Doc. no.LV50***-OMZ0015

Operation Manual

PRODUCT NAME

Vinyl Chloride Air Operated Valve

MODEL / Series / Product Number

LVP series

SMC Corporation

Contents

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: Manipulating industrial robots -Safety.
etc.

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

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.

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Safety Instructions

⚠ Caution

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.
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 regulation 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.

LV□ Series
High Purity Chemical Liquid Valve Precautions 1

Be sure to read this before handling the products.
Refer to the back cover for Safety Instructions.

Design / Selection

⚠ Warning

1. Check the specifications.

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

2. Fluids

Operate after confirming the compatibility of the product's component materials with fluids, using the check list on page 7. Please contact SMC regarding fluids other than those in the check list. Operate within the indicated fluid temperature range.

3. Maintenance space

Ensure the necessary space for maintenance and inspections.

4. Fluid pressure range

Keep the supplied fluid pressure within the operating pressure range shown in the catalog.

5. Ambient environment

Install in an environment where there is no effect from radiant heat caused by heat sources, etc., and use within the ambient temperature range. After confirming the compatibility of the product's component materials with the ambient environment, operate so that fluid does not adhere to the product's exterior surfaces.

6. Liquid seals

When circulating fluid:

Provide a relief valve in the system so that fluid does not get into the liquid seal circuit.

7. Countermeasures for static electricity

Since static electricity may be generated depending on the fluid being used, implement suitable countermeasures.

Mounting

⚠ Warning

1. If air leakage increases or equipment does not operate properly, stop operation.

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

2. Operation Manual

Mount and operate the product after reading the manual carefully and understanding its contents. Also, keep the manual where it can be referred to as necessary.

Piping

⚠ Caution

1. Preparation before piping

Before piping is connected, it should be thoroughly flushed out with air or washed to remove chips, cutting oil and other debris from inside the pipe.

Install piping so that it does not apply pulling, pressing, bending or other forces on the valve body.

2. Use the tightening torques shown below for the pilot port.

Tightening Torque for Operating Port

Operating port	Torque [N·m]
M5	1/6 turn with a tightening tool after first tightening by hand
Rc, NPT1/8	0.8 to 1.0

Piping

⚠ Caution

3. Use pilot ports and sensor (breathing) ports as indicated below.

	PA port	PB port	Sensor (breathing) port
N.C.	Pressure	Breathing	Breathing
N.O.	Breathing	Pressure	Breathing
Double acting	Pressure	Pressure	Breathing

LV□ Series
High Purity Chemical Liquid Valve Precautions 2

Be sure to read this before handling the products.
Refer to the back cover for Safety Instructions.

Operating Air Supply

⚠ Warning

1. Use clean air.

Do not use compressed air which includes chemicals, synthetic oils containing organic solvents, salt, or corrosive gases, etc., as this may cause damage or malfunction.

Operating Environment

⚠ Warning

1. Do not use in a location having an explosive atmosphere.

2. Do not operate in locations where vibration or impact occurs.

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

4. Do not use in environments which exceed the ambient temperature specifications of the product.

Maintenance

⚠ Warning

1. Maintenance should be performed in accordance with the procedures in the Operation Manual.

Incorrect handling can cause damage or malfunction of machinery and equipment, etc.

2. Before removing equipment or compressed air supply/ exhaust devices, shut off the air and power supplies, and exhaust compressed air from the system.
Further, when restarting equipment after remounting or replacement, first confirm safety and then check the equipment for normal operation.

3. Perform work after removing residual chemicals and carefully replacing them with DI water (Deionized water) or air, etc.

4. Do not disassemble the product. Products which have been disassembled cannot be guaranteed.

If disassembly is necessary, please contact SMC.

5. In order to obtain optimum performance from valves, perform periodic inspections to confirm that there are no leaks from valves or fittings, etc.

⚠ Caution

1. Removal of drainage

Flush drainage from filters regularly.

Handling

⚠ Warning

1. Operate within the ranges of the maximum operating pressure and back pressure.

Handling

⚠ Caution

1. When the diaphragm is made of PTFE

Please note that when the product is shipped from the factory, gases such as N_2 and air may leak from the valve at a rate of 1 cm^3/min (when pressurized).

2. When operated at a very low flow rate, the LV□ series with flow rate adjustment may vibrate, etc. depending on the operating conditions. Therefore, operate it after careful examination of the flow rate, pressure and piping conditions.

3. In the LV□ series, water hammering may occur depending on the fluid pressure conditions. In most cases, improvement is possible by adjusting the pilot pressure with a speed controller, etc., but the flow rate, pressure and piping conditions should be reviewed.

