



Installation and Maintenance Manual

Series SY100 3 Port Solenoid Valves

For future reference, please keep this manual in a safe place

This manual should be read in conjunction with the current valve catalogue

Safety Instructions

These safety instructions are intended to prevent a hazardous situation and/or equipment damage. These instructions indicate the level of potential hazard by label of "Caution", "Warning" or "Danger". To ensure safety, be sure to observe ISO4414 (Note 1), JIS B 8370 (Note 2) and other safety practices.

Note 1: ISO 4414: Pneumatic fluid power – Recommendations for the application of equipment to transmission and control systems.
Note 2: JIS B 8370: Pneumatic system axiom.

CAUTION : Operator error could result in injury or equipment damage.

WARNING: Operator error could result in serious injury or loss of life.

DANGER : In extreme conditions, there is a possible result of serious injury or loss of life.

WARNING

1. The compatibility of pneumatic equipment is the responsibility of the person who designs the pneumatic system or decides its specifications.

Since the products specified here are used in various operating conditions, their compatibility for the specific pneumatic system must be based on specifications or after analysis and/or tests to meet your specific requirements.

2. Only trained personnel should operate pneumatically operated machinery and equipment.

Compressed air can be dangerous if an operator is unfamiliar with it. Assembly, handling or repair of pneumatic systems should be performed by trained and experienced operators.

3. Do not service machinery/equipment or attempt to remove component until safety is confirmed.

1) Inspection and maintenance of machinery/equipment should only be performed after confirmation of safe locked-out control positions.

2) When equipment is to be removed, confirm the safety process as mentioned above. Switch off air and electrical supplies and exhaust all residual compressed air in the system.

3) Before machinery/equipment is re-started, ensure all safety measures to prevent sudden movement of cylinders etc. (Bleed air into the system gradually to create back-pressure, i.e. incorporate a soft-start valve).

4. Contact SMC if the product is to be used in any of the following conditions:

1) Conditions and environments beyond the given specifications, or if product is used outdoors.

2) Installations in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverage, recreation equipment, emergency stop circuits, press applications, or safety equipment.

3) An application which has the possibility of having negative effects on people, property, or animals, requiring special safety analysis.

CAUTION

Ensure that the air supply system is filtered to 5 micron.

Type of actuation	Model	Type	Operating pressure range MPa(kgf/cm ²)	Vacuum application MPa(kgf/cm ²)		Effective area mm ² (Cv factor)	Note 2) Weight g	
				P port	R port		Grommet type	L, M Plug connector type
N.C.	SY11 ³ / ₄	Standard	0-0.7 (0-7.1)	-100kPa-0.6 (10Torr-6.1)	-100kPa-0 (10Torr-0)	0.14 (0.008)		
N.C.	SY11 ³ / ₄ A	Large flow capacity	0-0.7 (0-7.1)	-100kPa-0.6 (10Torr-6.1)	-100kPa-0 (10Torr-0)	0.22 (0.012)	SY1□3(A):13 SY1□4(A):24 (Without subplate 12)	SY1□3(A):15 SY1□4(A):26 (Without subplate 14)
N.O.	Note 1) SY12 ³ / ₄	Standard	0-0.7 (0-7.1)	-100kPa-0 (10Torr-0)	-100kPa-0.6 (10Torr-6.1)	0.14 (0.008)		
N.O.	Note 1) SY12 ³ / ₄ A	Large flow capacity	0-0.7 (0-7.1)	-100kPa-0 (10Torr-0)	-100kPa-0.6 (10Torr-6.1)	0.22 (0.012)		

Note 1) In case of SY12³/₄ and SY12³/₄ A, supply air to "R" port, "P" port will be the exhaust port.
Note 2) Value for DC.

Specifications

Fluid		Air
Ambient and fluid temperature °C		Max. 50°C
Response time ms		10ms or less
Max. operating frequency Hz		20
Manual override		Non-locking type, locking slotted type, push-locking slotted type, push-locking lever type
Lubrication		Not required
Mounting position		Free
Impact/Vibration resistance m/s ²		150/30
Enclosure		IP 40

Note 1) According to dynamic performance test JIS B8374-1981 (Coil temperature 20°C, at rated voltage, without surge voltage suppressor.)

Note 2) Shock resistance: No malfunction from test using drop impact tester, to axis and right angle direction of main valve and armature, each one time when energized and de-energized.

Vibration resistance: No malfunction from test with 8.3-2000Hz 1 sweep, to axis and right angle direction of main valve and armature, each one time when energized and de-energized. (Value in the initial stage.)

