ORIGINAL INSTRUCTIONS

Instruction Manual

Refer to Declaration of Conformity for relevant Directives

5 Port Solenoid Valve

Series SV



Cassette base manifold

Tie-rod base manifold

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

Validated according to ISO 13849, see section 2 and 5.

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: Manipulating industrial robots –Safety,etc.

This manual contains essential information for the protection of users and others from possible injury and/or equipment damage.

- Read this manual before using the product, to ensure correct handling, and read the manuals of related apparatus before use.
- Keep this manual in a safe place for future reference.
- To ensure safety of personnel and equipment the safety instructions in this manual must be observed, along with other relevant safety practices.

⚠ **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

- **The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.**
- Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalogue information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

1 Safety Instructions - continued

- **Only personnel with appropriate training should operate machinery and equipment.**
  The product specified here may become unsafe if handled incorrectly.
  The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.
- **Do not service or attempt to remove product and machinery/equipment until safety is confirmed.**
  1) The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
  2) When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
  3) Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.
- **Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.**
  1) Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
  2) Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustions and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specification described in the product catalogue.
  3) An application which could have negative effects on people, property, or animals requiring special safety analysis outside the scope of ISO 13849 described in this document.
  4) Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.
- **Always ensure compliance with relevant safety laws and standards.**
  All electrical 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.**
  The product herein described is basically provided for peaceful use in manufacturing industries.
  If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.
  If anything is unclear, contact your nearest sales branch.

2 Specifications

2.1 Solenoid Valve Specifications

Fluid		Air
Internal pilot operating pressure range [MPa]	2 position single	0.15 to 0.7
	4 position dual 3 port valve	
	2 position double	0.1 to 0.7
	3 position	0.2 to 0.7
External pilot operating pressure range [MPa]	Operating pressure range	-100kPa to 0.7
	2 position single, double	0.25 to 0.7
	3 position	
Ambient and fluid temperature [℃]		-10 to + 50 (no freezing)
Air quality		5 µm
Minimum operating frequency		1 cycle / 30 day
Duty cycle		Contact SMC
Maximum operating frequency [Hz]	2 position single, double	5
	4 position dual 3 port valve	
	3 position	3
Manual override		Non-locking push type
		Push-turn locking slotted type

2 Specifications – continued

Pilot exhaust method	Internal pilot	Main valve / Pilot valve common exhaust
	External pilot	Pilot valve individual exhaust
Lubrication		Not required
Mounting orientation		Unrestricted
Impact/Vibration resistance [m/s^2] Note 1)		150 / 30 (8.3 to 2000 Hz)
Enclosure		IP 67 (based on IEC60529)
Response time		See 2.2
Rated coil voltage		24 VDC, 12 VDC
Allowable voltage fluctuation		±10% of rated voltage
Power consumption [W]		0.6 (With light: 0.65)
Surge voltage suppressor		Zener diode
Indicator light		LED
Standards		Complies with the basic and well-tried safety principles of EN ISO 13849-2:2012 Note 2)
B_{10} Note 3)	Single, Double, Dual	47 million cycles
	3 POS	27 million cycles
B_{10D} Note 3)	Single, Double, Dual	94 million cycles
	3 POS	54 million cycles

Table 1

Notes:

Note 1) Impact resistance: No malfunction when tested with a drop tester in the axial direction and at a right angle to the main valve and armature, one time each in energized and de-energized states (at initial value).
Vibration resistance: No malfunction when tested with one sweep of 8.3 to 2000 Hz in the axial direction and at a right angle to the main valve and armature, in both energized and de-energized states (at initial value).

Note 2) Compliance only applies to the products listed as “Validated” in Section 5 “How to order”.

Note 3) Under SMC test conditions. The B_{10} figure is estimated from SMC life tests. The B_{10D} figure is derived from B_{10} using the assumption in EN ISO 13849-1:2015 Annex C. Contact SMC for details.

2.1.1 Manifold Specifications

		Cassette base		Tie-rod base			
Applicable series		SV1000	SV2000	SV1000	SV2000	SV3000	SV4000
Manifold type		Stacking type cassette base manifold		Tie-rod base manifold			
1 (P:SUP) / 3, 5 (E: EXH) type		Common SUP, EXH		Common SUP, EXH			
Valve stations (maximum)		18 stations	20 stations	20 stations			
Max. number of solenoids		18 points	26 points	32 points			
Port size	1(P)/3,5(E) port	C8, N9	C10, N11	C8, N9	C10, N11	C12, N11	C12, N11, 03
	4(A)/2(B) port	C3, C4, C6 N1, N3, N7	C4, C6, C8 N3, N7, N9	C3, C4, C6 N1, N3, N7	C4, C6, C8 N3, N7, N9	C6, C8, C10 N7, N9, N11	C8, C10, C12 N9, N11, 02, 03

Table 2

2.2 Response time

Type of actuation	Response time ms (at 0.5 MPa)			
	SV1000	SV2000	SV3000	SV4000
2 position single	11 or less	25 or less	28 or less	40 or less
2 position double	10 or less	17 or less	26 or less	40 or less
3 position	18 or less	29 or less	32 or less	82 or less
4 position dual 3 port valve	15 or less	33 or less	–	–

Table 3

Note) Based on JISB8375-1981 dynamic performance test (with coil temperature of 20 ℃, at rated voltage).

