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

CATALOG SECTION TABS

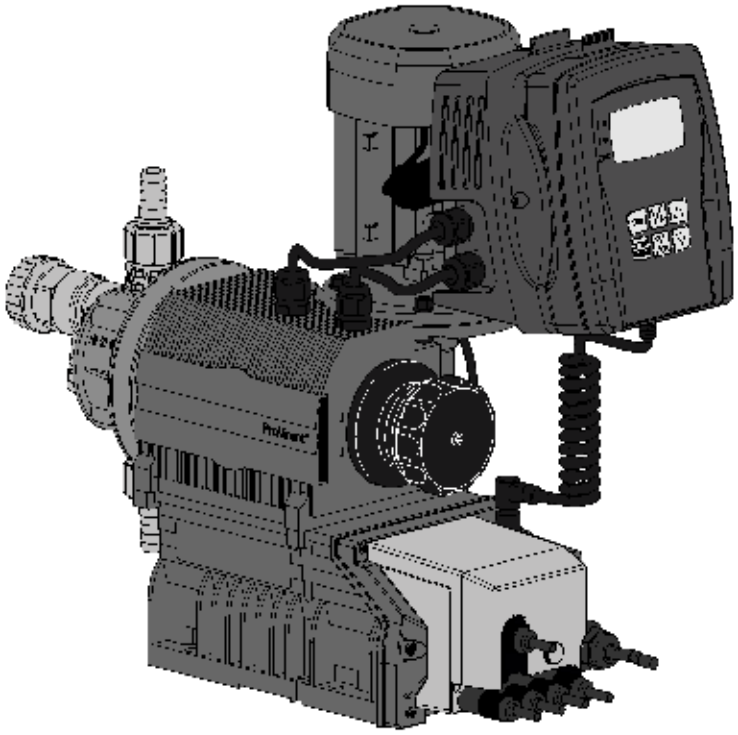
ProMinent® Sigma/ 1
Motor Diaphragm Metering Pumps

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 38.0 gph at a maximum backparessure of 174 to 58 psig. 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.

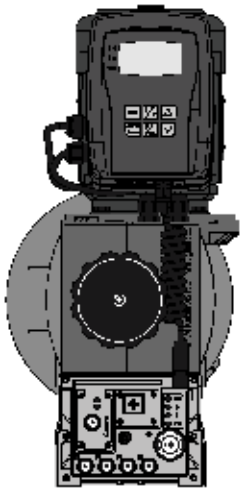


Sigma/ 1 Basic Type (S1Ba)

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/ 1 Motor Diaphragm Metering Pumps

Sigma/ 1 control type (S1Cb)

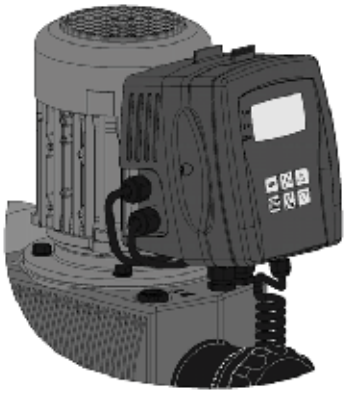


For optional control via contact or analog signals (e.g. 0/4 - 20 mA) the Sigma control type results in good adaptability, even in fluctuating metering requirements.

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.

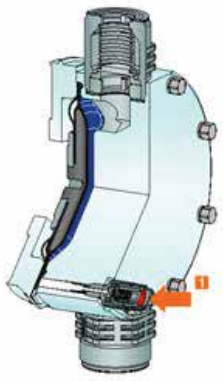
Detachable operating unit (HMI)



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 individual functions of the metering pump can be easily selected and adjusted with five program keys. 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.

Sigma/ 1 control type (S1Cb)

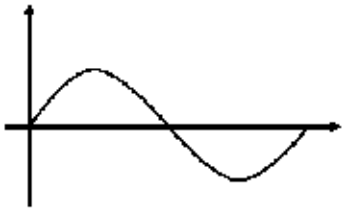


Diagram 1: Discharge stroke, suction stroke equal

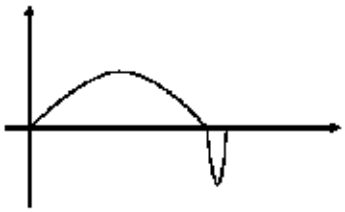


Diagram 2: long discharge stroke, short suction stroke

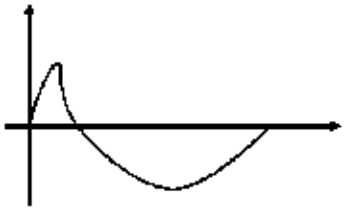


Diagram 3: short discharge stroke, long suction stroke

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/ 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		

NSF Certified to NSF/ANSI 61

ProMinent® 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/ 1 Motor Diaphragm Metering Pumps

Capacity Data (S1Ba)

Pump version:	Capacity at Max. Backpressure				Max. Stroke Rate	Output per Stroke mL/ stroke	Max. Suction Lift		Max. Suction Pressure		Suction/ Discharge Connector		Weight w/Motor (approx.)	
S1Ba H	psig	(bar)	GPH	(L/h)	spm		ft	(m)	psig	(bar)	in	(DN)	lbs	(kg)
12017 PVT	145	(10)	5.3	(20)	88	3.8	23	(7)	14.5	(1)	1/2 MNPT	(10)	19.8	(9)
12017 SST	174	(12)	5.3	(20)	88	3.8	23	(7)	14.5	(1)	3/8 FNPT	(10)	26.5	(12)
12035 PVT	145	(10)	11.1	(42)	172	4	23	(7)	14.5	(1)	1/2 MNPT	(10)	19.8	(9)
12035 SST	174	(12)	11.1	(42)	172	4	23	(7)	14.5	(1)	3/8 FNPT	(10)	26.5	(12)
10050 PVT	145	(10)	15.9	(60)	246	4	23	(7)	14.5	(1)	1/2 MNPT	(10)	19.8	(9)
10050 SST	145	(10)	15.9	(60)	246	4	23	(7)	14.5	(1)	3/8 FNPT	(10)	26.5	(12)
10022 PVT	145	(10)	6.9	(26)	88	5	19.6	(6)	14.5	(1)	1/2 MNPT	(10)	19.8	(9)
10022 SST	145	(10)	6.9	(26)	88	5	19.6	(6)	14.5	(1)	3/8 FNPT	(10)	26.5	(12)
10044 PVT	145	(10)	14	(53)	172	5.1	19.6	(6)	14.5	(1)	1/2 MNPT	(10)	19.8	(9)
10044 SST	145	(10)	14	(53)	172	5.1	19.6	(6)	14.5	(1)	3/8 FNPT	(10)	26.5	(12)
07065 PVT	100	(7)	20.6	(78)	246	5.2	19.6	(6)	14.5	(1)	1/2 MNPT	(10)	19.8	(9)
07065 SST	100	(7)	20.6	(78)	246	5.2	19.6	(6)	14.5	(1)	3/8 FNPT	(10)	26.5	(12)
07042 PVT	100	(7)	13.2	(50)	88	9.6	9.8	(3)	14.5	(1)	3/4 MNPT	(15)	21	(9.5)
07042 SST	100	(7)	13.2	(50)	88	9.6	9.8	(3)	14.5	(1)	1/2 FNPT	(15)	29.8	(13.5)
04084 PVT	58	(4)	26.7	(101)	172	9.7	9.8	(3)	14.5	(1)	3/4 MNPT	(15)	21	(9.5)
04084 SST	58	(4)	26.7	(101)	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)

Pump version:	Capacity at Max. Backpressure				Max. Stroke Rate	Output per Stroke mL/ stroke	Max. Suction Lift		Max. Suction Pressure		Suction/ Discharge Connector		Weight w/Motor (approx.)	
S1Cb H	psig	(bar)	GPH	(L/h)	spm		ft	(m)	psig	(bar)	in	(DN)	lbs	(kg)
12017 PVT	145	(10)	5.3	(20)	88	3.9	23	(7)	14.5	(1)	1/2 MNPT	(10)	19.8	(9)
12017 SST	174	(12)	5.3	(20)	88	3.9	23	(7)	14.5	(1)	3/8 FNPT	(10)	26.5	(12)
12035 PVT	145	(10)	11.1	(42)	174	4	23	(7)	14.5	(1)	1/2 MNPT	(10)	19.8	(9)
12035 SST	174	(12)	11.1	(42)	174	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)	6.9	(26)	88	5.1	19.6	(6)	14.5	(1)	1/2 MNPT	(10)	19.8	(9)
10022 SST	145	(10)	6.9	(26)	88	5.1	19.6	(6)	14.5	(1)	3/8 FNPT	(10)	26.5	(12)
10044 PVT	145	(10)	14	(53)	172	5.1	19.6	(6)	14.5	(1)	1/2 MNPT	(10)	19.8	(9)
10044 SST	145	(10)	14	(53)	172	5.1	19.6	(6)	14.5	(1)	3/8 FNPT	(10)	26.5	(12)
07065 PVT	100	(7)	16.6	(63)	200	5.1	19.6	(6)	14.5	(1)	1/2 MNPT	(10)	19.8	(9)
07065 SST	100	(7)	16.6	(63)	200	5.1	19.6	(6)	14.5	(1)	3/8 FNPT	(10)	26.5	(12)
07042 PVT	100	(7)	13.2	(50)	88	9.6	9.8	(3)	14.5	(1)	3/4 MNPT	(15)	21	(9.5)
07042 SST	100	(7)	13.2	(50)	88	9.6	9.8	(3)	14.5	(1)	1/2 FNPT	(15)	29.8	(13.5)
04084 PVT	58	(4)	26.7	(101)	172	9.8	9.8	(3)	14.5	(1)	3/4 MNPT	(15)	21	(9.5)
04084 SST	58	(4)	26.7	(101)	172	9.8	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/ 2
Motor Diaphragm Metering Pumps

