

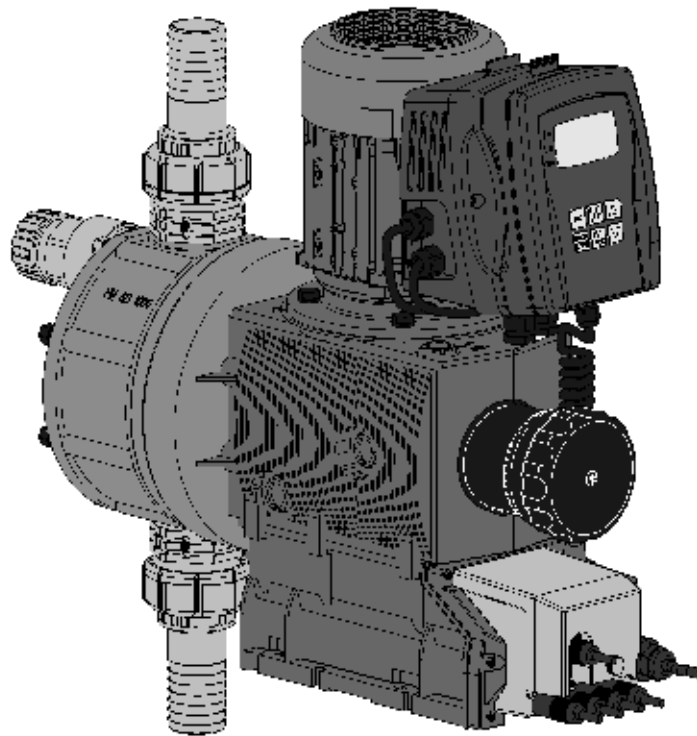
# ProMinent® Sigma/ 3 Motor Diaphragm Metering Pumps

## Overview: Sigma/ 3 (S3Cb)

The Sigma/3 motor diaphragm metering pumps are produced with a high-strength metal inner housing for parts subject to load as well as an additional plastic housing to protect against corrosion. The capacity range extends from 46.0 to 274.7 gph at a maximum backpressure of 174 to 58 psig. Stroke length is 0.24 in.

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

In all motor-driven metering pumps without integrated overload protection, for safety reasons, suitable overload protection must be provided during installation.

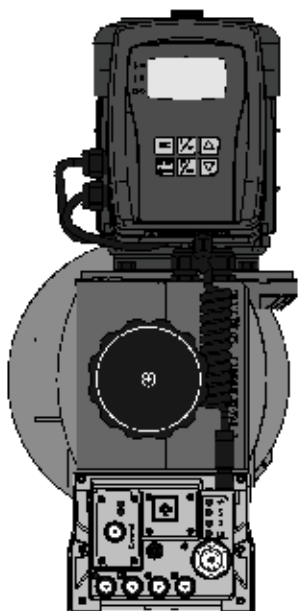


## Sigma/ 3 Basic Type (S3Ba)

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

# ProMinent® Sigma/ 3 Motor Diaphragm Metering Pumps

## Sigma/ 3 control type (S3Cb)



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

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

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

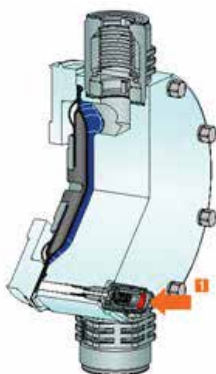
## Detachable operating unit (HMI)



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

The individual functions of the metering pump can be easily selected and adjusted with five program keys. An illuminated LCD display provides information about the relevant operating status. LEDs on the operating unit and the control unit indicate the active pump functions or the pump status.