Solenoid Specifications

Series	SY1 ^{1 1/2} / ₃	SY1 ^{1 1/2} / ₃ A
Electrical entry	Grommet(G) • (H), L type plug connector (L), M type plug connector (M)	
Coil rated voltage V	DC 24, 12, 6, 5, 3	
Allowable voltage	-10 ~ +10%	
Power consumption W	0.5W (With light : 0.55W)	0.75W (With light : 0.8W)
Surge voltage suppressor	Diode	
Indicator light	LED	

Note) At rated voltage

Manifold Specifications

Model	Type 30 (Note 4)	Type 31	Type S41
Manifold type	Single base type, B mount		
P(SUP)/R(EXH) type	Common SUP/Common EXH		
Valve stations	2-10 stations	2-20 stations	
A porting	Location Direction	Valve Top	Base Side
Port size	PR port A port	M5X0.8	
Valve effective area mm ² (Cv factor)	SY1□3	0.14(0.008)	-
	SY1□3A	0.21(0.012)	-
	SY1□4	-	0.13(0.007)
	SY1□4A	-	0.2(0.011)

Note 1) When mounted on manifold base

Note 2) SY114(A) and SY124(A) can not be mounted on the same manifold.

Note 3) Supply to R port and exhaust from P port for SY124(A).

Note 4) Type 30 is applicable only for SY113 and SY113A. Piping to exhaust port is not possible.

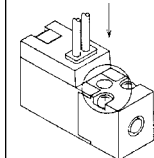
WARNING

Operation of Manual Override (Fig 1)

Use caution since manual override operation will operate any connected actuators.

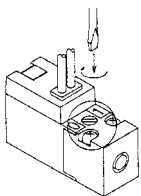
Non-locking push type [Standard type]

Press in the direction of the arrow.

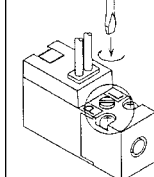


Locking slotted type [B]

Turn in the direction of arrow.

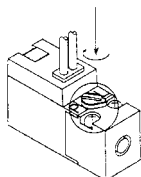


Push-locking slotted type [D]



(While pressing, turn in the direction of the arrow. If you do not turn, the mechanism does not lock in position.)

Push-locking lever type [E]



(While pressing, turn in the direction of the arrow. If you do not turn, the mechanism does not lock in position.)

CAUTION

Gently operate locking manual override types B, D using a small screw driver. (Torque : 0.1N-m(1kgf/cm²) or less)

Fig 1

CAUTION

How to Use Plug Connector (Fig 2)

(1) Insertion/Removal of Connector

Insertion - Push the connector straight on to the pins of the solenoid, making sure the lip of the lever securely "locks" into the groove of the solenoid cover.

Removal - Press the lever against the connector housing and pull it outward from the solenoid.

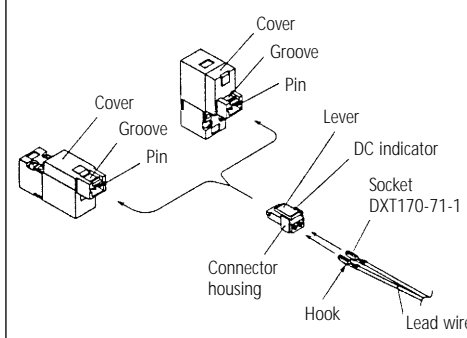


Fig 2

Combination with Solenoid Valve and Gasket Manifold Base (Fig 3)

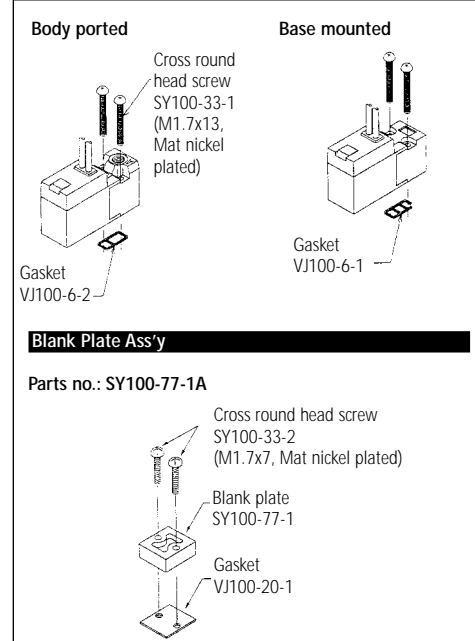
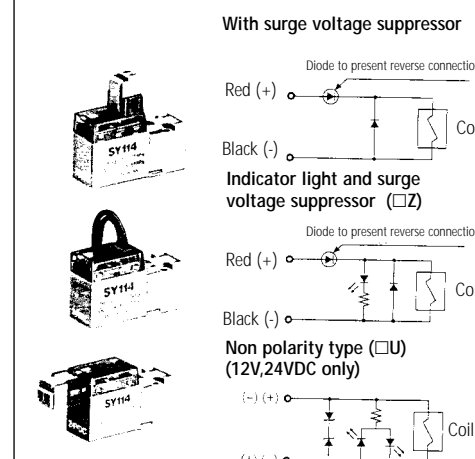


Fig 3

Surge Voltage Suppressor (Fig 4)

(For DC)
Grommet, L and M type plug connector



- Please correctly connect the lead wires to ⊕ (positive) and ⊖ (negative) indications on the connector. For non-polarity type, the lead wires can be connected to either one.
- For DC voltages other than 12, 24 incorrect wiring will cause damage to the surge voltage suppressor circuit. (Wrong polarity will cause trouble.)
- Solenoids, whose lead wires have been pre-wired, are positive side red and negative side black.

