Motor-Driven Metering Pumps

“Motor-Driven Metering Pumps” T.O.C.

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- Hydro 2 API 675
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Overview: Sigma/ 1 control type (S1Cb)

The Sigma/1 motor diaphragm metering pumps are produced with a high-strength inner housing for parts subject to load as well as an additional plastic housing to protect against corrosion. The capacity range extends from 5.3 to 38 gph (20 - 144 l/h) and pressures up to 174 psig (12 bar). Stroke length is 0.16 in

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

In all motor-driven metering pumps without integrated overload protection, for safety reasons, suitable overload protection must be provided during installation. (see page 148 for spare parts)

Sigma/ 1 Basic Type (S1Ba)

The Sigma/ 1 basic type is a motor-driven metering pump without internal electronics. Various NEMA 56C frame motors can be used depending upon the application requirements. The Sigma 1 Basic pump is also suitable for use with inverter duty and DC motors for varying flow requirements.
**ProMinent® Sigma X: Sigma/1 Motor Diaphragm Metering Pumps**

**Sigma/1 control type (S1Cb)**

For optional control via contact or analog signals (e.g. 0/4 - 20 mA) the Sigma control type results in good adaptability, even in fluctuating metering requirements. The microprocessor control is an optimum combination of speed control and stop & go operation, i.e. it works in a wide control field with customized fine adjustment. Moreover it enables an optimum metering result thanks to the metering behavior of the metering pump being matched to the chemicals or application. The control system measures the movement and speed profile in conjunction with the power demand. This leads to a real reduction in the actually required power, which means an increase in efficiency.

**Detachable operating unit (HMI)**

The operating unit (HMI) can be attached directly to the metering pump or mounted on the wall alongside the pump or completely removed. This provides the operator with a wide range of options for the integration of a metering system into the overall system that it is readily accessible and easy to use. Moreover, the removable operating unit offers additional protection against unauthorized operation of the metering pump or against changing of the pump settings. The Sigma X features a NEW removable HMI control unit with innovative click-wheel and 4 operating buttons. An illuminated LCD display provides information about the relevant operating status. LEDs on the operating unit and the control unit indicate the active pump functions or the pump status.

**Diaphragm rupture warning system**

The liquid end has a patented multilayer safety diaphragm as standard and a visual diaphragm rupture indicator. The diaphragm is coated on both sides with PTFE film. This coating ensures that no leakage to the outside occurs even if the diaphragm ruptures. If the diaphragm ruptures, feed chemical enters between the diaphragm layers and thus triggers a mechanical indication or an alarm via the sensor area. This concept ensures reliable metering - even under critical operating conditions.
Metering profiles

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

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

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

In the mode with the optimized suction stroke (Diagram 3), the suction stroke is carried out as slowly as possible, which permits precise and trouble-free metering of viscous and gaseous media. This setting should also be chosen to minimize the NPSH value.
ProMinent® Sigma X: Sigma/1
Motor Diaphragm Metering Pumps

Specifications (S1Ba and S1Cb)

General:
Maximum stroke length: 0.16" (4.0 mm)
Power cord: 6 feet (2 m) 2 wire + ground (supplied on control versions)
Stroke frequency control: S1Ba: Constant speed or optional DC/SCR drive or AC inverter
S1Cb: Microprocessor control version with innovative start/stop and variable speed control proportional to set frequency or external control signal.
Stroke counting: Standard on S1Cb
Materials of construction
Housing: Glass-filled Luranyl™ (PPE)
Wetted materials of construction:
Liquid End
PVDF 316 SS
Suct./Dis. Connectors
PVDF 316 SS
Seals
PTFE/Viton®
PTFE/Viton®
Check Balls
Ceramic SS
Pressure Relief Valves:
PVDF/Viton® O-rings
SS/Viton® O-rings
Viscosity ranges:
Liquid end version
Max. strokes/min
Viscosity (mPas)
Standard
180 0-200
With valve springs
130 200-500
With valve springs and suction-side feed
90 500-1000*
* Only when properly installed & adjusted
Sound pressure level:
Sound pressure level LpA < 70 dB in accordance with EN ISO 20361:2010-10 at max. stroke length, max. stroke rate, max. back pressure (water)
Drive:
Cam and spring-follower (lost motion)
Lubrication:
Sealed grease lubricated bearings and gearing
Warranty:
Two years on drive, one year on liquid end.
Factory testing:
Each pump is tested for rated flow at maximum pressure.
Industry Standard:
CE approved, CSA available (standard in Canada), NSF/ANSI 61
Diaphragm materials:
PTFE faced EPDM with Nylon reinforcement and steel core
Liquid end options:
Polyvinylidene Fluoride (PVDF) or 316 SS, with PTFE faced Viton® seals
Check valves:
Single ball check, PVDF and SS versions.
Optional springs available in Hastelloy C
Repeatability:
When used according to the operating instructions, better than ±2%
Max. fluid operating temp:
Material
PVDF
316 SS
Constant
149°F (65°C)
194°F (90°C)
Short Term
(15 min. @ max. 30 psi)
212°F (100°C)
248°F (120°C)
Diaphragm failure indication:
Visual indicator is mandatory. The delivery unit has a patented multilayer safety diaphragm as standard and a visual diaphragm rupture indicator.
Max. solids size in fluid:
0.3 mm
Stroke length adjustment:
Manual, in increments of 1%. Motorized stroke length adjustment is available.
Sigma/1 Basic Version
Motor:
See available motors in Identcode
Sigma/1 Control Version

Control Function: At stroke frequencies equal to or greater than 33%, the integral AC variable frequency drive continuously varies the motor speed in a linear response to the incoming signal. At stroke frequencies less than 33%, the motor starts and stops according to a control algorithm to provide the desired stroke frequency. In the start-stop mode the motor speed is constant at approximately 580 RPM.

Enclosure rating: (IP 65)

Pump power requirements: ph, 115V-230V, 50/60 Hz (internally converted to drive below motor)

Motor data: (0.09 kW) 230 V, 3 phase (0.7 A)

Relay load

Fault relay only (option 1): Contact load: 230 VAC, 8 A, 50/60 Hz

Operating life: > 200,000 switch functions

Fault and pacing relay Contact load: max. 24 V, AC/DC, max. 100 mA

(Contact 3): maximum 200,000 switch cycles

Contact closure: 100 ms (for pacing relay)

Analog output signal: maximum impedance 300 W

Isolated 4-20 mA output signal

BUS interface options available: CANopen, PROFIBUS DP

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 + 10%, 50/60 Hz
## ProMinent® Sigma X: Sigma/1 S1Cb
### Motor Diaphragm Metering Pumps

#### Capacity Data (S1Ba)

**Capacity data: Sigma/ 1 Basic Version**

<table>
<thead>
<tr>
<th>Pump version</th>
<th>Capacity at Max. Backpressure</th>
<th>Max. Stroke Rate</th>
<th>Output per Stroke</th>
<th>Max. Suction Lift</th>
<th>Max. Suction Pressure</th>
<th>Suction/Discharge Connector</th>
<th>Shipping Weight w/Motor (approx.)</th>
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<tbody>
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<td>S1Ba H</td>
<td>psig (bar) GPH (L/h) smp mL/stroke ft (m) psig (bar) in (DN) lbs (kg)</td>
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#### Capacity Data (S1Cb)

**Capacity data: Sigma/ 1 Control Version**

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#### Materials In Contact With Chemicals

<table>
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<tr>
<th>Liquid End</th>
<th>Suction/Discharge connector</th>
<th>Valve</th>
<th>Seals/ ball seat</th>
<th>Balls</th>
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<tr>
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<td>PVDF (Polyvinylidenefluoride)</td>
<td>PVDF (Polyvinylidenefluoride)</td>
<td>PTFE/PTFE Ceramic</td>
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<td>Stainless steel</td>
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**ProMinent® Sigma X: Sigma/1 S1Ba**

**Motor Diaphragm Metering Pumps**

**Identcode Ordering System (S1Ba)**

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<th>Position</th>
<th>Capacity</th>
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<td></td>
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<td>20.6 gph (78 l/h), 102 psi (7 bar)</td>
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<td>13.3 gph (50 l/h), 102 psi (7 bar)</td>
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<td>26.6 gph (100 l/h), 58 psi (4 bar)</td>
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<td>38 gph (144 l/h), 58 psi (4 bar)</td>
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**Liquid End Material:**
- PV: PVDF
- SS: 316 Stainless Steel

**Seal:**
- T: PTFE seal

**Diaphragm Type:**
- A: Safety diaphragm w/pump stop function
- S: Safety diaphragm w/visual indicator

**Liquid End Version:**
- 0: Without valve springs
- 1: With 2 valve springs (Hastelloy C4, 1 psig)

**Hydraulic Connections:**
- 7: PVDF clamping nut & insert
- 8: SS clamping nut & insert

**Logo:**
- 0: Standard with logo

**Electrical Connection (± 10%):**
- S: 3 ph, 230 V/400 V, 50/60 Hz
- M: 1 ph, AC, 230 V, 50/60 Hz
- N: 1 ph, AC, 115 V 60 Hz
- K: 90 VDC Permanent magnet
- 3: Without motor, B5

**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 moto 4-20 mA, 230 V 50/60 Hz
- 6: W/ stroke positioning motor 4-20 mA, 115 V 50/60 Hz
**ProMinent® Sigma X: Sigma/1 S1Cb**

**Motor Diaphragm Metering Pumps**

**Identcode Ordering System (S1Cb)**

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**Version:**

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<tbody>
<tr>
<td>12017: 5.5 gph (21 l/h), 145 psi (10 bar)</td>
</tr>
<tr>
<td>12035: 11.1 gph (42 l/h), 145 psi (10 bar)</td>
</tr>
<tr>
<td>10050: 12.9 gph (49 l/h), 145 psi (10 bar)</td>
</tr>
<tr>
<td>10022: 7.1 gph (27 l/h), 145 psi (10 bar)</td>
</tr>
<tr>
<td>10044: 14 gph (53 l/h), 145 psi (10 bar)</td>
</tr>
</tbody>
</table>

**Capacity:**

<table>
<thead>
<tr>
<th>Note: For SS versions see capacity data</th>
</tr>
</thead>
</table>

**Liquid end material:**

<table>
<thead>
<tr>
<th>PV</th>
<th>PVDF</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS</td>
<td>Stainless Steel</td>
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</tbody>
</table>

**Seal:**

<table>
<thead>
<tr>
<th>T</th>
<th>PTFE seal</th>
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</table>

**Diaphragm type:**

<table>
<thead>
<tr>
<th>S</th>
<th>Multi-layer safety diaphragm w/ visual indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Multi-layer safety diaphragm w/ pump stop function</td>
</tr>
</tbody>
</table>

**Liquid end version:**

<table>
<thead>
<tr>
<th>0</th>
<th>Without valve spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>With 2 valve springs</td>
</tr>
</tbody>
</table>

**Hydraulic connections:**

<table>
<thead>
<tr>
<th>7</th>
<th>PVDF clamping nut &amp; insert</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Stainless steel clamping nut &amp; insert</td>
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</tbody>
</table>

**Logo:**

<table>
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<th>Standard with logo</th>
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**Electrical Connection (± 10%):**

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<tr>
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</table>

**Cable and plug:**

<table>
<thead>
<tr>
<th>8</th>
<th>Open end 3m UL/CSA 115/230V</th>
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<tbody>
<tr>
<td>D</td>
<td>North American plug, 115 V</td>
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<tr>
<td>X</td>
<td>Without cable</td>
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**Relay:**

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<tr>
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<th>No relay</th>
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<tbody>
<tr>
<td>1</td>
<td>Fault indicating relay</td>
</tr>
<tr>
<td>3</td>
<td>Option 1 + pacing relay</td>
</tr>
<tr>
<td>8</td>
<td>4-20 mA output + fault/pacing relay</td>
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</tbody>
</table>

**Control variant:**

<table>
<thead>
<tr>
<th>0</th>
<th>Manual + External with pulse control (mult/div)</th>
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<tr>
<td>1</td>
<td>Manual + External with pulse control &amp; analog</td>
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<tr>
<td>6</td>
<td><em>Option 1 + PROFIBUS® (M12 plug)</em></td>
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**Over Pressure Shut-off:**

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**Operating unit (HMI):**

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<thead>
<tr>
<th>0</th>
<th>HMI + 1.6' (0.5m) cable</th>
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</thead>
<tbody>
<tr>
<td>4</td>
<td>HMI + 6.5' (2.0 m) cable</td>
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<tr>
<td>5</td>
<td>HMI + 16.4' (5.0 m) cable</td>
</tr>
<tr>
<td>6</td>
<td>HMI + 32.8' (10.0 m) cable</td>
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<tr>
<td>X</td>
<td>Without HMI</td>
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**Access Code:**

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<tr>
<td>1</td>
<td>Access code</td>
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</tbody>
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**Language:**

| EN | English |

**Approval:**

| 01 | CE |

---

*S1Cb: H 12017 PV T S 0 0 0 0 U D 0 0 0 0 S EN 01*
# Dimensional Drawing: (S1Ba)

## Dimensions in inches (mm)

<table>
<thead>
<tr>
<th>Type Sigma/1</th>
<th>A</th>
<th>B</th>
<th>C*</th>
<th>D</th>
<th>D1**</th>
<th>E</th>
<th>E1**</th>
<th>ØF</th>
</tr>
</thead>
<tbody>
<tr>
<td>12017, 12035, 10050, 10022, 10044, 07065</td>
<td>11 (279)</td>
<td>9.38 (238)</td>
<td>1/2&quot; MNPT</td>
<td>3.54 (90)</td>
<td>4.33 (110)</td>
<td>10.8 (275)</td>
<td>11.6 (295)</td>
<td>3.8 (96)</td>
</tr>
<tr>
<td>SST</td>
<td>9.75 (248)</td>
<td>7.13 (181)</td>
<td>1/2&quot; FNPT</td>
<td>3.5 (89)</td>
<td>4.29 (109)</td>
<td>10.8 (275)</td>
<td>11.6 (295)</td>
<td>3.8 (96)</td>
</tr>
<tr>
<td>07042, 04084, 04120</td>
<td>11.38 (289)</td>
<td>10 (254)</td>
<td>3/4&quot; MNPT</td>
<td>3.74 (95)</td>
<td>4.52 (115)</td>
<td>11.2 (285)</td>
<td>12 (305)</td>
<td>4.8 (122)</td>
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<tr>
<td>SST</td>
<td>13.3 (337)</td>
<td>13.1 (332)</td>
<td>DN 25</td>
<td>4.5 (115)</td>
<td>5.3 (135)</td>
<td>13.4 (340)</td>
<td>14.2 (360)</td>
<td>5.8 (148)</td>
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</table>

* Piping adapters provided according to technical data.
** Dimensions with diaphragm failure detector.
### Dimensions in inches (mm)

<table>
<thead>
<tr>
<th>Type Sigma 1</th>
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<th>B</th>
<th>C*</th>
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<tr>
<td>PVT</td>
<td>9.2 (234)</td>
<td>3.4 (87)</td>
<td>1/2” (MNPT)</td>
<td>3.7 (93)</td>
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<tr>
<td>SS</td>
<td>9.1 (231)</td>
<td>3.5 (89)</td>
<td>3/8” (MNPT)</td>
<td>3.6 (92)</td>
<td>4.3 (109)</td>
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<tr>
<td><strong>10022, 10044, 07065</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PVT</td>
<td>9.2 (234)</td>
<td>3.4 (87)</td>
<td>1/2” (MNPT)</td>
<td>4.6 (117)</td>
<td>4.3 (109)</td>
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<tr>
<td>SS</td>
<td>9.1 (231)</td>
<td>3.5 (89)</td>
<td>3/8” (MNPT)</td>
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<td>4.3 (109)</td>
</tr>
<tr>
<td><strong>07042, 04084, 04120</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PVT</td>
<td>9.6 (243)</td>
<td>3.1 (78)</td>
<td>3/4” MNPT</td>
<td>3.9 (98)</td>
<td>4.7 (119)</td>
</tr>
<tr>
<td>SS</td>
<td>9.6 (243)</td>
<td>3.1 (78)</td>
<td>1/2” (MNPT)</td>
<td>3.8 (97)</td>
<td>4.6 (118)</td>
</tr>
</tbody>
</table>

* Suction/Discharge valve thread

Piping adapters provided according to technical data
The Sigma/2 motor diaphragm metering pumps are produced with a high-strength inner housing for parts subject to load as well as an additional plastic housing to protect against corrosion. The capacity range extends from 14.7 to 111 gph (56 - 420 l/h) and pressures up to 232 psig (16 bar). Stroke length is 0.20 in.

