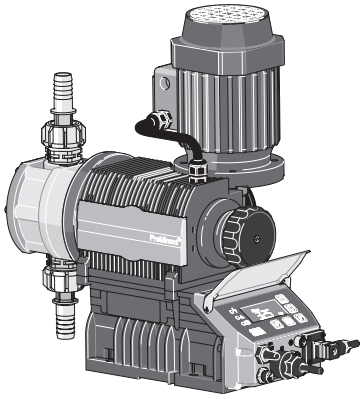
"Motor-Driven Metering Pumps" T.O.C. IV

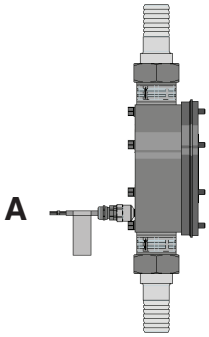
CATALOG SECTION TABS

ProMinent® Sigma/ 1
Motor Diaphragm Metering Pumps

Overview: Sigma/ 1



S1Ca



Ideal for Economical mid-range applications

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

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

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

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

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

All PVDF versions are NSF/ANSI 61 approved.

Diaphragm Failure Indication (A)

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

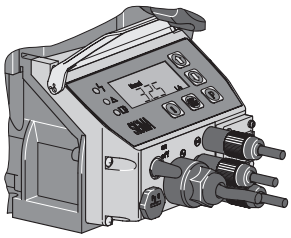
In connection with the S1Ca, continued metering, or alternatively, a stopping of the metering pump can be selected.

Sigma/ 1 Basic Type (S1Ba)

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

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

Sigma/1 Control Type (S1Ca)



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

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

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

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

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

(see page 134)

ProMinent® Sigma/ 1 Motor Diaphragm Metering Pumps

Standard Modes and Functions

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

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

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

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

Control Modes

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

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

Standard Functions

“Calibrate”

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

“Auxiliary Frequency”

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

“Flow”

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

“Float Switch”

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

“Pause”

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

“Stop”

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

“Prime”

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

Function and Error Indicators

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

NSF®
Certified to NSF/ANSI 61

Optional Modes and Functions

Optional Control Modes

“Analog” Mode

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

“Contact” Mode with Pulse Control

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

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

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

For example:

Step-up Factor:
99.99 1 pulse = 99.99 pump strokes
10 1 pulse = 10 pump strokes

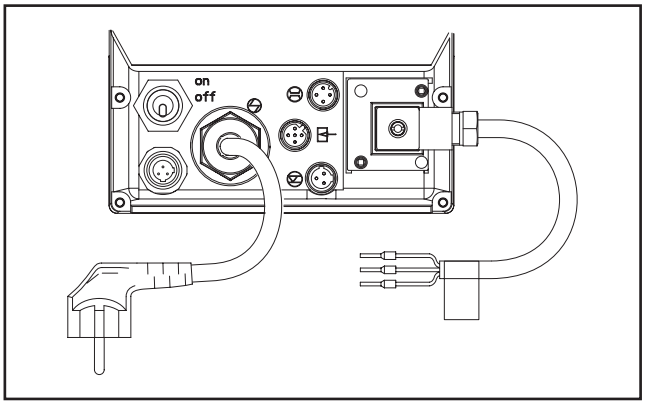
Step-down Factor:
0.25 4 pulses = 1 pump stroke
0.01 100 pulses = 1 pump stroke

“Batch” Mode

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

Access Code

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



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

Relay outputs

Fault annunciating relay

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

Fault annunciating and Pacing relay

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

4-20 mA Analog Output

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

Timer Relay

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

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

Fieldbus connection

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

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

ProMinent® Sigma/ 1
Motor Diaphragm Metering Pumps

Specifications

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 S1Ca: Microprocessor control version with innovative start/stop and variable speed control proportional to set frequency or external control signal.
Stroke counting:	Standard on S1Ca
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

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 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.
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

ProMinent® Sigma/ 1
Motor Diaphragm Metering Pumps

Specifications (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)
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 (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: max. 24 V, AC/DC, max. 100 mA maximum $50x10^6$ switch cycles @ 10 V, 10 mA Contact closure: 100 ms (for pacing relay)
Analog output signal:	maximum impedance 300 W 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 $\pm$ 10%, 50/60 Hz

Capacity Data Notice

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

ProMinent® Sigma/ 1 Motor Diaphragm Metering Pumps

Capacity Data

Sigma/1 Basic Version

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

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

Sigma/1 Control Version

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

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

Materials In Contact With Chemicals

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

ProMinent® Sigma/ 1
Motor Diaphragm Metering Pumps

Identcode Ordering System (S1Ba)

S1Ba	Drive Type:											
	H	Main Drive, Diaphragm										
		Verison: Capacity:										
		12017*	5.2 gph (20 l/h), 174 psi (10 bar)									
		12035*	11.1 gph (42 l/h), 174 psi (10 bar)									
		10050	15.8 gph (60 l/h), 145 psi (10 bar)									
		10022	6.8 gph (26 l/h), 145 psi (10 bar)									
		10044	14 gph (53 l/h), 145 psi (10 bar)									
		07065	20.6 gph (78 l/h), 102 psi (7 bar)									
		07042	13.2 gph (50 l/h), 102 psi (7 bar)									
		04084	26.7 gph (101 l/h), 58 psi (4 bar)									
		04120	38 gph (144 l/h), 58 psi (4 bar)									
		* For PVDF versions. Maximum 145 psig										
		NOTE: Refer to technical data for capacities and stroke rates										
			Liquid end material:									
			PVT	PVDF with PTFE gasket								
			SST	316 Stainless Steel with PTFE gasket								
				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	Explosion Proof**			
									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
												MOTOR (INCLUDING MOUNTING FLANGE):
												1) pn. 7500344 1/3 HP, single ph, AC, 115 V, 60 Hz, EPFC (class 1 Group C & D or class 2 Group F & G T3B)
												2) pn 7746261 1/2 HP, 3 ph, 1D, 208-230/460 VAC EPFC (class 1 Group C & D or class 2 Group F & G T3B)
S1Ba	**H**	**12017**	**PVT**	**0**	**0**	**7**	**0**	**S**	**0**	**0**	**0**	

