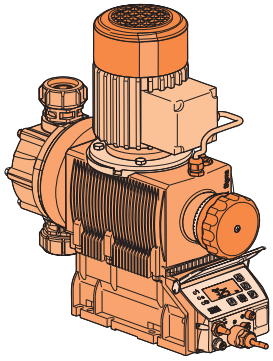
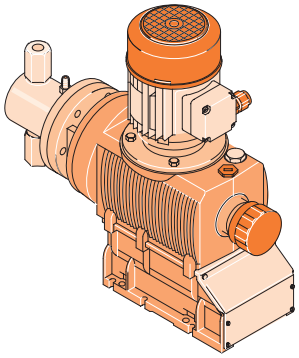
ProMinent® Sigma/2 Motor-Driven Metering Pumps

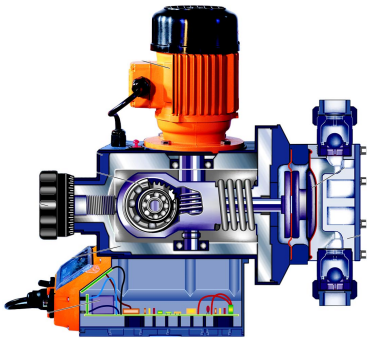


Diaphragm Type Control Version (S2Ca HM)



Packed-Plunger Type Basic Version (S2Ba HK) (with motor)

Sigma/2 Metering Pumps



The ProMinent Sigma/2 series is a motor driven metering pump with a mechanically actuated diaphragm-type liquid end (Sigma HM) or a packed plunger-type liquid end (Sigma HK). It is constructed of a rugged metal inner casing for components subjected to mechanical stress, and a corrosion resistant plastic outer housing. The standard materials for the liquid end are PVDF or 316 stainless steel, both with PTFE seals.

Sigma/2 HM pumps are designed with a convex DEVELOPAN diaphragm which seals to a concave curve in the liquid end. This allows for precise metering of media with various viscosities and reduces stress for long diaphragm life. Three gear ratios and two liquid end sizes provide maximum capacities ranging from 15.2 to 111 gph (57 to 420 L/h) (basic) and 15.2 to 92.5 gph (57 to 350 L/h) (control) at maximum backpressures of 174 to 58 psig (12 to 4 bar). The capacity can be infinitely varied in steps of 0.5% by adjustment of the self-locking stroke length adjusting knob or via an optional stroke positioning motor. Maximum stroke length is 0.19 (5mm). Under defined conditions and with correct installation, the repeatability is better than ± 2% in the stroke length range of between 30 - 100%.

Sigma/2 HK pumps offer three gear ratios and four liquid end sizes for maximum capacities ranging from 0.6 to 20.1 gph (2.3 to 76 L/h) (basic) or 0.6 to 17.2 gph (2.3 to 65.2 L/h) (control) at maximum backpressures of 4640 to 174 psig (320 to 12 bar). The capacity can be infinitely varied in steps of 0.2% by adjustment of the self-locking stroke length adjusting knob or via an optional stroke positioning motor. Maximum stroke length is 0.6 (15mm). Under defined conditions and with correct installation, the repeatability is better than ± 1% in the stroke length range of between 30 - 100%.

Control Versions

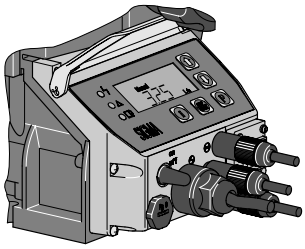
Basic type

The Sigma/2 basic version (S2Ba) does not include internal electronics or a motor. Any NEMA 56 C 1750 RPM motor can be supplied including explosion-proof or inverter duty AC motors. The Sigma/2 uses a 1/3 HP DC single or 3-phase AC motor.

The pump may be operated manually by adjusting the stroke length knob (displacement per stroke). Automatic control of displacement per stroke via a 4-20 mA analog or 3P signal is possible with an optional servomotor. Control of stroke frequency via analog signal is possible with variable speed drives (DC/SCR or AC inverter).

Control type

The Sigma/2 microprocessor controlled metering pump (S2Ca) is supplied with an integral TEFC motor. Pump settings are programmable and viewed on an illuminated LCD. Functions include stroke frequency, batch delivery and external control by pulse or analog signal.



pk-2-104

CE Approved

CSA Available (standard in Canada)

The Sigma/2 control version features information displays for flow rate (in gph or l/h) and totalized flow (gallons or litres); accumulative stroke count with clear/reset capabilities; and stroke length adjustment displayed in increments of 1%. Three LED lights indicate operating status. Options include a programmable access code, flow monitoring, fault and pacing relays, calibration, timer and 4-20 mA output.

ProMinent®

Technical Data: Sigma/2 HM Diaphragm Pumps

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)

Wetted Materials of Contruction

Material Code	Liquid end	Suction/Discharge Connectors	Seals**	Balls
PVT	PVDF (Polyvinylidene fluoride)	PVDF (Polyvinylidene fluoride)	PTFE/ Viton®	Alumina Ceramic/glass*
SST	316 Stainless steel	316 Stainless steel	PTFE/ Viton®	SS

Note: * For versions 07120, 07220, 04350
** EPDM/Viton® also available

Technical Data: Sigma/2 HK Plunger Pumps

ProMinent®

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

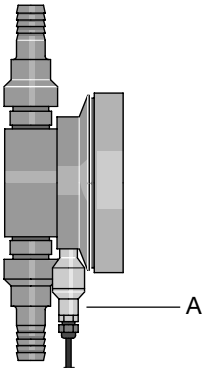
Technical data:	60 Hz operation Capacity at Maximum Pressure				Max. Stroke Rate	Output per Stroke	Max. Suction Lift (water)		Max. Suction Pressure		Suction/ Discharge Connector	Shipping Weight w/Motor	
Pump Version Sigma/2C HK	psig	(bar)	U.S. GPH	(L/h)	Stroke/ min.	mL/ stroke	ft.	(m)	psig	(bar)	in. 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)

Wetted Materials of Construction

Material Code	Liquid End	Suction/Discharge Connectors	Seals	Valve Balls	Ball Seat
SST	316 Stainless steel	316 Stainless steel	PTFE	Ceramic	SS

Technical Data: Sigma/2 HM Diaphragm Pumps

Diaphragm Failure Indicators



Note: All diaphragm-type motor-driven metering pumps should be installed with a pressure relief valve on the discharge line. See the High-Flow Accessories section of the catalog for pressure relief valves.

Diaphragm Failure Monitor (A)

As an option, the liquid end can be equipped with diaphragm failure monitor. This consists of a PVDF spacer with leak detector positioned between the primary (fluid side) diaphragm and a hermetically sealed backer diaphragm. A normally closed diaphragm-isolated pressure switch (A) opens upon the increase of pressure resulting from main diaphragm failure, based on minimum backpressure of 21 psig (1.5 bar). This offers the distinct advantage that the metered fluid cannot flow uncontrolled out of the pump. The diaphragm failure is signalled on an LCD display and the pump is stopped on S2Ca models, and triggers the optional fault indicating relay. A contact is opened on S2Ba HM models to allow fault annunciation or to stop the pump.

Diaphragm Failure Kits

For conversion of a standard Sigma pump to one with diaphragm failure indication. Includes safety diaphragm, backplate, secondary containment diaphragm and hub, leak detection spacer, leak detection pressure switch assembly, diaphragm, pump head bolts.

130	S2Ba (version 12050 - 12130)	792767
130	S2Ca (version 12050 - 12130)	740332
350	S2Ba (version 07120 - 04350)	792768
350	S2Ca (version 07120 - 04350)	740333

Specifications: Sigma/2

ProMinent®

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:* *Housing:*	 Cast aluminum 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:	Glass	SS
Pressure Relief Valves:	PVDF/Viton® O-rings	SS/Viton® O-rings

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 faced Viton® 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.

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Specifications cont.

