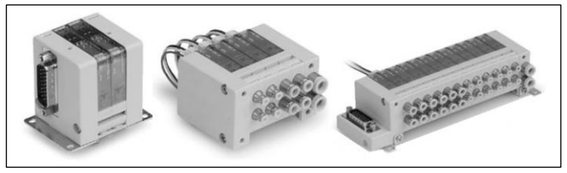
ORIGINAL INSTRUCTIONS

Instruction Manual

3 Port Solenoid Valve Highly Integrated Unit Manifold

Series VV100



The intended use of this product is the control of air in the downstream circuit.

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

Valve function			N.C., N.O.
Fluid			Air
Operating pressure range [MPa]	Positive pressure		0 to 0.7
	Vacuum pressure	N.C.	1 port: -100 kPa to 0.6 3 ports: -100kPa to 0
		N.O.	1 port: -100 kPa to 0 3 ports: -100kPa to 0.6
Ambient and fluid temperature [°C]			-10 to 50 (no freezing)
Flow characteristics			Refer to catalogue
Response time (at 0.5 MPa) [ms] Note 1)			7 or less
Duty cycle			Contact SMC
Minimum operating frequency			1 cycle / 30 days
Maximum operating frequency [Hz]			20
Lubrication			Not required
Mounting orientation			Unrestricted
Impact/vibration resistance [m/s^2] Note 2)			150/30
Enclosure (based on IEC60529)			IP40
Weight			Refer to catalogue

Table 1.

Note 1) Based on dynamic performance test, JIS B 8419:2010 (Coil temperature: 20°C, at rated voltage).

2 Specifications - continued

Note 2) Impact resistance: No malfunction occurred when it was tested with a drop tester in the axial direction and at right angles to the main valve and armature; in both energized and de-energized states and for every time in each condition. (Values quoted are for a new valve).
Vibration resistance: No malfunction occurred in a one-sweep test between 45 and 2000 Hz. Tests are performed at both energized and de-energized states in the axial direction and at right angles to the main valve and armature. (Values quoted are for a new valve).

2.2 Solenoid specifications

Rated voltage [VDC]		24, 12
Allowable voltage fluctuation Note 1)		±10% of rated voltage
Power consumption [W]	Standard	0.4
	With power saving circuit (continuous duty type)	0.15 [Starting 0.4, holding 0.15]
Surge voltage suppressor		Diode, varistor
Indicator light		LED

Table 2.

Note 1) For the allowable voltage fluctuation for Z and T types (with power saving circuit), observe the following range because there is a voltage drop due to internal circuit.
Z type: 24 VDC: -7% to 10%, 12VDC: -4% to 10%
T type: 24 VDC: -5% to 10%, 12VDC: -6% to 10%

2.3 Manifold specifications

Model		D-sub connector		Non plug-in
		Type 10FA	Type 10FB	Type 10
Manifold type		Connector type		Individual wiring
1 (SUP), 3 (EXH)		Common SUP, EXH		
Valve stations		1 to 12 (Max 7 stations if all valves are double solenoid)	1 to 12	
Applicable connector		D-sub connector 15 pins	D-sub connector 26 pins	
		Refer to catalogue		
Internal wiring		Non-polar, +COM, -COM		+COM, -COM
2a, 2b port piping specification	Location	Valve		
	Direction	Side, upward, downward (using elbow fittings for upward/downward)		
Port size	1 (SUP), 3 (EXH) port Note 1)	C4, C6, N3, N7		
	2a, 2b port	C2, C4, N1, N3		

Table 3.

Note 1) Supply to 3 port and exhaust from 1 port for V120 type (N.O.).

2.4 Pneumatic symbols

Refer to catalogue and special drawings for ‘Pneumatic symbols’.

2.5 Indicator light

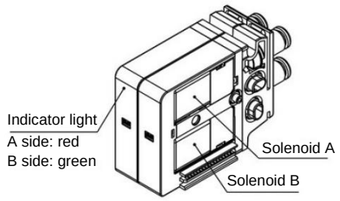


Figure 1.

