



ORIGINAL INSTRUCTIONS

Instruction Manual

5 Port Solenoid valve/ISO 15407-2 Standard Series VS#8-(2,4)



The intended use of this valve 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<sup>\*)</sup>, and other safety regulations.

- \*) 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.

<b>Caution</b>	Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
<b>Warning</b>	Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
<b>Danger</b>	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 type	Plug-in	
	Metal Seal	Rubber seal
Fluid	Air, inert gas	
Maximum operating pressure [MPa]	1.0	
Minimum operating pressure [MPa]	Single	0.15
	Double	0.1
	3-position	0.2
	4-position	0.15
Ambient and fluid temperature [°C] <sup>Note 1)</sup>	-10 to 60	-5 to 50
Flow characteristics	Refer to catalogue	
Response time [ms]	Refer to catalogue	
Duty cycle	Contact SMC	
Minimum operating frequency	1 cycle / 30 days	
Maximum operating frequency	Contact SMC	
Manual override	Push type / Locking type (tool required)	
Impact / vibration resistance [m/s <sup>2</sup> ] <sup>Note 2)</sup>	150 / 50	
Lubrication	Not required	

2 Specification - continued

Mounting orientation	Single, 4-position	Unrestricted
	Double, 3-position	Horizontal
Enclosure (based on IEC60529) <sup>Note 3)</sup>	IP65	
Weight [g]	Refer to catalogue	

Table 1.

- Note 1) No freezing. Use dry air to prevent condensation at low temperatures.
- Note 2) **Impact resistance:** No malfunction occurred when it is tested with a drop tester in the axial direction and at the right angles to the main valve and armature in both energized and de-energized states every once for each condition. (Values quoted are for a new valve).
- Vibration resistance:** No malfunction occurred in a one-sweep test between 8.3 and 2000 Hz. Test was performed at both energized states in the axial direction and at the right angles to the main valve and armature. (Values quoted are for a new valve).

Note 3) Refer to 2.3 for applicable variations

2.2 Solenoid specifications

Rated coil voltage [VDC]	12, 24	
Allowable voltage fluctuation	±10% of rated voltage	
Coil insulation type	Equivalent to Class B	
Power consumption [W] (current [mA])	24 VDC	1 (42)
	12 VDC	1 (83)
Surge voltage suppressor	Varistor	
Indicator light	LED	

Table 2.

2.3 Manifold specifications

Series	VS#8-2 (VV802)	VS#8-4 (VV801)	Enclosure
Port size	1(P), 3(R)	3/8" Built-in silencer (option)	1/2" Built-in silencer (option)
	2(A), 4(B)	1/8" (Side, bottom)	3/8" (Side), 1/4" (Side, bottom)
	12(PE), 14(X)	1/8"	
Electrical entry	SI units (EX500, EX250, EX600, EX126), D-sub connector, Flat ribbon, Terminal block box, Lead wire, Circular connector		

Maximum number of solenoids	Circular connector	24	IP65
	D-sub connector	24	IP40
	EX126	16	IP65
	EX250	24	
	EX500	16	
	EX600	24	IP40
	Flat ribbon connector		
Lead wire			
Terminal block box	20	IP65	
Weight [g]	Refer to catalogue		

Table 3.

2.4 Pneumatic symbol

Refer to catalogue for pneumatic symbols.

2.5 Indicator light

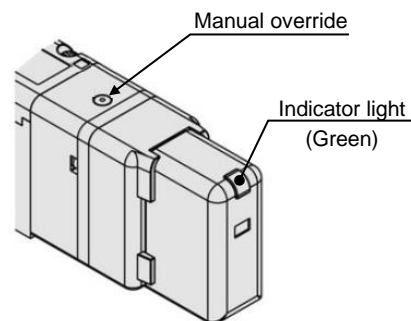


Figure 1.

2.6 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.
- Products compliant with IP65 enclosures are protected against dust and water; however, these products cannot be used in water.
- Products compliant with IP65 enclosures satisfy the specifications by mounting each product properly. Be sure to read the Specific Product Precautions for each product.

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.

Connection thread size (R, G, NPTF)	Tightening Torque [N·m]
1/8"	7 to 9
1/4"	12 to 14
3/8"	22 to 24
1/2"	28 to 30

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 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-energised or cause unexpected movement in the equipment.
- Refer to the catalogue for details of manual override operation.

3.7 Electrical wiring specifications

Refer to catalogue for electrical wiring specifications.