Sigma/2 Basic Version

Motor mounting flange:	Fits all NEMA 56C frame motors (motor not included with pump)
Gear ratios and stroke frequencies (with 1725 RPM motor):	20:1 = 87 SPM, 11:1 = 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

Data required to size metering pumps and accessories

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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 selection.

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	_____

System sketch

Identity code: Basic Version Sigma/2 HM (S2Ba)

Series:
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/Viton® seal
Viton® is a registered trademark of DuPont Dow Elastomers

Diaphragm type:
0 Standard diaphragm
1 With double diaphragm and failure monitor (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)
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	120130	PV	T	0	0	7	0	2	0	0	0

Identity code: Basic Version Sigma/2 HK (S2Ba)

Series:
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

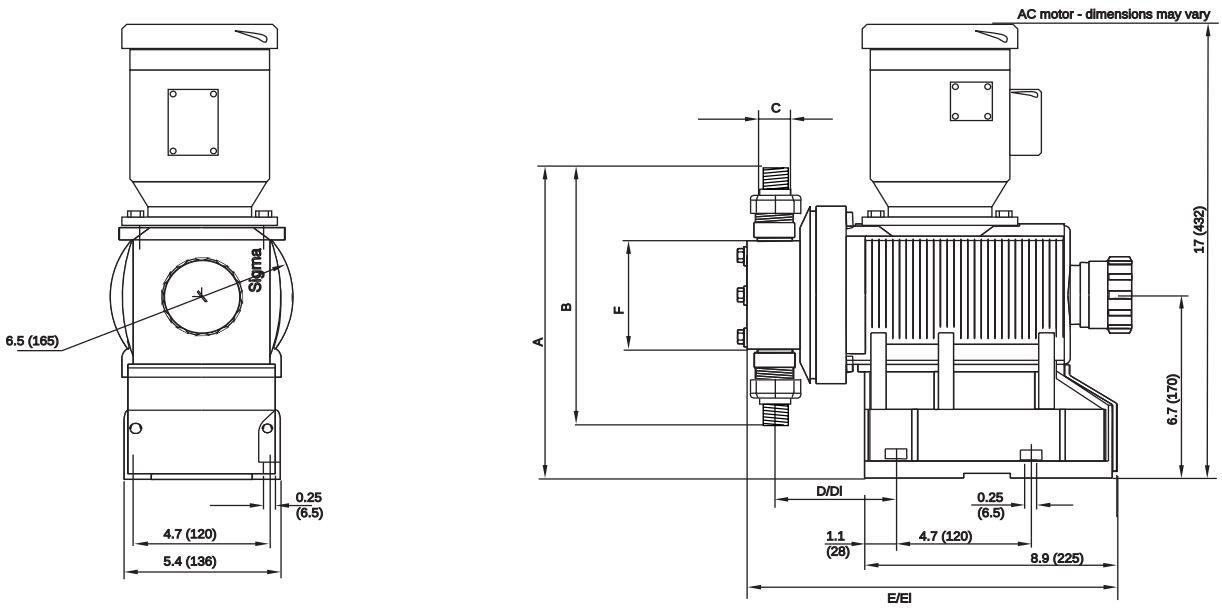
Enclosure rating:
0 Standard

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

Stroke length adjustment:
0 Manual
1 With 3P stroke positioning motor, 230 V, 50/60 Hz
2 With 3P stroke positioning motor, 115 V, 50/60 Hz
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**

Dimensions: Sigma/2 HM Basic (S2Ba)



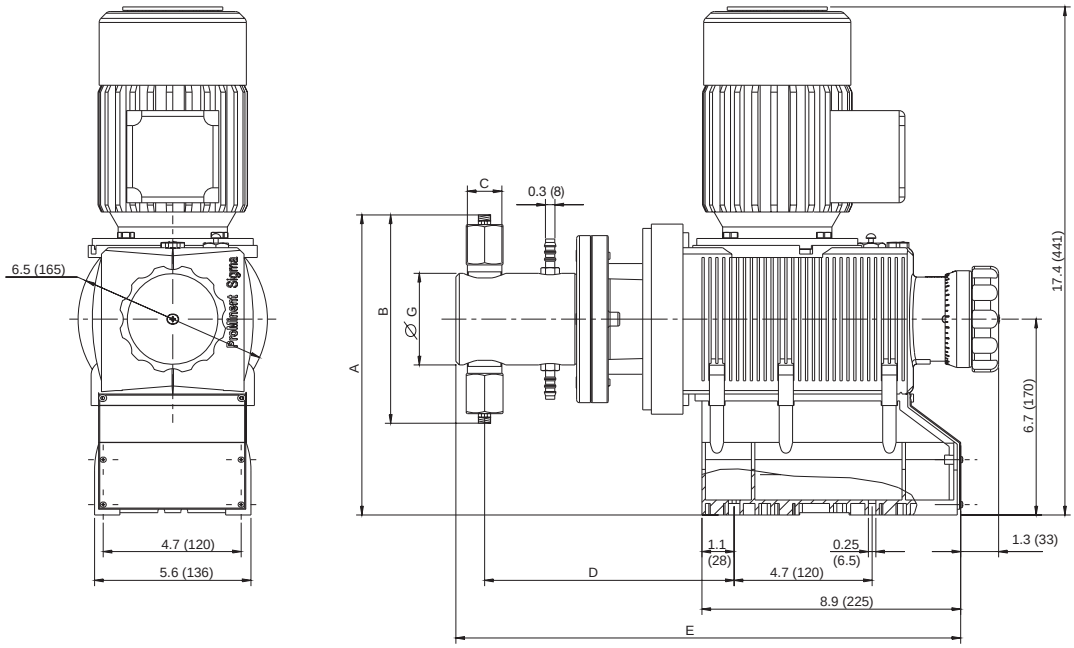
Dimensions in inches (mm)

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 (See Sigma/2-2).

** Dimensions with diaphragm failure detector.

Dimensions: Sigma/2 HK Basic (S2Ba)



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 Motor-Driven Metering Pumps Control Version S2Ca

Sigma/2 Control Version

The microprocessor-based electronics for the Sigma/2 control version are the same as the Sigma/1 and Sigma/3 metering pumps. Programming functions enable the user to set and retrieve pertinent information easily.

- flow can be set and displayed in either U.S. gph or L/h
- totalized flow is displayed in gallons or Litres
- accumulative stroke counter is displayed
- optional access code can be programmed to prevent unauthorized adjustment to settings
- three LED lights indicate operational status

The S2Ca pump is available with contact and 4-20 mA analog signal control.

Optional monitoring indicators include

- fault annunciating relay for low tank level, loss of flow, system faults and fuse/power supply failure, loss of analog signal, diaphragm rupture
- pacing relay to pace a second pump or totalize flow with an external stroke counter
- Profibus field bus connection for remote monitor and control

Pumps can also be ordered with a diaphragm failure monitor.

Sigma/2 Microprocessor Control
Standard Control 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 0.5% via the stroke length knob.

Stroke rate can be set to a maximum of 90, 160 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

Three control modes are available with the Sigma/2: 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 90/160/200 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 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 levels in the source tank. 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/2 series can be remotely started and stopped via a dry contact through the optional control cable.

“Stop”

The Sigma/2 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.

Sigma/2
Optional Control Modes and Features

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

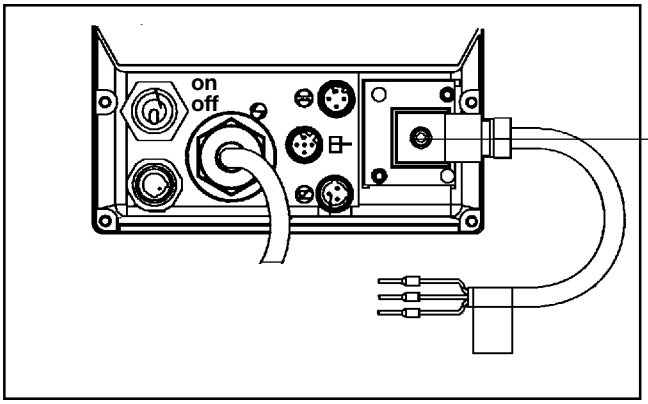
Step-down Factor:
0.25 4 pulses = 1 pump stroke
0.01 100 pulses = 1 pump stroke

"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 rupture monitor, 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.

