ORIGINAL INSTRUCTIONS

Instruction Manual
ISO 5599-1 Solenoid Valve - Metal Seal
Series VS7-6/8 Series

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: 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		VS7-6	VS7-8
Fluid		Air / Inert gas	
Operating pressure range [MPa]		0.1 to 1.0	
Ambient and fluid temperature [°C]		5 to 60	
Flow characteristics		Refer to catalogue	
Response time			
Duty cycle		Contact SMC	
Minimum operating frequency		1 cycle / 30 days	
Maximum operating frequency [Hz]	2 position	20	15
	3 position Note 1)	10	10
Manual override		Non-locking type, Locking type	
Lubrication		Not required	
Impact / vibration resistance [m/s^2] Note 2)		150 / 50	
Enclosure (based on IEC60529)		IP65	
Mounting orientation Note 3)		Unrestricted	

2 Specifications - continued

Applicable sub-plate		VS7-1	VS7-2
Weight [kg] Note 4)	2 position single	0.460	0.655
	2 position double	0.560	0.74
	3 position closed center	0.635	0.89
	3 position exhaust center		
	3 position pressure center		
	3 position double pilot check	0.990	2.12

Table 1.

Note 1) Maximum operating frequency for 3 position double pilot check valve is 8Hz.
Note 2) Impact resistance: No malfunction resulted during the 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 conditions. (Values quoted are for a new valve)
Vibration resistance: No malfunction resulted during a one-sweep test between 8.3 and 2000 Hz. The test was performed in the axial and right angle directions of the main valve and armature for both energized and de-energized conditions. (Values quoted are for a new valve).
Note 3) If there is vibration or impact, install the valve so that the spool is perpendicular to the direction of vibration.
If there is no vibration or impact, install the spool valve so that it is horizontal.
Note 4) Weight is without sub-plate. Sub-plate weight: 0.37 kg.

2.2 Solenoid specifications

Coil rated voltage [V]	DC			12, 24
	AC [50/60 Hz]			100, 200
Electrical entry				DIN terminal
Coil insulation class				Class B equivalent
Allowable voltage fluctuation				-15 to 10% of rated voltage
Current [A]	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		VS7-6	VS7-8
Valve stations Note)		1 to 10 stations	
Piping	A,B port	1/4”, 3/8”, C6, C8, C10	3/8”, 1/2"
	P, R1, R2 port	1/4”, 3/8”, C12	1/2", 3/4"

Table 3.

Note) Stations including F.R. unit (equivalent to 2 stations).

2.4 Pneumatic symbol

Refer to catalogue for pneumatic symbol.

2.5 Indicator light

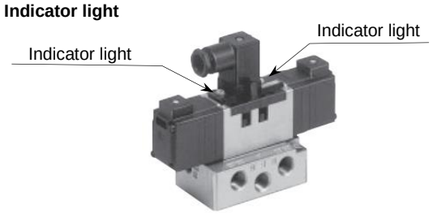


Figure 1.

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.

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.
- Locked manual overrides might prevent the valve responding to being electrically de-energised or cause unexpected movement in the equipment.

3.6.1 Non-locking push type

- Push on the manual override button (orange) using a small-bladed screwdriver or suitable tool until the valve switches (ON position).
- Hold this position for the duration of the check (ON position).
- Release the button and the override will re-set to the OFF position.

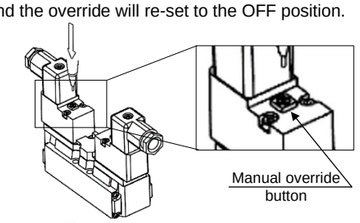


Figure 2.

3.6.2 Push-locking slotted type

3.6.2.1 To lock:

- Using a small-bladed screwdriver in the slot, push the manual override button down until it stops.

3 Installation - continued

- Turn the override button 90° in the direction of the arrow until it stops (ON position).
- Remove the screwdriver. The valve will remain switched ON.

