Compact Direct Operated 2/3 Port Solenoid Valve for Chemicals

**Series LVM**

**Wetted part material:**
- **Body/Plate**: PEEK
- **Diaphragm**: Choice of EPDM, FKM, Kalrez®

**Service life**: 10 million cycles or more (Based on SMC test conditions)

*More variations!*

- Orifice diameter 1.1 mm
- Orifice diameter 1.4 mm
- Orifice diameter 1.6 mm
- Orifice diameter 2 mm

Note: Kalrez® is a registered trademark of DuPont Performance Elastomers.
Meeting the most advanced needs of process control

Compact Direct Operated 2/3 Port

Solenoid Valve for Chemicals

Valve chamber volume

<table>
<thead>
<tr>
<th>Series</th>
<th>LVM09/090</th>
<th>LVM10/100</th>
<th>LVM15/150</th>
<th>LVM20/200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume</td>
<td>18 µl</td>
<td>11 µl</td>
<td>20 µl</td>
<td>50 µl</td>
</tr>
</tbody>
</table>

Change in volume depending on open/closed status of valve (pumping volume)

0.01 µl or less (Rocker type)

"Pumping volume" refers to the volume of water that is expelled from the valve chamber, in which it is sealed, by the opening and closing action of the valve (once with no applied pressure).

With a normal diaphragm valve, because the valve chamber volume varies depending on ON or OFF status, a difference in volume is discharged into the outlet side of the valve when the valve is switched from ON to OFF. However, with a rocker type valve, there is almost no change in volume, and thus no fluid is discharged into the outlet side of the valve.

Type with power-saving circuit can be selected.

Holding power consumption can be reduced substantially.

<table>
<thead>
<tr>
<th>Series</th>
<th>LVM09/090</th>
<th>LVM10/100</th>
<th>LVM15/150</th>
<th>LVM20/200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>3.3</td>
<td>2.5</td>
<td>5.5</td>
<td>4</td>
</tr>
<tr>
<td>Inrush</td>
<td>0.9</td>
<td>1</td>
<td>1</td>
<td>0.6</td>
</tr>
</tbody>
</table>

Space-saving

<table>
<thead>
<tr>
<th>Series</th>
<th>LVM09/090</th>
<th>LVM10/100</th>
<th>LVM15/150</th>
<th>LVM20/200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valve width</td>
<td>9.5</td>
<td>13</td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td>Manifold pitch</td>
<td>16.5</td>
<td>14</td>
<td>17</td>
<td>21</td>
</tr>
</tbody>
</table>

Applications: Various analytical and inspection equipment

Analytical instruments for blood, urine, immune system, etc.

Piping/Mounting Variations

Body ported
- M5 thread
- Tubing type

Base mounted
- Without sub-plate
- With sub-plate

Valve chamber volume

Body/Plate material: PEEK

Diaphragm material: EPDM, FKM or Kalrez®

Series LV M

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
### Series Variations

<table>
<thead>
<tr>
<th>Model</th>
<th>Valve construction</th>
<th>Valve type</th>
<th>Number of ports</th>
<th>Operating pressure range</th>
<th>Orifice diameter (mm)</th>
<th>Valve width</th>
<th>Flow characteristics (Water)</th>
<th>Fluid temperature (°C)</th>
<th>Volume of valve chamber (g)</th>
<th>Power consumption (W)</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>LVM09R3</td>
<td>Diaphragm type direct operated poppet (Rocker type)</td>
<td>N.C.</td>
<td>2</td>
<td>−75 kPa to 0.2 MPa</td>
<td>1.1</td>
<td>9.5</td>
<td>0.43 x 10⁻⁴</td>
<td>0.018</td>
<td>0.06</td>
<td>0.2</td>
<td>18</td>
</tr>
<tr>
<td>LVM09R4</td>
<td>N.O.</td>
<td>2</td>
<td>0 to 0.25 MPa</td>
<td>1.5</td>
<td>13</td>
<td>0.96 x 10⁻⁴</td>
<td>0.04</td>
<td>0.13</td>
<td>0.22</td>
<td>11</td>
<td>30</td>
</tr>
<tr>
<td>LVM095R</td>
<td>Universal</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LVM11</td>
<td>Diaphragm type direct operated poppet</td>
<td>N.C.</td>
<td>2</td>
<td>0 to 0.25 MPa</td>
<td>1.5</td>
<td>13</td>
<td>0.96 x 10⁻⁴</td>
<td>0.04</td>
<td>0.13</td>
<td>0.22</td>
<td>11</td>
</tr>
<tr>
<td>LVM10R1</td>
<td>N.C.</td>
<td>2</td>
<td>−75 kPa to 0.25 MPa</td>
<td>1.4</td>
<td>13</td>
<td>0.72 x 10⁻⁴</td>
<td>0.03</td>
<td>0.1</td>
<td>0.2</td>
<td>20</td>
<td>34</td>
</tr>
<tr>
<td>LVM10R2</td>
<td>N.O.</td>
<td>2</td>
<td>−75 kPa to 0.25 MPa</td>
<td>1.4</td>
<td>13</td>
<td>0.72 x 10⁻⁴</td>
<td>0.03</td>
<td>0.1</td>
<td>0.2</td>
<td>20</td>
<td>34</td>
</tr>
<tr>
<td>LVM102R</td>
<td>Universal</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LVM10R3</td>
<td>N.C.</td>
<td>2</td>
<td>−75 kPa to 0.25 MPa</td>
<td>1.4</td>
<td>13</td>
<td>0.72 x 10⁻⁴</td>
<td>0.03</td>
<td>0.1</td>
<td>0.2</td>
<td>20</td>
<td>34</td>
</tr>
<tr>
<td>LVM10R4</td>
<td>N.O.</td>
<td>2</td>
<td>−75 kPa to 0.25 MPa</td>
<td>1.4</td>
<td>13</td>
<td>0.72 x 10⁻⁴</td>
<td>0.03</td>
<td>0.1</td>
<td>0.2</td>
<td>20</td>
<td>34</td>
</tr>
<tr>
<td>LVM10R6</td>
<td>N.C.</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LVM105R</td>
<td>Universal</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LVM15R3</td>
<td>N.C.</td>
<td>2</td>
<td>−75 kPa to 0.25 MPa</td>
<td>1.6 (1)</td>
<td>16</td>
<td>0.96 x 10⁻⁴</td>
<td>0.04</td>
<td>0.13</td>
<td>0.22</td>
<td>50</td>
<td>45</td>
</tr>
<tr>
<td>LVM15R4</td>
<td>N.O.</td>
<td>2</td>
<td>−75 kPa to 0.25 MPa (0 to 0.6 MPa)</td>
<td>1.6 (1)</td>
<td>16</td>
<td>0.96 x 10⁻⁴</td>
<td>0.04</td>
<td>0.13</td>
<td>0.22</td>
<td>50</td>
<td>45</td>
</tr>
<tr>
<td>LVM155R</td>
<td>Universal</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LVM20R3</td>
<td>N.C.</td>
<td>2</td>
<td>−75 kPa to 0.3 MPa</td>
<td>2</td>
<td>20</td>
<td>1.56 x 10⁻⁴</td>
<td>0.065</td>
<td>0.23</td>
<td>0.27</td>
<td>84</td>
<td>80</td>
</tr>
<tr>
<td>LVM20R4</td>
<td>N.O.</td>
<td>2</td>
<td>−75 kPa to 0.3 MPa</td>
<td>2</td>
<td>20</td>
<td>1.56 x 10⁻⁴</td>
<td>0.065</td>
<td>0.23</td>
<td>0.27</td>
<td>84</td>
<td>80</td>
</tr>
<tr>
<td>LVM205R</td>
<td>Universal</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


