

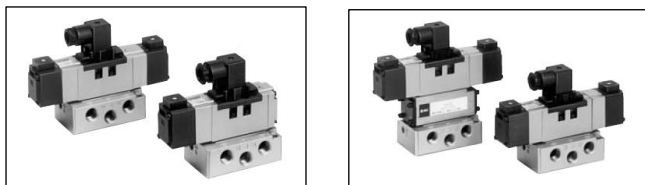


ORIGINAL INSTRUCTIONS

Instruction Manual

ISO Standard Solenoid Valve

Series VP7-6, VPN-6, VP7-8, VPN-8



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⁽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.
- If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Caution

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

2 Specifications

2.1 Valve specifications

Model	VP7-6 / VPN-6	VP7-8 / VPN-8	
Fluid	Air		
Operating pressure range [MPa]	2 position single	0.15 to 0.9	
	2 position double	0.1 to 0.9	
	3 position	0.15 to 0.9	
Ambient and fluid temperature [°C]	Max. 50 (no freezing)		
Effective area [mm ²]	2 position single/double	30 (1639.11) / 65 (3533.40)	
	3 position closed center	28.8 (1570.40)	
	3 position exhaust center	57.6 (3140.80)	
(Flow [Nl/min])	3 position double pilot check	20 (1079.65)	
	3 position pressure center	ON position	20 (1079.65) / 57 (3111.36)
		OFF position	14.4 (785.2) / 30.6 (1668.55)
Response time [ms]	2 position	≤0.04 / ≤0.05	
	3 position	≤0.06 / ≤0.07	
Duty cycle	Contact SMC		

2 Specifications - continued

Model	VP7-6 / VPN-6	VP7-8 / VPN-8
Minimum operating frequency	1 cycle / 30 days	
Maximum operating frequency [Hz]	2 position	5
	3 position	3
Pilot valve manual override	Non-locking type	
Lubrication	Not required	
Impact/Vibration resistance [m/s ²]	300 / 50	
Enclosure (based on IEC60529)	IP53	
Mounting orientation	Unrestricted	
Weight [kg]	2 position single	0.53
	2 position double	0.73
	3 position closed center	1.12
	3 position exhaust center	1.13
	3 position double pilot check	1.52
	3 position pressure center	1.12

Table 1.

Note 1) According to JIS B8375-1975 dynamic performance test.(0.5MPa, Coil temperature: 20°C, At rated voltage, Without surge voltage suppressor)

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 and deenergized 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) Weight is without sub-plate.
Sub-plate weight: 0.37 kg for VP7-6 & 0.68 kg for VP7-8.

2.2 Solenoid specifications

Coil rated voltage [V]	DC	AC [50/60 Hz]	24, 12	
			100, 200	DIN terminal (D)
Electrical entry	Class B equivalent			
Coil insulation class	-15 to 10% of rated voltage			
Allowable voltage fluctuation	24 VDC	Inrush/holding	0.075	
	12 VDC		0.15	

Current [A]	100 VAC	Inrush	50 Hz	0.049
			60 HZ	0.043
		Holding	50 Hz	0.031
			60 HZ	0.020
200 VAC	Inrush	50 Hz	0.024	
		60 HZ	0.021	
	Holding	50 Hz	0.015	
		60 HZ	0.010	
Surge voltage suppressor	Varistor			
Indicator light	AC	Neon		
	DC	LED		

Table 2.

2.3 Manifold specifications

Manifold block size	ISO size 1	ISO size 2
Valve series	VP7-6 / VPN-6	VP7-8 / VPN-8
Valve stations	1 to 10 stations ^{Note)}	
Piping	A,B port	1/4", 3/8", C6, C8, C10
	P, R1, R2 port	1/4", 3/8", C12

Table 3.

Note) Stations including control unit. (Control unit: equivalent to 2 stations).

2.4 Pneumatic symbol

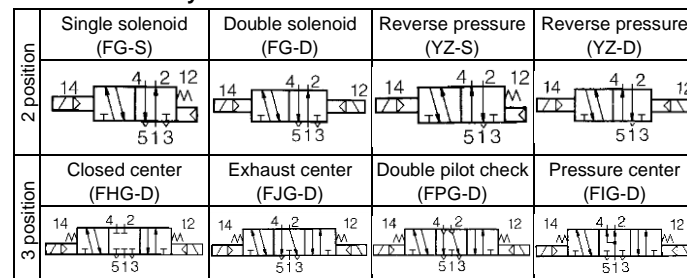


Figure 1.

2 Specifications - continued

2.5 Indicator light

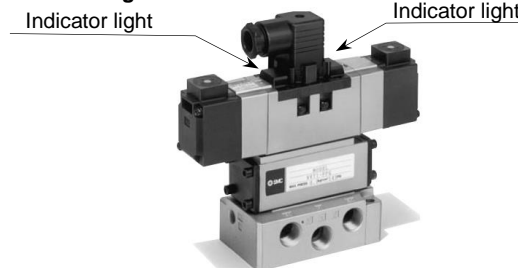


Figure 2.

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.

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.

Thread (Rc)	Tightening torque [N·m]
1/4	8 to 12
3/8	15 to 20
1/2	20 to 25
3/4	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.

3.6.1 Non-locking push type

- Push down the manual override button (orange) using a small-bladed screwdriver or suitable tool until it stops.