Identity code: Control Version Sigma/2 HM (S2Ca)

Series:

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/Viton® seal
SST — 316 Stainless steel with PTFE/Viton® seal

Viton® is a registered trademark of DuPont Dow

Diaphragm type:

0 — Standard diaphragm, PTFE
1 — With double diaphragm and failure monitor (NC contact opens on fault)
2 — With double diaphragm and failure monitor (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

Identity code: Control Version Sigma/2 HK (S2Ca)

Series:
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)

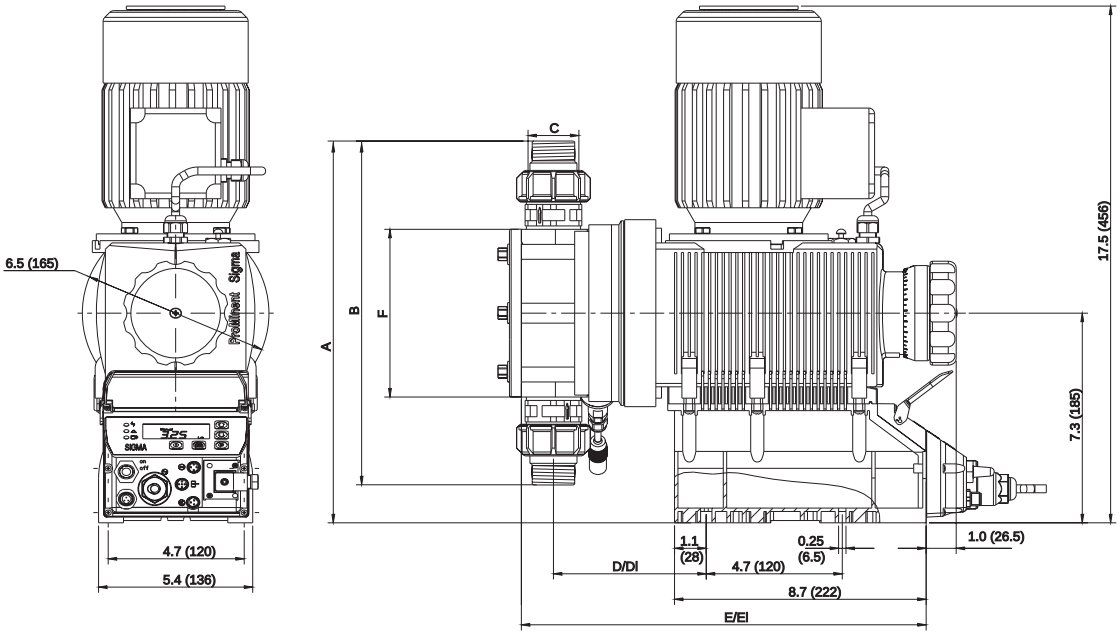
Access code:
0 No access code
1 Access code

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

Dimensions: Sigma/2 HM Control (S2Ca)



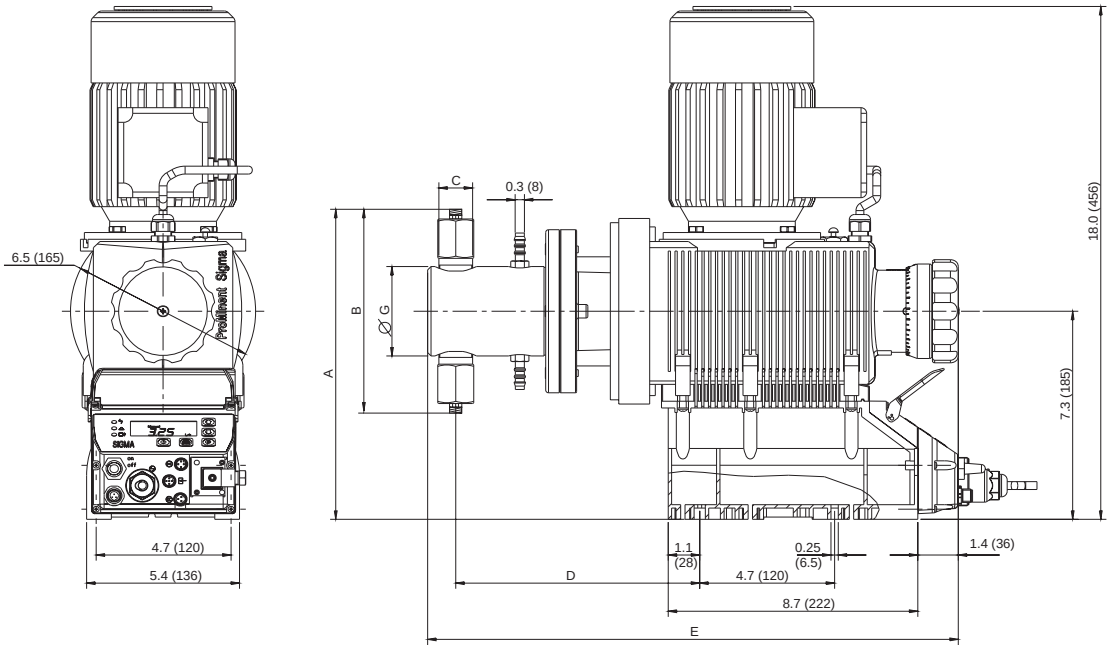
Dimensions in inches (mm)

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 (See Sigma/2-2).

** Dimensions with diaphragm failure detector

Dimensions: Sigma/2 HK Control (S2Ca)



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)

ProMinent® Sigma/2
Metering monitor

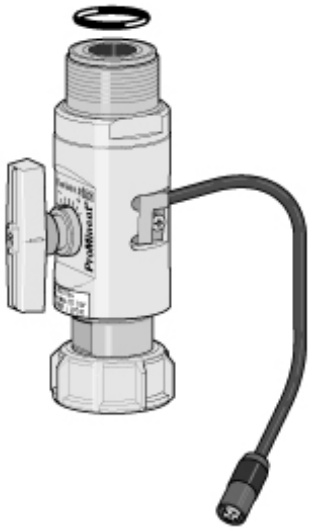
Description	Part No.

Metering monitor

Adjustable metering monitor “Flow Control”

For S2Ca HM with connection cable for assembly directly to liquid end.

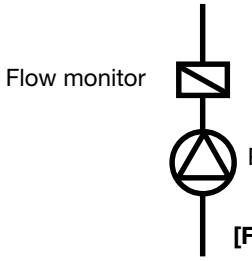
Monitors individual strokes according to the float and orifice principle. The partial quantity of chemical flowing past the float is adjusted from the total stroke volume via the adjusting screw so that an alarm is actuated if there is no pump flow. The user can select the number of incomplete strokes permitted (between 1 and 125) in accordance with the actual process requirements.



Materials:

Flow meter:	PVDF
Float:	PTFE-coated
Seals:	Viton® B/EPDM

Call for details.



[For use with low-viscosity (water-like) fluids only].

ProMinent® Sigma/2 Control cables

Description	Part No.

External control cables

Universal control cable

For metering pump control via contact closure (pulse), standard process signal (analog), and voltage-free contact for remote pause control and auxiliary frequency.

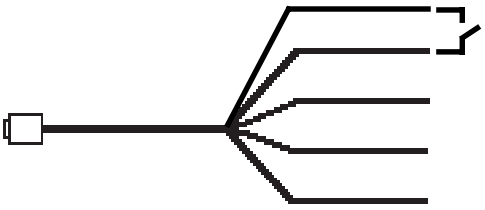
For Sigma pumps with 5-pole round plastic connector and 5-wire cable with loose end.

