



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
Allowable voltage	24, 12, 6, 5, 3
Power consumption W (Note)	±10% rated voltage
Surge voltage suppressor	DC
Indicator light	0.5 (with light: 0.55)
	Diode
	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)

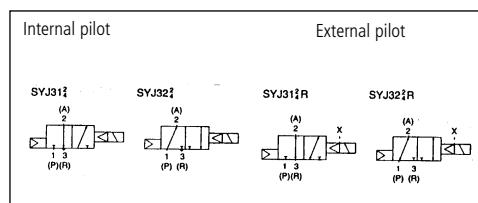


Fig 1a

Manifold Specifications

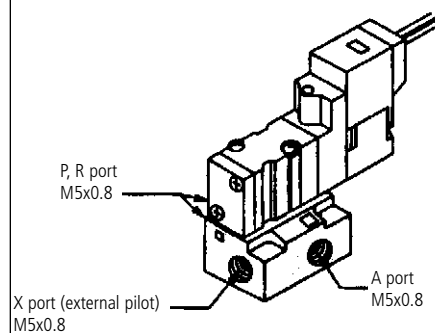
Type	For internal pilot		Type 20	Type 41, S41	Type 42, S42
	For external pilot		Type 20R	-	Type 42R, S42R
Manifold type	Single base type /B mount				
P(SUP) · R(EXH) type	Common SUP · Common EXH				
Valve stations	2-20 stations				
A port specifications	Location	Valve			
	Direction	Base			
Port size	P,R port	Top		Side	
		M5x0.8		Rc(PT) 1/8	
	A port	M3x0.5		M5x0.8	
		M3x0.5		C4 (ø4 one-touch fitting)	
X port (Note 1)	M5x0.8		M5-0.8		
	-		-		
Note 2 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

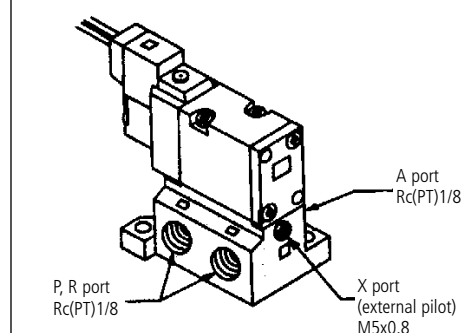
Fluid	Air
Operating pressure range MPa (kgf/cm ²)	Internal pilot 0.15~0.7 (1.5~7.1)
Ambient and fluid temperature °C	Max.50
Response time ms (at 0.5MPa [5.1 kgf/cm ²])	25 or less
Max. operating frequency Hz	5
Manual override	Non-locking push type, push turn-locking slotted type
Pilot exhaust	Individual 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

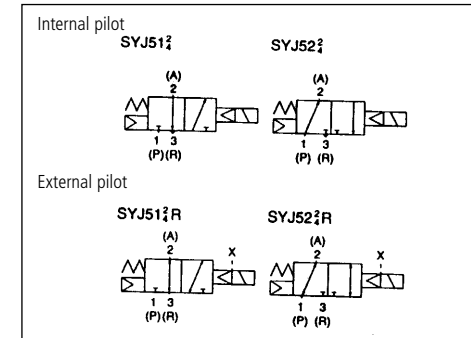


Fig 2b

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	Top		Side	
		Rc(PT) 1/8		Rc(PT) 1/8	
	A port	M5x0.8		M5x0.8	
		M5x0.8		C4 (ø4 one-touch fitting) C6 (ø6 one-touch fitting)	
X port (Note 1)	M5x0.8		M5x0.8		
	-		-		
Note 2 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
	P,R port	Rc(PT) 1/8	Rc(PT) 1/4	Rc(PT) 1/8	Rc(PT) 1/4	Rc(PT) 1/8
Port size	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.

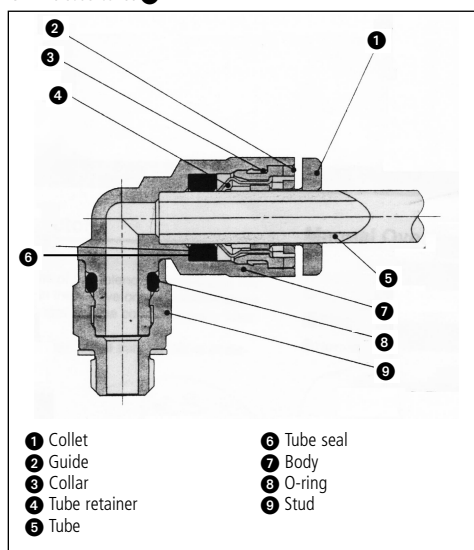


Fig 4

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.