## Diaphragm rupture warning system



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

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

# ProMinent® Sigma/ 3 Motor Diaphragm Metering Pumps

Sigma/ 3 control type (S3Cb)

## Metering profiles

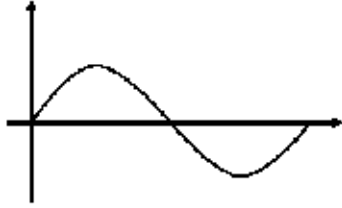


Diagram 1: Discharge stroke, suction stroke equal

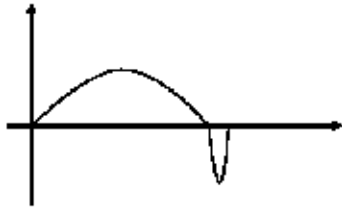


Diagram 2: long discharge stroke, short suction stroke

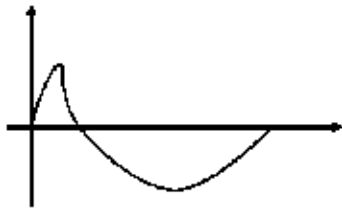


Diagram 3: short discharge stroke, long suction stroke

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

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

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

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

# ProMinent® Sigma/ 3 Motor Diaphragm Metering Pumps

## Specifications (S3Ba and S3Cb)

### General:

Maximum stroke length: 0.236" (6.0 mm)  
 Power cord: 6 foot (2 m) 2 wire + ground (supplied on control version)  
 Stroke frequency control: S3Ba: Constant speed or optional DC/SCR drive or AC inverter  
 S3Cb: Microprocessor control version with innovative start/stop and variable speed control proportional to set frequency or external control signal.

Stroke counting: Standard on S3Cb

#### Materials of construction

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

Wetted materials of construction:

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

Viscosity ranges:

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

\* Only when properly installed & adjusted

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

Drive: Cam and spring-follower (lost motion)

Lubrication: Oil lubricated

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

Oil quantity: Approximately 0.95 quart (900 mL)

Recommended oil change interval: 5,000 hours

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

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

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

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

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

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

Repeatability: When used according to the operating instructions, better than ±2%

Max. fluid operating temperatures:	Material	Constant (Max. Backpressure)	Short Term (15 min. @ max.30 psi)	Minimum temperature
	PVDF	149°F (65°C)	212°F (100°C)	14°F (-10°C)
	316 SS	194°F (90°C)	248°F (120°C)	14°F (-10°C)

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

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

Max. solids size in fluid: 0.3 mm

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



# ProMinent® Sigma/ 3 Motor Diaphragm Metering Pumps

## Specifications (S3Ba and S3Cb) Cont.

### Basic Version

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

### Control Version

<i>Control Function:</i>	At stroke frequencies equal to or greater than 33%, the integral AC variable frequency drive continuously varies the motor speed in a linear response to the incoming signal. At stroke frequencies less than 33%, the motor starts and stops according to a control algorithm to provide the desired stroke frequency. In the start-stop mode the motor speed is constant at approximately 580 RPM.
<i>Enclosure rating:</i>	IP 65
<i>Motor data:</i>	Totally enclosed, fan cooled (IP55); class F insulation; Manufacturer ATB; 0.55 kW (0.75 HP) 230 3 phase (2.5 A, 1710 rpm)
<i>Relay load</i>	
<i>Fault relay only (Option 1):</i>	Contact load: 250 VAC, 8 A, 50/60 Hz Operating life: > 200,000 switch functions
<i>Fault relay with pacing relay (Option 3):</i>	<b>Fault Relay</b> Contact load: 24 V, 100 mA, 50/60 Hz Operating life: > 200,000 switch functions <b>Pacing relay</b> Residual impedance in ON-position ( $R_{DS(on)}$ ): < 8 $\Omega$ Residual current in OFF-position: < 1 $\mu$ A Maximum voltage: 24 VDC Maximum current: < 100 mA (for pacing relay) Switch functions: 750x10 <sup>6</sup> Contact closure: 100 ms (for pacing relay)
<i>Air Humidity</i>	Max. air humidity*: 95% rel. humidity * non-condensing
<i>Fuse:</i>	Internal, 6.3 AT - (1.5 kA)
<i>Analog output signal:</i>	Max. impedance 300 $\Omega$ Isolated 4-20 mA output signal
<i>Bus interface options available:</i>	CANopen, PROFIBUS DP
<i>Relay cable (optional):</i>	6 feet (2 m) 3 wire (SPDT) 250 VAC, 2 A
<i>Pulse contact/remote pause contact:</i>	With voltage-free contact, or semiconductor sink logic control (not source logic) with a residual voltage of <700 mV. The contact load is approximately 0.5 mA at + 5 VDC. (Note: Semiconductor contacts that require >700 mV across a closed contact should not be used.)
<i>Contact input max. pulse frequency:</i>	25 pulses/sec
<i>Contact input impedance:</i>	10 kOhm
<i>Max. pulse memory:</i>	65,535 pulses
<i>Necessary contact duration:</i>	20ms
<i>Analog - current input burden:</i>	Approximately 120 Ohm
<i>Max. allowable input current:</i>	50 mA
<i>Input power requirements:</i>	single phase, 115-230 VAC

