ORIGINAL INSTRUCTIONS

Instruction Manual

Refer to Declaration of Conformity for relevant Directives.

5 Port Solenoid Valve - Body Ported

Series SY3000/5000/7000/9000



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

Refer to how to order for CE marked and/or validated components.

Validated according to ISO13849, see section 2.

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.
- **Only personnel with appropriate training should operate machinery and equipment.**
  The product specified here may become unsafe if handled incorrectly.

1 Safety Instructions - continued

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.

- Ensure that the air supply quality meets the specification in section 2, 3.

2 Specifications

2.1 Valve Specifications

Series		SY3000	SY5000	SY7000	SY9000
Fluid		air			
Internal pilot operating pressure range (MPa)	2 position single	0.15 to 0.7			
	2 position double	0.1 to 0.7			
	3 position	0.2 to 0.7			
Ambient and fluid temperature (℃)		-10 to 50 (no freezing)			
Max. operating frequency (Hz)	2 position single, double	10	5	5	5
	3 position	3	3	3	3
Min. operating frequency		1 cycle / 30 days			
Manual override (Manual operation) Note 1)		Non-locking push type, Push-turn locking slotted type, Push turn locking lever type			
Pilot exhaust method		Common exhaust type for main and pilot valve			
Lubrication		Not required Note 2)			
Mounting orientation		Unrestricted			
Impact/Vibration resistance (m/s^2)		150/30 Note 3)			
Air quality		5 µm filtration or better			
Enclosure		Dust proof (DIN terminal and M8 connector: IP65 Note 4))			
Standards Note 1)		Complies with the basic and well-tried safety principles of ISO 13849-2:2012			
B_{10} Note 5)	Single, Double	47 million cycles			
	3 position	27 million cycles			
B_{10D} Note 5)	Single, Double	94 million cycles			
	3 position	54 million cycles			

Table 1

2 Specifications - continued

Notes:
Note 1) For validated types refer to section 5 ‘How to order’.
Note 2) If lubrication is used in the system, use class 1 turbine oil (no additive), ISO VG32
Note 3) **Impact resistance**: No malfunction occurred when it is tested 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 at the initial period)
Vibration resistance: No malfunction occurred in a one-sweep test between 45 and 2000 Hz. Test was performed at both energized and de-energized states in the axial direction and at the right angles to the main valve and armature. (Values at the initial period)
Note 4) Based on IEC60529
Note 5) The B_{10} figure is estimated from SMC life tests under SMC test conditions. The B_{10D} figure is derived from B_{10} using the assumption in ISO 13849-1:2015 Annex C. Contact SMC for details.

2.2 Solenoid Specifications

Electrical entry			Grommet (G), (H) DIN terminal (D), (Y) L plug connector (L) M plug connector (M) M8 connector (W), (WA)	
			G, H, L, M, W, WA	D, Y
Coil rated voltage (V)	DC		24, 12, 6, 5, 3	24, 12
	AC 50/60 Hz		100, 110, 200, 220	
Allowable voltage fluctuation			±10 % of rated voltage Note 1)	
Power consumption (W)	DC	Standard	0.35 (With indicator light: 0.4 DIN terminal with indicator light: 0.45)	
		With power saving circuit	0.1 (With indicator light only) Note 1) [Starting 0.4, Holding 0.1]	
Apparent power (VA) Note 2)	AC	100 V	0.78 (With indicator light: 0.81)	0.78 (With indicator light: 0.87)
		110 V [115 V]	0.86 (With indicator light: 0.89) [0.94 (With indicator light: 0.97)]	0.86 (With indicator light: 0.97) [0.94 (With indicator light: 1.07)]
		200 V	1.18 (With indicator light: 1.22)	1.15 (With indicator light: 1.30)
		220 V [230 V]	1.30 (With indicator light: 1.34) [1.42 (With indicator light: 1.46)]	1.27 (With indicator light: 1.46) [1.39 (With indicator light: 1.60)]
Surge voltage suppressor			Diode (Varistor is for DIN terminal and Non-polar type.)	
Indicator light			LED (AC of DIN connector is neon light.)	

Table 2

Notes:
Note 1) In common between 110 VAC and 115 VAC, and between 220 VAC and 230 VAC.
* For 115 VAC and 230 VAC, the allowable voltage is -15 % to +5 % of rated voltage.
* S, Z and T type (with power saving circuit) should be used within the following allowable voltage fluctuation range due to a voltage drop caused by the internal circuit.
S and Z type: 24 VDC: -7 % to +10 %
12 VDC: -4 % to +10 %
T type: 24 VDC: -8 % to +10 %
12 VDC: -6 % to +10 %

2 Specifications - continued

Note 2) DIN terminal and M8 connector with power saving circuit are not available.
* For details, refer to the catalogue.

