0 gph, 145 – 1450.4 psi

The hydraulic diaphragm metering pump Hydro/ 3 API 675 (HA3e) meets the requirements of API 675, among other things due to its full-motion drive and automatic bleeding. Some of the many drive options are also approved for use in areas at risk from explosion.

Your benefits:

Excellent process safety and reliability:

- PTFE multi-layer diaphragm with integral diaphragm rupture warning system
- Integral hydraulic relief valve
- Metering reproducibility is better than ± 1% within the 20-100% stroke volume range under defined conditions and with proper installation

Excellent flexibility:

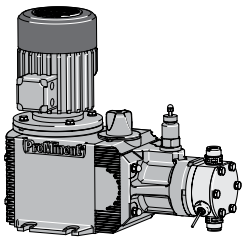
- The modular construction with single and double head versions permits a wide range of applications, with the double head designs being operated in push-pull mode
- It is possible to combine up to 5 metering units, even with different pump capacities, in multiple pump systems
- 5 different gear ratios are available
- Customized designs are available on request

Technical Details:

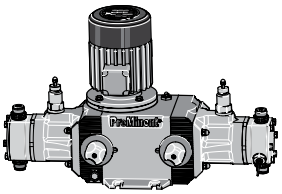
- Stroke length: 15 mm, Rod force: 4,200 N
- Stroke volume adjustment range: 0 – 100%
- Stroke volume adjustment: manually by scaled rotary dial (optionally with electric actuator or control drive)
- Metering reproducibility is better than ± 1% in the 20 – 100% stroke volume range under defined conditions and with correct installation
- PTFE multi-layer diaphragm with electrical diaphragm rupture warning system via a contact
- Integrated hydraulic relief and bleed valve
- Wetted materials: PVDF, PTFE+25% carbon, stainless steel 1.4571, Hastelloy C.
- A wide range of power end versions is available: three-phase standard or 1-phase AC motor, motors for use in Exe and Exde areas, different flange designs for use in customer-specific motors
- Degree of protection: IP 55 (standard) ISO Class F
- Design in compliance with API 675 among others

Field of application:

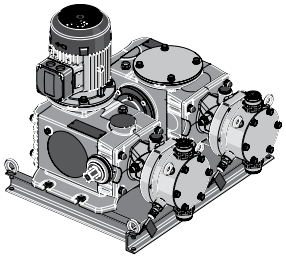
- Oil and gas industry.
- Volume-proportional metering of chemicals/additives in the treatment of boiler feed water
- Metering of reactants and catalysts in the chemical industry
- Level-dependent metering of auxiliary agents in industrial production engineering, for instance hot wax metering in the production of adhesive strips



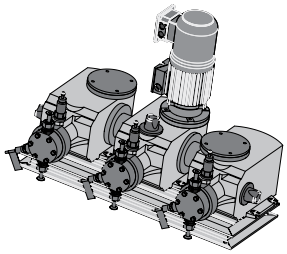
Hydro pump



Hydro double head pump



Hydro externally mounted pump



Hydro triplex pump

ProMinent® Hydro/ 3 API 675 Hydraulic Diaphragm Metering Pumps

Capacity Data: Hydro/ 3 API 675 (HA3a)

Capacity data[1]: Hydro/ 3 API 675 (HA3a)											
Plunger Max.	Pressure	Max. Pump capacity in gph at strokes/Min (60 Hz) Stroke frequency				Theor. Stroke volume	Suction Lift	Connection on suction/ discharge side		Shipping Weight (approx.)	
⌀	psig	72	149	180	224	mL/ stroke	ft	PVDF*	SST	lbs	(kg)
26	928	5.7 - 5.9	11.1 - 13.6	12.7 - 16.2	17.4 - 19.8	7.9	9.8	1/2" MNPT	SS flange 1/2" / ANSI - DN 15	90.4	(41)
26	580	5.7 - 6.6	11.6 - 14.3	12.7 - 17.4	15.8 - 22.4	7.9	9.8	1/2" MNPT	SS flange 1/2" / ANSI - DN 15	90.4	(41)
26	363	4.7 - 6.6	9.5 - 15.6	12.7 - 18.6	17.4 - 23.4	7.9	9.8	1/2" MNPT	SS flange 1/2" / ANSI - DN 15	90.4	(41)
26	145	4.7 - 6.9	9.5 - 15.6	11.1 - 19.3	15.8 - 24.3	7.9	9.8	1/2" MNPT	SS flange 1/2" / ANSI - DN 15	90.4	(41)
32	580	7.9 - 8.0	15.9 - 20.7	22.2 - 25.4	20.6 - 32.0	12.0	9.8	1/2" MNPT	SS flange 1/2" / ANSI - DN 15	90.4	(41)
32	363	7.9 - 8.3	15.9 - 21.7	20.6 - 26.3	20.6 - 33.3	12.0	9.8	1/2" MNPT	SS flange 1/2" / ANSI - DN 15	90.4	(41)
32	145	7.0 - 9.9	15.9 - 23.2	22.3 - 28.5	19.0 - 35.5	12.0	9.8	1/2" MNPT	SS flange 1/2" / ANSI - DN 15	90.4	(41)
38	174	7.9 - 16.0	22.2 - 34.6	25.4 - 39.9	47.5 - 52.3	17.0	9.8	1/2" MNPT	SS flange 1/2" / ANSI - DN 15	90.4	(41)
38	145	9.5 - 16.2	25.4 - 34.9	28.5 - 42.8	47.5 - 53.1	17.0	9.8	1/2" MNPT	SS flange 1/2" / ANSI - DN 15	90.4	(41)

1- SPECIFIC FLOW RATE AND PRESSURE MUST BE PROVIDED UPON ORDER

* Liquid end PVDF version Max. 363 psi (25 bar)

The permitted design of the rate flow is possible in the stated range with pump selection in accordance with API 675 (adjustment range 1:10).