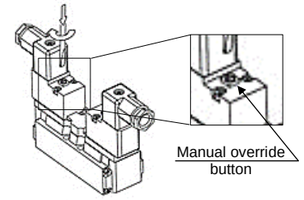


Figure 3.

⚠ Warning

In this position the manual override is in the locked ‘ON’ position.

3.6.2.2 To unlock:

- Place a small-bladed screwdriver in the slot, push down the manual override button.
- Turn the override button 90° in the reverse direction of the arrow.
- Remove the screwdriver and the manual override will re-set to the 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]
VS7-6	M5	2.3 to 3.7
VS7-8	M6	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 is used, suppression must be provided by the host controller as close as possible to the valve.

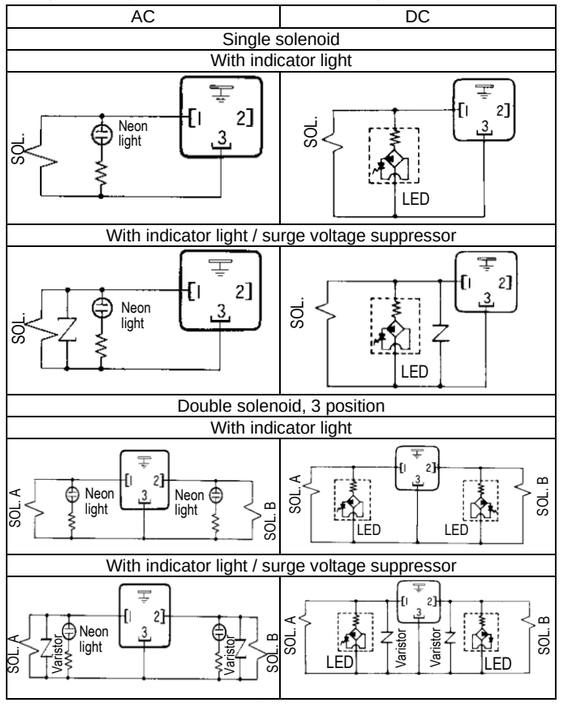


Figure 4.

3 Installation - continued

3.9 Wiring

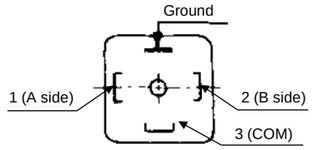
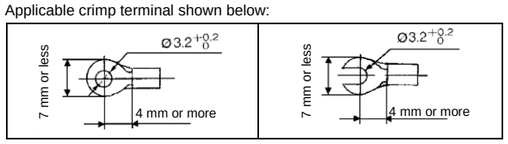


Figure 5.

Note 1) Either +COM or -COM is applicable. Incorrect connection of 'COM' terminal (terminal 3) can cause damage on power source circuit.
Note 2) Applicable cable diameter. O.D. ∅8 to ∅10.
Note 3) Core wire effective cross-sectional area: 0.5 mm^2 to 1.5 mm^2.
Note 4) Tightening torque: connector/terminal fixing screw: 0.5 N·m to 0.6 N·m.
Note 5) Applicable crimp terminal shown below:



3.10 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.
- 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 valve, 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.

6 Maintenance - continued

- 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 us 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	Spool position	Single solenoid	Double solenoid	3 position
Air supply present, electrical supply cut	Spool at the end position	Spool returns to the OFF position by air and spring force	Spool holds position	Spool returns to the OFF position by spring force
	During spool movement (Spool at intermediate position)		Spool stops moving after electricity cut (Position cannot be defined)	
Electrical supply present, air supply cut	Spool at the end position	Spool returns to the OFF position by spring force	Spool holds position	Spool returns to the OFF position by spring force
	During spool movement (Spool at intermediate position)		Spool stops moving after air pressure cut (Position cannot be defined)	

Table 6.

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 ≤ 3% (for DC coils) or ≤ 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°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)
SMC Corporation, 4-14-1, Sotokanda, Chiyoda-ku, Tokyo 101-0021, Japan

Template DKP50047-F-085M