



# Installation and Maintenance Manual

## Series SY3000/5000/7000/300/500

### Body ported/base mounted

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

This manual should be read in conjunction with the current 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.

#### Valve Specifications

Series	SY3000/300	SY5000/500	SY7000
Fluid	Air		
Internal pilot operating pressure range MPa (kgf/cm <sup>2</sup> )			
2 position single	0.15–0.7 (1.5–7.1)		
2 position double	0.1–0.7 (1–7.1)		
3 position	0.2–0.7 (2–7.1)		
Ambient & fluid temperature °C	-10–50°C		
Max operating frequency Hz			
2 position single, double	10	5	5
3 position	3	3	3
Manual override	Non-locking push type, push turn-locking slotted type, push locking lever type		
Pilot exhaust	Common exhaust for main & pilot valve		
Lubrication	Not required		
Mounting position	Free		
Impact/vibration resistance m/s	Note 1) 150/30		
Protection structure	Grommet and Plug connector: IP40, DIN connector: IP65		

Use dry air for operation at low temperature to prevent moisture

Specification are subject to change without notice

Note 1) Shock resistance . . . . . No malfunction from test using drop impact tester, to exist and right angle direction of main valve and armature, each one time when energised and de-energised.

Vibration resistance . . . . . No malfunction from test with 8.3 to 2000Hz 1 sweep, to axis and right angle direction of main valve and armature, each one time when energised and de-energised.

#### Solenoid Specifications

Electrical entry	Grommet (G) (H), L type plug connector (L), M type plug connector (M), *DIN connector (D)	
Coil rated voltage V		
DC	24, 12, 6, 5, 3	
AC 50/60 Hz	*100, 110, 200, 220 (Note 2)	
Allowable voltage	±10% rated voltage	
Power consumption (W)		
DC	0.5 (with light: 0.55 (DIN connector with lamp:0.6))	
Apparent power VA (at rated voltage)		
AC		
100V	0.9 (with light: 1.0)	
110V (115V)	1.0 (with light: 1.1) (1.1 (with light: 1.2))	
200V	1.8 (with light: 1.9)	
220V [230V]	1.9 (with light: 2.0) [2.2 (with light: 2.3)]	
Surge voltage suppressor	Diode (DIN connector is ZNR)	
Indicator light	LED (AC of DIN connector is neon lamp)	

Note 2) AC type is applicable to only DY and DZ, YZ.

#### Torque Figures for Valve Holding Screws

SY3000 Series	0.15 N.m (1.5 kgf)
SY5000 Series	0.6 N.m (6 kgf)
SY7000 Series	1.4 N.m (14 kgf)

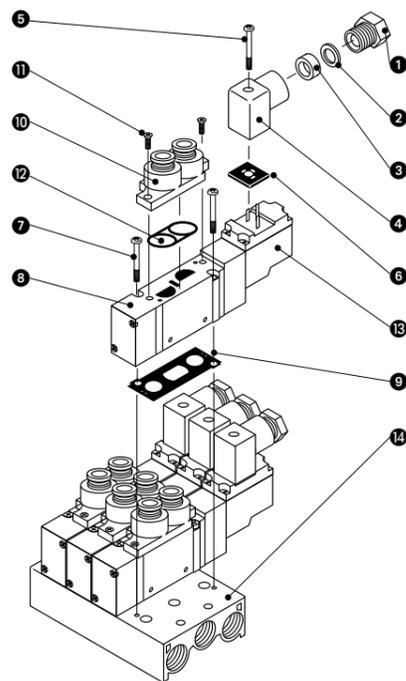


Fig. 1 Body ported type

- 1 Gland nut
- 2 Washer
- 3 Grommet
- 4 Housing
- 5 Set screw
- 6 Gasket
- 7 Valve housing screw
- 8 Valve body
- 9 Mounting gasket
- 10 Port block
- 11 Mounting screw
- 12 Gasket
- 13 Solenoid pilot
- 14 Bar manifold

