Hydraulic diaphragm metering pumps have both the high-pressure and high-precision features of plunger type pumps and zero liquid leakage thanks to the fully enclosed structure of diaphragm pumps.

**Hydraulic Diaphragm Pump**

Packed with all the features of plunger and diaphragm pumps, this pump is ideal for petrochemical and food processes that demand high precision and safety.

**Features**

- **Oil pressure regulating valve**
  Built-in relief mechanism allows excess pressure to escape during pipe blockages, for example, for improved safety and durability.

- **Silicon oil used in hydraulic mechanisms**
  Low-toxicity, stable silicon oil is used separately from gear oil in the drive for sustained performance and safety.

**Mechanism**

Piston reciprocating motion is transmitted to the operating oil (silicon oil) to suck in and discharge liquid. The top of the pump is equipped with an oil pressure regulator in which an oil pressure regulating valve (pressure relief valve) is installed.

**Hydraulic Double-diaphragm Pump**

This enhanced hydraulic diaphragm pump is ideal for food processes and metering injection of high-viscosity liquids and liquids containing slurry.

**Features**

- **PTFE corrugated diaphragm used**
  A thick PTFE diaphragm free of impurities is used for the front diaphragm to ensure higher precision and safety.

**Mechanism**

Piston reciprocating motion is transmitted to the operating oil (silicon oil) to reciprocally operate the drive diaphragm. This reciprocating motion is transmitted uniformly to the front diaphragm by the buffer solution (glycerin, etc.) to suck in and discharge liquids stably.
**Applied Products**

Liquid used, on-site operation and control means, installation space and other factors greatly affect the operating conditions of metering pumps. And injection needs are as equally diverse. This is why TACMINA has prepared a wide range of enhanced precision and safety applied products in response to all possible injection needs. TACMINA also provides a custom-made system for helping users choose the required products.

* Several application series can be combined.

**Variation**

**Smoothflow Pump**
For food and other processes
- Extremely easy on-site assembly and disassembly. CIP cleaning also possible
- No liquid accumulating points prevents the propagation of bacteria.

**Remote Head**
For metering injection of hot liquids between 100 and 130°C
- For metering injection of liquids that must be maintained in a high-temperature state
- When cleaning by steam and hot water is required
- Effective for pumping slurry

**Name of Hydraulic Adjusters and Principle of Operation**

During normal operation
- Suction pressure adjusting nut
- Suction pressure adjusting spring
- Relief pressure adjusting nut
- Relief pressure adjusting spring
- Silicon oil
- Relief valve
- Urethane rubber
- Oil replenish valve

When abnormal pressure occurs
When abnormal pressure is generated inside the discharge side piping due to blockage, etc., the relief valve is pulled up to relieve the silicon oil. This relief pressure can be adjusted by turning the relief pressure adjusting nut.

At return to normal pressure
When abnormal pressure is corrected, and normal pressure is returned to, negative pressure is generated in the hydraulic mechanism at each piston suction process. When this happens, the oil replenish valve moves down, and relieved silicon oil is sucked in up to the appropriate amount inside the pipe.
## Performance Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>SXMA1/SXMA1</th>
<th>SYMA1/SYMA1</th>
<th>ZM1/ZMW1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-014</td>
<td>-020</td>
<td>-030</td>
</tr>
<tr>
<td>Max. discharge volume (mL/min) 50 Hz</td>
<td>97</td>
<td>195</td>
<td>500</td>
</tr>
<tr>
<td>Max. discharge pressure (MPa)</td>
<td>2.5</td>
<td>2.0</td>
<td>2.5</td>
</tr>
<tr>
<td>Strokes per minute (spm) 50 Hz</td>
<td>120</td>
<td>210</td>
<td>300</td>
</tr>
<tr>
<td>Strokes per minute (spm) 60 Hz</td>
<td>126</td>
<td>216</td>
<td>324</td>
</tr>
<tr>
<td>Stroke length (mm)</td>
<td>15</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Piston diameter (mm)</td>
<td>14</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>Type/power supply</td>
<td>Totally enclosed fan-cooled outdoor type 3-phase 200/200/220 V: 50/60/60 Hz</td>
<td>Totally enclosed fan-cooled outdoor type 3-phase 200/200/220 V: 50/60/60 Hz</td>
<td>Totally enclosed fan-cooled outdoor type 3-phase 200/200/220 V: 50/60/60 Hz</td>
</tr>
<tr>
<td>Motor specifications</td>
<td>Rated current (A) 202000000 50/60Hz</td>
<td>Rated current (A) 202000000 50/60Hz</td>
<td>Rated current (A) 202000000 50/60Hz</td>
</tr>
<tr>
<td>Power/number of poles</td>
<td>0.2kW/4P</td>
<td>0.4kW/4P</td>
<td>0.75kW/4P</td>
</tr>
<tr>
<td>Paint color</td>
<td>Acrylic urethane resin (Munsell 10B 5/10)</td>
<td>Acrylic urethane resin (Munsell 10B 5/10)</td>
<td>Acrylic urethane resin (Munsell 10B 5/10)</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>Approx. 16</td>
<td>Approx. 16</td>
<td>Approx. 16</td>
</tr>
</tbody>
</table>

