

# Pinch Valve

## Solenoid Type

New



### Applicable tubing

- Silicone
- PharMed®BPT\*1,
- Tygon®\*1

| Size   | (O.D.)               |
|--------|----------------------|
| Metric | ø3, ø4, ø6           |
| Inch   | ø1/8", ø5/32", ø1/4" |

### Power consumption

**2.0** W\*2

\*2 Built-in power saving circuit (Refer to page 2.)

\*2 Excludes ø6 and ø1/4"

### Compact

**20** mm Valve width



### Valve type

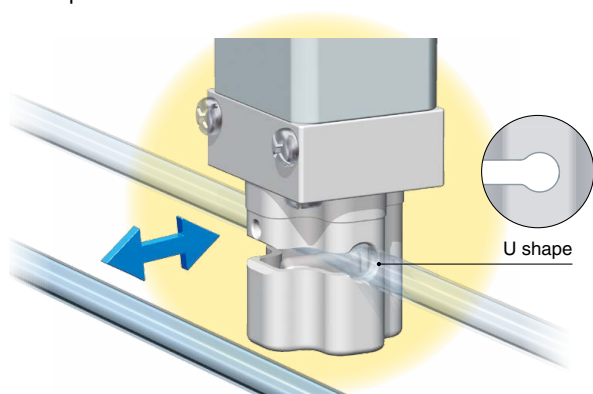
N.C. (Normally in clamping position)

N.O. (Normally in unclamping position)

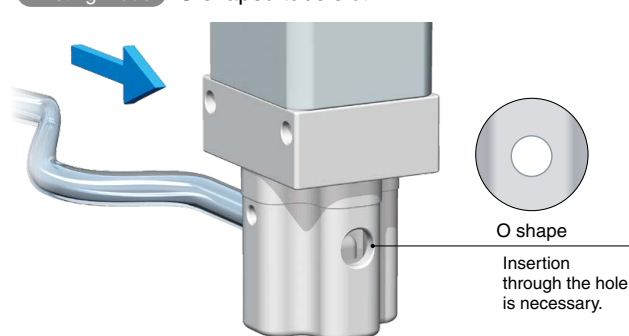
\*1 PharMed®BPT and Tygon® are registered trademarks of Saint-Gobain Performance Plastics Corporation.

## Easy tubing replacement

U shaped tube slot



Existing model O shaped tube slot



**LPV Series**



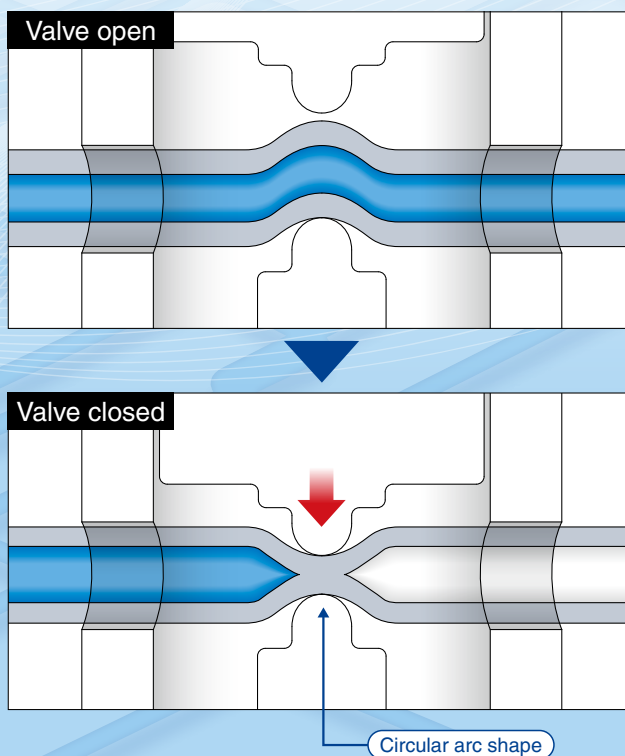
CAT.ES70-58A

# Highly resistant to contamination and reduces valve failures



## Less damage to tube

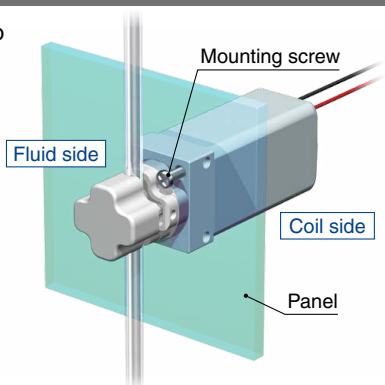
Circular arc shape of tube clamp is less likely to damage the tube.