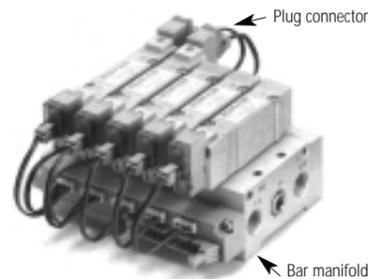


Fig. 2

Base mounted valve: bar manifold type

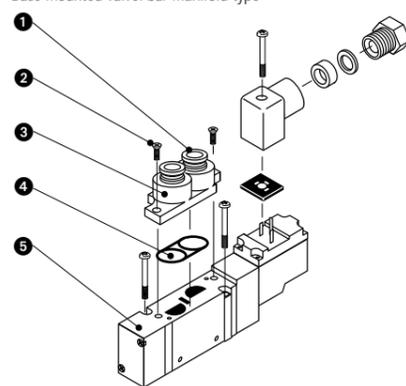


Fig. 3

- 1 Collet flange
- 2 Retaining screw
- 3 Port block
- 4 Gasket
- 5 Valve body

#### 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.

#### Tube Connecting (Fig 3) (Push in Fitting)

1. Ensure that the end of the tube is cut square
2. Push the tube firmly into the fitting until it stops. Pull back on the tube to ensure that it is gripped
3. To dis-connect the tube, push down on the collet flange, hold down and withdraw the tube

#### Porting Block (Body Ported Valve) (Fig 3)

1. To remove the porting block, remove the two block retaining screws and lift off the block
2. Note position of the gasket and retain
3. Replace the block, ensuring the gasket is in place and fit and tighten retaining screws

##### CAUTION

Port block for SY300 (SY500) is not the same one for SY3000 (SY5000).

Do not assemble port block for SY300 (SY500) to SY3000 (SY5000).

Port block assembly

SY300 - 2A - \*\* (for SY300)

SY500 - 2A - \*\* (for SY500)

SY3000 - 6A - \*\* (for SY3000)

SY5000 - 6A - \*\* (for SY5000)

#### Converting from 5 Port to 3 Port Valve (Fig 4)

1. By plugging either port A or B it is possible to convert a 5 port valve to a 3 port N.O. or N.C. valve. Ensure exhaust ports are not restricted. See Fig 4.
2. SY300 and SY500 can be mounted on the manifold base for SY3000 and SY5000 respectively.

#### Manual Override Operation (Fig 5)

##### WARNING

Refer to Fig 5 for correct operation of a manual override exercise extreme caution when operating any manual override as connected equipment will commence operation. Ensure all safety precautions are in place prior to operation

#### Electrical Connector – Fig's 6, 7 & 8

Ensure compressed air and power supplies are isolated before connecting/disconnecting electrical connectors.

#### Connection – Fig 6

Push the connector in a straight line onto the solenoid pins, ensure that the lever, of the connector, is securely positioned in the groove of the solenoid cover

#### Dis-connection:- Fig 6

Press the lever down against the connector body, and pull the connector out from the solenoid in a straight line movement

#### Connection/Disconnection of Socket complete with Lead Wire:- Fig 8

1. Connection:
  - a) Insert the socket into the solenoid, ensuring a straight line entry
  - b) Ensure that the level fully locks into position, by lightly pulling back on the wire
2. Disconnection:
  - a) Press the lever down, and remove the socket from the solenoid in a straight line movement

#### Din-Connector:- Fig 1

1. Dis-connection:
  - a) Unscrew the housing screw(5)
  - b) Lift off the housing(4)
  - c) Retain gasket(6)
2. Re-connection:
  - a) Replace gasket(6) over pins
  - b) Replace housing(4) onto pins, ensuring correct orientation
  - c) Tighten securing screws(5)

#### Connecting Wires to Din Type:- Fig 12

1. Remove housing from the solenoid valve as shown above
1. Unscrew the gland nut(1) from the housing(4) and retain
2. Remove and retain washer(2) and grommet(3)
3. Remove the terminal block(6) from inside of the housing as follows:- using a small screw driver, lever the terminal block(6) out of the housing(4) (Fig 12)

Use the cable cable (ø3.5 to ø7) for wiring to meet IP65 standard (protective construction).  
Tighten the ground nut and set screw with the specified range of torque.