Identcode Ordering System (S1Ba)

S1Ba	**Drive Type:**												
	H	Main Drive, Diaphragm											
		Verison: Capacity:											
		12017	5.3 gph (20 l/h), 145 psi (10 bar)				07065	20.6 gph (78 l/h), 100 psi (7 bar)					
		12035	11.1 gph (42 l/h), 145 psi (10 bar)				07042	13.2 gph (50 l/h), 100 psi (7 bar)					
		10050	15.9 gph (60 l/h), 145 psi (10 bar)				04084	26.7 gph (101 l/h), 58 psi (4 bar)					**Note: For SS versions see capacity data**
		10022	6.9 gph (26 l/h), 145 psi (10 bar)				04120	38 gph (144 l/h), 58 psi (4 bar)					
		10044	14 gph (53 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)
												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 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**	**0**	**0**	**7**	**0**	**S**	**0**	**0**	**0**	

ProMinent® Sigma/ 1
Motor Diaphragm Metering Pumps

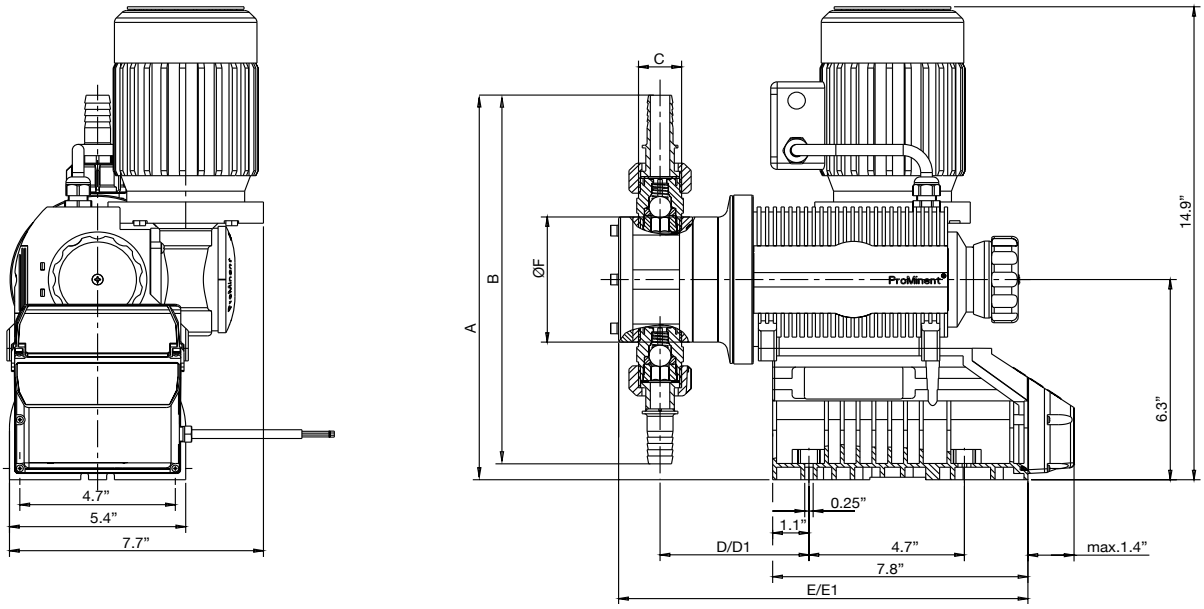
Identcode Ordering System (S1Cb)

S1Cb	**Drive Type:**																	
	H	Main Drive, Diaphragm																
		Version: Capacity:																
		12017	5.3 gph (20 l/h), 145 psi (10 bar)				07065	16.6 gph (63 l/h), 100 psi (7 bar)										
		12035	11.1 gph (42 l/h), 145 psi (10 bar)				07042	13.2 gph (50 l/h), 100 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)	**Note: For SS versions see capacity data**									
		10022	6.9 gph (26 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)															
			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):				
														S	HMI + 1.64' (0.5m) cable			
														1	HMI + 6.5' (2.0 m) cable			
														2	HMI + 16.4' (5.0 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/ 1
Motor Diaphragm Metering Pumps

Dimensional Drawing: (S1Ba)



Dimensions in inches (mm)

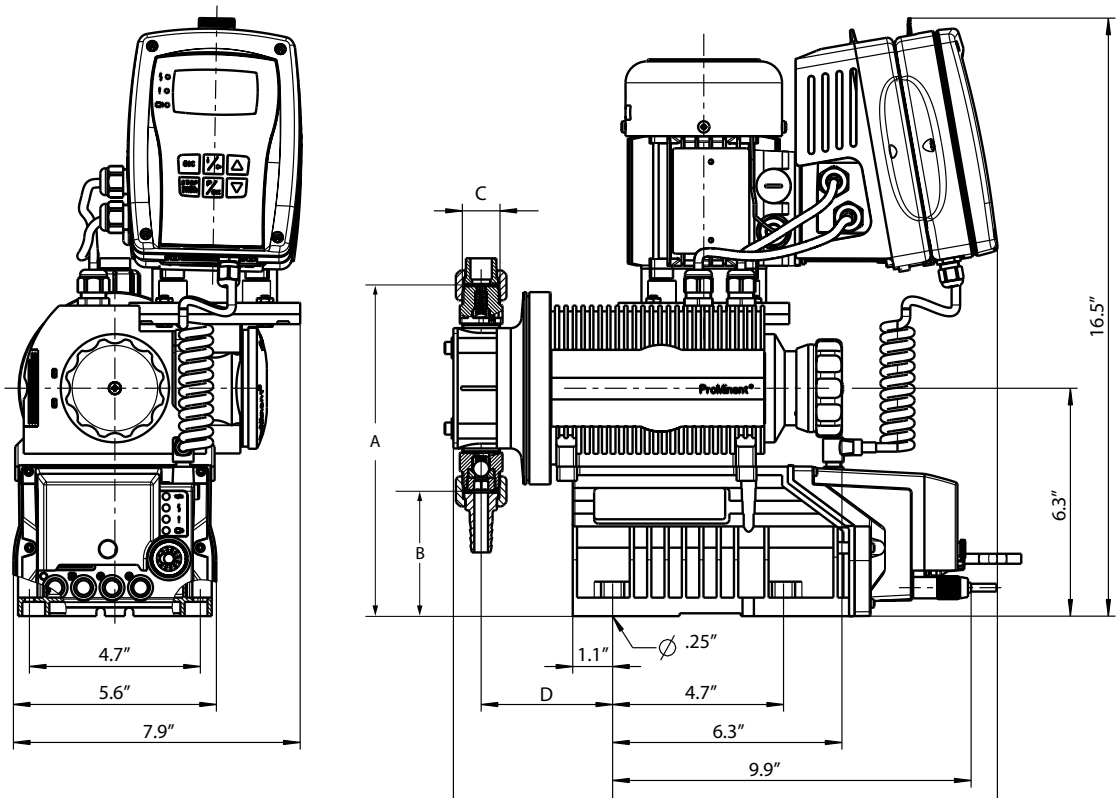
Type Sigma/ 1	A	B	Suction/ Discharge Valve Thread C*	D	D1**	E	E1**	ØF
12017, 12035, 10050, 10022, 10044, 07065 PVT	11 (279)	9.38 (238)	1/2” MNPT	3.54 (90)	4.33 (110)	10.8 (275)	11.6 (295)	3.8 (96)
SST	9.75 (248)	7.13 (181)	1/2” FNPT	3.5 (89)	4.29 (109)	10.8 (275)	11.6 (295)	3.8 (96)
07042, 04084, 04120 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/ 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

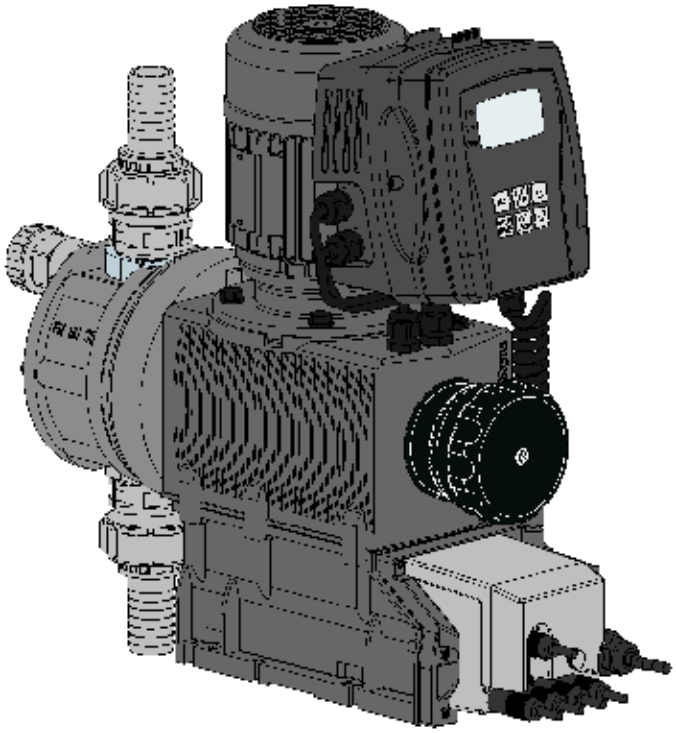
ProMinent® Sigma/ 2
Motor Diaphragm Metering Pumps

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 16.1 to 93.0 gph at a maximum backparessure of 232 to 58 psig. 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.