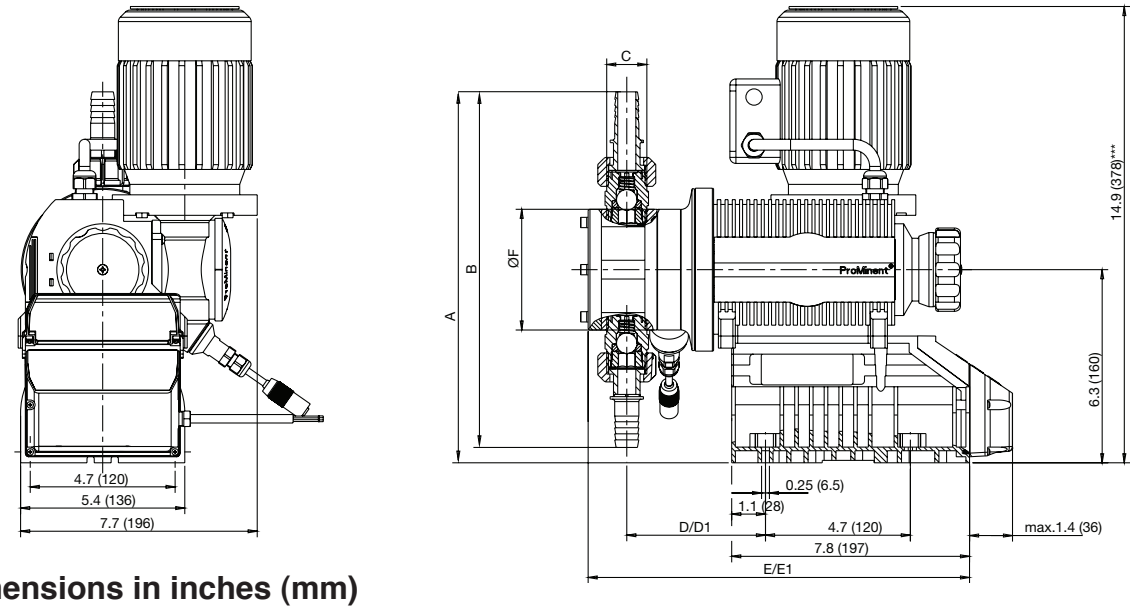
ProMinent® Sigma/ 1
Motor Diaphragm Metering Pumps

Identcode Ordering System (S1Ca)

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

ProMinent® Sigma/ 1
Motor Diaphragm Metering Pumps

Dimensional Drawing: (S1Ba)



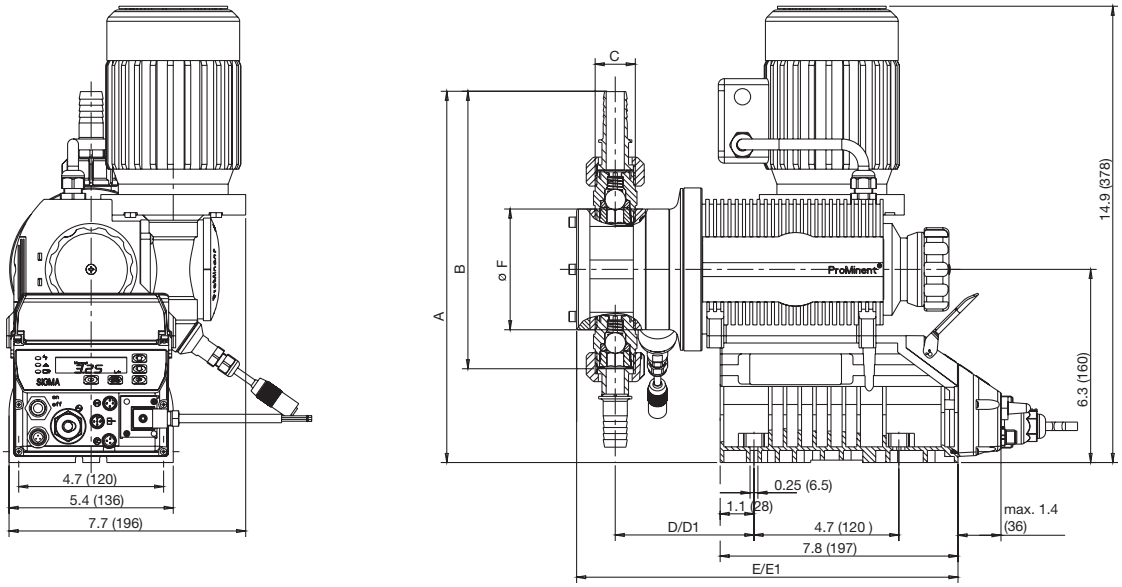
Dimensions in inches (mm)

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

* Piping adapters provided according to technical data.
** Dimensions with diaphragm failure detector.
*** Dimension may vary depending on motor installed.

ProMinent® Sigma/ 1
Motor Diaphragm Metering Pumps

Dimensional Drawing: (S1Ca)



Dimensions in inches (mm)

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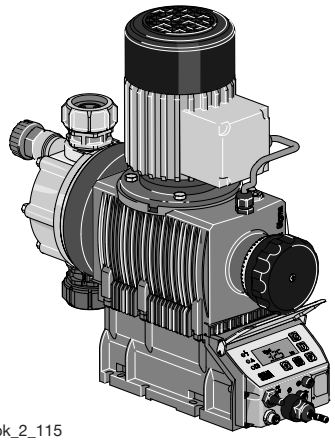
* Piping adapters provided according to technical data.
** Dimensions with diaphragm failure detector.