# ProMinent® Sigma/ 3 Motor Diaphragm Metering Pumps

## Capacity Data (S3Ba)

### Capacity data: Sigma/ 3 Basic Version

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

## Capacity Data (S3Cb)

### Capacity data: Sigma/ 3 Control Version

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

## Materials In Contact With Chemical

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

# ProMinent® Sigma/ 3 Motor Diaphragm Metering Pumps

## Identcode Ordering System (S3Ba)

### S3Ba Drive Type

H	Main Drive, Diaphragm												
<b>Version: Capacity:</b>													
120145	46.0 gph (174 l/h), 145 psi (10 bar)							070410	130.0 gph (492 l/h), 100 psi (7 bar)				
120190	66.2 gph (251 l/h), 145 psi (10 bar)							070580	183.9 gph (696 l/h), 100 psi (7 bar)				
120270	92.6 gph (350 l/h), 145 psi (10 bar)							040830	264.2 gph (1000 l/h), 58 psi (4 bar)				
<b>Liquid end material:</b>													
PV		PVDF											
SS		316 Stainless Steel											
<b>Seal:</b>													
T		PTFE											
<b>Diaphragm type:</b>													
S		Safety diaphragm w/ visual indicator											
A		Safety diaphragm w/ pump stop fuction											
<b>Liquid end version:</b>													
0		Without valve springs											
1		With 2 valve springs (Hastelloy C4, 1 psig)											
<b>Hydraulic connections:</b>													
7		PVDF clamping nut & insert											
8		SS clamping nut & insert											
<b>Logo:</b>													
0		Standard with logo											
<b>Motor mount:</b>													
2		Without motor, with NEMA 56C flange											
<b>Enclosure rating:</b>													
0		Standard											
<b>Stroke sensor:</b>													
0		Without stroke sensor (Standard)											
2		With Pacing relay (Consult Factory)											
<b>Stroke length adjustment:</b>													
0		Manual (Standard)											
1		with 3P stroke positioning motor, 230 V 50/60 Hz											
2		with 3P stroke positioning motor, 115 V 50/60 Hz											
4		W/ stroke positioning motor 4-20 mA, 230 V 50/60 Hz											
6		W/ stroke positioning motor 4-20 mA, 115 V 50/60 Hz											
S3Ba	H	120145	PV	T	0	0	7	0	2	0	0	0	

