

## 1.2 Motor-Driven Metering Pumps

### 1.2.7

### Motor-Driven Metering Pump Sigma/ 2 (Basic Type)

The robust pump for safe and reliable use.

Capacity range 50 – 420 l/h, 16 – 4 bar

Robust motor-driven metering pumps like the Sigma/ 2 Basic guarantee excellent process reliability with their patented multi-layer safety diaphragm. The diaphragm metering pump offers a number of power end versions, also suitable for use in areas at risk from explosion.

The Sigma/ 2 diaphragm metering pump, together with pumps of type Sigma/ 1 and Sigma/ 3, represents an integrated product range. They cover the capacity range from 17 to 1,030 l/h, with a consistent operating concept, control concept and spare parts management. A wide range of power end versions is available, including some for use in ATEX areas.

#### Your benefits

Excellent process reliability:

- In the event of an accident, the feed chemical does not escape to the outside nor into the pump's power end, thanks to the patented multi-layer safety diaphragm with optical (optionally electric) signalling
- Integrated relief valve protects the pump against overloading
- Reliable operation by bleed option during the suction process

Flexible adaptation to the process:

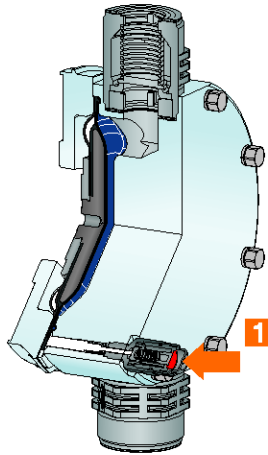
- The Sigma product range is available as standard in the "Physiologically safe in respect of wetted materials" "F" design.
- Metering pumps with electro-polished stainless steel metering head enable them to be used in hygienically challenging applications
- Wide range of power end versions, also for use in areas at risk from explosion, and different flange designs for the use of customised motors
- Customised designs are available on request

#### Technical Details

- Stroke length: 5 mm,
- Stroke length adjustment range: 0 – 100%
- Stroke length adjustment: manually by self-locking rotary dial in 1 % increments (optionally with actuator or control drive)
- Metering reproducibility is better than  $\pm 2\%$  in the 30 – 100 % stroke length adjustment range under defined conditions and with correct installation.
- Wetted materials: PVDF, stainless steel 1.4571/1.4404, special materials on request
- Patented multi-layer safety diaphragm with optical diaphragm rupture display (optionally with diaphragm rupture warning system via a contact)
- Integrated hydraulic relief and bleed valve
- A wide range of power end versions is available: Three-phase standard motor, 1-phase AC motor, motors for use in areas at risk from explosion and different flange designs for use in customer-specific motors
- For areas at risk from explosion II 2G Ex h IIC T3 Gb X or II 2G Ex h IIC T4 Gb X (optional)
- Degree of protection IP 55
- Highly rigid fibreglass-reinforced plastic housing with excellent chemical resistance
- For reasons of safety, provide suitable overload protection mechanisms when installing all mechanically deflected diaphragm metering pumps.

#### Field of application

- Volume-proportional addition of chemicals in water treatment, e.g. sodium-calcium hypochlorite for the disinfection of potable water
- Addition of chemicals depending on the measured value, e.g. metering of acid and alkali for pH neutralisation in waste water treatment
- Time-controlled addition of chemicals in the cooling water circuit
- Pulse-controlled metering in the bottling of different volumes e.g. glycerin filling of manometers



P\_SL\_0065\_C1

1: Diaphragm rupture sensor



## 1.2 Motor-Driven Metering Pumps

### Sigma Basic Type Control Functions (S2Ba)

#### Stroke length actuator/controller

**Actuator:** Electronically regulated actuator with contactless position detection for automatic stroke length adjustment, actuating period approx. 1 second for 1% stroke length, return potentiometer 1 k $\Omega$ , degree of protection IP 65.

**Control drive:** Electronically regulated actuator with position detection, with no contact with the media, consisting of an actuator and integral servo controller for stroke length adjustment via a standard signal. Standard current input 0/4-20 mA corresponds to stroke length 0 – 100%, switch-over for manual / automatic operation, stroke adjustment in manual mode, electronic stroke length position display, wide-range voltage power unit 85 - 265 V 50/60 Hz, degree of protection Ip65, actual value output 0/4-20 mA for remote display.

#### Speed controllers with frequency converter (identity code specification Z)

The speed controller assembly consists of a frequency converter and a variable speed motor of 0.37 kW.

