



Installation and Maintenance Manual

Series SYJ300/500/700 Solenoid Valve (3 Port)

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.

SYJ300/500/700 Series Common Solenoid Specifications

Solenoid specifications

| | | |
|----------------------------|----|---|
| 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% rated voltage |
| Power consumption W (Note) | DC | 0.5 (with light: 0.55) |
| Surge voltage suppressor | | Diode |
| Indicator light | | LED |

SYJ300 Series (Fig 1a, b)

Model

| Valve model | Type of actuation | Port size | Effective mm ² (Cv) | Weight g | | |
|------------------------------------|-------------------|-----------|--------------------------------|------------|--|---------------------------|
| | | | | Grommet | L type plug connector, M type plug connector | |
| Body ported type | SYJ312 | N.C. | M3x0.5 | 0.9 (0.05) | 29 | 31 |
| | SYJ322 | N.O. | | | | |
| Base mounted type (with sub-plate) | SYJ314 | N.C. | M5x0.8 | 1.8 (0.1) | 50 (without sub-plate 29) | 52 (without sub-plate 31) |
| | SYJ324 | N.O. | | | | |

Valve specifications

| | | |
|--|----------------|---|
| Fluid | | Air |
| Operating pressure range MPa (kgf/cm ²) | Internal pilot | 0.15~0.7 (1.5~7.1) |
| Ambient and fluid temperature °C | | Max.50 |
| Response time ms (at 0.5MPa [5.1 kgf/cm ²]) (Note 1) | | 15 or less |
| Max. operating frequency Hz | | 10 |
| Manual override | | Non-locking push type, push-locking slotted type |
| Pilot exhaust | | Individual pilot exhaust type. Common exhaust (pilot and main valve) type |
| Lubrication | | Not required |
| Mounting position | | Free |
| Impact/vibration resistance m/s ² | | 150/30 (Note 1) |
| Protection structure | | IP40 |

Note: Impact resistance: There should be no malfunction of the valve after testing, using a drop impact tester, along the valve axis and at right angles to the valve and armature. Carry out each test with the valve energised and de-energised.

Vibration resistance: There should be no malfunction of the valve after testing, using an 8,3 to 2000Hz sweep, along the axis and at right angles to the valve and armature. Carry out each test with the valve energised and de-energised.

Installation

CAUTION

Ensure all air and power supplies are ISOLATED before commencing installation.

WARNING

DO NOT INSTALL THESE VALVES IN EXPLOSIVE ATMOSPHERES.

If these valves are exposed to water or oil droplets, ensure that the valves are protected.

If it is intended to energise a valve for an extended period please consult SMC.

SYJ300 Series (Fig 1a)

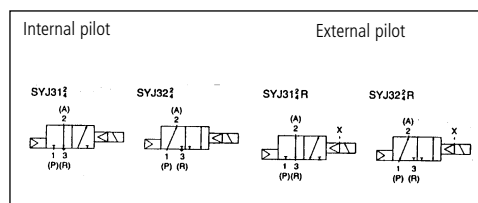


Fig 1a

Manifold Specifications

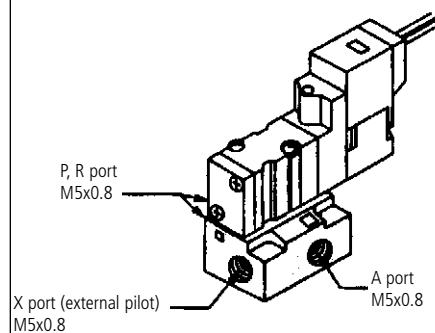
| Type | For internal pilot | | Type 20 | Type 41, S41 | Type 42, S42 |
|---|----------------------------------|-----------------|----------|--------------|----------------|
| | For external pilot | | Type 20R | - | Type 42R, S42R |
| Manifold type | Single base type /B mount | | | | |
| P(SUP) · R(EXH) type | Common SUP · Common EXH | | | | |
| Valve stations | 2-20 stations | | | | |
| A port specifications | Location | Valve | | | |
| | Direction | Base | | | |
| Port size | P,R port | M5x0.8 | | M5x0.8 | Rc(PT) 1/8 |
| | | Rc(PT) 1/8 | | | |
| | A port | M3x0.5 | | M3x0.5 | M5x0.8 |
| | | X port (Note 1) | | M5x0.8 | |
| Valve effective area mm ² (Cv) | Body ported type SYJ□2/SYJ3□2R | 0.9 (0.05) | | | |
| | Base mounted type SYJ3□4/SYJ3□4R | - | | | 1.5 (0.08) |

Note 1: Only for external pilot

Note 2: Value when used on a manifold

External pilot type

SYJ300R



Note: Externally piloted body ported valves (SYJ3□2R) can only be used on the manifold.