Universal control cable, 5-pole round connector, 5-wire, 6 ft. (2 m)	1001300
Universal control cable, 5-pole round connector, 5-wire, 16.4 ft. (5 m)	1001301
Universal control cable, 5-pole round connector, 5-wire, 32.8 ft. (10 m)	1001302

ON/OFF Control (Pause)

BROWN and BLACK wires must be connected together via an ON/OFF contact or shorted together. When the contact is closed between the BLACK & BROWN wires, the pump will run. When the contact is open, the pump will stop.

Note: If ON/OFF control is the only control feature being used, WHITE, BLUE & GREY wires are not used and should be cut back.



BROWN: Remote On/Off (+)

BLACK: Common

GREY: Auxiliary Frequency

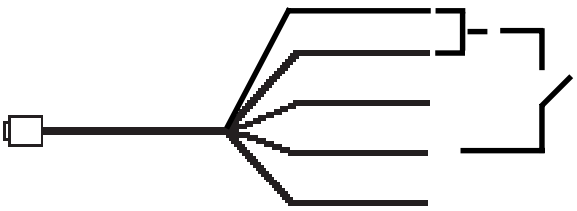
WHITE: Pulse (+)

BLUE: Analog (+)

Pulse Control

Pulse control will allow the pump to run in proportion to a pulsing potential free contact closure.

Note: BROWN and BLACK wires have to be connected together via an ON/OFF contact or shorted together. GREY wire is not used and should be cut back.



BROWN: Remote On/Off (+)

BLACK: Common

GREY: Auxiliary Frequency

WHITE: Pulse (+)

BLUE: Analog (+)

ProMinent® Sigma/2 Control cables

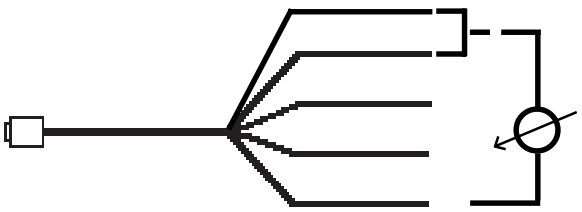
Description	Part No.

External control cables

Analog Control

Analog control runs in proportion to an analog signal such as 4 - 20 mA.

Note: BROWN and BLACK wires must be connected together via an ON/OFF contact or shorted together. The BLACK wire is negative and the BLUE wire is positive. GREY wire is not used and should be cut back.



BROWN: Remote On/Off (+)

BLACK: Common

GREY: Auxiliary Frequency

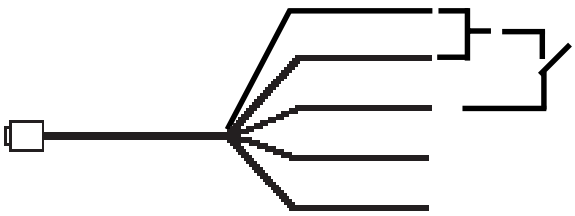
WHITE: Pulse (+)

BLUE: Analog (+)

Auxiliary Frequency

Auxiliary frequency will allow the pump to default to a predetermined stroking frequency regardless of which operating mode the pump is in. The pump defaults to this stroking frequency as long as a contact is closed between the black and grey wires of the universal control cable.

Note: BROWN and BLACK wires must be connected together via an ON/OFF contact or shorted together.



BROWN: Remote On/Off (+)

BLACK: Common

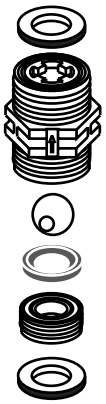
GREY: Auxiliary Frequency

WHITE: Pulse (+)

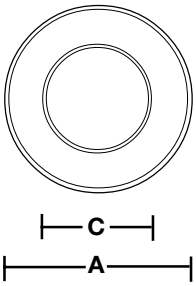
BLUE: Analog (+)

ProMinent Sigma/2 HM & HK
Spare Parts

Spare Parts and Liquid Ends



Valve Complete



Liquid End	Dim A (mm)	Dim C (mm)
FM 130	87.3	50.8
FM 350	123.8	82.5

Complete liquid ends include pump head, valves, mounting screws, diaphragm and backplate. Clamping nuts and inserts are not included with complete liquid ends, complete valves or spare parts kits (see the High Flow Accessories section for these parts). Spare parts kits include:

PVT Liquid ends
1 Diaphragm
1 Suction valve, complete
1 Discharge valve, complete
2 Valve balls
1 Set of seals, complete
(sleeve rings, ball seat rings, ball seals)

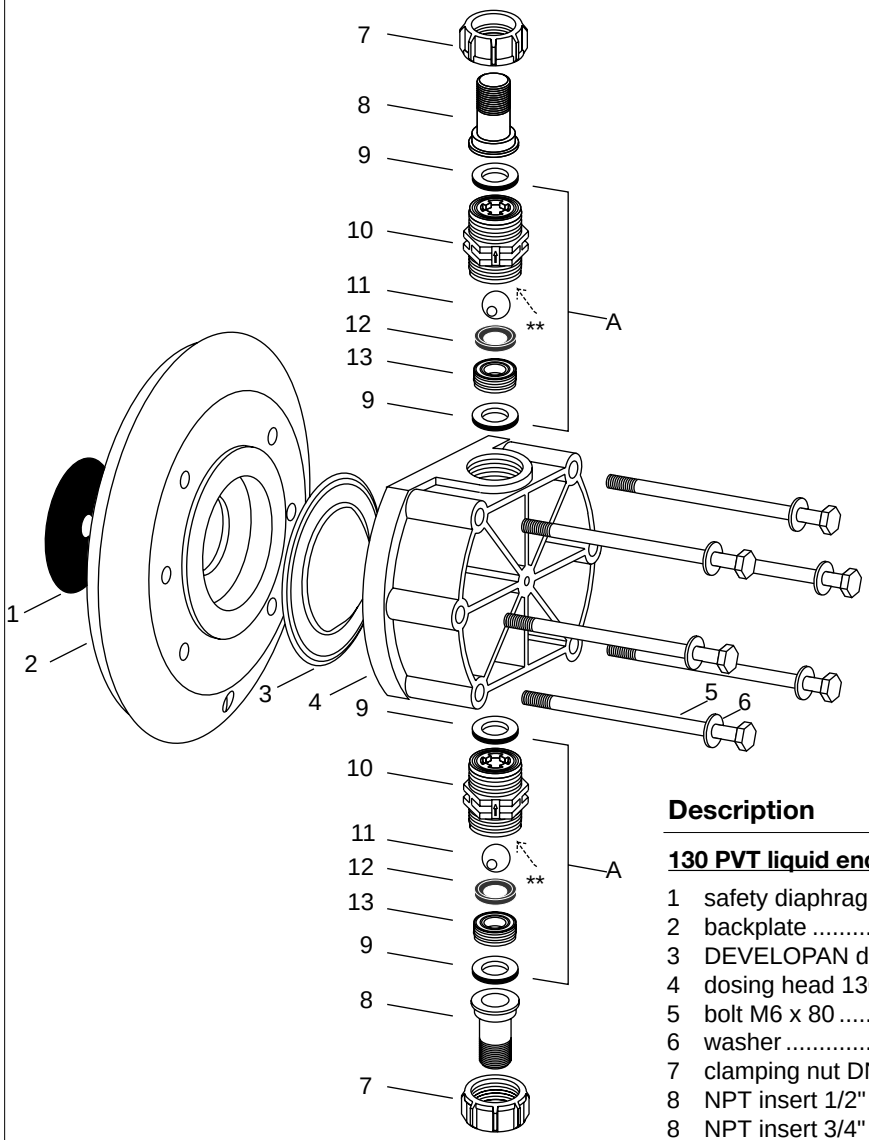
SST Liquid ends
1 Diaphragm
2 Valve balls
1 Set of seals, complete
(sleeve rings, ball seat rings)

