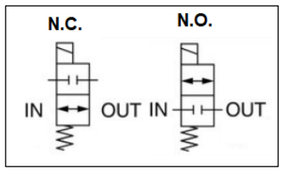
ORIGINAL INSTRUCTIONS

Instruction Manual
Solenoid Pinch Valve
LPV Series



The intended use of this product is for on/off flow control of fluid by pinching tubing and so avoiding fluid contact with the moving parts of the valve.

1 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.

*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: Robots and robotic devices - Safety requirements for industrial robots - Part 1: Robots.

- Refer to product catalogue, Operation Manual and Handling Precautions for SMC Products for additional information.
- Keep this manual in a safe place for future reference.

⚠ **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.

⚠ Warning

- **Always ensure compliance with relevant safety laws and standards.**
- All work must be carried out in a safe manner by a qualified person in compliance with applicable national regulations.

⚠ Caution

- The product is provided for use in manufacturing industries only. Do not use in residential premises.

2 Specifications

2.1 Valve specifications

Model			LPV21	LPV22
Valve type			N.C	N.O.
Applicable tubing			Silicone, PHARMED® BPT (Hardness 64 (shore A) or less)	
Applicable tube sizes (O.D. x I.D.)	Metric [mm]	Code 3	∅3 x ∅1	
		Code 4	∅4 x ∅2	
		Code 6	∅6 x ∅4	
	Inch ["]	Code 3A	∅1/8 x ∅1/16	
		Code 4A	∅5/32 x ∅1/32	
		Code 6A	∅1/4 x ∅1/8	
Fluid (within tubing, no contact with valve)			Air or liquid	
Switching method			Direct acting solenoid	
Working pressure [MPa] Note 1)			0 to 0.2	
Ambient and fluid temperature [°C] Note 2), 4)			0 to 50 (No freezing)	
Flow characteristics			As per tubing selected	
Response time Note 5)			Contact SMC	
Duty cycle				
Minimum operating frequency			1 cycle / 30 days	
Maximum operating frequency			Contact SMC	
Lubrication			Not required	
Impact / vibration resistance [m/s²] Note 3), 4)			150 / 30	
Enclosure (based on IEC60529)			IP40	

2 Specifications - continued

Mounting orientation			Unrestricted
Tube effective cross-sectional area Note 5)			70% or more of unclamped state
Operating noise [dB] Note 6)			80
Weight [g]			75

Table 1.

Note 1) Check the operating pressure range of the tube.
Note 2) Operating temperature conditions differ depending on characteristics of tubes.
Note 3) Impact resistance: No malfunction occurred when it is tested in the axial direction and at the right angles to the armature in both energized and de-energized states for each condition. (Values quoted are for a new valve).
Vibration resistance: No malfunction occurred in one sweep test between 45 and 2000 Hz in the axial direction and at the right angles to the main valve and armature in both energized and de-energized states for each condition. (Values quoted are for a new valve).
Note 4) If used at ambient and fluid temperature of <5 °C or >40°C, or when the valve surface temperature is 60°C or over, valve response and resistance to impact / vibration may change from tubing material characteristic changes, hardness of the tubing, affected by its characteristics.
In such a case, consider reducing the voltage applied to the valve (voltage fluctuation) within +10% / -5% of the rated voltage, as well as checking compatibility with your system in advance.
Note 5) At tube installation.

Before installation	After installation	
	Pinch valve OPEN	Pinch valve CLOSE
		
Flow area: 100%	Flow area: ≥70%	Flow area: 0%

Note 6) Based on SMC test conditions. Sound level may vary according to customer's conditions of use.

2.2 Solenoid specifications

Model			LPV21	LPV22
Coil rated voltage [VDC]			24, 12	
Electrical entry			Plug connector, Grommet	
Allowable voltage fluctuation Note 1), 2)			±10% of rated voltage	
Coil insulation class			B	
Power consumption [W]	T3(A), T4(A)	Inrush	8	
		Holding	2 (Built-in power saving circuit)	
	T6(A)	Inrush	24	
		Holding	2.9 (Built-in power saving circuit)	
Indicator light			LED	
Surge voltage suppressor			Diode (built-in to power saving circuit)	

Table 2.

Note 1) Allowable voltage fluctuation may vary depending on characteristics of tubes.
Note 2) When using the below solenoid valves at ambient and fluid temperatures between 5 °C and 40 °C, ensure that allowable voltage range is as per the table below.