Specifications

| Applicable model | Base mounted type (SYJ314R, SYJ324R) | |
|------------------|---|-------------------|
| | Operating pressure range MPa (kgf/cm ²) | Main pressure |
| | External pilot pressure | 0.15~0.7(1.5~7.1) |

Fig 1b

SYJ500 Series (Fig 2a, b)

Model

| Valve model | Type of actuation | Port size | Effective mm ² (Cv) | Weight g (Note) | |
|------------------------------------|-------------------|-----------|--------------------------------|---------------------------|--|
| | | | | Grommet | L type plug connector, M type plug connector |
| Body ported type | SYJ512 | N.C. | M5x0.8 | 43 | 45 |
| | SYJ522 | N.O. | | | |
| Base mounted type (with sub-plate) | SYJ514 | N.C. | Rc(PT) 1/8 | 57 (without sub-plate 43) | 59 (without sub-plate 45) |
| | SYJ524 | N.O. | | | |

Valve Specifications

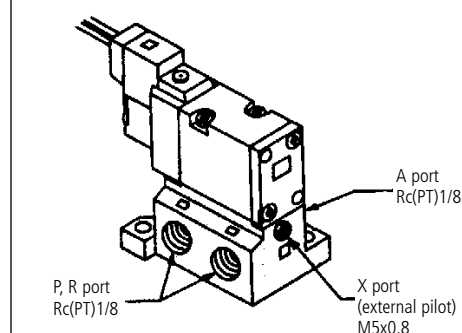
| | | |
|---|----------------|---|
| Fluid | | Air |
| Operating pressure range MPa (kgf/cm ²) | Internal pilot | 0.15~0.7 (1.5~7.1) |
| Ambient and fluid temperature °C | | Max.50 |
| Response time ms (at 0.5MPa [5.1 kgf/cm ²]) | | 25 or less |
| Max. operating frequency Hz | | 5 |
| Manual override | | Non-locking push type, push turn-locking slotted type |
| Pilot exhaust | | Individual pilot exhaust type. Common exhaust (pilot and main valve) type |
| Lubrication | | Not required |
| Mounting position | | Free |
| Impact/vibration resistance m/s ² | | 150/30 (Note 1) |
| Protection structure | | IP40 |

Note: Impact resistance: There should be no malfunction of the valve after testing, using a drop impact tester, along the valve axis and at right angles to the valve and armature. Carry out each test with the valve energised and de-energised.

Vibration resistance: There should be no malfunction of the valve after testing, using an 8,3 to 2000Hz sweep, along the axis and at right angles to the valve and armature. Carry out each test with the valve energised and de-energised.

External pilot type

SYJ500R



Note: Externally piloted body ported valves (SYJ5□2R) can only be used on the manifold. For body ported models with the external pilot option contact SMC.

Specifications

| Applicable model | Base mounted type (SYJ514R, SYJ524R) | |
|------------------|---|-------------------|
| | Operating pressure range MPa (kgf/cm ²) | Main pressure |
| | External pilot pressure | 0.15~0.7(1.5~7.1) |

Fig 2a

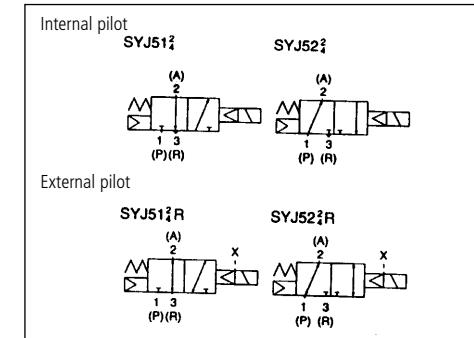


Fig 2b

Manifold Specifications

| Type | For internal pilot | | Type 20 | Type 40 | Type 41 |
|---|----------------------------------|-----------------|----------|-----------------------------------|---|
| | For external pilot | | Type 21R | Type 40R | Type 41R |
| Manifold type | Single base type /B mount | | | | |
| P(SUP) · R(EXH) type | Common SUP · Common EXH | | | | |
| Valve stations | 2-20 stations | | | | |
| A port specifications | Location | Valve | | | |
| | Direction | Base | | | |
| Port size | P,R port | M5x0.8 | | Rc(PT) 1/8 | Rc(PT) 1/8 |
| | | Rc(PT) 1/8 | | | |
| | A port | M5x0.8 | | M5x0.8 | M5x0.8 |
| | | X port (Note 1) | | M5x0.8 | |
| Valve effective area mm ² (Cv) | Body ported type SYJ5□2/SYJ5□2R | 3.4 (0.19) | | | |
| | Base mounted type SYJ5□4/SYJ5□4R | | | M5: 3.8 (0.21) 1/8: 4.7 (0.26) | M5: 3.3 (0.18) 1/8: 4.8 (0.27) C4, C6: 3.8 (0.21) |

Note 1: Only for external pilot

Note 2: Value when used on a manifold

External pilot type

SYJ700R

Note: Externally piloted body ported valves (SYJ7□2R) can only be used on the manifold. For body ported models with the external pilot option contact SMC.