Example: Considering plunger 16 mm, pressure 25 bar (363 psi) and stroke rate 180 stroke/min gives (4.4) – 5.5 gph; the adjustment range of 1:10 is met for a flow rate between 4.4 and 5.5 gph.

Materials In Contact With Chemicals

Material	Dosing Head	Suction/ pressure connection	Seals/ ball seat	Balls
SST	Stainless steel 1.457/1.4404	Stainless stell 1.4581	PTFE/stainless steal 1.4404	Ceramic
PVT*	PVDF (polyvinylidene fluoride)	PVDF (polyvinylidene fluoride)	PTFE/ PTFE	Ceramic
HCT	Hastelloy C	Hastelloy C	PTFE/ Hastelloy C	Ceramic
TTT	PTFE + 25% carbon	PVDF (polyvinylidene fluoride)	PTFE/ PTFE	Ceramic

Spare Parts: Hydro/ 3 (HA3a)

Plunger ⌀	Pressure	Connection suction / discharge side		Allocated to Type HP2a	Spare Diaphragm S1, P1	Spare Diaphragm H1	Spare Part Set S1 See below for content	Spare Part Set P1 See below for content	Spare Part Set H1 See below for content
mm	psi (bar)	PVDF	SST	Type / Liquid end					
26	928.2 (64)	1/2" MNPT	SS flange 1/2" / ANSI -DN 15	Type 064.../FMH 25	1005545	1006481	1005549	1005548	1009571
26	580.1 (40)	1/2" MNPT	SS flange 1/2" / ANSI -DN 15	Type 064.../FMH 25	1005545	1006481	1005549	1005548	1009571
26	363.0 (25)	1/2" MNPT	SS flange 1/2" / ANSI -DN 15	Type 064.../FMH 25	1005545	1006481	1005549	1005548	1009571
26	145.0 (10)	1/2" MNPT	SS flange 1/2" / ANSI -DN 15	Type 064.../FMH 25	1005545	1006481	1005549	1005548	1009571
32	580.1 (40)	3/4" MNPT	SS flange 1/2" / ANSI -DN 15	/ FMH 60	1005546	1006482	1005553	1005552	1009573
32	363.0 (25)	3/4" MNPT	SS flange 1/2" / ANSI -DN 15	/ FMH 60	1005546	1006482	1005553	1005552	1009573
32	145.0 (10)	3/4" MNPT	SS flange 1/2" / ANSI -DN 15	/ FMH 60	1005546	1006482	1005553	1005552	1009573
38	363.0 (25)	3/4" MNPT	SS flange 1/2" / ANSI -DN 15	Type 025... /FMH 60	1005546	1006482	1005553	1005552	1009573
38	145.0 (10)	3/4" MNPT	SS flange 1/2" / ANSI -DN 15	Type 025... /FMH 60	1005546	1006482	1005553	1005552	1009573

**Version SST with double ball valve, valve connector on suction-pressure with female thread Rp 1/4 and external thread G 3/4 - DN 10*

Spare part set includes:

S1/H1 1 spare diaphragm cpl., 1 set of seals, 2 vavle balls, (4 valve balls for version with double ball valves)

P1 1 spare diaphragm cpl., 1 suction valve cpl, 1 discharge valve cpl., 2 valve balls, 1 set of seals

ProMinent® Hydro/ 3 API 675 Hydraulic Diaphragm Metering Pumps

Identcode: Hydro/ 3 (HA3a)

HA3a

Drive Type

V	Simplex (vertical)	T	Triplex
D	Simplex double head		
U	Duplex		

Plunger:

022	Plunger D 22	038	Plunger D 38
026	Plunger D 26		
032	Plunger D 32		

Stroke frequency 60 Hz - Operation:

072	72 Strokes/min; 60 Hz	180	180 Strokes/min 60 hz
149	140 Strokes/min; 60 Hz	214	214 Strokes/min 60 Hz

Pressure range:

A	145 psi (10 bar)	H	928.2 psi (64 bar)
D	362.6 psi (25 bar)	J	1450.3 psi (100 bar)
E	580.2 psi (40 bar)		

Material:

S1	Standard stainless steel; PTFE	T1	PTFE + Carbon; PTFE
H1	Hastelloy C; PTFE		
P1	PVDF; PTFE		

Valve design:

0	Without valve springs/ for plunger D=16 SST and HCT double ball va
1	With valve springs/ for plunger D=16 SST and HCT double ball valve

Diaphragm rupture signal:

0	Standard	2	Visual indicator
1	Without		

Hydraulic connection:

0	Standard
F	Flange ANSI

Electrical power supply:

4	no motor, w/motor flange NEMA 56 C
0	Add on drive

Stroke length adjustment:

0	Standard stroke length adjustment
C	Stroke control motor 0-20 mA; 115 V; 60 Hz
D	Stroke control motor 4-20 mA; 115 V; 60 Hz

Temperature:

0	-4 °F - 104 °F / -4 °F - 194 °F (SS;HC) 122 °F (PTFE) 140 °F (PVDF)
1	14 °F - 122 °F / -4 °F - 194 °F (SS;HC) 122 °F (PTFE) 140 °F (PVDF)
2	-13 °F - 104 °F / -13 °F - 194 °F (SS;HC) 122 °F (PTFE) 149 °F (PVDF)