4. Before connecting the wires to the terminal block(6) (no-polarity) thread the wire through the gland nut(1), washer(2) and grommet(3) (Fig 12)
5. Connect the wires to terminals 1 and 2
6. Re-fit terminal blocks(6) into housing(4) and check correct orientation of electrical entry
7. Push grommet(3) into the housing(4)
8. Push washer(2) into the housing(4)
9. Screw in gland nut(1) and fully tighten
10. Re-fit housing(4) to the solenoid valve ensuring the housing(4) is kept vertical when pushing onto the pins
11. Tighten retaining screws(5) securely

#### Change of electrical entry (orientation)

After separating terminal block and housing, mount housing at any position (total 4 directions, per 90 degrees), therefore changing electrical entry.

\* In the case of indicator light, avoid damaging the light with lead wire. (In the case of a manifold type, change in the direction of electrical entry is limited depending on the mounting position).

#### Precautions

Plug connector in or out vertically, never at an angle.

#### Increasing manifold blocks

#### (Figs 13, 14, 15, 16 & 17)

Ensure air and power supplies are isolated from manifold

1. Slacken the bolt holding the manifold base(a) Fig 13
  2. Press the din rail(8) release button(c) and separate the manifold base from the din rail(8)
- Note: Additional bases must be added to the "U" side Fig 13
3. Press the dis-connecting button(b) Fig 13 until button locks, then separate block assemblies
  4. Separate the connector block assembly as in (3) and remove connector mounting screw Fig 14
  5. Slacken the valve mounting screw Fig 15, remove the valve, and remove receptacle housing Fig 15
  6. Insert the (red) common wire of the manifold block to be added, into the pin insertion terminal (N) Fig15 of receptacle housing. Mount on to manifold block and replace valve
  7. Mount the additional manifold block(1) onto the din rail(8) (on the "U" side) refer to circuit diagram and insert black wire Fig 16 & 10
  8. Press blocks together until they click
  9. Replace the lead wire into the manifold block, close lid Fig 15 & 16 ensuring wire is not "pinched"
  10. Hold blocks together and re-tighten bolt(a) Fig 13 to fix to din rail(8) (tightening torque 1Nm)
  11. Insert wires from additional blocks into the appropriate connector Fig 17
  12. Re-apply air and power connections and test

#### Manifold Push-in Fitting Removal & Assembly

#### Fig 11 Type 45

Isolate air and power supplies

1. Remove valve from manifold (as explained earlier)
  2. Remove fitting assembly, retaining clip Fig 11 using a small screwdriver
  3. Remove fitting assemblies from manifold block
- Note: It is possible to replace existing fitting for either Ø4, Ø6 or Ø8
4. Replace fittings into manifold block
  5. Re-fit cup, ensuring it locks into position
  6. Re-fit valve
  7. Re-connect air and power supplies
  8. Function test
- Note: P & R ports cannot be changed (Fig.10)  
Protect O-rings from scratches and dust to prevent air leakage.

#### Individual Supply and Exhaust Spacers (Body Ported)

#### Fig 18 & 19

These spacers fit between the manifold base and the valve as shown in Fig's 18 and 19  
Before removal or fitting isolate air and power supplies from the manifold

1. Fittings:
  - a) Remove valve(1)
  - b) Retain mounting gasket(2)
  - c) Fit supply or exhaust spacer(3) ensuring gasket(4) fits between manifold and spacer(3)
2. Replacement:
  - a) Replace valve(1) and ensure gasket(2) fits between spacer(3) and valve(1)
  - b) Re-instate air and power supplies
- c) Function test

#### Blanking Plate Assemblies

#### 1. Non plug in manifolds Fig 20

This blanking plates is fitted on stations as per valve fitting

#### 2. Plug in manifold Fig 21

As above with the addition of the fitting of a short cap over the electrical connection

#### Supply and Exhaust Block Disc (Plug in Manifold)

#### Fig 9 and 13

Inserted into manifold block when differing supply pressures are required or when valve exhausts effect other stations (Fig 22 and 23) or externally piloted dual pressure valve is used.