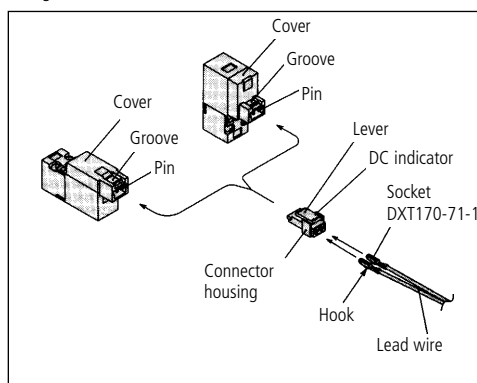


Fig 5

Disconnection of plug connector (Fig 6)

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

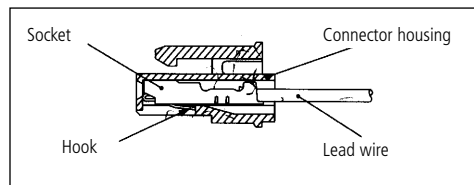


Fig 6

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

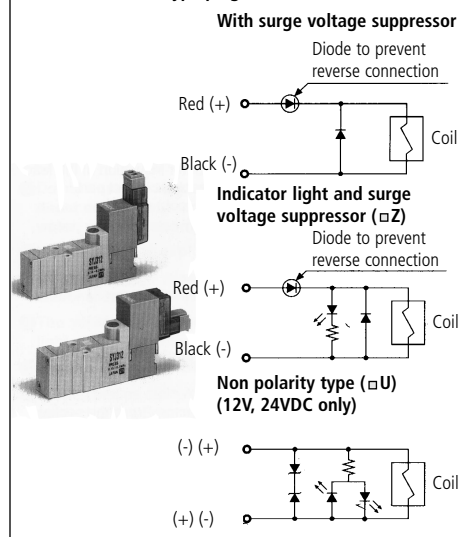


Fig 7

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.

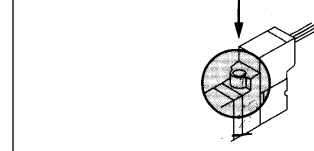


Fig 8

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.

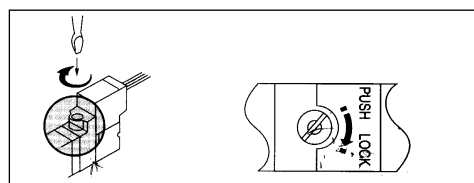


Fig 9

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).

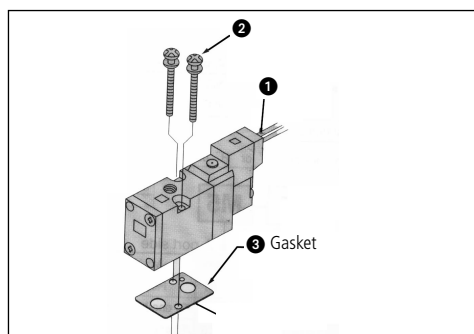


Fig 10

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)

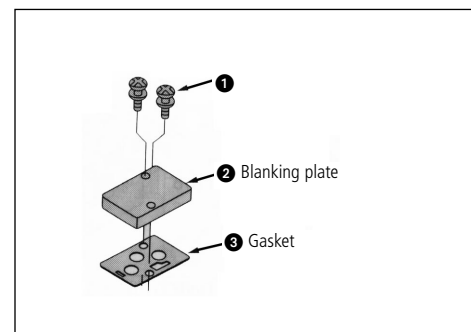


Fig 11

- 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	TURKEY	Phone 212-2211512
ITALY	Phone 02-92711	GERMANY	Phone 6103-402-0
HOLLAND	Phone 020-5318888	FRANCE	Phone 01-64-76-10-00
SWITZERLAND	Phone 052-34-0022	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 8738-0800
FINLAND	Phone 09-68 10 21	NORWAY	Phone 67-12 90 20
BELGIUM	Phone 03-3551464	POLAND	Phone 48-22-6131847