Paint:

0P	C3 Standard textured paint - RAL 2003	3P	C5 Offshore - RAL 2003
1P	C3 Standard gloss paint - RAL 2003		
2P	C4 Outdoor - RAL 2003		

Testing:

S1	Standard performance test	A2	API cpl. Test + NPSH/NPIP
S2	Standard performance test + 3.1 Certificate		
A1	API cpl. Test + NPSH/NPIP		

Certification:

0	CE	3	CE + EAC + ATEX
1	CE + ATEX		
2	CE + EAC		

Documentation:

EN	English

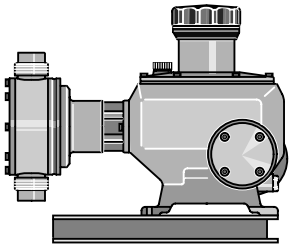
Units:

0	bar, l/h
1	psi, gph
2	kPa, l/h

HA3a	V	022	072	A	S1	0	0	0	4	0	0	0P	S1	0	EN	1

ProMinent® Makro TZ Diaphragm Metering Pumps

Overview: Makro TZ

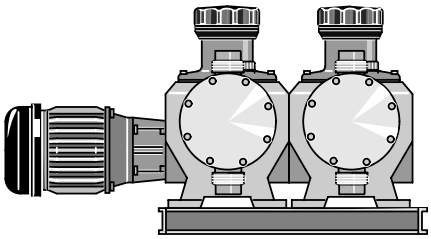


Ideal for high volume and high pressure applications

(see page 150 for spare parts)

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

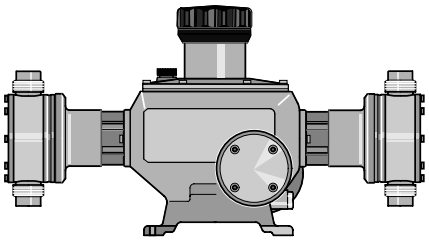
The stroke length can be adjusted by means of the shift ring mechanism from 0-10 mm (TZMb), with 0.5 % accuracy. The 5-speed gearbox is encased in a cast, seawater resistant, acrylic resin lacquered housing. Liquid ends are available in different material combinations to suit differing applications. 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

Identcode Ordering System (TZMb)

TZMb	Drive Type:												
	H	Main Drive											
		Pump Type:											
		120260	82 gph, 174 psi	070720	228 gph, 100 psi								
		120340	108 gph, 174 psi	070860	272 gph, 100 psi								
		120430	136 gph, 174 psi	040840	266 gph, 58 psi								
		120510	162 gph, 174 psi	041100	348 gph, 58 psi								
		070430	136 gph, 100 psi	041400	443 gph, 58 psi								
		070570	180 gph, 100 psi	041670	529 gph, 58 psi								
			Liquid end material:										
			PC	PVC									
			PP	Polypropylene									
			SS	Stainless Steel									
			TT	PTFE + 25% carbon									
				Seal material:									
				T	PTFE								
					Positive displacement element:								
					1	Standard composit diaphragm with rupture indicator							
						Liquid end version:							
						0	No valve springs						
						1	With valve springs						
							Hydraulic connection:						
							0	Standard connection	3	PVDF union nut and insert			
							1	PVC union nut and insert	4	SS union nut and insert			
							2	PP union nut and insert					
								Versions:					
								0	with ProMinent® logo				
									Electrical power supply:				
									0	add-on drive unit without electrical connection			
									4	No motor, with 56 C flange			
										Enclosure rating:			
										0	IP 55 (Standard) ISO class F		
											Stroke sensor:		
											0	No stroke sensor	
											1	With stoke sensor (Namur)	
												Stroke length adjustment:	
												0	0 Stroke length adjustment, man.
												1	230 V stroke actuator
												2	115 V stroke actuator
												3	230 V 0-20 mA stroke controller
												4	230 V 4-20 mA stroke controller
												5	115 V 0-20 mA stroke controller
												6	115 V 4-20 mA stroke controller
												Applications	
												0	Standard
TZMb	**H**	**120260**	**PC**	**T**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

ProMinent® Makro TZ Diaphragm Metering Pumps

Capacity Data (TZMbH)

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

Overview: DULCOFLEX - DFXa

The **DULCOFLEX - DFXa** is an intelligent peristaltic metering pump that is valve-free and has the accuracy of a diaphragm pump. Applications include gaseous, highly viscous, abrasive, shear-sensitive and chemically aggressive fluids.

The liquid end of the pump is designed for a quick and simple replacement of the tubing, utilizing a unique exchange process. The pump display provides precise instructions on the steps required for the tube replacement. High-preformance tubing consists of a **TPV (Santoprene)** or **PUR (Polyurethane)** material that provides excellent chemical resistance and a long service life.

The **DULCOFLEX - DFXa** is powered by a DC motor and will provide continuous metering from **0.038 GPD (6 ml/h) to 17.17 GPH (65 l/h)** and pressures up to **100 PSIG (7bar)**. Additional features such as communication protocol includes PROFIBUS, CANbus, Modbus and PROFINET are available.