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

In all motor-driven metering pumps without integrated overload protection, for safety reasons, suitable overload protection must be provided during installation. (see page 146 for spare parts)

The Sigma/2 basic type is a motor-driven metering pump without internal electronics. Various NEMA 56C frame motors can be used depending upon the application requirements. The Sigma 2 Basic pump is also suitable for use with inverter duty and DC motors for varying flow requirements.
**Sigma/2 control type (S2Cb)**

For optional control via contact or analog signals (e.g. 0/4 - 20 mA) the Sigma control type results in good adaptability, even in fluctuating metering requirements. The microprocessor control is an optimum combination of speed control and stop & go operation, i.e. it works in a wide control field with customized fine adjustment. Moreover it enables an optimum metering result thanks to the metering behavior of the metering pump being matched to the chemicals or application. The control system measures the movement and speed profile in conjunction with the power demand. This leads to a real reduction in the actually required power, which means an increase in efficiency.

**Detachable operating unit (HMI)**

The operating unit (HMI) can be attached directly to the metering pump or mounted on the wall alongside the pump or completely removed. This provides the operator with a wide range of options for the integration of a metering system into the overall system that it is readily accessible and easy to use. Moreover, the removable operating unit offers additional protection against unauthorized operation of the metering pump or against changing of the pump settings. The Sigma X features a NEW removable HMI control unit with innovative click-wheel and 4 operating buttons. An illuminated LCD display provides information about the relevant operating status. LEDs on the operating unit and the control unit indicate the active pump functions or the pump status.

**Diaphragm rupture warning system**

The liquid end has a patented multilayer safety diaphragm as standard and a visual diaphragm rupture indicator. The diaphragm is coated on both sides with PTFE film. This coating ensures that no leakage to the outside occurs even if the diaphragm ruptures. If the diaphragm ruptures, feed chemical enters between the diaphragm layers and thus triggers a mechanical indication or an alarm via the sensor area. This concept ensures reliable metering - even under critical operating conditions.
Metering profiles

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

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

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

In the mode with the optimized suction stroke (Diagram 3), the suction stroke is carried out as slowly as possible, which permits precise and trouble-free metering of viscous and gaseous media. This setting should also be chosen to minimize the NPSH value.
ProMinent® Sigma X: Sigma/2
Motor Diaphragm Metering Pumps

Specifications (S2Ba and S2Cb)

General:
- **Maximum stroke length:** 0.196" (5.0 mm) HM; 0.6" (15 mm) HK
- **Power cord:** 6 feet (2 m) 2 wire + ground (supplied on control versions)
- **Stroke frequency control:**
  - S2Ba: Constant speed or optional DC/SCR drive or AC inverter
  - S2Cb: Microprocessor control version with innovative start/stop and variable speed control proportional to set frequency or external control signal.
- **Stroke counting:** Standard on S2Cb
- **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
- **Viscosity ranges:**
  - Liquid end version
    - **Max. strokes/min**
      - **Standard:** 180
      - **With valve springs:** 130
  - **Viscosity (mPas)**
    - **Standard:** 0-200
    - **With valve springs:** 200-500
    - **With valve springs and suction-side feed:** 500-1000
      - *Only when properly installed & adjusted*
- **Sound pressure level:** Sound pressure level LpA < 70 dB in accordance with EN ISO 20361:2010-10 at max. stroke length, max. stroke rate, max. back pressure (water)
  - **Drive:** Cam and spring-follower (lost motion)
  - **Lubrication:** Oil lubricated
  - **Recommended oil:** ISO VG 460, such as Mobil Gear Oil 634
  - **Oil quantity:** Approximately 0.6 quart (550 mL)
- **Recommended oil change interval:** 5,000 hours
- **Warranty:** Two years on drive, one year on liquid end
- **Industry Standard:** CE approved, CSA available (standard in Canada), NSF/ANSI 61

Sigma 2 Diaphragm:
- **Diaphragm materials:** PTFE faced EPDM with Nylon reinforcement and steel core
- **Liquid end options:** Polyvinylidene Fluoride (PVDF) or 316 SS, with PTFE seals
- **Check valves:** Single ball check, PVDF and SS versions.
  - Optional springs available in Hastelloy C
- **Repeatability:** When used according to the operating instructions, better than ±2%
- **Max. fluid operating temperatures:**
  - **Material**
    - PVDF
      - **Constant** 149°F (65°C)
      - **Short Term** 212°F (100°C)
    - 316 SS
      - **Constant** 194°F (90°C)
      - **Short Term** 248°F (120°C)
- **Diaphragm failure indication:** Visual indicator is mandatory. The delivery unit has a patented multilayer safety diaphragm as standard and a visual diaphragm rupture indicator.
- **Separation of drive from liquid end:** An air gap with secondary safety diaphragm separates the drive from the liquid end to prevent cross contamination of oil and process fluid (with or without diaphragm failure indication).
  - **Max. solids size in fluid:** 0.3 mm
  - **Stroke length adjustment:** Manual, in increments of 0.5%. Motorized stroke length adjustment is available.

Sigma 2 Packed Plunger:
- **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**
    - 316 SS
      - **Constant** 392°F (200°C)
      - **Short Term** 428°F (220°C)
- **Stroke length adjustment:** Manual, in increments of 0.2%. Motorized stroke length control is optional.
ProMinent® Sigma X: Sigma/2
Motor Diaphragm Metering Pumps

Specifications (S2Ba and S2Cb) 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 = 158 SPM, 7.25:1 = 238 SPM

Motor coupling: Flexible coupling included with pump

Required Motor HP: 1/3 HP (0.25 kW)

Full load RPM: 1750 RPM (60 Hz)

Stroke sensor (optional): Hall effect - requires 5 VDC

Sigma 2 Control Version

Control Function: At stroke frequencies equal to or greater than 33%, the integral AC variable frequency drive continuously varies the motor speed in a linear response to the incoming signal. At stroke frequencies less than 33%, the motor starts and stops according to a control algorithm to provide the desired stroke frequency. In the start-stop mode the motor speed is constant at approximately 580 RPM.

Enclosure rating: IP 65

Pump power requirements: 1ph, 115V-230V, 50/60 Hz (internally converted to drive below motor)

Motor data: Totally enclosed, fan cooled (IP55); class F insulation; Manufacturer ATB; 0.25 kW (0.33 HP) 230 3 phase (1.2 A, 1690 rpm)

Relay load
Fault relay only (Option 1): Contact load: 250 VAC, 8 A, 50/60 Hz
Operating life: > 200,000 switch functions

Fault relay with pacing relay (Option 3): Fault Relay
Contact load: 24 V, 8 A, 50/60 Hz
Operating life: > 200,000 switch functions
Pacing relay
Residual impedance in ON-position ($R_{\text{on}}$): < 8 Ω
Residual current in OFF-position: < 1 μA
Maximum voltage: 24 VDC
Maximum current: < 100 mA (for pacing relay)
Switch functions: 750 x 10⁶
Contact closure: 100 ms (for pacing relay)

Air Humidity
Max. air humidity*: 95% rel. humidity
* non-condensing

Fuse: Internal, 6.3 AT - (1.5 kA)

Analog output signal: Max. impedance 300 Ω
Isolated 4-20 mA output signal

Bus interface options available: CANopen, PROFIBUS DP

Relay cable (optional): 6 feet (2 m) 3 wire (SPDT) 250 VAC, 2 A

Pulse contact/remote pause contact: With voltage-free contact, or semiconductor sink logic control (not source logic) with a residual voltage of < 700 mV. The contact load is approximately 0.5 mA at + 5 VDC. (Note: Semiconductor contacts that require > 700 mV across a closed contact should not be used.)

Contact input max. pulse frequency: 25 pulses/sec
Contact input impedance: 10 kΩ
Max. pulse memory: 65,535 pulses
Necessary contact duration: 20 ms

Analog - current input burden: Approximately 120 Ohm
Max. allowable input current: 50 mA
Input power requirements: single phase, 115-230 VAC
# Capacity Data (S2Ba)

## Capacity data: Sigma/2 Basic Version

<table>
<thead>
<tr>
<th>Pump Version</th>
<th>Capacity at Max. Backpressure</th>
<th>Max. Stroke Rate</th>
<th>Output per Stroke</th>
<th>Max. Suction Lift</th>
<th>Max. Suction Pressure</th>
<th>Suction/Discharge Connector</th>
<th>Shipping Weight w/Motor (approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S2Ba H</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Max. Suction</td>
</tr>
<tr>
<td>16050 PVT</td>
<td>145</td>
<td>15.8</td>
<td>87</td>
<td>11.4</td>
<td>23</td>
<td>(7) 44 (3)</td>
<td>1/2 MNPT (15) 33 (15)</td>
</tr>
<tr>
<td>16050 SST</td>
<td>232</td>
<td>14.7</td>
<td>87</td>
<td>11.4</td>
<td>23</td>
<td>(7) 44 (3)</td>
<td>1/2 FNPT (15) 44 (20)</td>
</tr>
<tr>
<td>16090 PVT</td>
<td>145</td>
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<td>158</td>
<td>11.4</td>
<td>23</td>
<td>(7) 44 (3)</td>
<td>3/4 MNPT (15) 33 (15)</td>
</tr>
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<td>158</td>
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<td>(7) 44 (3)</td>
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<td>238</td>
<td>10.9</td>
<td>23</td>
<td>(7) 44 (3)</td>
<td>3/4 MNPT (15) 33 (15)</td>
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<td>39.0</td>
<td>238</td>
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<td>(7) 44 (3)</td>
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<td>87</td>
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<td>04350 SST</td>
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<td>29.4</td>
<td>16</td>
<td>(5) 15 (1)</td>
<td>1 MNPT (25) 35 (16)</td>
</tr>
</tbody>
</table>

## Capacity Data (S2Cb)

## Capacity data: Sigma/2 Control Version

<table>
<thead>
<tr>
<th>Pump Version</th>
<th>Capacity at Max. Backpressure</th>
<th>Max. Stroke Rate</th>
<th>Output per Stroke</th>
<th>Max. Suction Lift</th>
<th>Max. Suction Pressure</th>
<th>Suction/Discharge Connector</th>
<th>Shipping Weight w/Motor (approx.)</th>
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<td>Max. Suction</td>
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<td>90</td>
<td>11.4</td>
<td>23</td>
<td>(7) 29 (2)</td>
<td>1/2 MNPT (15) 33 (15)</td>
</tr>
<tr>
<td>16050 SST</td>
<td>232</td>
<td>14.7</td>
<td>90</td>
<td>10.4</td>
<td>23</td>
<td>(7) 29 (2)</td>
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<tr>
<td>16090 PVT</td>
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<td>28.8</td>
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<td>(7) 29 (2)</td>
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<td>(7) 29 (2)</td>
<td>3/4 MNPT (15) 33 (15)</td>
</tr>
<tr>
<td>16130 SST</td>
<td>232</td>
<td>34.1</td>
<td>200</td>
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<td>23</td>
<td>(7) 29 (2)</td>
<td>1/2 FNPT (15) 44 (20)</td>
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<tr>
<td>07120 PVT</td>
<td>102</td>
<td>39.6</td>
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<td>27.4</td>
<td>16</td>
<td>(5) 15 (1)</td>
<td>3/4 MNPT (25) 35 (16)</td>
</tr>
<tr>
<td>07120 SST</td>
<td>102</td>
<td>39.6</td>
<td>90</td>
<td>27.4</td>
<td>16</td>
<td>(5) 15 (1)</td>
<td>3/4 MNPT (25) 35 (16)</td>
</tr>
<tr>
<td>07220 PVT</td>
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<td>69.7</td>
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<td>(5) 15 (1)</td>
<td>3/4 MNPT (25) 35 (16)</td>
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<tr>
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<td>69.7</td>
<td>160</td>
<td>27.4</td>
<td>16</td>
<td>(5) 15 (1)</td>
<td>3/4 MNPT (25) 35 (16)</td>
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<tr>
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<td>1 MNPT (25) 35 (16)</td>
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<td>04350 SST</td>
<td>58</td>
<td>111.0</td>
<td>200</td>
<td>29.4</td>
<td>16</td>
<td>(5) 15 (1)</td>
<td>1 MNPT (25) 35 (16)</td>
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</table>

## Materials In Contact With Chemicals

<table>
<thead>
<tr>
<th>Liquid End</th>
<th>Suction/Discharge connector</th>
<th>Valve</th>
<th>Seals/ ball seat</th>
<th>Balls</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVT</td>
<td>PVDF (Polyvinylidenfluoride)</td>
<td>PVDF</td>
<td>PTFE/PTFE</td>
<td>Ceramic</td>
</tr>
<tr>
<td>SST</td>
<td>Stainless steel</td>
<td>Stainless steel</td>
<td>PTFE/PTFE</td>
<td>Stainless steel</td>
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</tbody>
</table>
Identcode Ordering System (S2Ba)

**ProMinent® Sigma X: Sigma/2 Motor Diaphragm Metering Pumps**

### Drive Type

- **H Main Drive, Diaphragm**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>16050</td>
<td>PV</td>
<td>T</td>
<td>S Safety diaphragm w/ visual indicator</td>
<td>0 Without valve springs</td>
<td>0 No nuts, No inserts</td>
<td>0 Standard with logo</td>
<td>2 Without motor, with NEMA 56C flange</td>
<td>0 Standard</td>
<td>0 Without stroke sensor (Standard)</td>
<td>0 Manual (Standard)</td>
</tr>
<tr>
<td></td>
<td>16090</td>
<td>PV</td>
<td>T</td>
<td>S Safety diaphragm w/ pump stop function</td>
<td>1 With 2 valve springs (Hastelloy C4, 1 psig)</td>
<td>7 PVDF clamping nut &amp; insert</td>
<td>0 Standard with logo</td>
<td>2 Without motor, with NEMA 56C flange</td>
<td>0 Standard</td>
<td>4 W/ stroke positioning motor 4-20 mA, 230 V 50/60 Hz</td>
<td>0 W/ stroke positioning motor 4-20 mA, 115 V 50/60 Hz</td>
</tr>
<tr>
<td></td>
<td>16130</td>
<td>PV</td>
<td>T</td>
<td>S Safety diaphragm w/ pump stop function</td>
<td>1 With 2 valve springs (Hastelloy C4, 1 psig)</td>
<td>8 SS clamping nut &amp; insert</td>
<td>0 Standard with logo</td>
<td>2 Without motor, with NEMA 56C flange</td>
<td>0 Standard</td>
<td>4 W/ stroke positioning motor 4-20 mA, 230 V 50/60 Hz</td>
<td>0 W/ stroke positioning motor 4-20 mA, 115 V 50/60 Hz</td>
</tr>
</tbody>
</table>

- **Liquid end material:**
  - PV PVDF
  - SS 316 Stainless Steel

- **Seal:**
  - T PTFE seal

- **Diaphragm type:**
  - S Safety diaphragm w/ visual indicator
  - A Safety diaphragm w/ pump stop function

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

- **Hydraulic connections:**
  - 0 No nuts, No inserts
  - 7 PVDF clamping nut & insert
  - 8 SS clamping nut & insert

- **Logo:**
  - 0 Standard with logo

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

- **Enclosure rating:**
  - 0 Standard

- **Stroke sensor:**
  - 0 Without stroke sensor (Standard)

- **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

---

DULCOMETER® instrumentation
DULCOTEST® sensors

pump spare parts & accessories
polymer blending & dry feed solutions
### ProMinent® Sigma X: Sigma/2
Motor Diaphragm Metering Pumps

#### Identcode Ordering System (S2Cb)

<table>
<thead>
<tr>
<th>S2Cb</th>
<th>Drive Type</th>
<th>Capacity:</th>
<th>H</th>
<th>Main Drive, Diaphragm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>07120</td>
<td>39.6 gph (150 l/h), 102 psi (7 bar)</td>
</tr>
<tr>
<td>16050</td>
<td></td>
<td>16.1 gph (61 l/h), 145 psi (10 bar)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16090</td>
<td></td>
<td>29.9 gph (109 l/h), 145 psi (10 bar)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16130</td>
<td></td>
<td>34.6 gph (131 l/h), 145 psi (10 bar)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>07220</td>
<td>71.6 gph (271 l/h), 102 psi (7 bar)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>04250</td>
<td>93.3 gph (353 l/h), 58 psi (4 bar)</td>
</tr>
</tbody>
</table>

**Note:** For SS versions see capacity data

#### Liquid end material:
- PVDF
- SS Stainless Steel

#### Seal:
- T PTFE seals

#### Diaphragm type:
- S Multi-layer safety diaphragm w/ visual indicator
- A Multi-layer safety diaphragm w/ pump stop function