ProMinent® Sigma/ 2
Motor Diaphragm Metering Pumps

Overview: Sigma/ 2



pk_2_115

Ideal for Economical mid-range applications

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

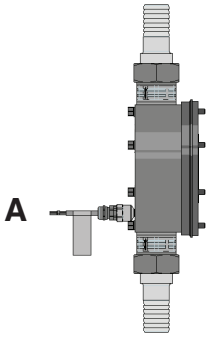
The ProMinent® Sigma/ 2 is a mechanically actuated diaphragm metering pump. It has a capacity range of 15.9-111 gph (60-420 l/h) at a maximum back pressure of 58-232 psi (16-4 bar). The pump capacity is adjusted by varying the stroke length (5 mm) in .05% increments via a self-locking adjusting knob.

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

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

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

All PVDF versions are NSF/ANSI 61 approved.



Diaphragm Failure Indication (A)

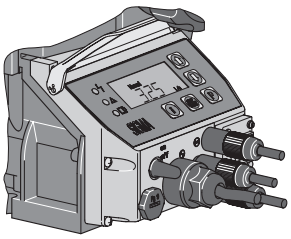
The delivery unit has a patented multilayer safety diaphragm as standard and a visual diaphragm rupture indicator. The diaphragm is coated with PTFE film on both sides, from the drive and working side. This guarantees that no discharge to the outside occur if the diaphragm ruptures. When the diaphragm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

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

Sigma/ 2 Basic Type (S2Ba)

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

Sigma/ 2 Control Type (S2Ca)



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

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

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

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

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

(see page 134)

ProMinent® Sigma/ 2 Motor Diaphragm Metering Pumps

Standard Modes and Functions

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

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

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

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

Control Modes

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

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

Standard Functions

“Calibrate”

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

“Auxiliary Frequency”

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

“Flow”

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

“Float Switch”

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

“Pause”

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

“Stop”

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

“Prime”

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

Function and Error Indicators

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

NSF®
Certified to NSF/ANSI 61

Optional Modes and Functions

Optional Control Modes

"Analog" Mode

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

"Contact" Mode with Pulse Control

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

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

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

For example:

Step-up Factor:
99.99 1 pulse = 99.99 pump strokes
10 1 pulse = 10 pump strokes

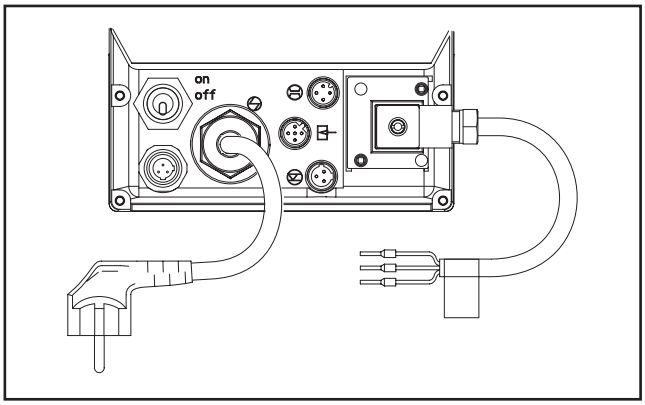
Step-down Factor:
0.25 4 pulses = 1 pump stroke
0.01 100 pulses = 1 pump stroke

"Batch" Mode

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

Access Code

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



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

Relay outputs

Fault annunciating relay

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

Fault annunciating and Pacing relay

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

4-20 mA Analog Output

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

Timer Relay

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

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

Fieldbus connection

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

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

ProMinent® Sigma/ 2
Motor Diaphragm Metering Pumps

Specifications

General:

Maximum stroke length:	0.196” (5.0 mm) HM; 0.6” (15 mm) HK
Power cord:	6 feet (2 m) 2 wire + ground (supplied on control versions)
Stroke frequency control:	S2Ba: Constant speed or optional DC/SCR drive or AC inverter S2Ca: Microprocessor control version with innovative start/stop and variable speed control proportional to set frequency or external control signal.
Stroke counting:	Standard on S2Ca
Materials of construction	
Inner casing:	Cast aluminum
Housing:	Glass-filled Luranyl™ (PPE)

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

Drive:	Cam and spring-follower (lost motion)
Lubrication:	Oil lubricated
Recommended oil:	ISO VG 460, such as Mobil Gear Oil 634
Oil quantity:	Approximately 0.6 quart (550 mL)
Recommended oil change interval:	5,000 hours
Warranty:	Two years on drive, one year on liquid end
Factory testing:	**Each pump is tested for rated flow at maximum pressure.**
Industry Standard:	CE approved, CSA available (standard in Canada), NSF/ANSI 61

Sigma/2 HM:

Diaphragm materials:	PTFE faced EPDM with Nylon reinforcement and steel core
Liquid end options:	Polyvinylidene Fluoride (PVDF) or 316 SS, with PTFE seals
Check valves:	Single ball check, PVDF and SS versions. Optional springs available in Hastelloy C
Repeatability:	When used according to the operating instructions, better than ±2%

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

Diaphragm failure indication:	Visual indicator is mandatory. The delivery unit has a patented multilayer safety diaphragm as standard and a visual diaphragm rupture indicator.
Separation of drive from liquid end:	An air gap with secondary safety diaphragm separates the drive from the liquid end to prevent cross contamination of oil and process fluid (with or without optional diaphragm failure indication).
Max. solids size in fluid:	0.3 mm
Stroke length adjustment:	Manual, in increments of 0.5%. Motorized stroke length adjustment is available.