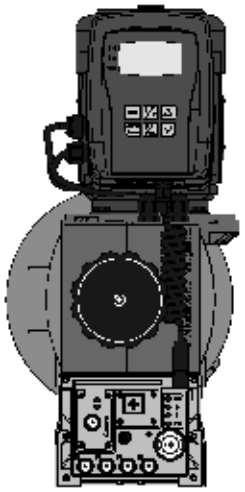


Sigma/ 2 Basic Type (S2Ba)

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/ 2 Motor Diaphragm Metering Pumps

Sigma/ 2 control type (S2Cb)

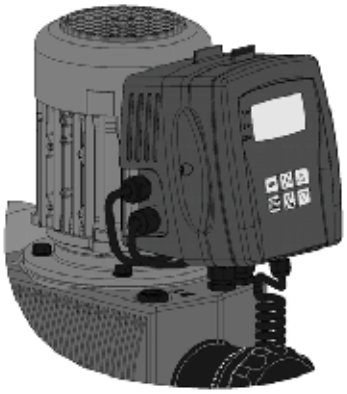


For optional control via contact or analog signals (e.g. 0/4 - 20 mA) the Sigma control type results in good adaptability, even in fluctuating metering requirements.

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.

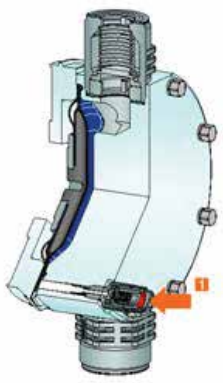
Detachable operating unit (HMI)



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 individual functions of the metering pump can be easily selected and adjusted with five program keys. 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.

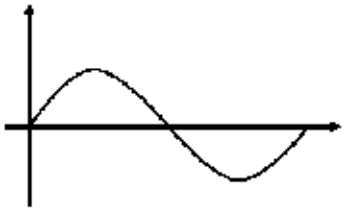


Diagram 1: Discharge stroke, suction stroke equal

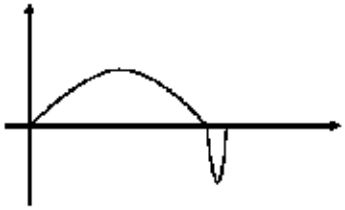


Diagram 2: long discharge stroke, short suction stroke

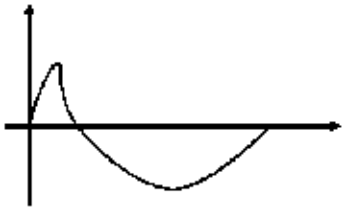


Diagram 3: short discharge stroke, long suction stroke

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/ 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:* *Housing:*	 Cast aluminum 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/ 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/ 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		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)	15.9	(60)	87	11.4	23	(7)	44	(3)	1/2 MNPT	(15)	33	(15)
16050 SST	232	(16)	15.1	(57)	87	11.4	23	(7)	44	(3)	1/2 FNPT	(15)	44	(20)
16090 PVT	145	(10)	28	(106)	158	11.4	23	(7)	44	(3)	3/4 MNPT	(15)	33	(15)
16090 SST	232	(16)	25.9	(98)	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)	39.1	(148)	238	10.9	23	(7)	44	(3)	1/2 FNPT	(15)	44	(20)
07120 PVT	100	(7)	39.6	(150)	87	27.4	16	(5)	15	(1)	3/4 MNPT	(25)	35	(16)
07120 SST	100	(7)	39.6	(150)	87	27.4	16	(5)	15	(1)	3/4 MNPT	(25)	53	(24)
07220 PVT	100	(7)	69.7	(264)	158	27.4	16	(5)	15	(1)	3/4 MNPT	(25)	35	(16)
07220 SST	100	(7)	69.7	(264)	158	27.4	16	(5)	15	(1)	3/4 MNPT	(25)	53	(24)
04350 PVT	58	(4)	111	(420)	238	29.4	16	(5)	15	(1)	1 MNPT	(25)	35	(16)
04350 SST	58	(4)	111	(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		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)	44	(3)	1/2 MNPT	(15)	33	(15)
16050 SST	232	(16)	14.8	(56)	90	11.4	23	(7)	44	(3)	1/2 FNPT	(15)	44	(20)
16090 PVT	145	(10)	28.8	(109)	160	11.4	23	(7)	44	(3)	3/4 MNPT	(15)	33	(15)
16090 SST	232	(16)	26.2	(99)	160	11.4	23	(7)	44	(3)	1/2 FNPT	(15)	44	(20)
16130 PVT	145	(10)	35.9	(136)	200	10.9	23	(7)	44	(3)	3/4 MNPT	(15)	33	(15)
16130 SST	232	(16)	33	(125)	200	10.9	23	(7)	44	(3)	1/2 FNPT	(15)	44	(20)
07120 PVT	100	(7)	39.1	(148)	90	27.4	16	(5)	15	(1)	3/4 MNPT	(25)	35	(16)
07120 SST	100	(7)	39.1	(148)	90	27.4	16	(5)	15	(1)	3/4 MNPT	(25)	53	(24)
07220 PVT	100	(7)	71.6	(271)	160	27.7	16	(5)	15	(1)	3/4 MNPT	(25)	35	(16)
07220 SST	100	(7)	71.6	(271)	160	27.7	16	(5)	15	(1)	3/4 MNPT	(25)	53	(24)
04350 PVT	58	(4)	93	(352)	200	29.4	16	(5)	15	(1)	1 MNPT	(25)	35	(16)
04350 SST	58	(4)	93	(352)	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/ 2
Motor Diaphragm Metering Pumps

Identcode Ordering System (S2Ba)

S2Ba	Drive Type												
	H	Main Drive, Diaphragm											
		Version Capacity:											
		16050	15.9 gph (60 l/h), 145 psi (10 bar)				07120	39.6 gph (150 l/h), 100 psi (7 bar)					
		16090	28.0 gph (106 l/h), 145 psi (10 bar)				07220	69.7 gph (264 l/h), 100 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)
												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	**H**	**16050**	**PV**	**T**	**S**	**0**	**7**	**0**	**2**	**0**	**0**	**0**	

ProMinent® Sigma/ 2 Motor Diaphragm Metering Pumps

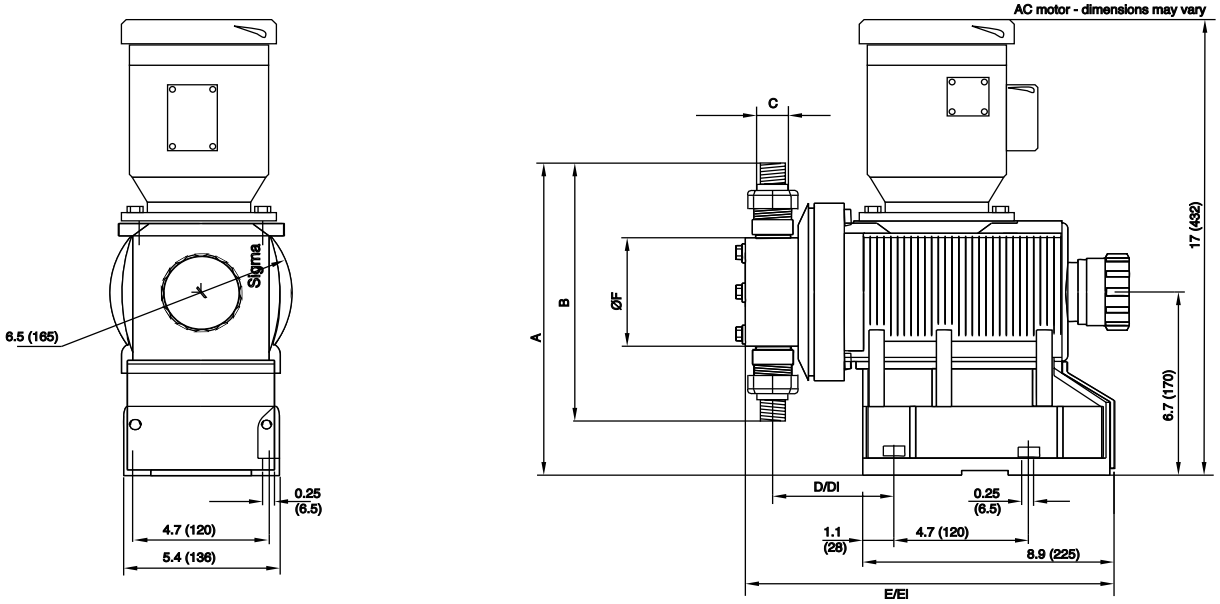
Identcode Ordering System (S2Cb)

