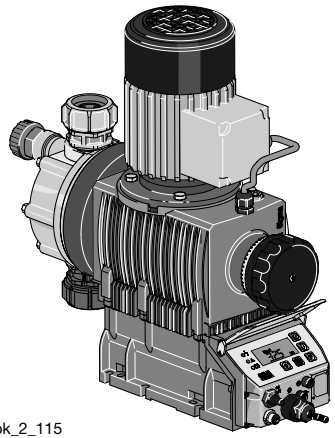
ProMinent® Sigma/ 2
Motor Diaphragm Metering Pumps

Overview: Sigma/ 2



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Ideal for mid-range applications

(see page 133 for spare parts and page 138 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 backpressure of 232-58 psi (16-4 bar). The pump capacity is adjusted by varying the stroke length (5 mm) in 0.5 % steps 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.)

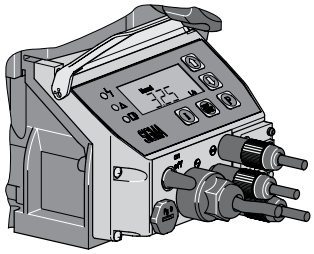
The stable, corrosion resistant metal and plastic housing is rated IP 65. To facilitate adaptation of the pumps to the widest possible range of processing requirements we offer a choice of three gearbox ratios, three liquid end sizes, two liquid end materials and either contact or analogue signal (e.g. 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 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)



ProMinent® Sigma Controller
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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, LEDs function as operation or fault indicators and fault indicator or pacing relays monitor the pump function.

PROFIBUS® Process Field Bus

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

(see page 138)

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, which 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 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 lights. The optional fault relay changes state to issue an alarm or activate a standby pump.
Call for availability.

"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 lights 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 lights. 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 light appears.

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

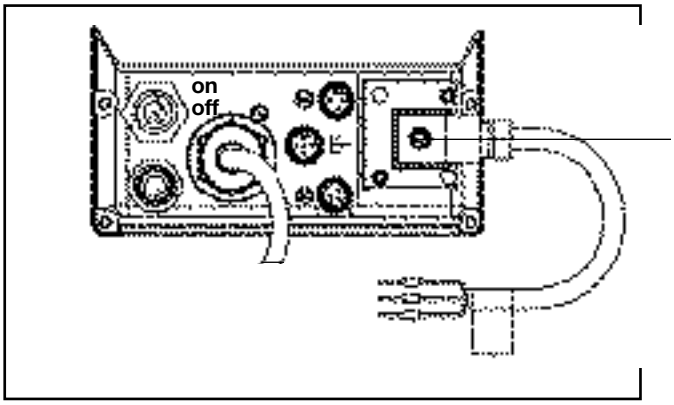
Step-down Factor:
0.25 4 pulses = 1 pump stroke
0.01 100 pulses = 1 pump stroke

"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. Profibus is not field retrofittable.

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 foot (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; ProMinent Part no. 555325

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 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 (Hastelloy C4)

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: Optional, see accessories. Switch is N.C., opens to indicate failure. Switch rated 250 VAC, 0.3 A inductive or 0.5 A resistive; 30 VDC,1.0 A resistive. Requires minimum 21 psig (1.5 bar) backpressure on pump. N.O. switch available upon request. Includes double diaphragm leak prevention.

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.