### "Physiologically Safe (FDA) in Respect of Wetted Materials" Version

All wetted materials in the "Physiologically safe (FDA) in respect of wetted materials" design comply with the FDA guidelines.

FDA guidelines:

- Material PTFE: FDA-No. 21 CFR § 177.1550
- Material PVDF: FDA-No. 21 CFR § 177.2510

Available for material version PV and SS.

Identity code example: S2BaHM07220PV F S000S000



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## Technical Data

Type S2Ba	With 1500 rpm motor at 50 Hz				With 1800 rpm motor at 60 Hz			Suction lift m WC	Perm. pre-pressure suction side bar	Connection suction/discharge side G-DN	Shipping weight kg
	Delivery rate at max. back pressure		Max. stroke rate Strokes/min	Delivery rate at max. back pressure		Max. stroke rate Strokes/min					
	bar	l/h		ml/stroke	psi		l/h/gph (US)				
16050 PVT	10	50	11.4	73	145	60.0/15.8	87	7	3	1-15	15
16050 SST	16	47	11.4	73	232	56.0/14.7	87	7	3	1-15	20
16090 PVT	10	88	11.4	132	145	106.0/28.0	158	7	3	1-15	15
16090 SST	16	82	11.4	132	232	98.4/25.9	158	7	3	1-15	20
16130 PVT	10	135	10.9	198	145	156.0/41.2	238	7	3	1-15	15
16130 SST	16	124	10.9	198	232	148.0/39.0	238	7	3	1-15	20
07120 PVT	7	126	27.4	73	102	150.0/39.6	87	5	1	1 1/2-25*	16
07120 SST	7	126	27.4	73	102	150.0/39.6	87	5	1	1 1/2-25*	24
07220 PVT	7	220	27.7	132	102	264.0/69.7	158	5	1	1 1/2-25*	16
07220 SST	7	220	27.7	132	102	264.0/69.7	158	5	1	1 1/2-25*	24
04350 PVT	4	350	29.4	198	58	420.0/110.9	238	5	1	1 1/2-25*	16
04350 SST	4	350	29.4	198	58	420.0/110.9	238	5	1	1 1/2-25*	24

Performance data for TTT, see type PVT

\* With Sigma types 07120, 07220 and 04350, the dosing head is fitted with DN 25 (G 1 1/2) valves. As DN 20 is generally sufficient for these types of pipes (see technical data, suction/discharge side connector), the connector parts that can be ordered under the identity code (e.g. inserts) are already reduced to DN 20, i.e. piping and accessories can be installed in DN 20.

## Materials in Contact With the Medium

Material	Dosing head	Suction/pressure connector	Seals/ball seat	Balls	Integral relief valve
PVT	PVDF	PVDF	PTFE/PTFE	Ceramic/glass*	PVDF/FKM or EPDM
SST	Stainless steel 1.4404	Stainless steel 1.4581	PTFE/PTFE	Stainless steel 1.4404	Stainless steel/FKM or EPDM
TTT**	PTFE + 25% carbon	PTFE + 25% carbon	PTFE/PTFE	Ceramic/glass*	-

\* with 07120, 07220, 04350

\*\* specifically for areas at risk from explosion

With "F" sealing material design – "physiologically safe - FDA", the ball seat is made of PVDF

## Motor Data

Identity code specification	Power supply	Δ/Y	Remarks		
S	3-phase, IP 55	220 – 240 V/380 – 420 V	50 Hz	0.25 kW	
		220 – 280 V/440 – 480 V	60 Hz	0.25 kW	
T	3-phase, IP 55	220 – 240 V/380 – 420 V	50 Hz	0.25 kW	with PTC, speed control range 1:5
		220 – 280 V/440 – 480 V	60 Hz		
R	3-phase, IP 55	220 – 240 V/380 – 420 V	50 Hz	0.37 kW	with PTC, speed adjustment range 1:20 with external fan (1-phase 230 V; 50/60Hz, 134 W)
M	1-phase AC, IP 55	230 V ± 5 %	50/60 Hz	0.18 kW	
N	1-phase AC, IP 55	115 V ± 5 %	60 Hz	0.18 kW	
L1	3-phase, II2GEEExIICT3	220 – 240 V/380 – 420 V	50 Hz	0.18 kW	
L2	3-phase, II2GEEExIICT4	220 – 240 V/380 – 420 V	50 Hz	0.18 kW	with PTC, speed control range 1:5
P1	3-phase, II2GEEExIICT3	250 – 280 V/440 – 480 V	60 Hz	0.18 kW	
P2	3-phase, II2GEEExIICT4	250 – 280 V/440 – 480 V	60 Hz	0.21 kW	with PTC, speed control range 1:5

Motor data sheets can be requested for more information. Motors for Sigma basic pumps, special motors or special motor flanges are available on request.