3 Installation - continued

3.8 Electrical circuit

3.8.1 Single solenoid

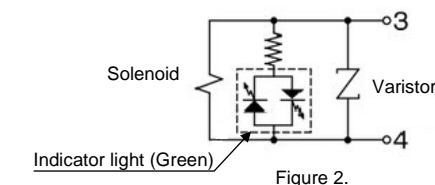


Figure 2.

3.8.2 Double solenoid

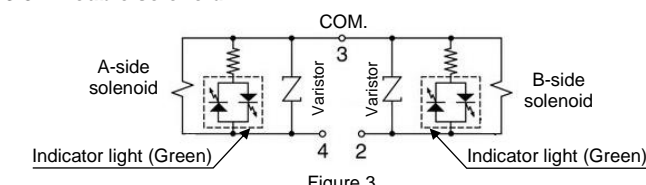


Figure 3.

3.9 Residual voltage

**Caution**

- If a varistor surge voltage suppressor is used, the suppressor arrests the back EMF voltage from the coil to approximately 1 V.
- Ensure the transient voltage is within the specification of the host controller.
- Valve response time is dependent on surge suppression method selected.

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 de-energised 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.

3.11 Extended periods of continuous energization

**Warning**

- If a valve will be continuously energized for an extended period of time, the temperature of the valve will increase due to the heat generated by the coil assembly. This will likely adversely affect the performance of the valve and any nearby peripheral equipment. Therefore, if the valve is to be energized for periods of longer than 30 minutes at a time or if during the hours of operation the energized period per day is longer than the de-energized period, we advise using a valve with power consumption of 0.4 W or lower, such as the SY series, or a valve with a power-saving circuit.
- For applications such as mounting a valve on a control panel, incorporate measure to limit the heat radiation so that it is within the operating temperature range. For example, the temperature will be high when a 3-station manifold or larger is put next to other valves and continuously energized or the long and continuous energization on both the A and B sides (simultaneous) of dual 3-port valves.

3.12 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.
- Special caution must be taken when using 3 position exhaust centre valve or when driving a single acting cylinder. To prevent a malfunction, implement counter measures such as using an individual EXH spacer assembly, a back pressure check valve or an individual exhaust manifold.

## 4 Settings

### 4.1 Changing from internal pilot manifold to external pilot type

Refer to catalogue for more details.

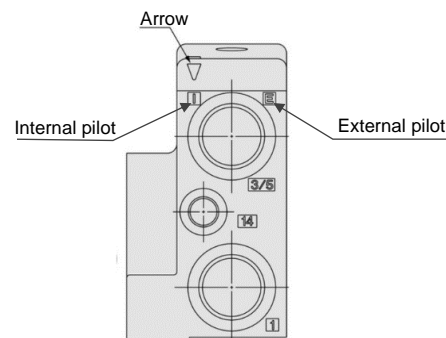


Figure 4.

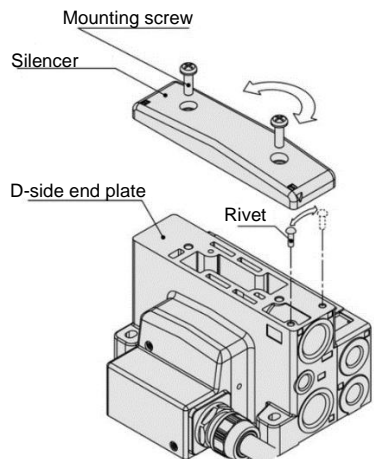


Figure 5.

## 5 How to Order

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

## 6 Outline Dimensions

Refer to catalogue for outline dimensions.

## 7 Maintenance

### 7.1 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.

### 7.2 Mounting

#### Caution

- After confirming the gasket is correctly placed under the valve and the O-ring is secure on the valve electrical connector, assemble the valve and base block, securely tighten the bolts with proper tightening torque shown in the table below.
- Tighten threads with proper tightening torque shown in the below table. Tightening outside of the allowable torque range will likely damage the product.

## 7 Maintenance - continued

Part	Screw size	Recommended tightening torque [N·m]
Terminal block cover mounting screws (for T kit)	M4	0.7 to 1.2
Silencer cover mounting screws (For manifold end plate)	VV801	2.3 to 3.7
	VV802	1 to 1.4
Valve mounting screws	VS#8-2	1 to 1.8
	VS#8-4	0.8 to 1.2
Pilot valve mounting screws	M1.7	0.12 to 0.13
Valve holding screw for valve plate	-	0.6 to 0.7

Table 5.