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 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 (.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 foot (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.)**
12050 PVT	145	(10)	15.9	(60)	87	11.4	23	(7)	44	(3)	15	1/2 MNPT	33	(15)
12050 SST	174	(12)	15.2	(57)	87	11.4	23	(7)	44	(3)	15	1/2 FNPT	44	(20)
12090 PVT	145	(10)	28.5	(108)	156	11.4	23	(7)	44	(3)	15	3/4 MNPT	33	(15)
12090 SST	174	(12)	27	(103)	156	11.4	23	(7)	44	(3)	15	1/2 FNPT	44	(20)
12130 PVT	145	(10)	41	(156)	232	10.9	23	(7)	44	(3)	15	3/4 MNPT	33	(15)
12130 SST	174	(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.)**
12050 PVT	145	(10)	15.9	(60)	90	11.4	23	(7)	44	(3)	15	1/2 MNPT	33	(15)
12050 SST	174	(12)	15.9	(60)	90	11.4	23	(7)	44	(3)	15	1/2 FNPT	44	(20)
12090 PVT	145	(10)	28.5	(108)	160	11.4	23	(7)	44	(3)	15	3/4 MNPT	33	(15)
12090 SST	174	(12)	28.5	(108)	160	11.4	23	(7)	44	(3)	15	1/2 FNPT	44	(20)
12130 PVT	145	(10)	34.3	(130)	200	10.9	23	(7)	44	(3)	15	3/4 MNPT	33	(15)
12130 SST	174	(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: Universal control cable necessary for external Sigma control. (see *page 138*)

Materials In Contact With Chemicals

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

*for 07120, 07220, 04350

ProMinent® Sigma/ 2
Motor Diaphragm Metering Pumps

Identcode Ordering System (S2Ba)

S2Ba **Sigma/2 Basic Version a**

HM — Main Drive, Diaphragm

Pump version:

12050*
12090*
12130*
07120
07220
04350

* For PVDF versions, max. 145 psig (10 bar)

Liquid end material:

PV	PVDF
SS	316 Stainless steel

Seal material:

T	PTFE

Diaphragm type:

0	Standard diaphragm
1	With double diaphragm and failure detector (NC contact opens on fault)

Liquid end version:

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

Connectors:

7	PVDF clamping nut & insert
8	SS clamping nut & insert

Labeling:

0	Standard with logo

Motor mount:

2	Without motor, with NEMA 56C flange

Enclosure rating:

0	Standard

Stroke sensor:

0	Without stroke sensor (Standard)
2	With Pacing relay (Consult Factory)

Stroke length adjustment:

0	Manual (Standard)
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	120130	PV	T	0	0	7	0	2	0	0	0

ProMinent® Sigma/ 2 Motor Diaphragm Metering Pumps

Identcode Ordering System (S2Ca)

S2Ca **Sigma/2 Control Version a**

Main drive
HM Main drive/Diaphragm

Pump version:

12050*	07120
12090*	07220
12130* **	04350**

* For PVDF versions, max. 145 psig (10 bar)
** Max. 200 strokes per minute

Liquid end materials:
PVT PVDF with PTFE
SST 316 Stainless steel with PTFE

Diaphragm type:
0 Standard diaphragm, PTFE
1 With double diaphragm and failure detector (NC contact opens on fault)
2 With double diaphragm and failure detector (alarm & continues to operate)

Liquid end version:
0 Without valve springs
1 With 2 valve springs (Hastelloy C4, 1.45 psig)

Connectors:
7 PVDF clamping nut & insert
8 SS clamping nut & insert

Labeling:
0 Standard with logo

Voltage supply:
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 Without 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 variants:
0 Manual + External with pulse control (multiplier/divider)
1 Manual + External with pulse control & 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