## 2 patterns of mounting

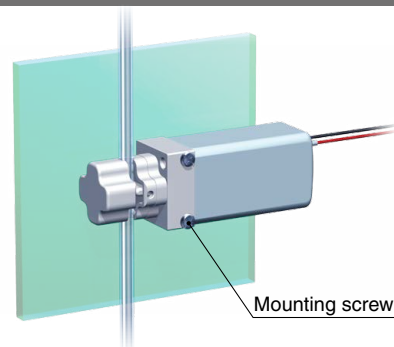
### Panel mounting

Electrical faults due to scattering of liquid prevented by panels between the flow and coil sides



### Direct mounting

Can be mounted from the front



## Application Examples

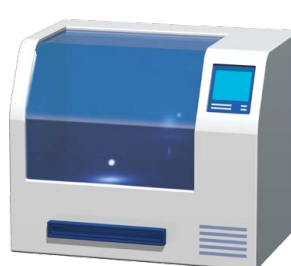
- Waste liquid line for the blood analyzer



- Bacteria identification and inspection device



- DNA analyzer



- Liquid filling device



# Pinch Valve LPV Series



## How to Order

LPV **21** - **5** **K** **□** - T **3** - **□**

1
2
3
4
5
6

### 1 Symbol

| Symbol    | Valve type |
|-----------|------------|
| <b>21</b> | N.C.       |
| <b>22</b> | N.O.       |

### 4 Light

| Symbol     | Light |
|------------|-------|
| <b>Nil</b> | None  |
| <b>Z</b>   | Yes   |

### 6 Lead wire length

|            |         |
|------------|---------|
| <b>Nil</b> | 300 mm  |
| <b>6</b>   | 600 mm  |
| <b>10</b>  | 1000 mm |

\* Only for the electrical entry type using a G type grommet

### 2 Coil voltage

| Symbol   | Voltage |
|----------|---------|
| <b>5</b> | 24 VDC  |
| <b>6</b> | 12 VDC  |

### 5 Tubing size

| Symbol    | O.D. x I.D.     | Inscribed number |
|-----------|-----------------|------------------|
| <b>3</b>  | ø3 x ø1         | 3                |
| <b>3A</b> | ø1/8" x ø1/16"  |                  |
| <b>4</b>  | ø4 x ø2         | 4                |
| <b>4A</b> | ø5/32" x ø1/32" |                  |
| <b>6</b>  | ø6 x ø4         | 6                |
| <b>6A</b> | ø1/4" x ø1/8"   |                  |

\* When tubing is needed to be included, order using the product code shown below. Saint-Gobain made PharMed®BPT tubing, 100 mm, will be provided as an accessory.

Tube no.: LPV20 - 7 - T **3**

Tubing size

| Symbol    | O.D. x I.D.     | Length |
|-----------|-----------------|--------|
| <b>3</b>  | ø3 x ø1         | 100 mm |
| <b>3A</b> | ø1/8" x ø1/16"  |        |
| <b>4</b>  | ø4 x ø2         |        |
| <b>4A</b> | ø5/32" x ø1/32" |        |
| <b>6</b>  | ø6 x ø4         |        |
| <b>6A</b> | ø1/4" x ø1/8"   |        |

### 3 Electrical entry

| Symbol            | Electrical entry, Lead wire length |  |
|-------------------|------------------------------------|--|
| <b>K</b>          | Plug connector, 300 mm             |  |
| <b>KO</b>         | Plug connector, Without connector  |  |
| <b>G (Option)</b> | Grommet, 300 mm                    |  |

\* The plug connector is included but does not come assembled.