S2Cb	Drive Type																	
	H	Main Drive, Diaphragm																
		Version: Capacity:																
		16050	16.1 gph (61 l/h), 145 psi (10 bar)					07120	39.1 gph (148 l/h), 100 psi (7 bar)									
		16090	28.8 gph (109 l/h), 145 psi (10 bar)					07220	71.6 gph (271 l/h), 100 psi (7 bar)	**Note: For SS versions see capacity data**								
		16130	35.9 gph (136 l/h), 145 psi (10 bar)					04350	93.0 gph (352 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):				
														S	HMI + 1.64' (0.5) cable			
														1	HMI + 6.5' (2.0 m) cable			
														2	HMI + 16.4' (5.0 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**	**S**	**0**	**EN**	**01**	

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

ProMinent® Sigma/ 2
Motor Diaphragm Metering Pumps

Dimensional Drawing: (S2Ba)



Dimensions in inches (mm)

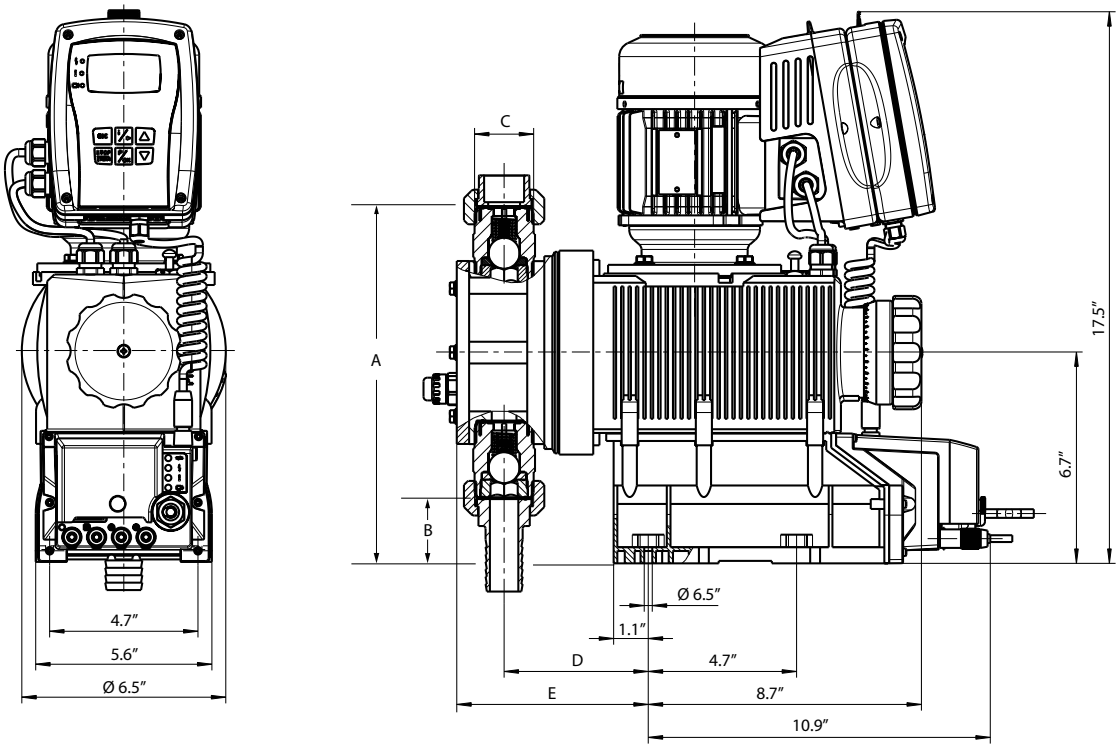
Type Sigma/ 2	A	B	Suction/ Discharge Valve Thread C*	D	D1**	E	E1**	ØF
16050, 16090, 16130								
PVT	10.1 (257)	6.95 (177)	DN 15	4.1 (104)	4.9 (124)	13.0 (329)	13.7 (349)	4.0 (101)
SST	10.9 (276)	8.2 (208)	DN 15	4.1 (104)	4.9 (124)	13.0 (329)	13.7 (349)	4.0 (101)
07120, 07220								
PVT	13.3 (337)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

* Piping adapters provided according to technical data.

** Dimensions with diaphragm failure detector.

ProMinent® Sigma/ 2
Motor Diaphragm Metering Pumps

Dimensional Drawing: (S2Cb)



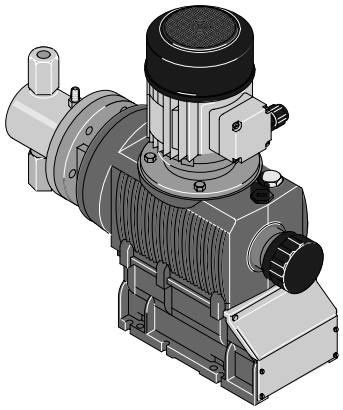
Dimensions in inches (mm)

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)	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)
04350					
PVT	14.3 (362)	14.1 (358)	DN25	4.6 (117)	6.1 (155)
SS	14.3 (362)	14.1 (358)	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 drivem plunger metering pump has a high strength metal-lined housing for those components subject to load, and an additional plastic housing to protect against corrosion. It has a capacity range of 0.6-20.1 gph (60-420 l/h) at a maximum back pressure of 174-4,640 psi (12-320 bar). The pump capacity is adjusted by varying the stroke length 0.2 in (5 mm) in .2% increments via a self-locking adjusting knob.

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

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

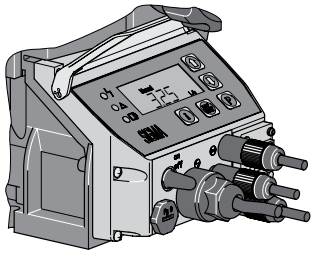
For safety reasons, all motor-driven metering pumps must be equipped with adequate protection against electrical overload.

Sigma/ 2 HK Basic Type (S2Ba)

The ProMinent® Sigma Basic type is a motor-driven metering pump with no internal electronic control system. The ProMinent® S1Ba has a number of different drive options, including the single phase AC motor or a 3 phase motor.

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

Sigma/ 2 HK Control Type (S2Ca)



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

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

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

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

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

(see page 136)

ProMinent® Sigma/ 2 HK Plunger Metering Pumps

Specifications

General:

Maximum stroke length:	0.196” (5.0 mm) HM; 0.6” (15 mm) HK		
Power cord:	6 feet (2 m) 2 wire + ground (supplied on control versions)		
Stroke frequency control:	S2Ba: Constant speed or optional DC/SCR drive or AC inverter S2Ca: Microprocessor control version with innovative start/stop and variable speed control proportional to set frequency or external control signal.		
Stroke counting:	Standard on S2Ca HK		
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:	Glass	SS
Drive:	Cam and spring-follower (lost motion)		
Lubrication:	Oil lubricated		
Recommended oil:	ISO VG 460, such as Mobil Gear Oil 634		
Oil quantity:	Approximately 0.6 quart (550 ml)		
Recommended oil change interval:	5,000 hours		
Warranty:	Two years on drive, one year on liquid end		
Factory testing:	**Each pump is tested for rated flow at maximum pressure.**		
Industry Standard:	CE approved, CSA available (standard in Canada)		

Sigma/ 2 HK:

Piston materials:	Ceramic oxide; packing rings of PTFE, packing spring of 316 SS		
Liquid end options:	316 SS with PTFE seals		
Check valves:	Double ball, stainless steel; optional springs (Hastelloy C).		
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/ 2 HK Plunger Metering Pumps

Specifications

Sigma/2 HK 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 = 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

Sigma/ 2 HK 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:	NEMA 3 (IP 55)
Motor data:	Totally enclosed, fan cooled (IP55); class F insulation; Manufacturer ATB; 0.18 kW (0.24 HP) 230 3 phase (1.9 A)
Relay load *Fault relay only (options 1 & 3):*	Contact load: 250 VAC, 2 A, 50/60 Hz Operating life: > 200,000 switch functions
Fault and pacing relay (options 4 & 5):	Contact load: 24 V, 2 A, 50/60 Hz Operating life: > 200,000 switch functions 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)
Analog output signal:	maximum impedance 300 Ω Isolated 4-20 mA output signal
PROFIBUS® - DP fieldbus options:	Transfer: RS - 485 Wiring: 2-wired, twisted, shielded Length: 3637 ft (1200 m)/328 ft (100 m) Baudrate: 9600 bits/s; 12 Mbits/s No. of participants: 32 with 127 repeaters Topology: Line Access procedure: Master/master with token ring
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.)
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