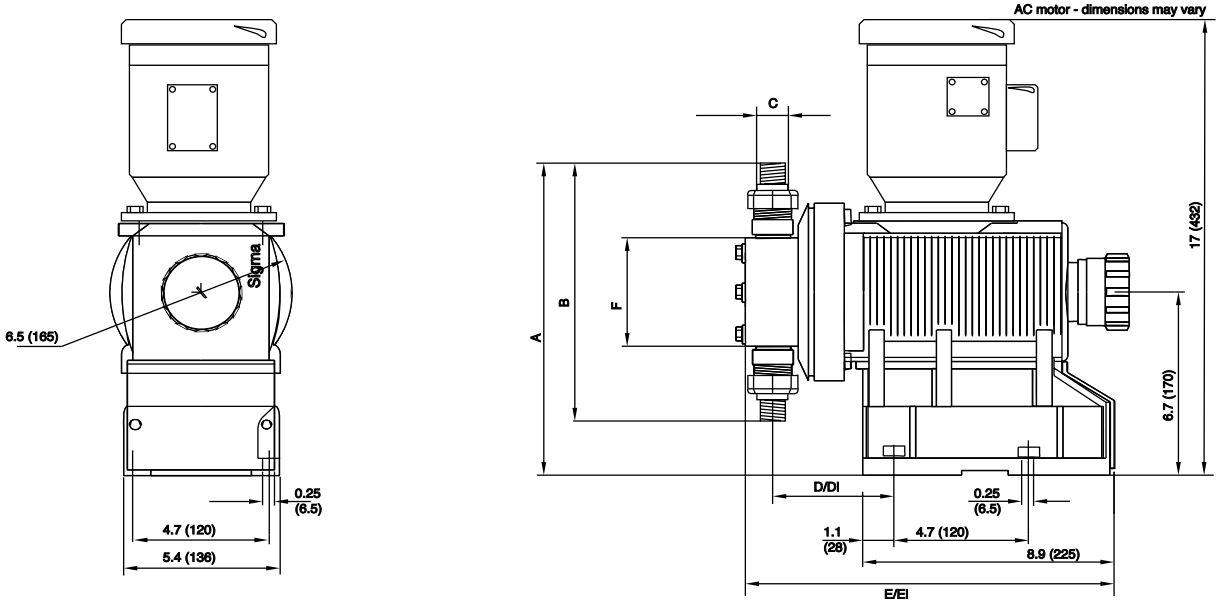
Flow monitor:
0 Input for metering monitor signal (pulse)
1 Input for maintained flow switch signal

Stroke length adjustment:
C Manual + Calibration

S2Ca	H	07120	PVT	0	0	7	0	U	D	0	0	0	0	C

ProMinent® Sigma/ 2
Motor Diaphragm Metering Pumps

Dimensional Drawing: (S2Ba)



Dimensions in inches (mm)

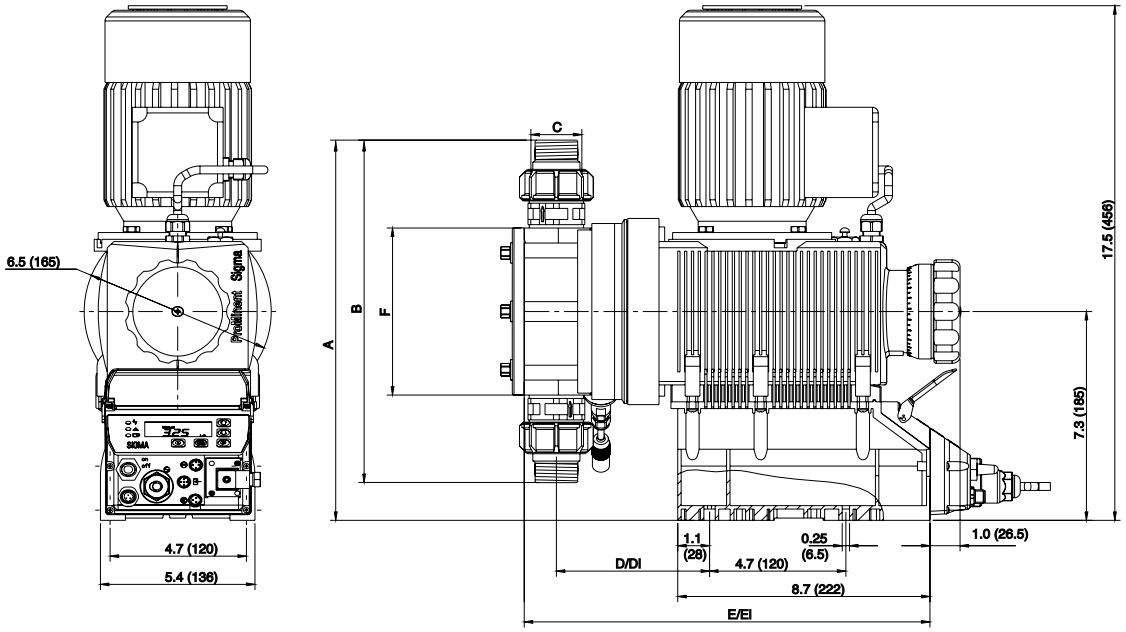
Type Sigma/2	A	B	Suction/ Discharge Valve Thread C*	D	D1**	E	E1**	F
12050, 12090, 12130								
PVT	10.1 (257)	6.95 (177)	DN 15	4.1 (104)	4.9 (124)	13.0 (329)	13.7 (349)	4.0 (101)
SST	10.9 (276)	8.2 (208)	DN 15	4.1 (104)	4.9 (124)	13.0 (329)	13.7 (349)	4.0 (101)
07120, 07220,								
PVT	13.3 (337)	13.1 (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)