Specifications

| Applicable model | Base mounted type (SYJ714R, SYJ724R) | |
|------------------|---|-------------------|
| | Operating pressure range MPa (kgf/cm ²) | Main pressure |
| | External pilot pressure | 0.15~0.7(1.5~7.1) |

Fig 3b

SYJ700 Series (Fig 3a, b)

Model

| Valve model | Type of actuation | Port size | Effective mm ² (Cv) | Weight g | |
|------------------------------------|-------------------|-----------|--------------------------------|------------|--|
| | | | | Grommet | L type plug connector, M type plug connector |
| Body ported type | SYJ712 | N.C. | Rc (PT) 1/8 | 0.9 (0.05) | 72 |
| | SYJ722 | N.O. | | | |
| Base mounted type (with sub-plate) | SYJ714 | N.C. | Rc (PT) 1/8 | 0.9 (0.05) | 132 (without sub-plate 72) |
| | SYJ724 | N.O. | | | |

Valve Specifications

| | | |
|--|----------------|---|
| Fluid | | Air |
| Operating pressure range MPa (kgf/cm ²) | Internal pilot | 0.15~0.7 (1.5~7.1) |
| Ambient and fluid temperature °C | | Max.50 |
| Response time ms (at 0.5MPa [5.1 kgf/cm ²]) (Note 1) | | 30 or less |
| Max. operating frequency Hz | | 5 |
| Manual override | | Non-locking push type, push-locking slotted type |
| Pilot exhaust | | Individual pilot exhaust type. Common exhaust (pilot and main valve) type |
| Lubrication | | Not required |
| Mounting position | | Free |
| Impact/vibration resistance m/s ² | | 150/30 (Note 1) |
| Protection structure | | IP40 |

Note: Impact resistance: There should be no malfunction of the valve after testing, using a drop impact tester, along the valve axis and at right angles to the valve and armature. Carry out each test with the valve energised and de-energised.

Vibration resistance: There should be no malfunction of the valve after testing, using an 8,3 to 2000Hz sweep, along the axis and at right angles to the valve and armature. Carry out each test with the valve energised and de-energised.

Manifold Specifications

| Type | For internal pilot For external pilot | Type 20 | Type 21 Type 21R | Type 40 | Type 41 Type 41R | Type 42 Type 42R |
|--|--|---------------------------|---------------------|-------------|---------------------|--|
| Manifold type | | Single base type /B mount | | | | |
| P(SUP) - R(EXH) type | | Common SUP - Common EXH | | | | |
| Valve stations | | 2-20 stations | | | | |
| A port specifications | Location | Valve | Valve | Base | Base | Base |
| | Direction | Top | Top | Bottom | Bottom | Side |
| Port size | P,R port | Rc(PT) 1/8 | Rc(PT) 1/4 | Rc(PT) 1/8 | Rc(PT) 1/4 | Rc(PT) 1/8 |
| | A port | Rc(PT) 1/8 | Rc(PT) 1/8 | Rc(PT) 1/8 | Rc(PT) 1/8 | C6 (ø6 one-touch fitting) C8 (ø8 one-touch fitting) |
| | X port ^{Note 1)} | - | M3x0.8 | - | M5x0.8 | M5x0.8 |
| ^{Note 2)} Valve effective area mm ² (Cv) | Body ported type SYJ7 □2/SYJ7 □2R | 10.6 (0.59) | | - | - | - |
| | Base mounted type SYJ7 □4/SYJ7 □4R | - | - | 10.2 (0.57) | 10.2 (0.57) | 1/8: 9.2 (0.51) C6: 8.8 (0.49) C8: 10 (0.56) |

Note 1: Only for external pilot

Note 2: Value when used on a manifold

Tube connections - push-in fittings (Fig 4)

- Ensure the tube ⑤ is cut square.
- Push tube ⑤ into the body ⑦ until tube stops.
- Lightly pull tube ⑤ back to ensure connection.

Tube disconnection (Fig 4)

- Push collet in ①.
- While holding collet in ① withdraw tube ⑤.
- Release collet ①.