2.3 Flow Characteristics (Manifold)

2.3.1 Cassette Base

Model	Port size		Flow characteristics			
	1, 5, 3 (P/EA/EB)	4,2 (A/B)	1→4,2 (P→A,B)		4, 2→5, 3 (A, B→EA, EB)	
			C	b	C	b
SS5V1-16	C8	C6	0.89	0.22	0.98	0.21
SS5V2-16	C10	C8	2.3	0.28	2.7	0.18

Table 4

2 Specifications – continued

Note) Value is for manifold base with 5 stations and individually operated 2 position types.

2.3.2 Tie-rod base

Model	Port size		Flow characteristics			
	1, 5, 3 (P/EA/EB)	4,2 (A/B)	1→4,2 (P→A,B)		4, 2→5, 3 (A, B→EA, EB)	
			C	b	C	b
SS5V1-10	C8	C6	0.98	0.26	1.1	0.35
SS5V2-10	C10	C8	2.1	0.2	2.4	0.18
SS5V3-10	C12	C10	4.2	0.22	4.3	0.21
SS5V4-10	C12	C12	6.2	0.19	7	0.18

Table 5

Note) Value is for manifold base with 5 stations and individually operated 2 position types.

2.4 Symbols

Note) Refer to Section 8 “Limitations of Use” for valves with air return or combined air/spring return spool.

2.4.1 2 position (SV1000/2000/3000/4000)

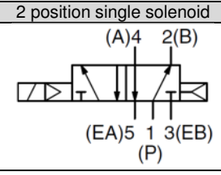
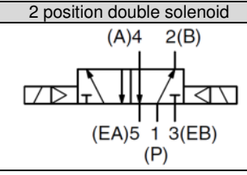
2 position single solenoid	2 position double solenoid
	

Table 6

2.4.2 3 position

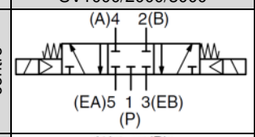
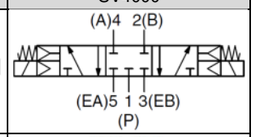
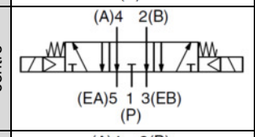
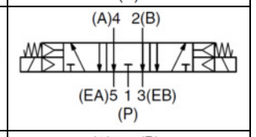
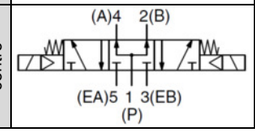
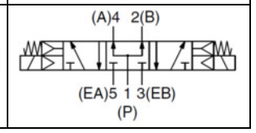
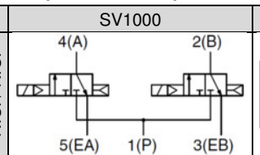
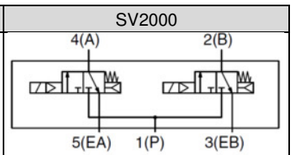
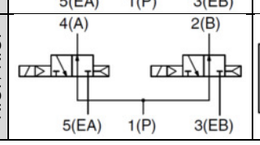
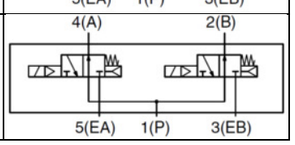
	SV1000/2000/3000	SV4000
3 position closed centre		
3 position exhaust centre		
3 position pressure centre		

Table 7

2.4.3 4 position dual 3 port valve

	SV1000	SV2000
N.C. / N.C.		
N.O. / N.O.		

2 Specification – continued

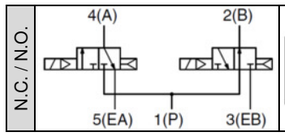
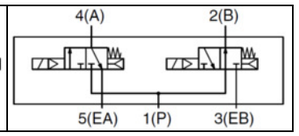
N.C. / N.O.	4(A)	2(B)	5(EA)	1(P)	3(EB)
					

Table 8

2.5 Manual override

Warning

Handle carefully, as connected equipment can be actuated through manual override operation.

2.5.1 Non-locking push type (Refer to Figure 1)

1. Push down on the manual override button, until it stops, using a small-bladed screwdriver.
2. Hold this position for the duration of the check (ON position).
3. Release the button and the override will re-set to the OFF position.

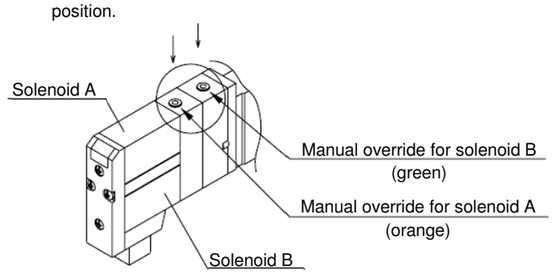


Figure 1

2.5.2 Push-turn locking slotted type (screwdriver operated) (Refer to Figure 2)

To lock

1. Using a small-bladed screwdriver in the slot push the manual override down until it stops.
2. Turn the override 90° in the direction of the arrow until it stops (ON position).
3. Remove the screwdriver.