Note: The figures in ( ) indicate the high-pressure type.

The values of Av and Cv are based on JIS B 2005:1995. C and b are based on JIS B 6396:2000.
Compact Direct Operated 2/3 Port Solenoid Valve for Chemicals

Series LVM09/090

How to Order

<table>
<thead>
<tr>
<th>Base Mounted</th>
<th>LVM</th>
<th>09R3</th>
<th>-5A-</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Symbol</td>
<td>Number of ports</td>
<td>Valve type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>09R3</td>
<td>2</td>
<td>N.C.</td>
<td>IN (Symbol 1)</td>
<td>OUT (Symbol 2)</td>
</tr>
<tr>
<td>09R4</td>
<td></td>
<td>N.O.</td>
<td>IN (Symbol 1)</td>
<td>OUT (Symbol 2)</td>
</tr>
<tr>
<td>095R</td>
<td>3</td>
<td>Universal</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

- CE compliant
- Wetted part material
  - Symbol: Voltage
  - Plate: Diaphragm
    - A: PEEK, EPDM
    - B: PEEK, FKM
    - C: PEEK, Kalrez*

- Function
  - Nil: Standard
  - Y1: With power-saving circuit

Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>LVM09R3</th>
<th>LVM09R4</th>
<th>LVM095R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valve construction</td>
<td>Diaphragm type direct operated poppet (Rocker type)</td>
<td>N.O.</td>
<td>Universal</td>
</tr>
<tr>
<td>Number of ports</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Fluid (Note 1)</td>
<td>Air, Water, Pure water, Diluent, Cleaning fluid</td>
<td>N.O.</td>
<td>Universal</td>
</tr>
<tr>
<td>Operating pressure range</td>
<td>–75 kPa to 0.2 MPa</td>
<td>1.1 mm</td>
<td></td>
</tr>
<tr>
<td>Response time</td>
<td>10 ms or less (at pneumatic pressure)</td>
<td>Zero leakage, either external or internal (at water pressure)</td>
<td></td>
</tr>
<tr>
<td>Proof pressure (Note 2)</td>
<td>0.3 MPa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>0 to 50°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluid temperature</td>
<td>0 to 50°C (No condensation)</td>
<td>18 µ</td>
<td></td>
</tr>
<tr>
<td>Volume of valve chamber (Note 3)</td>
<td>18 µ</td>
<td>Free</td>
<td></td>
</tr>
<tr>
<td>Mounting orientation (Note 4)</td>
<td>IP40 or equivalent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mass</td>
<td>20 g</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated voltage</td>
<td>12, 24 VDC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allowable voltage fluctuation (Note 5)</td>
<td>±10% of rated voltage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of coil insulation</td>
<td>Class B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power consumption (When rated voltage is at 24 V)</td>
<td>Standard: 2 W</td>
<td>With power-saving circuit: 3.3 W</td>
<td>Holding: 0.9 W</td>
</tr>
<tr>
<td></td>
<td>(0.08 A)</td>
<td>(0.14 A)</td>
<td></td>
</tr>
<tr>
<td>Coil switching noise (Note 6)</td>
<td>50 dB</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note 1: Select an appropriate material for the wetted part when fluid such as a cleaning solvent is used. Also, be sure to confirm the fluid compatibility in advance.

Note 2: Indicates the pressure which does not generate breakage, cracks or external leakage after a one-minute air tight test.

Note 3: Indicates the volume of clearance inside the valve chamber after the volume of the diaphragm is subtracted.

Note 4: Since the body (orifice shape) is designed to eliminate residual liquid, mounting in a vertical direction with the coil at the top is recommended. When residual liquid is not considered, any mounting orientation is available.

Note 5: When the response speed is regarded as important, prevent negative fluctuation of the voltage by adequate regulation.

Note 6: The value is based on SMC’s measurement conditions. The noise level will vary with conditions.

Note 7: Refer to 10 in “Design and Selection” on the back of page 302, if the valve is to be energized continuously for extended periods of time.

Flow Characteristics

<table>
<thead>
<tr>
<th>Water</th>
<th>Air</th>
</tr>
</thead>
<tbody>
<tr>
<td>Av</td>
<td>Cv</td>
</tr>
<tr>
<td>0.43 × 10⁻²</td>
<td>0.018</td>
</tr>
</tbody>
</table>

* The values of Av and Cv are based on JIS B 2005:1995, C and b are based on JIS B 8390:2000.