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

#### Hydraulic connections:
0 No Nuts, no inserts
7 PVDF clamping nut & insert
8 Stainless steel clamping nut & insert

#### Logo:
0 Standard with ProMinent logo

#### Electrical Connection (± 10%):
- U 1ph, 115 V - 230 V 50/60Hz

#### Cable and plug:
- B Open end 3m UUCSA 115/230V
- D North American plug, 115 V
- X Without cable

#### Relay:
0 No relay
1 Fault indicating relay
3 Option 1 + pacing relay
8 4-20 mA output + fault/pacing relay

#### Control variant:
0 Manual + External with pulse control (mult/div)
1 Manual + External with pulse control & analog
6 *Option 1 + PROFIBUS® (M12 plug)

#### Over Pressure Shut-off:
0 Without over pressure shut-off

#### Operating unit (HMI):
0 HMI + 1.64' (0.5) cable
4 HMI + 6.6' (2.0 m) cable
5 HMI + 16.6' (5.0 m) cable
6 HMI + 32.8' (10.0 m) cable
X Without HMI

#### Access Code:
0 Without access code
1 Access code

#### Language:
- EN English

#### Approval:
01 CE

---

*With the option PROFIBUS®-DP no relay can be selected*
## Dimensions in inches (mm)

<table>
<thead>
<tr>
<th>Type Sigma/2</th>
<th>A</th>
<th>B</th>
<th>C*</th>
<th>D</th>
<th>D1**</th>
<th>E</th>
<th>E1**</th>
<th>ØF</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVT 16050, 16090, 16130</td>
<td>10.1 (257)</td>
<td>6.95 (177)</td>
<td>DN 15</td>
<td>4.1 (104)</td>
<td>4.9 (124)</td>
<td>13.0 (329)</td>
<td>13.7 (349)</td>
<td>4.0 (101)</td>
</tr>
<tr>
<td>SST 07120, 07220</td>
<td>10.9 (276)</td>
<td>8.2 (208)</td>
<td>DN 15</td>
<td>4.1 (104)</td>
<td>4.9 (124)</td>
<td>13.0 (329)</td>
<td>13.7 (349)</td>
<td>4.0 (101)</td>
</tr>
<tr>
<td>PVT 04350</td>
<td>13.3 (337)</td>
<td>13.1 (332)</td>
<td>DN 25</td>
<td>4.5 (115)</td>
<td>5.3 (135)</td>
<td>13.4 (340)</td>
<td>14.2 (360)</td>
<td>5.8 (148)</td>
</tr>
<tr>
<td>SST 04350</td>
<td>13.3 (337)</td>
<td>13.1 (332)</td>
<td>DN 25</td>
<td>4.5 (115)</td>
<td>5.3 (135)</td>
<td>13.4 (340)</td>
<td>14.2 (360)</td>
<td>5.8 (148)</td>
</tr>
</tbody>
</table>

* Piping adapters provided according to technical data.
** Dimensions with diaphragm failure detector.
ProMinent® Sigma X: Sigma/2
Motor Diaphragm Metering Pumps

Dimensional Drawing: (S2Cb)

Dimensions in inches (mm)

<table>
<thead>
<tr>
<th>Type Sigma 2</th>
<th>A</th>
<th>B</th>
<th>C*</th>
<th>D</th>
<th>E</th>
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<tr>
<td>16050, 16090, 16130</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>PVT</td>
<td>10.1 (257)</td>
<td>6.95 (177)</td>
<td>DN 15</td>
<td>4.4 (111)</td>
<td>5.7 (144)</td>
</tr>
<tr>
<td>SS</td>
<td>10.9 (276)</td>
<td>8.2 (208)</td>
<td>DN 15</td>
<td>4.3 (110)</td>
<td>5.2 (133)</td>
</tr>
<tr>
<td>07120, 07220</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PVT</td>
<td>13.3 (337)</td>
<td>2.04 (52)</td>
<td>DN 25</td>
<td>4.6 (117)</td>
<td>6.1 (155)</td>
</tr>
<tr>
<td>SS</td>
<td>13.3 (337)</td>
<td>2.08 (53)</td>
<td>DN 25</td>
<td>4.6 (117)</td>
<td>5.8 (147)</td>
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<tr>
<td>04350</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PVT</td>
<td>14.3 (362)</td>
<td>2.04 (52)</td>
<td>DN25</td>
<td>4.6 (117)</td>
<td>6.1 (155)</td>
</tr>
<tr>
<td>SS</td>
<td>14.3 (362)</td>
<td>2.08 (53)</td>
<td>DN25</td>
<td>4.6 (117)</td>
<td>5.8 (147)</td>
</tr>
</tbody>
</table>

* Suction/Discharge valve thread

Piping adapters provided according to technical data
**ProMinent® Sigma/ 2 HK**

**Plunger Metering Pumps**

---

**Overview: Sigma/2 HK**

Ideal for high pressure applications requiring significant turndown

The ProMinent® Sigma/ 2 HK is a 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 15.9-111.0 gph (60-420 l/h) at a maximum back pressure of 174-4,640 psi (12-320 bar). The pump capacity is adjusted by varying the stroke length 0.2 in (5 mm) in .2% increments via a self-locking adjusting knob.

The reproducible metering accuracy is better than ±1% providing installation has been correctly carried out, and in the stroke length range of 10-100%. (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. For safety reasons, all motor-driven metering pumps must be equipped with adequate protection against electrical overload.

---

**Sigma/ 2 HK Basic Type (S2Ba)**

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

Different flanges are available so that customers can use their own motor to drive the pump.
**ProMinent® Sigma/ 2 HK**

**Plunger Metering Pumps**

**Specifications**

**General:**
- **Maximum stroke length:** 0.6” (15 mm) HK
- **Stroke frequency control:** S2Ba: Constant speed or optional DC/SCR drive or AC inverter
- **Materials of construction**
  - **Inner casing:** Cast aluminum
  - **Housing:** Glass-filled Luranyl™ (PPE)
  - **Drive:** Cam and spring-follower (lost motion)
- **Lubrication:** Oil lubricated
- **Recommended oil:** ISO VG 460, such as Mobil Gear Oil 634
- **Oil quantity:** Approximately 0.6 quart (550 ml)
- **Recommended oil change interval:** 5,000 hours
- **Warranty:** Two years on drive, one year on liquid end
- **Factory testing:** Each pump is tested for rated flow at maximum pressure.
- **Industry Standard:** CE approved, CSA available (standard in Canada)
- **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.
- **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%.
- **Motor mounting flange:** Fits all NEMA 56C frame motors (motor not included with pump)
- **Motor ratios and stroke frequencies**: (with 1725 RPM motor): 20:1 = 87 SPM, 11:1 = 156 SPM, 7.25:1 = 232 SPM
- **Motor coupling:** Flexible coupling included with pump.
- **Required Motor HP:** 1/3 HP (.25 kW)
- **Full load RPM:** 1750 RPM (60 Hz)
- **Stroke sensor (optional):** Hall effect - requires 5 VDC
## Sigma/2 HK Basic Version

**Technical data:**
60 Hz (1750 RPM) operation

<table>
<thead>
<tr>
<th>Capacity at Maximum Pressure</th>
<th>Max. Stroke Rate</th>
<th>Output per Stroke</th>
<th>Max. Suction Lift (water)</th>
<th>Max. Suction Pressure</th>
<th>Suction/Discharge Connector</th>
<th>Shipping Weight w/Motor</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Pump Version</th>
<th>S2Ba HK</th>
<th>psig (bar)</th>
<th>U.S. gph</th>
<th>Stroke/min</th>
<th>ml/stroke</th>
<th>ft (m)</th>
<th>psig (bar)</th>
<th>in MNPT</th>
<th>lbs (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>32002 SST</td>
<td>4640</td>
<td>(320)</td>
<td>0.6</td>
<td>(2.3)</td>
<td>84</td>
<td>0.46</td>
<td>16 (5)</td>
<td>2175 (150)</td>
<td>1/4</td>
</tr>
<tr>
<td>23004 SST</td>
<td>3335</td>
<td>(230)</td>
<td>1.2</td>
<td>(4.8)</td>
<td>153</td>
<td>0.52</td>
<td>16 (5)</td>
<td>2175 (150)</td>
<td>1/4</td>
</tr>
<tr>
<td>10006 SST</td>
<td>1450</td>
<td>(100)</td>
<td>2.0</td>
<td>(7.6)</td>
<td>233</td>
<td>0.55</td>
<td>16 (5)</td>
<td>2175 (150)</td>
<td>1/4</td>
</tr>
<tr>
<td>14006 SST</td>
<td>2030</td>
<td>(140)</td>
<td>1.8</td>
<td>(7.1)</td>
<td>84</td>
<td>1.42</td>
<td>13 (4)</td>
<td>870 (60)</td>
<td>1/4</td>
</tr>
<tr>
<td>10011 SST</td>
<td>1450</td>
<td>(100)</td>
<td>3.4</td>
<td>(13.1)</td>
<td>153</td>
<td>1.43</td>
<td>13 (4)</td>
<td>870 (60)</td>
<td>1/4</td>
</tr>
<tr>
<td>05016 SST</td>
<td>725</td>
<td>(50)</td>
<td>5.2</td>
<td>(20)</td>
<td>16</td>
<td>1.43</td>
<td>13 (4)</td>
<td>870 (60)</td>
<td>1/4</td>
</tr>
<tr>
<td>07012 SST</td>
<td>1015</td>
<td>(70)</td>
<td>3.9</td>
<td>(14.8)</td>
<td>84</td>
<td>2.90</td>
<td>13 (4)</td>
<td>435 (30)</td>
<td>1/4</td>
</tr>
<tr>
<td>04522 SST</td>
<td>652</td>
<td>(45)</td>
<td>7.0</td>
<td>(27.6)</td>
<td>153</td>
<td>2.91</td>
<td>13 (4)</td>
<td>435 (30)</td>
<td>1/4</td>
</tr>
<tr>
<td>02534 SST</td>
<td>363</td>
<td>(25)</td>
<td>10.7</td>
<td>(40.8)</td>
<td>233</td>
<td>2.92</td>
<td>13 (4)</td>
<td>435 (30)</td>
<td>1/4</td>
</tr>
<tr>
<td>04022 SST</td>
<td>580</td>
<td>(40)</td>
<td>7.0</td>
<td>(26.5)</td>
<td>84</td>
<td>5.26</td>
<td>13 (4)</td>
<td>218 (15)</td>
<td>3/8</td>
</tr>
<tr>
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<td>(25)</td>
<td>13.0</td>
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<td>153</td>
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<td>218 (15)</td>
<td>3/8</td>
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<tr>
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<td>(12)</td>
<td>20.1</td>
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<td>233</td>
<td>5.45</td>
<td>13 (4)</td>
<td>218 (15)</td>
<td>3/8</td>
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</table>

### Idencode Ordering System (S2Ba HK)

<table>
<thead>
<tr>
<th>S2Ba HK</th>
<th>Drive Type</th>
<th>Main Drive/Plunger</th>
<th>Version</th>
<th>Capacity:</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS</td>
<td>HK</td>
<td>S2Ba HK</td>
<td>32002</td>
<td>0.6 gph (2.3 l/h), 4640 psi (320 bar)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>23004</td>
<td>1.2 gph (4.8 l/h), 3335 psi (230 bar)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10006</td>
<td>2.0 gph (7.6 l/h), 1450 psi (100 bar)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>14006</td>
<td>1.8 gph (7.1 l/h), 2030 psi (140 bar)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>07012</td>
<td>3.9 gph (14.8 l/h), 1015 psi (70 bar)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>04022</td>
<td>7.0 gph (26.5 l/h), 580 psi (40 bar)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>23004</td>
<td>1.2 gph (4.8 l/h), 3335 psi (230 bar)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10011</td>
<td>3.4 gph (13.1 l/h), 1450 psi (100 bar)</td>
</tr>
</tbody>
</table>

#### Liquid end material:
- SS: 316 Stainless Steel

#### Seal:
- T: PTFE seal

#### Plunger assembly:
- 4: Plunger (Ceramic)

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

#### Hydraulic connections:
- 0: Standard (In accordance with technical data)

#### Logo:
- 0: Standard with logo

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

#### Enclosure rating:
- 0: Standard

#### Stroke sensor:
- 0: Without stroke sensor (Standard)
- 1: With Pacing relay (Consult Factory)

#### Stroke length adjustment:
- 0: Manual (Standard)
- 1: With 3P stroke positioning motor, 230 V 50/60 Hz
- 2: With 3P stroke positioning motor, 115 V 50/60 Hz
- 4: W/ stroke positioning motor 4-20 mA, 230 V 50/60 Hz
- 6: W/ stroke positioning motor 4-20 mA, 115 V 50/60 Hz
**ProMinent® Sigma/ 2 HK**

**Plunger Metering Pumps**

### Materials In Contact With Chemicals

<table>
<thead>
<tr>
<th>Liquid End</th>
<th>Suction/ Discharge connector</th>
<th>Seals</th>
<th>Valve Balls</th>
<th>Ball Seat</th>
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<tbody>
<tr>
<td>SST</td>
<td>Stainless steel</td>
<td>Stainless steel</td>
<td>PTFE/PTFE</td>
<td>Ceramic</td>
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</table>

### Dimensional Drawing: (S2Ba HK)

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

### Dimensions in inches (mm)

<table>
<thead>
<tr>
<th>Model</th>
<th>Connector</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>ØG</th>
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<tr>
<td>32002</td>
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<td>R1/4&quot;</td>
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<tr>
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<td>(277)</td>
<td>(216)</td>
<td></td>
<td>(217)</td>
<td>(439)</td>
<td>(79.5)</td>
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<td>05016</td>
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<tr>
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<td>(216)</td>
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<td>02534</td>
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<tr>
<td>04022</td>
<td>3/8&quot;</td>
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<td>R3/8&quot;</td>
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<tr>
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</table>
ProMinent® Sigma X: Sigma/3
Motor Diaphragm Metering Pumps

Overview: Sigma/3 (S3Cb)

The Sigma/3 motor diaphragm metering pumps are produced with a high-strength metal inner housing for parts subject to load as well as an additional plastic housing to protect against corrosion. The capacity range extends from 46 to 274.7 gph (174 - 1040 l/h) and pressures up to 174 psig (12 bar). Stroke length is 0.24 in.

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

In all motor-driven metering pumps without integrated overload protection, for safety reasons, suitable overload protection must be provided during installation. (see page 148 for spare parts)

Sigma/3 Basic Type (S3Ba)

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

**Sigma/3 control type (S3Cb)**

For optional control via contact or analog signals (e.g. 0/4 - 20 mA) the Sigma control type pump results in good adaptability, even in fluctuating metering requirements. The microprocessor control is an optimum combination of speed control and stop & go operation, i.e. it works in a wide control field with customized fine adjustment. Moreover it enables an optimum metering result thanks to the metering behavior of the metering pump being matched to the chemicals or application. The control system measures the movement and speed profile in conjunction with the power demand. This leads to a real reduction in the actually required power, which means an increase in efficiency.

**Detachable operating unit (HMI)**

The operating unit (HMI) can be attached directly to the metering pump or mounted on the wall alongside the pump or completely removed. This provides the operator with a wide range of options for the integration of a metering system into the overall system that it is readily accessible and easy to use. Moreover, the removable operating unit offers additional protection against unauthorized operation of the metering pump or against changing of the pump settings. The Sigma X features a NEW removable HMI control unit with innovative click-wheel and 4 operating buttons. An illuminated LCD display provides information about the relevant operating status. LEDs on the operating unit and the control unit indicate the active pump functions or the pump status.

