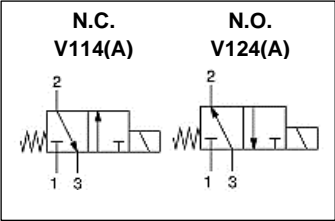




ORIGINAL INSTRUCTIONS

Instruction Manual
3 Port Solenoid Valve
Series V100



The intended use of this product is to control the movement of an actuator.

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

2 Specifications

2.1 Valve specification

Fluid	Air	
Operating pressure range [MPa] ^{Note 1)}	N.C.	Standard (V114) Large flow capacity (V114A)
	N.O. ^{Note 2)}	Standard (V124) Large flow capacity (V124A)
Ambient and fluid temperature [°C]	-10 to 50 (no freezing)	
Flow characteristics	Refer to catalogue	
Response Time (at 0.5 MPa) [ms] ^{Note 3)}	ON: 5 or less OFF: 4 or less	
Duty cycle	Contact SMC	
Minimum operating frequency	1 cycle / 30 days	
Maximum operating frequency [Hz]	20	
Manual override	Non-locking push type & Locking slotted type	
Lubrication	Not required	
Impact / Vibration resistance [m/s ²] ^{Note 4)}	150 / 30	
Enclosure (based on IEC60529)	IP40	
Mounting orientation	Unrestricted	

2 Specifications - continued

Weight [g]	Electrical entry / model		Without subplate	With subplate
	Grommet	Standard Large flow capacity	13 16	27 30
	L / M plug connector	Standard Large flow capacity	12 15	26 29

Table 1.

- Note1) If the difference between the inlet side and the outlet side is extremely low (0.001 MPa or less as a guide), air output may not be achieved or the flow rate may deteriorate excessively due to the quality of the lubricant and air in the solenoid valve (mixing in of the drain, etc.).
- Note 2) For both V124 and V124A, pressure is applied to port 3, and exhaust is from port 1.
- Note 3) Based on dynamic performance test, JIS B8419: 2010. (standard type: at coil temperature of 20°C, with rated voltage, without surge voltage suppressor).
- Note 4) **Impact resistance:** No malfunction resulted in an impact test using a drop impact tester. The test was performed one time each in the axial and right angle directions of the main valve and armature, for both energized and de-energized states. (Values quoted are for a new valve).
Vibration resistance: No malfunction resulted in 45 to 2000 Hz, a one-sweep test performed in the axial and right angle directions of the main valve and armature for both energized and de-energized states. (Values quoted are for a new valve).

2.2 Solenoid specifications

Series		V114 / V124	V114A / V124A
Electrical entry		Grommet (G, (H), L plug connector (L), M Plug connector (M)	
Coil rated voltage [V]	AC (50 / 60 Hz)	100, 110, 200, 220	-
	DC	24, 12, 6, 5, 3	-
Allowable voltage fluctuation ^{Note 1) Note 2)}		-10 to 10% of rated voltage	
Apparent power [VA]	AC	100 V	0.78 (With light:0.81)
		110 V	0.86 (With light:0.89)
		115 V	0.94 (With light:0.97)
		200 V	1.18 (With light:1.22)
		220 V	1.30 (With light:1.34)
		230 V	1.42 (With light:1.46)

Power consumption [W]	DC	Standard	0.35 (with light: 0.4)	1 (With light: 1.1)
		With power saving circuit	0.1 (Starting 0.4, Holding 0.1)	
Surge voltage suppressor			Diode	
Indicator light			LED	

Table 2.

- Note 1) Valve state is not defined if electrical input is outside the specified operating range.
- Note 2) For 115 VAC and 230 VAC, the allowable voltage fluctuation is -15% to 5% of the coil rated voltage.
The voltage drop will occur due to the internal circuit of S, Z and T types (with energy saving circuits). Allowable voltage fluctuations should be within the range below.
S and Z types 24 VDC: -7% to 10%
12 VDC: -4% to 10%
T type 24 VDC: -8% to 10%
12 VDC: -6% to 10%

2.3 Vacuum specifications

Valve model	Operating pressure range [MPa] ^{Note)}	
	Port 1	Port 3
V114(A)	-100 kPa to 0.6	-100 kPa to 0
V124(A)	-100 kPa to 0	-100 kPa to 0.6

Table 3.