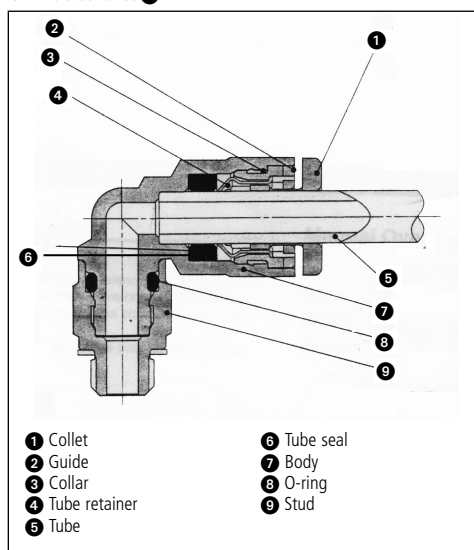


Fig 4

Connection of plug connector (Fig 5)

- Push the connector in a straight line onto the pins of the solenoid ensuring that the lip of the lever is securely positioned in the groove of the solenoid cover.

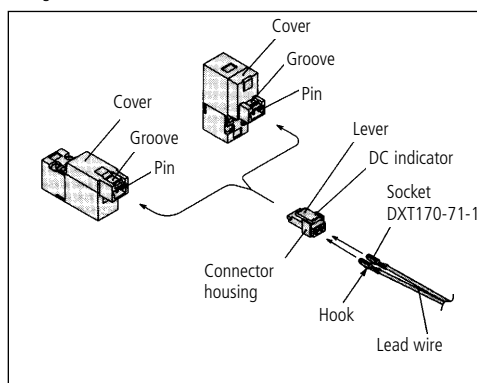


Fig 5

Disconnection of plug connector (Fig 6)

- Press the lever against the connector and pull the connector away from the solenoid.

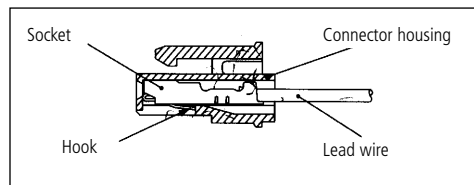


Fig 6

CAUTION

Do not exert excessive force on the wires as this may cause contact failure.

Wiring specifications (Fig 7)

Surge voltage suppressor (For DC)

Grommet, L and M type plug connector

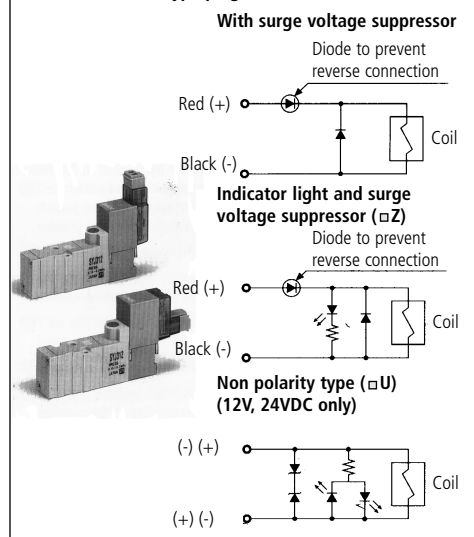


Fig 7

Ensure correct connection of 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 damage the surge voltage suppressor circuit. (Incorrect polarity will cause malfunction).

Solenoids whose lead wires have been pre-wired are red positive and black negative.

CAUTION

Leakage voltage

When a C-R device (surge voltage suppressor) is used for the protection of the switching device, be aware that leakage voltage will be increased by passing this leakage through a C-R device.

Suppress residual leakage voltage as follows:

DC coil: 3% or less of rated voltage

Solenoid manual override (Fig 8 and Fig 9)

WARNING

Exercise extreme CAUTION when operating solenoid manual overrides as connected equipment will commence operation.

Push non-locking type (Fig 8)

- Push down on the manual override button (Fig 8) until it stops ON.
- Hold this position whilst carrying out function checks.
- Release the manual override button and the override will re-set to the OFF position.

Non-locking push type (Standard type)

Push down in the direction of the arrow.

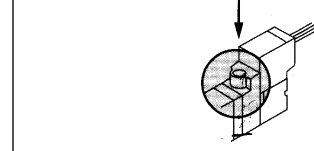


Fig 8

Push locking type (Fig 9)

- Push down and turn the manual override button (Fig 9) clockwise using a small slotted screwdriver until the slot is opposite the locked position.
- Withdraw the screwdriver.