Your benefits

- NSF61 Approvedl
- Volume adjustment in GPH or LPH
- Manual, Analog, Contact and Batch modes optional
- High visibility of LED-indicator lights
- Large illuminated display
- New configurable input/output port
- CIP (cleaning in place) enabled system
- Reverse flow is possible
- Dosing head can be aligned in four directions: Left, Right, Up and Down
- Integrated 7-day timer
- Viscosities to 10,000 cPs

NSF®

Certified to NSF/ANSI 61

PROFI® PROCESS FIELD BUS BUS

ProMinent® DULCOFLEX Series Peristaltic Metering Pumps

Capacity Data

Capacity data: DULCOFLEX - DFXa

Pump Version	Capacity at Maximum Backpressure				Max. speed	Connector size	Pre-primed suct. lift		Shipping weight	
	PSIG	**(bar)**	**GPH**	**(l/h)**	**rpm**	**in**	**ft**	**(m)**	**lbs**	**(kg)**
0518	73	(5)	4.75	(18)	100	1/2" x 3/8"	16.4	(5)	12.8	5.8
0530	73	(5)	8.00	(30)	100	1/2" x 3/8"	16.4	(5)	12.8	5.8
0730	100	(7)	8.00	(30)	100	1/2" x 3/8"	16.4	(5)	12.8	5.8
0565	73	(5)	17.17	(65)	100	1/2" x 3/8"	16.4	(5)	12.8	5.8

Tube material:

TPV (Santoprene): available with pump versions 0730 and 0530

PUR (Polyurethane): available with pump version 0518, 0530 and 0565 only

Tube connectors: PVDF/PTFE

Metering reproducibility: ± 2% with retracted tube (after approx. 200 revolutions)

Turndown: 3,000:1

Electrical connection: 100 -230 V ± 10%, 50/60 Hz

Nominal power: approx. 45 W

Degree of protection: IP 66, NEMA 4X Indoor

Permissible ambient temperature: 14 - 113 °F

Optional relay modules: 1 x switch over contact, 230 V - 8 A or 2 x On, 24 V - 100 mA

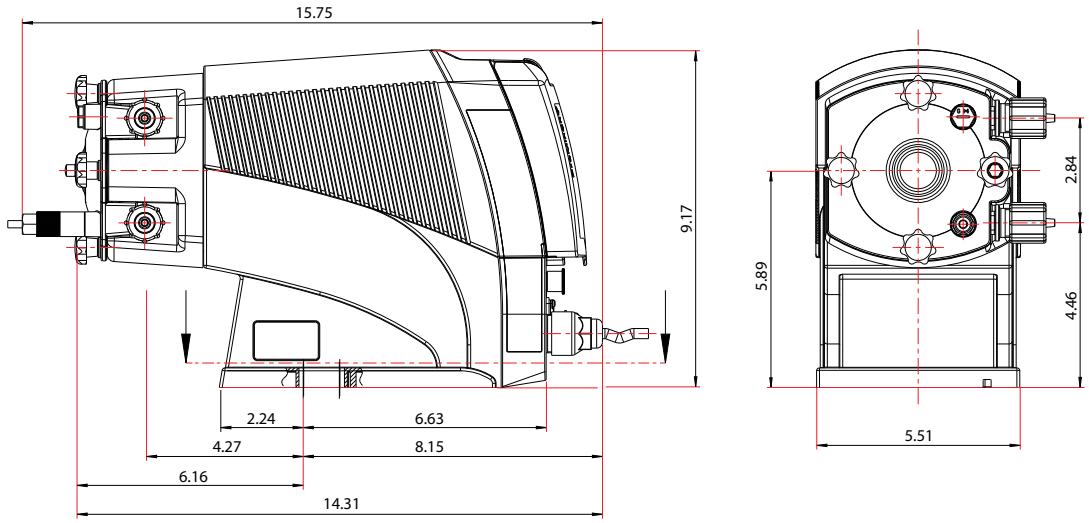
Spare Parts

Tube assembly:	**Part Number**
TPV (Santoprene) 101.5 PSIG (7 bar), Version 0730	1102991
TPV (Santoprene) 72.5 PSIG (5 bar), Version 0530	1102907
PUR (Polyurethane) 72.5 PSIG (5 bar), Versions 0518, 0530 and 0565	1104951

Tube assembly & 1/2" x 3/8" Connection set:	**Part Number**
0530 TPV (Santoprene) FDA	1108974
0530 TPV (Santoprene)	1108975
0530 PUR (Polyurethane) FDA	1110172
0530 PUR (Polyurethane)	1110171
0730 TPV (Santoprene) FDA	1108951
0730 SPT (Santoprene)	1108952

Dosing head parts:	**Part Number**
Dosing head	1094919
Dosing head cover	1104727
Spare star knob set	1104952
Rotor Complete	1103249

Dimensional Drawings



Note: All above measurements are in inches

ProMinent® DULCOFLEX Series Peristaltic Metering Pumps

Specifications

Materials of construction:	
Housing	Fiberglass reinforced PPE (Polyphenylene Ether)
Dosing head	Glass reinforced PA6 (Polyamide)
Rotor	Fiberglass reinforced PPS (Polyphenylennsulphide)
Pump hose	TPV (Santoprene) available with pump versions 0730 and 0530
	PUR (Polyurethane) available with pump version 0518,0530 and 0565 only
Connections:	
Hose Connection	PVDF
O-rings (wetted)	PTFE
Electrical:	
Enclosure rating	IP 66, NEMA 4X Indoor
Power supply	100 – 230 VAC 1 Phase 50 / 60 Hz ± 10%
Power cord	6ft
Relay Options:	
Relay cable (*optional*)	6ft
Identcode Option 1	1 x changeover contact 230 V AC - 6 A, Fault indicating relay (N/C)
Identcode Option 4	1 x N/O 24 V DC -1 A - 1 x N/O 24 V - 1 ma, As 1 + pacing relay
Identcode Option C	1 x N/O 24 V DC - 100 mA and 1 x 4-20 mA output, As 1 + 4-20 mA output
Ambient temperature range:	
In operation	14 °F to 113 °F (-10 °C to 45 °C)
Storage & Transport	14 °F to 122 °F (-10 °C to 50 °C)
Climate:	95% Relative humidity – non-condensing
Sound pressure level:	LpA < 70 dB according to EN ISO 20361
Warranty:	2 years on pump drive, 1 year on liquid end
Hose insert threads:	NP / PVT M20 x 1.5 (provided with adapters for tubing)
Standard production test:	All pumps are tested for capacity at maximum pressure prior to shipment
Contact input:	
Minimum pulse duration	20 ms
Maxiumum pulse input	25 pulses / second
Analog Input Impedance	120 Ohms