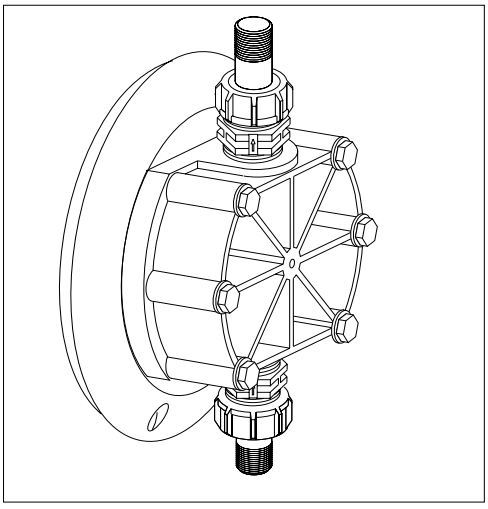
Material Code	Liquid End Complete	Spare Parts Kit	Valve Complete	Diaphragm
12050 with Liquid end FM 130				
PVT	792755	740324	792517	792495
SST	792761	740328	809404	792495
SST*		740326		
12090, 12130 with Liquid end FM 130				
PVT	7792755	740324	792517	792495
SST	792761	740328	809404	792495
SST*		740326		
07120, 07220 with Liquid end FM 350				
PVT	792756	740325	740615	792496
SST	792762	740329	803708	792496
SST*		740327		
04350 with Liquid end FM 350				
PVT	7792756	740325	740615	792496
SST	792762	740329	803708	792496
SST*		740327		

*Without valves

Liquid End Version		Material Code	Complete Liquid End	Spare Parts Kit	Valve Complete Suction (Spare valves only)	Discharge	Packing set
Sigma HK							
08	(For pump versions 32002, 23004, & 10006)	S	1000584	1001572	803792	803793	1000565
12.5	(For pump versions 14006, 10011, & 05016)	S	910420	910470	803792	803793	485401
25	(For pump versions 07012, 04522, & 02534)	S	910421	910471	803792	803793	485402
50	(For pump versions 04022, 02541, & 01264)	S	910422	910472	803794	803795	485403

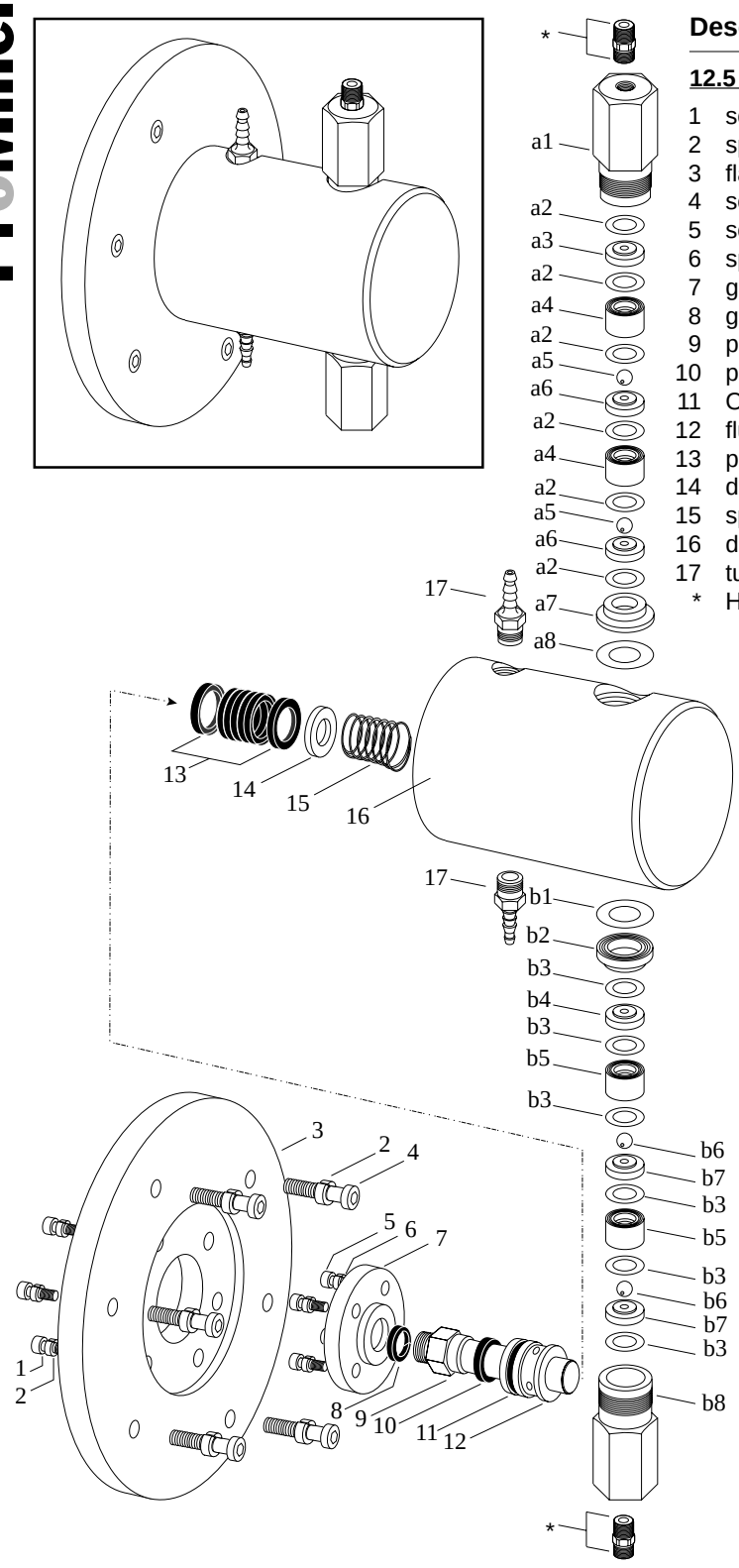
Exploded View





Description	Qty.	Part No.
130 PVT liquid end complete	**1**	**792755**
1 safety diaphragm	1	792474
2 backplate	1	792499
3 DEVELOPAN diaphragm	1	792495
4 dosing head 130 PVDF	1	790131
5 bolt M6 x 80	6	468166
6 washer	6	462229
7 clamping nut DN15 PVDF	2	358814
8 NPT insert 1/2" PVDF (12050) or	2	7358641
8 NPT insert 3/4" PVDF (12090, 12130)	2	7358642
** indicates location of spring if needed		
A valve cpl. DN15 PVT	***2**	**792517**
9 cover ring DN15	2	483984
10 valve body DN15 PVDF	1	792501
11 valve ball 17mm Ceramic	1	740614
12 ball seat disc DN15 PTFE Sigma	1	740613
13 ball seat bushing DN15 PVDF	1	792454
* Sigma valves complete are used as *both* suction *and* discharge valves. Quantities reflect # of components in *each* valve.		
Spare Parts Kit	**1**	**740324**
A valve cpl. DN15 PVT	2	792517
3 DEVELOPAN diaphragm	1	792495
9 cover ring DN15	4	483984
11 valve ball 17mm Ceramic	2	740614
12 ball seat disc DN15 PTFE Sigma	2	740613
13 ball seat bushing DN15 PVDF	2	792454