Motors less than 0.75 kW and motors designed for speed-controllable operation are not subject to the IE3 standard in compliance with the Ecodesign Directive 2009/125/EC.

### Information for use in areas at risk from explosion

Only use pumps with the appropriate labelling in line with the ATEX Directive 2014/34/EU in premises at risk from explosion. Ensure that the explosion group, category and degree of protection specified on the label corresponds to or is better than the conditions prevalent in the intended field of application.



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## Identity Code Ordering System for Sigma/ 2 Basic Type (S2Ba)

S2Ba	<b>Drive type</b>					
	HM	Main drive, diaphragm				
	<b>Pump type</b>					
		<b>bar</b>	<b>l/h</b>		<b>bar</b>	<b>l/h</b>
	16050	16	47	07120	7	126
	16090	16	82	07220	7	220
	16130	16	124	04350	4	350
	<b>Liquid end material</b>					
	PV	PVDF (max. 10 bar)				
	SS	Stainless steel				
	TT	PTFE + 25% carbon (max. 10 bar)				
	<b>Seal material</b>					
	T	PTFE seal				
	F	FDA-compliant				
	<b>Diaphragm</b>					
	S	Multi-layer safety diaphragm with optical rupture indicator				
	A	Multi-layer safety diaphragm with rupture signalling (contact)				
	<b>Liquid end version</b>					
	0	No spring				
	1	With 2 valve springs, Hastelloy C4, 0.1 bar				
	4**	With pressure relief valve, FKM seal, no valve spring, only with PV and SS				
	5**	With pressure relief valve, FKM seal with valve springs, only with PV and SS				
	6**	With pressure relief valve, EPDM seal, without valve spring, only with PV and SS				
	7**	With pressure relief valve, EPDM seal, with valve spring, only with PV and SS				
	<b>Hydraulic connection</b>					
	0	Standard				
	1	Union nut and PVC insert				
	2	Union nut and PP insert				
	3	Union nut and PVDF insert				
	4	Union nut and SS*** insert				
	7	Union nut and PVDF hose nozzle				
	8	Union nut and SS hose nozzle				
	9	Union nut and stainless steel hose nozzle				
	<b>Version</b>					
	0	With ProMinent® logo (standard)				
	1	Without ProMinent® logo				
	M	Modified				
	<b>Electrical power supply</b>					
	S	3 ph, 230 V/400 V 50/60 Hz				
	T	3 ph, 230 V/400 V 50/60 Hz, with PTC				
	R	Variable speed motor 3 ph, 230/400 V, with PTC, with external fan 1 ph 230 V 50/60 Hz				
	Z	Speed control compl 1 ph 230 V, 50/60 Hz (variable speed motor + FC)				
	M	1 ph, AC, 230 V/50/60 Hz				
	N	1 ph, AC, 115 V, 60 Hz				
	L	3 ph, 230 V/400 V, 50 Hz, (Exe, Exd)				
	P	3 ph, 265 V/440 V, 60 Hz, (Exe, Exd)				
	1	No motor, with B14 flange, Gr. 71 DIN				
	2	No motor, with flange NEMA 56 C				
	3	No motor, with B5 flange, Gr. 63 DIN				
	<b>Enclosure rating</b>					
	0	IP 55 (standard)				
	1	Ex-design ATEX-T3 (EX specification: II 2G Ex h IIC T3 Gb X)				
	2	Ex-design ATEX-T4 (EX specification: III 2G Ex h IIC T4 Gb X)				
	<b>Stroke sensor</b>					
	0	No stroke sensor (standard)				
	2	Pacing relay (reed relay)				
	3	Stroke sensor (Namur) for hazardous locations				
	<b>Stroke length adjustment</b>					
	0	Manual (standard)				
	1	with servomotor, 85...265 V AC 50/60 Hz				
	3	with stroke control motor 0...20 mA 85...265 V AC 50/60 Hz				
	4	with stroke control motor 4...20 mA 85...265 V AC 50/60 Hz				

\* 10 bar with the PVDF and TTT version.