ProMinent® Sigma/ 2 HK Plunger Metering Pumps

Capacity Data

Sigma/2 HK Basic Version

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

Sigma/ 2 HK Control Version

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

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

Materials In Contact With Chemicals

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

ProMinent® Sigma/ 2 HK Plunger Metering Pumps

Identcode Ordering System (S2Ba HK)

S2Ba	Drive Type											
	HK	Main Drive/Plunger										
		Version: Capacity:										
		32002	0.6 gph (2.3 l/h), 4640 psi (320 bar)									
		14006	1.8 gph (7.1 l/h), 2030 psi (140 bar)									
		07012	3.9 gph (14.8 l/h), 1015 psi (70 bar)									
		04022	7.0 gph (26.5 l/h), 580 psi (40 bar)									
		23004	1.2 gph (4.8 l/h), 3335 psi (230 bar)									
		10011	3.4 gph (13.1 l/h), 1450 psi (100 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**

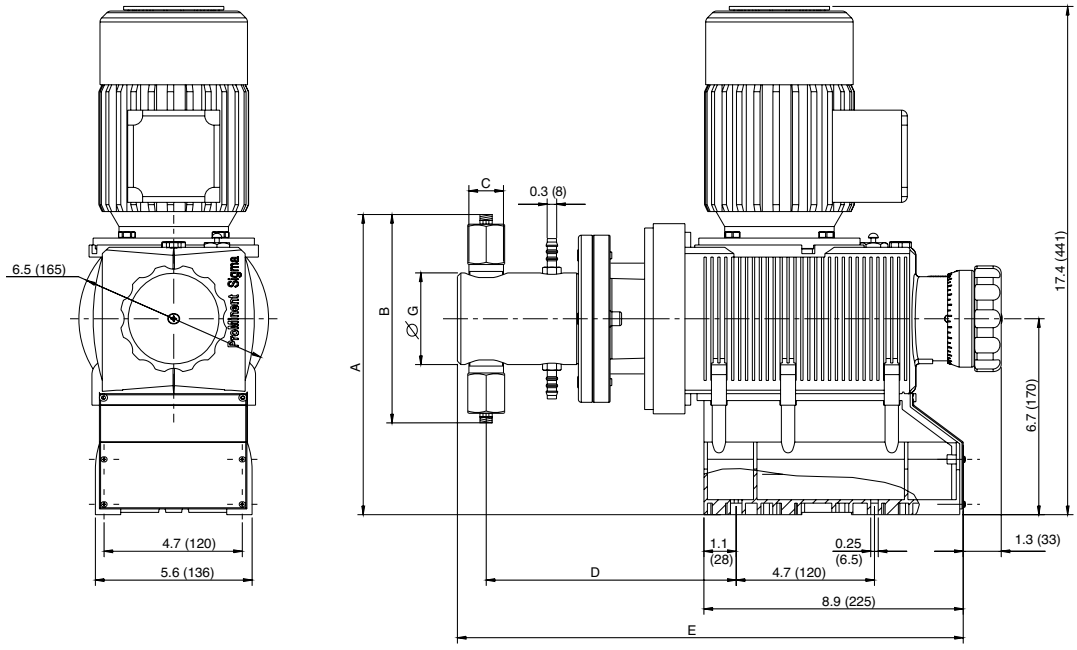
ProMinent® Sigma/ 2 HK Plunger Metering Pumps

Identcode Ordering System (S2Ca HK)

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

ProMinent® Sigma/ 2 HK Plunger Metering Pumps

Dimensional Drawing: (S2Ba HK)



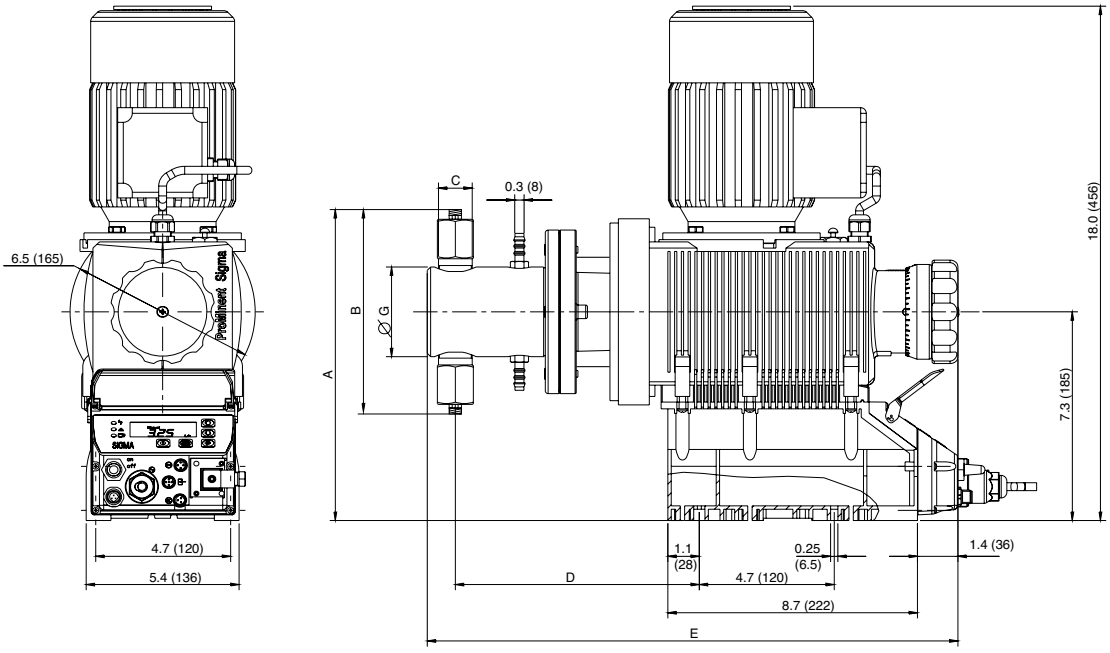
The S2Ba HK models offer other motors, and height dimensions may vary.

Dimensions in inches (mm)

Model	Connector	A	B	C	D	E	ØG
32002 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/ 2 HK Plunger Metering Pumps

Dimensional Drawing: (S2Ca HK)



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

Dimensions in inches (mm)

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

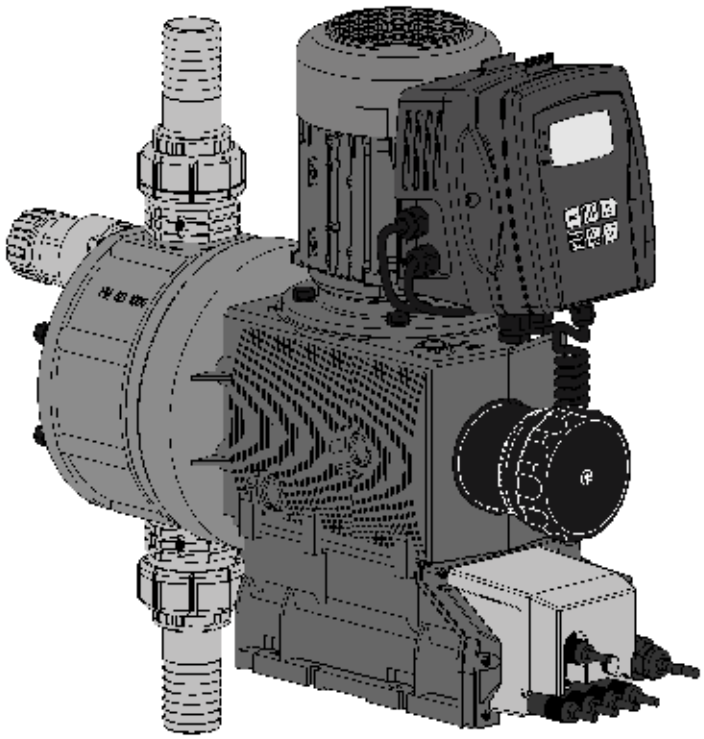
ProMinent® Sigma/ 3
Motor Diaphragm Metering Pumps

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 46.0 to 274.7 gph at a maximum backpressure of 174 to 58 psig. 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.

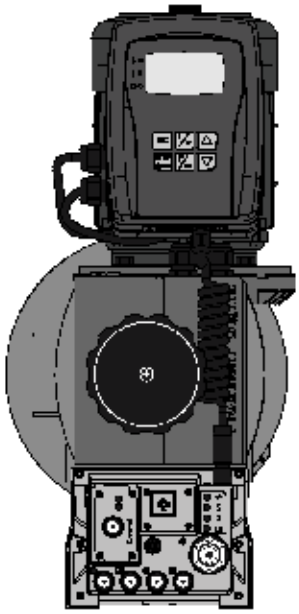


Sigma/ 3 Basic Type (S3Ba)

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/ 3 Motor Diaphragm Metering Pumps

Sigma/ 3 control type (S3Cb)

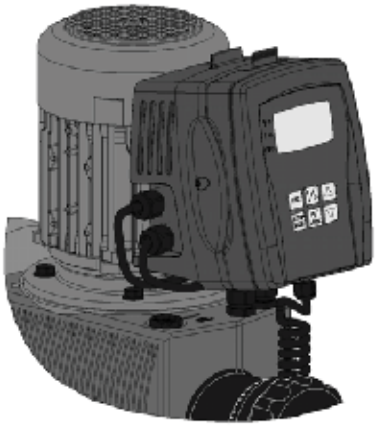


For optional control via contact or analog signals (e.g. 0/4 - 20 mA) the Sigma control type pump results in good adaptability, even in fluctuating metering requirements.