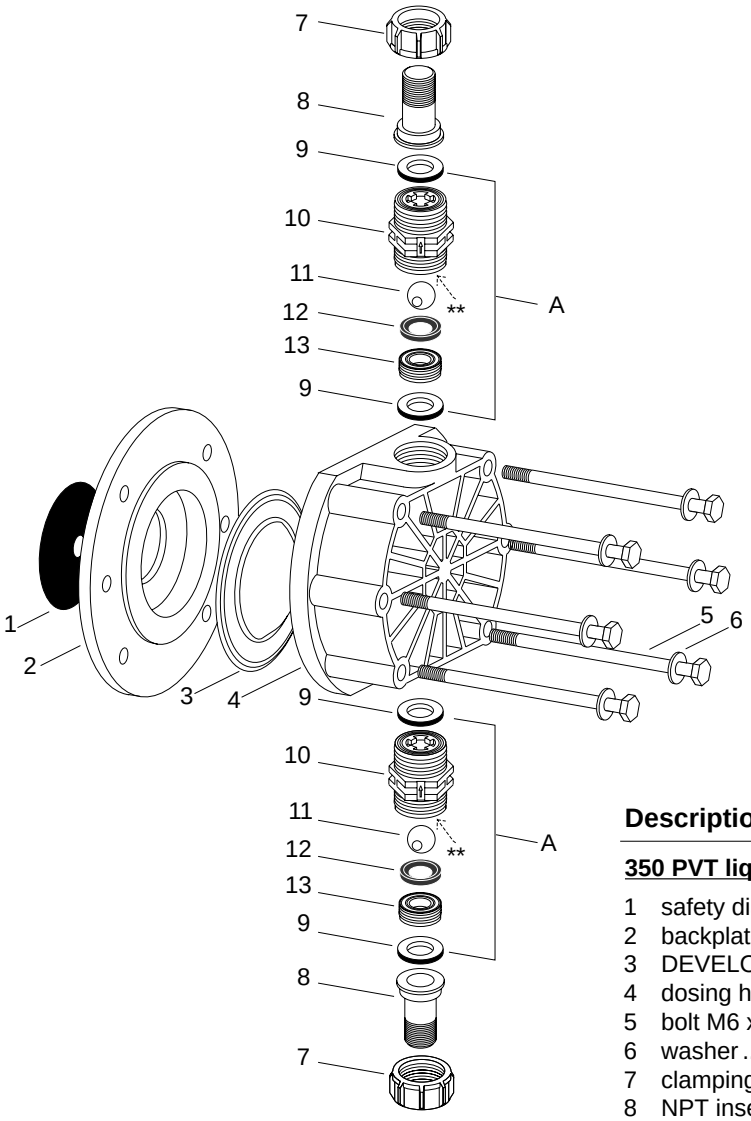
#SIG1PVT-1/97NA

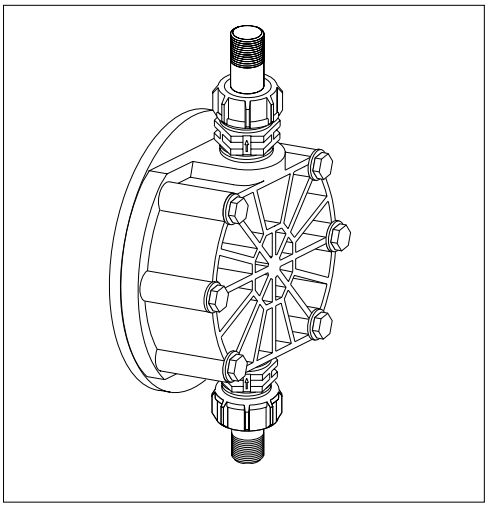


	Description	Qty.	Part No.
	12.5 SS HK liquid end complete	**1**	**910420**
1	screw M6 x 16	6	468083
2	spring washer	12	462456
3	flange d145 x 15 (HK)	1	803763
4	screw M6 x 20	6	468084
5	screw M5 x 16	4	465114
6	spring washer	4	462411
7	guide ring d12 SS	1	803765
8	guide ring d12 PTFE	1	485446
9	piston cpl. d12	1	1000586
10	packing ring (HK 12.5) PTFE	1	485456
11	O-ring 18 x 2 Viton	1	481022
12	flushing ring d12	1	803764
13	packing set 12-22-25 Teflon	1	485401
14	disc d12 SS	1	803766
15	spring	1	469466
16	dosing head body only (FK 12.5)	1	810670
17	tube nozzle PVC	1	358206
*	Hex Nipple 1/4" MNPT (316 SS)	2	7740931
A	**dis. valve 12.5 SS HK**	**1**	**803793**
a1	valve body 12.5 SS	1	803773
a2	gasket 21.5 x 15 x 1 PTFE	6	483909
a3	guide disc 9.5 SS HK	1	104208
a4	valve insert SS HK	2	803775
a5	valve ball 9.2mm Ceramic	2	404281
a6	ball seat disc 9.5 SS HK	2	803774
a7	insert washer SS HK	1	1005097
a8	gasket 27.5 x 16 x .5 Teflon	1	1005096
B	**suct. valve 12.5 SS HK**	**1**	**803792**
b1	gasket 27.5 x 16 x .5 Teflon	1	1005096
b2	insert washer SS HK	1	1005097
b3	gasket 21.5 x 15 x 1 PTFE	6	483909
b4	guide disc 9.5 SS HK	1	104208
b5	valve insert SS HK	2	803775
b6	valve ball 9.2mm Ceramic	2	404281
b7	ball seat disc 9.5 SS HK	2	803774
b8	valve body 12.5 SS	1	803773
	Spare Parts Set 12.5 SS HK	**1**	**910470**
8	guide ring d12 PTFE	1	485446
9	piston cpl. d12	1	1000586
10	packing ring (HK 12.5) PTFE	1	485456
11	O-ring 18 x 2 Viton	1	481022
13	packing set 12-22-25 Teflon	1	485401
a2	gasket 21.5 x 15 x 1 PTFE	12	483909
a5	valve ball 9.2mm Ceramic	4	404281
a6	ball seat disc 9.5 SS HK	4	803774
a8	gasket 27.5 x 16 x .5 Teflon	2	1005096

#SIGHKSS9/6/01

ProMinent®





Description	Qty.	Part No.
350 PVT liquid end complete	**1**	**792756.9**
1 safety diaphragm	1	792474.9
2 backplate	1	790123.4
3 DEVELOPAN diaphragm	1	792496.2
4 dosing head 350 PVDF	1	790212.5
5 bolt M6 x 90	6	468167.2
6 washer	6	462229.6
7 clamping nut DN25 PVDF	2	358816.7
8 NPT insert 1" PVDF (04350) or	2	7358644.8
8 NPT insert 3/4" PVDF (07120, 07220)	2	7358645.5
** indicates location of spring if needed		
A valve cpl. DN25 PVT	***2**	**740615.0**
9 cover ring DN25	2	483986.6
10 valve body DN25 PVDF	1	740520.2
11 valve ball 25mm Duran	1	404217.2
12 ball seat disc DN25 PTFE Sigma	1	792510.0
13 ball seat bushing DN25 PVDF	1	740539.2
* Sigma valves complete are used as *both* suction *and* discharge valves. Quantities reflect # of components in *each* valve.		
Spare Parts Kit	**1**	**740325.6**
A valve cpl. DN25 PVT	2	740615.0
3 DEVELOPAN diaphragm	1	792496.2
9 cover ring DN25	4	483986.6
11 valve ball 25mm Duran	2	404217.2
12 ball seat disc DN25 PTFE Sigma	2	792510.0

#SIG5PVT-1/97NA

THIS IS A MASTER, EDIT FOR SPECIFIC APPLICATION))
PROMINENT FLUID CONTROLS, INC. – SIGMA/2 HM (for flow rates from 16 to 111 gph)

PART 1 – GENERAL

1.1 GENERAL

A. This specification covers the supply, installation, and testing of a complete functional metering pump system including all accessories and appurtenances as shown on the drawings and described herein. A single chemical metering pump manufacturer shall be responsible for supplying all components of the metering feed system.

1.2 QUALITY ASSURANCE

A. For the purpose of establishing quality assurance, experience, and system reliability, the products described herein are based on those metering pumps manufactured by ProMinent Fluid Controls, Inc. All pumps shall be shop-tested for capacity at rated pressure prior to shipment, with documented results provided.