To unlock

1. Place a small-bladed screwdriver into the slot of the manual override.
2. Turn the screwdriver 90° in the reverse direction.
3. Remove the screwdriver. The manual override will re-set to the OFF position.

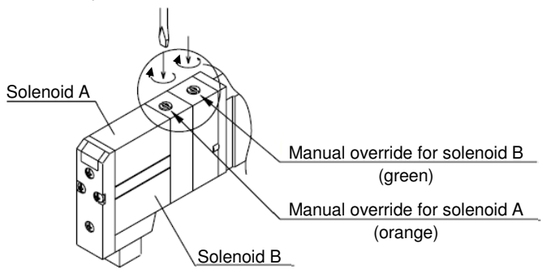


Figure 2

Note) If it is not turned, it can be operated the same way as the non-locking type.

Caution

When locking the manual override with the push-turn locking slotted type, be sure to push it down before turning.
Turning without first pushing it down can cause damage to the manual override and other trouble such as air leakage, etc.

2 Specification – continued

Caution

Special products might have specifications different from those shown in this section. Contact SMC for specific drawings. These drawings will give the appropriate specification details and compliance with the safety principles of ISO 13849, if applicable.

3 Installation

3.1 Installation

Warning

- Do not install the product unless the safety instructions have been read and understood.
- If it is intended to energize a valve for an extended period of time please consult SMC.
- These valves are NOT intended to be used as emergency shut-off valves.
- Double solenoid valves must be energized for AT LEAST 0.1 seconds to ensure correct operation.
- Mount double solenoid, 3 position valves with the spool horizontal.
- Ensure all air and power supplies are isolated before commencing installation.
- Specification of the product of IP65 enclosure or IP67 corresponded is firstly satisfied by mounting each product appropriately. Please thoroughly read caution of each product.
- Mount double solenoid, 3 position valves with the spool horizontal.
- All valves are NON-POLAR.

3.2 Environment

Warning

- Do not use in an environment where corrosive gases, chemicals, salt water, water, steam, or where there is direct contact with any of these.
- 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. Check the product specifications.
- Do not mount in a location exposed to radiant heat.
- Products compliant with IP65 and IP67 enclosures (Based on IEC60529) are protected against dust or water, however, these products cannot be used in water.
- Products compliant with IP65 and IP67 enclosures satisfy the specifications by mounting each product properly. Be sure to read the Specific Product Precautions for each product.
- When using built-in silencer type manifold with an IP67 enclosure, keep the exhaust port of the silencer from coming in direct contact with water or other liquids. Liquid filtration through the exhaust port of the silencer can cause damage to the valve.

3.3 Piping

Caution

- Before 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 1.5 to 2 threads 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, use turbine oil Class 1 (no additive), ISO VG32. Once lubricant is used in the system, lubrication must be continued because the original lubricant applied during manufacturing will be washed away.

3.5 Tube attachment / detachment for One-touch fittings

Caution

- **Attaching of tube**

3 Installation – continued

1. Take a tube having no flaws on its periphery and cut it off at a right angle. When cutting the tube, use tube cutters TK-1, 2 or 3. Do not use pinchers, nippers or scissors, etc. If cutting is done with tools other than tube cutters, there is the danger that the tube may be cut diagonally or become flattened, etc., making a secure installation impossible, and causing problems such as the tube pulling out after installation or air leakage. Also allow some extra length in the tube.
2. Grasp the tube and push it in slowly, inserting it securely all the way into the fitting.
3. After inserting the tube, pull on it lightly to confirm that it will not come out. If it is not installed securely all the way into the fitting, this can cause problems such as air leakage or the tube pulling out.

- **Detaching of tube**

1. Push in the release button sufficiently, and push the collar evenly at the same time.
2. Pull out the tube while holding down the release button so that it does not come out. If the release button is not pressed down sufficiently, there will be increased bite on the tube and it will become more difficult to pull it out.
3. When the removed tube is to be used again, cut off the end or portion that was connected before reusing it as it may have become worn. If the grabbing or connecting portion of the tube is used as it is, this can cause trouble such as air leakage or difficulty in removing the tube.

3.6 Other tube brands

Caution

When using other than SMC brand tubes, confirm that the following specifications are satisfied with respect to the outside diameter tolerance of the tube.

- Nylon tube within ±0.1 mm
- Soft nylon tube within ±0.1 mm
- Polyurethane tube within +0.15 mm or less
  within -0.2 mm or less

Do not use tubes which do not meet these outside diameter tolerances. It may not be possible to connect them, or they may cause other trouble, such as air leakage or the tube pulling out after connection.

3.7 Replacement of fittings

Caution

By replacing a valve's fitting assembly, it is possible to change the connection diameter of the A and B ports.
When replacing it, pull out the fitting assembly after removing the clip with a flat head screwdriver, etc. To mount a new fitting assembly, put it into place and then fully reinsert the clip.

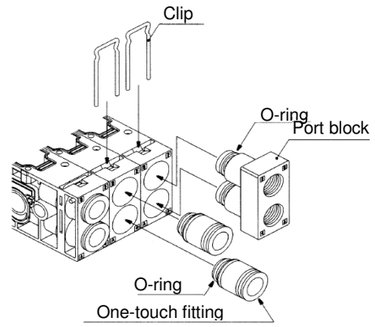


Figure 3

3.8 Substrate assemblies inside manifolds

Caution

Substrate assemblies inside of manifolds cannot be taken apart. Attempting to do so may damage parts.