# ProMinent® Sigma/ 3 Motor Diaphragm Metering Pumps

## Identcode Ordering System (S3Cb)

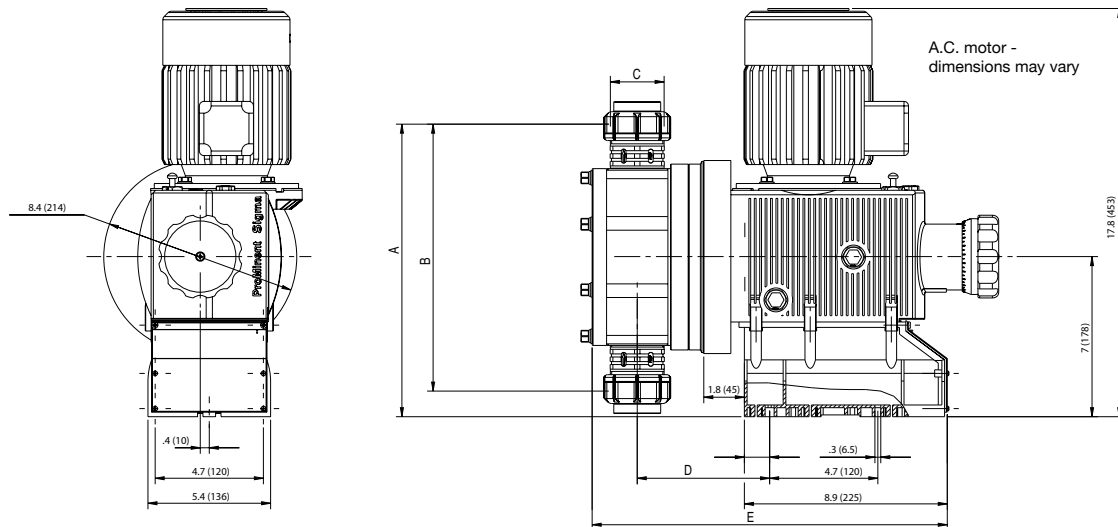
S3Cb	Drive Type																		
	H	Main Drive, Diaphragm																	
		<b>Version: Capacity:</b>																	
		120145	48.1 gph (182 l/h), 145 psi (10 bar)			070410	132.1 gph (500 l/h), 100 psi (7 bar)			<b>Note: For SS versions see capacity data</b>									
		120190	64.2 gph (243 l/h), 145 psi (10 bar)			070580	177 gph (670 l/h), 100 psi (7 bar)												
		120270	96.4 gph (365 l/h), 145 psi (10 bar)			040830	274.7 gph (1040 l/h), 58 psi (4 bar)												
		<b>Liquid end material:</b>																	
		PV	PVDF max. 145 psi (10 bar)																
		SS	Stainless Steel																
		<b>Seal:</b>																	
		T	PVDF with PTFE/Viton® seal																
		<b>Diaphragm type:</b>																	
		S	Multi-layer safety diaphragm w/ visual indicator																
		A	Multi-layer safety diaphragm w/ pump stop function																
		<b>Liquid end version:</b>																	
		0	Without valve springs																
		1	With 2 valve springs (Hastelloy C4, 1 psig)																
		<b>Hydraulic connections:</b>																	
		0	Standard connection																
		7	PVDF clamping nut & insert																
		8	Stainless steel clamping nut & insert																
		<b>Logo:</b>																	
		0	Standard with ProMinent logo																
		<b>Electrical Connection (± 10%):</b>																	
		U	1ph, 115 V - 230 V 50/60Hz																
		<b>Cable and plug:</b>																	
		8	Open end 3m UL/CSA 115/230V																
		D	North American plug, 115 V																
		X	Without cable																
		<b>Relay:</b>																	
		0	Without relay																
		1	Fault annunciating relay																
		3	Option 1 + Pacing Relay																
		8	Option 3 + 4-20 mA output																
		<b>Control variant:</b>																	
		0	Manual + External with pulse control (mult/div)																
		1	Manual + External with pulse control & analog																
		6	*Option 1 + PROFIBUS® (M12 Plug)																
		<b>Over Pressure Shut-off:</b>																	
		0	Without over pressure shut-off																
		<b>Operating unit (HMI):</b>																	
		S	HMI + 1.64' (0.5m) cable																
		1	HMI + 6.5' (2.0 m) cable																
		2	HMI + 16.4' (5.0 m) cable																
		X	Without HMI																
		<b>Access Code:</b>																	
		0	Without access code																
		1	Access code																
		<b>Language:</b>																	
		EN	English																
<b>Approval:</b>																			
		01																CE	
S3Cb	H	120145	PV	T	A	0	7	0	U	D	0	0	0	0	1	0	EN	01	