4. To adjust the flow rate for the LV□ series with flow rate adjustment, open gradually starting from the fully closed state.
Opening is accomplished by turning the adjustment knob counterclockwise. Additionally, do not apply excessive force to the adjustment knob when nearing a fully open or closed state. This may result in deformation of the orifice sheet surface or damage to the threaded portion of the adjustment knob. It is in the fully closed state when the product is shipped from the factory.

5. After a long period of nonuse, perform a test run before beginning regular operation.

Return of Product

⚠ Warning

If the product to be returned is contaminated or is possibly contaminated with substances that are harmful to humans, for safety reasons, please contact SMC beforehand and then employ a specialist cleaning company to decontaminate the product. After the decontamination prescribed above has been carried out, submit a Product Return Request Sheet or the Detoxification/Decontamination Certificate to SMC and await SMC's approval and further instructions before attempting to return the item.
Please refer to the International Chemical Safety Cards (ICSC) for a list of harmful substances.
If you have any further questions, please don't hesitate to contact your SMC sales representative.

How to Order

LVP 5 0 W – 16A □ P2 – □ □

Valve type

0	N.C.
1	N.O.
2	Double acting

Type

Symbol	Type
Nil	Standard
W	Low water hammer type

Rubber material

Symbol	Material
Nil	FKM
N	EPDM

Pilot port position (Refer to the figure above.)

Symbol	Position
Nil	①
P2	②
P3	③
P4	④

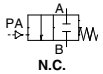
Series

Symbol	Body size	Orifice dia.
5	5	ø16 mm
6	6	ø22 mm

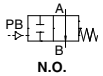
Applicable tubing size

Symbol	Tubing outside diameter	Applicable series
16A	ø22 mm	LVP5□
20A	ø26 mm	LVP6□
25A	ø32 mm	

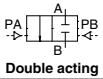
Symbol



N.C.



N.O.



Double acting

Pilot port thread (fitting) type

Symbol	Thread (fitting) type
Nil	ø6 mm One-touch fitting
1	Rc1/8
2	M5 x 0.8
N	NPT1/8

Option

Symbol	Option	Applicable valve type		
		N.C.	N.O.	Double acting
Nil	None	○	○	○
1	With flow rate adjustment	○	—	○
2	With bypass	○	—	○
3	With flow rate adjustment/bypass	○	—	○

Specifications

Model		LVP5□	LVP6□
Fluid pressure		0 to 0.3 MPa	0 to 0.4 MPa
Withstand pressure		1 MPa	
Pilot pressure		0.3 to 0.5 MPa	
Back pressure	**Valve type: N.C. type**	0.2 MPa or less	
	Valve type: N.O. type	0.2 MPa or less	
	Valve type: Double acting type	0.3 MPa or less	
Valve leakage		0 cm^3/min (with water pressure 0.3 MPa)	0 cm^3/min (with water pressure 0.4 MPa)
Fluid		Deionized water, chemical liquids (Fluid wetted part materials, fluid that does not corrode rigid vinyl chloride tube)	
Orifice diameter		ø16 mm	ø22 mm
Flow rate characteristics Kv (Cv)		4.2 (5)	8.1 (9.5)
Fluid temperature		0 to 60°C (No freezing)	
Ambient temperature		0 to 60°C	
Fluid wetted part material	**Diaphragm**	PTFE	
	Body	CPVC	
Port size		PVC unfixed union (Nominal dia.: 16A)	PVC unfixed union (Nominal dia.: 20A or 25A)
Applicable tube		Rigid vinyl chloride tube Note 1) O.D. ø22 mm (Nominal dia.: 16A)	Rigid vinyl chloride tube Note 1) O.D. ø26 mm (Nominal dia.: 20A) O.D. ø32 mm (Nominal dia.: 25A)
Pilot port size		ø6 mm One-touch fitting Note 2) Rc1/8, M5 x 0.8, NPT1/8	
Operating frequency		10 times/min (reference)	

Note 1) Rigid vinyl chloride tube complies with JIS K6742

Note 2) SMC polyolefin tubing (TRH series) and soft polyolefin tubing (TPH series) are recommended for piping since the same mechanism and construction as SMC KP series are used for ø6 mm One-touch fittings.
Complement: Polyurethane tubing (TU series), nylon tubing (T series), and soft nylon tubing (TS series) can be used, but the degree of clean performance will be reduced.