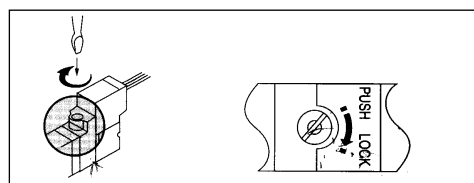


Fig 9

WARNING

In this position the manual override is mechanically locked ON.

Unlocking (Fig 9)

- Insert screwdriver into the override slot, push down and turn anti-clockwise until the slot is opposite the unlock position.
- Remove the screwdriver and the manual override will re-set to the OFF position.

Maintenance

WARNING

Before carrying out any form of maintenance ensure all air and power supplies are isolated.

Removing a valve from the base (Fig 10)

- Disconnect the electrical connector ① (Fig 10). (Also refer to Fig 6).
- Remove the valve holding down screws ② and retain (Fig 10).
- Lift off the valve from the base.
- Retain the gasket ③ (Fig 10).

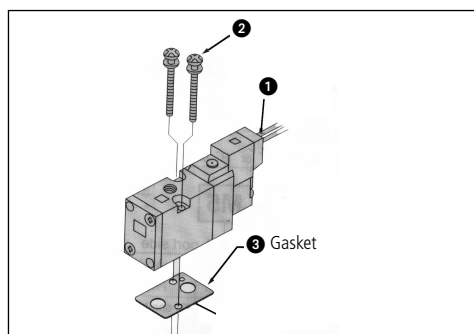


Fig 10

Refitting a valve to a base

- Refit the gasket ③ (Fig 10) ensuring correct orientation.
- Replace the valve.
- Refit the valve holding down screws ② (Fig 10).
- Torque the screws to the following figures:
SYJ300 0.12 N-m { 1.2 kgf/cm }
SYJ500 0.45 N-m { 4.5 kgf/cm }
SYJ700 0.8 N-m { 8.0 kgf/cm }

Fitting blanking plate (Fig 11)

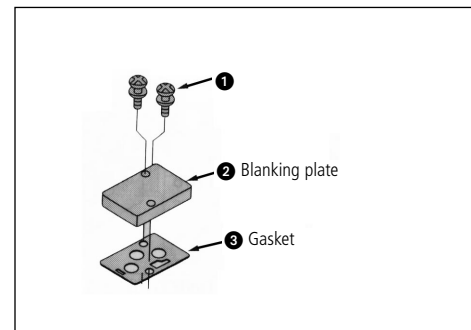


Fig 11

- Remove valve as shown above (Fig 10).
- Fit blanking plate gasket ③ (Fig 11).
- Fit blanking plate ② (Fig 11).
- Fit blanking plate holding down screws ① (Fig 11).
- Torque the screws to the following figures:
SYJ300 0.12 N-m { 1.2 kgf/cm }
SYJ500 0.45 N-m { 4.5 kgf/cm }
SYJ700 0.8 N-m { 8.0 kgf/cm }

Piping

Clamping torque

| Thread | Correct clamping torque N-m (kgf-cm) |
|-----------|--------------------------------------|
| Rc(PT)1/8 | 7-9 (70-90) |
| Rc(PT)1/4 | 12-14 (120-140) |

Lubrication

The valve has been lubricated for life at manufacture and requires no additional lubrication.

CAUTION

However, if a lubricant is to be used, a turbine oil type #1 (ISO VG32) should be used. If a lubricant is used, continuous lubrication must be carried out, as the original lubricant will be washed away.

Energisation time

The double solenoid valve must be energised for at least 0.05 seconds to ensure proper operation.

Low temperature application

May be used down to -10° if the air is sufficiently free of moisture. Please use an appropriate dryer to ensure dry air preventing the valve from freezing.

Energising in a long run

For use of long run energising, its specifications should be consulted.

When you enquire about the product, please contact the following

| SMC Corporation: | |
|------------------|----------------------|
| ENGLAND | Phone 01908-563888 |
| ITALY | Phone 02-92711 |
| HOLLAND | Phone 020-5318888 |
| SWITZERLAND | Phone 052-34-0022 |
| SPAIN | Phone 945-184100 |
| GREECE | Phone 902-255255 |
| FINLAND | Phone 01-3426076 |
| BELGIUM | Phone 09-68 10 21 |
| TURKEY | Phone 212-2211512 |
| GERMANY | Phone 6103-402-0 |
| FRANCE | Phone 01-64-76-10-00 |
| SWEDEN | Phone 08-603 07 00 |
| AUSTRIA | Phone 02262-62-280 |
| IRELAND | Phone 01-4501822 |
| DENMARK | Phone 8738-0800 |
| NORWAY | Phone 67-12 90 20 |
| POLAND | Phone 48-22-6131847 |