2.3 Port Size

Series			SY3000	SY5000	SY7000	SY9000
P, EA, EB Port size		M5	•	–	–	–
		1/8	–	•	• (EA,EB)	–
		1/4	–	–	• (P)	•
		3/8	–	–	–	–
		1/2	–	–	–	–
A, B port size		M5	•	–	–	–
		1/8	–	•	–	–
		1/4	–	–	•	•
		3/8	–	–	–	•
		1/2	–	–	–	–
	One-touch fitting	C4	•	•	–	–
		C6	•	•	–	–
		C8	–	•	•	•
		C10	–	–	•	•
		C12	–	–	–	•
		N3	•	•	–	–
		N7	•	•	–	–
		N9	–	•	•	•
		N11	–	–	•	•

Table 3

2.4 Flow Characteristics

Series	Flow Characteristics			
	C [dm^3/(s·bar)]	b	C_V	Q[ℓ/min(ANR)]
SY3000	0.77	0.34	0.21	201
SY5000	2.2	0.46	0.61	626
SY7000	4.3	0.23	0.97	1048
SY9000	8.9	0.34	2.2	2323

Table 4

Note: The values given in this table vary depending on the different types of actuation.

2.5 Response Time

SY3000

Type of actuation	Response time (ms) (at the pressure of 0.5 MPa)		
	Without light/surge voltage suppressor	With light/surge voltage suppressor	
		Type S, Z	Type R, U
2 position single	12 or less	15 or less	12 or less
2 position double	10 or less	13 or less	10 or less
3 position	15 or less	20 or less	16 or less

Table 5

SY5000

Type of actuation	Response time (ms) (at the pressure of 0.5 MPa)		
	Without light/surge voltage suppressor	With light/surge voltage suppressor	
		Type S, Z	Type R, U
2 position single	19 or less	26 or less	19 or less
2 position double	18 or less	22 or less	18 or less
3 position	32 or less	38 or less	32 or less

Table 6

SY7000

Type of actuation	Response time (ms) (at the pressure of 0.5 MPa)		
	Without light/surge voltage suppressor	With light/surge voltage suppressor	
		Type S, Z	Type R, U
2 position single	31 or less	38 or less	33 or less
2 position double	27 or less	30 or less	28 or less
3 position	50 or less	56 or less	50 or less

Table 7

2 Specifications - continued

SY9000

Type of actuation	Response time (ms) (at the pressure of 0.5 MPa)		
	Without light/surge voltage suppressor	With light/surge voltage suppressor	
		Type S, Z	Type R, U
2 position single	35 or less	41 or less	35 or less
2 position double	35 or less	41 or less	35 or less
3 position	62 or less	64 or less	62 or less

Table 8

2.6 Symbol

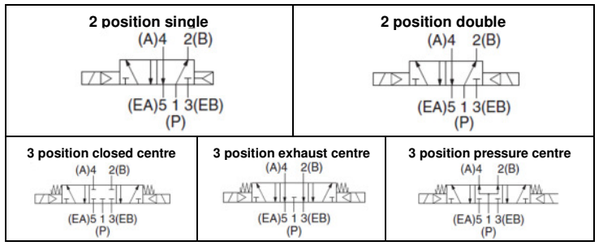


Figure 1

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.

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. Check the product specifications.
- Do not mount in a location exposed to radiant heat.
- Products with IP65 enclosures (based on IEC60529) are protected against dust & water; however, these products cannot be used in water.
- Products compliant to IP65 satisfy the specifications through mounting.
- If using in an atmosphere where there is possible contact with water drop-lets, oil, weld spatter, etc., take suitable preventive measures.
- When the solenoid valve is mounted in a control panel or it is energized for a long time, make sure that the ambient temperature is within the specification of the valve.

3.3 Air supply

Caution

- **When extremely dry air is used as the fluid, degradation of the lubrication properties inside the equipment may occur, resulting in reduced reliability (or reduced service life) of the equipment.**
  Please contact SMC.
- **Install an air filter**
  Install an air filter upstream near the valve. Select an air filter with a filtration size of 5 µm or smaller.
- **Take measures to ensure air quality, such as by installing an aftercooler, air dryer, or water separator.**
  Compressed air that contains a large amount of drainage can cause malfunction of pneumatic equipment such as valves. Therefore, take appropriate measures to ensure air quality, such as by providing an aftercooler, air dryer or water separator.

3 Installation - continued

3.4 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.

Thread	Tightening Torque (N m)
Rc 1/8	7 to 9
Rc 1/4	12 to 14
Rc 3/8	22 to 24
Rc 1/2	28 to 30

Table 9

3.5 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.

3.6 Tubing attachment / detachment for One-touch fittings

Caution

Tube attachment

- 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 pincers, nippers or scissors etc. If cutting is done with tools other than tube cutters, the tube may be cut diagonally or become flattened. This makes a secure installation impossible, and causes problems such as air leakage or the tube being pulled out after installation. Allow some extra length in the tube.
- Grasp the tube and push it in slowly, inserting it securely all the way into the fitting.
- After inserting the tube, pull on it lightly to confirm that it will not come out. Problems such as air leakage or the tube being pulled out can occur if the tube is not inserted securely all the way into the fittings.