ProMinent® DULCOFLEX Series Peristaltic Metering Pumps

Identcode Ordering System

DFXa	**DULCOFLEX**																	
	Regional design:																	
	US	USA																
		Version Capacity:																
		0518	4.75 gph (18 l/h), 73 psi (5 bar)															
		0530	7.92 gph (30 l/h), 73 psi (5 bar)															
		0730	7.92 gph (30 l/h), 100 psi (7 bar)															
		0565	17.17 gph (65 l/h), 73 psi (5 bar)															
			Tube material:															
			SP	Santoprene (TPV)	***Note:*** *Available with pump versions 0730 and 0530*													
			VP	Polyurethane (PUR)	**Note:** Available with pump versions 0518, 0430 and 0565 only													
				Seal material:														
				F	FDA-compliant (PTFE)													
				T	PTFE													
					Dosing head orientation:													
					R	Right (view from behind)												
					L	Left (view from behind)												
					O	Top												
					U	Bottom												
						Hydraulic connector:												
						Q	connection 1/2" x 3/8" (USA)											
							Tube rupture alarm:											
							1	With diaphragm rupture indicator, optical sensor										
								Design:										
								0	Housing RAL 5003 / cover RAL 2003									
									Logo:									
									0	with ProMinent logo								
										Power connection:								
										U	Universal 100 - 240 V							
											Cable and plug:							
											D	USA 115 V - 6 ft. (2m)						
												Relay:						
												0	No relay					
												1	1x changeover contact 230 V - 8A, fault indicating relay N/C					
												4	2x N/O 24 V - 100 mA, fault indicating relay N/C + pacing relay					
												C	1x N/O 24 V - 100 mA, fault indicating relay N/C + 4-20 mA output					
													Accessories:					
													0	None				
													1	Injection valve 1/2" and foot valve				
														Control Variants:				
														0	Manual + Contact with PulseControl			
														3	Manual + Contact with PulseControl + Analog			
														C	CANopen			
														P	ProfiNet			
														R	ProfiBus			
															Communication:			
															0	None		
																Language:		
																EN	English	
																	Certification:	
																	01	CE
																		Documentation:
																		EN English
DFXa	**US**	**0730**	**SP**	**F**	**R**	**Q**	**1**	**0**	**0**	**U**	**D**	**0**	**0**	**0**	**0**	**EN**	**01**	**EN**

ProMinent® DULCOFLEX Series Peristaltic Metering Pumps

Overview: DULCOFLEX - DFYa

The **DULCOFLEX- DFYa** metering pump adds an intelligent peristaltic offering to our established line of ProMinent pumps

This new design of peristaltic pump is controlled electronically via an HMI controller thus allowing for greater turndown in our DulcoFlex pump series. All the benefits of a peristaltic pump are retained including off-gassing fluids, high viscosity and abrasive media, and shear-sensitive liquids.

Like the DFXa, the DFYa offers simple and easy hose replacement via the HMI controller. When the hose needs replaced, the pump displays instructions for the user to step-through the replacement process.

Your benefits

- Contact, batch, manual or analog modes
- Adjustment of the metering rate directly in gph or l/h
- Connection to process control systems via a BUS interface, such as PROFIBUS®, Profinet or CANbus
- Large illuminated display
- Pump is available as an FDA design
- No problems with very gaseous media or air locks
- Reverse flow is possible
- Viscosities to 20,000 cPs

ProMinent® DULCOFLEX Series Peristaltic Metering Pumps

Capacity Data

Capacity data: DULCOFLEX - DFYa

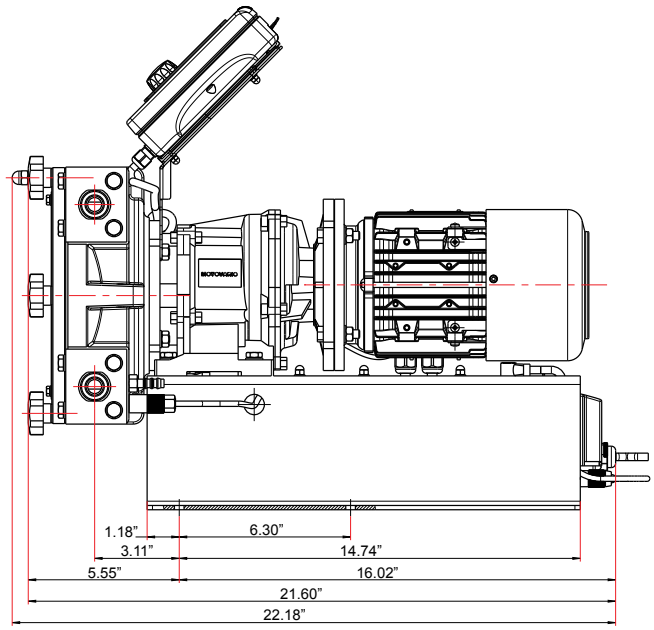
Pump Version	Capacity at Maximum Backpressure				Max. speed	Connector size	Pre-primed suct. lift		Shipping weight	
	GPH ±10%	**(L/h)** ±10%	**PSIG**	**(bar)**	**rpm**	**in**	**ft**	**(m)**	**lbs**	**(kg)**
04410	108.3	(410)	58	(4)	80	3/4”	26.25	(8)	66	(30)
06410	108.3	(410)	87	(6)	80	3/4”	26.25	(8)	66	(30)
08410	108.3	(410)	116	(8)	80	3/4”	26.25	(8)	66	(30)