Fig 4

Connector Ass'y with Protective Cover

Connector ass'y with protective cover enhances dust protection.

- Effective in preventing possible short circuit problems due to contaminants in contact with connector section.
- Cover material is chloroprene rubber which has excellent weatherability and electric insulation properties. However, be careful not to allow contact with cutting oil.
- Round cord provides neat appearance.

Effect of back pressure when using manifold

Possible malfunction by back-pressure may happen when valves are mounted on manifold. If this problem occurs, take appropriate countermeasures.

Long period continuous energization

Contact SMC when valve is to be continuously energized for a long period.

CAUTION

1. Voltage leakage

Especially when C-R device (Surge voltage suppressor) is used for protection of switching device, note the voltage leakage will be increased by passing voltage leakage through C-R device. Suppress residual voltage leakage as follows:
DC coil: 3% or less of rated voltage

2. Using in low temperature environment

Valve can be used in max. -10°C. Take appropriate countermeasures for avoiding freezing of drain, moisture etc..

3. Mounting orientation

Mounting is free. No specific orientation is necessary.

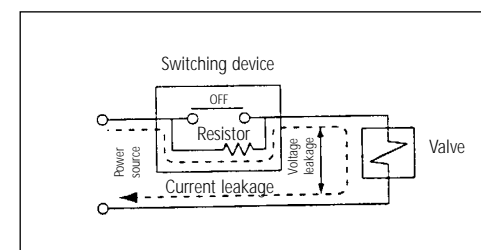


Fig 5

Piping

CAUTION

Tightening torques

When installing fitting, etc., follow the given torque levels below.

Tightening torque

Thread	Appropriate tightening torque Nm (kgf/cm)
M3	0-0.5 (3-5)
M5	1.5-2 (15-20)

Wiring

CAUTION

Polarity

When DC power is connected to a solenoid valve equipped with light and/or surge voltage suppressor, check for polarity indications.

For polarity indications:

No diode to protect polarity:

If polarity connection is wrong, the diode in the valve or switching device at control equipment or power supply may be damaged.

With diode to protect polarity:

If polarity connection is wrong, the valve does not switch.

Lubrication

CAUTION

Lubrication

The valve has been lubricated for life at manufacture, and does not require lubrication in service.

If a lubricant is used in the system, use turbine oil Class 1, ISO VG32 (no additives). Once lubricant is used in the system, you must continue to lubricate as the original lubricant applied during manufacturing will be washed away.

Contact SMC for recommended turbine oil Class 2, ISO VG32 (with additives).

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 stream side of the valve. Filtration degree should be 5µm or less.

Environment

WARNING

- Do not use in atmospheres where the valve is in direct contact with corrosive gases, chemicals, salt water, water or steam.
- Do not use in an explosive atmosphere.
- Do not use in a place subjected to heavy vibration and/or shock. Check the specifications for each series.
- The valve should not be exposed to prolonged sun light. Use a protective cover.
- Remove emissive heat.
- If using in an atmosphere where there is possible contact with water drop-lets, oil, weld spatter, etc., take suitable protectionary measures.
- When the solenoid valve is mounted in a control panel or its energizing time is long, make sure ambient temperature is within valve specification range.

Maintenance

WARNING

Maintenance procedures are shown in operation manual.

If handling is wrong, it causes malfunction and damage of machine or equipment.

Machine maintenance and supply/exhaust of compressed air.

When machine is to be serviced, first check for removal of workpieces and run-away of equipment, etc. Then cut the supply pressure and power and exhaust all compressed air from the system. (Lock-out valve for release of residual pressure is recommended). When the machine is to be restarted, check first that actuators are in their proper start up positions.

Low frequency operation

Valve should be switched at least once every 30 days to avoid malfunction.

Manual override

When manual override is engaged, connected equipment starts to operate. Be sure of safety.

When you enquire about the product, please contact the following

SMC Corporation:

ENGLAND	Phone 01908-563888	TURKEY	Phone 212-2211512
ITALY	Phone 02-927111	GERMANY	Phone 6103-402-0
HOLLAND	Phone 020-5318888	FRANCE	Phone 01-64-76-10-00
SWITZERLAND	Phone 052-396 31 31	SWEDEN	Phone 08-603 07 00
SPAIN	Phone 945-184100	AUSTRIA	Phone 02262-62-280
	Phone 902-255255	IRELAND	Phone 01-4501822
GREECE	Phone 01-3426076	DENMARK	Phone 70 25 29 00
FINLAND	Phone 09-68 10 21	NORWAY	Phone 67-12 90 20
BELGIUM	Phone 03-3551464	POLAND	Phone 48-22-6131847
		PORTUGAL	Phone 02-610 8922