Tube detachment

- Push in the release bushing and the collar at the same time.
- Pull out the tube while holding down the release bushing so that it does not come out. If the release bushing is not pressed down sufficiently there will be increased bite on the tube and it will become more difficult to pull out.
- When the removed tube is to be used again, cut off the portion which has been chewed before reusing it. If this is not done then the chewed portion of the tube can cause problems such as air leakage or difficulty in removing the tube from the fitting.

3.7 Precautions on other tube brands

Caution

- When using non-SMC brand tubes, confirm that the following specifications are satisfied with respect to the outside diameter tolerance of the tube.
  Nylon tube ±0.1mm
  Soft nylon tube ±0.1mm
  Polyurethane tube +0.15mm; -0.2mm
- Do not use tubing that does not meet these outside diameter tolerances. It may not be possible to connect them, or they may cause other problems, such as air leakage or the tubing pulling out after connection.

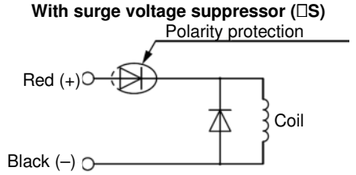
3 Installation – continued

3.8 Indicator Light/Surge Voltage Suppressor

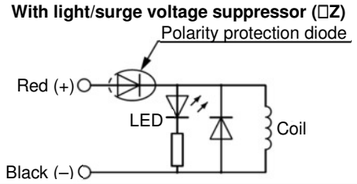
- **Grommet, L/M Plug Connector**

▪ **Standard type (With polarity)**

With surge voltage suppressor (□S)

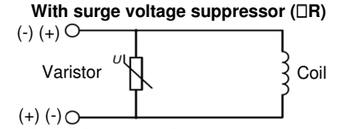


With light/surge voltage suppressor (□Z)

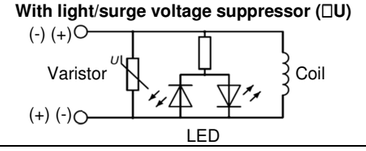


▪ **Non-polar type**

With surge voltage suppressor (□R)



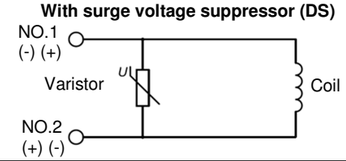
With light/surge voltage suppressor (□U)



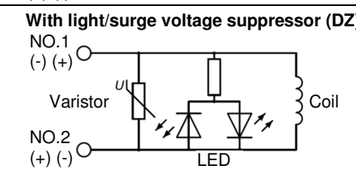
- Connect the standard type in accordance with the +, - polarity indication. (The non-polar type can be used with the connections made either way.)
- Since voltage specifications other than standard 24 VDC and 12 VDC do not have diodes for polarity protection, be careful not to make errors in the polarity.
- Please use caution regarding the allowable fluctuation because there is about a 1 volt drop for a valve with polarity protection. (For details, refer to the solenoid specification.)
- When wiring is done at the factory, positive (+) is red and negative (-) is black.

- **DIN Terminal**

With surge voltage suppressor (DS)



With light/surge voltage suppressor (DZ)



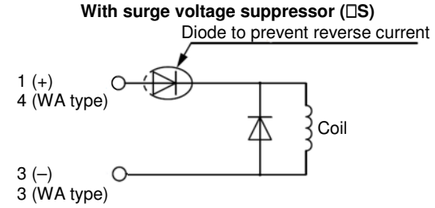
* DIN terminal has no polarity.

3 Installation – continued

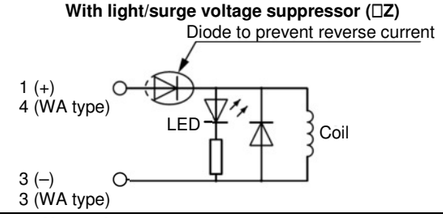
- **M8 Connector**

▪ **Standard type (With polarity)**

With surge voltage suppressor (□S)

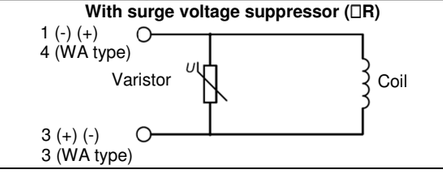


With light/surge voltage suppressor (□Z)

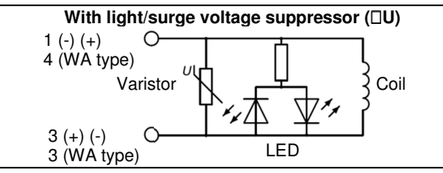


▪ **Non-polar type**

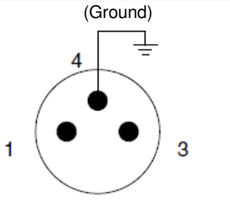
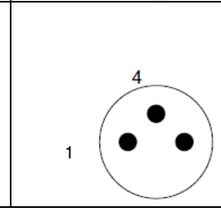
With surge voltage suppressor (□R)