Sigma/2 HK:

Piston materials:	Ceramic oxide; packing rings of PTFE, packing spring of 316 SS.
Liquid end options:	316 SS with PTFE seals
Check valves:	Double ball, stainless steel; optional springs (Hastelloy C4).
Repeatability:	When used according to the operating instructions, better than ±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

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 = 156 SPM, 7.25:1 = 232 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:	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:	max. 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 Motor Diaphragm Metering Pumps

Capacity Data

Sigma/2 Basic Version

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

Sigma/2 Control Version

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

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

Materials In Contact With Chemicals

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

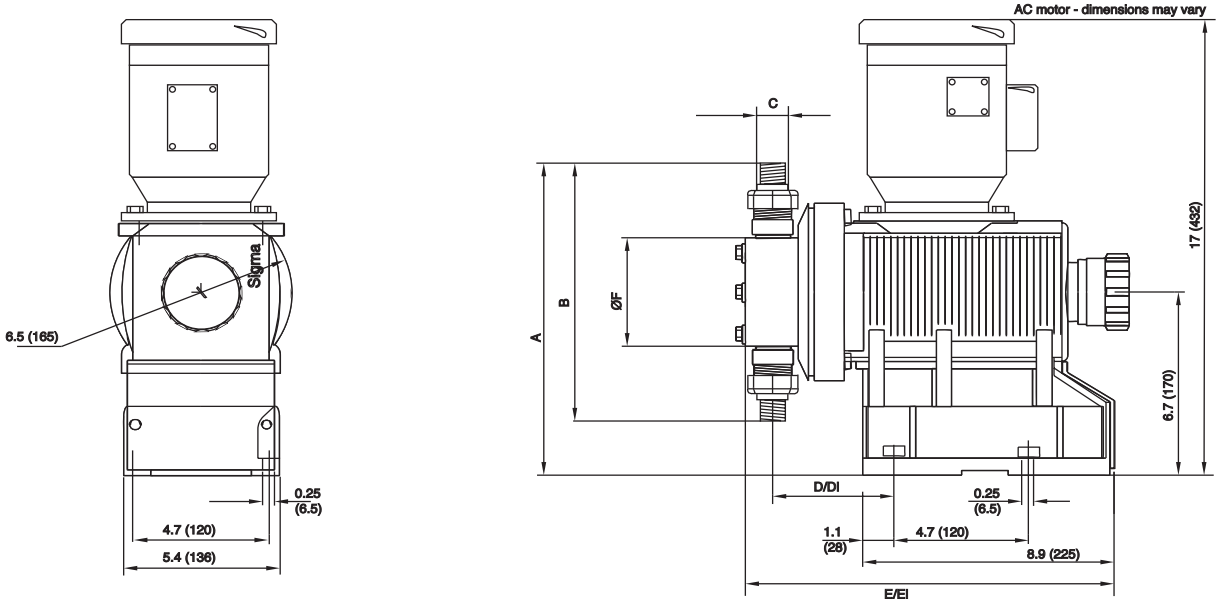
ProMinent® Sigma/ 2
Motor Diaphragm Metering Pumps

Identcode Ordering System (S2Ca)

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

ProMinent® Sigma/ 2
Motor Diaphragm Metering Pumps

Dimensional Drawing: (S2Ba)



Dimensions in inches (mm)

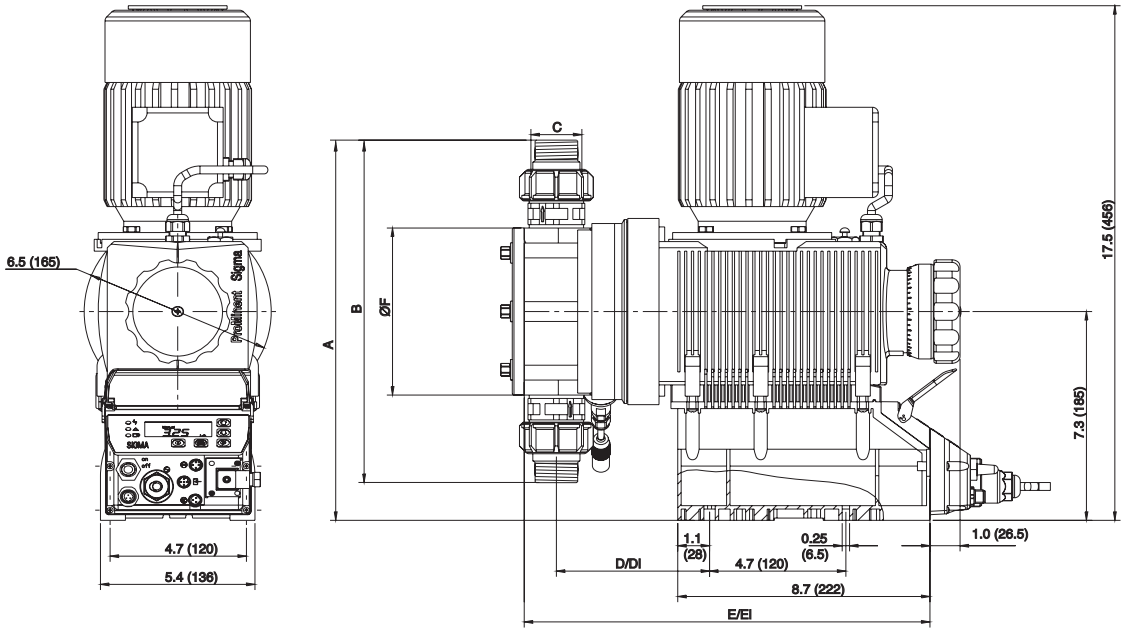
Type Sigma/ 2	A	B	Suction/ Discharge Valve Thread C*	D	D1**	E	E1**	ØF
16050, 16090, 16130								
PVT	10.1 (257)	6.95 (177)	DN 15	4.1 (104)	4.9 (124)	13.0 (329)	13.7 (349)	4.0 (101)
SST	10.9 (276)	8.2 (208)	DN 15	4.1 (104)	4.9 (124)	13.0 (329)	13.7 (349)	4.0 (101)
07120, 07220								
PVT	13.3 (337)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

* Piping adapters provided according to technical data.