2.6 Valves with switch

⚠ Warning

- When turning off the valve using the switch, move it to the position where the valve is locked. If the switch is at an improper position and is energized, equipment connected to the valve could be actuated.
- Also, if the switch is turned OFF on the valve in the energized state, be careful because any actuators connected will actuate.
- Refer to catalogue for additional information.

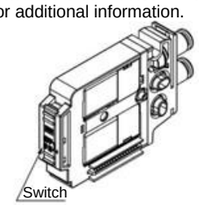


Figure 2.

2 Specifications - continued

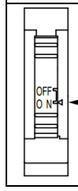
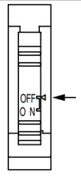
ON position	OFF position
	
Normal operation: The valve is switched according to electric signals from the connector on the manifold side.	The valve coil is kept in a de-energized state even when there is an electric signal from the connector on the manifold side.

Figure 3.

2.7 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, 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.

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.

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 Mounting

⚠ Caution

- Ensure O-rings are in good condition, not deformed and are dust and debris free.
- When mounting valves ensure gaskets are present, aligned and securely in place and tighten screws to a torque of 0.54 N·m to 0.66 N·m.

3.6.1 Bracket mounting

- Fit the bracket to the groove at the back of the connector block (end block).
- Tighten the screws to the correct tightening torque. M3: 0.6 N·m.

3 Installation - continued

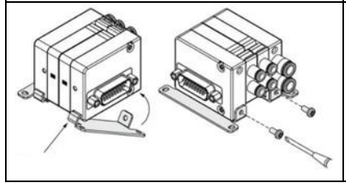
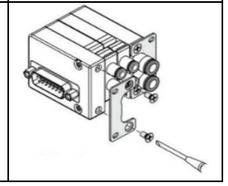
Side ported type	Bottom ported type
	

Table 4.

Note) Image shows lateral connector type. Mounting method is the same for the upward connector type.

3.6.2 Manifold direct (panel) mounting

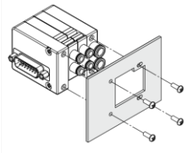
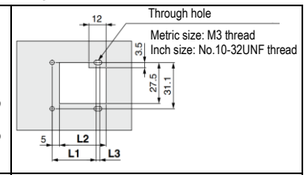
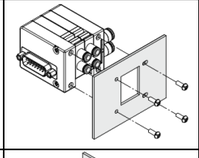
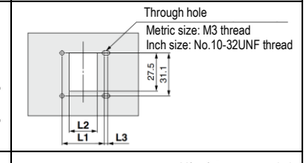
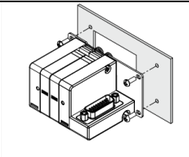
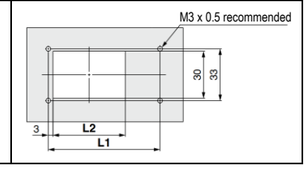
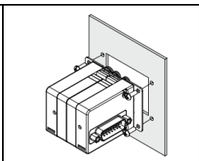
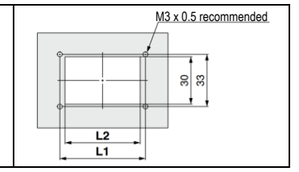
SUP/EXH block fitting entry direction: Standard		
SUP/EXH block fitting entry direction: Side		
Upward connector		
Lateral connector		

Table 5.

Note) Refer to catalogue for dimensions L1, L2 & L3.

3.7 One-touch fittings

3.7.1 Tube attachment and detachment

⚠ Caution

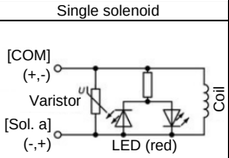
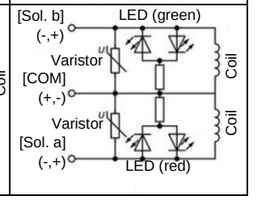
Refer to the Specific Precautions in the catalogue.

3.8 Precautions on other tube brands

⚠ Caution

When using non-SMC brand tubes, refer to the Specific Precautions in the catalogue.