With light/surge voltage suppressor (□U)



Solenoid valve side pin wiring diagram

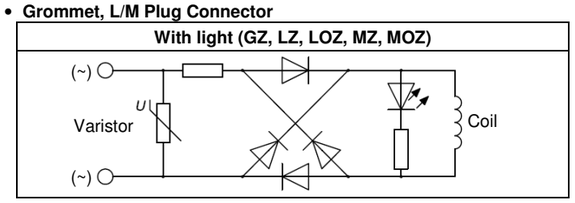
W type	WA type
	

- For the standard type, connect + to 1 and – to 3 for Type W according to polarity, while + to 4 and – to 3 for Type WA.
- For DC voltages other than 12 V and 24 V, incorrect wiring will cause damage to the surge suppressor circuit.
- Please use caution regarding the allowable voltage fluctuation because there is about a 1 Volt drop for a valve with polarity protection. (For details, refer to the solenoid specifications.)
- The WA-type valve cannot be grounded.

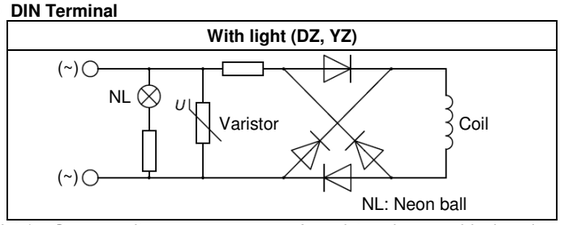
3 Installation – continued

• **<For AC>**
(There is no “S” option, because the generation of surge voltage is prevented by a rectifier.)

• **Grommet, L/M Plug Connector**



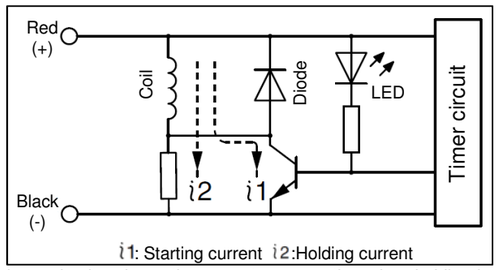
• **DIN Terminal**



Note) Surge voltage suppressor of varistor has residual voltage corresponding to the protective element and rated voltage; therefore, protect the controller side from the surge voltage. The residual voltage of the diode is approximately 1 V.

3.9 With power saving circuit

Power consumption is decreased to 1/4 by reducing the wattage required to hold the valve in an energized state.
(Effective energizing time is over 62 ms at 24 VDC.)



The above circuit reduces the current consumption when holding in order to save energy. Refer to the electrical power waveform as shown below.

<Electrical power waveform with power saving circuit>

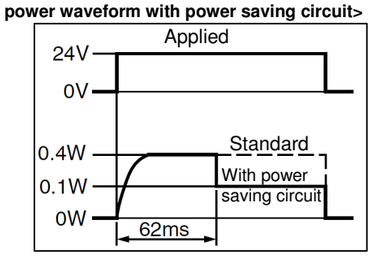


Figure 2

- Please be careful not to reverse the polarity, since a diode to prevent the reversed current is not provided for the power saving circuit.
- Please use caution regarding the allowable voltage fluctuation because there is about a 0.5 volt drop due to the transistor. (For details, refer to the solenoid specifications of each type of valve.)

3.10 Residual voltage of the surge voltage suppressor

If a varistor or diode surge voltage suppressor is used, there is some residual voltage to the protection element and rated voltage.

3 Installation – continued

3.11 Valve Mounting

⚠ Caution

Mount it so that there is no slippage or deformation in gaskets, and tighten with the tightening torque as shown below.

Model	Thread size	Tightening torque
SY3000	M2	0.16 N m
SY5000	M3	0.8 N m
SY7000	M4	1.4 N m
SY9000	M3	0.8 N m

Table 10

3.12 Manual override

⚠ Warning

Regardless of an electric signal for the valve, the manual override is used for switching the main valve. Connected actuator is started by manual operation. Use the manual override after confirming that there is no danger.

■Non-locking push type (Standard)
Press in the direction of the arrow.

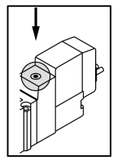


Figure 3

■Push-turn locking slotted type [Type D] Note 1)

⚠ Caution

Push down on the manual override with a small flat head screwdriver until it stops. Turn it clockwise by 90° to lock it. Turn it counterclockwise to release it.
If it is not turned, it can be operated the same way as the non-locking type.
Do not apply excessive torque when turning the manual override [0.1 N m].

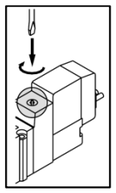


Figure 4

■Push-turn locking lever type [Type E] Note 1)
Push down on the manual override by finger until it stops, and then turn it 60° clockwise. The manual override is then locked. To release it, turn it counterclockwise. If it is not turned, it can be operated the same way as the non-locking type.