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Smaller Flow Characteristics:

<table>
<thead>
<tr>
<th>Water</th>
<th>Air</th>
</tr>
</thead>
<tbody>
<tr>
<td>Av</td>
<td>Cv</td>
</tr>
<tr>
<td>0.43 × 10⁻²</td>
<td>0.018</td>
</tr>
</tbody>
</table>

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Small Flow Characteristics:

<table>
<thead>
<tr>
<th>Water</th>
<th>Air</th>
</tr>
</thead>
<tbody>
<tr>
<td>Av</td>
<td>Cv</td>
</tr>
<tr>
<td>0.43 × 10⁻²</td>
<td>0.018</td>
</tr>
</tbody>
</table>

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Construction: Base Mounted

LVM09R3

LVM09R4

LVM095R

Component Parts: LVM09R3, 09R4, 095R

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Plate</td>
<td>PEEK</td>
</tr>
<tr>
<td>2</td>
<td>Diaphragm assembly</td>
<td>EPDM/FKM/Kalrez®</td>
</tr>
<tr>
<td>3</td>
<td>Body</td>
<td>PBT</td>
</tr>
<tr>
<td>4</td>
<td>Slide bushing assembly</td>
<td>PPS/Stainless steel</td>
</tr>
<tr>
<td>5</td>
<td>Armature assembly</td>
<td>—</td>
</tr>
<tr>
<td>6</td>
<td>Coil assembly</td>
<td>—</td>
</tr>
<tr>
<td>7</td>
<td>Lead wire</td>
<td>—</td>
</tr>
<tr>
<td>8</td>
<td>Mold</td>
<td>PET</td>
</tr>
<tr>
<td>9</td>
<td>O-ring</td>
<td>NBR</td>
</tr>
<tr>
<td>10</td>
<td>Interface gasket</td>
<td>EPDM/FKM/Kalrez®</td>
</tr>
</tbody>
</table>
**Series LVM09/090**

**Dimensions: Base Mounted**

LVM09R3
LVM09R4
LVM095R

*L The broken lines indicate with power-saving circuit.*

The dimensions are as follows:

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting hole</td>
<td>2 x ø2.1</td>
</tr>
<tr>
<td>With power-saving circuit</td>
<td>Approx. 5</td>
</tr>
<tr>
<td>UL1061 AWG26</td>
<td></td>
</tr>
<tr>
<td>Ø1.2 depth</td>
<td>1.8</td>
</tr>
<tr>
<td>Effective thread length</td>
<td>3.5 or more</td>
</tr>
<tr>
<td>2 x M2 x 0.4</td>
<td></td>
</tr>
<tr>
<td>3 x ø1.3</td>
<td></td>
</tr>
<tr>
<td>1 (N.C.), IN</td>
<td></td>
</tr>
<tr>
<td>2 (COM), OUT</td>
<td></td>
</tr>
<tr>
<td>Not required for LVM09R3</td>
<td></td>
</tr>
</tbody>
</table>

**Recommended interface dimensions**

- Surface roughness = Rz3.2 or less

When using a positioning pin for mounting, please use ø1 and height 1.5 or less.

2 x M2 x 0.4
Effective thread length 3.5 or more

2 x ø1.3
C0.2 or less

2 (COM), OUT

1 (N.C.), IN

LVM09R3, LVM095R

UL1061 AWG26

Approx. 110 (For Y1)
Approx. 150 (Lead wire length)
Approx. 300 (Lead wire length for Y1)

* Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
# Compact Direct Operated 2/3 Port Solenoid Valve for Chemicals

## Series LVM10/100

### How to Order

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Number of ports</th>
<th>Valve type</th>
<th>Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>1</td>
<td>N.C.</td>
<td>OUT</td>
</tr>
<tr>
<td>10R1</td>
<td>2</td>
<td>N.C.</td>
<td>OUT</td>
</tr>
<tr>
<td>10R2</td>
<td>2</td>
<td>N.O.</td>
<td>OUT</td>
</tr>
<tr>
<td>102R</td>
<td>3</td>
<td>Universal</td>
<td>1</td>
</tr>
</tbody>
</table>

**Wetted part material**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Plate</th>
<th>Diaphragm</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>PEEK</td>
<td>EPDM</td>
</tr>
<tr>
<td>B</td>
<td>PEEK</td>
<td>FKM</td>
</tr>
<tr>
<td>C</td>
<td>PEEK</td>
<td>Kalrez®</td>
</tr>
</tbody>
</table>

**Option**

- None
- Bracket
- Manual override

*Only Option 1 can be selected for the LVM11*

**Body Ported**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Number of ports</th>
<th>Valve type</th>
<th>Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>10R3</td>
<td>2</td>
<td>N.C.</td>
<td>OUT</td>
</tr>
<tr>
<td>10R4</td>
<td>2</td>
<td>N.O.</td>
<td>OUT</td>
</tr>
<tr>
<td>10R6</td>
<td>2</td>
<td>N.C.</td>
<td>OUT</td>
</tr>
<tr>
<td>105R</td>
<td>3</td>
<td>Universal</td>
<td>1</td>
</tr>
</tbody>
</table>

**Wetted part material**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Plate</th>
<th>Diaphragm</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>PEEK</td>
<td>EPDM</td>
</tr>
<tr>
<td>B</td>
<td>PEEK</td>
<td>FKM</td>
</tr>
<tr>
<td>C</td>
<td>PEEK</td>
<td>Kalrez®</td>
</tr>
<tr>
<td>D</td>
<td>PEEK</td>
<td>FKM</td>
</tr>
<tr>
<td>E</td>
<td>PEEK</td>
<td>Kalrez®</td>
</tr>
<tr>
<td>F</td>
<td>PEEK</td>
<td>FKM</td>
</tr>
<tr>
<td>G</td>
<td>PEEK</td>
<td>Kalrez®</td>
</tr>
</tbody>
</table>

**Lead wire length**

- Nil: 300 mm
- 6: 600 mm
- 10: 1000 mm

**Function**

- Standard
- With power-saving circuit

*For the LVM11, the type with power-saving circuit is standard.*

**Coil voltage**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>24 VDC</td>
</tr>
<tr>
<td>6</td>
<td>12 VDC</td>
</tr>
</tbody>
</table>

**Sub-plate material/Port size**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Plate</th>
<th>Port size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nil*</td>
<td>PVDF</td>
<td>M6</td>
</tr>
<tr>
<td>1U**</td>
<td>PVDF</td>
<td>1/4-28UNF</td>
</tr>
<tr>
<td>2</td>
<td>PFA</td>
<td>M6</td>
</tr>
<tr>
<td>2U</td>
<td>PFA</td>
<td>1/4-28UNF</td>
</tr>
</tbody>
</table>

*Without a sub-plate, a bracket cannot be attached.