Solenoid valve part number	Allowable voltage range (ambient and fluid temperatures between 5 °C and 40 °C)
LPV21-##-T4	+10% / -5% of the rated voltage
LPV21-6##-T6(A)	
LPV22-###-T4A	
LPV22-###-T6A	

Table 3.

2.3 Indicator light

Figure 1.

2.4 Special products

⚠ Warning

Special products (-X) might have specifications different from those shown in this section. Contact SMC for specific drawings.

3 Installation

3.1 Installation

⚠ Warning

- Do not install the product unless the safety instructions have been read and understood.

3.2 Environment

⚠ Warning

- Do not use in an environment where corrosive gases, chemicals, liquids, salt water or steam can get on the valve.
- Do not use in an explosive atmosphere.
- Do not expose to direct sunlight. Use a suitable protective cover.
- Do not install in a location subject to vibration or impact in excess of the product's specifications.
- Do not mount in a location exposed to radiant heat that would result in temperatures in excess of the product's specifications.

3.3 Piping

⚠ Caution

- Before connecting piping make sure to clean up chips, cutting oil, dust etc.
- Before use, check and ensure the compatibility between the tube and fluid to be used.
- When tubing is inserted into the clamp, ensure it is properly fitted in the pinch valve without causing damage to the tubing.

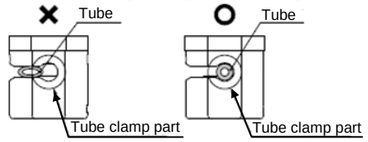


Figure 2.

- If the tube is repeatedly gripped for a long period of time, the life of the tube may get reduced causing unstable operation of the solenoid valve. Therefore, it is recommended to replace or change the gripping position and to replace the tube after 1 million operations.
- If the tube is too long or under certain conditions of use, it may cause damage to the tube clamp of the solenoid valve, dislodging of the tube or deterioration of the tube. In such cases, please secure the tube so that it does not become loose.

3.4 Lubrication

⚠ Caution

- SMC products have been lubricated for life at manufacture, and do not require lubrication in service.
- If a lubricant is used in the system, refer to catalogue for details.

3.5 Mounting

⚠ Warning

- Ensure sufficient space for maintenance activities.
- Always tighten threads with the proper tightening torque.
  When mounting the solenoid valve, tighten it with the proper tightening torque shown below.

Type of mounting	Thread size	Tightening torque [N·m]
Direct mounting	M2.5	0.25 to 0.35
Panel mounting	M3	0.4 to 0.6

Table 4.

- If equipment does not operate properly, stop operation.
  After mounting, perform suitable function and leak tests to confirm that the mounting is correct.

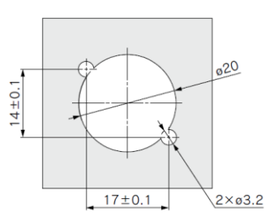


Figure 3. Recommended panel hole dimensions for valve mounting

3 Installation - continued

3.6 Electrical circuit

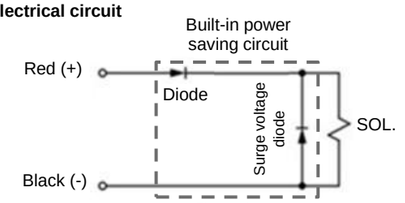


Figure 4.

3.7 Wiring

⚠ Warning

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

⚠ Caution

- Apply the correct voltage.
  Applying incorrect voltage may cause a malfunction or a burned coil.
- Polarity
  LPV has an in-built circuit with polarity, ensure that the positive terminal is connected to the red lead wire and negative terminal is connected to the black lead wire. Otherwise, malfunction could occur.

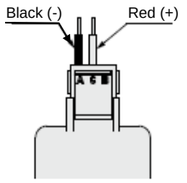


Figure 5.

