Direct Operated 2/3 Port Isolated Valve

**Low Particle Generation**  **Oil-free**  **Metal-free**

**Isolated Structure**
Solenoid drive body is separated from the fluid area by block seal.

**Easy piping**
Body ported
- Bottom ported
- Side ported
- Base mounted

**Minimal dead space**
No fluids enter the seal groove.

**Flow adjustment not required**
As the flow rate difference is 5% or less, no flow rate adjustment is required at inlet and outlet side.

**LVMK20/200 Series**

**Solenoid drive body**
**Fluid area**

**Block seal**
Material: EPDM, FKM

**Shaft**
Material: PPS

**Poppet**
Material: EPDM, FKM

**Body**
Material: PPS

**Flow rate difference**
5% or less

**Material**
- EPDM
- FKM
- PPS

**New**
Air
Water
RoHS

**Low Particle Generation**
**Oil-free**
**Metal-free**

**LVMK20/200 Series**

**New**

**Flow rate difference**
5% or less
Direct Operated 2/3 Port Isolated Valve  *LVMK20/200* Series

**Application Examples**

- Oil-free, clean, low particle generation applications
- Pure water purification equipment
- Semiconductor equipment (CMP equipment)
- Water dispenser
- Blood analyzer
- Water processing facility (water quality analysis)
- Dental equipment etc.
- Immunity inspection device
- Water dispenser
- Beverage dispenser
- Automatic faucet
- Liquid filling instrument
- Atmospheric pollution analyzer
- Ion cleaner
- Dying machine etc.

**Variations**

<table>
<thead>
<tr>
<th>Model</th>
<th>Valve type</th>
<th>Piping direction</th>
<th>Voltage</th>
<th>Fluid contact material</th>
</tr>
</thead>
<tbody>
<tr>
<td>LVMK21</td>
<td>N.C.</td>
<td>Bottom ported</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>LVMK27</td>
<td>N.C.</td>
<td>Side ported</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>LVMK202</td>
<td>Universal</td>
<td>Bottom ported</td>
<td>24 VDC</td>
<td>Body: PPS Seal: EPDM, FKM</td>
</tr>
<tr>
<td>LVMK207</td>
<td>Universal</td>
<td>Side ported</td>
<td>12 VDC</td>
<td>—</td>
</tr>
<tr>
<td>LVMK23</td>
<td>N.C.</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>LVMK205</td>
<td>Universal</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>
Direct Operated 2/3 Port Isolated Valve

**LVMK20/200 Series**

**How to Order**

- **Symbol**
- **Number of ports**
- **Valve type**
- **Piping direction**
- **Recommended tubing diameter**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Number of ports</th>
<th>Valve type</th>
<th>Piping direction</th>
<th>Recommended tubing diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>2</td>
<td>N.C.</td>
<td>Bottom ported</td>
<td>I.D. 2 to 3.2 mm, O.D. after mounting 8 mm or less</td>
</tr>
<tr>
<td>27</td>
<td>2</td>
<td>N.C.</td>
<td>Side ported</td>
<td>—</td>
</tr>
<tr>
<td>202</td>
<td>3</td>
<td>Universal</td>
<td>Bottom ported</td>
<td>—</td>
</tr>
<tr>
<td>207</td>
<td>3</td>
<td>Universal</td>
<td>Side ported</td>
<td>—</td>
</tr>
</tbody>
</table>

**Body ported**

**LVMK 202 - 5 J -**

**Base mounted**

**LVMK 205 - 5 J -**

**Lead wire length**

- **Symbol**
- **Number of ports**
- **Valve type**
- **Piping direction**
- **Recommended tubing diameter**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Number of ports</th>
<th>Valve type</th>
<th>Piping direction</th>
<th>Recommended tubing diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>2</td>
<td>N.C.</td>
<td>Bottom ported</td>
<td>—</td>
</tr>
<tr>
<td>205</td>
<td>3</td>
<td>Universal</td>
<td>Bottom ported</td>
<td>—</td>
</tr>
</tbody>
</table>

**Fluid contact material**

- **Symbol**
- **Body**
- **Poppet/Seal**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Body</th>
<th>Poppet/Seal</th>
</tr>
</thead>
<tbody>
<tr>
<td>J</td>
<td>PPS</td>
<td>EPDM</td>
</tr>
<tr>
<td>K</td>
<td>PPS</td>
<td>FKM</td>
</tr>
</tbody>
</table>

**Coil voltage**

- **Symbol**
- **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>

**Flow Rate Characteristics**

<table>
<thead>
<tr>
<th>Fluid</th>
<th>Water</th>
<th>Air</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$K_v$</td>
<td>$C$</td>
</tr>
<tr>
<td>Water</td>
<td>0.055</td>
<td>0.23</td>
</tr>
<tr>
<td>Air</td>
<td>0.065</td>
<td>0.23</td>
</tr>
</tbody>
</table>

*The values of $K_v$ and $C$ are based on JIS B 2005:1995, $C$ and $b$ are based on JIB B 8390:2000.*
### Component Parts