**Diaphragm rupture warning system**

The liquid end has a patented multilayer safety diaphragm as standard and a visual diaphragm rupture indicator. The diaphragm is coated on both sides with PTFE film. This coating ensures that no leakage to the outside occurs even if the diaphragm ruptures. If the diaphragm ruptures, feed chemical enters between the diaphragm layers and thus triggers a mechanical indication or an alarm via the sensor area. This concept ensures reliable metering - even under critical operating conditions.
Metering profiles

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

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

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

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

### Specifications (S3Ba and S3Cb)

#### General:
- **Maximum stroke length:** 0.236" (6.0 mm)
- **Power cord:** 6 foot (2 m) 2 wire + ground (supplied on control version)
- **Stroke frequency control:** S3Ba: Constant speed or optional DC/SCR drive or AC inverter  
  S3Cb: Microprocessor control version with innovative start/stop and variable speed control proportional to set frequency or external control signal.
- **Stroke counting:** Standard on S3Cb
- **Materials of construction:**
  - Inner casing: Cast aluminum
  - Housing: Glass-filled Luranyl™ (PPE)
- **Wetted materials of construction:**
  - Liquid End: PVDF  
  - Suct./Dis. Connectors: PVDF  
  - Seals: PTFE  
  - Check Balls: DN 25 Glass  
  - Check Plates: DN 32 Hastelloy C  
- **Viscosity ranges:**
  - Standard: 180 max. strokes/min, 0-200 (mPas)
  - With valve springs: 130, 200-500
  - With valve springs and suction-side feed: 90, 500-1000*  
  * Only when properly installed & adjusted

#### Sound pressure level:
- Sound pressure level $L_{pa} < 70$ dB in accordance with EN ISO 20361:2010-10 at max. stroke length, max. stroke rate, max. back pressure (water)

#### Drive:
- Cam and spring-follower (lost motion)

#### Lubrication:
- Oil lubricated

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

#### Oil quantity:
- Approximately 0.95 quart (900 mL)

#### Recommended oil change interval:
- 5,000 hours

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

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

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

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

#### Liquid end options:
- Polymethylmethacrylate (PMMA) or 316 SS with PTFE

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

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

#### Max. fluid operating temperatures:
- **Material**  
  - PVDF 149°F (65°C)  
  - 316 SS 194°F (90°C)

#### Minimum temperature:
- **Material**  
  - PVDF 212°F (100°C)  
  - 316 SS 248°F (120°C)

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

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

#### Max. solids size in fluid:
- 0.3 mm

#### Stroke length adjustment:
- Manual, in increments of 0.5%. Motorized stroke length adjustment available.
Basic Version

Motor mounting flange: Fits all NEMA 56C frame motors (motor not included with pump)

Gear ratios and stroke frequencies
(with 1725 RPM motor): 20:1 = 86 SPM, 14:1 = 124 SPM, 10.1: = 173 SPM

Motor coupling: Flexible coupling included with pump.

Required Motor HP: 3/4 HP (.55 kW)

Full load RPM: 1750 RPM (60 Hz)

Stroke sensor (optional): Hall effect - requires 5 VDC

Control Version

Control Function: At stroke frequencies equal to or greater than 33%, the integral AC variable frequency drive continuously varies the motor speed in a linear response to the incoming signal. At stroke frequencies less than 33%, the motor starts and stops according to a control algorithm to provide the desired stroke frequency. In the start-stop mode the motor speed is constant at approximately 580 RPM.

Enclosure rating: IP 65

Pump power requirements: 1 ph, 115V-230V, 50/60 Hz (internally converted to drive below motor)

Motor data: Totally enclosed, fan cooled (IP55); class F insulation; Manufacturer ATB; 0.55 kW (0.75 HP) 230 3 phase (2.5 A, 1710 rpm)

Relay load

Fault relay only (Option 1): Contact load: 250 VAC, 8 A, 50/60 Hz
Operating life: > 200,000 switch functions

Fault relay with pacing relay (Option 3): Contact load: 24 V, 100 mA, 50/60 Hz
Operating life: > 200,000 switch functions

Pacing relay
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: 750x10⁶
Contact closure: 100 ms (for pacing relay)

Air Humidity
Max. air humidity*: 95% rel. humidity
* non-condensing

Fuse: Internal, 6.3 AT - (1.5 kA)

Analog output signal: Max. impedance 300 Ω
Isolated 4-20 mA output signal

Bus interface options available: CANopen, PROFIBUS DP

Relay cable (optional): 6 feet (2 m) 3 wire (SPDT) 250 VAC, 2 A

Pulse contact/remote pause contact:

With voltage-free contact, or semiconductor sink logic control (not source logic) with a residual voltage of <700 mV. The contact load is approximately 0.5 mA at + 5 VDC. (Note: Semiconductor contacts that require >700 mV across a closed contact should not be used.)

Contact input max. pulse frequency: 25 pulses/sec

Contact input 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

Input power requirements: single phase, 115-230 VAC
### Capacity Data (S3Ba)

**Capacity data: Sigma/3 Basic Version**

<table>
<thead>
<tr>
<th>Pump Version</th>
<th>Capacity at Max. Backpressure</th>
<th>Max. Stroke Rate</th>
<th>Output per Stroke</th>
<th>Max. Suction Lift (water)</th>
<th>Max. Suction Pressure</th>
<th>Suction/Discharge Connector</th>
<th>Shipping Weight w/Motor (approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S3Ba H</td>
<td>psig (bar) GPH (L/h)</td>
<td>spm</td>
<td>ML/stroke</td>
<td>ft (m)</td>
<td>psig (bar) in</td>
<td>(DN) lbs (kg)</td>
<td></td>
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<tr>
<td>120145 PVT</td>
<td>145 (10) 45.9 (174)</td>
<td>86</td>
<td>33.7</td>
<td>16 (5)</td>
<td>29 (2) 1 MNPT</td>
<td>(25) 49 (22)</td>
<td></td>
</tr>
<tr>
<td>120145 SST</td>
<td>174 (12) 45.9 (174)</td>
<td>86</td>
<td>33.7</td>
<td>16 (5)</td>
<td>29 (2) 1 MNPT</td>
<td>(25) 57 (26)</td>
<td></td>
</tr>
<tr>
<td>120190 PVT</td>
<td>145 (10) 66.3 (251)</td>
<td>124</td>
<td>33.7</td>
<td>16 (5)</td>
<td>29 (2) 1 MNPT</td>
<td>(25) 49 (22)</td>
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</tr>
<tr>
<td>120190 SST</td>
<td>174 (12) 66.3 (251)</td>
<td>124</td>
<td>33.7</td>
<td>16 (5)</td>
<td>29 (2) 1 MNPT</td>
<td>(25) 57 (26)</td>
<td></td>
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<tr>
<td>120270 PVT</td>
<td>145 (10) 92.7 (351)</td>
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<td>(25) 49 (22)</td>
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<tr>
<td>120270 SST</td>
<td>174 (12) 92.7 (351)</td>
<td>173</td>
<td>33.8</td>
<td>16 (5)</td>
<td>29 (2) 1 MNPT</td>
<td>(25) 57 (26)</td>
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<tr>
<td>070410 PVT</td>
<td>102 (7) 129.9 (492)</td>
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<td>13 (4)</td>
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<tr>
<td>070410 SST</td>
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<td>13 (4)</td>
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<tr>
<td>070580 SST</td>
<td>102 (7) 183.8 (696)</td>
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<td>040830 SST</td>
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<td>(32) 64 (29)</td>
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### Capacity Data (S3Cb)

**Capacity data: Sigma/3 Control Version**

<table>
<thead>
<tr>
<th>Pump Version</th>
<th>Capacity at Max. Backpressure</th>
<th>Max. Stroke Rate</th>
<th>Output per Stroke</th>
<th>Max. Suction Lift (water)</th>
<th>Max. Suction Pressure</th>
<th>Suction/Discharge Connector</th>
<th>Shipping Weight w/Motor (approx.)</th>
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</thead>
<tbody>
<tr>
<td>S3Cb H</td>
<td>psig (bar) GPH (L/h)</td>
<td>spm</td>
<td>ML/stroke</td>
<td>ft (m)</td>
<td>psig (bar) in</td>
<td>(DN) lbs (kg)</td>
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<tr>
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<td>33.7</td>
<td>16 (5)</td>
<td>29 (2) 1 MNPT</td>
<td>(25) 49 (22)</td>
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<tr>
<td>120145 SST</td>
<td>174 (12) 48.1 (182)</td>
<td>90</td>
<td>33.7</td>
<td>16 (5)</td>
<td>29 (2) 1 MNPT</td>
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<tr>
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<tr>
<td>120190 SST</td>
<td>174 (12) 64.2 (243)</td>
<td>120</td>
<td>33.7</td>
<td>16 (5)</td>
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<tr>
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<td>145 (10) 96.4 (365)</td>
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<tr>
<td>120270 SST</td>
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<td>33.8</td>
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<tr>
<td>070410 SST</td>
<td>100 (7) 132.1 (500)</td>
<td>90</td>
<td>95.1</td>
<td>13 (4)</td>
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<tr>
<td>070580 PVT</td>
<td>100 (7) 177 (670)</td>
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<tr>
<td>070580 SST</td>
<td>100 (7) 177 (670)</td>
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<tr>
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<td>040830 SST</td>
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<td>14.5 (1) 1-1/2 MNPT</td>
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</table>

### Materials In Contact With Chemical

<table>
<thead>
<tr>
<th>Material</th>
<th>Suction/discharge connector Liquid end</th>
<th>Seals DN 25 Valve balls</th>
<th>Valve seats</th>
<th>Seals DN 32 Valve Plate/Spring</th>
<th>Valve seats</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVT</td>
<td>PVDF (Polyvinylidenefluoride)</td>
<td>PTFE</td>
<td>Glass PTFE</td>
<td>PTFE</td>
<td>Ceramic/ Hast. C + CTFE** PTFE</td>
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<tr>
<td>SST</td>
<td>Stainless steel</td>
<td>PTFE</td>
<td>Stainless steel PTFE</td>
<td>PTFE</td>
<td>Stainless steel PTFE</td>
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</table>
## ProMinent® Sigma X: Sigma/3
### Motor Diaphragm Metering Pumps

#### Identcode Ordering System (S3Ba)

<table>
<thead>
<tr>
<th>S3Ba</th>
<th>Drive Type</th>
<th>Version:</th>
<th>Capacity:</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>Main Drive, Diaphragm</td>
<td>120145 45.9 gph (174 l/h), 145 psi (10 bar)</td>
<td>070410 129.9 gph (492 l/h), 100 psi (7 bar)</td>
</tr>
<tr>
<td>H</td>
<td>Main Drive, Diaphragm</td>
<td>120190 66.3 gph (251 l/h), 145 psi (10 bar)</td>
<td>070580 183.8 gph (696 l/h), 100 psi (7 bar)</td>
</tr>
<tr>
<td>H</td>
<td>Main Drive, Diaphragm</td>
<td>120270 92.7 gph (351 l/h), 145 psi (10 bar)</td>
<td>040830 264.1 gph (1000 l/h), 58 psi (4 bar)</td>
</tr>
</tbody>
</table>

**Note:** For SS versions see capacity data

**Liquid end material:**
- PV: PVDF
- SS: 316 Stainless Steel
- T: PTFE

**Diaphragm type:**
- S: Safety diaphragm w/ visual indicator
- A: Safety diaphragm w/ pump stop function

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

**Hydraulic connections:**
- 7: PVDF clamping nut & insert
- 8: SS clamping nut & insert

**Logo:**
- 0: Standard with logo
- 2: Without motor, with NEMA 56C flange

**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
### Identcode Ordering System (S3Cb)

<table>
<thead>
<tr>
<th>S3Cb</th>
<th>Drive Type</th>
<th>Main Drive, Diaphragm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Version</th>
<th>Capacity</th>
<th>S3Cb</th>
</tr>
</thead>
<tbody>
<tr>
<td>120145</td>
<td>48.1 gph (182 l/h), 145 psi (10 bar)</td>
<td>070410</td>
</tr>
<tr>
<td>120190</td>
<td>64.2 gph (243 l/h), 145 psi (10 bar)</td>
<td>070590</td>
</tr>
<tr>
<td>120270</td>
<td>96.4 gph (365 l/h), 145 psi (10 bar)</td>
<td>040300</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Capacity</th>
<th>132.1 gph (500 l/h), 100 psi (7 bar)</th>
<th>Note: For SS versions see capacity data</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Liquid end material:</th>
<th>PVDF max. 145 psi (10 bar)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS</td>
<td>Stainless Steel</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Seal:</th>
<th>PVDF with PTFE/Viton® seal</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Diaphragm type:</th>
<th>S Multi-layer safety diaphragm w/ visual indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Multi-layer safety diaphragm w/ pump stop function</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Liquid end version:</th>
<th>Without valve springs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>With 2 valve springs (Hastelloy C4, 1 psig)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hydraulic connections:</th>
<th>Standard connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>PVDF clamping nut &amp; insert</td>
</tr>
<tr>
<td>8</td>
<td>Stainless steel clamping nut &amp; insert</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Logo:</th>
<th>Standard with ProMinent logo</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Electrical Connection (± 10%):</th>
<th>U 1ph, 115 V - 230 V 50/60Hz</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Cable and plug:</th>
<th>8 Open end 3m UL/CSA 115/230V</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>North American plug, 115 V</td>
</tr>
<tr>
<td>X</td>
<td>Without cable</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Relay:</th>
<th>Without relay</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fault annunciating relay</td>
</tr>
<tr>
<td>3</td>
<td>Option 1 + Pacing Relay</td>
</tr>
<tr>
<td>8</td>
<td>Option 3 + 4-20 mA output</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Control variant:</th>
<th>Manual + External with pulse control (mult/div)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual + External with pulse control &amp; analog</td>
</tr>
<tr>
<td>6</td>
<td>*Option 1 + PROFIBUS® (M12 Plug)</td>
</tr>
<tr>
<td>7</td>
<td>Option 1 + CANopen</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Over Pressure Shut-off:</th>
<th>Without over pressure shut-off</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Operating unit (HMI):</th>
<th>HMI + 1.54' (0.5m) cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>HMI + 6.5' (2.0 m) cable</td>
</tr>
<tr>
<td>5</td>
<td>HMI + 16.4' (5.0 m) cable</td>
</tr>
<tr>
<td>6</td>
<td>HMI + 32.8' (10.0 m) cable</td>
</tr>
<tr>
<td>X</td>
<td>Without HMI</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Access Code:</th>
<th>Without access code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Access code</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Language:</th>
<th>EN English</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approval:</td>
<td>01 CE</td>
</tr>
</tbody>
</table>

*With the option PROFIBUS®-DP no relay can be selected*
### Dimensions in inches (mm)

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

* Piping adapters provided according to technical data.
** Dimensions with diaphragm failure detector.
Dimensions in inches (mm)

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

* Suction/Discharge valve thread

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

ProMus Design Specifications

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

ProMus Benefits

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

Specifications

Pump type: Hydraulically actuated diaphragm type liquid end
Maximum stroke length: 20mm
Materials of construction:
Housing: Cast iron
Diaphragm: Flat Teflon

Required Motor HP: 1/2 HP (if 12.5:1 gear is selected 3/4 hp might be used)
Full load RPM: 1725
Drive: Uses a hydraulic piston and mechanically actuated Oil replenishment valve to transfer the reciprocating Motion to a flat Teflon diaphragm

Gear ratios:
5 gear ratios; 12.5:1, 15:1, 30:1, 40:1, 50:1*, 100:1*

Note: minimum stroke rate is 18 spm
Motor mounting flange: Fits all NEMA 56 C frame motors (Optional IEC 71 with B5 flange)

Motor coupling: Direct coupled to worm gear shaft
Check valves: PVDF/PTFE: size 17 double inlet & outlet; sizes 30/40 single inlet & outlet
Metal:
1) single inlet & outlet
2) double inlet & outlet
3) single inlet & double outlet (Double ball needed for pressures over 500 psi)

Repeatability:
Steady state flow accuracy is +/- 1% over turndown
Ratio of 10:1

Max fluid operating temp:
constant: 195 F (90 C) short term 250 F (120 C)

Max solids size:
0.3mm; if larger than this provisions must be made to remove them prior to suction inlet

Max viscosity:
200 mPas

Recommend oil: Mobilube SCH 75w-90
Oil quantity: 1.5 quart (1.42 l)

Oil change interval: Every 5000 hours
Stroke length adjustment: Manual adjustment. Automatic stroke length adjustment via 4 to 20 mA available as an option

Pressure relief:
Integrated pressure relief to protect pump. External pressure relief must be used to protect system

Warranty:
2 years on drive, 1 year on liquid end

Factory testing:
each pump is tested for capacity at rated pressure

Maximum inlet pressure:
14.5 psi (1 bar)