1.3 WARRANTY

A. The chemical metering pump manufacturer shall provide a two year warranty on the metering pump mechanical drive and one year on the liquid end.

PART 2 – PRODUCTS

2.1 GENERAL

A. Manufacturers:
   1. ProMinent Fluid Controls, Inc.
   2. Pre-approved equal.

2.2 DESCRIPTION

A. The chemical metering pump shall be a simplex, motor-driven, reciprocating, mechanically-actuated diaphragm type. The pump shall include integral motor, oil-lubricated gear reducer, and cam-and-spring drive mounted in an aluminum housing. Such housing to be sealed into an outer plastic housing for corrosion protection with heat sinks for cooling.
B. The power supply shall be ___VAC, ___Hz, ___Phase.
C. The liquid end shall be physically separated from the drive unit by a back plate with weep hole creating air gap separation. An elastomer shaft wiper seal shall prevent contamination of the gear box by confining chemical within the back plate if the primary diaphragm fails. The primary diaphragm shall have a steel core, vulcanized into a nylon-reinforced EPDM backing, with PTFE-faced fluid contact surface.
D. ((OPTIONAL)) The liquid end shall also feature a secondary diaphragm separated from the primary diaphragm by a spacer plate with diaphragm-isolated pressure switch to close a contact for alarm annunciation and to prevent chemical spill or intrusion into pump drive upon failure of the primary diaphragm.

2.3 LIQUID END

A. The diaphragm shall be of a convex design fitting into a concave liquid end to minimize diaphragm wear, liquid end dead volume, and to promote flow of solids in suspension.

((SELECT ONE))

- The liquid end shall be virgin PVDF. The suction and discharge valve shall be PVDF with PTFE faced Viton gasket seals and ceramic valve balls.

Or

- The liquid end shall be 316 stainless steel. The suction and discharge valves shall be 316 stainless steel with PTFE-faced Viton gasket seals and stainless steel valve balls.

2.4 CONTROL ((BASIC VERSION PUMP))

A. Stroke length control of the basic version pump

((SELECT ONE))

- shall be adjustable manually by means of a stroke length knob, in increments of 0.5%, from 0% to 100% of stroke length.

Or

- shall be adjustable by means of a stroke positioning motor from 0% to 100% of stroke length. The stroke positioning motor shall feature visual stroke length indication and manual/ external selector switch for local control via toggle switch or external control in proportion to a 4-20 mA signal.

B. Stroke frequency control of the basic version pump

((SELECT ONE))

- shall be fixed at the pump's maximum stroke rate. Pump shall include a 1/3 HP, TEFC, four-pole AC motor.

Or

- shall be controlled by DC SCR drive system for stroke frequency control. The SCR shall include a wall mountable NEMA 4 enclosure with on/off switch, manual/external switch and speed potentiometer. The DC voltage output to the motor shall be proportional to the potentiometer setting in manual mode, or proportional to an external 4-20 mA signal in external mode. Pump shall include a 1/3 HP, TENV, permanent magnet 90V DC motor.

Or

- shall be controlled by an SCR drive system for stroke frequency control. The SCR shall include a wall mountable NEMA 4 enclosure with on/off switch, manual/external switch and membrane keypad and digital display spannable to show RPM, percent output or flow rate. The actual motor speed, as measured by motor-mounted tachometer, shall be proportional to the rate setting in manual mode, or proportional to an external 4-20 mA signal in external mode. Pump shall include a 1/3 HP, TENV, permanent magnet 90V DC motor and Tach.

Or

- shall be controlled by an AC inverter system for stroke frequency control. The inverter shall include a wall mountable NEMA 4/12 enclosure with keypad and display of % load or output voltage. Selectable for local or remote operation via 4-20 mA signal. Pump shall include a 1/3 HP, inverter duty, 3-phase, 208-230 VAC motor. Minimum speed 3-30 Hz.

2.5 PROGRAMMING AND CONTROL ((CONTROL VERSION PUMP))

A. The metering pump shall be microprocessor-controlled. All pumping functions shall be set by membrane-switch keypad and status shall be displayed on an illuminated LCD, which is readable at an offset of 45 degrees. Keypad will allow for simple scrolling of programmed parameters.

B. Stroke length control shall be adjustable manually by means of a stroke length, in increments of 0.5%, from 0 to 100% of stroke length. The LCD shall digitally display stroke length in 1% increments in the full range between 100% and 0%.

C. Programming shall allow pump to be calibrated so as to display pump output in gallons/hour or liters/hour. Calibration shall be maintained when stroke length is altered up to +/-10% on the stroke length knob. If stroke length is altered by more than +/-10%, a yellow warning light will light and a flashing message “calib” will appear.

D. The pump shall be equipped with the programmable function of electronic interlocking of the keypad by access code to prevent unauthorized adjustments to the pump.

E. Keypad shall allow for scrolling and display on LCD such parameters as stroke frequency, stroke length, stroke counter, pump output in gals/hr or l/hr, dosing quantity, mA input being received by pump, and indication of external mode.

F. An AC inverter shall be integral to the microprocessor control and function of the pump. While 115VAC or 230VAC, 1 phase may be used to power the pump, the inverter shall drive a 1/4 HP, 230VAC, 3 phase motor. Stroke frequency shall be accomplished through microprocessor control with proportional start/stop of the motor, from 0% to 33% of stroke rate. Stroke rate shall be accomplished through variable speed of the motor from 34% to 100% of stroke rate. Stroke frequency control shall be manually adjusted by touch keypads, with the set stroke rate displayed on the LCD. The pump shall be capable of receiving a pulse input via optional external control cable such that one pulse gives one pump stroke rate. The pump shall be capable of remote ON-OFF operation using the pause function via a voltage free contact relay through an optional control cable. In addition, the pump shall be configured with;

((OPTIONAL SELECTIONS))

- pulse multiplier/divider functionality. The pump shall allow factoring to issue from 1 to 99.99 strokes per pulse input or to issue 1 stroke per 1 to 100 input pulses.

Or

- analog input functionality. The pump shall accept an analog signal such that stroke frequency is proportional to 4-20mA or 20-4mA, the choice of which is programmed at the pump. The pump shall allow the setting of a maximum stroke rate, which corresponds to the maximum analog signal, with stroke rate proportional to signal strength below that rate. Programming for curve processing shall also be possible, in which any stroke frequency ratio in proportion to the electrical signal can be configured. Analog to digital converters external to the pump shall not be acceptable.

Or

- pulse multiplier/divider and analog input functionality. The pump shall allow factoring to issue from 1 to 99.99 strokes per pulse input or to issue 1 stroke per 1 to 100 input pulses. The pump shall also accept an analog signal such that stroke frequency is proportional to 4-20mA or 20-4mA, the choice of which is programmed at the pump. The pump shall allow the setting of a maximum stroke rate, which corresponds to the maximum analog signal, with stroke rate proportional to signal strength below that rate. Programming for curve processing shall also be possible, in which any stroke frequency ratio in proportion to the electrical signal can be configured. Analog to digital converters external to the pump shall not be acceptable.

Or

- programmable timer functionality. The pump shall be configured with an integral, programmable 2-week, 81 event timer to change operational state of the pump. Timers external to the pump are not acceptable.

Or

- pulse multiplier/divider, analog input, and programmable timer functionality (as described above).

G. The pump shall be equipped with the programmable function of auxiliary frequency control, allowing for quick priming of the pump or for slug feed of process during initial start up after shutdown. Stroke frequency shall be programmable to the maximum for the pump, and the auxiliary frequency function shall be capable of interfacing with a contact closure relay for control purposes.

2.6 FLOW ASSURANCE ((OPTIONAL))

A. Low Level Control - A 2-stage Float Switch shall be supplied to stop the pump prior to losing prime and annunciate low level on the pump LED.