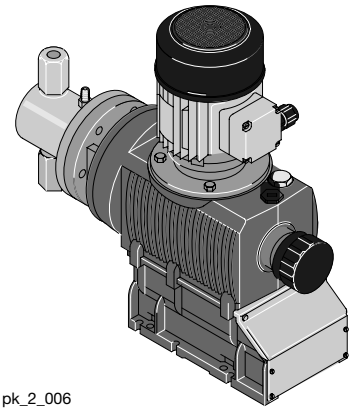
Type Sigma/2	A	B	Suction/ Discharge Valve Thread C*	D	D1**	E	E1**	F
12050, 12090, 12130								
PVT	10.6 (272)	6.95 (177)	DN 15	4.1 (104)	4.9 (124)	12.8 (326)	13.6 (346)	4.0 (101)
SST	10.4 (288)	8.2 (208)	DN 15	4.1 (104)	4.9 (124)	12.8 (326)	13.6 (346)	4.0 (101)
07120, 07220,								
PVT	13.9 (352)	13.1 (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 motor driven plunger metering pump has a high strength metal-lined housing for those components subject to load, and an additional plastic housing to protect against corrosion. It has a capacity range of 0.6- 20.1 gph (2.3-76 l/h) at a max. backpressure of 174-4640 psi (12-320 bar). The pump capacity is adjusted by varying the stroke length 0.6 in (15 mm) in 0.2 % steps via a self locking rotary knob.
The reproducible metering accuracy is better than ±1 % providing installation has been correctly carried out, and in the stroke length range of 30 -100 %. (Follow instructions given in operating instructions manual.)

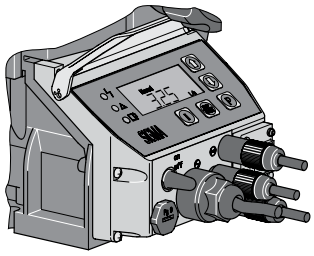
The rugged, corrosion resistant metal and plastic housing is combined with a choice of three gearbox ratios and four 316 stainless steel liquid end sizes. To facilitate adaptation of the pumps to the widest possible range of processing requirements the S2Ca Sigma controller offers either contact or analogue signal (e.g. 0/4-20 mA) control options.

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® 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 HK Control Type (S2Ca)



pk_2_104

The ProMinent® Sigma/ 2 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.

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 foot (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:

	PVDF	**316 SS**
Liquid End:		
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; ProMinent Part no. 555325
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 HM:

Diaphragm materials:	PTFE faced EPDM with Nylon reinforcement and steel core
Liquid end options:	Polyvinylidene Fluoride (PVDF) or 316 SS with PTFE
Check valves:	Single ball check, PVDF and SS versions. Optional springs available (Hastelloy C4)
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:	Optional, see accessories. Switch is N.C., opens to indicate failure. Switch rated 250 VAC, 0.3 A inductive or 0.5 A resistive; 30 VDC,1.0 A resistive. Requires minimum 21 psig (1.5 bar) backpressure on pump. N.O. switch available upon request. Includes double diaphragm leak prevention.
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.

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 optional.