- Wiring must be made avoiding an external force exceeding 10 N to be applied to the lead wire.
- Avoid mounting the coil downwards. When coil is mounted downwards, in the event of tube break / burst, it may cause leakage of fluid into the coil and may result in coil burnout or damage.
- Power-saving circuit (PWM control) built in this product reduces power consumption by fast switching controlled by the PWM circuit after the rated voltage is applied for about 100 ms from the start of energization. Be aware that this PWM control may cause the following problems depending on your switch or drive circuit:
  - When the drive circuit uses a mechanical relay, the power-saving circuit may not turn on properly, if chattering occurs during application of the rated voltage for about 100 ms from the start of energization.
  - When a filter is fitted between the power and this product for noise reduction purposes, the filter may reduce the power required to drive this product, failing to turn the power-saving circuit on properly.
  - When the drive circuit uses a SSR (solid state relay) that has a built-in photocoupler, the photocoupler fails to turn off, resulting in this product's failure to turn off (i.e., keeping to stay on).

3.8 Residual voltage

⚠ Caution

- The suppressor arrests the back EMF voltage from the coil to a level in proportion to the rated voltage.
- Ensure the transient voltage is within the specification of the host controller.
- In the case of a diode, the residual voltage is approximately 1 V.
- Valve response time is dependent on surge suppression method selected.

3.9 Extended period of continuous energization

⚠ Warning

- The solenoid coil will generate heat when continuously energized so avoid installing in an enclosed space. Install the valve in a well-ventilated area.
- Do not touch the coil while it is being energized or immediately after energization.
- The solenoid valve has a built-in power saving circuit, which is activated after 100 ms from the start of energization. Ensure that energizing time is 100 ms or more.

3 Installation - continued

- If used for continuous energization, ensure that the surface temperature is below 70 ºC. Be aware of a large temperature rise if solenoid valves are mounted closely each other and continuously energised at the same time. When the solenoid valve is mounted in a control panel, install a fan or take other measures against heat radiation to keep the temperature within the stated ambient temperature range. As a guide, if a single valve is continuously energized for 30 minutes at an ambient temperature of 25 ºC, the surface temperature will not exceed 70 ºC.

3.10 How to use a plug connector

Refer to catalogue for more information.

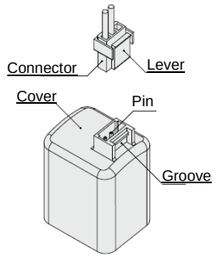


Figure 6.

4 How to Order

Refer to catalogue for ‘How to order’ or to product drawing for special products.

5 Outline Dimensions

Refer to drawings or catalogue for outline dimensions.

6 Maintenance

6.1 General maintenance

⚠ Caution

- Not following proper maintenance procedures could cause the product to malfunction and lead to equipment damage.
- If handled improperly, compressed air can be dangerous.
- Maintenance of pneumatic systems should be performed only by qualified personnel.
- Before performing maintenance, turn off the power supply and be sure to cut off the supply pressure. Confirm that the air is released to atmosphere.
- After installation and maintenance, apply operating pressure and power to the equipment and perform appropriate functional and leakage tests to make sure the equipment is installed correctly.
- If any electrical connections are disturbed during maintenance, ensure they are reconnected correctly and safety checks are carried out as required to ensure continued compliance with applicable national regulations.
- Do not make any modification to the product.
- Do not disassemble the product, unless required by installation or maintenance instructions.
- Storage
  In case of long term storage after use, thoroughly remove all moisture to prevent rust and deterioration of rubber materials etc.

7 Limitations of Use

7.1 Limited warranty and disclaimer/compliance requirements

Refer to Handling Precautions for SMC Products.

7.2 Application

⚠ Warning

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).

7.3 Low temperature operation

⚠ Warning

Use within the operable ambient temperature range specified in table 1.

7 Limitations of Use - continued

7.4 Cannot be used as an emergency shut-off valve

⚠ Warning

This product is 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 be adopted.

7.5 Closed liquid circuit

⚠ Warning

In a closed circuit, when liquid is static, pressure could rise due to changes in temperature. This pressure rise could cause malfunction and damage to components such as valves. To prevent this, install a relief valve in the system.

7.6 Leakage voltage

⚠ Caution

Ensure that any leakage voltage caused by the leakage current when the switching element is OFF causes ≤2% of the rated voltage across the valve.

8 Product Disposal

This product shall not be disposed of as municipal waste. Check your local regulations and guidelines to dispose this product correctly, in order to reduce the impact on human health and the environment.

9 Contacts

Refer to www.smcworld.com or www.smc.eu for your local distributor/importer.

SMC Corporation

URL : https:// www.smcworld.com (Global) https:// www.smc.eu (Europe)
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