*50:1 and 100:1 are not available for 50 Hz operation
# ProMinent® ProMus

## Hydraulic Diaphragm Metering Pumps

### Capacity Data

#### Capacity Data: ProMus

<table>
<thead>
<tr>
<th>Plunger (in.)</th>
<th>Capacity at Max. Backpressure 60 Hz (1750 rpm)</th>
<th>Max. Stroke Rate</th>
<th>Capacity at Max. Backpressure 50 Hz</th>
<th>Typical suct./dis.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>psig (PVDF)</td>
<td>Bar (PVDF)</td>
<td>psig (SS2)</td>
<td>Bar (SS2)</td>
</tr>
<tr>
<td><strong>Size 17</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/8&quot;</td>
<td>230</td>
<td>16</td>
<td>3500</td>
<td>241</td>
</tr>
<tr>
<td>1/2&quot;</td>
<td>2080</td>
<td>143</td>
<td>1.8 (6.8)</td>
<td>50</td>
</tr>
<tr>
<td><strong>Size 30</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5/8&quot;</td>
<td>230</td>
<td>16</td>
<td>2080</td>
<td>143</td>
</tr>
<tr>
<td>3/4&quot;</td>
<td>265</td>
<td>18</td>
<td>15.4 (58.2)</td>
<td>50</td>
</tr>
<tr>
<td><strong>Size 40</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-1/4&quot;</td>
<td>230</td>
<td>16</td>
<td>265</td>
<td>18</td>
</tr>
<tr>
<td>1-1/2&quot;</td>
<td>200</td>
<td>14</td>
<td>265</td>
<td>18</td>
</tr>
<tr>
<td>2&quot;</td>
<td>200</td>
<td>14</td>
<td>265</td>
<td>18</td>
</tr>
<tr>
<td><strong>Material</strong></td>
<td><strong>Pump head</strong></td>
<td><strong>Suction/Pressure connector</strong></td>
<td><strong>Seals/ball seat</strong></td>
<td><strong>Valve Balls</strong></td>
</tr>
<tr>
<td>SS</td>
<td>stainless steel</td>
<td>stainless steel</td>
<td>PTFE/SS</td>
<td>stainless steel</td>
</tr>
<tr>
<td>A2</td>
<td>alloy 20</td>
<td>alloy 20</td>
<td>PTFE/A2</td>
<td>alloy 20</td>
</tr>
<tr>
<td>HC</td>
<td>hastelloy C</td>
<td>hastelloy C</td>
<td>PTFE/HC</td>
<td>hastelloy C</td>
</tr>
<tr>
<td>PVT</td>
<td>PVDF</td>
<td>PVDF</td>
<td>PTFE/PVDF</td>
<td>ceramic</td>
</tr>
</tbody>
</table>

* Not available for 50 Hz operation
* ProMus30ASS2 Identity Code have a 1/4” FNPT outlet and a 3/8” FNPT Inlet

## Materials In Contact With Chemicals

<table>
<thead>
<tr>
<th>Material</th>
<th>Pump head</th>
<th>Suction/Pressure connector</th>
<th>Seals/ball seat</th>
<th>Valve Balls</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS</td>
<td>stainless steel</td>
<td>stainless steel</td>
<td>PTFE/SS</td>
<td>stainless steel</td>
</tr>
<tr>
<td>A2</td>
<td>alloy 20</td>
<td>alloy 20</td>
<td>PTFE/A2</td>
<td>alloy 20</td>
</tr>
<tr>
<td>HC</td>
<td>hastelloy C</td>
<td>hastelloy C</td>
<td>PTFE/HC</td>
<td>hastelloy C</td>
</tr>
<tr>
<td>PVT</td>
<td>PVDF</td>
<td>PVDF</td>
<td>PTFE/PVDF</td>
<td>ceramic</td>
</tr>
</tbody>
</table>
### ProMus1 Pump Version:

<table>
<thead>
<tr>
<th>Number</th>
<th>Version</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>17A</td>
<td>Size 17 liquid end with 3/8&quot; Plunger</td>
<td>30C Size 30 liquid end with 1-1/8&quot; Plunger</td>
</tr>
<tr>
<td>17B</td>
<td>Size 17 liquid end with 7/16&quot; Plunger</td>
<td>40A Size 40 liquid end with 1-3/4&quot; Plunger</td>
</tr>
<tr>
<td>30A</td>
<td>Size 30 liquid end with 5/8&quot; Plunger</td>
<td>40B Size 40 liquid end with 2&quot; Plunger</td>
</tr>
<tr>
<td>30B</td>
<td>Size 30 liquid end with 13/16&quot; Plunger</td>
<td>40C Size 40 liquid end with 2-1/4&quot; Plunger</td>
</tr>
</tbody>
</table>

### Liquid end material:

- **SS1**: 316 Stainless steel Single ball check
- **SS2**: 316 Stainless steel Double ball check (*Needed for applications above 500 psi)
- **SS3**: 316 St. steel Single inlet, Double outlet (Rcmd. for Flooded suction w/ discharge pressure above 500 psi)
- **PVT**: PVDF/PTFE size 17 Double inlet & outlet; sizes 30/40 Single inlet & outlet

### Connectors:

- 0 NPT
- 1 BSP taper
- 7 MNPT PVDF Standard (PVT LE only)

### Gear ratio:

- 1 12.5:1 56C
- 2 15:1 56C
- 3 30:1 56C
- 4 40:1 56C
- 5 50:1 56C
- 6 12.5:1 IEC (IEC 71 with B5 flange)
- 7 15:1 IEC (IEC 71 with B5 flange)
- 8 30:1 IEC (IEC 71 with B5 flange)
- 9 40:1 IEC (IEC 71 with B5 flange)
- 10 50:1 56C IEC (IEC 71 with B5 flange)
- 11 100:1 (17A 3/8 plunger only) 56C

### Motor:

- X No motor included
- D Standard motor (1/2 HP, 115V, single phase, TEFC, NEMA 56C

### Base:

- 0 Standard Base

### Stroke Adjustment:

- 1 Manual stroke adjustment
- 7 Explosion proof NEMA 7

### Internal relief valve:

- A 3500 psi/size 17
- B 2080 psi/size 17
- C 1230 psi/size 17
- D 640 psi/size 17
- E 300 psi/size 17
- F 2080 psi/size 30
- G 1230 psi/size 30
- H 640 psi/size 30
- I 265 psi/sizes 30 & 40
- J 200 psi/sizes 30 & 40
- K 160 psi (30B, C & 40)

### Hydraulic oil:

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

| Desired capacity min./max. GPH (l/h) | __________________________________________________________________________________ |
| Available power supply | _____ V, _____ Hz, _____ phase |
| Working temperature min./max. °F (°C) | __________________________________________________________________________________ |
| Description of process fluid | __________________________________________________________________________________ |
| Concentration % | __________________________________________________________________________________ |
| Solids content % | __________________________________________________________________________________ |
| Absolute viscosity, cP | __________________________________________________________________________________ |
| Vapor pressure at working temperature psig (bar) | __________________________________________________________________________________ |
| Remarks (e.g. abrasive, developing gases and fumes, flammable, corrosive) | __________________________________________________________________________________ |
| Suction conditions: | __________________________________________________________________________________ |
| Suction lift min./max., or ft. (m) | __________________________________________________________________________________ |
| Positive suction head min./max., or ft. (m) | __________________________________________________________________________________ |
| Pressure in chemical tank psig (bar) | __________________________________________________________________________________ |
| Length of suction line ft. (m) | __________________________________________________________________________________ |
| Size (I.D.) of suction line in. (mm) | __________________________________________________________________________________ |
| Number of valves and fittings in suction line | __________________________________________________________________________________ |
| Discharge conditions: | __________________________________________________________________________________ |
| Back-pressure min./max. psig (bar) | __________________________________________________________________________________ |
| Discharge head min./max. ft. (m) | __________________________________________________________________________________ |
| Negative discharge head min./max. ft. (m) | __________________________________________________________________________________ |
| Length of discharge line ft. (m) | __________________________________________________________________________________ |
| Size (I.D.) of discharge line in. (mm) | __________________________________________________________________________________ |
| Number of valves and fittings in discharge line | __________________________________________________________________________________ |
ProMinent® Hydro/ 2 API 675
Hydraulic Diaphragm Metering Pumps

Overview: Hydro/ 2 API 675 (HA2a)

For flexible metering with excellent process reliability in the medium pressure range.
Capacity range of single pump: 1.85 - 24.0 gph; 145.0 - 1450.4 psi

As the new member of the Hydro product range, the hydraulic diaphragm metering pump Hydro/ 2 API 675 (HA2a) meets the requirements of API 675. The pumps stand out on account of their full-motion drive and automatic bleeding. There are a variety of drives, including some for use in areas at risk from explosion.

Your benefits:
Excellent process safety and reliability:
- PTFE multi-layer diaphragm with integral diaphragm rupture warning system
- Integral hydraulic relief valve
- Metering reproducibility is better than ± 1% within the 20-100% stroke volume range under defined conditions and with proper installation

Excellent flexibility:
- The modular construction with single and double head versions permits a wide range of applications, with the double head designs being operated in push-pull mode
- It is possible to combine up to 5 metering units, even with different pump capacities, in multiple pump systems
- 5 different gear ratios are available

Technical Details:
- Stroke length: 15 mm, Rod force: 2,000 N
- Stroke volume adjustment range: 0 – 100%
- Stroke volume adjustment: manually by scaled rotary dial (optionally with electric actuator or control drive)
- Metering reproducibility is better than ± 1% in the 20 to 100% stroke volume range under defined conditions and with correct installation
- PTFE multi-layer diaphragm with electric diaphragm rupture warning system via a contact
- Integrated hydraulic relief and bleed valve
- Wetted materials: PVDF, PTFE+25% carbon, stainless steel 1.4571, Hastelloy C.
- A wide range of power end versions is available: three-phase standard or 1-phase AC motor, motors for use in Exe and Exde areas, different flange designs for use in customer-specific motors
- Degree of protection: IP 55, ISO Class F
- Design in compliance with API 675 among others

Field of application:
- Oil and gas industry
- Volume-proportional metering of chemicals/additives in the treatment of boiler feed water
- Metering of reactants and catalysts in the chemical industry
- Level-dependent metering of auxiliary agents in industrial production engineering, for instance hot wax metering in the production of adhesive strips
**ProMinent® Hydro/ 2 API 675**

**Hydraulic Diaphragm Metering Pumps**

### Capacity Data: (HA2a)

<table>
<thead>
<tr>
<th>Plunger</th>
<th>Pressure Max.</th>
<th>Max. Pump capacity in gph at strokes/Min (60 Hz)</th>
<th>Theor. Stroke Volume</th>
<th>Suction Lift</th>
<th>Connection on suction/ discharge side</th>
<th>Shipping Weight w/Motor (approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Max. Pressure</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Stroke</td>
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<tr>
<td></td>
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<td>Volume</td>
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<td></td>
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<td>rpm</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>mL/ stroke</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ft</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PVDF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SST</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Material:** Pressure and Suction/Discharge side connections are made of Stainless steel 1.454. All other connections are made of Stainless steel 1.4404. Connections on suction/pressure side are made of PTFE.

**Materials In Contact With Chemicals**

<table>
<thead>
<tr>
<th>Material</th>
<th>Dosing Head</th>
<th>Suction/ pressure connection</th>
<th>Seals/ ball seat</th>
<th>Balls</th>
</tr>
</thead>
<tbody>
<tr>
<td>SST</td>
<td>Stainless steel 1.457/1.4404</td>
<td>Stainless steel 1.4581</td>
<td>PTFE/ZrO₂ (DN 15 - stainless steel 1.4404)</td>
<td>Ceramic</td>
</tr>
<tr>
<td>PVT*</td>
<td>PVDF (polyvinylidene fluoride)</td>
<td>PVDF (polyvinylidene fluoride)</td>
<td>PTFE/ PTFE</td>
<td>Ceramic</td>
</tr>
<tr>
<td>HCT</td>
<td>Hastelloy C</td>
<td>Hastelloy C</td>
<td>PTFE/ Hastelloy C</td>
<td>Ceramic</td>
</tr>
<tr>
<td>TTT</td>
<td>PTFE + 25% carbon</td>
<td>PVDF (polyvinylidene fluoride)</td>
<td>PTFE/ PTFE</td>
<td>Ceramic</td>
</tr>
</tbody>
</table>

**Spare Parts: (HA2a)**

<table>
<thead>
<tr>
<th>Plunger</th>
<th>Pressure</th>
<th>Connection</th>
<th>Allocated to</th>
<th>Spare Diaphragm S1, P1</th>
<th>Spare Diaphragm H1</th>
<th>Spare Part Set S1</th>
<th>Spare Part Set P1</th>
<th>Spare Part Set H1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>suction / discharge side</td>
<td>Type HP2a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td>Type HP2a</td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

*Version SST with double ball valve, valve connector on suction-pressure with female thread Rp 1/4 and external thread G 3/4 - DN 10

Spare part set includes:

- 1 spare diaphragm cpl., 1 set of seals, 2 valve balls, (4 valve balls for version with double ball valves)
- 1 spare diaphragm cpl., 1 suction valve cpl, 1 discharge valve cpl, 2 valve balls, 1 set of seals

### Capacity Data: (HA2a)

<table>
<thead>
<tr>
<th>Plunger</th>
<th>Max. Pressure psig</th>
<th>Max. Pump capacity in gph at strokes/Min (60 Hz)</th>
<th>Theor. Stroke Volume</th>
<th>Suction Lift</th>
<th>Connection on suction/ discharge side</th>
<th>Shipping Weight w/Motor (approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Stroke</td>
<td>Volume</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>rpm</td>
<td>mL/ stroke</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ft</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>PVDF</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SST</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Max. Pressure</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Max. Pressure</td>
<td>Stroke</td>
<td>Volume</td>
<td>Lift</td>
<td>connection</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Max. Pressure</td>
<td>rpm</td>
<td>mL/ stroke</td>
<td>ft</td>
<td>side</td>
</tr>
</tbody>
</table>
### ProMinent® Hydro/ 2 API 675

**Hydraulic Diaphragm Metering Pumps**

**Identcode:** (HA2a)

<table>
<thead>
<tr>
<th>Drive Type</th>
<th>Pressure Stage</th>
<th>Electrical Power Supply</th>
<th>Valve Design</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>V T Simplex (vertical)</td>
<td>580.2 psi (40 bar)</td>
<td>115 V; 60 Hz</td>
<td>Without valve springs for plunger D=16</td>
<td>-4 ºF - 104 ºF / -4 ºF - 194 ºF (SS;HC) 122 ºF (PTFE) 140 ºF (PVDF)</td>
</tr>
<tr>
<td>D Simplex double head</td>
<td>928.2 psi (64 bar)</td>
<td>115 V; 60 Hz</td>
<td>With valve springs for plunger D=16</td>
<td>-4 ºF - 104 ºF / -4 ºF - 194 ºF (SS;HC) 122 ºF (PTFE) 140 ºF (PVDF)</td>
</tr>
<tr>
<td>U Duplex</td>
<td>1450.3 psi (100 bar)</td>
<td>115 V; 60 Hz</td>
<td>Add on drive</td>
<td>-4 ºF - 104 ºF / -4 ºF - 194 ºF (SS;HC) 122 ºF (PTFE) 140 ºF (PVDF)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pressure Range</th>
<th>Stroke Frequency</th>
<th>Stroke Control Motor</th>
<th>Standard Stroke Length Adjustment</th>
<th>Certification</th>
</tr>
</thead>
<tbody>
<tr>
<td>016</td>
<td>72 Strokes/min; 60 Hz</td>
<td>4-20 mA; 115 V; 60 Hz</td>
<td>Standard stroke length adjustment</td>
<td>CE + EAC + ATEX</td>
</tr>
<tr>
<td>018</td>
<td>140 Strokes/min; 60 Hz</td>
<td>4-20 mA; 115 V; 60 Hz</td>
<td>Standard stroke length adjustment</td>
<td>CE + EAC + ATEX</td>
</tr>
<tr>
<td>022</td>
<td>180 Strokes/min 60 Hz</td>
<td>4-20 mA; 115 V; 60 Hz</td>
<td>Standard stroke length adjustment</td>
<td>CE + EAC + ATEX</td>
</tr>
</tbody>
</table>

**Additional Information:**
- **Material:**
  - Standard stainless steel; PTFE
  - Hastelloy C; PTFE
  - PVDF; PTFE
- **Paint:**
  - Offshore - RAL 2003
  - Standard texture painted - RAL 2003
  - Standard stainless steel - RAL 2003
  - DULCOMETER® instrumentation
  - DULCOTEST® sensors
- **Testing:**
  - Standard performance test + 3.1 Certificate
  - API opt. Test + NSF/ANSI
  - CE + ATEX + ATEX
  - CE + EAC

**Product Overview:**
- Solenoid-driven metering pumps
- Motor-driven metering pumps
- Pump spare parts & accessories
- DULCOMETER® instrumentation
- DULCOTEST® sensors
- Polymer blending & dry feed solutions
The hydraulic diaphragm metering pump Hydro/ 3 API 675 (HA3e) meets the requirements of API 675, among other things due to its full-motion drive and automatic bleeding. Some of the many drive options are also approved for use in areas at risk from explosion.