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



# ProMinent® Sigma/ 3 Motor Diaphragm Metering Pumps

## Dimensional Drawing: (S3Ba)



### Dimensions in inches (mm)

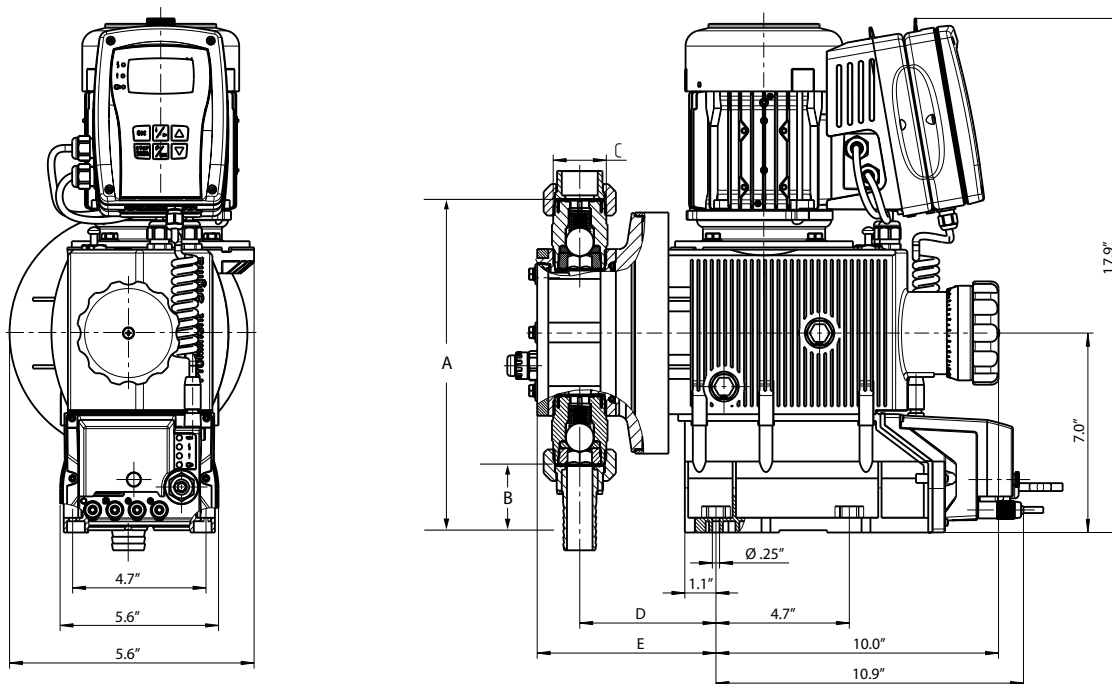
Type Sigma/3	A	B	Suction/ Discharge Valve Thread C*	D	D1**	E	E1**	F
121045, 120190, 120270 PVT	14.1 (358)	14.3 (364)	1" MNPT	4.7 (120)	5.5 (140)	13.6 (346)	14.4 (366)	6.1 (156)
SST	14.1 (358)	14.3 (364)	1" MNPT	4.8 (121)	5.6 (141)	13.7 (349)	14.5 (369)	6.1 (156)
070410, 070580, 040830 PVT	15.9 (403)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

\* Piping adapters provided according to technical data.

\*\* Dimensions with diaphragm failure detector.

# ProMinent® Sigma/ 3 Motor Diaphragm Metering Pumps

Dimensional Drawing: (S3Cb)



## Dimensions in inches (mm)

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

\* Suction/ Discharge valve thread

Piping adapters provided according to technical data