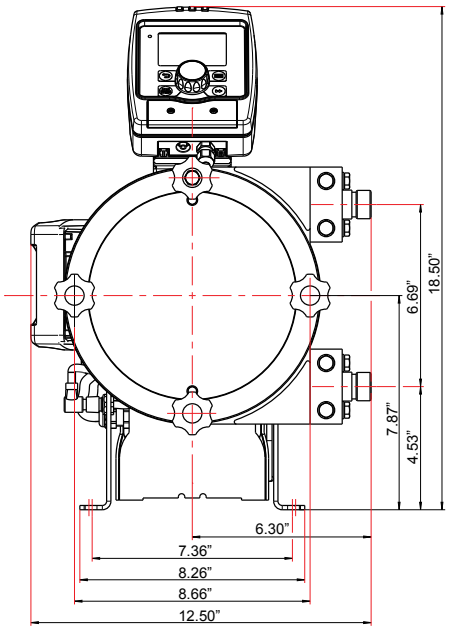
Tube material:
NR (Natural rubber)
NBR (Nitrile rubber), NBR-A (Nitrile rubber FDA approved)
EPDM
HYPALON®
Adjustable feed rate: between 1.1 gph and 90.1 gph (5.1 l/h and 410 l/h)
Pre-primed suction lift: 26.25 ft (8 m)
Rollers/ shoes: Rollers
Metering reproducibility: ± 2% with retracted tube (after approx. 500 revolutions)
Electrical connection: 100 - 230 V ± 10%, 50/60 Hz
Power consumption: Max. 400 W
Degree of protection: IP 55
Permissible ambient temperature: 32 - 113 °F (0 - 45 °C)
Optional relay modules:
Fault indicating relay - 230 V AC - 8 A
Fault indicating relay + Pacing relay - 24 V DC - 100 mA
0/4-20 mA output + fault indicating/ pacing relay - 24 V DC - 100 mA

Capacity data represents minimum values, tested using water at 68 °F (room temperature)

HYPALON® is a registered trade mark of DuPont Performance Elastomers

Dimensional Drawings





Note: All above measurements are in inches

ProMinent® DULCOFLEX Series Peristaltic Metering Pumps

Identcode Ordering System

DFYa	DULCOFLEX																		
	Regional design:																		
	US	USA																	
		Version Capacity:																	
		04410	108.3 gph ±10% (410 l/h), 58.0 psi (4 bar)																
		06410	108.3 gph ±10% (410 l/h), 87.0 psi (6 bar)																
		08410	108.3 gph ±10% (410 l/h), 116.0 psi (8 bar)																
			Tube material:																
			0	NR (Natural rubber)															
			B	NBR (Nitrile rubber)															
			E	EPDM															
				A	NBR-A (Nitrile rubber FDA approved)														
				H	Hypalon														
				Dosing head orientation:															
				R	Right (standard)														
				L	Left														
					Hydraulic connector:														
					A	VA, BSP 3/4"													
					B	VA, NPT 3/4"													
					C	PP, BSP 3/4"													
					D	PVDF, BSP 3/4"													
						E	PVDF, NPT 3/4"												
						F	PVC, NPT 3/4"												
						G	Tri-clamp, VA, 1"												
						H	DIN 11851, VA NW20												
							Tube rupture alarm:												
							0	Without hose rupture indicator											
							1	With diaphragm rupture indicator											
								Design:											
								P	ProMinent version										
								M	Modified										
									Special version:										
									0	Standard									
									H	Chemically high-resistance version (Halar-coated)									
										Logo:									
										0	With ProMinent logo								
										1	With out logo								
										M	Modified								
											Power connection:								
											U	Universal 100 - 240 V ± 10%, 50/60 Hz							
												Cable and plug:							
												D	USA 115 V - 6 ft. (2m)						
													Relay:						
													0	No relay					
													1	Fault indicating relay 230 V AC, 8 A					
													3	Fault indicating relay 24 V AC, 100 mA + Pacing relay 24 V AC, 100 mA					
													8	4-20 mA output + Fault indicating / Pacing relay 24 V AC, 100 mA					
														Accessories:					
														0	No accessories				
															Control Variants:				
															0	Manual + external contact wth pulse control			
															1	Manual + external contact wth pulse control + analog 4-20 mA			
															6	PROFIBUS® M12 plug			
															7	CANopen			
																Operating unit (HMI):			
																0	HMI + 1.64' (0.5m) cable		
																4	HMI + 6.5' (2.0 m) cable		
																5	HMI + 16.4' (5.0 m) cable		
																6	HMI + 32.8' (10.0 m) cable		
																	Access code:		
																	0	Access code	
																	1	No access code	
																		Communication:	
																		0	None
																			Documentation:
																			EN English
DFYa	US	04410	0	R	A	0	P	0	0	U	D	0	0	0	0	0	0	EN	