** Dimensions with diaphragm failure detector.

ProMinent® Sigma/ 2 Motor Diaphragm Metering Pumps

Dimensional Drawing: (S2Ca)



Dimensions in inches (mm)

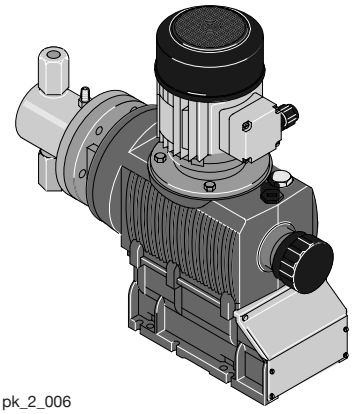
Type Sigma/2	A	B	Suction/ Discharge Valve Thread C*	D	D1**	E	E1**	ØF
16050, 16090, 16130								
PVT	10.6 (272)	6.95 (177)	DN 15	4.1 (104)	4.9 (124)	12.8 (326)	13.6 (346)	4.0 (101)
SST	10.4 (288)	8.2 (208)	DN 15	4.1 (104)	4.9 (124)	12.8 (326)	13.6 (346)	4.0 (101)
07120, 07220								
PVT	13.9 (352)	13.1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

* Piping adapters provided according to technical data.

** Dimensions with diaphragm failure detector

ProMinent® Sigma/ 2 HK Plunger Metering Pumps

Overview: Sigma/2 HK



pk_2_006

Ideal for high pressure applications requiring significant turndown

The ProMinent® Sigma/ 2 HK is a motor 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.

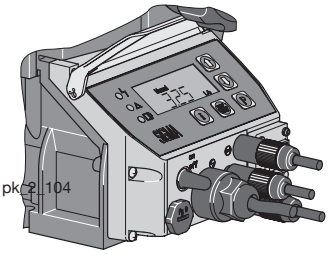
For safety reasons, all motor-driven metering pumps must be equipped with adequate protection against electrical overload.

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)



pk_2_104

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

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

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

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

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

(see page 134)

pk_2_103

ProMinent® Sigma/ 2 HK Plunger Metering Pumps

Specifications

General:

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

ProMinent® Sigma/ 2 HK Plunger Metering Pumps

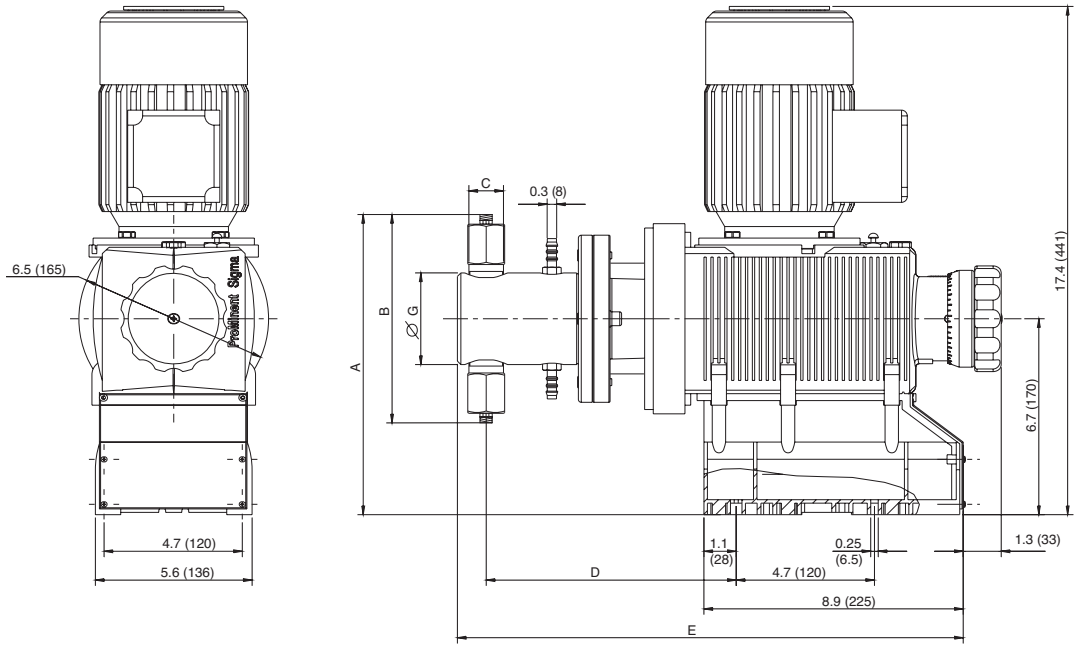
Identcode Ordering System (S2Ca HK)

Sigma/2 Control (HK)

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

ProMinent® Sigma/ 2 HK Plunger Metering Pumps

Dimensional Drawing: (S2Ba HK)