*Combinations with wetted part materials E, F, G are not available.*

**CE compliant**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>CE compliant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nil</td>
<td>None</td>
</tr>
<tr>
<td>Q</td>
<td>CE compliant</td>
</tr>
</tbody>
</table>

*Combination with wetted part materials E, F, G are not available.*

---

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### Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>Body ported</th>
<th>Body ported (Tubing type)</th>
<th>Base mounted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LVM11</td>
<td>LVM10R1</td>
<td>LVM10R2</td>
</tr>
<tr>
<td>Valve construction</td>
<td>Diaphragm type direct operated poppet</td>
<td>Diaphragm type direct operated poppet (Rocker type)</td>
<td></td>
</tr>
<tr>
<td>Valve type</td>
<td>N.C.</td>
<td>N.C.</td>
<td>N.O.</td>
</tr>
<tr>
<td>Number of ports</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Fluid (Note 1)</td>
<td>Air, Water, Pure water, Diluent, Cleaning fluid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating pressure range</td>
<td>0 to 0.25 MPa</td>
<td>-75 kPa to 0.25 MPa</td>
<td></td>
</tr>
<tr>
<td>Orifice diameter</td>
<td>1.5 mm</td>
<td>1.4 mm</td>
<td></td>
</tr>
<tr>
<td>Response time</td>
<td>10 ms or less (at pneumatic pressure)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leakage</td>
<td>Zero leakage, either external or internal (at water pressure)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proof pressure (Note 2)</td>
<td>0.38 MPa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>0 to 50°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluid temperature</td>
<td>0 to 50°C (No condensation)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Volume of valve chamber (Note 3)</td>
<td>11 µl</td>
<td>20 µl</td>
<td></td>
</tr>
<tr>
<td>Mounting orientation (Note 4)</td>
<td>Free</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enclosure</td>
<td>IP40 or equivalent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mass</td>
<td>30 g</td>
<td>34 g (without sub-plate), 42 g (with sub-plate)</td>
<td></td>
</tr>
<tr>
<td>Rated voltage</td>
<td>12, 24 VDC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allowable voltage fluctuation (Note 5)</td>
<td>±10% of rated voltage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of coil insulation</td>
<td>Class B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power consumption (When rated voltage is at 24 V)</td>
<td>Standard —</td>
<td>1.5 W (0.06 A)</td>
<td></td>
</tr>
<tr>
<td>With power-saving circuit (Inrush)</td>
<td>2.5 W (0.1 A)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Holding</td>
<td>1 W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coil switching noise (Note 6)</td>
<td>50 dB</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

### Flow Characteristics

<table>
<thead>
<tr>
<th>Valve construction</th>
<th>Water</th>
<th>Air</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Av</td>
<td>Cv</td>
</tr>
<tr>
<td>Direct operated poppet</td>
<td>0.96 x 10^-6</td>
<td>0.04</td>
</tr>
<tr>
<td>Rocker type</td>
<td>0.72 x 10^-6</td>
<td>0.03</td>
</tr>
</tbody>
</table>

*The values of Av and Cv are based on JIS B 2005:1995, C and b are based on JIS B 8390:2000.*
Construction: Body Ported

LVM11

Component Parts: LVM11

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Body</td>
<td>PEEK</td>
</tr>
<tr>
<td>2</td>
<td>Diaphragm assembly</td>
<td>EPDM/FKM/Kalrez®</td>
</tr>
<tr>
<td>3</td>
<td>Spacer</td>
<td>PBT</td>
</tr>
<tr>
<td>4</td>
<td>Armature assembly</td>
<td>Stainless steel/POM</td>
</tr>
<tr>
<td>5</td>
<td>Coil assembly</td>
<td>—</td>
</tr>
<tr>
<td>6</td>
<td>Sleeve</td>
<td>SUY</td>
</tr>
<tr>
<td>7</td>
<td>Return spring</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>8</td>
<td>Board assembly</td>
<td>—</td>
</tr>
<tr>
<td>9</td>
<td>Casing</td>
<td>—</td>
</tr>
<tr>
<td>10</td>
<td>Plug</td>
<td>NBR</td>
</tr>
<tr>
<td>11</td>
<td>O-ring</td>
<td>NBR</td>
</tr>
</tbody>
</table>

LVM10R1

LVM10R2

LVM102R

Component Parts: LVM10R1, 10R2, 102R

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Plate</td>
<td>PEEK</td>
</tr>
<tr>
<td>2</td>
<td>Diaphragm assembly</td>
<td>EPDM/FKM/Kalrez®</td>
</tr>
<tr>
<td>3</td>
<td>Body</td>
<td>PBT</td>
</tr>
<tr>
<td>4</td>
<td>Slide bushing assembly</td>
<td>POM/Stainless steel</td>
</tr>
<tr>
<td>5</td>
<td>Armature assembly</td>
<td>Stainless steel/PBT</td>
</tr>
<tr>
<td>6</td>
<td>Coil assembly</td>
<td>—</td>
</tr>
<tr>
<td>7</td>
<td>Sleeve</td>
<td>SUY</td>
</tr>
<tr>
<td>8</td>
<td>Spacer</td>
<td>PBT</td>
</tr>
<tr>
<td>9</td>
<td>Return spring</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>10</td>
<td>Board assembly</td>
<td>—</td>
</tr>
<tr>
<td>11</td>
<td>Casing</td>
<td>—</td>
</tr>
<tr>
<td>12</td>
<td>Plug</td>
<td>NBR</td>
</tr>
<tr>
<td>13</td>
<td>O-ring</td>
<td>NBR</td>
</tr>
</tbody>
</table>
Series LVM10/100