ProMinent® DULCOFLEX Series

Overview: DULCOFLEX DFBU

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 337 gph, the DFB ia 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 337 gph (5.6 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

Capacity Data					
	DFB10	**DFB13**	**DFB16**	**DFB19***	**DFB22**
DFB Series					
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	31	51	122	163	337
Max. Pressure Reinforced Hoses	116 psi	116 psi	116 psi	N/A	116 psi
Tubing	Norprene	Norprene	Norprene	Norprene	Norprene
Max. Presure Tubing	30 psi	30 psi	30 psi	30 psi	30 psi

Models are available with one of the following reinforced hoses: Natural Rubber, Buna, EPDM, Hypalon

**** DFB19 is not available with reinforced hoses***

Identcode Ordering System

DFBU	DULCOFLEX DFBU

pump size

010	DFBu 010, 0.006 gal/revolution 3/8"	**019**	DFBu 019, 0.032 gal/revolution 1"
013	DFBu 013, 0.010 gal/revolution 3/8"	**022**	DFBu 022, 0.066 gal/revolution 1"
016	DFBu 016, 0.024 gal/revolution 3/4"		

Speed

010 - 019 ONLY					022 ONLY			
005	5 rpm	**029**	29 rpm		**209**	9 rpm	**236**	36 rpm
006	6 rpm	**039**	39 rpm		**212**	12 rpm	**239**	39 rpm
007	7 rpm	**043**	43 rpm		**216**	16 rpm	**245**	45 rpm
009	9 rpm	**049**	49 rpm		**218**	18 rpm	**249**	49 rpm
011	11 rpm	**054**	54 rpm		**220**	20 rpm	**257**	57 rpm
013	13 rpm	**061**	61 rpm		**225**	25 rpm	**264**	64 rpm
017	17 rpm	**068**	68 rpm		**227**	27 rpm	**272**	72 rpm
021	21 rpm	**077**	77 rpm		**230**	30 rpm	**287**	87 rpm
024	24 rpm	**086**	86 rpm					

Motor type

0	Without motor
1	TEFC 115/1/60
2	TEFC 230-460/3/60 1000:1
3	WD/Chem Duty TENV 230-460/3/60 1000:1
4	X1 120/1/60
5	XV 230-460/3/60 1000:1
6	DC 90V

Hose material

0	Natural rubber
B	NBR
E	EPDM
H	Hypalon
N	Norprene (max 30 psi)

Connection

B	SS NPT
F	PVDF NPT
G	PVC NPT
H	Tri-clamp, SS

Base plate

4	base plate, HDPE

Leakage sensor

0	No leakage detector
L	Leakage detector
R	Leakage detector and relay kit

Orientation

D	Down
L	Left
R	Right (standard)
U	Up

VFD

0	Without VFD
1	Basic VFD 115/1/60
2	Basic VFD 460/3/60
3	Advanced VFD 115/1/60
4	Advanced VFD 460/3/60

Special version

0	Standard model
H	Chemical version (Halar coated)

Discharge pressure

1	30 psi (max tube)
2	60 psi
3	90 psi
4	115 psi (max hose)

DFBU	010	005	0	0	B	4	0	R	0	0	1	

ProMinent® DULCOFLEX Series

Overview: DULCOFLEX DFBR

The DULCOFLEX RAD pump offers a choice of tubing or a reinforced hose in about ½ the space needed for conventional hose pumps! Proven roller technology means no expensive fill lubricants, no required torque stabilization, and up to 30% longer hose life than comparable “pressing shoe” hose pumps. Disaster proof hose/tube fittings, flows up to 337 gph, and pressure capability up to 116 psi makes the RAD pump a great choice for pumping difficult fluids!

Feature & Benefits

- 10, 13, 16, 19, 22 mm tubing pumps (30psi)
- 10, 13, 16, 22 mm reinforced hose pumps (116psi)
- Flows to 337 gph (5.6 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 DFBR Capacities

Capacity Data					
	DFBR10	**DFBR13**	**DFBR16**	**DFBR19***	**DFBR22**
DFBR Series					
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	31	51	122	163	337
Max. Pressure Reinforced Hoses	116 psi	116 psi	116 psi	N/A	116 psi
Tubing	Norprene	Norprene	Norprene	Norprene	Norprene
Max. Presure Tubing	30 psi	30 psi	30 psi	30 psi	30 psi

Models are available with one of the following reinforced hoses: Natural Rubber, Buna, EPDM, Hypalon

**** DFBR19 is not available with reinforced hoses***

ProMinent® DULCOFLEX Series

Identcode Ordering System

DFBR	DULCOFLEX DFBR											
	pump size											
	010	DFBr 010, 0.006 gal/revolution 3/8"				**019**	DFBr 019, 0.032 gal/revolution 1"					
	013	DFBr 013, 0.010 gal/revolution 3/8"				**022**	DFBr 022, 0.066 gal/revolution 1"					
	016	DFBr 016, 0.024 gal/revolution 3/4"										
		Speed										
		032	32 rpm									
		056	56 rpm									
		076	76 rpm									
			Motor type									
			0	Without motor								
			1	TEFC 115/1/60								
			2	TEFC 230-460/3/60 1000:1								
			3	WD/Chem Duty TENV 230-460/3/60 1000:1								
			4	X1 120/1/60								
			5	XV 230-460/3/60 1000:1								
			6	DC 90V								
				Hose material								
				0	Natural rubber							
				B	NBR							
				E	EPDM							
				H	Hypalon							
				N	Norprene (max 30 psi)							
					Connection							
					B	SS NPT						
					F	PVDF NPT						
					G	PVC NPT						
					H	Tri-clamp, SS						
						Base plate						
						4	base plate, HDPE					
							Leakage sensor					
							0	No leakage detector				
							L	Leakage detector				
							R	Leakage detector and relay kit				
								Orientation				
								D	Down			
								L	Left			
								R	Right (standard)			
								U	Up			
									VFD			
									0	Without VFD		
									1	Basic VFD 115/1/60		
									2	Basic VFD 460/3/60		
									3	Advanced VFD 115/1/60		
									4	Advanced VFD 460/3/60		
										Special version		
										0	Standard model	
										H	Chemical version (Halar coated)	
											Discharge pressure	
											1	30 psi (max tube)
											2	60 psi
											3	90 psi
											4	115 psi (max hose)
DFBR	**010**	**005**	**0**	**0**	**B**	**4**	**0**	**R**	**0**	**0**	**1**	