LVP Series
Applicable Fluids

Material and Fluid Compatibility Check List for Vinyl Chloride Air Operated Valves

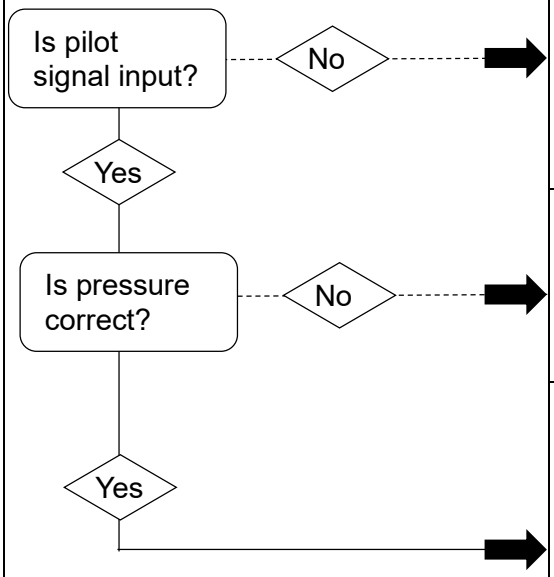
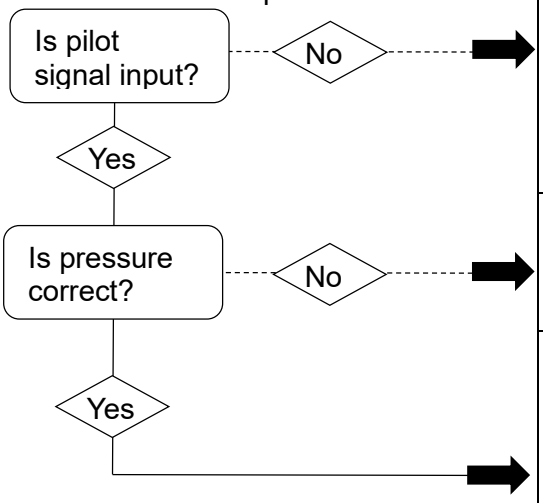
Chemical		Compatibility
Ammonium hydroxide	Temperature 40°C or less	○ Material option "N" Note 2)
Isobutyl alcohol	Temperature 40°C or less	○ Note 1) Note 2)
Isopropyl alcohol	Temperature 40°C or less	○ Note 1) Note 2)
Hydrochloric acid	Concentration 30% or less	○ Note 2)
Hydrogen peroxide	Concentration 5% or less, Temperature 50°C or less	○
Nitric acid (except fuming nitric acid)	Concentration 10% or less, Temperature 40°C or less	○ Note 2)
Deionized water		○
Sodium hydroxide (Caustic soda)	Concentration 50% or less	○
Nitrogen gas		○
Super pure water		○
Sulfuric acid (except fuming sulfuric acid)	Concentration 30% or less	○ Note 2)
Phosphoric acid	Concentration 50% or less	○

The material and fluid compatibility check list provides reference values as a guide only.
Note 1) Since static electricity may be generated, implement suitable countermeasures.
Note 2) Use caution as permeation may occur. The permeated fluid may effect the parts of other materials.

Table symbols
○: Can be used
○: Can be used in certain conditions

- Compatibility is indicated for fluid temperatures of 60°C or less.
- The material and fluid compatibility check list provides reference values as a guide only, therefore we do not guarantee the application to our product.
- The data above is based on the information presented by the material manufacturers.
- SMC is not responsible for its accuracy and any damage happened because of this data.

Trouble Shooting

Failure	If valves do not operate properly, refer the following failure and perform countermeasures stated in check list.	Causes	Countermeasures
Malfunction	1.Fluid does not stop 	1)Malfunction of pilot valve 2)Failure of electrical system	・Replace valve ・Clean air supply sourse ・Check power supply
		1)Lacking pilot pressure (N.O. valve, double acting valve) 2)Main pressure is high	・Set proper pressure ・Set proper pressure
		1)Back pressure is high 2)Particle intrusion 3)Mishandling of pilot port	・Set proper pressure ・ Eliminate particles and install filter ・Check if the connection of pilot port is correct
	2.Fluid does not stop 	1)Malfunction of pilot valve 2)Failure of electrical system	・Replace valve ・Clean air supply sourse ・Check power supply
		1)Lacking pilot pressure (N.C. valve)	・Set proper pressure
		1)No main pressure 2)Side failure of piston packing	・Check to proper pressure ・Replace product
Failure of air tight	1)Internal lackage	1)Instrusion of particles 2)Flaws on valve seat	・Eliminate to proper pressure ・Replace product
	2)External leakage	1)Tightening failure 2)Breakage of diaphragm	・Tighten additionally ・Replace product

Revision history

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