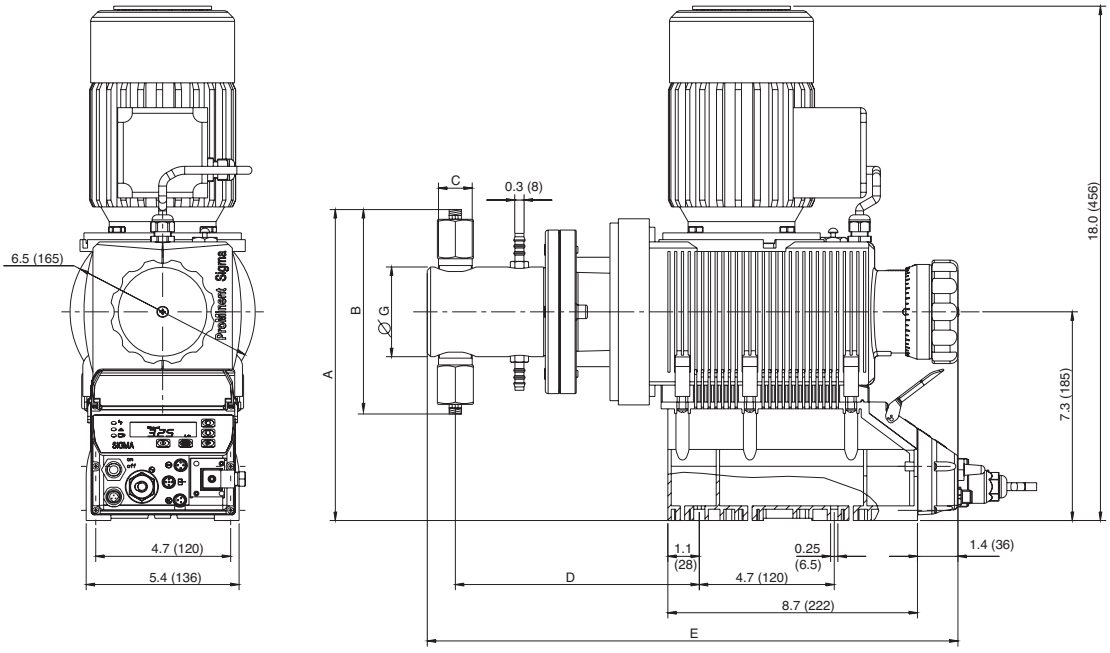
The S2Ba HK models offer other motors, and height dimensions may vary.

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)



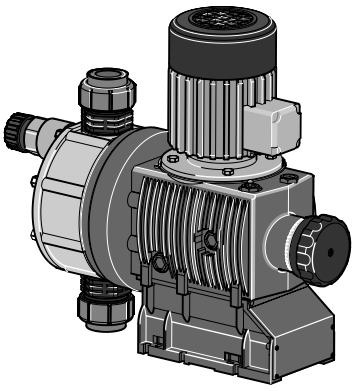
The S2Ba HK models offer other motors, and height dimensions may vary.

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



pk_2_071

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

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

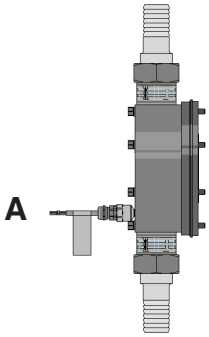
The ProMinent® Sigma/ 3 is a mechanically actuated diaphragm metering pump. It has a capacity range of 46-264 gph (174-1000 l/h) at a maximum back pressure of 58-174 psi (4-12 bar). The pump capacity is adjusted by varying the stroke length (5 mm) in .05% increments via a self-locking adjusting knob.

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

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

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

All PVDF versions are NSF/ANSI 61 approved.



Diaphragm Failure Indication (A)

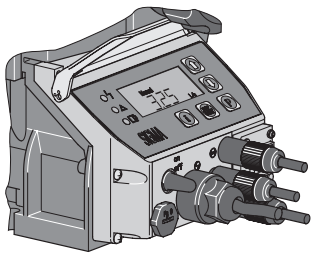
The delivery unit has a patented multilayer safety diaphragm as standard and a visual diaphragm rupture indicator. The diaphragm is coated with PTFE film on both sides, from the drive and working side. This guarantees that no discharge to the outside occur if the diaphragm ruptures. When the diaphragm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

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

Sigma/ 3 Basic Type (S3Ba)

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

Sigma/ 3 Control Type (S3Ca)



pk_2_104

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

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

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

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

PROFI® PROCESS FIELD BUS BUS Central or decentral adjustmentis possible with PROFIBUS® and/or an integrated process timer.

(see page 134)

pk_2_003

ProMinent® Sigma/ 3
Motor Diaphragm Metering Pumps

Specifications

General:

Maximum stroke length:	0.236" (6.0 mm)
Power cord:	6 foot (2 m) 2 wire + ground (supplied on control version)
Stroke frequency control:	S3Ba: Constant speed or optional DC/SCR drive or AC inverter S3Ca: Microprocessor control version with innovative start/stop and variable speed control proportional to set frequency or external control signal.
Stroke counting:	Standard on S3Ca
Materials of construction	
Inner casing:	Cast aluminum
Housing:	Glass-filled Luranyl™ (PPE)

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

Drive:	Cam and spring-follower (lost motion)
Lubrication:	Oil lubricated
Recommended oil:	ISO VG 460, such as Mobil Gear Oil 634s
Oil quantity:	Approximately 0.95 quart (900 mL)
Recommended oil change interval:	5,000 hours
Warranty:	Two years on drive, one year on liquid end.
Factory testing:	**Each pump is tested for rated flow at maximum pressure.**
Industry Standard:	CE approved, CSA available (standard in Canada), NSF/ANSI 61
Diaphragm materials:	PTFE faced EPDM with Nylon reinforcement and steel core
Liquid end options:	Polyvinylidene Fluoride (PVDF) or 316 SS with PTFE
Check valves:	DN 25 valves - Single ball check, PVDF and SS versions. Optional springs available (Hastelloy C4) DN 32 valves - Plate valves, with Hastelloy C4 plates and springs in both PVDF and SS valves.
Repeatability:	When used according to the operating instructions, better than ±2%

Certified to NSF/ANSI 61

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

Diaphragm failure indication:	Visual indicator is mandatory. The delivery unit has a patented multilayer safety diaphragm as standard and a visual diaphragm rupture indicator.
Separation of drive from liquid end:	An air gap with secondary safety diaphragm separates the drive from the liquid end to prevent cross contamination of oil and process fluid (with or without optional diaphragm failure indication).
Max. solids size in fluid:	0.3 mm
Stroke length adjustment:	Manual, in increments of 0.5%. Motorized stroke length adjustment available.