\* If a lead wire length of 600 mm or more is required, select "KO" (Without connector) and then add the connector part number shown below under the valve part number when ordering.

Plug connector part no.: AXT661 - 14A - **6**

Lead wire length

|           |         |
|-----------|---------|
| <b>6</b>  | 600 mm  |
| <b>10</b> | 1000 mm |

## Specifications

| Model                           |              |          | LPV21                                                                  | LPV22 |
|---------------------------------|--------------|----------|------------------------------------------------------------------------|-------|
| Valve type                      |              |          | N.C.                                                                   | N.O.  |
| Applicable tubing               |              |          | Silicone, PharMed®BPT, "Hardness of 64 (shore A) or lower (reference)" |       |
| Applicable fluid                |              |          | Gas and liquid applicable to the tube                                  |       |
| Type of actuation               |              |          | Direct operated solenoid                                               |       |
| Operating pressure range*1      |              |          | 0 to 0.2 MPa                                                           |       |
| Rated voltage                   |              |          | 24/12 VDC                                                              |       |
| Allowable voltage fluctuation*2 |              |          | ±10% of the rated voltage                                              |       |
| Type of coil insulation         |              |          | Class B                                                                |       |
| Ambient temperature*2           |              |          | 0 to 50°C                                                              |       |
| Fluid temperature*2             |              |          | 0 to 50°C (No freezing)                                                |       |
| Mounting orientation            |              |          | Free                                                                   |       |
| Enclosure                       |              |          | IP40 equivalent                                                        |       |
| Impact/Vibration resistance*3   |              |          | 150/30                                                                 |       |
| Tube effective area*4           |              |          | 70% or more                                                            |       |
| Coil switching noise*5          |              |          | 80 dB                                                                  |       |
| Power consumption               | T3(A), T4(A) | Starting | 8 W                                                                    |       |
|                                 |              | Holding  | 2.0 W [Built-in power saving circuit]                                  |       |
|                                 | T6(A)        | Starting | 24 W                                                                   |       |
|                                 |              | Holding  | 2.9 W [Built-in power saving circuit]                                  |       |

\*1 Check the operating pressure range of a tube to be used.

\*2 Allowable voltage range and operating temperature varies depending on the characteristics of tubes. Refer to "3. Tube conditions" on page 5 for details.

\*3 Impact resistance: No malfunction occurred when tested in the axial direction and at a right angle to the armature in both an energized and a de-energized state, once in each condition. (Value in the initial state)

Vibration resistance: No malfunction occurred in a one-sweep test between 45 and 2000 Hz. Test was performed at both an energized and a de-energized state in the axial direction and at a right angle to the main valve and armature. (Value in the initial state)

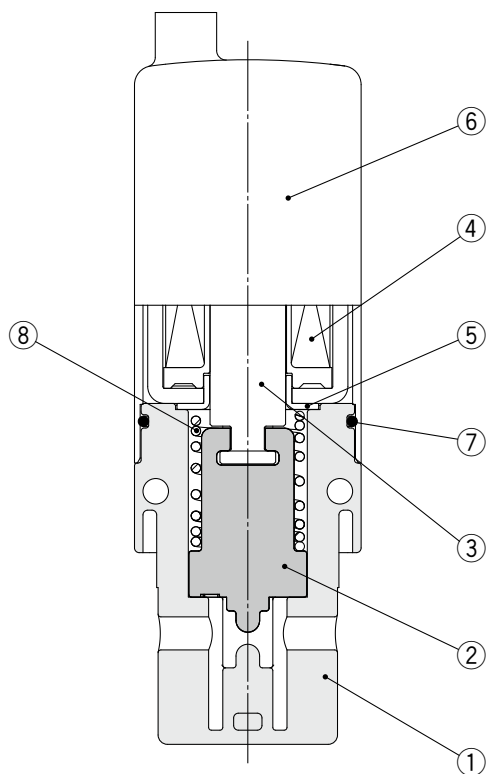
\*4 When the tube is installed

\*5 The value is based on SMC's measurement conditions. The noise level will vary according to the actual conditions.