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.

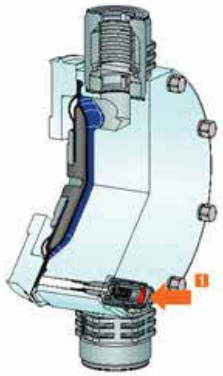
Detachable operating unit (HMI)



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 individual functions of the metering pump can be easily selected and adjusted with five program keys. 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.

Sigma/ 3 control type (S3Cb)

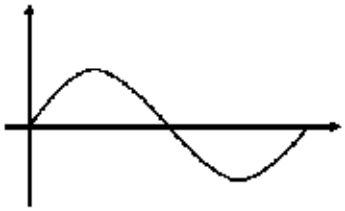


Diagram 1: Discharge stroke, suction stroke equal

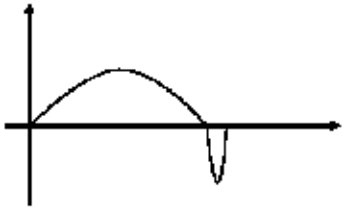


Diagram 2: long discharge stroke, short suction stroke

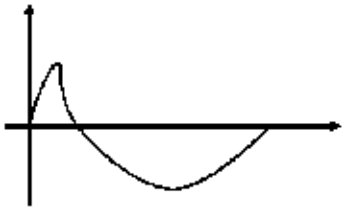


Diagram 3: short discharge stroke, long suction stroke

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/ 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%

NSF 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/ 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/ 3 Motor Diaphragm Metering Pumps

Capacity Data (S3Ba)

Capacity data: Sigma/ 3 Basic Version

Pump Version	Capacity at Max. Backpressure				Max. Stroke Rate	Output per Stroke	Max. Suction Lift (water)		Max. Suction Pressure		Suction/ Discharge Connector		Weight w/Motor (approx.)	
S3Ba H	psig	(bar)	GPH	(L/h)	spm	mL/stroke	ft	(m)	psig	(bar)	in	(DN)	lbs	(kg)
120145 PVT	145	(10)	46	(174)	86	33.7	16	(5)	29	(2)	1 MNPT	(25)	49	(22)
120145 SST	174	(12)	46	(174)	86	33.7	16	(5)	29	(2)	1 MNPT	(25)	57	(26)
120190 PVT	145	(10)	66.2	(251)	124	33.7	16	(5)	29	(2)	1 MNPT	(25)	49	(22)
120190 SST	174	(12)	66.2	(251)	124	33.7	16	(5)	29	(2)	1 MNPT	(25)	57	(26)
120270 PVT	145	(10)	92.6	(350)	173	33.8	16	(5)	29	(2)	1 MNPT	(25)	49	(22)
120270 SST	174	(12)	92.6	(350)	173	33.8	16	(5)	29	(2)	1 MNPT	(25)	57	(26)
070410 PVT	100	(7)	130	(492)	86	95.1	13	(4)	14.5	(1)	1-1/2 MNPT	(32)	53	(24)
070410 SST	100	(7)	130	(492)	86	95.1	13	(4)	14.5	(1)	1-1/2 MNPT	(32)	64	(29)
070580 PVT	100	(7)	183.9	(696)	124	95.1	13	(4)	14.5	(1)	1-1/2 MNPT	(32)	53	(24)
070580 SST	100	(7)	183.9	(696)	124	95.1	13	(4)	14.5	(1)	1-1/2 MNPT	(32)	64	(29)
040830 PVT	58	(4)	264.2	(1000)	173	95.1	10	(3)	14.5	(1)	1-1/2 MNPT	(32)	53	(24)
040830 SST	58	(4)	264.2	(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	Capacity at Max. Backpressure				Max. Stroke Rate	Output per Stroke	Max. Suction Lift (water)		Max. Suction Pressure		Suction/ Discharge Connector		Weight w/Motor (approx.)	
S3Cb H	psig	(bar)	GPH	(L/h)	spm	mL/stroke	ft	(m)	psig	(bar)	in	(DN)	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

Identcode Ordering System (S3Ba)

S3Ba	Drive Type												
	H	Main Drive, Diaphragm											
		Version:	**Capacity:**										
		120145	46.0 gph (174 l/h), 145 psi (10 bar)					070410	130.0 gph (492 l/h), 100 psi (7 bar)				
		120190	66.2 gph (251 l/h), 145 psi (10 bar)					070580	183.9 gph (696 l/h), 100 psi (7 bar)	**Note: For SS versions see capacity data**			
		120270	92.6 gph (350 l/h), 145 psi (10 bar)					040830	264.2 gph (1000 l/h), 58 psi (4 bar)				
			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)
												1	with 3P stroke positioning motor, 230 V 50/60 Hz
												2	with 3P stroke positioning motor, 115 V 50/60 Hz
												4	W/ stroke positioning motor 4-20 mA, 230 V 50/60 Hz
												6	W/ stroke positioning motor 4-20 mA, 115 V 50/60 Hz
S3Ba	**H**	**120145**	**PV**	**T**	**0**	**0**	**7**	**0**	**2**	**0**	**0**	**0**	

ProMinent® Sigma/ 3
Motor Diaphragm Metering Pumps

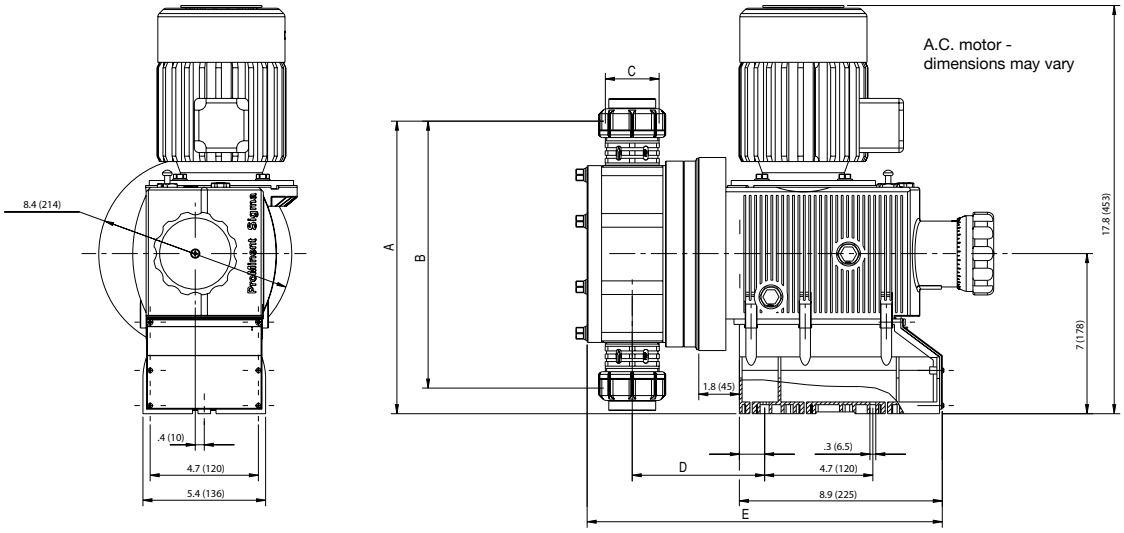
Identcode Ordering System (S3Cb)

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)	**Note: For SS versions see capacity data**									
		120270	96.4 gph (365 l/h), 145 psi (10 bar)				040830	274.7 gph (1040 l/h), 58 psi (4 bar)										
			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)					
													Over Pressure Shut-off:					
													0	Without over pressure shut-off				
														Operating unit (HMI):				
														S	HMI + 1.64' (0.5m) cable			
														1	HMI + 6.5' (2.0 m) cable			
														2	HMI + 16.4' (5.0 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**	**A**	**0**	**7**	**0**	**U**	**D**	**0**	**0**	**0**	**1**	**0**	**EN**	**01**	

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

ProMinent® Sigma/ 3
Motor Diaphragm Metering Pumps

Dimensional Drawing: (S3Ba)