3 Installation - continued

- Hold this position for the duration of the check (ON position).
- Release the button and the override will re-set to OFF position.

3.7 Mounting

Caution

- Ensure gaskets 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 torque values as per table below.

Series	Thread size	Recommended tightening torque [N·m]
VP7-6 / VPN-6	M5 x 35	2.3 to 3.7
VP7-8 / VPN-8	M6 x 45	4 to 6

Table 5.

3.8 Electrical circuit

Caution

Surge suppression should be specified by using the appropriate part number. If a valve type without suppression (Type 'Nil' or Type 'N') is used, suppression must be provided by the host controller as close as possible to the valve.

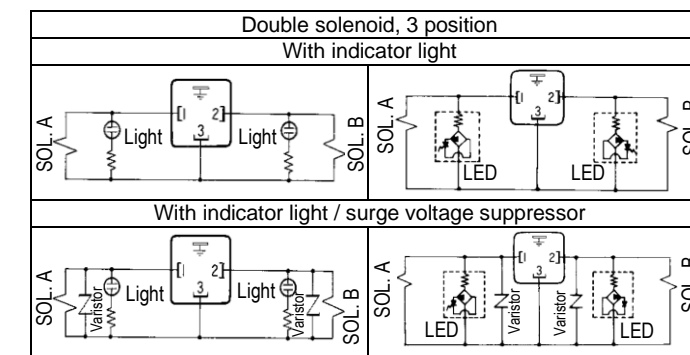
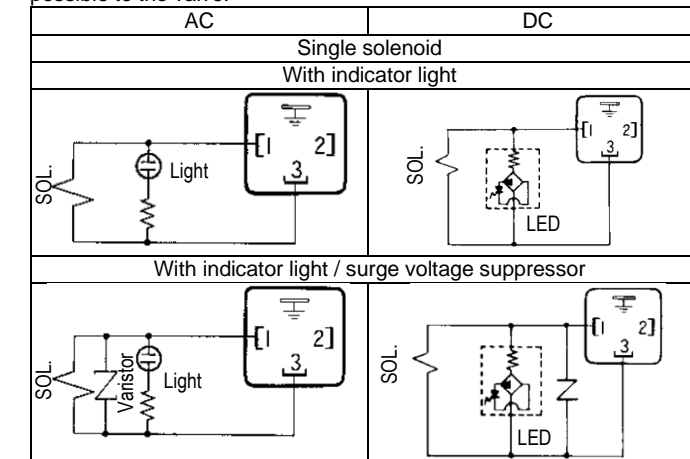


Figure 3.

3.9 Wiring

Warning

The ground terminal is connected to the coil assembly only and does not provide a protective earth for the body of the valve.

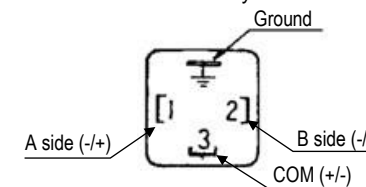


Figure 4.

- Note 1) Either +COM or -COM is applicable.
- Note 2) Applicable cable diameter. O.D. ∅6.8 mm to ∅10 mm.
- Note 3) Core wire effective cross-sectional area: 0.5 mm² to 1.5 mm².
- Note 4) Connector/terminal fixing thread: 0.5 N·m to 0.6 N·m.

3.10 Residual voltage

Caution

- The suppressor arrests the back EMF voltage from the coil to a level in proportion to the rated voltage.

3 Installation - continued

- Ensure the transient voltage is within the specification of the host controller.
- Contact SMC for the varistor residual voltage.
- Valve response time is dependent on surge suppression method selected.

3.11 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.

3.12 Extended period of continuous energization

⚠ Caution

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 specification of 0.4 W or lower, such as the SY series, or a valve with a power-saving circuit.

3.13 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 a single EXH spacer assembly or an individual exhaust manifold.

4 How to Order

Refer to catalogue for 'How to Order'.

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

Contact SMC for details regarding replacement parts such as blanking plate assembly, double pilot check spacer, individual SUP spacer, individual EXH spacer, blanking plate, silencer, gasket and screw assembly, sub-plate and bracket assembly, and DIN connector.

7 Limitations of Use

7.1 Limited warranty and disclaimer/compliance requirements

Refer to Handling Precautions for SMC Products.

⚠ Warning

7.2 Effect of energy loss on valve switching

Energy source status	Single solenoid	Double solenoid	3 position
Air supply present, electrical supply 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
Electrical supply present, air supply cut	Spool stops moving after air pressure cut (Position cannot be defined)	Spool stops moving after air pressure cut (Position cannot be defined)	

Table 6.

Note) Applies to when the spool is at the end position and at an intermediate position.

7.3 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.

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 system.

7.5 Intermediate stopping

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

⚠ Caution

7.6 Leakage voltage

Ensure that any leakage voltage caused by the leakage current when the switching element is OFF causes $\leq 3\%$ (for DC coils) or $\leq 20\%$ (for AC coils) of the rated voltage across the valve.

7.7 Low temperature operation

Unless otherwise indicated in the specifications for each valve, operation

is possible to $-5\text{ }^{\circ}\text{C}$, but appropriate measures should be taken to avoid solidification or freezing of drainage and moisture, etc.

7.8 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 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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