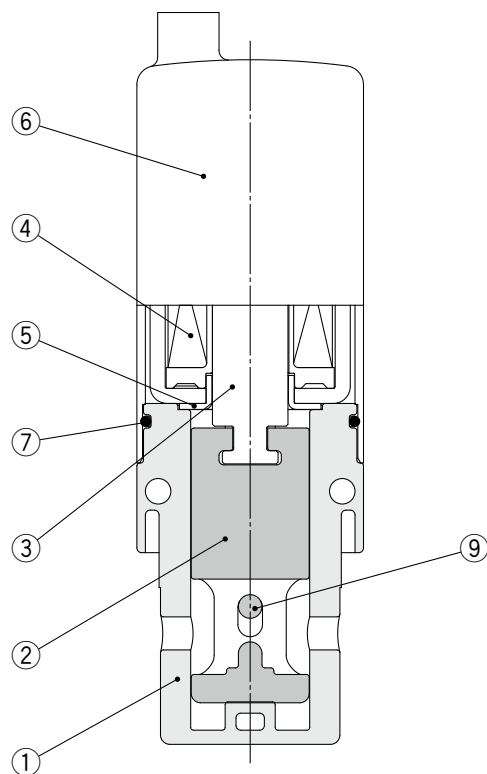
# LPV Series

## Construction

### LPV21 (N.C.)



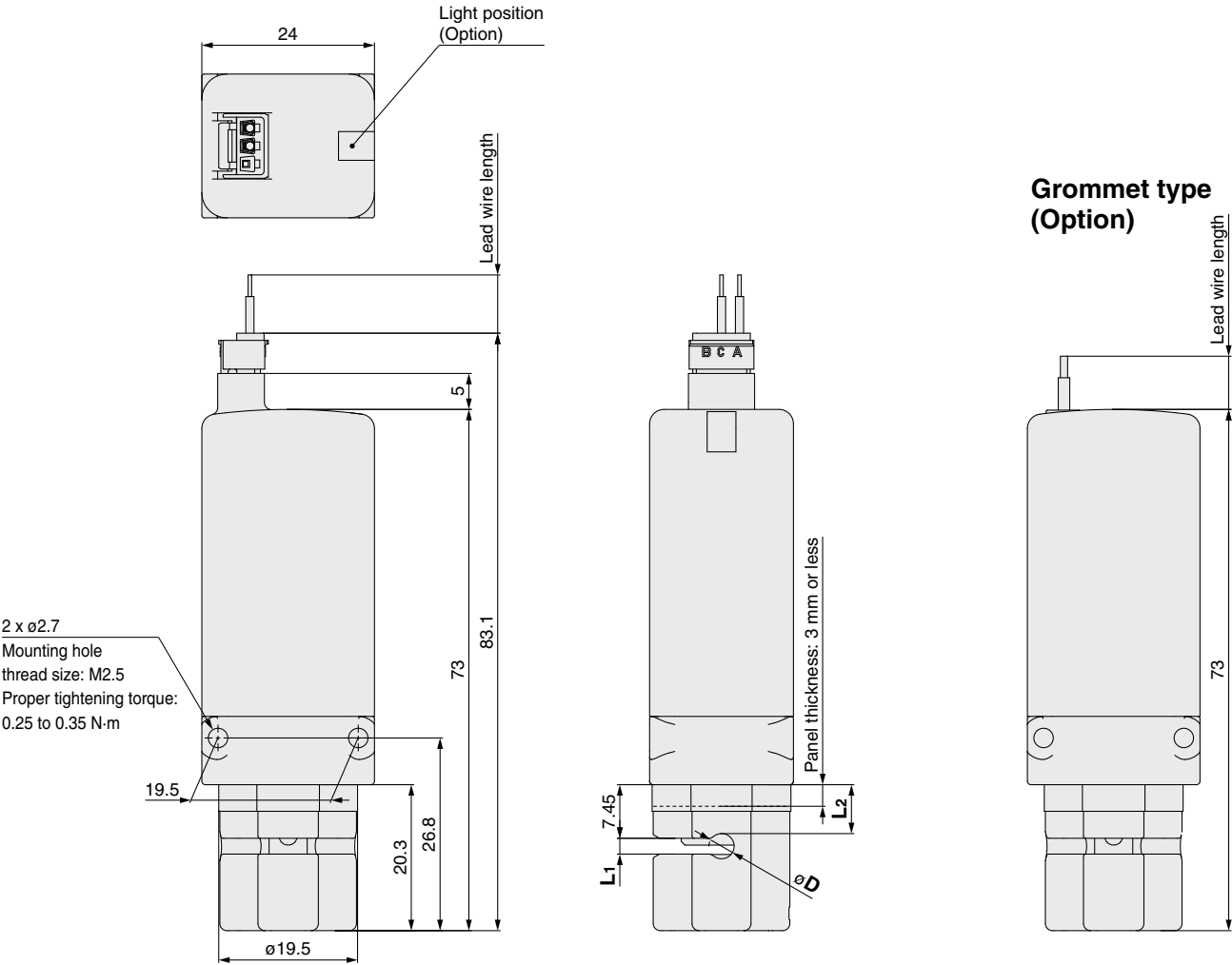
### LPV22 (N.O.)