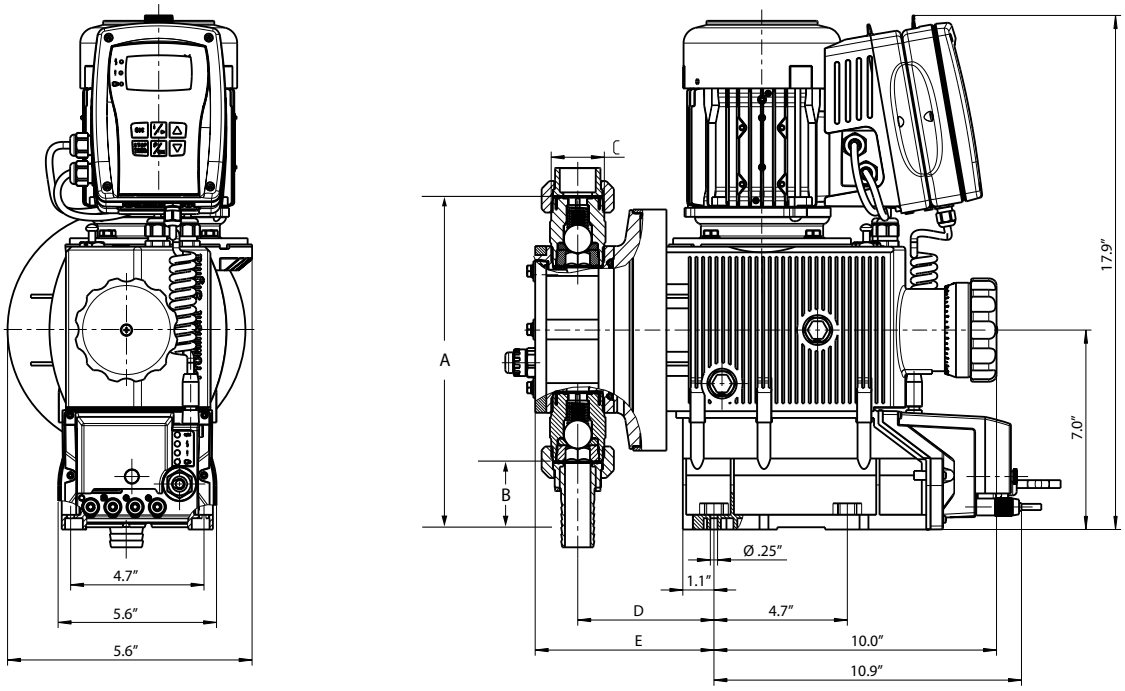
Dimensions in inches (mm)

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

* Piping adapters provided according to technical data.
** Dimensions with diaphragm failure detector.

ProMinent® Sigma/ 3
Motor Diaphragm Metering Pumps

Dimensional Drawing: (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*

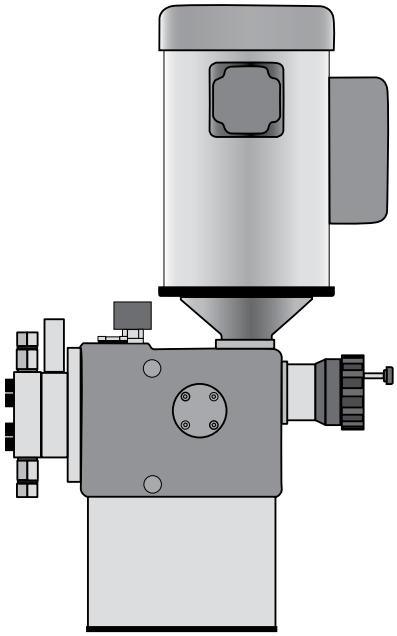
Piping adapters provided according to technical data

ProMinent® ProMus
Hydraulic Diaphragm Metering Pumps

Overview: ProMus

High pressure chemical process metering

(see page 133 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 29 spm
Motor mounting flange:	Fits all NEMA 56 C frame motors (Optional IEC 71 with B5 flange)
Motor coupling:	Direct coupled to worm gear shaft
Check valves:	PVDF/PTFE: size 17 double inlet & outlet; sizes 30/40 single inlet & outlet
Metal:	1) single inlet & outlet 2) double inlet & outlet 3) single inlet & double outlet (Double ball needed for pressures over 500 psi)
Repeatability:	Steady state flow accuracy is +/- 1% over turndown Ratio of 10:1
Max fluid operating temp:	constant: 195 F (90 C) short term 250 F (120 C)
Max solids size :	0.3mm; if larger than this provisions must be made to remove them prior
to suction inlet	
Max viscosity:	200 mPas
Recommend oil:	Mobilube SCH 75w-90
Oil quantity:	1.5 quart (1.42 l)
Oil change interval:	Every 5000 hours
Stroke length adjustment:	Manual adjustment. Automatic stroke length adjustment via 4 to 20 mA available as an option
Pressure relief:	Integrated pressure relief to protect pump. External pressure relief must be
used to protect system	
Warranty:	2 years on drive, 1 year on liquid end
Factory testing:	each pump is tested for capacity at rated pressure
Maximum inlet pressure:	14.5 psi (1 bar)

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

ProMinent® ProMus
Hydraulic Diaphragm Metering Pumps

Capacity Data

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

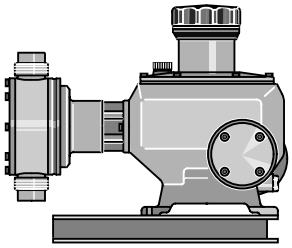
Data Requirements To Size a ProMus Pump

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

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

ProMinent® Makro TZ Diaphragm Metering Pumps

Overview: Makro TZ

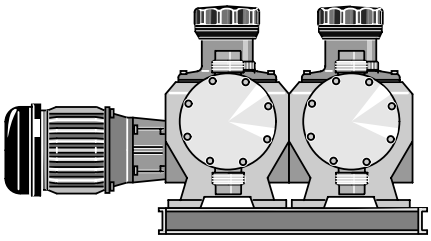


Ideal for high volume and high pressure applications

(see page 134 for spare parts)

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

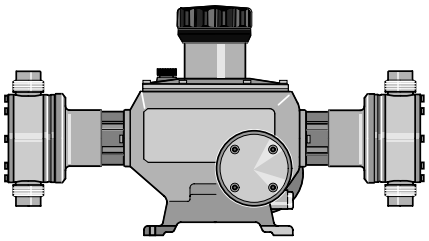
The stroke length can be adjusted by means of the shift ring mechanism from 0-10 mm (TZMb), with 0.5 % accuracy. The 5-speed gearbox is encased in a cast, seawater resistant, acrylic resin lacquered housing. Liquid ends are available in different material combinations to suit differing applications. 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 (25)	102/119 (46/54)
120340	108	408	174	12	60	115	13.1 (4)	1 (25)	102/119 (46/54)
120430	136	516	174	12	60	144	13.1 (4)	1 (25)	102/119 (46/54)
120510	162	612	174	12	60	173	13.1 (4)	1 (25)	102/119 (46/54)
120650	–	–	174	12	60	–	13.1 (4)	1 (25)	102/119 (46/54)
070430	136	516	100	7	99	86	11.5 (3.5)	1 1/2 (32)	110/141 (50/64)
070570	180	684	100	7	99	115	11.5 (3.5)	1 1/2 (32)	110/141 (50/64)
070720	228	864	100	7	99	144	11.5 (3.5)	1 1/2 (32)	110/141 (50/64)
070860	272	1032	100	7	99	173	11.5 (3.5)	1 1/2 (32)	110/141 (50/64)
071070	–	–	100	7	99	–	11.5 (3.5)	1 1/2 (32)	110/141 (50/64)
040840	266	1008	58	4	194	86	9.8 (3)	2 (40)	124/177 (56/80)
041100	348	1320	58	4	194	115	9.8 (3)	2 (40)	124/177 (56/80)
041400	443	1680	58	4	194	144	9.8 (3)	2 (40)	124/177 (56/80)
041670	529	2004	58	4	194	173	9.8 (3)	2 (40)	124/ 177 (56/80)
042100	-	-	58	4	194	-	9.8 (3)	2 (40)	124/177 (56/80)

Stroke length 10 mm

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

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

Materials In Contact With Chemical In Version

			DN 25 Ball Valves		DN 32/DN 40 Plate Valves**			
	Pump Head	**Suction/ 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

Overview: DulcoFlex DFB

The DulcoFlex DFB is a versatile peristaltic pump, which incorporates both hose and tubing technology. The unique roller design offers a lubricant-free housing unlike typical shoe pumps. With pressures up to 116 psi and flow rates to 385 gph, the DFB 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 385 gph (6.5 gpm)
- Halar coating available for the toughest chemicals
- Disaster proof hose connections
- Roller Technology - Lower hose Stress
- Easy maintenance
- Reinforced hose
- Can run dry
- Self priming
- Great for solids
- Reversible
- No seals
- No valves

DulcoFlex DFB Capacities

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 gpm	52	84	210	270	385
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***