3 Installation - continued

3.9 Back Pressure Check Valve Built-in Type

Caution

- Valves with built-in back pressure check valve is to protect the back pressure inside a valve. For this reason, use caution the valves with external pilot specification cannot be pressurized from exhaust port [3/5(E)]. As compared with the types which do not integrate the back pressure check valve, C value of the flow characteristics goes down. For details, please contact SMC.
- Do not switch valves when A or B port is open to the atmosphere, or while the actuators and air operated equipment are in operation. The back pressure prevention seal may be peeled off, which may cause air leakage or malfunctions. Use caution especially when performing a trial operation or maintenance work.

3.10 Manifold Electrical Wiring

3.10.1 10C/16C Circular Connector Type (26 pins)

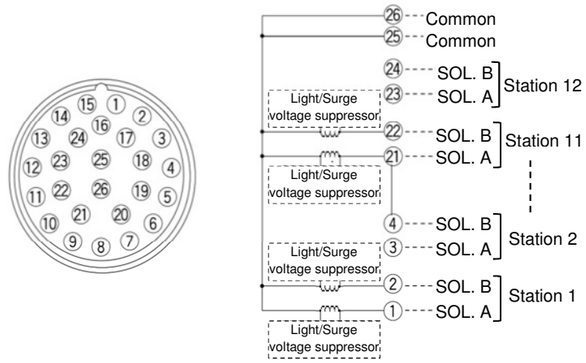


Figure 4

- This circuit has double wiring specifications for up to 12 stations. Since the usable number of solenoids differs depending on the manifold type, refer to the table below. In the case of single solenoids, connect to SOL. A. Furthermore, when wiring is specified on a manifold specification sheet, connections are made without skipping any connectors, and signals A for single and A, B for double are in order 1→2→3→4, etc.
- Stations are counted starting from station 1 on the D side (connector side).
- Since solenoid valves do not have polarity, either the +COM or -COM can be used.

Usable number of solenoids

Model		Maximum number of solenoids
Tie-rod base type 10	SV1000 to SV4000	24
Cassette base type 16	SV1000	18
	SV2000	24

Table 9

3 Installation – continued

3.10.2 10F/16F D-sub Connector Type (25 pins)

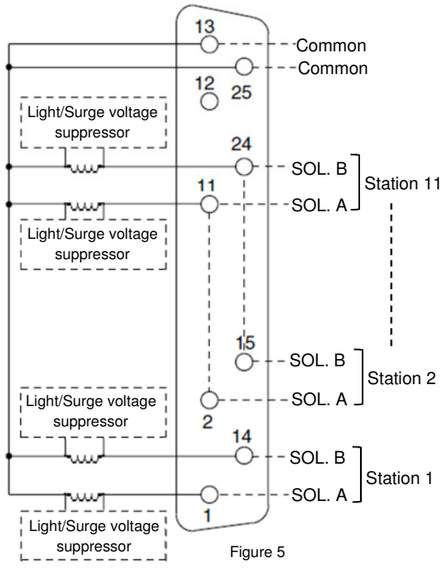


Figure 5

- This circuit has double wiring specifications for up to 11 stations. Since the usable number of solenoids differs depending on the manifold type, refer to the table below. In the case of single solenoids, connect to SOL. A. Furthermore, when wiring is specified on a manifold specification sheet, connections are made without skipping any connectors, and signals A for single and A, B for double are in order 1→14→2→15, etc.
- Stations are counted starting from station 1 on the D side (connector side).
- Since solenoid valves do not have polarity, either the +COM or -COM can be used.

Usable number of solenoids

Model		Maximum number of solenoids
Tie rod base type 10	SV 1000 to SV4000	23
Cassette base type 16	SV1000	18
	SV2000	23

Table 10

3.10.3 10P/16P Flat Ribbon Cable Type (26 pins)

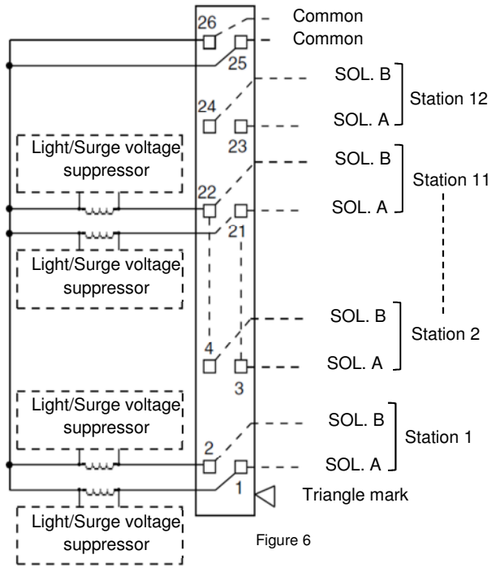


Figure 6

3 Installation – continued

- This circuit has double wiring specifications for up to 12 stations. Since the usable number of solenoids differs depending on the manifold type, refer to the table below. In the case of single solenoids, connect to SOL. A. Furthermore, when wiring is specified on a manifold specification sheet, connections are made without skipping any connectors, and signals A for single and A, B for double are in order 1→2→3→4, etc.
- Stations are counted starting from station 1 on the D side (connector side).
- Since terminal numbers are not indicated on flat ribbon cables, use the triangle mark as a reference.
- Since solenoid valves do not have polarity, either the +COM or -COM can be used.