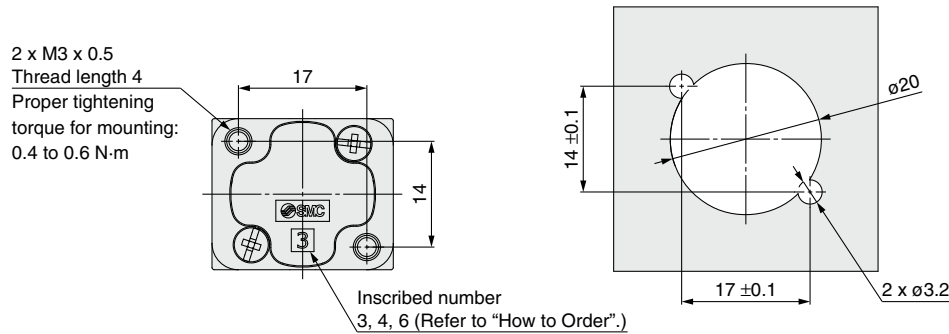
### Component Parts

| No. | Description         | Material        |
|-----|---------------------|-----------------|
| 1   | Body                | PBT             |
| 2   | Push rod            | PBT             |
| 3   | Armature            | Stainless steel |
| 4   | Coil/Board assembly | —               |
| 5   | Sleeve              | SUY (Iron)      |
| 6   | Casing              | PBT             |
| 7   | O-ring              | NBR             |
| 8   | Spring              | Stainless steel |
| 9   | Pin                 | Stainless steel |

**Dimensions**



**Recommended panel hole dimensions for valve mounting**



| Part no.            | D          | L <sub>1</sub> | L <sub>2</sub> |
|---------------------|------------|----------------|----------------|
| LPV21/22-□□-T3(A)-□ | $\phi 3.5$ | 2.2            | 6.8            |
| LPV21/22-□□-T4(A)-□ | $\phi 4.5$ | 2.8            | 6.6            |
| LPV21/22-□□-T6(A)-□ | $\phi 6.5$ | 3.5            | 6              |





## LPV Series

# Specific Product Precautions 1

Be sure to read this before handling the products. Refer to the back cover for safety instructions. For 2-port solenoid valve for fluid control precautions, refer to the “Handling Precautions for SMC Products” and the “Operation Manual” on the SMC website: <https://www.smcworld.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 specified operating ranges indicated in the catalog. Ensure that product and tubing are properly matched in the main specifications such as operation, leakage, flow rate, and endurance.

3. Tube conditions

Be sure to confirm the compatibility of a tube to be used with fluid before use. The operating pressure and operating method shall be complied with the precautions described by its manufacturer.

The following table shows the allowable voltage range of 5°C or higher and 40°C or lower in case of the ambient and fluid temperatures.

Use the appropriate solenoid valve with the part numbers shown in the table under the specified conditions.