Construction: Base Mounted

LVM10R3

LVM10R4

LVM10R6

LVM105R

Component Parts: LVM10R3, 10R4, 10R6, 105R

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Plate</td>
<td>PEEK/PFA</td>
</tr>
<tr>
<td>2</td>
<td>Diaphragm assembly</td>
<td>EPDM/FKM/Kalrez®</td>
</tr>
<tr>
<td>3</td>
<td>Body</td>
<td>PBT</td>
</tr>
<tr>
<td>4</td>
<td>Slide bushing assembly</td>
<td>POM/Stainless steel</td>
</tr>
<tr>
<td>5</td>
<td>Armature assembly</td>
<td>Stainless steel/PBT</td>
</tr>
<tr>
<td>6</td>
<td>Coil assembly</td>
<td>—</td>
</tr>
<tr>
<td>7</td>
<td>Sleeve</td>
<td>SUY</td>
</tr>
<tr>
<td>8</td>
<td>Spacer</td>
<td>PBT</td>
</tr>
<tr>
<td>9</td>
<td>Return spring</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>10</td>
<td>Board assembly</td>
<td>—</td>
</tr>
<tr>
<td>11</td>
<td>Casing</td>
<td>PBT</td>
</tr>
<tr>
<td>12</td>
<td>Plug</td>
<td>NBR</td>
</tr>
<tr>
<td>13</td>
<td>O-ring</td>
<td>NBR</td>
</tr>
<tr>
<td>14</td>
<td>O-ring</td>
<td>EPDM/FKM/Kalrez®</td>
</tr>
</tbody>
</table>
Compact Direct Operated 2/3 Port Solenoid Valve for Chemicals Series LVM10/100

Dimensions: Body Ported

LVM11-□□□ (N.C.)

LVM10R1-□□□ (N.C.)
LVM10R2-□□□ (N.O.)
LVM102R-□□□ (Universal)

* The broken lines indicate with bracket.
Series LVM10/100

Dimensions: Base Mounted

LVM10R3 - N.C. (N.C.)
LVM10R4 - N.O. (N.O.)
LVM10R6 - N.C. (N.C.)
LVM105R - Universal (Universal)

The figures in brackets < > indicate the values for PFA plate material (wetted part material "E, F, G"). In the case of PFA plate material (wetted part material "E, F, G"), there is no ø1.6 positioning hole.

Recommended interface dimensions

+ Surface roughness = Rz3.2 or less

When using a positioning pin for mounting, please use ø1.5 and height 2 or less.

LVM10R3, LVM10R6, LVM105R

LVM10R4

LVM10R4
Dimensions: Base Mounted

LVM10R3-□□□□□ (N.C.)
LVM10R4-□□□□□ (N.O.)
LVM10R6-□□□□□ (N.C.)
LVM105R-□□□□□ (Universal)

2 x φ3.5 Mounting hole

3 x M6 x 1, 1/4-28UNF
OUT port (LVM10R3, 10R4)
2 (COM) port (LVM105R)
Plug (LVM10R6)

2 x M3 Thread length 5
For direct mounting

UL1007
AWG22

Approx. 300
(Lead wire length)

The broken lines indicate with bracket.
Compact Direct Operated 2/3 Port Solenoid Valve for Chemicals
Series LVM15/150

How to Order

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Valve type</th>
<th>Number of ports</th>
</tr>
</thead>
<tbody>
<tr>
<td>15R3</td>
<td>N.C.</td>
<td>2</td>
</tr>
<tr>
<td>15R4</td>
<td>N.O.</td>
<td>3</td>
</tr>
<tr>
<td>155R</td>
<td>Universal</td>
<td>3</td>
</tr>
</tbody>
</table>

Wetted part material

- Symbol: A (PEEK), B (FKM), C (Kalrez®)
- Plate: PEEK
- Diaphragm: EPDM

Lead wire length
- Symbol: Nil, 300 mm, 600 mm, 1000 mm

Function
- CE compliant
- Y: Standard (With power-saving circuit)
- HY: High-pressure type (With power-saving circuit)

Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>Base mounted</th>
<th>Valve type</th>
<th>Fluid</th>
<th>Operating pressure range</th>
<th>Orifice diameter</th>
<th>Response time</th>
<th>Leakage</th>
<th>Proof pressure</th>
<th>Ambient temperature</th>
<th>Volume of valve chamber</th>
<th>Mounting orientation</th>
<th>Enclosure</th>
<th>Mass</th>
<th>Rated voltage</th>
<th>Allowable voltage fluctuation</th>
<th>Type of coil insulation</th>
<th>Power consumption (Inrush)</th>
<th>Power consumption (Holding)</th>
<th>Coil switching noise</th>
</tr>
</thead>
<tbody>
<tr>
<td>LVM15R3</td>
<td>LVM15R4</td>
<td>LVM155R</td>
<td>Air, Water, Pure water, Diluent, Cleaning fluid</td>
<td>-75 kPa to 0.25 MPa</td>
<td>1.6 mm (1 mm)</td>
<td>15 ms or less (at pneumatic pressure)</td>
<td>Zero leakage, either external or internal (at water pressure)</td>
<td>0.38 MPa (0.9 MPa)</td>
<td>0 to 50°C</td>
<td>50 µl</td>
<td>Free</td>
<td>IP40 or equivalent</td>
<td>45 g</td>
<td>12, 24 VDC</td>
<td>±10% of rated voltage</td>
<td>Class B</td>
<td>5.5 W (0.23 A)</td>
<td>1 W</td>
<td>60 dB</td>
</tr>
<tr>
<td>LVM15R4</td>
<td>LVM155R</td>
<td></td>
<td>Air, Water, Pure water, Diluent, Cleaning fluid</td>
<td>-75 kPa to 0.25 MPa</td>
<td>1.6 mm (1 mm)</td>
<td>15 ms or less (at pneumatic pressure)</td>
<td>Zero leakage, either external or internal (at water pressure)</td>
<td>0.38 MPa (0.9 MPa)</td>
<td>0 to 50°C</td>
<td>50 µl</td>
<td>Free</td>
<td>IP40 or equivalent</td>
<td>45 g</td>
<td>12, 24 VDC</td>
<td>±10% of rated voltage</td>
<td>Class B</td>
<td>5.5 W (0.23 A)</td>
<td>1 W</td>
<td>60 dB</td>
</tr>
</tbody>
</table>