ProMinent® Sigma/ 2 HK Plunger 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 (.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 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:	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 foot (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 Sigma/2B HK	psig	(bar)	U.S. GPH	(L/h)	Stroke/ min.	mL/ stroke	ft.	(m)	psig	(bar)	in. FNPT (G)	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 Sigma/2C HK	psig	(bar)	U.S. GPH	(L/h)	Stroke/ min.	mL/ stroke	ft.	(m)	psig	(bar)	in. FNPT (G)	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: Universal control cable necessary for external Sigma control. (see *page 138*)

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 **Sigma Basic Version a**

HK — Main drive/Plunger

Pump version:

32002	04522
14006	02541
07012	10006
04022	05016
23004	02534
10011	01264

Liquid end material:
SS — 316 Stainless steel

Seal material:
T — PTFE seal

Plunger assembly:
4 — Plunger (Ceramic)

Liquid end version:
0 — Without valve springs (Standard)
1 — With 2 valve springs (Hastelloy C4, 1 psig)

Connectors:
0 — Standard (In accordance with technical data)

Labeling:
0 — Standard with logo

Motor mount:
2 — Without motor, with NEMA 56C flange

Enclosure rating:
0 — Standard

Stroke sensor:
0 — Without stroke sensor (Standard)
1 — With Pacing relay (consult factory)

Stroke length adjustment:
0 — Manual
5 — W/ stroke positioning motor 0 - 20 mA, 115 V, 50/60 Hz
6 — W/ stroke positioning motor 4 - 20 mA, 115 V, 50/60 Hz

SIBa	**HK**	**14006**	**SS**	**T**	**4**	**1**	**0**	**0**	**2**	**0**	**0**	**0**

ProMinent® Sigma/ 2 HK Plunger Metering Pumps

Identcode Ordering System (S2Ca HK)

S2Ca **Sigma Control Version a**

HK — Main drive/ Plunger

Pump version:

32002	04522
14006	02541
07012	10006
04022	05016
23004	02534
10011	01264

Liquid end material:
SS — 316 Stainless steel

Seal material:
T — PTFE seal

Plunger:
4 — Plunger (Ceramic)

Liquid end version:
0 — Without valve springs (Standard)
1 — With 2 valve springs (Hastelloy C4, 1 psig)

Connectors:
0 — Standard (In accordance with technical data)

Labeling:
0 — Standard with logo

Voltage supply:
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 — Without relay
1 — Fault annunciating relay, drops out
3 — Fault annunciating relay, pulls in
4 — Option 1 + pacing relay
5 — Option 3 + pacing relay

Control variants:
0 — Manual + External with pulse control (multiplier/divider)
1 — Manual + External with pulse control & 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

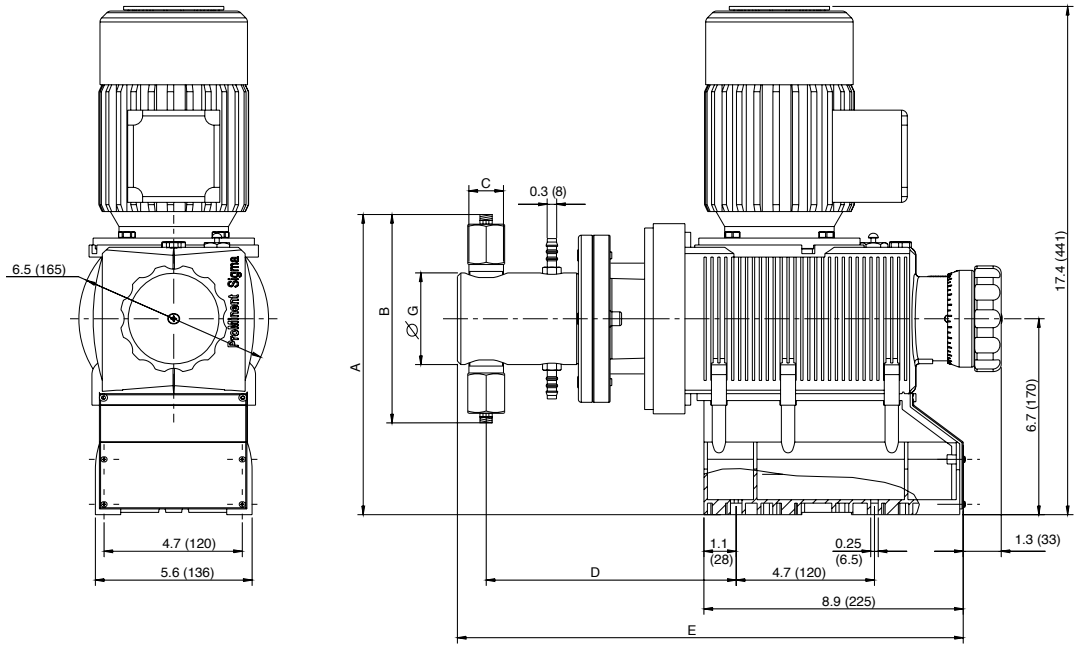
Flow monitor:
0 — Input for metering monitor signal (pulse)
1 — Input for maintained flow switch signal