### Notes
1. To calculate the max. discharge volume for two pump heads or more, multiply the values for one pump head by the number of pump heads.
2. The max. discharge volume is the discharge volume at the max. discharge pressure.
3. The max. discharge pressure is 1.0 MPa when the pump material is resin (PVC, PVDF, etc.) even on models where the max. discharge pressure exceeds 1.0 MPa.
4. The max. discharge volume is 50 mL/min.
5. Numerical values in specifications for Z Series are for the STST.
6. Contact your dealer regarding special specifications.

## Liquid Contact Material

<table>
<thead>
<tr>
<th>Part</th>
<th>S Series</th>
<th>Z Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pump Head</td>
<td>SUS304</td>
<td>PVC</td>
</tr>
<tr>
<td>Diaphragm</td>
<td>PTFE</td>
<td>Ceramic</td>
</tr>
<tr>
<td>Check ball</td>
<td>SUS304</td>
<td>Ceramic</td>
</tr>
<tr>
<td>Joint</td>
<td>SUS304</td>
<td>PVC</td>
</tr>
<tr>
<td>O-ring</td>
<td>Fluoro rubber</td>
<td>PTFE</td>
</tr>
<tr>
<td>Valve seat</td>
<td>SUS304</td>
<td>PVC</td>
</tr>
</tbody>
</table>

### Notes
1. Fluoro rubber, or Vyton by trade name, is a copolymer of vinylidene fluoride and propylene hexafluoride.
2. Contact your dealer regarding special materials other than the above.
A wide range of unique discharge volume automatic control products is available for you to choose to suit your conditions of use. Naturally, dual control that allows the discharge volume to be adjusted over a wide range is also possible.

### Control Variations

<table>
<thead>
<tr>
<th>Control Method</th>
<th>Control Equipment</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroke Length Control</td>
<td>Stroke length remote control method</td>
<td>Wide control range (50:1) enabled by dual control of number of strokes and stroke length</td>
</tr>
<tr>
<td>Inverter rpm control method (frequency control method)</td>
<td>Digital Servo Controller (DSG100) (for electrical servo, applicable to all models)</td>
<td>Wide control range (50:1) enabled by dual control of number of strokes and stroke length</td>
</tr>
<tr>
<td>Manual stepless speed change system</td>
<td>Inverter</td>
<td>Speed of general-purpose motor can be varied.</td>
</tr>
<tr>
<td>Dual control method</td>
<td>Stepless speed change unit</td>
<td>Control panel or inverter not required. Can be used even in explosive areas</td>
</tr>
</tbody>
</table>

### Pump

- **Model**: Totally enclosed fan-cooled outdoor type 3-phase 200/200/220 V: 50/60/60 Hz
- **Max. discharge volume (L/min)**
  - 50 Hz: 28, 40, 56, 80, 100
  - 60 Hz: 25, 12, 7, 0.6
- **Strokes per minute (spm)**
  - 50 Hz: 25, 12, 7, 0.6
  - 60 Hz: 97, 117
- **Piston diameter (mm)**
  - 28, 40, 56, 80, 100
- **Flange**: JIS 30 K 15 mm
- **Discharge side**: JIS 10 K 15 mm (JIS 10 K 15 mm, JIS 10 K 40 mm (JIS 10 K 40 mm, JIS 10 K 40 mm)
- **Suction side**: JIS 10 K 20 mm (JIS 10 K 20 mm, JIS 10 K 20 mm, JIS 10 K 40 mm)
- **Union UW**: JIS 10 K 20 mm (JIS 10 K 20 mm, JIS 10 K 20 mm, JIS 10 K 40 mm)
- **Motor specification**: 0.4kW 4P
- **Paint color**: Acrylic urethane resin (Munsell 1B 5/10)
- **Weight (kg)**
  - Approx. 75

### Notes
1. To calculate the max. discharge volume for two pump heads or more, multiply the values for one pump head by the number of pump heads.
2. The max. indicated discharge volume is the discharge volume at the max. discharge pressure. 3. The max. discharge pressure is 1.0 MPa when the pump material is resin (PVC, PVdf, etc.) even on models where the max. discharge pressure exceeds 1.0 MPa.
4. The max. dischargeable pressure is 50 mPa•s. 5. Contact your dealer regarding special specifications.