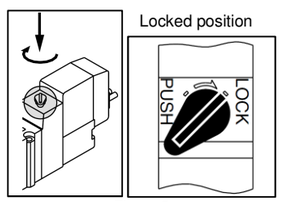


Figure 5

Note 1) Locking type is not allowed in safety applications.

⚠ Caution

When locking the manual override on the push-turn locking types (D, E), be sure to push it down before turning.
Turning without first pushing it down can cause damage to the manual override and trouble such as air leakage, etc.

3 Installation – continued

3.13 How to Use Plug Connector

⚠ Caution

1. **Attaching and detaching connectors**
   - To attach a connector, hold the lever and connector unit between your fingers and insert straight onto the pins of the solenoid valve so that the lever’s pawl is pushed into the groove and locks.
   - To detach a connector, remove the pawl from the groove by pushing the lever downward with your thumb, and pull the connector straight out.

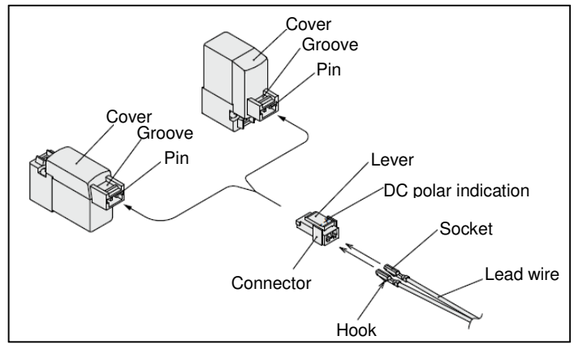


Figure 6

2. **Crimping connection of lead wire and socket**
   Strip 3.2 to 3.7 mm at the end of lead wires, insert the end of the core wires evenly into the sockets, and then crimp it by a crimping tool. When this is done, take care that the coverings of the lead wires do not enter the core wire crimping area.
   (Please contact SMC for the dedicated crimping tools.)

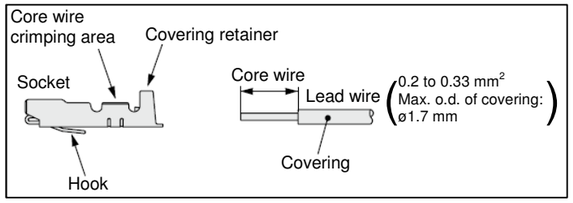


Figure 7

3. **Attaching and detaching lead wires with sockets**
   - **Attaching**
     Insert the sockets into the square holes of the connector (+, - indication), and continue to push the sockets all the way in until the lock by hooking into the seats in the connector.
     (When they are pushed in, their hooks open and they are locked automatically.) Then confirm that they are locked by pulling lightly on the lead wires.
   - **Detaching**
     To detach a socket from a connector, pull out the lead wire while pressing the socket’s hook with a stick having a thin tip (approx. 1 mm).
     If the socket will be used again, first spread the hook outward.

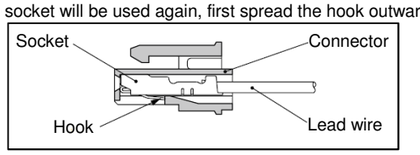


Figure 8

3 Installation – continued

3.14 How to Use DIN Terminal

⚠ Caution

Connection

1. Loosen the holding screw and pull the connector out of the solenoid valve terminal block.
2. After removing the holding screw insert a flat head screwdriver, etc. into the notch on the bottom of the terminal block and pry it open, separating the terminal block and the housing.
3. Loosen the terminal screws (slotted screws) on the terminal block, insert the cores of the lead wires into the terminals according to the connection method, and fasten them securely with the terminal screws.
4. Secure the cord by fastening the ground nut.

⚠ Caution

When making connections, take note that using other than the supported size (ø3.5 to ø7) heavy duty cord will not satisfy IP 65 (enclosure) standards. Also, be sure to tighten the ground nut and holding screw within their specified torque ranges.

Changing the entry direction
After separating the terminal block and housing, the cord entry can be changed by attaching the housing in the desired direction (4 directions at 90° intervals).
* When equipped with a light, be careful not to damage the light with the cord’s lead wires.

Precautions
Plug in and pull out the connector vertically without tilting to one side.