\*\* Standard with tube nozzle in the bypass. Threaded connection on request.

\*\*\* Internal thread of the insert SS DN15-Rp 1/2, DN25/20-G 3/4

On request, electropolished dosing heads (≤ Ra 0.8 μm) are available.



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### Spare Parts

The spare parts kit generally includes the wear parts for the liquid ends.

#### Scope of delivery with PVT material version:

- 1 diaphragm
- 2 valves, complete
- 2 valve balls
- 2 ball seats
- 4 composite seals
- 1 elastomer sealing set (EPDM, FKM-B)

#### Scope of delivery with SST material version:

- 1 diaphragm
- 2 valve balls
- 2 ball seat discs
- 4 composite seals

### Spare Parts Kit for Sigma/ 2 for Design With Multi-layer Safety Diaphragm

(Applies to identity code types 16050, 16090, 16130, 12050, 12090 and 12130)

Liquid end	Materials in contact with the medium		Order no.
FM 130 - DN 15	PVT	–	1035951
FM 130 - DN 15	TTT	with 2 valves cpl.	1077573
FM 130 - DN 15	SST	–	1035957
FM 130 - DN 15	SST	with 2 valves cpl.	1035954

(Applies to identity code types 07120, 07220 and 04350)

Liquid end	Materials in contact with the medium		Order no.
FM 350 - DN 25	PVT	–	1035953
FM 350 - DN 25	TTT	with 2 valves cpl.	1077574
FM 350 - DN 25	SST	–	1035960
FM 350 - DN 25	SST	with 2 valves cpl.	1035959

### Spare Parts Kits for Sigma/ 2 for Design With Old Diaphragm

(Applies to identity code types 16050, 16090, 16130, 12050, 12090 and 12130)

Liquid end	Materials in contact with the medium		Order no.
FM 130 - DN 15	PVT	–	740324
FM 130 - DN 15	SST	–	740326
FM 130 - DN 15	SST	with 2 valves cpl.	740328

(Applies to identity code types 07120, 07220 and 04350)

Liquid end	Materials in contact with the medium		Order no.
FM 350 - DN 25	PVT	–	740325
FM 350 - DN 25	SST	–	740327
FM 350 - DN 25	SST	with 2 valves cpl.	740329



## 1.2 Motor-Driven Metering Pumps

### Spare Parts Kits for Sigma/ 2 With FDA Design (Physiologically Safe)

(Applies to identity code types 16050, 16090, 16130, 12050, 12090 and 12130)

Liquid end	Materials in contact with the medium		Order no.
FM 130 - DN 15	PVT	–	1046472
FM 130 - DN 15	SST	without valve	1046473
FM 130 - DN 15	SST	with valve	1046474

(Applies to identity code types 07120, 07220 and 04350)

Liquid end	Materials in contact with the medium		Order no.
FM 350 - DN 25	PVT	–	1046475
FM 350 - DN 25	SST	without valve	1046476
FM 350 - DN 25	SST	with valve	1046477

### Multi-layer Safety Diaphragm (Standard)

	Order no.
FM 130 (type: 16050, 16090, 16130)	1029771
FM 350 (type: 07120, 07220, 04350)	1033422

### Metering Diaphragm (Old Version)

	Order no.
Sigma with FM 130 identity code: Type 16050, 16090, 16130	792495
Sigma with FM 350 identity code: Type 07120, 07220, 04350	792496

### Spare Parts Kits for Integrated Relief Valve

Consisting of two compression springs made from Hastelloy C and four FKM-A and EPDM O-rings each

	For material	Seals	Order no.
Spare parts kits for integrated relief valve 4 bar	PVT/SST	FKM-A/EPDM	1031199
Spare parts kits for integrated relief valve 7 bar	PVT/SST	FKM-A/EPDM	1031200
Spare parts kits for integrated relief valve 10 bar	PVT	FKM-A/EPDM	1031201
Spare parts kit for relief valve 16 bar	SST	FKM-A/EPDM	1031203

### Gear Oil

	Volume l	Order no.
Mobilgear 634 VG 460 gear oil	1	1004542

### Accessories

- Foot Valves see page
- Injection Valves see page
- Connector Parts, Seals, Hoses see page → 1-189
- Suction Lances/Suction Assemblies see page → 1-183
- Speed Controllers see page → 1-203
- Metering monitor Flow Control set up for motor-driven metering pumps see page → 1-198

### Spare Parts

- Custom Accessories See page