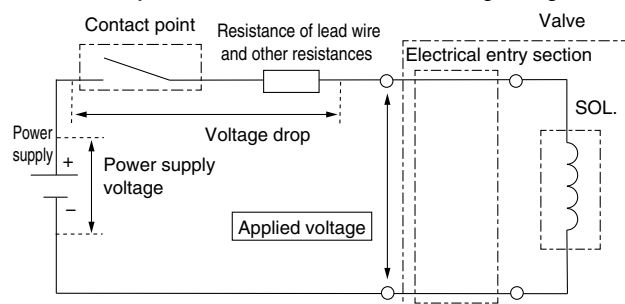
| Solenoid valve part number                                       | Allowable voltage range<br>[Ambient and fluid temperatures: 5°C or higher and 40°C or lower] |
|------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| LPV21-□□-T4<br>LPV21-6□□-T6(A)<br>LPV22-□□□-T4A<br>LPV22-□□□-T6A | +10%/–5% of the rated voltage                                                                |

Repeated and prolonged grip of a tube can shorten its product life, causing the solenoid valve to operate unsteadily. Thus, a used tube should be replaced with a new one or put in a different grip position after the operating cycles of 1 million times are reached as the guideline.

4. Ambient environment

Use within the allowable ambient temperature range. Also, do not use the product in an environment where corrosive gases, chemicals, liquid can come in contact with its outside surface. When the product is used in an environment where ambient/fluid temperature declines to 5°C or lower or rises to 40°C or higher, or the temperature of the valve surface rises to 60°C or higher, the hardness of the tube can increase or decrease depending on its characteristics, which will reduce the responsiveness of the valve or decline the vibration resistance/shock resistance of it. In such a case, the voltage to be applied to the valve should be reduced to within +10/–5% the rated voltage or other consideration should be taken to ensure that the valve conditions shall be compatible with the system requirements.

And, since the contacts and wiring routing (the resistance of lead wires) can cause a voltage drop, the applied voltage should be adjusted to within the allowable voltage range.



## Warning

5. Extended periods of continuous energization

The temperature rise due to heat generation in the coil may cause a decline in solenoid valve performance and reduce its service life. Therefore, if the solenoid valve is energized for long periods, take measures to cool the solenoid valve to keep the surface temperature at 70°C or lower by paying attention to the radiated heat from the ambient equipment. When energizing adjacent solenoids at the same time continuously, the temperature increase will be greater. When the solenoid valve is to be mounted in a control panel, take precautions to cool down the heat of the valve with proper measures, including placing a fan in the position, to keep the inside within the specified ambient temperature range.

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

|                                   |                 |
|-----------------------------------|-----------------|
| Period of continuous energization | 30 min. or less |
| Ambient temperature               | 25°C or lower   |

6. Energizing time

This solenoid valve has a built-in power saving circuit. The start-up of the power-saving type unit is set to take 100 msec. This valve should be in the ON position after the energizing time of 100 msec. or longer.

7. Do not use the switch unless the equipment operates normally.

After mounting, perform suitable function and leak tests to confirm that the mounting is correct.

8. Avoid installing the coil vertically with its top to a downward direction.

Should the tube break, the fluid could enter into the coil, causing the coil to burn out.

9. Countermeasures against static electricity

Take measures to prevent static electricity since some fluids can cause static electricity.

10. Do not use in explosive atmospheres.

11. Do not use in locations where radiated heat will be received from nearby heat sources.

12. Ensure sufficient space for maintenance activities.

When installing the products, allow access for maintenance and inspection.

13. Fluid pressure range

Fluid pressure should be within the allowable pressure range.

14. Cannot be used as an emergency shut-off valve, etc.

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

15. Do not use in locations subject to excessive vibration or impact.

Impact resistance of this solenoid valve is 150 m/s<sup>2</sup>. Vibration resistance of this solenoid valve is 30 m/s<sup>2</sup>.

16. Do not disassemble the solenoid valve.

A disassembled product will void our warranty. If you absolutely require it be disassembled, contact SMC.