ProMinent® Sigma/ 3
Motor Diaphragm Metering Pumps

Specifications

Basic Version

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

Control Version

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; 0.37 kW (0.5 HP) 230 3 phase (1.9 A)
Thermal overload protection:	Thermal cutout switches off at 284˚F (140˚C).
Relay cable (optional):	6 foot (2 m) 3 wire (SPDT) 250 VAC, 2 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:	max. 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
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:	115 VAC or 230 VAC single phase

ProMinent® Sigma/ 3 Motor Diaphragm Metering Pumps

Capacity Data

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

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

Universal control cable necessary for external Sigma control. (see *page 134*)

Materials In Contact With Chemical

Material	Suction/discharge connector Liquid end	Seals	DN 25 Valve balls	Valve seats	Seals	DN 32 Valve Plate/ Spring	Valve seats
PVT	PVDF (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)

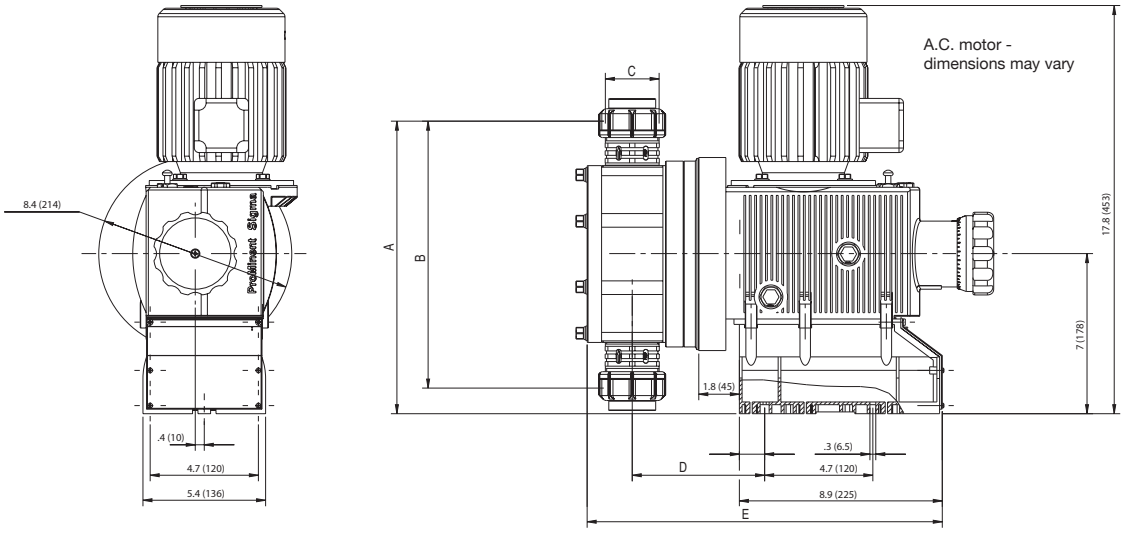
S3Ba	Drive Type											
	H	Main Drive, Diaphragm										
		Version: Capacity:										
		120145	46 gph, 145 psi, 174 l/h, 10 bar					070410	130 gph, 100 psi, 492 l/h, 7 bar			
		120190	60.2 gph, 145 psi, 228 l/h, 10 bar					070580	184 gph, 100 psi, 696 l/h, 7 bar			
		120270	85.6 gph, 145 psi,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

ProMinent® Sigma/ 3
Motor Diaphragm Metering Pumps

Identcode Ordering System (S3Ca)

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

Dimensional Drawing: (S3Ba)



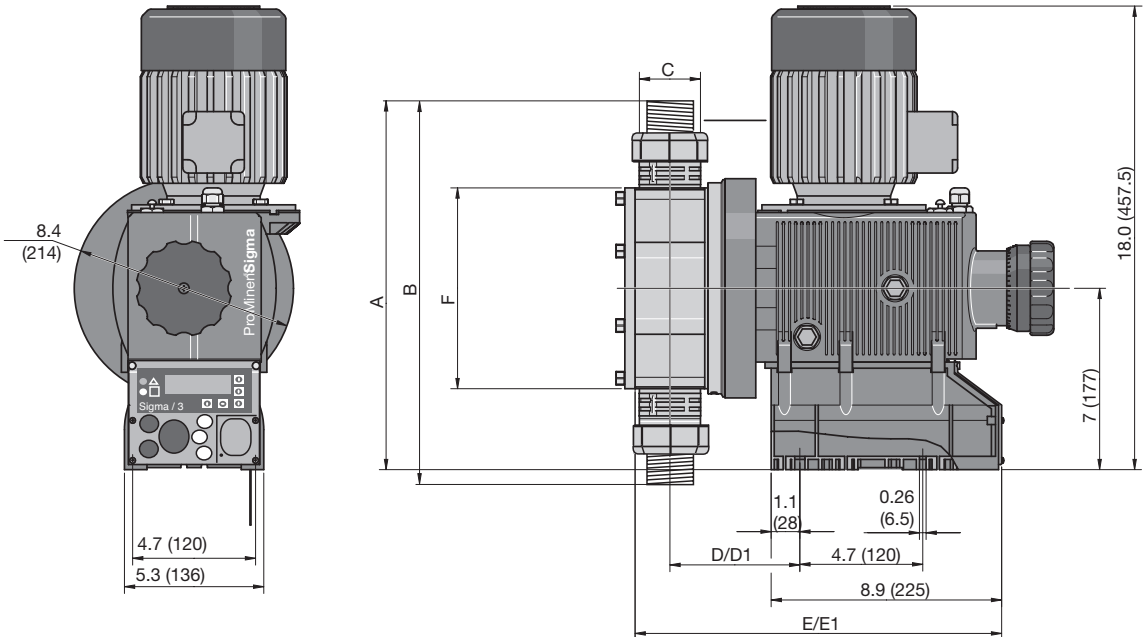
Dimensions in inches (mm)