Your benefits:

Excellent process safety and reliability:

- PTFE multi-layer diaphragm with integral diaphragm rupture warning system
- Integral hydraulic relief valve
- Metering reproducibility is better than ± 1% within the 20-100% stroke volume range under defined conditions and with proper installation

Excellent flexibility:

- The modular construction with single and double head versions permits a wide range of applications, with the double head designs being operated in push-pull mode
- It is possible to combine up to 5 metering units, even with different pump capacities, in multiple pump systems
- 5 different gear ratios are available
- Customized designs are available on request

Technical Details:

- Stroke length: 15 mm, Rod force: 4,200 N
- Stroke volume adjustment range: 0 – 100%
- Stroke volume adjustment: manually by scaled rotary dial (optionally with electric actuator or control drive)
- Metering reproducibility is better than ± 1% in the 20 – 100% stroke volume range under defined conditions and with correct installation
- PTFE multi-layer diaphragm with electrical diaphragm rupture warning system via a contact
- Integrated hydraulic relief and bleed valve
- Wetted materials: PVDF, PTFE+25% carbon, stainless steel 1.4571, Hastelloy C.
- A wide range of power end versions is available: three-phase standard or 1-phase AC motor, motors for use in Exe and Exde areas, different flange designs for use in customer-specific motors
- Degree of protection: IP 55 (standard) ISO Class F
- Design in compliance with API 675 among others

Field of application:

- Oil and gas industry.
- Volume-proportional metering of chemicals/additives in the treatment of boiler feed water
- Metering of reactants and catalysts in the chemical industry
- Level-dependent metering of auxiliary agents in industrial production engineering, for instance hot wax metering in the production of adhesive strips
## Capacity Data: Hydro/ 3 API 675 (HA3a)

<table>
<thead>
<tr>
<th>Material</th>
<th>Dosing Head</th>
<th>Suction/ pressure connection</th>
<th>Seals/ ball seat</th>
<th>Balls</th>
</tr>
</thead>
<tbody>
<tr>
<td>SST</td>
<td>Stainless steel 1.457/1.4404</td>
<td>Stainless steel 1.4581</td>
<td>PTFE/stainless steel 1.4404</td>
<td>Ceramic</td>
</tr>
<tr>
<td>PVT*</td>
<td>PVDF (polyvinylidene fluoride)</td>
<td>PVDF (polyvinylidene fluoride)</td>
<td>PTFE / PTFE</td>
<td>Ceramic</td>
</tr>
<tr>
<td>HCT</td>
<td>Hastelloy C</td>
<td>Hastelloy C</td>
<td>PTFE / Hastelloy C</td>
<td>Ceramic</td>
</tr>
<tr>
<td>TTT</td>
<td>PTFE + 25% carbon</td>
<td>PVDF (polyvinylidene fluoride)</td>
<td>PTFE / PTFE</td>
<td>Ceramic</td>
</tr>
</tbody>
</table>

### Materials In Contact With Chemicals

1. **SPECIFIC FLOW RATE AND PRESSURE MUST BE PROVIDED UPON ORDER**

* Liquid end PVDF version Max. 363 psi (25 bar)

Example: Considering plunger 16 mm, pressure 25 bar (363 psi) and stroke rate 180 stroke/min gives (4.4) – 5.5 gph; the adjustment range of 1:10 is met for a flow rate between 4.4 and 5.5 gph.

## Capacity data: Hydro/ 3 API 675 (HA3a)

<table>
<thead>
<tr>
<th>Plunger</th>
<th>Max. pressure</th>
<th>Max. Pump capacity in gph at strokes/Min (60 Hz)</th>
<th>Theor. Stroke volume</th>
<th>Suction Lift</th>
<th>Connection on suction/ discharge side</th>
<th>Shipping Weight (approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ø</td>
<td>psig</td>
<td>72</td>
<td>149</td>
<td>180</td>
<td>224</td>
<td></td>
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<tr>
<td>26</td>
<td>928</td>
<td>5.7 - 5.9</td>
<td>11.1 - 13.6</td>
<td>12.7 - 16.2</td>
<td>17.4 - 19.8</td>
<td>9.8</td>
</tr>
<tr>
<td>26</td>
<td>580</td>
<td>5.7 - 6.6</td>
<td>11.6 - 14.3</td>
<td>13.7 - 17.4</td>
<td>15.8 - 22.4</td>
<td>9.8</td>
</tr>
<tr>
<td>26</td>
<td>363</td>
<td>4.7 - 6.6</td>
<td>9.5 - 15.6</td>
<td>12.7 - 18.6</td>
<td>17.4 - 23.4</td>
<td>9.8</td>
</tr>
<tr>
<td>26</td>
<td>145</td>
<td>4.7 - 6.9</td>
<td>9.5 - 15.6</td>
<td>11.1 - 19.3</td>
<td>15.8 - 24.3</td>
<td>9.8</td>
</tr>
<tr>
<td>32</td>
<td>580</td>
<td>7.9 - 8.0</td>
<td>15.9 - 20.7</td>
<td>22.2 - 25.4</td>
<td>20.6 - 32.0</td>
<td>9.8</td>
</tr>
<tr>
<td>32</td>
<td>363</td>
<td>7.9 - 8.3</td>
<td>15.9 - 21.7</td>
<td>20.6 - 26.3</td>
<td>20.6 - 33.3</td>
<td>9.8</td>
</tr>
<tr>
<td>32</td>
<td>145</td>
<td>7.0 - 9.9</td>
<td>15.9 - 22.2</td>
<td>23.2 - 28.5</td>
<td>19.0 - 35.5</td>
<td>9.8</td>
</tr>
<tr>
<td>38</td>
<td>174</td>
<td>7.9 - 16.0</td>
<td>22.2 - 24.6</td>
<td>34.6 - 39.9</td>
<td>25.4 - 39.9</td>
<td>9.8</td>
</tr>
<tr>
<td>38</td>
<td>145</td>
<td>9.5 - 16.2</td>
<td>25.4 - 34.9</td>
<td>28.5 - 42.8</td>
<td>20.6 - 33.3</td>
<td>9.8</td>
</tr>
<tr>
<td>38</td>
<td>145</td>
<td>9.5 - 16.2</td>
<td>25.4 - 34.9</td>
<td>28.5 - 42.8</td>
<td>20.6 - 33.3</td>
<td>9.8</td>
</tr>
</tbody>
</table>

*Spare Part Set includes:

- S1/H1: 1 spare diaphragm cpl., 1 set of seals, 2 valve balls, 4 valve balls for version with double ball valves
- P1: 1 spare diaphragm cpl., 1 suction valve cpl, 1 discharge valve cpl., 2 valve balls, 1 set of seals

### Spare Parts: Hydro/ 3 (HA3a)

<table>
<thead>
<tr>
<th>Connection on suction/ discharge side</th>
<th>Allocated to Type HP2a</th>
<th>Spare Diaphragm S1, P1</th>
<th>Spare Diaphragm H1</th>
<th>Spare Part Set S1</th>
<th>Spare Part Set P1</th>
<th>Spare Part Set H1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>See below for content</td>
<td>See below for content</td>
<td>See below for content</td>
</tr>
</tbody>
</table>

*Version SST with double ball valve, valve connector on suction-pressure with female thread Rp 1/4 and external thread G 3/4 - DN 10

The permitted design of the rate flow is possible in the stated range with pump selection in accordance with API 675 (adjustment range 1:10).

Example: Considering plunger 16 mm, pressure 25 bar (363 psi) and stroke rate 180 stroke/min gives (4.4) – 5.5 gph; the adjustment range of 1:10 is met for a flow rate between 4.4 and 5.5 gph.

### Plunger Pressure

- Connection on suction/ discharge side
- Allocated to Type HP2a
- Spare Diaphragm S1, P1
- Spare Diaphragm H1
- Spare Part Set S1
- Spare Part Set P1
- Spare Part Set H1

<table>
<thead>
<tr>
<th>mm</th>
<th>psi (bar)</th>
<th>PVDF</th>
<th>SST</th>
<th>Type / Liquid end</th>
</tr>
</thead>
<tbody>
<tr>
<td>26</td>
<td>928.2 (64)</td>
<td>1/2&quot; MNPT S5 flange 1/2&quot; / ANSI - DN 15</td>
<td>Type 064.../FMH 25</td>
<td>1005545</td>
</tr>
<tr>
<td>26</td>
<td>580.1 (40)</td>
<td>1/2&quot; MNPT S5 flange 1/2&quot; / ANSI - DN 15</td>
<td>Type 064.../FMH 25</td>
<td>1005545</td>
</tr>
<tr>
<td>26</td>
<td>363.0 (25)</td>
<td>1/2&quot; MNPT S5 flange 1/2&quot; / ANSI - DN 15</td>
<td>Type 064.../FMH 25</td>
<td>1005545</td>
</tr>
<tr>
<td>26</td>
<td>145.0 (10)</td>
<td>1/2&quot; MNPT S5 flange 1/2&quot; / ANSI - DN 15</td>
<td>Type 064.../FMH 25</td>
<td>1005545</td>
</tr>
<tr>
<td>26</td>
<td>145.0 (10)</td>
<td>3/4&quot; MNPT S5 flange 1/2&quot; / ANSI - DN 15</td>
<td>Type 064.../FMH 25</td>
<td>1005545</td>
</tr>
<tr>
<td>32</td>
<td>363.0 (25)</td>
<td>3/4&quot; MNPT S5 flange 3/4&quot; / ANSI - DN 15</td>
<td>Type 025.../FMH 60</td>
<td>1005545</td>
</tr>
<tr>
<td>32</td>
<td>363.0 (25)</td>
<td>3/4&quot; MNPT S5 flange 3/4&quot; / ANSI - DN 15</td>
<td>Type 025.../FMH 60</td>
<td>1005545</td>
</tr>
<tr>
<td>32</td>
<td>145.0 (10)</td>
<td>3/4&quot; MNPT S5 flange 3/4&quot; / ANSI - DN 15</td>
<td>Type 025.../FMH 60</td>
<td>1005545</td>
</tr>
<tr>
<td>38</td>
<td>145.0 (10)</td>
<td>3/4&quot; MNPT S5 flange 3/4&quot; / ANSI - DN 15</td>
<td>Type 025.../FMH 60</td>
<td>1005545</td>
</tr>
</tbody>
</table>
## ProMinent® Hydro/3 API 675

**Hydraulic Diaphragm Metering Pumps**

**Identcode:** Hydro/3 (HA3a)

**HA3a Drive Types:**

<table>
<thead>
<tr>
<th>HA3a</th>
<th>Drive Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>Single (vertical)</td>
</tr>
<tr>
<td>D</td>
<td>Single double head</td>
</tr>
<tr>
<td>U</td>
<td>Duplex</td>
</tr>
</tbody>
</table>

**Pumps:**

<table>
<thead>
<tr>
<th>Type</th>
<th>Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>C0</td>
</tr>
<tr>
<td>D</td>
<td>D0</td>
</tr>
<tr>
<td>E</td>
<td>E0</td>
</tr>
</tbody>
</table>

**Stroke Frequency:** 60 Hz

**Pressure Range:**

- **A:** 0 bar | l/h
- **B:** 1 bar | l/h
- **C:** 2 bars | l/h

**Temperature:**

- **1:** -4°F - 122°F / -20°C - 50°C
- **2:** -4°F - 149°F / -20°C - 65°C

**Certification:**

- **0:** CE
- **1:** CE + ATEX
- **2:** CE + EAC

**Diaaphragm rupture signal:**

- **0:** Standard
- **1:** Without

**Standard performance test:**

- **0:** Standard performance test
- **1:** Standard performance test + 3.1 Certificate
- **2:** API complete test + NPSH/NPIP

**Units:**

- **0:** EN
- **1:** EN

**Material:**

- **Standard stainless steel; PTFE**
- **PTFE + Carbon; PTFE**
- **PVDF; PTFE**
- **PTFE + Carbon; PTFE**

**Valve Design:**

- **Without valve springs/ for plunger D=16 SST and HCT double ball valves**
- **With valve springs for plunger D=16 SST and HCT double ball valve**

**Drive Type:**

- **V:** Triplex
- **T:** Duplex
- **D:** Simplex
- **U:** Simplex double head

**Optional Features:**

- **Hydraulic connection:**
  - **0:** Standard
  - **1:** Add on drive

**Electrical Power Supply:**

- **4:** Motor-driven, semi-automatic, NEMA 56 C
- **0:** Add on drive

**Visual Indicator:**

- **A1:** Standard textured paint - RAL 2003
- **A2:** Standard gloss paint - RAL 2003
- **A3:** Offshore - RAL 2003

**Testing:**

- **A2:** Standard performance test + 3.1 Certificate
- **A1:** API complete test + NPSH/NPIP

**Product Overview:**

- **DULCOTE® sensors**
- **DULCOMETER® instrumentation**
- **Pump spare parts & accessories**
- **Motor-driven metering pumps**
- **Solenoid-driven metering pumps**
ProMinent® Makro TZ
Diaphragm Metering Pumps

Overview: Makro TZ

Ideal for high volume and high pressure applications
(see page 150 for spare parts)

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

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

ProMinent® Makro TZ TZMbA Add-On Pumps

The ProMinent® Makro TZ main diaphragm metering pump can be converted to a duplex or triplex pump with the ProMinent® Makro TZ add-on diaphragm pump (several add-on pumps can be operated at reduced back pressure). Multiplex pumps can also be retrofitted by the operator; all the necessary components and fittings are included with the TZMbA. Different stroke rates can be achieved with the add-on pump independently of the main pump as each TZMbA has its own reducing gear. The main power end can be fitted for this purpose with a more powerful drive motor. A base frame is required when using add-on power ends.

ProMinent® Makro TZ Double Head Version TZMbD/TZMbB

The double head version of the ProMinent® Makro TZ is similar to the simplex pump. It is, however, fitted with a second liquid end.

The liquid ends work in push-pull mode by means of a coupling element in the gearbox.
# ProMinent® Makro TZ Diaphragm Metering Pumps

**Identcode Ordering System (TZMb)**

<table>
<thead>
<tr>
<th>TZMb Drive Type:</th>
<th>H Main Drive</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pump Type:</strong></td>
<td></td>
</tr>
<tr>
<td>120260</td>
<td>82 gph, 174 psi</td>
</tr>
<tr>
<td>120340</td>
<td>108 gph, 174 psi</td>
</tr>
<tr>
<td>120430</td>
<td>136 gph, 174 psi</td>
</tr>
<tr>
<td>120510</td>
<td>162 gph, 174 psi</td>
</tr>
<tr>
<td>070430</td>
<td>136 gph, 100 psi</td>
</tr>
<tr>
<td>070570</td>
<td>180 gph, 100 psi</td>
</tr>
</tbody>
</table>

**Liquid end material:**

- PC PVC
- PP Polypropylene
- SS Stainless Steel
- TT PTFE + 25% carbon

**Seal material:**

- T PTFE

**Positive displacement element:**

1 Standard composite diaphragm with rupture indicator

**Liquid end version:**

- 0 No valve springs
- 1 With valve springs

**Hydraulic connection:**

| 0 Standard connection | 3 PVDF union nut and insert |
| 1 PVC union nut and insert | 4 SS union nut and insert |
| 2 PP union nut and insert |

**Versions:**

- 0 with ProMinent® logo

**Electrical power supply:**

- 0 add-on drive unit without electrical connection
- 4 No motor, with 56 C flange

**Enclosure rating:**

- 0 IP 55 (Standard) ISO class F

**Stroke sensor:**

- 0 No stroke sensor
- 1 With stroke sensor (Namur)

**Stroke length adjustment:**

- 0 Stroke length adjustment, man.
- 1 230 V stroke actuator
- 2 115 V stroke actuator
- 3 230 V 0-20 mA stroke controller
- 4 230 V 4-20 mA stroke controller
- 5 115 V 0-20 mA stroke controller
- 6 115 V 4-20 mA stroke controller

**Applications**

- 0 Standard
**Materials In Contact With Chemical In Version**

<table>
<thead>
<tr>
<th>Pump Head</th>
<th>Suction/ Discharge Connector</th>
<th>DN 25 Ball Valves</th>
<th>DN 32/DN 40 Plate Valves**</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPT</td>
<td>Polypropylene, PVDF</td>
<td>PTFE, Ceramic</td>
<td>PTFE, Ceramic/Hast. C + CTFE*</td>
</tr>
<tr>
<td>PCT</td>
<td>PVC, PVDF</td>
<td>PTFE, Ceramic</td>
<td>PTFE, Ceramic/Hast. C + CTFE*</td>
</tr>
<tr>
<td>TTT</td>
<td>PTFE with carbon</td>
<td>PTFE, Ceramic</td>
<td>PTFE, Ceramic/Hast. C + CTFE*</td>
</tr>
<tr>
<td>SST</td>
<td>Stainless steel</td>
<td>PTFE, Stainless steel</td>
<td>PTFE, Stainless steel/Hast. C + CTFE*</td>
</tr>
</tbody>
</table>

*Multi-layer safety diaphragm with PTFE coating.

** The valve spring is coated with CTFE (similar to PTFE)

Custom designs available to order.
Overview: DULCO flex Control - DFXa

The DULCO flex Control - DFXa is an intelligent peristaltic metering pump that is valve-free and has the accuracy of a diaphragm pump. Applications include gaseous, highly viscous, abrasive, shear-sensitive and chemically aggressive fluids.