3.9 Electrical circuits

Type	Single solenoid	Double solenoid
Non-Polar		

3 Installation - continued

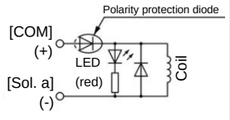
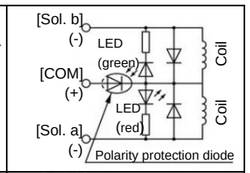
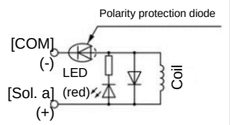
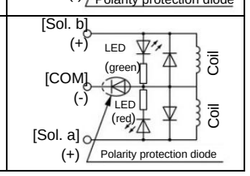
Positive common		
Negative common		

Table 6.

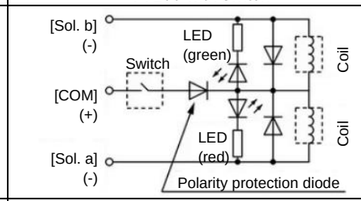
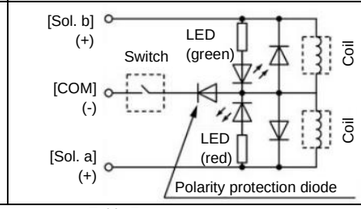
Type	VV100 with switch
Positive common with light/surge voltage suppressor	
Negative common with light/surge voltage suppressor	

Table 7.

3.10 How to use plug connector

Caution

Refer to catalogue for additional information.

3.10.1 Attaching and detaching connectors

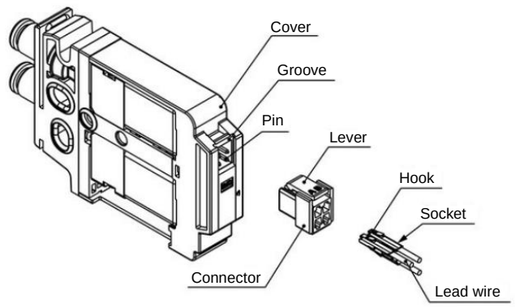


Figure 4.

3.10.2 Crimping of lead wires and sockets

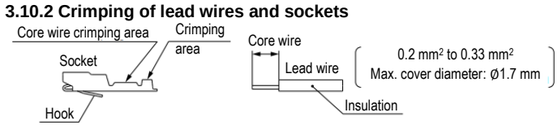


Figure 5.

3.10.3 Attaching and detaching lead wires with sockets

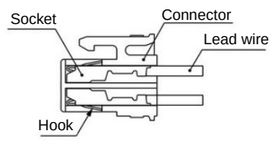


Figure 6.

3 Installation - continued

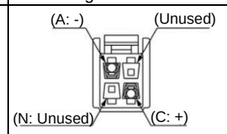
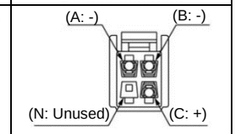
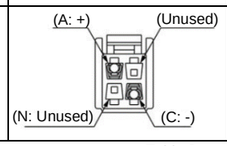
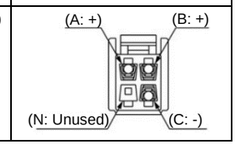
Type	Single solenoid	Double solenoid
Positive common		
Negative common		

Table 8.

Wire no.	Single solenoid		Double solenoid	
	Positive common	Negative common	Positive common	Negative common
A	Black	Black	Black	Black
B	Unused	Unused	White	White
N	Unused	Unused	Unused	Unused
C	Red	Yellow	Red	Yellow

Table 9.

3.11 Connector assembly for manifolds (for junction common)

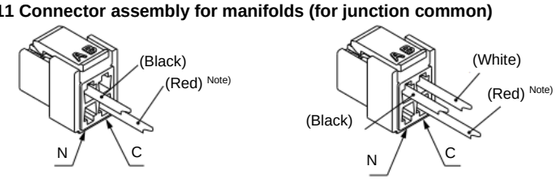


Figure 7.

Note) In case of negative common, the lead wire changes from red to yellow.