Usable number of solenoids

Model		Maximum number of solenoids
Tie-rod base type 10	SV 1000 to SV4000	24
Cassette base type 16	SV1000	18
	SV2000	24

Table 11

3.10.4 10PG/16PG Flat Ribbon Cable Type (20 pins)

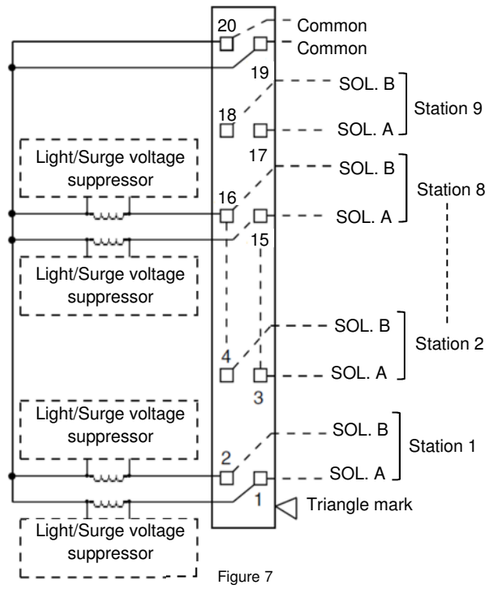


Figure 7

- This circuit has double wiring specifications for up to 9 stations. Since the usable number of solenoids differs depending on the manifold type, refer to the table below. In the case of single solenoids, connect to SOL. A. Furthermore, when wiring is specified on a manifold specification sheet, connections are made without skipping any connectors, and signals A for single and A, B for double are in order 1→2→3→4, etc.

3 Installation – continued

- Stations are counted starting from station 1 on the D side (connector side).
- Since terminal numbers are not indicated on flat ribbon cables, use the triangle mark as a reference.
- Since solenoid valves do not have polarity, either the +COM or -COM can be used.

Usable number of solenoids

Model		Maximum number of solenoids
Tie-rod base type 10	SV 1000 to SV4000	18
Cassette base type 16	SV1000	
	SV2000	

Table 12

3.10.5 10PH/16PH Flat Ribbon Cable Type (10 pins)

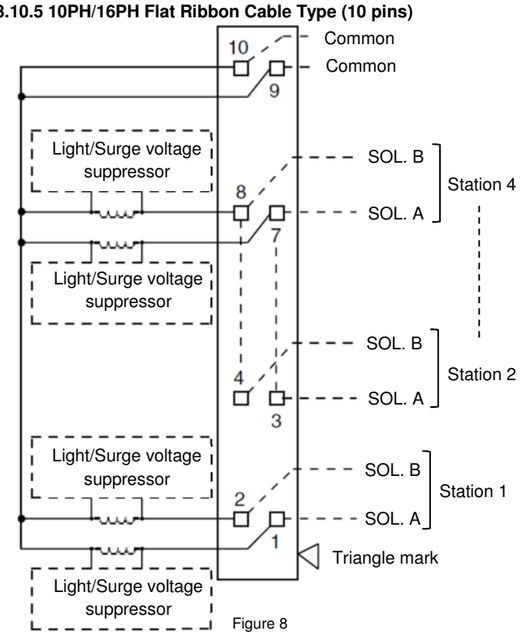


Figure 8

- This circuit has double wiring specifications for up to 4 stations. Since the usable number of solenoids differs depending on the manifold type, refer to the table below. In the case of single solenoids, connect to SOL. A. Furthermore, when wiring is specified on a manifold specification sheet, connections are made without skipping any connectors, and signals A for single and A, B for double are in order 1→2→3→4, etc.

3 Installation – continued

- Stations are counted starting from station 1 on the D side (connector side).
- Since terminal numbers are not indicated on flat ribbon cables, use the triangle mark as a reference.
- Since solenoid valves do not have polarity, either the +COM or -COM can be used.

Usable number of solenoids

Model		Maximum number of solenoids
Tie-rod base type 10	SV 1000 to SV4000	8
Cassette base type 16	SV1000	
	SV2000	

Table 13

3.10.6 16GD Flat Ribbon Cable Type (PC wiring)

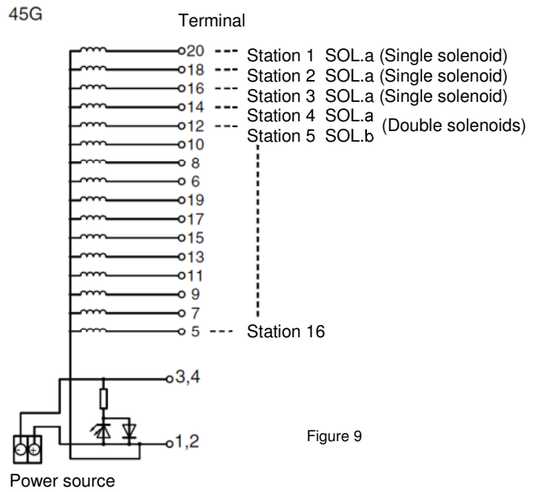


Figure 9

- This circuit has double wiring specifications for up to 8 stations. Since the usable number of solenoids differs depending on the manifold type, refer to the table below. In the case of single solenoids, connect to SOL. A. Furthermore, when wiring is specified on a manifold specification sheet, connections are made without skipping any connectors, and signals A for single and A, B for double are in order 20→18→16→14, etc.
- Stations are counted starting from station 1 on the D side (connector side).
- Since terminal numbers are not indicated on flat ribbon cables, use the triangle mark as a reference.