- Note) If the difference between the inlet side and the outlet side is extremely low (0.001 MPa or less as a guide), air output may not be achieved or the flow rate may deteriorate excessively due to the quality of the lubricant and air in the solenoid valve (mixing in of the drain, etc.).

2 Specifications - continued

2.4 Indicator light

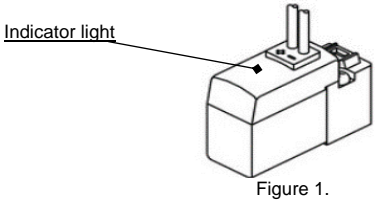


Figure 1.

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, salt water or steam are present.
- 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.
- If using in an atmosphere where there is possible contact with water droplets, oil, weld spatter, etc., take suitable preventive measures.
- Do not use in high humidity environment where condensation can occur.
- Contact SMC for altitude limitations.

3.3 Piping

Caution

- Before connecting piping make sure to clean up chips, cutting oil, dust etc.
- When installing piping or fittings, ensure sealant material does not enter inside the port. When using seal tape, leave 1 thread exposed on the end of the pipe/fitting.
- Tighten fittings to the specified tightening torque.

Port	Connection thread size	Tightening Torque [N·m]
1(P), 2(A), 3(R)	M5	1 to 1.5

Table 4.

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 Air supply

Warning

- Use clean air. If the compressed air supply includes chemicals, synthetic materials (including organic solvents), salinity, corrosive gas etc., it can lead to damage or malfunction.

Caution

- Install an air filter upstream of the valve. Select an air filter with a filtration size of 5 µm or smaller.

3.6 Effect of back pressure when using a manifold

- Use caution when valves are used on a manifold, because an actuator may malfunction due to back pressure.
- For single acting cylinder, take appropriate measures to prevent malfunction by using it with an individual EXH interface block or an individual exhaust manifold.

3 Installation - continued

3.7 Light/surge voltage suppressor

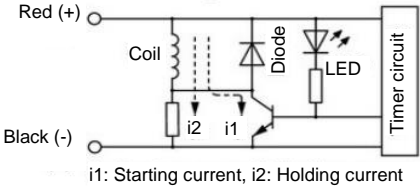
3.7.1 DC

Standard type (with polarity)	
With surge voltage suppressor (S)	With light / surge voltage suppressor (Z)
Non-polar type	
With surge voltage suppressor (R)	With light / surge voltage suppressor (U)

Figure 2.

3.7.2 With power saving circuit

Power consumption is reduced by approximately 75% compared with the standard product by eliminating the need for electrical current for holding. (Effective after more than 62 ms at 24 VDC rated voltage applied).



i1: Starting current, i2: Holding current

Figure 3.

3.7.3 AC

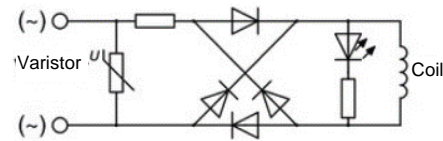


Figure 4.

3.8 Residual voltage of the surge voltage suppressor

Caution

- In the case of varistor surge voltage suppressor, note the surge voltage to be suppressed at controller side as there will be a residual voltage according to the protective element and rated voltage.
- Moreover, the residual voltage of the diode is approximately 1V.
- Valve response time is dependent on surge suppression method selected.

3.9 Extended periods of continuous energization

Caution

- If a valve is energized continuously for a long period of time or is mounted in a control panel, the rise in temperature due to heating-up of the coil assembly may cause a decline in solenoid valve performance, reduce service life, or have adverse effects on peripheral equipment.
- If the valve is energized continuously for a long period of time, be sure to use DC standard type or a valve with power saving circuit.