The liquid end of the pump is designed for a quick and simple replacement of the tubing, utilizing a unique exchange process. The pump display provides precise instructions on the steps required for the tube replacement. High-preformance tubing consists of a TPV (Santoprene) or PUR (Polyurethane) material that provides excellent chemical resistance and a long service life.

The DULCO flex Control - DFXa is powered by a DC motor and will provide continuous metering from 0.038 GPD (6 ml/h) to 17.17 GPH (65 l/h) and pressures up to 100 PSIG (7bar). Additional features such as communication protocol includes PROFIBUS, CANbus, Modbus and PROFINET are available.

Your benefits

- NSF61 Approved
- Volume adjustment in GPH or LPH
- Manual, Analog, Contact and Batch modes optional
- High visibility of LED-indicator lights
- Large illuminated display
- New configurable input/output port
- CIP (cleaning in place) enabled system
- Reverse flow is possible
- Dosing head can be aligned in four directions: Left, Right, Up and Down
- Integrated 7-day timer
- Viscosities to 10,000 cPs

Certified to NSF/ANSI 61
ProMinent® DULCO flex Control Series
Peristaltic Metering Pumps

Capacity Data

<table>
<thead>
<tr>
<th>Capacity data: DULCO flex Control - DFXa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pump Version</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>0518</td>
</tr>
<tr>
<td>0530</td>
</tr>
<tr>
<td>0730</td>
</tr>
<tr>
<td>0565</td>
</tr>
</tbody>
</table>

Tube material:
TPV (Santoprene): available with pump versions 0730 and 0530
PUR (Polyurethane): available with pump version 0518, 0530 and 0565 only

Tube connectors: PVDF/PTFE

Metering reproducibility: ± 2% with retracted tube (after approx. 200 revolutions)

Turndown: 3,000:1

Electrical connection: 100 - 230 V ± 10%, 50/60 Hz

Nominal power: approx. 45 W

Degree of protection: IP 66, NEMA 4X Indoor

Permissible ambient temperature: 14 - 113 °F

Optional relay modules: 1 x switch over contact, 230 V - 8 A or 2 x On, 24 V - 100 mA

Spare Parts

<table>
<thead>
<tr>
<th>Tube assembly:</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>TPV (Santoprene) 101.5 PSIG (7 bar), Version 0730</td>
<td>1102991</td>
</tr>
<tr>
<td>TPV (Santoprene) 72.5 PSIG (6 bar), Version 0530</td>
<td>1102907</td>
</tr>
<tr>
<td>PUR (Polyurethane) 72.5 PSIG (5 bar), Versions 0518, 0530 and 0565</td>
<td>1104951</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tube assembly &amp; 1/2&quot; x 3/8&quot; Connection set:</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>0530 TPV (Santoprene) FDA</td>
<td>1108974</td>
</tr>
<tr>
<td>0530 TPV (Santoprene)</td>
<td>1108975</td>
</tr>
<tr>
<td>0530 PUR (Polyurethane) FDA</td>
<td>1110172</td>
</tr>
<tr>
<td>0530 PUR (Polyurethane)</td>
<td>1110171</td>
</tr>
<tr>
<td>0730 TPV (Santoprene) FDA</td>
<td>1108951</td>
</tr>
<tr>
<td>0730 SPT (Santoprene)</td>
<td>1108952</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dosing head parts:</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dosing head</td>
<td>1094919</td>
</tr>
<tr>
<td>Dosing head cover</td>
<td>1104727</td>
</tr>
<tr>
<td>Spare star knob set</td>
<td>1104952</td>
</tr>
<tr>
<td>Rotor Complete</td>
<td>1103249</td>
</tr>
</tbody>
</table>

Dimensional Drawings

Note: All above measurements are in inches
# ProMinent® DULCO flex Control Series
## Peristaltic Metering Pumps

### Specifications

**Materials of construction:**
- **Housing:** Fiberglass reinforced PPE (Polyphenylene Ether)
- **Dosing head:** Glass reinforced PA6 (Polyamide)
- **Rotor:** Fiberglass reinforced PPS (Polyphenylensulphide)
- **Pump hose:** TPV (Santoprene) available with pump versions 0730 and 0530
- **Pump hose:** PUR (Polyurethane) available with pump version 0518, 0530 and 0565 only

**Connections:**
- **Hose Connection:** PVDF
- **O-rings (wetted):** PTFE

**Electrical:**
- **Enclosure rating:** IP 66, NEMA 4X Indoor
- **Power supply:** 100 – 230 VAC 1 Phase 50 / 60 Hz ± 10%
- **Power cord:** 6ft
- **Relay Options:**
  - Relay cable (optional): 6ft
  - **Identcode Option 1:** 1 x changeover contact 230 V AC - 6 A, Fault indicating relay (N/C)
  - **Identcode Option 4:** 1 x N/O 24 V DC -1 A - 1 x N/O 24 V - 1 ma, As 1 + pacing relay
  - **Identcode Option C:** 1 x N/O 24 V DC - 100 mA and 1 x 4-20 mA output, As 1 + 4-20 mA output

**Ambient temperature range:**
- **In operation:** 14 °F to 113 °F (-10 °C to 45 °C)
- **Storage & Transport:** 14 °F to 122 °F (-10 °C to 50 °C)

**Climate:**
- **Sound pressure level:** LpA < 70 dB according to EN ISO 20361
- **Warranty:** 2 years on pump drive, 1 year on liquid end
- **Hose insert threads:** NP / PVT M20 x 1.5 (provided with adapters for tubing)
- **Standard production test:** All pumps are tested for capacity at maximum pressure prior to shipment

**Contact input:**
- **Minimum pulse duration:** 20 ms
- **Maximum pulse input:** 25 pulses / second
- **Analog Input Impedance:** 120 Ohms
# ProMinent® DULCO flex Control Series

## Peristaltic Metering Pumps

### Identcode Ordering System

<table>
<thead>
<tr>
<th>DFXa</th>
<th>DULCO flex Control</th>
</tr>
</thead>
</table>

### Regional design:

<table>
<thead>
<tr>
<th>Version Capacity:</th>
<th>US</th>
<th>USA</th>
</tr>
</thead>
<tbody>
<tr>
<td>0518</td>
<td>4.75 gph (18 l/h), 73 psi (5 bar)</td>
<td></td>
</tr>
<tr>
<td>0530</td>
<td>7.82 gph (30 l/h), 73 psi (5 bar)</td>
<td></td>
</tr>
<tr>
<td>0730</td>
<td>7.82 gph (30 l/h), 100 psi (7 bar)</td>
<td></td>
</tr>
<tr>
<td>0565</td>
<td>17.17 gph (65 l/h), 73 psi (5 bar)</td>
<td></td>
</tr>
</tbody>
</table>

### Tube material:

- **SP** Santoprene (TPV)
- **VP** Polyurethane (PUR)

Note: Available with pump versions 0730 and 0530

### Seal material:

- **F** FDA-compliant (PTFE)
- **T** PTFE

### Dosing head orientation:

- **R** Right (view from behind)
- **L** Left (view from behind)
- **Q** Top
- **U** Bottom

### Hydraulic connector:

- **Q** connection 1/2" x 3/8" (USA)

### Tube rupture alarm:

- **1** With diaphragm rupture indicator, optical sensor

### Design:

- **0** Housing RAL 5003 / cover RAL 2003
- **0** with ProMinent logo

### Power connection:

- **U** Universal 100 - 240 V

### Cable and plug:

- **D** USA 115 V - 6 ft. (2m)

### Relay:

- **0** No relay
- **1** 1x changeover contact 230 V - 8A, fault indicating relay N/C
- **4** 2x N/O 24 V - 100 mA, fault indicating relay N/C + pacing relay
- **C** 1x N/O 24 V - 100 mA, fault indicating relay N/C + 4-20 mA output

### Accessories:

- **0** None
- **1** Injection valve 1/2" and foot valve

### Control Variants:

- **0** Manual + Contact with PulseControl
- **3** Manual + Contact with PulseControl + Analog
- **C** CANopen
- **P** Profinet
- **R** Profinet

### Communication:

- **0** None

### Language:

- **EN** English

### Certification:

- **01** CE

### Documentation:

- **EN** English

---

**Note:**
Available with pump versions 0730 and 0530

**Control variants:**
- **0** Manual + Contact with PulseControl
- **3** Manual + Contact with PulseControl + Analog
- **C** CANopen
- **P** Profinet
- **R** Profinet

**Communication:**
- **0** None

**Language:**
- **EN** English

**Certification:**
- **01** CE

**Documentation:**
- **EN** English
Overview: DULCO flex Control - DFYa

The Dulco flex Control- DFYa metering pump adds an intelligent peristaltic offering to our established line of ProMinent pumps.

This new design of peristaltic pump is controlled electronically via an HMI controller thus allowing for greater turndown in our DulcoFlex pump series. All the benefits of a peristaltic pump are retained including off-gassing fluids, high viscosity and abrasive media, and shear-sensitive liquids.

Like the DFXa, the DFYa offers simple and easy hose replacement via the HMI controller. When the hose needs replaced, the pump displays instructions for the user to step-through the replacement process.

Your benefits

- Contact, batch, manual or analog modes
- Adjustment of the metering rate directly in l/h or gph
- Connection to process control systems via a BUS interface, such as PROFIBUS®, Profinet or CANbus
- Large illuminated display
- Pump is available as an FDA design
- No problems with very gaseous media or air locks
- Reverse flow is possible
- Viscosities to 40,000 cPs
**ProMinent® DULCO flex Control Series**

**Peristaltic Metering Pumps**

### Capacity Data

<table>
<thead>
<tr>
<th>Pump Version</th>
<th>Capacity at Maximum Backpressure</th>
<th>Max. speed rpm</th>
<th>Connector size</th>
<th>Pre-primed suct. lift</th>
<th>Shipping weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GPH ±10% (L/h) ±10%</td>
<td>PSIG (bar)</td>
<td>in</td>
<td>ft (m)</td>
<td>lbs (kg)</td>
</tr>
<tr>
<td>08410</td>
<td>108.3 (410)</td>
<td>116.0 (8)</td>
<td>80</td>
<td>3/4&quot;</td>
<td>26.25 (8)</td>
</tr>
<tr>
<td>04410</td>
<td>108.3 (410)</td>
<td>58.0 (4)</td>
<td>80</td>
<td>3/4&quot;</td>
<td>26.25 (8)</td>
</tr>
<tr>
<td>02410</td>
<td>108.3 (410)</td>
<td>29.0 (2)</td>
<td>80</td>
<td>3/4&quot;</td>
<td>26.25 (8)</td>
</tr>
</tbody>
</table>

**Tube material:**
- NR (Natural rubber)
- NBR (Nitrile rubber), NBR-A (Nitrile rubber FDA approved)
- EPDM
- HYPALON®

**Pre-primed suction lift:** 26.25 ft (8 m)

**Rollers/shoes:** Rollers

**Metering reproducibility:** ± 2% with retracted tube (after approx. 500 revolutions)

**Electrical connection:** 100 - 230 V ± 10%, 50/60 Hz

**Power consumption:** Max. 400 W

**Degree of protection:** IP 55

**Permissible ambient temperature:** 32 - 113 °F (0 - 45 ºC)

**Optional relay modules:**
- Fault indicating relay - 230 V AC - 8 A
- Fault indicating relay + Pacing relay - 24 V DC - 100 mA
- 0/4-20 mA output + fault indicating/pacing relay - 24 V DC - 100 mA

*Capacity data represents minimum values, tested using water at 68 °F (room temperature)*

*HYPALON® is a registered trade mark of DuPont Performance Elastomers*

### Dimensional Drawings

*Note: All above measurements are in inches*
ProMinent® DULCO flex Control Series
Peristaltic Metering Pumps

Specifications

Materials of construction:
Housing: Fiberglass reinforced PPE (Polyphenylene Ether)
Dosing head: Glass reinforced PA6 (Polyamide)
Rotor: Fiberglass reinforced PPS (Polyphenylensulphide)
Pump hose: TPV (Santoprene) available with pump versions 0730 and 0530
PUR (Polyurethane) available with pump version 0530 only

Connections:
Hose Connection: PVDF
O-rings (wetted): PTFE

Electrical:
Enclosure rating: IP 66, NEMA 4X Indoor
Power supply: 100 – 230 VAC 1 Phase 50 / 60 Hz ± 10%
Power cord: 6ft

Relay Options:
Relay cable (optional): 6ft
Identcode Option 1: 1 x changeover contact 230 V AC - 6 A, Fault indicating relay (N/C)
Identcode Option 4: 1 x N/O 24 V DC -1 A - 1 x N/O 24 V - 1 ma, As 1 + pacing relay
Identcode Option C: 1 x N/O 24 V DC - 100 mA and 1 x 4-20 mA output, As 1 + 4-20 mA output

Ambient temperature range:
In operation: 14 °F to 113 °F (-10 °C to 45 °C)
Storage & Transport: 14 °F to 122 °F (-10 °C to 50 °C)

Climate: 95% Relative humidity – non-condensing
Sound pressure level: LpA < 70 dB according to EN ISO 20361
Warranty: 2 years on pump drive, 1 year on liquid end
Hose insert threads: NP / PVT M20 x 1.5 (provided with adapters for tubing)
Standard production test: All pumps are tested for capacity at maximum pressure prior to shipment

Contact input:
Minimum pulse duration: 20 ms
Maximum pulse input: 25 pulses / second
Analog Input Impedance: 120 Ohms

Specifications are from the DFXa, just a starting point for DFYa
**Identcode Ordering System**

<table>
<thead>
<tr>
<th>DFYa</th>
<th>DULCO flex Control</th>
<th>Regional design:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>US USA</td>
</tr>
</tbody>
</table>

**Version Capacity:**
- 08410: 108.3 gph ±10% (410 l/h), 116.0 psi (8 bar)
- 04410: 108.3 gph ±10% (410 l/h), 58.0 psi (4 bar)
- 02410: 108.3 gph ±10% (410 l/h), 29.3 psi (2 bar)

**Tube material:**
- 0 NBR (Natural rubber)
- A NBR-A (Nitrile rubber FDA approved)
- B NBR (Nitrile rubber)
- H Hypalon
- E EPDM

**Dosing head orientation:**
- R Right (standard)
- L Left

**Hydraulic connector:**
- A VA, BSPT 3/4"
- B VA, NPT 3/4"
- C PP, BSPT 3/4"
- D PVDF, BSPT 3/4"
- E PVDF, NPT 3/4"
- F PVC, NPT 3/4"
- G Triclamp, VA, 1"
- H DIN 11851, VA, NW 20

**Tube rupture alarm:**
- 0 Without hose rupture indicator
- 1 With diaphragm rupture indicator

**Design:**
- 0 ProMinent version
- M Modified

**Special version:**
- 0 Standard
- H Chemically high-resistance version (Halar-coated)

**Logo:**
- 0 With ProMinent logo
- 1 Without logo
- M Modified

**Power connection:**
- Universal 100 - 240 V ± 10%, 50/60 Hz

**Cable and plug:**
- D USA 115 V - 6 ft. (2 m)

**Relay:**
- 0 No relay
- 1 Fault indicating relay 230 V AC, 8 A
- 3 Fault indicating relay 24 V AC, 100 mA + Placing relay 24 V AC, 100 mA
- 6 4-20 mA output + Fault indicating / Placing relay 24 V AC, 100 mA

**Accessories:**
- 0 No accessories

**Control Variants:**
- 0 Manual + external contact with pulse control
- 1 Manual + external contact with pulse control + analog 4-20 mA
- 6 PROFIBUS M12 (Ar)</code>
- 7 CANopen

**Operating unit (HMI):**
- 0 HMI = 1.5" (3.8 cm) cable
- 4 HMI = 6.3" (2.0 m) cable
- 5 HMI = 16-ft (5.0 m) cable
- 6 HMI = 32-ft (10.0 m) cable

**Access code:**
- 0 Access code
- 1 No access code

**Documentation:**
- EN English

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2021 - DULCO flex Control (DFYa)
**Overview: DulcoFlex DFBU**

The DulcoFlex DFB is a versatile peristaltic pump, which incorporates both hose and tubing technology. The unique roller design offers a lubricant-free housing unlike typical shoe pumps. With pressures up to 116 psi and flow rates to 337 gph, the DFB ia a great choice for pumping difficult fluid such as slurries and abrasive chemicals.