3 Installation – continued

- Since solenoid valves do not have polarity, either the +COM or -COM can be used.

Usable number of solenoids

Model		Maximum number of solenoids
Tie-rod base type 10	SV 1000 to SV4000	16
Cassette base type 16	SV1000	
	SV2000	

Table 14

4 Settings

4.1 Manual Override

⚠ Warning

Since connected equipment will operate when the manual override is activated, confirm that conditions are safe prior to activation.

4.2 Exhaust restriction

⚠ Caution

Since the series SV is a type in which the pilot valve exhaust joins the main valve exhaust inside the valve, care must be taken so that the piping from the exhaust port is not restricted.

4.3 Series SV used as a 3 port valve

⚠ Caution

Using a 5 port valve as a 3 port valve

Series SV valves can be used as normally closed (N.C.) or normally open (N.O.) 3 port valves by closing one of the cylinder ports (A or B) with a plug. However, they should be used with the exhaust ports kept open. They are convenient at times when a double solenoid type 3 port valve is required.

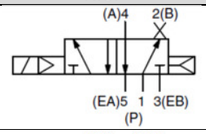
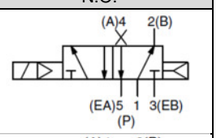
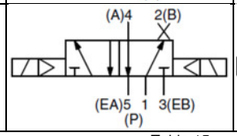
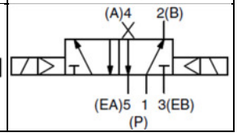
Plug position		Port B	Port A
Actuation		N.C.	N.O.
Number of solenoids	Single		
	Double		

Table 15

4.4 Light/Surge voltage suppressor

Solenoid valves have no polarity.

4.4.1 Light/surge voltage suppressor

Single solenoid type

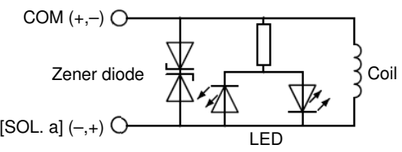


Figure 10

4 Settings – continued

Double solenoid, 3 position type

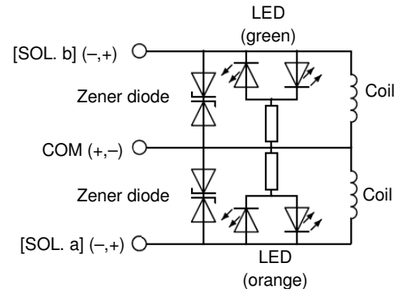


Figure 11

4.4.2 Surge voltage suppressor

Single solenoid type

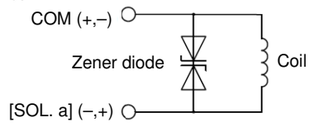


Figure 12

Double solenoid, 3 position type

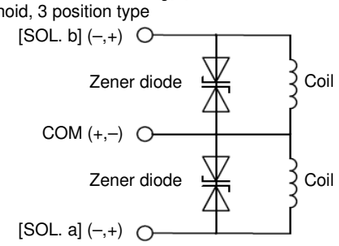


Figure 13

4.5 Light indication

⚠ Caution

When equipped with light and surge voltage suppressor, the indicator light window turns orange when solenoid A is energized, and it turns green when solenoid B is energized.

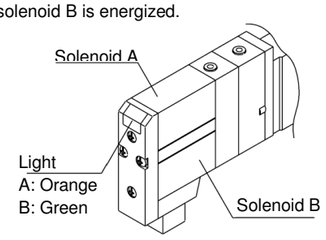


Figure 14

4.6 Connector entry directions

⚠ Caution

Connector entry directions for D-sub connectors and flat ribbon cables can be changed. To change the connector's entry direction, press the levers on both sides of the connector, take it off, and change the direction as shown in the drawing. Since lead wire assemblies are attached to the connector, excessive pulling or twisting can cause broken wires or other trouble. Also, take precautions so that lead wires are not caught and pinched when installing the connector.

4 Settings – continued

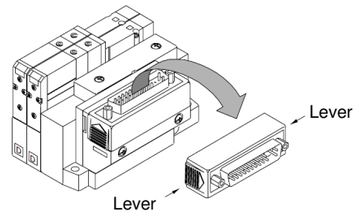


Figure 15

4.7 Manifold Options

4.7.1 Blanking plate assembly

Used in situations where valves will be added in the future, and for maintenance, etc.