3.10 Countermeasure for surge voltage

Caution

- At times of sudden interruption of the power supply, the energy stored in a large inductive device may cause non-polar type valves in a deenergised state to switch.
- When installing a breaker circuit to isolate the power, consider a valve with polarity (with polarity protection diode), or install a surge absorption diode across the output of the breaker.

3 Installation - continued

3.11 Manual override

Warning

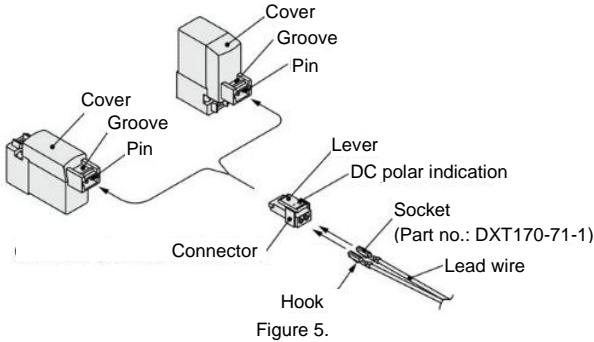
- Regardless of an electric signal for the valve, the manual override is used for switching the main valve. Since connected equipment will operate when the manual override is activated, confirm that conditions are safe prior to activation.
- Locked manual overrides might prevent the valve responding to being electrically de-energized or cause unexpected movement in the equipment.
Refer to the catalogue for details of manual override operation.

3.12 How to use plug connector

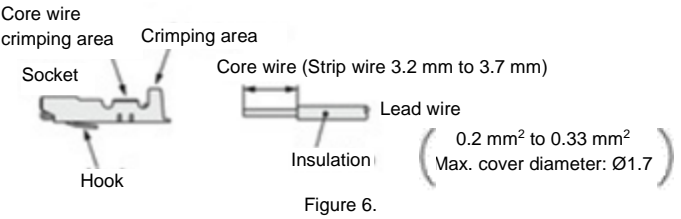
Refer to catalogue for additional details.

Caution

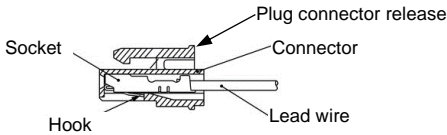
3.12.1 Attaching and detaching connectors



3.12.2 Crimping connection of a lead wire and socket



3.12.3 Attaching and detaching lead wires with socket



3.13 Mounting and removal of valves

Mounting screw type	Recommended tightening torque [N·m]
M2	0.12

Table 5.

Refer to catalogue for additional details.

4 How to Order

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

5 Outline Dimensions (mm)

Refer to 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.

7 Limitations of Use

Warning

The system designer should determine the effect of the possible failure modes of the product on the system.

7.1 Limited warranty and disclaimer/compliance requirements

Refer to Handling Precautions for SMC Products.

Caution

7.2 Leakage voltage

Ensure that any leakage voltage caused by the leakage current when the switching element is OFF causes ≤ 3% of the rated voltage for DC coils and ≤ 8% of the rated voltage for AC coils across the valve.

7.3 Low temperature operation

Unless otherwise indicated in the specifications for each valve, operation is possible to -10° C, but appropriate measures should be taken to avoid

solidification or freezing of drainage and moisture, etc.

Warning

7.4 Holding of pressure (including vacuum)

Since valves are subject to air leakage, they cannot be used for applications such as holding pressure (including vacuum) in a pressure vessel.

7.5 Return of the valve to the de-energised position

When electricity is cut, the valve returns to the de-energised position by spring force.

7.6 Safety relay or PLC

If a safe output from a safety relay or PLC is used to operate this valve, ensure that any output test pulse duration is shorter than 1 ms to avoid the valve solenoid responding.

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

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