Flow Characteristics

<table>
<thead>
<tr>
<th>Water</th>
<th>Air</th>
</tr>
</thead>
<tbody>
<tr>
<td>Av</td>
<td>Cv</td>
</tr>
<tr>
<td>0.96 x 10⁻²</td>
<td>0.04</td>
</tr>
<tr>
<td>[0.36 x 10⁻²]</td>
<td>[0.015]</td>
</tr>
<tr>
<td>C</td>
<td>b</td>
</tr>
<tr>
<td>0.13</td>
<td>0.22</td>
</tr>
<tr>
<td>[0.05]</td>
<td>[0.2]</td>
</tr>
</tbody>
</table>

Note 1) Select an appropriate material for the wetted part when fluid such as a cleaning solvent is used. Also, be sure to confirm the fluid compatibility in advance.
Note 2) Indicates the pressure which does not generate breakage, cracks or external leakage after a one-minute airtight test.
Note 3) Indicates the volume of clearance inside the valve chamber after the volume of the diaphragm is subtracted.
Note 4) Since the body (orifice shape) is designed to eliminate residual liquid, mounting in a vertical direction with the coil at the top is recommended. When residual liquid is not considered, any mounting orientation is available.
Note 5) When the response speed is regarded as important, prevent negative fluctuation of the voltage by adequate regulation.
Note 6) The value is based on SMC’s measurement conditions. The noise level will vary with conditions.
Note 7) Refer to 10 in “Design and Selection” on the back of page 302, if the valve is to be energized continuously for extended periods of time.
Construction: Base Mounted

LVM15R3

LVM15R4

LVM155R

Component Parts: LVM15R3, 15R4, 155R

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Plate</td>
<td>PEEK</td>
</tr>
<tr>
<td>2</td>
<td>Diaphragm assembly</td>
<td>EPDM/FKM/Kalrez®</td>
</tr>
<tr>
<td>3</td>
<td>Body</td>
<td>PBT</td>
</tr>
<tr>
<td>4</td>
<td>Slide bushing assembly</td>
<td>PPS/Stainless steel</td>
</tr>
<tr>
<td>5</td>
<td>Armature assembly</td>
<td>—</td>
</tr>
<tr>
<td>6</td>
<td>Coil assembly</td>
<td>—</td>
</tr>
<tr>
<td>7</td>
<td>Sleeve</td>
<td>SUY</td>
</tr>
<tr>
<td>8</td>
<td>Board assembly</td>
<td>—</td>
</tr>
<tr>
<td>9</td>
<td>Casing</td>
<td>PBT</td>
</tr>
<tr>
<td>10</td>
<td>Interface gasket</td>
<td>EPDM/FKM/Kalrez®</td>
</tr>
</tbody>
</table>
**Recommended interface dimensions**

- **LVM15R4, LVM15R3**
  - 2 x M2.5 x 0.45
  - Effective thread length 4.5 or more
  - Max. 9
  - Min. 5.5
  - Max. 10.75
  - Min. 0 (N.O.)
  - 4.5
  - 3 (N.O.)
  - Not required for LVM15R3

- **LVM155R, LVM15R3**
  - 2 x ø2.7
  - Mounting hole
  - 2 x M2.5 x 0.45
  - Effective thread length 4.5 or more
  - 5.5
  - 2 x ø2.1
  - CD.2 or less
  - 1 (N.C.), IN
  - When using a positioning pin for mounting, please use ø1.2 and height 2 or less.

- **LVM15R4**
  - 2 x ø2.1
  - CD.2 or less
  - Max. 9
  - Min. 5.5
  - Max. 10.75
  - Min. 0
  - 4.5
  - 3 (N.O.)
  - Conventionally

- **LVM15R3**
  - 2 x ø2.1
  - CD.2 or less
  - Max. 9
  - Min. 5.5
  - Max. 10.75
  - Min. 0
  - 4.5
  - 3 (N.O.)
  - Conventionally

- **Surface roughness = Rz3.2 or less**
Compact Direct Operated 2/3 Port Solenoid Valve for Chemicals

Series LVM20/200

How to Order

LVM [20R3] 5 A

Valve type

Symbol Number of ports Valve type

20R3 2 N.C.
20R4 N.O.
205R 3 Universal

Lead wire length

Nil 300 mm
6 600 mm
10 1000 mm

Flow Characteristics

<table>
<thead>
<tr>
<th>Fluid</th>
<th>Water</th>
<th>Air</th>
</tr>
</thead>
<tbody>
<tr>
<td>Av</td>
<td>1.56 x 10^{-4}</td>
<td>0.065</td>
</tr>
<tr>
<td>Cv</td>
<td>0.065</td>
<td>0.22</td>
</tr>
<tr>
<td>C</td>
<td>0.22</td>
<td>0.27</td>
</tr>
<tr>
<td>b</td>
<td>0.27</td>
<td>-</td>
</tr>
</tbody>
</table>

* The values of Av and Cv are based on JIS B 2005:1995, C and b are based on JIS B 8390:2000.

Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>Base mounted</th>
</tr>
</thead>
<tbody>
<tr>
<td>LVM20R3</td>
<td>Valve type</td>
</tr>
<tr>
<td>LVM20R4</td>
<td>Diaphragm type direct operated poppet (Rocker type)</td>
</tr>
<tr>
<td>LVM205R</td>
<td>N.C.</td>
</tr>
</tbody>
</table>