ProMinent® DULCOFLEX Series

Overview: DULCOFLEX DFCU

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 106 gpm and is ideal for difficult industrial and municipal applications.

Feature & Benefits

- Sizes: 30, 40, 50, 60, 70mm
- Flows to 106 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 DFCU Capacities

Capacity Data					
	DFCU30	**DFCU40**	**DFCU50**	**DFCU60**	**DFCU70**
DFCU Series					
Compression	Roller	Roller	Roller	Roller	Roller
Connection	1 1/4”	1 1/2”	1 1/2”	2”	2 1/2”
Capacity gal/rev	0.11	0.24	0.39	0.82	1.76
Max. Flow GPM	7.4	14.4	23.1	41.2	106.4
Max. Pressure Reinforced Hoses	116 psi	116 psi	116 psi	116 psi	116 psi
Tubing	N/A	Norprene	N/A	N/A	N/A
Max. Presure Tubing	N/A	30 psi	N/A	N/A	N/A

All models are available with one of the following reinforced hoses: Natural Rubber, Buna, EPDM, Hypalon

Identcode Ordering System

DFCU	DULCOFLEX DFCU											
	pump size											
	030	DFCU 030, 0.11 gal/revolution		**060**	DFCU 060, 0.82 gal/revolution							
	040	DFCU 040, 0.24 gal/revolution		**070**	DFCU 070, 1.76 gal/revolution							
	050	DFCU 050, 0.39 gal/revolution										
		Speed										
		030 - 050 ONLY					**060 - 070 ONLY**					
		000	without gear reducer	**030**	30 rpm		**000**	without gear reducer		**034**	34 rpm	
		009	9 rpm	**035**	35 rpm		**012**	12 rpm		**042**	42 rpm	
		012	12 rpm	**039**	39 rpm		**016**	16 rpm		**053**	53 rpm	
		014	14 rpm	**045**	45 rpm		**023**	23 rpm		**057**	57 rpm	
		016	16 rpm	**049**	49 rpm		**028**	28 rpm		**071**	71 rpm	
		018	18 rpm	**057**	57 rpm							
		020	20 rpm	**064**	64 rpm							
		025	25 rpm	**072**	72 rpm							
		027	27 rpm	**082**	82 rpm							
			Motor type									
			0	No motor provided								
			1	TEFC Severe Duty 230-460/3/60 20:1 (variable speed)								
			2	TEFC Explosion Proof 230-460/3/60 Class 1 Div 1, Groups C&D								
				Hose material								
				0	Natural rubber							
				B	NBR							
				E	EPDM							
				H	Hypalon							
					Hydraulic connection							
					1	ANSI Flange SS						
					2	ANSI Flange PVC						
					3	ANSI Flange PVDF						
						Base plate						
						1	painted steel					
							Leakage sensor					
							0	Without leakage detector				
							A	5-48VDC, N.O. (USE WITH DRIVE)				
							B	5-48VDC, N.C.				
							C	24-240VAC, N.O.				
							D	24-240VAC, N.C.				
								Orientation				
								D	Down			
								L	Left			
								R	Right (standard)			
								U	Up			
									VFD			
									0	Without VFD		
									1	Basic VFD 115/1/60 **(030 & 040 ONLY)**		
									2	Basic VFD 460/3/60		
									3	Advanced VFD 115/1/60 **(030 ONLY)**		
									4	Advanced VFD 460/3/60		
										Special version		
										0	Standard version	
										H	Chemical version (Halar coated)	
											Discharge pressure	
											1	30 psi (max tube)
											2	60 psi
											3	90 psi
											4	115 psi (max hose)
DFCU	**030**	**000**	**0**	**0**	**1**	**1**	**0**	**R**	**0**	**0**	**1**	

ProMinent® DULCOFLEX Series

Overview: DULCOFLEX DFDU

The DULCOFLEX DFD is a hose pump designed for pressures up to 232 psi and flow rates up to 160 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 160 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 DFDU Capacities

Capacity Data						
	DFDU25	**DFDU32**	**DFDU40**	**DFDU60**	**DFCU70**	**DFDU100**
DFDU Series						
Compression	Shoe	Shoe	Shoe	Shoe	Shoe	Shoe
Connection	1”	1 1/2”	1 1/2”	2 1/2”	2 1/2”	4”
Capacity gal/rev	0.08	0.16	0.37	0.85	1.76	5.28
Max. Flow GPM	5.2	9.6	20.4	42.4	88	160
Max. Pressure Reinforced Hoses	232 psi	232 psi	232 psi	232 psi	232 psi	232 psi

All models are available with one of the following reinforced hoses: Natural Rubber, Buna, EPDM, Hypalon