Compatible cable
Cord O.D.: ø3.5 to ø7
(Reference) 0.5 mm², 2-core or 3-core, equivalent to JIS C 3306

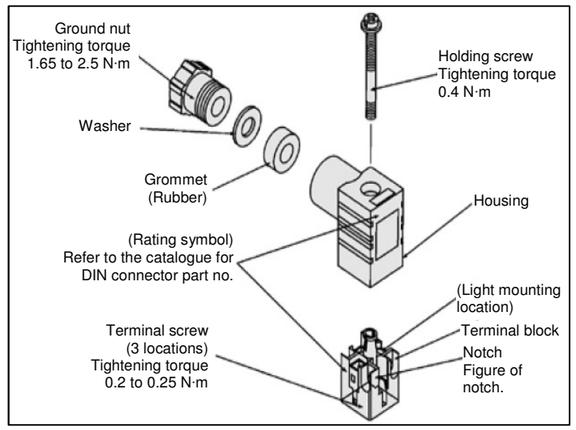


Figure 9

Type “Y”
DIN connector type Y is a DIN connector that conforms to the DIN EN 175301-803 (DIN pitch 8-mm standard).

- D type DIN connector with 9.4 mm pitch between terminals is not interchangeable.
- To distinguish from the D type DIN connector, “N” is listed at the end of voltage symbol. (For connector parts without lights, “N” is not indicated. Please refer to the name plate to distinguish.)
- Dimensions are completely the same as D type DIN connector.

3 Installation – continued

3.14.1 Series SY3000

Caution

- SMC can provide a DIN style terminal connector for the series SY3000. This cannot be assembled to a standard manifold and sub-plate since the DIN connector width (15.8 mm) exceeds that of the valve body (10 mm). Contact SMC if you wish to use with a manifold and sub-plate.

* The DIN style terminal connector and single manifold unit have no external pilot specifications.

4 Settings

4.1 Exhaust Throttle

Caution

The SY series pilot valve and main valve share a common exhaust inside the valve. Therefore, do not block the exhaust port when arranging the piping.

4.2 Use as a 3-Port Valve

Caution

In case of using a 5-port valve as a 3-port valve

Series SY3000/5000/7000/9000 can be used as normally closed (N.C.) or normally open (N.O.) 3-port 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.

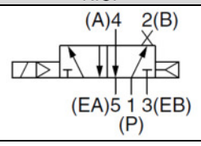
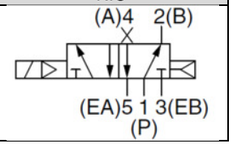
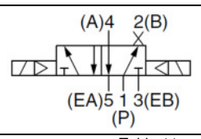
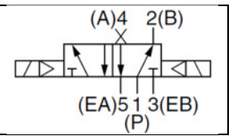
Plug position		B port	A port
Configuration		N.C.	N.O
Number of solenoids	Single		
	Double		

Table 11

4.3 Changing Port Block Assembly

If using body port type, both A and B port sizes can be changed by replacing the port block assembly mounted on the body. When changing this block assembly, the correct screw torque must be achieved to avoid possible air leakage.

With the one-touch fitting port block assembly, it is only necessary to change the fitting and not the whole block.

For SY5000

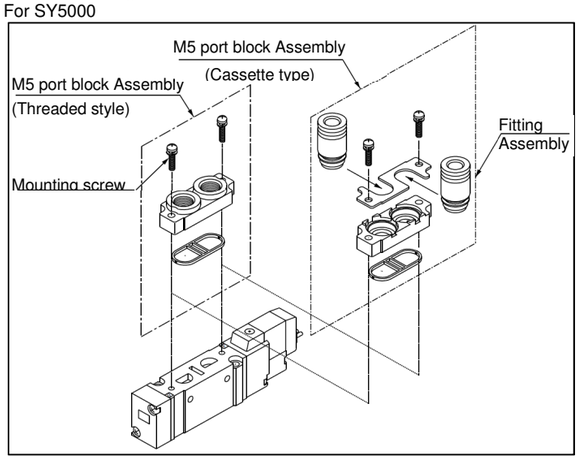


Figure 10

4 Settings - continued

Caution

Mounting screw tightening torques:

Model	Thread size	Tightening torques
SY3000	M2	0.12 N m
SY5000	M3	0.6 N m
SY7000	M3	0.6 N m
SY9000	M4	1.4 N m

Table 12

- One-touch fitting (Metric size)

Applicable series	Port size
SY3000	One-touch fitting for Ø4
	One-touch fitting for Ø6
SY5000	One-touch fitting for Ø4
	One-touch fitting for Ø6
	One-touch fitting for Ø8
SY7000	One-touch fitting for Ø8
	One-touch fitting for Ø10
SY9000	One-touch fitting for Ø8
	One-touch fitting for Ø10
	One-touch fitting for Ø12

Table 13

- One-touch fitting (Inch size)

Applicable series	Port size
SY3000	One-touch fitting for Ø5/32”
	One-touch fitting for Ø1/4”
SY5000	One-touch fitting for Ø5/32”
	One-touch fitting for Ø1/4”
	One-touch fitting for Ø5/16”
SY7000	One-touch fitting for Ø5/16”
	One-touch fitting for Ø3/8”
SY9000	One-touch fitting for Ø5/16”
	One-touch fitting for Ø3/8”

Table 14

5 How to Order

SY 5 1 20 □ – 5 L □ □ – 01 □ – □ – □ – □

Series

3	SY3000
5	SY5000
7	SY7000
9	SY9000

Type of actuation

		Validated ✧
1	2 position single (A)4 2(B) (EA)5 1 3(EB) (P)	●
2	2 position double (A)4 2(B) (EA)5 1 3(EB) (P)	–
3	3 position closed centre (A)4 2(B) (EA)5 1 3(EB) (P)	●
4	3 position exhaust centre (A)4 2(B) (EA)5 1 3(EB) (P)	●
5	3 position pressure centre (A)4 2(B) (EA)5 1 3(EB) (P)	●

Note) For details about Symbol of the 3 position type of series SY9000, refer to the catalogue.