Number of ports

<table>
<thead>
<tr>
<th>Fluid</th>
<th>Air, Water, Pure water, Diluent, Cleaning fluid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating pressure range</td>
<td>-75 kPa to 0.3 MPa</td>
</tr>
<tr>
<td>Orifice diameter</td>
<td>2 mm</td>
</tr>
<tr>
<td>Response time</td>
<td>20 ms or less (at pneumatic pressure)</td>
</tr>
<tr>
<td>Leakage</td>
<td>Zero leakage, either external or internal (at water pressure)</td>
</tr>
<tr>
<td>Proof pressure [Note 2]</td>
<td>0.45 MPa</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>0 to 50°C</td>
</tr>
<tr>
<td>Fluid temperature</td>
<td>0 to 50°C (No condensation)</td>
</tr>
<tr>
<td>Volume of valve chamber [Note 3]</td>
<td>84 µ</td>
</tr>
<tr>
<td>Mounting orientation [Note 4]</td>
<td>Free</td>
</tr>
<tr>
<td>Enclosure</td>
<td>IP40 or equivalent</td>
</tr>
<tr>
<td>Mass</td>
<td>80 g</td>
</tr>
<tr>
<td>Rated voltage</td>
<td>12, 24 VDC</td>
</tr>
<tr>
<td>Allowable voltage fluctuation [Note 5]</td>
<td>±10% of rated voltage</td>
</tr>
<tr>
<td>Type of coil insulation</td>
<td>Class B</td>
</tr>
<tr>
<td>Power consumption (When rated voltage is at 24 V)</td>
<td>Standard 2.5 W (0.1 A)</td>
</tr>
<tr>
<td>With power-saving circuit</td>
<td>Inrush 4 W (0.17 A)</td>
</tr>
<tr>
<td>Holding</td>
<td>0.6 W</td>
</tr>
<tr>
<td>Coil switching noise [Note 6]</td>
<td>60 dB</td>
</tr>
</tbody>
</table>

Note 1) Select an appropriate material for the wetted part when fluid such as a cleaning solvent is used. Also, be sure to confirm the fluid compatibility in advance.

Note 2) Indicates the pressure which does not generate breakage, cracks or external leakage after a one-minute airtight test.

Note 3) Indicates the volume of clearance inside the valve chamber after the volume of the diaphragm is subtracted.

Note 4) Since the body (orifice shape) is designed to eliminate residual liquid, mounting in a vertical direction with the coil at the top is recommended. When residual liquid is not considered, any mounting orientation is available.

Note 5) When the response speed is regarded as important, prevent negative fluctuation of the voltage by adequate regulation.

Note 6) The value is based on SMC’s measurement conditions. The noise level will vary with conditions.

Note 7) Refer to 10 in “Design and Selection” on the back of page 302, if the valve is to be energized continuously for extended periods of time.
Series LVM20/200

Construction: Base Mounted

LVM20R3  LVM20R4

Component Parts: LVM20R3, 20R4, 205R

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Plate</td>
<td>PEEK</td>
</tr>
<tr>
<td>2</td>
<td>Diaphragm assembly</td>
<td>EPDM/FKM/Kalrez®</td>
</tr>
<tr>
<td>3</td>
<td>Body</td>
<td>PBT</td>
</tr>
<tr>
<td>4</td>
<td>Slide bushing assembly</td>
<td>PPS/Stainless steel</td>
</tr>
<tr>
<td>5</td>
<td>Armature assembly</td>
<td>—</td>
</tr>
<tr>
<td>6</td>
<td>Coil assembly</td>
<td>—</td>
</tr>
<tr>
<td>7</td>
<td>Sleeve</td>
<td>SUY</td>
</tr>
<tr>
<td>8</td>
<td>Board assembly</td>
<td>—</td>
</tr>
<tr>
<td>9</td>
<td>Casing</td>
<td>PBT</td>
</tr>
<tr>
<td>10</td>
<td>Plug</td>
<td>NBR</td>
</tr>
<tr>
<td>11</td>
<td>O-ring</td>
<td>NBR</td>
</tr>
<tr>
<td>12</td>
<td>O-ring</td>
<td>EPDM/FKM/Kalrez®</td>
</tr>
</tbody>
</table>
Compact Direct Operated
2/3 Port Solenoid Valve for Chemicals Series LVM20/200

Dimensions: Base Mounted

LVM20R3
LVM20R4
LVM205R

Recommended interface dimensions

- Surface roughness = Rz3.2 or less
- + Surface roughness = Rz3.2 or less

2 x M3 x 0.5 Effective thread length 4.5 or more
2 x M3 x 0.5 Effective thread length 4.5 or more

When using a positioning pin for mounting, please use Ø1.8 and height 2.8 or less.
When using a positioning pin for mounting, please use Ø1.8 and height 2.8 or less.

Not required for LVM20R3

VX2 VXD VXZ VXE VXP VXR VXH VXF VX3 VXA VCH VDW VQ LVM VCA VCB VCL VCS VCW

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
### Warning

1. Do not use this product in applications which may adversely affect human life (e.g. medical equipment connected to the human body for drip infusion).

2. Confirm the specifications.
   - Give careful consideration to the operating conditions such as the application, fluid and environment, and use within the operating ranges specified in this catalog.

3. Fluid
   - Be sure to confirm the compatibility between the component material and the fluid.

4. Maintenance space
   - The installation should allow sufficient space for maintenance activities.

5. Fluid pressure range
   - Fluid pressure should be within the allowable pressure range.

6. Ambient environment
   - Use within the allowable ambient temperature range. Be sure that the fluid used does not touch the external surface of the product.

7. Countermeasures against static electricity
   - Take measures to prevent static electricity since some fluids can cause static electricity.

8. Pressure (including vacuum) holding
   - It is not usable for an application such as holding the pressure (including vacuum) inside of a pressure vessel because air leakage is entailed in a valve.

9. Cannot be used as an emergency shutoff valve, etc.
   - The valves presented in this catalog are not designed for safety applications such as an emergency shutoff valve. If the valves are used in this type of system, other reliable safety assurance measures should also be adopted.

10. Extended periods of continuous energization
    - If solenoid valves are to be continuously energized for extended periods of time, use valves with power-saving circuits to minimize the amount of heat released by the coil.

    **Power-saving circuit waveform (example)**

    | Current consumption | Energization period of solenoid valve |
    |---------------------|--------------------------------------|
    | (At inrush 3.3 W)   | Approx. 100 msec                      |
    | (At holding 0.9 W)  |                                      |

    - Power consumption for the waveform shown above is that of the LVM09/090.
    - For the LVM15/150, the inrush is 50 msec.