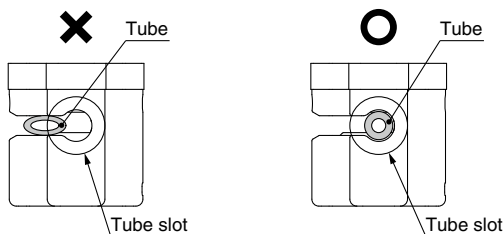
## LPV Series

# Specific Product Precautions 2

Be sure to read this before handling the products. Refer to the back cover for safety instructions. For 2-port solenoid valve for fluid control precautions, refer to the “Handling Precautions for SMC Products” and the “Operation Manual” on the SMC website: <https://www.smcworld.com>

### ⚠ Caution

1. Be sure to fully insert the tube into the tube clamp of the solenoid valve.



2. Apply the correct voltage.

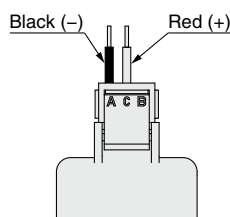
Applying incorrect voltage may cause a malfunction or a burned coil.

3. Connect the wires so that an external force of 10 N or more is not applied to the lead wire.

Otherwise, the coil will burn.

4. This solenoid valve has a built-in power saving circuit, which has polarity.

Red (+), Black (-)



5. Removing the solenoid valve

Shut off the fluid supply and release the fluid pressure in the system. Shut off the power supply before removing the solenoid valve.

6. 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.

7. When the tubing is long or according to the operating conditions, tubing may thrash about, causing damage to the tube slot of the solenoid valve, or the tubing to come off or deteriorate.

In this case, secure the tubing to prevent its uncontrolled movement.

8. Leakage voltage

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

### ⚠ Caution

9. Power saving circuit

The power saving circuit (PWM control) contained in this product reduces the power consumption through the switching operation at high speeds in the PWM control circuit after the rated voltage is applied for approx. 100 msec. since energizing the circuit. Please note that the effect of this PWM control can cause the following problems, depending on the type of a used switch and drive circuit.

1. When a mechanical type relay is used in the drive circuit, the circuit cannot turn on normally if chattering occurs in the relay just when the rated voltage is applied for approx. 100 msec. after energizing the valve.
2. When a filter or another device is added to between the power supply and the product to achieve the noise elimination, the current required for driving the product can be decreased through its filtering effect, disabling the drive to operate normally.
3. When the SSR (Solid state relay) with a built-in photo coupler is used in the drive circuit, the photo coupler may not turn off, disabling the product to be switched off (held in the ON condition).

### How to Use Plug Connector

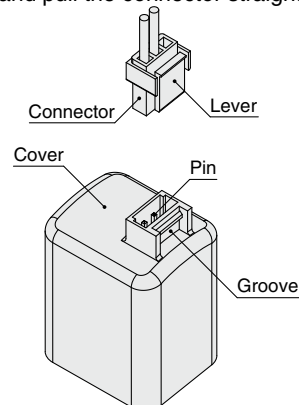
### ⚠ Caution

#### Attaching connectors

Hold the lever and connector unit between your fingers and insert straight onto the pins of the solenoid valve so that the lever's pawl is pushed into the groove and locks.

#### Detaching connectors

Remove the pawl from the groove by pushing the lever downward with your thumb, and pull the connector straight out.



## Safety Instructions

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.

\*1) ISO 4414: Pneumatic fluid power – General rules relating to systems.  
ISO 4413: Hydraulic fluid power – General rules relating to systems.  
IEC 60204-1: Safety of machinery – Electrical equipment of machines.  
(Part 1: General requirements)  
ISO 10218-1: Manipulating industrial robots – Safety.  
etc.

### 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

#### 1. The product is provided for use in manufacturing industries.

The product herein described is basically provided for peaceful use in manufacturing industries.  
If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.  
If anything is unclear, contact your nearest sales branch.

## 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.

#### \*2) Vacuum pads are excluded from this 1 year warranty.

A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.  
Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

### 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.

### Caution

#### SMC products are not intended for use as instruments for legal metrology.

Measurement instruments that SMC manufactures or sells have not been qualified by type approval tests relevant to the metrology (measurement) laws of each country. Therefore, SMC products cannot be used for business or certification ordained by the metrology (measurement) laws of each country.

## Safety Instructions

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