Stroke length adjustment:
C — Manual + Calibration

S2Ca	HK	14006	SS	T	4	0	0	0	U	D	0	0	0	0	C

ProMinent® Sigma/ 2 HK Plunger Metering Pumps

Dimensional Drawing: (S2Ba HK)



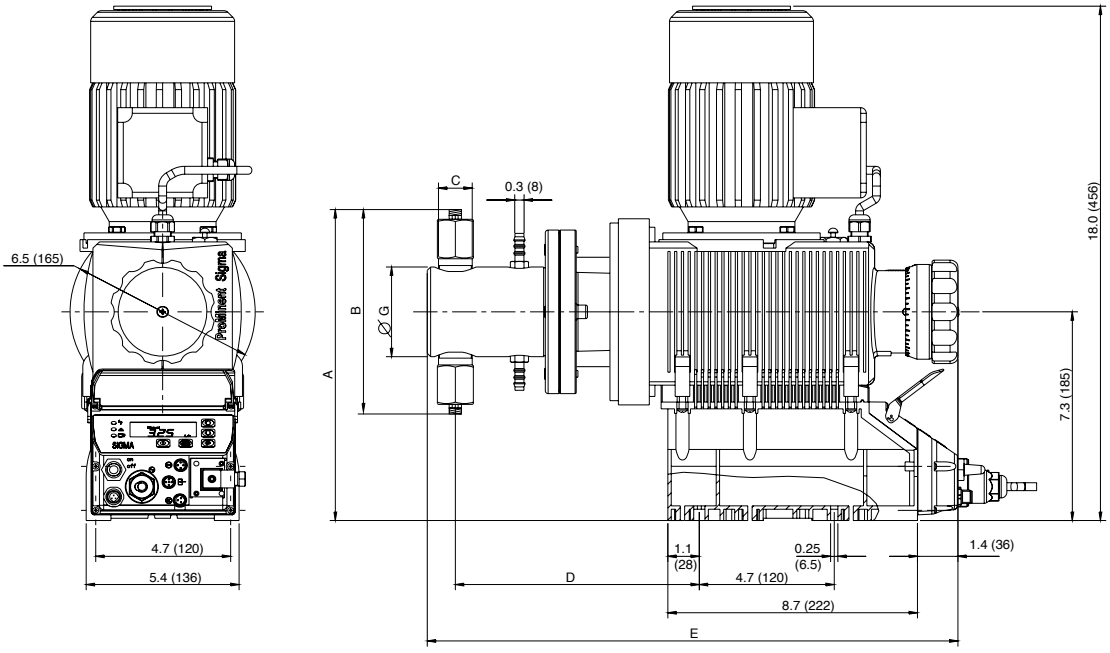
The S2Ba HK models offer other motors, and height dimensions may vary.

Dimensions in inches (mm)

Model	Connector	A	B	C	D	E	G
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)



Dimensions in inches (mm)

Model	Connector	A	B	C	D	E	G
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)