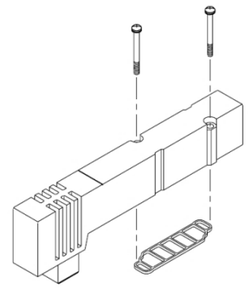


Figure 16

Series	Blanking plate assembly part no.
SV1000	SV1000-67-1A
SV2000	SV2000-67-1A
SV3000	SV3000-67-1A
SV4000	SV4000-67-1A

Table 16

⚠ Caution

Mounting screw tightening torques

M2: 0.16 N·m
M3: 0.8 N·m
M4: 1.4 N·m

4.7.2 SUP/EXH block disks

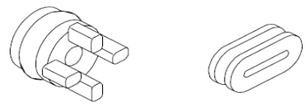
4.7.2.1 SUP block disk

By placing a SUP block disk in a manifold valve's pressure supply passage, two different high and low pressures can be supplied to one manifold.

4.7.2.2 EXH block disk

By placing an EXH block disk in a manifold valve's exhaust passage, the valve's exhaust can be separated so that it will not affect other valves.

It can also be used on a manifold with mixed positive pressure and vacuum. (Two pieces are required to block EXH on both sides. However, series SV1000 and 2000 type 10 manifolds require only one piece.)



Cassette base type 16 Tie-rod base type 10

Figure 17

Series	Manifold type	SUP block disk	EXH block disk
SV1000	10	SV1000-59-1A	SV1000-59-2A
	16	SX3000-77-1A	SX3000-77-1A
SV2000	10	SV2000-59-1A	SV2000-59-2A
	16	SV2000-59-3A	SV2000-59-3A
SV3000	10	SV3000-59-1A	SV3000-59-1A
SV4000	10	SY9000-57-1A	SY9000-57-1A

Table 17

4 Settings – continued

4.7.3 Block disk labels

These labels are attached to manifolds in which SUP and EXH block disks have been installed, in order to identify the installed locations. (Three sheets each included.)

*When manifolds are ordered with block disks installed, the labels will be attached where the block disks are installed.

- SV1000-74-1A



SUP block disk label EXH block disk label SUP, EXH block disk label

* When ordering a manifold and block disks together using a manifold specification sheet, etc., labels will be attached where block disks are installed prior to shipment from the factory.

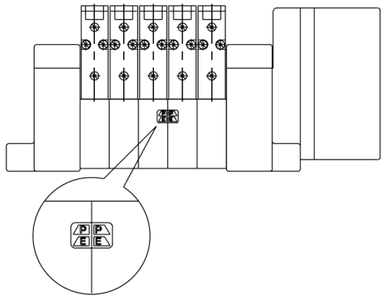


Figure 6

4.7.4 Plug (white)

These are inserted in unused cylinder ports and P, E ports.

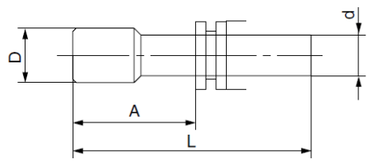


Figure 19

Applicable fitting size d	Model	A	L	D
Ø4	KQ2P-04	16	32	Ø6
Ø6	KQ2P-06	18	35	Ø8
Ø8	KQ2P-08	20.5	39	Ø10
Ø10	KQ2P-10	22	43	Ø12
Ø12	KQ2P-12	24	44.5	Ø14
Ø1/8"	KQ2P-01	16	31.5	Ø5
Ø5/32"	KQ2P-03	16	32	Ø6
Ø1/4"	KQ2P-07	18	35	Ø8.5
Ø5/16"	KQ2P-09	20.5	39	Ø10
Ø3/8"	KQ2P-11	22	43	Ø11.5

Table 18

4 Settings – continued

4.7.5 Silencer (Compact resin type/One-touch fitting connection)

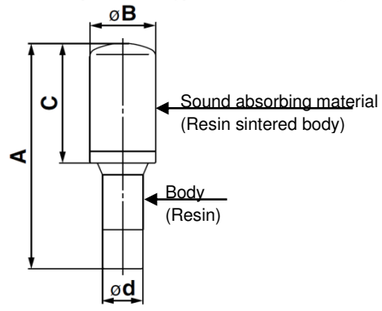


Figure 20

Series	Model	A	B	C	Ød
SV1000 (for Ø8)	AN15-C08	45	13	20	Ø8
SV2000 (for Ø10)	AN20-C10	57.5	16.5	30.5	Ø10
SV3000 SV4000 (for Ø12)	AN30-C12	71.5	20	43.5	Ø12

Table 19

5 How to Order

5.1 How to order manifolds

Refer to the catalogue and section 5.3.

5.2 How to order manifold blocks

Caution

The letter “S” or “D” is indicated on manifold blocks for series SV as shown below. This indication refers to the type substrate assembly (single wiring or double wiring) inside the manifold blocks.

When the manifold specification sheet does not include a wiring specification, all stations will be double wiring specification (D). In this case, single and double valves can be mounted in any position, but when a single valve is used, there will be an unused control signal. To avoid this, indicate positions of manifold blocks for single wiring specification (S) and double wiring specification (D) on a manifold specification sheet. (Note that double, 3 or 4 position valves cannot be used for manifolds blocks with single wiring specification (S).)

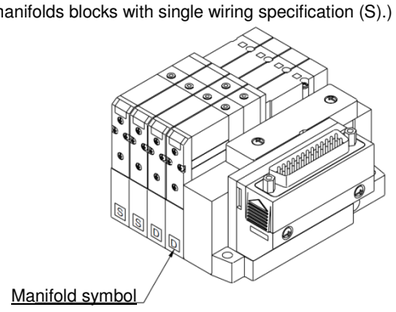


Figure 21

Refer to the catalogue for full how to order.