### 7.3 Built-in silencer element replacement

#### Caution

- A filter element on both sides is built into the manifold base end plate. When the element becomes dirty and clogged, this will cause trouble such as a drop in the cylinder speed, etc. Therefore, replace the element regularly.
- Refer to catalogue for more details.

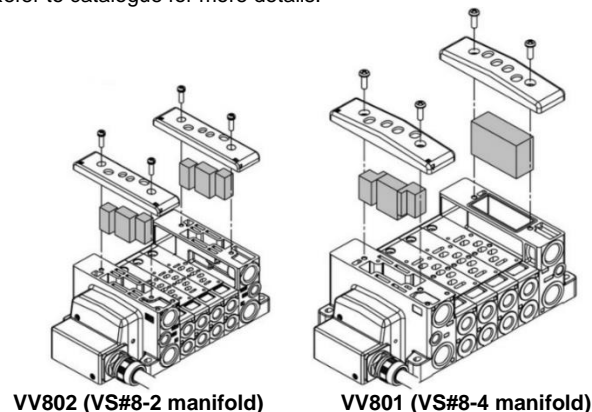


Figure 6.

### 7.4 Installation and removal of pilot valve cover

#### Caution

Refer to catalogue for more details.

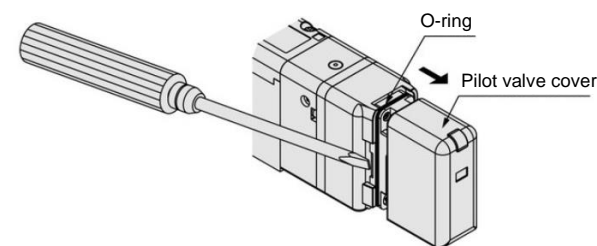


Figure 7.

### 7.5 Pilot valve replacement

#### Caution

Refer to catalogue for more details.

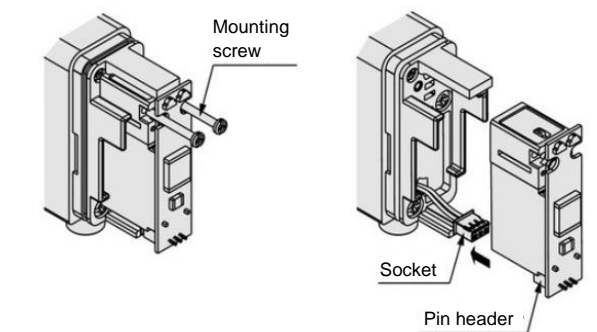


Figure 8.

## 8 Limitations of Use

### 8.1 Limited warranty and disclaimer/compliance requirements

Refer to Handling Precautions for SMC Products.

#### Warning

### 8.2 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.

### 8.3 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 system.

### 8.4 Intermediate stopping

Refer to Handling Precautions for 3/4/5 port Solenoid Valves.

#### Caution

### 8.5 Leakage voltage

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

### 8.6 Low temperature operation

Use within the operable ambient temperature range specified in table 1. Appropriate measures should be taken to avoid solidification or freezing of drainage and moisture, etc.

### 8.7 Momentary energization

If a double solenoid valve is operated with momentary energization, it should be energized for at least 0.1 second. However, depending on the secondary load conditions, it should be energized until the cylinder reaches the stroke end position, as there is a possibility of malfunction otherwise.

### 8.8 Air returned or air/spring returned spool valves

#### Warning

- The use of 2-position single valves with air returned or air/spring returned spools has to be carefully considered.
- The return of the valve spool into the de-energized position depends

on the pilot pressure. If the pilot pressure drops below the specified operating pressure the position of the spool cannot be defined.

- The design of the system must take into account such behaviour.
- Additional measures might be necessary. For example, the installation of an additional air tank to maintain the pilot pressure.

Energy source status	Single	Double	3 position	Dual 3 Port
Air supply present, electricity cut	Spool returns to the off position by air force and spring force	Spool stops moving after electricity cut (Position cannot be defined)	Spool returns to the off position by spring force	Spools return to the off position by air force and spring force
Air supply cut before electricity cut	Spool returns to the off position by spring force	Spool stops moving after air pressure cut (Position cannot be defined)	Spool returns to the off position by spring force	Spools return to the off position by spring force

Table 6.

## 9 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.

## 10 Contacts

Refer to [www.smcworld.com](http://www.smcworld.com) or [www.smc.eu](http://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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