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

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

ProMinent® Sigma/ 3
Motor Diaphragm Metering Pumps

Dimensional Drawing: (S3Ca)



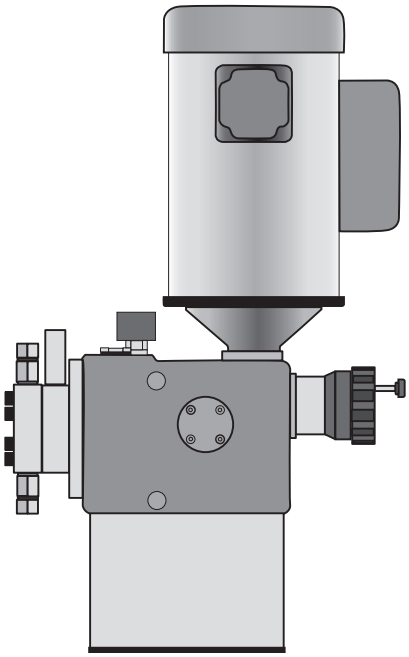
Dimensions in inches (mm)

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

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

ProMinent® ProMus
Hydraulic Diaphragm Metering Pumps

Overview: ProMus



High pressure chemical process metering

(see page 131 for spare parts)

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

ProMus Design Specifications

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

ProMus Benefits

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

ProMinent® ProMus
Hydraulic Diaphragm Metering Pumps

Specifications

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

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

ProMinent® ProMus
Hydraulic Diaphragm Metering Pumps

Capacity Data

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

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

Materials In Contact With Chemicals

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

ProMinent® ProMus
Hydraulic Diaphragm Metering Pumps

Identcode Ordering System ProMus

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

ProMinent® ProMus
Hydraulic Diaphragm Metering Pumps

Data required to size ProMus Pump:

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

Desired capacity min./max.	GPH (l/h)_____
Available power supply	_____V, _____Hz, _____ phase
Working temperature min./max.	°F (°C) _____
Description of process fluid	_____
Concentration %	_____
Solids content %	_____
Absolute viscosity, cP	_____
Vapor pressure at working temperature	psig (bar) _____
Remarks (e.g. abrasive, developing	_____
gases and fumes, flammable, corrosive)	_____

Suction conditions:

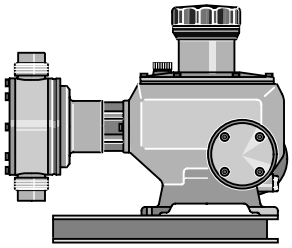
Suction lift min./max., or	ft. (m) _____
Positive suction head min./max., or	ft. (m)_____
Pressure in chemical tank	psig (bar) _____
Length of suction line	ft. (m) _____
Size (I.D.) of suction line	in. (mm)_____
Number of valves and fittings in suction line	_____

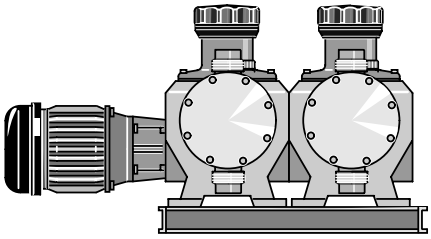
Discharge conditions:

Back-pressure min./max.	psig (bar) _____
Discharge head min./max.	ft. (m) _____
Negative discharge head min./max.	ft. (m) _____
Length of discharge line	ft. (m) _____
Size (I.D.) of discharge line	in. (mm)_____
Number of valves and fittings in discharge line	_____

ProMinent® Makro TZ Diaphragm Metering Pumps

Overview: Makro TZ





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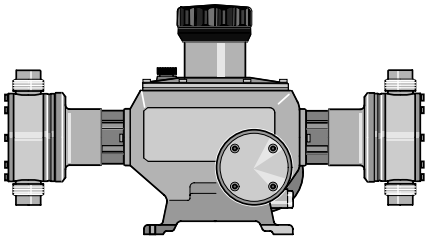

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Ideal for high volume and high pressure applications

(see page 132 for spare parts)

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

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

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.

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
	A Add-on power end
	D Double main drive
	B Double add-on power end

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
2	No ProMinent® logo
A	0 with ProMinent® logo, with frame, simplex
B	0 with ProMinent® logo, with frame, duplex
C	0 with ProMinent® logo, with frame, triplex
M	Modified

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
A	ATEX power end

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

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

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

ProMinent® DulcoFlex Series

Overview: DulcoFlex DFC

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

Feature & Benefits

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

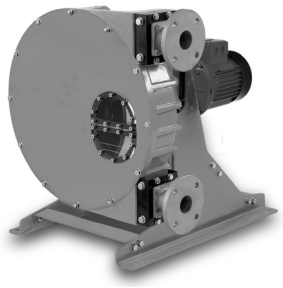
DulcoFlex DFC Capacities

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

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

ProMinent® DulcoFlex Series

Overview: DulcoFlex DFD



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

Feature & Benefits

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

DulcoFlex DFD Capacities

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

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