5.3 How to order Solenoid Valves

Note) To be used when increasing the number of stations and manifold block is also required. See catalogue for details.

SV 1 1 0 0 □ □ – 5 F □ □ – □ Note) – □

Series

1	SV1000
2	SV2000
3	SV3000
4	SV4000

Type of actuation

		Validated ✧
1	2 position single solenoid	●
2	2 position double solenoid	–
3	3 position closed center	●
4	3 position exhaust center	●
5	3 position pressure center	●
A	4 position dual 3 port valve: N.C./N.C. *	●
B	4 position dual 3 port valve: N.O./N.O. *	●
C	4 position dual 3 port valve: N.C./N.O. *	●

* 4 position dual 3 port valves are applicable to series SV1000 and SV2000 only.

Pilot specification

Nil	Internal pilot
R	External pilot

* External pilot specification is not available for 4 position dual 3 port valves.

Back pressure check valve

Nil	None
K	Built-in

* Built-in back pressure check valve type is applicable to series SV1000 only.
* Back pressure check valve is not available for 3 position valve.

Rated voltage

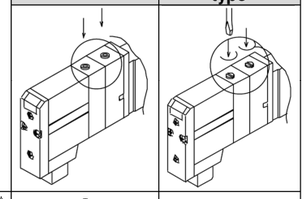
		Validated ✧
5	24 VDC	●
6	12 VDC	–

Light/Surge voltage suppressor

U	With light and surge voltage suppressor
R	With surge voltage suppressor

Manual override

	Nil: Non-locking push type	D: Push-turn locking slotted type
Validated ✧	●	–



Made to order

		Validated ✧
Nil	–	●
X90	Main valve fluororubber	●

✧: Validated according to ISO 13849

6 Outline Dimensions (mm)

Refer to the catalogue.

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.
- When handling and replacing the unit:
  Do not touch the sharp metal parts of the connector or plug.
  Do not apply excessive force to the unit when disassembling. The connecting portions of the unit are firmly joined with seals.
  When joining units, take care not to get fingers caught between units, injury can result.
- Perform periodic inspection. Unexpected malfunction in the system composition devices is likely to occur due to malfunction of machinery or equipment.
- After maintenance, make sure to perform an appropriate functionality inspection. In cases of abnormality such as faulty operation, stop operation. Unexpected malfunction in the system composition devices is likely to occur.
- Do not use benzene and thinner for cleaning units.
  Damage to the surface or erasure of the display can result.
  Wipe off any stains with a soft cloth.
  If the stain is persistent, wipe off with a cloth soaked in a dilute solution of neutral detergent and wrung out tightly, and then finish with a dry cloth.

8 Limitations of Use

8.1 Limited warranty and Disclaimer/Compliance Requirements

- **The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”. Read and accept them before using the product**.
- **Limited warranty and Disclaimer**

  1) The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first[(1)]. Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.

  2) For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.

  This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.

  3) Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalogue for the particular products.

  [(1)] Vacuum pads are excluded from this 1 year warranty.

8 Limitations of use – continued

A vacuum pad is a consumable part, so it is warranted for a year after it is delivered. Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

- **Compliance Requirements**

  1) The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.

  2) The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

Caution

- **SMC products are not intended for use as instruments for legal metrology.**

  Measurement instruments that SMC manufactures or sells have not been qualified by type approval tests relevant to the metrology (measurement) laws of each country.

  Therefore, SMC products cannot be used for business or certification ordained by the metrology (measurement) laws of each country.

Danger

- Do not exceed any of the specifications laid out in section 2 of this document or the specific product catalogue.
- Any use in an EN ISO 13849 system must be within the specified limits and application condition. The user is responsible for the specification, design, implementation, validation and maintenance of the safety system (SRP/CS).

Warning

Valves with pilot air returned or combined pilot air/spring returned spools.
Refer to section 2.4 Symbols

The use of these valves needs to be carefully considered.
The return of the main spool into the safe position depends on the pilot air pressure being present.
Take measures to ensure, that the operating pressure (for internal pilot type) and external pilot pressure (for external pilot type), is applied for the return of the spool into the safe position.

If the pilot air pressure drops below the specified minimum operating pressure the following might occur:

- unexpected movement of the actuator when the pilot air pressure is restored.
- prevention or delay of a stopping or reversing of movement
- an uncommanded change of the original position (without an input signal).

The design of the safety 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. Such measures must be evaluated by risk assessment within the validation process.

9 Contacts

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CROATIA	SMC IndustrijskaAutomatikad.o.o. ZagrebačkaAvenija 104,10 000 Zagreb
CZECH REP.	SMC Industrial Automation CZ s.r.o. Hudcova 78a, CZ-61200 Brno, Czech Republic
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UK	SMC Pneumatics (U.K.) Ltd. Vincent Avenue, Crownhill, Milton Keynes, Buckinghamshire MK8 0AN, United Kingdom

SMC Corporation

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'SMC Corporation, Akihabara UDX15F, 4-14-1, Sotokanda, Chiyoda-ku, Tokyo 101 0021
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