3.12 Wiring

3.12.1 Manifold electrical wiring specifications

Refer to catalogue for manifold electrical wiring specifications.

3.12.2 Wiring procedure for junction common

Caution

If only connector assembly (for junction common) is ordered, please wire according to the instructions in figure 7. Socket mounting details as per figure 8.

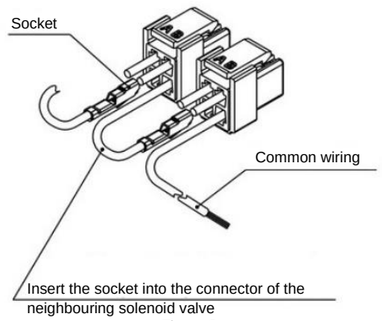


Figure 8.

3.13 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.

3.14 Countermeasures for surge voltage

- 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 de-energized 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

3.15 Extended period of continuous energization

Warning

If a valve is energized continuously for long periods of time, the rise in temperature due to heat-up of the coil may cause a decline in solenoid valve performance, reduce service life, or have adverse effects on peripheral equipment. If a valve will be energized continuously, be sure to use the 'Continuous duty type' with a power saving circuit. In particular, there will be a large increase in temperature if 3 or more neighbouring stations are simultaneously energized continuously for long periods of time, or if the a and b sides are simultaneously energized continuously for long periods of time. Be very careful in such cases.

3.15.1 With power saving circuit

- Compared to the standard products, power consumption is reduced to approx. 1/3 (V1□0T) by cutting the unnecessary wattage required to hold the valve in an energized state.
  (Effective energizing time is over 67 ms at 24 VDC.)
- Be careful about the allowable voltage fluctuation since a voltage drop of about 0.5 V occurs due to a transistor

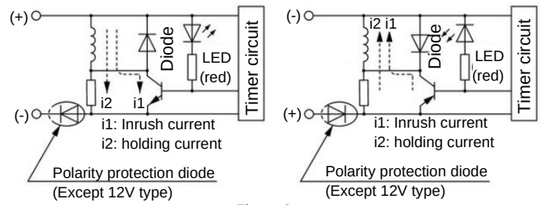


Figure 9.

3.16 Effect of back pressure when using a manifold

Warning

Use caution when valves are used on a manifold because an actuator may malfunction due to back-pressure.

4 How to Order

Refer to catalogue for 'How to Order' or to product drawing for special products.

5 Outline Dimensions

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.

6.2 Replacement parts

Refer to catalogue for details regarding replacement parts such as; manifold block assembly blocks, tension bolts, connector blocks, brackets, one touch fittings, and electrical connectors.

6.3 Fitting replacement

Refer to the Specific Product Precautions for additional details.

6 Maintenance - continued

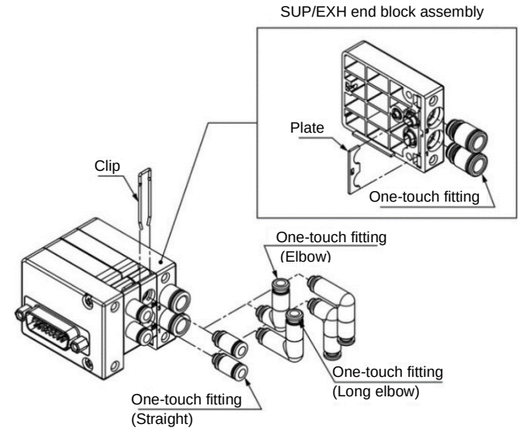


Figure 10.

7 Limitations of Use

7.1 Limited warranty and disclaimer/compliance requirements

Refer to Handling Precautions for SMC Products.

Warning

7.2 Return of the valve to the de-energized position

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

7.3 Holding of pressure

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

7.4 Cannot be used as an emergency shut-off valve

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.

Caution

7.5 Leakage voltage

Ensure that any leakage voltage caused by the leakage current when the switching element is OFF causes ≤ 3% of the rated voltage across the valve.

7.6 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.

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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Template DKP50047-F-085M