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Body A</td>
<td>PPS</td>
</tr>
<tr>
<td>2</td>
<td>Body B</td>
<td>PPS</td>
</tr>
<tr>
<td>3</td>
<td>Shaft</td>
<td>PPS</td>
</tr>
<tr>
<td>4</td>
<td>Poppet</td>
<td>EPDM, FKM</td>
</tr>
<tr>
<td>5</td>
<td>Seal</td>
<td>EPDM, FKM</td>
</tr>
<tr>
<td>6</td>
<td>Block seal</td>
<td>EPDM, FKM</td>
</tr>
<tr>
<td>7</td>
<td>Spacer</td>
<td>PBT</td>
</tr>
<tr>
<td>8</td>
<td>Armature</td>
<td>—</td>
</tr>
<tr>
<td>9</td>
<td>Return spring</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>10</td>
<td>Mold coil</td>
<td>Molded material: PBT</td>
</tr>
<tr>
<td>11</td>
<td>Cover</td>
<td>NBR</td>
</tr>
<tr>
<td>12</td>
<td>Lead wire</td>
<td>—</td>
</tr>
</tbody>
</table>
## Construction: Base Mounted

### LVMK23

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Body A</td>
<td>PPS</td>
</tr>
<tr>
<td>2</td>
<td>Body B</td>
<td>PPS</td>
</tr>
<tr>
<td>3</td>
<td>Shaft</td>
<td>PPS</td>
</tr>
<tr>
<td>4</td>
<td>Poppet</td>
<td>EPDM, FKM</td>
</tr>
<tr>
<td>5</td>
<td>Seal</td>
<td>EPDM, FKM</td>
</tr>
<tr>
<td>6</td>
<td>Block seal</td>
<td>EPDM, FKM</td>
</tr>
<tr>
<td>7</td>
<td>Spacer</td>
<td>PBT</td>
</tr>
</tbody>
</table>

### LVMK205

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Armature</td>
<td>—</td>
</tr>
<tr>
<td>9</td>
<td>Return spring</td>
<td>Stainless steel</td>
</tr>
<tr>
<td>10</td>
<td>Mold coil</td>
<td>Molded material: PBT</td>
</tr>
<tr>
<td>11</td>
<td>Cover</td>
<td>NBR</td>
</tr>
<tr>
<td>12</td>
<td>Lead wire</td>
<td>—</td>
</tr>
<tr>
<td>13</td>
<td>O-ring</td>
<td>EPDM, FKM</td>
</tr>
</tbody>
</table>

Direct Operated 2/3 Port Isolated Valve *LVMK20/200 Series*
Dimensions: Body Ported (Side Ported)

**LVMK20/200 Series**

---

**LVMK27-□□□**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 x ø2.7</td>
<td>(For mounting)</td>
</tr>
<tr>
<td>IN</td>
<td>5.8</td>
</tr>
<tr>
<td>OUT</td>
<td>26.6</td>
</tr>
<tr>
<td>Lead wire length</td>
<td>58.5</td>
</tr>
</tbody>
</table>

---

**LVMK207-□□□**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 x ø2.7</td>
<td>(For mounting)</td>
</tr>
<tr>
<td>IN</td>
<td>5.8</td>
</tr>
<tr>
<td>OUT</td>
<td>26.6</td>
</tr>
<tr>
<td>Lead wire length</td>
<td>58.5</td>
</tr>
</tbody>
</table>

---

**Tubing insertion dimension**

- For LVMK27: 2 locations
- For LVMK207: 3 locations

---

**Recommended tubing diameter:**

- I.D. ø2 to ø3.2, O.D. after mounting ø8 or less
- Mounting force (holding force) varies depending on the tube material or dimensions, so please check that there is no problem with the leakage and mounting performance before use.
Direct Operated 2/3 Port Isolated Valve  **LVMK20/200 Series**

**Dimensions: Body Ported (Bottom Ported)**

**LVMK21-□□□□**

- 2 x ø2.7 (For mounting)
- Lead wire length: 55.8
- UL1007 AWG22
- Recommended tubing diameter: I.D. ø2 to ø3.2, O.D. after mounting ø8 or less
- Mounting force (holding force) varies depending on the tube material or dimensions, so please check that there is no problem with the leakage and mounting performance before use.

**LVMK202-□□□□**

- 2 x ø2.7 (For mounting)
- Lead wire length: 58.4
- UL1007 AWG22
- Tubing insertion dimension:
  - For LVMK21: 2 locations
  - For LVMK202: 3 locations

---

**Tubing insertion dimension**

- For LVMK21: 2 locations
- For LVMK202: 3 locations
Dimensions: Base Mounted

LVMK20/200 Series

Recommended interface dimension

*: Surface roughness = Rz3.2 or less

- 2 x ø3.4 Mounting hole
- 2 x ø5.7 Mounting hole
- 8.2 Lead wire length

When mounting, pin to prevent mounting with incorrect orientation.
Size should be ø2.5 and height should be 1 to 2.