B. Relay Output - An SPDT relay shall be installed on the pump for:

((SELECT ONE))

- fault indication. ((OPTIONAL)). The metering pump shall have an integral relay to allow remote annunciation of a fault condition (i.e. low supply solution early warning/lack of supply solution shut down, loss of chemical output, system faults, and fuse/power supply failure). Configure as ((N/O//N/C)) contact closure relay.

Or

- both fault indication and pacing relay. ((OPTIONAL)). The metering pump shall have an integral relay to allow remote annunciation of a fault condition (i.e. low supply solution early warning/lack of supply solution shut down, loss of chemical output, system faults, and fuse/power supply failure). Configure as ((N/O//N/C)) contact closure relay. The pump shall also have an integral relay to issue a contact closure with every pump stroke to pace a second metering pump. The pacing relay shall be electrically isolated via an optical coupler with a semiconductor switch.

Or

- both 4-20mA output and fault indication. ((OPTIONAL)) The analog output function shall be a multiplicative factor of both stroke length % and stroke frequency %, reflecting the real time output capacity of the metering pump. The metering pump shall also have an integral relay to allow remote annunciation of a fault condition (i.e. low supply solution early warning/lack of supply solution shut down, loss of chemical output, system faults, and fuse/power supply failure). Configure as ((N/O//N/C)) contact closure relay.

Or

- both 4-20mA output and pacing relay. ((OPTIONAL)) The analog output function shall be a multiplicative factor of both stroke length % and stroke frequency %, reflecting the real time output capacity of the metering pump. The metering pump shall also have an integral relay to issue a contact closure with every pump stroke to pace a second metering pump. The pacing relay shall be electrically isolated via an optical coupler with a semiconductor switch.

2.7 ACCESSORIES ((ALL ARE OPTIONAL AND MAY BE INCLUDED AS SEPARATE ITEMS OR AS COMPONENTS OF A PUMP STAND))

A. The pump shall be mounted on a ((CHOOSE ONE: black, UV-protected polypropylene//304 stainless steel//FRP grating)) support stand suitable for wall, floor or top-of-tank mounting. A single chemical metering pump manufacturer shall be responsible for supplying and assembling all components of the skid, in addition to testing the skid-mounted metering system under conditions of maximum rated pump pressure, prior to shipment. The stand shall include the following accessories, pre-piped;

B. A foot valve and strainer shall be provided with each pump.

C. An injection check valve shall be provided with each pump.

D. A universal control cable with 5-pole round plastic connector and 5-wire cable with loose ends shall be provided with each pump.
E. A two-stage float switch compatible with the chemical metering pump shall be provided for monitoring tank level.
F. An adjustable discharge flow monitoring device mounted on a valved bypass shall be provided. The flow monitor shall be capable of signaling a fault condition to the metering pump.
G. A diaphragm failure detector shall be provided to ((open/close)) a contact in the event of diaphragm failure.
H. An adjustable-pressure, diaphragm-type back pressure/antisiphon valve shall be provided with each metering pump.
I. An in-line, adjustable-pressure, diaphragm-type pressure relief valve shall be provided with each metering pump.
J. An air-charged, bladder-type pulsation dampener shall be provided with each metering pump.
K. A clear PVC calibration column with FNPT fittings top and bottom shall be provided with each pump//skid.

2.8 APPLICATION

A. Quantity:
B. Chemical Service:
C. Capacity (U.S. gph):
D. Back Pressure (psig):

END OF SECTION

((THIS IS A MASTER, EDIT FOR SPECIFIC APPLICATION))
PROMINENT FLUID CONTROLS, INC.
- SIGMA HK ((for flow rates from 0.12 gpd to 20 gph (basic) or to 17.2 gph (control))

SECTION _____- CHEMICAL METERING PUMPS

1.1 APPLICATION

A. Quantity:_____
B. Chemical Service:_____
C. Tag. Nos.:_____
D. Capacity (US gallons per hour)_____
E. Backpressure (psig):_____

1.2 DESCRIPTION

A. The chemical metering pump(s) shall be a simplex, motor-driven, reciprocating, packed plunger type. The pump shall include integral motor, oil-lubricated gear reducer and cam-and-spring drive mounted in an aluminum housing, such housing to be sealed into an outer plastic housing for corrosion protection with heat sink fins for cooling.
B. The chemical metering pump manufacturer shall provide a two year warranty on the pump drive and one year warranty on the pump liquid end, including packed plunger and O-rings.
C. The pump shall be fully tested to meet rated flow and pressure by the manufacturer.
D. The power supply shall be ____ VAC, ____ Hz, _____phase.

1.3 LIQUID END

- The liquid end shall be 316 stainless steel. The suction and discharge valve shall be 316 stainless steel with PTFE-faced Viton® gasket seals and stainless steel valve balls.

1.4 CONTROL

A. Stroke length control ((SELECT ONE))
- shall be adjustable manually by means of a stroke length knob, in increments of 1%, from 0% to 100% of stroke length.
- shall be adjustable by means of a stroke positioning motor from 0% to 100% of stroke length. The stroke positioning motor shall feature visual stroke length indication and adjust in proportion to a 4-20 mA signal.

B. Stroke frequency control ((SELECT ONE))
- shall be fixed at the pump's maximum stroke rate. Pump shall include a 1/3 HP, TEFC, four-pole AC motor.
- shall be switchable between manual or external control via 4-20 mA signal. In manual mode, stroke frequency control shall be manually adjusted by touch keypads, with the set stroke rate displayed on the pump's LCD. In external mode, the pump shall be capable of receiving a 4-20 mA input via optional external control cable. . The pump shall allow setting of a maximum stroke rate which corresponds to the maximum analog signal, with stroke rate proportional to signal strength below that rate. The metering pump shall be capable of remote ON-OFF operation using the PAUSE function via a voltage-free contact relay through an optional control cable.
- shall be switchable between manual or external control via pulse signal. In manual mode, stroke frequency control shall be manually adjusted by touch keypads, with the set stroke rate

displayed on the pump's LCD. In external mode, the pump shall be capable of receiving a pulse train input via optional external control cable. The metering pump shall allow factoring to issue from 1 to 99.99 strokes per pulse input or to issue 1 stroke per 1 to 100 input pulses. The metering pump shall be capable of remote ON-OFF operation using the PAUSE function via a voltage-free contact relay through an optional control cable.

1.5 FLOW ASSURANCE ((OPTIONAL))

A. Low Level Control - A 2-stage Float Switch shall be supplied to stop the pump prior to losing prime and annunciate low level on the pump LED.
B. Relay Output - An SPDT relay shall be installed on the pump for: ((SELECT ONE))

- Fault Indication - ((OPTIONAL)) the metering pump shall have an integral relay to allow remote annunciation of a fault condition (i.e. low supply solution early warning/lack of supply solution shut down, flow monitor, system faults, and fuse/power supply failure).
- Pacing Relay - ((OPTIONAL)) the metering pump shall have an integral relay to issue a contact closure with every pump stroke to pace a second PROMINENT metering pump.

1.6 ACCEPTABLE MANUFACTURER:

A. ProMinent Fluid Controls, Inc. model _____
B. Or pre-approved equal.

1.7 ACCESSORIES ((ALL ARE OPTIONAL AND MAY BE INCLUDED AS SEPARATE ITEMS OR AS COMPONENTS OF A PUMP STAND))

A. The pump shall be mounted on a ((CHOOSE ONE: Fiberglass Reinforced Plastic / Stainless Steel)) support stand suitable for wall, floor or top-of-tank mounting, and including the following accessories pre-piped and factory tested:
B. A universal control cable with 4 pole round plastic connector and 4-wire cable with loose ends shall be provided with each pump.
C. A two stage float switch compatible with the chemical metering pump shall be provided for monitoring tank level.
D. An adjustable discharge flow monitoring device mounted on a valved bypass shall be provided. The flow monitor shall be capable of signaling a fault condition to the metering pump.
E. A packing failure detector shall be provided to ((open/close)) a contact in the event of a failure.

END OF SECTION