### Feature & Benefits

- 10, 13, 16, 19, 22 mm tubing pumps (30 psi)
- 10, 13, 16, 22 mm reinforced hose pumps (116 psi)
- Flows to 337 gph (5.6 gpm)
- Halar coating available for the toughest chemicals
- Disaster proof hose connections
- Roller Technology - Lower hose Stress
- Easy maintenance
- Reinforced hose
- Can run dry
- Self-priming
- Great for solids
- Reversible
- No seals
- No valves

### DulcoFlex DFB Capacities

<table>
<thead>
<tr>
<th>Capacity Data</th>
<th>DFB10</th>
<th>DFB13</th>
<th>DFB16</th>
<th>DFB19*</th>
<th>DFB22</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DFB Series</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compression</td>
<td>Roller</td>
<td>Roller</td>
<td>Roller</td>
<td>Roller</td>
<td>Roller</td>
</tr>
<tr>
<td>Connection</td>
<td>3/8”</td>
<td>3/8”</td>
<td>3/4”</td>
<td>1”</td>
<td>1”</td>
</tr>
<tr>
<td>Capacity gal/rev</td>
<td>0.006</td>
<td>0.01</td>
<td>0.024</td>
<td>0.032</td>
<td>0.066</td>
</tr>
<tr>
<td>Max. Flow GPH</td>
<td>31</td>
<td>51</td>
<td>122</td>
<td>163</td>
<td>337</td>
</tr>
<tr>
<td>Max. Pressure</td>
<td>116 psi</td>
<td>116 psi</td>
<td>116 psi</td>
<td>N/A</td>
<td>116 psi</td>
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<tr>
<td>Reinforced Hoses</td>
<td>Norprene</td>
<td>Norprene</td>
<td>Norprene</td>
<td>Norprene</td>
<td>Norprene</td>
</tr>
<tr>
<td>Tubing</td>
<td>30 psi</td>
<td>30 psi</td>
<td>30 psi</td>
<td>30 psi</td>
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<td>Max. Pressure</td>
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<tr>
<td>Tubing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Models are available with one of the following reinforced hoses:
Natural Rubber, Buna, EPDM, Hypalon

* DFB19 is not available with reinforced hoses
# ProMinent® DulcoFlex Series

## Identcode Ordering System

<table>
<thead>
<tr>
<th>DFBU</th>
<th>DULCO®flex DFBU</th>
<th>pump size</th>
</tr>
</thead>
<tbody>
<tr>
<td>010</td>
<td>DFBu 010, 0.006 gal/revolution 3/8&quot;</td>
<td>019 DFBu 019, 0.032 gal/revolution 1&quot;</td>
</tr>
<tr>
<td>013</td>
<td>DFBu 013, 0.010 gal/revolution 3/8&quot;</td>
<td>022 DFBu 022, 0.066 gal/revolution 1&quot;</td>
</tr>
<tr>
<td>016</td>
<td>DFBu 016, 0.024 gal/revolution 3/4&quot;</td>
<td></td>
</tr>
</tbody>
</table>

### Speed

<table>
<thead>
<tr>
<th>010 - 019 ONLY</th>
<th>022 ONLY</th>
</tr>
</thead>
<tbody>
<tr>
<td>005 5 rpm</td>
<td>209 9 rpm</td>
</tr>
<tr>
<td>006 6 rpm</td>
<td>212 12 rpm</td>
</tr>
<tr>
<td>007 7 rpm</td>
<td>216 16 rpm</td>
</tr>
<tr>
<td>009 9 rpm</td>
<td>218 18 rpm</td>
</tr>
<tr>
<td>011 11 rpm</td>
<td>220 20 rpm</td>
</tr>
<tr>
<td>013 13 rpm</td>
<td>225 25 rpm</td>
</tr>
<tr>
<td>017 17 rpm</td>
<td>227 27 rpm</td>
</tr>
<tr>
<td>021 21 rpm</td>
<td>230 30 rpm</td>
</tr>
<tr>
<td>024 24 rpm</td>
<td>236 36 rpm</td>
</tr>
</tbody>
</table>

#### Motor type

- 0: Without motor
- 1: TEFC 115/1/60
- 2: TEFC 230-460/3/60 1000:1
- 3: WD/Chem Duty TENV 230-460/3/60 1000:1
- 4: X1 120/1/60
- 5: XV 230-460/3/60 1000:1
- 6: DC 90V

#### Hose material

- 0: Natural rubber
- B: NBR
- E: EPDM
- H: Hypalon
- N: Norprene (max 30 psi)

#### Connection

- B: SS NPT
- F: PVDF NPT
- G: PVC NPT
- H: Tri-clamp, SS

#### Base plate

- 4: base plate, HDPE

#### Leakage sensor

- 0: No leakage detector
- L: Leakage detector
- R: Leakage detector and relay kit

#### Orientation

- D: Down
- L: Left
- R: Right (standard)
- U: Up

#### VFD

- 0: Without VFD
- 1: Basic VFD 115/1/60
- 2: Basic VFD 460/3/60
- 3: Advanced VFD 115/1/60
- 4: Advanced VFD 460/3/60

#### Special version

- 0: Standard model
- H: Chemical version (Halar coated)

#### Discharge pressure

- 1: 30 psi (max tube)
- 2: 60 psi
- 3: 90 psi
- 4: 115 psi (max hose)
ProMinent® DulcoFlex Series

Overview: DulcoFlex DFBR

The DulcoFlex RAD pump offers a choice of tubing or a reinforced hose in about ½ the space needed for conventional hose pumps! Proven roller technology means no expensive fill lubricants, no required torque stabilization, and up to 30% longer hose life than comparable “pressing shoe” hose pumps. Disaster proof hose/tube fittings, flows up to 337 gph, and pressure capability up to 116 psi makes the RAD pump a great choice for pumping difficult fluids!

Feature & Benefits

- 10, 13, 16, 19, 22 mm tubing pumps (30psi)
- 10, 13, 16, 22 mm reinforced hose pumps (116psi)
- Flows to 337 gph (6.6 gpm)
- Halar coating available for the toughest chemicals
- Disaster proof hose connections
- Roller Technology - Lower hose Stress
- Easy maintenance
- Reinforced hose
- Can run dry
- Self-priming
- Great for solids
- Reversible
- No seals
- No valves

DulcoFlex DFBR Capacities

<table>
<thead>
<tr>
<th>Capacity Data</th>
<th>DFBR10</th>
<th>DFBR13</th>
<th>DFBR16</th>
<th>DFBR19*</th>
<th>DFBR22</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DFBR Series</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compression</td>
<td>Roller</td>
<td>Roller</td>
<td>Roller</td>
<td>Roller</td>
<td>Roller</td>
</tr>
<tr>
<td>Connection</td>
<td>3/8”</td>
<td>3/8”</td>
<td>3/4”</td>
<td>1”</td>
<td>1”</td>
</tr>
<tr>
<td>Capacity gal/rev</td>
<td>0.006</td>
<td>0.01</td>
<td>0.024</td>
<td>0.032</td>
<td>0.066</td>
</tr>
<tr>
<td>Max. Flow GPH</td>
<td>31</td>
<td>51</td>
<td>122</td>
<td>163</td>
<td>337</td>
</tr>
<tr>
<td>Max. Pressure Reinforced Hoses</td>
<td>116 psi</td>
<td>116 psi</td>
<td>116 psi</td>
<td>N/A</td>
<td>116 psi</td>
</tr>
<tr>
<td>Tubing</td>
<td>Norprene</td>
<td>Norprene</td>
<td>Norprene</td>
<td>Norprene</td>
<td>Norprene</td>
</tr>
<tr>
<td>Max. Pressure Tubing</td>
<td>30 psi</td>
<td>30 psi</td>
<td>30 psi</td>
<td>30 psi</td>
<td>30 psi</td>
</tr>
</tbody>
</table>

Models are available with one of the following reinforced hoses:
Natural Rubber, Buna, EPDM, Hypalon

* DFBR19 is not available with reinforced hoses
**ProMinent® DulcoFlex Series**

**Identcode Ordering System**

<table>
<thead>
<tr>
<th>DFBR</th>
<th>DULCOflex DFBR pump size</th>
<th>DFBr 010, 0.006 gal/revolution 3/8&quot;</th>
<th>DFBr 013, 0.010 gal/revolution 3/8&quot;</th>
<th>DFBr 016, 0.024 gal/revolution 3/4&quot;</th>
<th>DFBr 019, 0.032 gal/revolution 1&quot;</th>
<th>DFBr 022, 0.066 gal/revolution 1&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>010</td>
<td></td>
<td>032</td>
<td>32 rpm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>013</td>
<td></td>
<td>056</td>
<td>56 rpm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>016</td>
<td></td>
<td>076</td>
<td>76 rpm</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Motor Type**

- 0: Without motor
- 1: TEFC 115/1/60
- 2: TEFC 230-460/3/60 1000:1
- 3: WD/Chem Duty TENV 230-460/3/60 1000:1
- 4: X1 120/1/60
- 5: XV 230-460/3/60 1000:1
- 6: DC 90V

**Hose Material**

- 0: Natural rubber
- B: NBR
- E: EPDM
- H: Hypalon
- N: Norprene (max 30 psi)

**Connection**

- B: SS NPT
- F: PVDF NPT
- G: PVC NPT
- H: Tri-clamp, SS

**Base Plate**

- 4: base plate, HDPE

**Leakage Sensor**

- 0: No leakage detector
- L: Leakage detector
- R: Leakage detector and relay kit

**Orientation**

- D: Down
- L: Left
- R: Right (standard)
- U: Up

**VFD**

- 0: Without VFD
- 1: Basic VFD 115/1/60
- 2: Basic VFD 460/3/60
- 3: Advanced VFD 115/1/60
- 4: Advanced VFD 460/3/60

**Special Version**

- 0: Standard model
- H: Chemical version (Halar coated)

**Discharge Pressure**

- 1: 30 psi (max tube)
- 2: 60 psi
- 3: 90 psi
- 4: 115 psi (max hose)
The DulcoFlex DFC is a hose pump designed for difficult pumping applications. It incorporates a roller design which eliminates the need for cumbersome lubricants, unlike typical shoe pumps. The DFC can reach pressures up to 116 psi and flow rates up to 106 gpm and is ideal for difficult industrial and municipal applications.

### Feature & Benefits

- Sizes: 30, 40, 50, 60, 70mm
- Flows to 106 gpm
- Disaster proof hose connections
- Roller Technology - Lower hose stress
- Easy maintenance
- Reinforced hose
- Can run dry
- Self-priming
- Great for solids handling
- Reversible
- No seals
- No valves

### DulcoFlex DFCU Capacities

<table>
<thead>
<tr>
<th>Capacity Data</th>
<th>DFCU30</th>
<th>DFCU40</th>
<th>DFCU50</th>
<th>DFCU60</th>
<th>DFCU70</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compression Roller</td>
<td>Roller</td>
<td>Roller</td>
<td>Roller</td>
<td>Roller</td>
<td>Roller</td>
</tr>
<tr>
<td>Connection</td>
<td>1 1/4”</td>
<td>1 1/2”</td>
<td>1 1/2”</td>
<td>2”</td>
<td>2 1/2”</td>
</tr>
<tr>
<td>Capacity gal/rev</td>
<td>0.11</td>
<td>0.24</td>
<td>0.39</td>
<td>0.82</td>
<td>1.76</td>
</tr>
<tr>
<td>Max. Flow GPM</td>
<td>7.4</td>
<td>14.4</td>
<td>23.1</td>
<td>41.2</td>
<td>106.4</td>
</tr>
<tr>
<td>Max. Pressure Reinforced Hoses</td>
<td>116 psi</td>
<td>116 psi</td>
<td>116 psi</td>
<td>116 psi</td>
<td>116 psi</td>
</tr>
<tr>
<td>Tubing</td>
<td>N/A</td>
<td>Norprene</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Max. Pressure Tubing</td>
<td>N/A</td>
<td>30 psi</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

All models are available with one of the following reinforced hoses: Natural Rubber, Buna, EPDM, Hypalon.
### ProMinent® DulcoFlex Series

**Identcode Ordering System**

<table>
<thead>
<tr>
<th>DFCU</th>
<th>DULCO®flex DFCU</th>
<th>pump size</th>
</tr>
</thead>
<tbody>
<tr>
<td>030</td>
<td>DFCU 030, 0.11 gal/revolution</td>
<td>060 DFCU 060, 0.82 gal/revolution</td>
</tr>
<tr>
<td>040</td>
<td>DFCU 040, 0.24 gal/revolution</td>
<td>070 DFCU 070, 1.76 gal/revolution</td>
</tr>
<tr>
<td>050</td>
<td>DFCU 050, 0.39 gal/revolution</td>
<td></td>
</tr>
</tbody>
</table>

**Speed**

<table>
<thead>
<tr>
<th>Speed</th>
<th>030 - 050 ONLY</th>
<th>060 - 070 ONLY</th>
</tr>
</thead>
<tbody>
<tr>
<td>000</td>
<td>000 without gear reducer</td>
<td>000 without gear reducer</td>
</tr>
<tr>
<td>009</td>
<td>035 35 rpm</td>
<td>012 12 rpm</td>
</tr>
<tr>
<td>012</td>
<td>039 39 rpm</td>
<td>016 16 rpm</td>
</tr>
<tr>
<td>014</td>
<td>045 45 rpm</td>
<td>023 23 rpm</td>
</tr>
<tr>
<td>016</td>
<td>049 49 rpm</td>
<td>028 28 rpm</td>
</tr>
<tr>
<td>018</td>
<td>057 57 rpm</td>
<td>071 71 rpm</td>
</tr>
<tr>
<td>020</td>
<td>064 64 rpm</td>
<td></td>
</tr>
<tr>
<td>025</td>
<td>072 72 rpm</td>
<td></td>
</tr>
<tr>
<td>027</td>
<td>082 82 rpm</td>
<td></td>
</tr>
</tbody>
</table>

**Motor type**

- 0: No motor provided
- 1: TEFC Severe Duty 230-460/3/60 20:1 (variable speed)
- 2: TEFC Explosion Proof 230-460/3/60 Class 1 Div 1, Groups C&D

**Hose material**

- 0: Natural rubber
- B: NBR
- E: EPDM
- H: Hypalon

**Hydraulic connection**

- 1: ANSI Flange SS
- 2: ANSI Flange PVC
- 3: ANSI Flange PVDF

**Base plate**

- 1: Painted steel

**Leakage sensor**

- 0: Without leakage detector
- A: 5-48VDC, N.O. (USE WITH DRIVE)
- B: 5-48VDC, N.C.
- C: 24-240VAC, N.O.
- D: 24-240VAC, N.C.

**Orientation**

- D: Down
- L: Left
- R: Right (standard)
- U: Up

**VFD**

- 0: Without VFD
- 1: Basic VFD 115/1/60 (030 & 040 ONLY)
- 2: Basic VFD 460/3/60
- 3: Advanced VFD 115/1/60 (030 ONLY)
- 4: Advanced VFD 460/3/60

**Special version**

- 0: Standard version
- H: Chemical version (Halar coated)

**Discharge pressure**

- 1: 30 psi (max tube)
- 2: 60 psi
- 3: 90 psi
- 4: 115 psi (max hose)
The DulcoFlex DFD is a hose pump designed for pressures up to 232 psi and flow rates up to 160 gpm. The unique shoe design is made of steel for smoother and cooler compression. The DFD uses safe DulcoLube oil for the shoe lubrication. With suction lifts up to 29 feet, the DulcoFlex DFD is a great choice for difficult pumping applications.

**Feature & Benefits**

- Sizes: 25, 32, 40, 60, 70, 100mm
- Flows to 160 gpm
- Suction lifts up to 29 ft.
- Disaster proof hose connections
- DulcoLube food grade glycerin lubricant
- Designed heat sink fins for cooler operation
- Steel shoes for a smoother and cooler compression
- Run dry capabilities

**DulcoFlex DFDU Capacities**

<table>
<thead>
<tr>
<th>Capacity Data</th>
<th>DFDU25</th>
<th>DFDU32</th>
<th>DFDU40</th>
<th>DFDU60</th>
<th>DFCU70</th>
<th>DFDU100</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DFDU Series</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compression</td>
<td>Shoe</td>
<td>Shoe</td>
<td>Shoe</td>
<td>Shoe</td>
<td>Shoe</td>
<td>Shoe</td>
</tr>
<tr>
<td>Connection</td>
<td>1”</td>
<td>1 1/2”</td>
<td>1 1/2”</td>
<td>2 1/2”</td>
<td>2 1/2”</td>
<td>4”</td>
</tr>
<tr>
<td>Capacity gal/rev</td>
<td>0.08</td>
<td>0.16</td>
<td>0.37</td>
<td>0.85</td>
<td>1.76</td>
<td>5.28</td>
</tr>
<tr>
<td>Max. Flow GPM</td>
<td>5.2</td>
<td>9.6</td>
<td>20.4</td>
<td>42.4</td>
<td>88</td>
<td>160</td>
</tr>
</tbody>
</table>

All models are available with one of the following reinforced hoses: Natural Rubber, Buna, EPDM, Hypalon