Coil specifications

–	Standard
T	With power saving circuit (24 VCD, 12 VDC only)

* Power saving circuit is not available in the case of D, Y, DO, YO, W□ or WA□ type.

Rated voltage

For DC

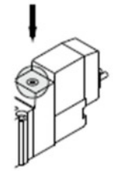
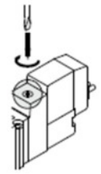
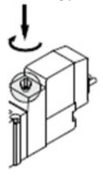
		Validated ✧
5	24 VDC	●
6	12 VDC	●
V	6 VDC	●
S	5 VDC	●
R	3 VDC	●

For AC (50/60 Hz)

		Validated ✧
1	100 VAC	–
2	200 VAC	–
3	110 VAC [115 VAC]	–
4	220 VAC [230 VAC]	–

* DC specifications of type D, Y, DO and YO is only available with 12 and 24 VDC.
* For Type W□/WA□, DC voltage is only available.
Note) AC-type models that are CE-compliant have DIN terminals only.

Manual override

–	D	E
Non-locking push type	Push-turn locking slotted type	Push-turn locking lever type
		
Validated ✧ ●	–	–

Light/surge voltage suppressor

Electrical entry for G, H, L, M, W

–	Without light/surge voltage suppressor
S	With surge voltage suppressor
Z	With light/surge voltage suppressor
R	With surge voltage suppressor (Non-polar type)
U	With light/surge voltage suppressor (Non-polar type)

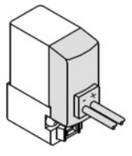
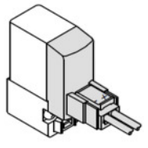
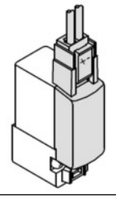
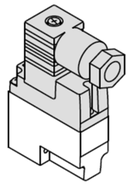
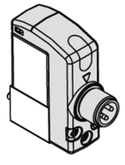
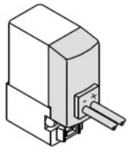
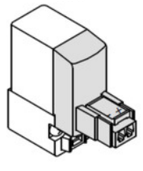
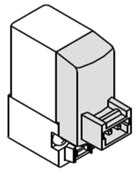
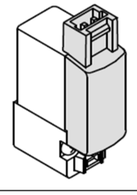
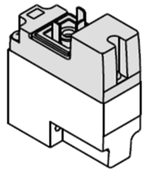
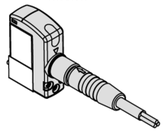
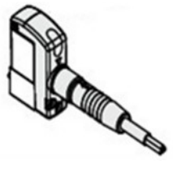
* For AC voltage valves there is no “S” option. It is already built-in to the rectifier circuit.
* For “R” and “U”, DC voltage is only available
* Power saving circuit is only available in the “Z” type.

Electrical entry for D, Y

–	Without light/surge voltage suppressor
S	With surge voltage suppressor (Non-polar type)
Z	With light/surge voltage suppressor (Non-polar type)

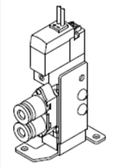
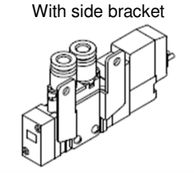
* DOZ and YOZ are not available.
* For AC voltage valves there is no “S” option. It is already built-in to the rectifier circuit.

Electrical entry

		24, 12, 6, 5, 3 VDC / 100, 110, 200, 220 VAC			24, 12 VDC, 100, 110, 200, 220 VAC	24, 12, 6, 5, 3 VDC	
		Grommet	L plug connector	M plug connector	DIN terminal	M8 connector	
		G: Lead wire length 300 mm	**L:** With lead wire (Length 300 mm)	**M**: With lead wire (Length 300 mm)	**D, Y**: With connector	**WO**: Without connector cable	**WAO**: Without connector cable
							
		H: Lead wire length 600 mm	**LN**: Without lead wire	**LO:** Without connector	**MO**: Without connector	**DO, YO**: Without connector	**W□**: With connector cable Note)	**WA□**: With connector cable Note)
								
CE-compliant	DC	●	●		●	●	●	
	AC	–	–		–	●	–	

* LN, MN type: with 2 sockets
* For DIN terminal of SY3000 series, refer to the catalogue.
* “Y” type is a DIN terminal conforming to EN-175301-803C (former DIN43650C). For details, refer to the catalogue.
* For connector cable of M8 connector, refer to the catalogue.
* M8 connector conforming to IEC60947-5-2 standard is also available. Refer to the catalogue for details.
* Refer to the catalogue for the lead wire length of L and M plug connectors.
* Refer to the catalogue for the connector assembly with cover for L and M plug connectors.
Note) Enter the cable length symbols in □. Please be sure to fill in the blank referring to the catalogue.
Note) When ordering single unit of the cassette type solenoid valve, the bushing assembly is included.