2 x M3 x 0.5 Effective thread length
4.5 or more

2 x ø2.3 C0.2 or less

Dimensions: Base Mounted

LVMK23-□□-□
Dimensions: Base Mounted

LVMK205-□□□

- Mounting hole: 2 x ø3.4
- Lead wire length: 13.5, 11.2, 8.2
- UL1007 AWG22
- Length: 20
- Effective thread length: 2 x M3 x 0.5, 4.5 or more

Recommended interface dimension:
- Surface roughness = Rz3.2 or less
- Pin to prevent mounting with incorrect orientation
- Size should be ø2.5 and height should be 1 to 2

Note: Surface roughness = Rz3.2 or less
**LVMK Series**

**Specific Product Precautions 1**

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

---

**Design / Selection**

**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 liquid or corrosive gas 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
    When a solenoid valve 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.

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

    | Period of continuous energization | 30 minutes or less |
    |----------------------------------|--------------------|
    | Duty ratio                       | 50% or less        |
    | Ambient temperature              | 25°C or less       |

   c: Duty ratio: ON time/(ON time + OFF time)

   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.

   Coil generates heat when it is energized in general, so do not touch it by hand.

11. Low temperature environments
    When poppet/seal material is FKM, if ambient temperature and fluid temperature is 10°C or less (guide), the response time of the solenoid valve will be longer.

---

**Selection**

**Caution**

Leakage voltage
The leakage voltage should be 2% or less of the rated voltage. If the leakage voltage exceeds this value, valve may not turn OFF.

---

**Mounting**

**Warning**

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.

---

**Caution**

1. Always tighten threads with the proper tightening torque.

   When mounting the solenoid valve, tighten it with the proper tightening torque shown below.

   **Tightening Torque for Mounting the Solenoid Valve**

<table>
<thead>
<tr>
<th>Location</th>
<th>Model</th>
<th>Thread size</th>
<th>Proper tightening torque [N·m]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body ported, Side of the body</td>
<td>LVMK21, 27, 202, 207</td>
<td>M2.5</td>
<td>0.25 to 0.35</td>
</tr>
<tr>
<td>Body ported, Bottom of the body</td>
<td>LVMK27, 207</td>
<td>M3</td>
<td>0.4 to 0.6</td>
</tr>
<tr>
<td>Base mounted, Body mounting</td>
<td>LVMK23, 205</td>
<td>M3</td>
<td>0.4 to 0.6</td>
</tr>
</tbody>
</table>

   Fig. 1 Thread size: M2.5
   Proper tightening torque: 0.25 to 0.35 N·m
   (Applicable model: LVMK21, 27, 202, 207)

   Fig. 2 Thread size: M3
   Proper tightening torque: 0.4 to 0.6 N·m
   (Applicable model: LVMK27, 207)

   Fig. 3 Thread size: M3
   Proper tightening torque: 0.4 to 0.6 N·m
   (Applicable model: LVMK23, 205)

---

11. Low temperature environments
    When poppet/seal material is FKM, if ambient temperature and fluid temperature is 10°C or less (guide), the response time of the solenoid valve will be longer.
Mounting

⚠️ Caution
2. Mount the solenoid valve on the horizontal surface.
Applicable model: LVMK21, 27, 202, 207 (Body ported)

3. Remove dust from the solenoid valve mounting surface completely.
The surface roughness of the mounting surface should be Rz3.2 or less.
Applicable model: LVMK23, 205 (Base mounted)

4. When mounting the solenoid valves next to each other, P (pitch) should be 23 mm or more. (See the figure.)
Applicable model: LVMK23, 205 (Base mounted)

Fluid Quality

⚠️ 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 barb for a complete fit.
The tube I.D. should be 2 to 3.2 mm and O.D. after mounting should be 8 mm or less, but mounting force (holding force) varies depending on the tube material or dimensions, so please check that there is no problem with the leakage and mounting performance before use.
After connecting the tubing, care should be taken not to put excessive force (tensile force, compression, bending, etc.) on the tubing.
If 20 N or more of external force is applied to the barb, it may break the barb.

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 10 N or greater is not applied to the lead wire.
Otherwise the coil will burn.

5. This solenoid valve has no polarity.

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.

4. Do not expose the solenoid valve to direct sunlight.
(Including storage environment.)

Maintenance

⚠️ Warning
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, please contact SMC.
These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of “Caution,” “Warning” or “Danger.” They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)*1, and other safety regulations.

**Caution:** Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

**Warning:** Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

**Danger:** Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

---

**Safety Instructions**

Be sure to read the “Handling Precautions for SMC Products” (M-E03-3) and “Operation Manual” before use.

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**Limited warranty and Disclaimer/Compliance Requirements**

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”. Read and accept them before using the product.

**Limited warranty and Disclaimer**

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.2) Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.

2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided. This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.

3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

**Compliance Requirements**

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.

2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

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## Warning

1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications. Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment. The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.

   1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.

   2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.

   3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

   1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.

   2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.

   3. An application which could have negative effects on people, property, or animals requiring special safety analysis.

   4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

---

## Caution

Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.