### Part

<table>
<thead>
<tr>
<th>Series Name</th>
<th>STS</th>
<th>VEC</th>
<th>VES</th>
<th>VTC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquid Contact Type Name</td>
<td>SUS304</td>
<td>PVC</td>
<td>PVC</td>
<td>PVC</td>
</tr>
<tr>
<td>Diaphragm</td>
<td>PTFE</td>
<td>PVC</td>
<td>PVC</td>
<td>PVC</td>
</tr>
<tr>
<td>Check ball</td>
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<td>PVC</td>
<td>PVC</td>
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</tr>
<tr>
<td>Joint</td>
<td>SUS304</td>
<td>PVC</td>
<td>PVC</td>
<td>PVC</td>
</tr>
<tr>
<td>O-ring</td>
<td>PTFE</td>
<td>Fluoro rubber</td>
<td>Fluoro rubber</td>
<td>Fluoro rubber</td>
</tr>
<tr>
<td>Valve seat</td>
<td>SUS304</td>
<td>PVC</td>
<td>PVC</td>
<td>PVC</td>
</tr>
</tbody>
</table>

Note) VEC and VES are not available for hydraulic double-diaphragm mode.
**Performance Curves**

**SXMA•MWA/SYMA•MWA Model**

- **-014 Model**
  - Discharge Volume: mL/min
  - Dial Scale

- **-020 Model**
  - Discharge Volume: mL/min
  - Dial Scale

- **-030 Model**
  - Discharge Volume: mL/min
  - Dial Scale

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**ZM/ZMW Model**

- **ZM-028P Model**
  - Discharge Volume: L/min
  - Dial Scale

- **ZM-040P Model**
  - Discharge Volume: L/min
  - Dial Scale

- **ZM1-056P Model**
  - Discharge Volume: L/min
  - Dial Scale

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**RYM•MW/RZM•MW Model**

- **RYM•MW-028 Model**
  - Discharge Volume: L/min
  - Dial Scale

- **RYM•MW-040 Model**
  - Discharge Volume: L/min
  - Dial Scale

- **RY(Z)M•MW-056 Model**
  - Discharge Volume: L/min
  - Dial Scale

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**RY(Z)M•MW-080 Model**

- **RY(Z)M•MW-100 Model**

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**Request**
- Measure discharge volume based upon user operating conditions, and set the dial according to that performance curve.

**Remarks**
- The above performance curves are examples of measurements performed under fixed conditions by test equipment at TACMINA. These curves may vary slightly due to individual on-site conditions and equipment differences.

**Conditions:** Room temperature, clean water

---

**50 Hz**

**60 Hz**
Hydraulic Diaphragm/Hydraulic Double-Diaphragm Pump Selection Table

**Max. Discharge Pressure (50 Hz)**

<table>
<thead>
<tr>
<th>MPa</th>
<th>0.1</th>
<th>0.2</th>
<th>0.3</th>
<th>0.4</th>
<th>0.5</th>
<th>0.6</th>
<th>0.7</th>
<th>0.8</th>
<th>0.9</th>
<th>1.0</th>
<th>1.1</th>
<th>1.2</th>
<th>1.3</th>
<th>1.4</th>
<th>1.5</th>
<th>1.6</th>
</tr>
</thead>
<tbody>
<tr>
<td>mL/min</td>
<td>10</td>
<td>20</td>
<td>50</td>
<td>30</td>
<td>40</td>
<td>50</td>
<td>60</td>
<td>70</td>
<td>80</td>
<td>90</td>
<td>100</td>
<td>200</td>
<td>300</td>
<td>400</td>
<td>500</td>
<td>600</td>
</tr>
</tbody>
</table>

*Values in the table are common to M and MW models. *For [ ] in S model, select X (vertical type) or Y (horizontal type).*

**Direct-drive Diaphragm Pump**

Low-cost model with stable injection precision ideal for water treatment and waste water processing

**Plunger Pump**

Capable of high-precision injection of trace amounts at high pressure, and with increased service life seals. Ideal for metered injection of boiler chemicals

- Numbers in graphs are for a 50 Hz power source. When a 60 Hz power source is used, leave the maximum discharge pressures at the same values, and multiply the maximum discharge volumes by about 1.2 times.
- Each of the values is calculated for a single pump head. In a duplex and triplex configuration, leave the maximum discharge pressures at the same values, and double and triple the maximum discharge volumes, respectively.
- Up to six in-series pumps can be manufactured for the S/E/R series.

**CAUTION**

- Do not use outside the temperature range shown below as this may result in failure:
  - Ambient temperature: 0 to 40°C
  - Requirement for liquid being handled: Liquid temperature: 0 to 50°C
- Operate at discharge pressures and viscosities within specifications listed in this catalog.
- Viscosities that can be transferred differ according to model.
- Contact your dealer when handling liquids containing slurry.

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