    When a solenoid valve without a power-saving circuit is continuously energized for long periods of time, temperature increase from coil heat release can result in worsening performance and shortened service life of the solenoid valve, as well as adverse effects on peripheral equipment in the vicinity. For this reason, when valves are to be continuously energized for extended periods, use a fan or take other measures to disperse heat and keep valve surface temperatures at 70°C or less.

### Caution

**Leakage voltage**

- Particularly when using a resistor in parallel with a switching element and using a C-R element (surge voltage suppressor) to protect the switching element, take note that leakage current will flow through the resistor, C-R element, etc., creating a possible danger that the valve may not turn off.

**Mounting**

1. If air leakage increases or equipment does not operate properly, stop operation.
   - After mounting is completed, confirm that it has been done correctly by performing a suitable function test.

2. Since the body (orifice shape) is designed to eliminate residual liquid, mounting in a vertical direction with the coil at the top is recommended.
   - When residual liquid is not considered, any mounting position is possible.

---

**Design and Selection**

The table below shows reference values for continuously energized valves (single unit) when surface temperature is 70°C or less.

<table>
<thead>
<tr>
<th>Series</th>
<th>LVM09/090</th>
<th>LVM10/100</th>
<th>LVM15/150</th>
<th>LVM20/200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period of continuous energization</td>
<td>5 min. or less</td>
<td>30 min. or less</td>
<td>30 min. or less</td>
<td></td>
</tr>
<tr>
<td>Duty ratio</td>
<td>50% or less</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>25°C or less</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power-saving circuit</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Duty ratio: 50% or less
* For the LVM15/150, the type with power-saving circuit is standard.

Please use a fan or take other measures to disperse heat and keep temperatures within the specified range when mounting the solenoid valves inside control panels, etc. Be especially careful when using three or more adjacent valves with manifolds and keeping them continuously energized for extended period, as this may result in dramatic increases in temperature.

11. Please use valve pitches equal to or above those shown in the table below when using multiple valves together.

<table>
<thead>
<tr>
<th>Series</th>
<th>LVM09/090</th>
<th>LVM10/100</th>
<th>LVM15/150</th>
<th>LVM20/200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valve pitch</td>
<td>10.5</td>
<td>14</td>
<td>17</td>
<td>21</td>
</tr>
</tbody>
</table>

---

**Specific Product Precautions 1**

Be sure to read this before handling. Contact SMC when it is used in conditions other than the specifications.
**Operating Environment**

**Warning**

1. Do not use in explosive atmospheres.
2. Do not use in locations subject to excessive vibration or impact.
   Impact resistance of this solenoid valve is 150 m/s². Vibration resistance of this solenoid valve is 30 m/s².
3. Do not use in locations where radiated heat will be received from nearby heat sources.

**Maintenance**

1. Removing the product
   Shut off the fluid supply and release the fluid pressure in the system. Shut off the power supply. Remove the product.
2. Before operating, remove residual chemicals and completely replace it with deionized water, air, etc.
3. Do not disassemble the product.
   Products which have been disassembled cannot be guaranteed. If disassembly is necessary, contact SMC.

**Wiring**

**Caution**

1. Use electrical circuits which do not generate chattering in their contacts.
2. Use voltage which is within ±10% of the rated voltage.
   However, when the response time is important, control the voltage to avoid variation on the minus side.
3. Apply the correct voltage.
   Applying incorrect voltage may cause a malfunction or a burned coil.
4. Connect the wires so that an external force of greater than 10 N is not applied to the lead wire.
   Otherwise the coil will burn.
5. Units with power-saving circuits use polarized electrical connections.
   Red (+), Black (–)

---

**Fluid Properties**

**Warning**

**Liquid (chemicals)**
Component crystallizes or clots depending on its nature. Leakage will occur when a crystallized or clotted component is caught between the sealing parts.
Take measures to clean such component if necessary.

**Water**
Install a filter strainer of about 100 mesh on the inlet side of the piping.

**Air**
Compressed air filtered with a filter with filtration rating of 5 µm or less, which is mounted on the inlet side of the piping, should be used.

---

**Piping**

**Caution**

1. Preparation before piping
   Before piping is connected, it should be thoroughly blown out with air (flushing) or washed to remove chips, cutting oil and other debris from inside the pipe.
2. When tubing is directly connected to the solenoid valve, insert the tubing straight into the nipple for a complete fit.
   The reference inner diameter of the tubing is ø2.5 or less. Exercise care in selecting the tubing so that the outer diameter of the tubing after being connected does not exceed ø4.5.
   The holding force varies by the tubing material. Be sure to confirm the holding force of each material before operation.
   After connecting the tubing, care should be taken not to put excessive force (tensile force, compression, bending, etc.) on the tubing. Applying an external force of greater than 20 N to the nipple may cause leakage.
   Models: LVM10R1, 10R2, 10R2
3. Always tighten threads with the proper tightening torque.
   Screw the fitting into the solenoid valve and tighten by referring to the tightening torque below.
   Models: LVM11, 10R3, 10R4, 10R6, 105R

**Tightening Torque for Piping**

<table>
<thead>
<tr>
<th>Model</th>
<th>Thread size</th>
<th>Proper tightening torque N·m</th>
</tr>
</thead>
<tbody>
<tr>
<td>LVM09R3, 09R4, 095R</td>
<td>M2</td>
<td>0.1 to 0.14</td>
</tr>
<tr>
<td>LVM11</td>
<td>M5</td>
<td>1.5 to 2</td>
</tr>
</tbody>
</table>

| Without sub-plate      | M2 Note     | 0.15 to 0.2                  |

| With sub-plate          | M6 or       | 1.5 to 2                     |
|                        | 1/4-28UNF   |                             |
| LVM10R3, 10R4, 10R6, 105R |            |                             |

| LVM15R3, 15R4, 155R   | M2.5        | 0.25 to 0.35                |
| LVM20R3, 20R4, 205R   | M3          | 0.4 to 0.6                  |

Note) At base mounted
* Reference
M5, M6, 1/4-28UNF thread type fitting: After tightening by hand, tighten approximately 1/6 turn with a tightening tool.

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**Series LVM**

**Specific Product Precautions 2**

Be sure to read this before handling. Contact SMC when it is used in conditions other than the specifications.