Bracket

–	Without bracket	
F1	With foot bracket (2 position single only)	
F2	With side bracket	

* SY9000 has no bracket.

Thread type

-	Rc
F	G
N	NPT
T	NPTF

* Except for M5

CE-compliant

		Validated ✧
–	–	–
Q	CE-compliant	●

Note) AC-type models that are CE-compliant have DIN terminals only.

✧ Note: AC variants, 2 position double and locking override types are not validated according to ISO 13849.

Made to Order

–	–
X20	Body ported external pilot Note)
X90	Main valve fluoro rubber Note)

Note) Refer to the catalogue.

Note) When placing an order for body ported solenoid valve as a single unit, mounting screw for manifold and gasket are not attached. Order them separately, if necessary. (For details, refer to the catalogue.)

A, B port size

Thread piping

Symbol	Port size	Applicable series
M5	M5 x 0.8	SY3000
01	1/8	SY5000
02	1/4	SY7000
02	1/4	SY9000
03	3/8	

One-touch fitting (Metric size)

Symbol	Port size	Applicable series
C4	One-touch fitting for ø4	SY3000
C6	One-touch fitting for ø6	
C4	One-touch fitting for ø4	SY5000
C6	One-touch fitting for ø6	
C8	One-touch fitting for ø8	
C8	One-touch fitting for ø8	SY7000
C10	One-touch fitting for ø10	
C8	One-touch fitting for ø8	SY9000
C10	One-touch fitting for ø10	
C12	One-touch fitting for ø12	

One-touch fitting (Inch size)

Symbol	Port size	Applicable series
N3	One-touch fitting for ø5/32”	SY3000
N7	One-touch fitting for ø1/4”	
N3	One-touch fitting for ø5/32”	SY5000
N7	One-touch fitting for ø1/4”	
N9	One-touch fitting for ø5/16”	
N9	One-touch fitting for ø5/16”	SY7000
N11	One-touch fitting for ø3/8”	
N9	One-touch fitting for ø5/16”	SY9000
N11	One-touch fitting for ø3/8”	

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.

7 Maintenance - continued

- 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.
- 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.
- When the 3-position closed centre type is in its rest position, air can be trapped between the valve and the cylinder. Exhaust this air pressure before removing piping or performing any maintenance.
- When the equipment is operated after remounting or replacement, first confirm that measures are in place to prevent lurching of actuators, etc. Then, confirm that the equipment is operating normally.

- **Low frequency operation**
  Valves should be operated at least once every 30 days to prevent malfunction. (Use caution regarding the air supply.)

7.2 Throttle

- The pilot valve and the main valve share exhausts, therefore care must be taken to ensure that the piping does not become restricted.

7.3 Supply air

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
Install an air filter at the upper streamside of the valve. Filtration degree should be 5 μm or less.

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.

8 Limitations of Use - continued

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.
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.

8.2 Limitations

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.
- **Leakage voltage**
  The suppressor residual voltage should be 3 % or less of the rated voltage.
- **Surge voltage suppressor**
  If a surge protection circuit contains non-ordinary diodes such as zener diodes or varistor, a residual voltage will remain that is in proportion to the protective elements & the rated voltage. Therefore, give consideration to surge voltage protection of the controller. In the case of diodes, the residual voltage is approximately 1 V.
- **Low temperature operation**
  Unless otherwise indicated in the specifications for each valve, operation is possible to -10℃, but appropriate measures should be taken to avoid solidification or freezing of drainage and moisture, etc.
- **Mounting orientation**
  Mounting orientation is universal.

Warning

Any use in an ISO 13849 system must be within the specified limits and application conditions. The user is responsible for the specification, design, implementation, validation and maintenance of the safety system (SRP/CS).

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 safe position depends on the pilot pressure. If the pilot pressure drops below the specified 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.

8 Limitations of Use - continued

8.3 Safety relays

Warning

If a safe output from a safety relay or PLC is used to operate this valve, ensure that any output test pulse duration is shorter than 1 ms to avoid the valve solenoid responding.

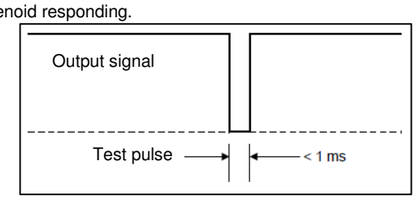


Figure 11

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