ProMinent® DulcoFlex Series

Identcode Ordering System

DFBu	DULCO®flex DFBu											
	pump size											
	010	DFBu 010, 0.006 gal/revolution										
	013	DFBu 013, 0.010 gal/revolution										
	016	DFBu 016, 0.025 gal/revolution										
	019	DFBu 019, 0.032 gal/revolution										
		speed										
		005	5 rpm	**029**	29 rpm							
		006	6 rpm	**039**	39 rpm							
		007	7 rpm	**043**	43 rpm							
		009	9 rpm	**049**	49 rpm							
		011	11 rpm	**054**	54 rpm							
		013	13 rpm	**061**	61 rpm							
		017	17 rpm	**068**	68 rpm							
		021	21 rpm	**077**	77 rpm							
		024	24 rpm	**086**	86 rpm							
			motor type									
			0	no motor provided								
			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	NR							
				B	NBR							
				E	EPDM							
				H	Hypalon							
				N	Norprene (max 30 psi)							
					connection							
					B	SS NPT						
					G	PVC NPT						
					F	PVDF NPT						
						base plate						
						4	base plate, HDPE					
							leakage sensor					
							0	without leakage detector				
							L	with leakage detector				
							R	with leakage detector and relay kit				
								orientation				
								R	right facing (standard)			
								L	left facing			
								U	up facing			
								D	down facing			
									vfd			
									0	without vfd		
									A	with basic vfd 115/1/60		
									B	with basic vfd 460/3/60		
									C	with advanced vfd 115/1/60		
									D	with advanced vfd 460/3/60		
									E	DC - SCR drive 120VAC in, 90V out		
										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

Identcode Ordering System

DFBu	DULCO®flex DFBu											
	pump size											
	022	DFBu 022, 0.066 gal/revolution										
		speed										
		209	9 rpm	236	36 rpm							
		212	12 rpm	239	39 rpm							
		216	16 rpm	245	45 rpm							
		218	18 rpm	249	49 rpm							
		220	20 rpm	257	57 rpm							
		225	25 rpm	264	64 rpm							
		227	27 rpm	272	72 rpm							
		230	30 rpm	287	87 rpm							
			motor type									
			0	no motor provided								
			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	NR							
				B	NBR							
				E	EPDM							
				H	Hypalon							
				N	Norprene (max 30 psi)							
					connection							
					B	SS NPT						
					G	PVC NPT						
					F	PVDF NPT						
						base plate						
						4	base plate, HDPE					
							leakage sensor					
							0	without leakage detector				
							L	with leakage detector				
							R	with leakage detector and relay kit				
								orientation				
								R	right facing (standard)			
								L	left facing			
								U	up facing			
								D	down facing			
									vfd			
									0	without vfd		
									A	with basic vfd 115/1/60		
									B	with basic vfd 460/3/60		
									C	with advanced vfd 115/1/60		
									D	with advanced vfd 460/3/60		
									E	DC - SCR drive 120VAC in, 90V out		
										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	022	209	0	0	B	4	0	R	0	0	1	

ProMinent® DulcoFlex Series

Overview: DulcoFlex DFC

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

Feature & Benefits

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

DulcoFlex DFC Capacities

Capacity Data					
	DFC30	**DFC40**	**DFC50**	**DFC60**	**DFC70**
DFC 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	12	20	30	82	130
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

ProMinent® DulcoFlex Series

Identcode Ordering System

DFCu	DULCO®flex DFCu											
	pump size											
	030	DFCu 030, 0.11 gal/revolution										
		speed										
		000	without gear reducer		030	30 rpm						
		009	9 rpm		035	35 rpm						
		012	12 rpm		039	39 rpm						
		014	14 rpm		045	45 rpm						
		016	16 rpm		049	49 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	NR							
				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	with leakage detector, 5-48VDC, N.O. (USE WITH DRIVE)				
							B	with leakage detector, 5-48VDC, N.C.				
							C	with leakage detector, 24-240VAC, N.O.				
							D	with leakage detector, 24-240VAC, N.C.				
							R	with leakage detector and relay kit (DC only)				
								orientation				
								R	right facing (standard)			
								L	left facing			
								U	up facing			
								D	down facing			
									vfd			
									0	without vfd		
									1	with basic vfd 115/1/60 (max 1-1/2 HP)		
									2	with basic vfd 460/3/60		
									3	with advanced vfd 115/1/60 (Max 1 HP)		
									4	with 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

Identcode Ordering System

DFCu	DULCO®flex DFCu											
	pump size											
	040	DFCu 040, 0.24 gal/revolution										
		speed										
		000	without gear reducer		030	30 rpm						
		009	9 rpm		035	35 rpm						
		012	12 rpm		039	39 rpm						
		014	14 rpm		045	45 rpm						
		016	16 rpm		049	49 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	NR							
				B	NBR							
				E	EPDM							
				N	Norprene (max 30 psi, DFC 40 only)							
				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	with leakage detector, 5-48VDC, N.O. (USE WITH DRIVE)				
							B	with leakage detector, 5-48VDC, N.C.				
							C	with leakage detector, 24-240VAC, N.O.				
							D	with leakage detector, 24-240VAC, N.C.				
							R	with leakage detector and relay kit (DC only)				
								orientation				
								R	right facing (standard)			
								L	left facing			
								U	up facing			
								D	down facing			
									vfd			
									0	without vfd		
									1	with basic vfd 115/1/60 (max 1-1/2 HP)		
									2	with basic vfd 460/3/60		
									4	with 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	**040**	**000**	**0**	**0**	**1**	**1**	**0**	**R**	**0**	**0**	**1**	

ProMinent® DulcoFlex Series

Identcode Ordering System

DFCu	DULCO®flex DFCu											
	pump size											
	050	DFCu 050, 0.39 gal/revolution										
		speed										
		000	without gear reducer		030	30 rpm						
		009	9 rpm		035	35 rpm						
		012	12 rpm		039	39 rpm						
		014	14 rpm		045	45 rpm						
		016	16 rpm		049	49 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	NR							
				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	with leakage detector, 5-48VDC, N.O. (USE WITH DRIVE)				
							B	with leakage detector, 5-48VDC, N.C.				
							C	with leakage detector, 24-240VAC, N.O.				
							D	with leakage detector, 24-240VAC, N.C.				
							R	with leakage detector and relay kit (DC only)				
								orientation				
								R	right facing (standard)			
								L	left facing			
								U	up facing			
								D	down facing			
									vfd			
									0	without vfd		
									2	with basic vfd 460/3/60		
									4	with 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	**040**	**000**	**0**	**0**	**1**	**1**	**0**	**R**	**0**	**0**	**1**	

ProMinent® DulcoFlex Series

Identcode Ordering System

DFCu	DULCO®flex DFCu											
	pump size											
	060	DFCu 060, 0.82 gal/revolution										
		speed										
		000	without gear reducer		034	34 rpm						
		012	12 rpm		042	42 rpm						
		016	16 rpm		053	53 rpm						
		023	23 rpm		057	57 rpm						
		028	28 rpm		071	71 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	NR							
				B	NBR							
				E	EPDM							
				H	Hypalon							
					hydraulic connection							
					6	ANSI Flange SS w/ SS Insert						
					7	ANSI Flange SS w/ PVC Insert						
					8	ANSI Flange SS w/ PVDF Insert						
						base plate						
						1	painted steel					
							leakage sensor					
							0	without leakage detector				
							A	with leakage detector, 5-48VDC, N.O. (USE WITH DRIVE)				
							B	with leakage detector, 5-48VDC, N.C.				
							C	with leakage detector, 24-240VAC, N.O.				
							D	with leakage detector, 24-240VAC, N.C.				
							R	with leakage detector and relay kit (DC only)				
								orientation				
								R	right facing (standard)			
								L	left facing			
								U	up facing			
								D	down facing			
									vfd			
									0	without vfd		
									2	with basic vfd 460/3/60		
									4	with advanced vfd 460/3/60		
										special version		
										0	standard version	
										H	chemical version (Halar coated)	
											discharge pressure	
											1	30 psi
											2	60 psi
											3	90 psi
											4	115 psi (max hose)
DFCu	**060**	**000**	**0**	**0**	**6**	**1**	**0**	**R**	**0**	**0**	**1**	

ProMinent® DulcoFlex Series

Identcode Ordering System

DFCu	DULCO®flex DFCu											
	pump size											
	070	DFCu 070, 1.76 gal/revolution										
		speed										
		000	without gear reducer		032	32 rpm						
		012	12 rpm		039	39 rpm						
		016	16 rpm		045	45 rpm						
		019	19 rpm		057	57 rpm						
		023	23 rpm		071	71 rpm						
		028	28 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	NR							
				B	NBR							
				E	EPDM							
				H	Hypalon							
					hydraulic connection							
					1	ANSI Flange SS						
					5	Halar Coated ANSI Flange SS						
						base plate						
						1	painted steel					
							leakage sensor					
							0	without leakage detector				
							A	with leakage detector, 5-48VDC, N.O. (USE WITH DRIVE)				
							B	with leakage detector, 5-48VDC, N.C.				
							C	with leakage detector, 24-240VAC, N.O.				
							D	with leakage detector, 24-240VAC, N.C.				
							R	with leakage detector and relay kit (DC only)				
								orientation				
								R	right facing (standard)			
								L	left facing			
								U	up facing			
								D	down facing			
									vfd			
									0	without vfd		
									2	with basic vfd 460/3/60		
									4	with 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	**070**	**000**	**0**	**0**	**1**	**1**	**0**	**R**	**0**	**0**	**1**	

ProMinent® DulcoFlex Series

Overview: DulcoFlex DFD

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

Feature & Benefits

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

DulcoFlex DFD Capacities

Capacity Data						
	DFD25	**DFD32**	**DFD40**	**DFD60**	**DFC70**	**DFD100**
DFC 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	12	20	30	84	130	225
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