#### Remove/Refitting a Valve from a non-plug in Manifold/Base (Fig 9)

1. Ensure compressed air and power supplies are first isolated before dismantling
  1. Remove:-
    - a) Disconnect electrical connections
  2. Refitting:-
    - a) Replace gasket(6) into the recess in the manifold block

- a) assembly(1), check orientation
- b) Re-fit valve and tighten securing screws(5)
- c) Re-connect electrical connections (see section on electrical connection)
- d) Re-connect compressed air and power
- e) Test function

#### Removal/Refitting Valve from a plug-in Manifold (Fig 13)

Ensure compressed air and power supplies are first isolated

1. Remove securing screws(6) and retain
2. Lift (pre-wired) valve off of manifold block(1), retain gasket(7) Refitting:-
  1. Re-place gasket(7) into recess in manifold block(1)
  2. Re-fit valve ensuring plug in connector engages in terminal block and tighten screws(6)
  3. Reconnect air and power supplies

#### Throttle

Due to the fact that the pilot valve and main valve share, exhaust care must be taken to ensure that the piping of the common exhaust air does not become restricted.

#### 'O' Suffix Modifications

#### Base Mounted

The base mounted valve is fitted with a location pin 4 adjacent to the solenoid end. A matching hole 5 is machined into the manifold and the gasket 3 has a matching hole to accept the above pin, ensuring that these are located correctly on assembly

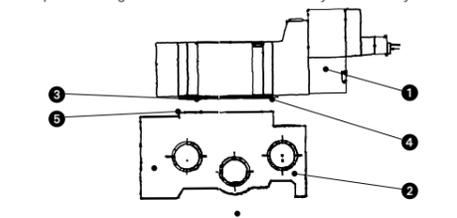


Fig. 25

#### Energising in a long run

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

#### Leakage voltage-Fig 26

When connecting a C-R element in parallel with a switching element, leakage current will flow through the C-R element increasing the leakage voltage. Ensure that the voltage leakage across the coil is as follows:-

- DC Coil - Max. 3% of the rated voltage
- AC Coil - Max. 8% of the rated voltage

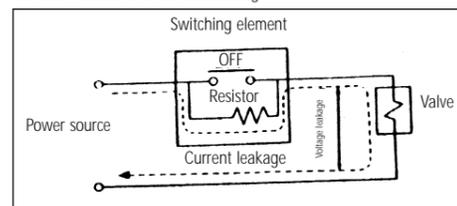


Fig. 26

#### 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.

#### Piping

Thread	Correct clamping torque N-m (kgf-cm)
M5	1.5–2 (15–20)
Rc(PT)1/8	7–9 (70–90)
Rc(PT)1/4	12–14 (120–140)
Rc(PT)3/8	22–24 (220–240)

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 052-396 31 31	SWEDEN	Phone 08-603 07 00
SPAIN	Phone 945-184100	AUSTRIA	Phone 02262-62-280
	Phone 902-255255	DENMARK	Phone 01-4501822
GREECE	Phone 01-3426076	IRELAND	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

**Using a 5 port valve as a 3 port valve**  
 Series SY3/5/7000 may use a N.C. or N.O. 3 way valve by plugging one end of the A, B ports. Be sure not to plug the exhaust ports. Can be used when a double solenoid, 3 way valve is required.

Plug position	B port	A port
Configuration	N.C.	N.O.
Number of solenoids	Single	(Plug) A4 B2 EAS P1 EB3
	Double	(Plug) A4 B2 EAS P1 EB3

Fig. 4

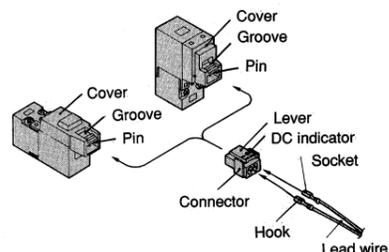


Fig. 6



Fig. 5

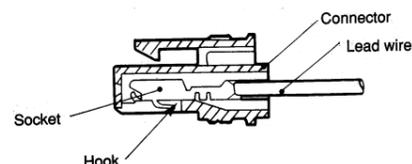
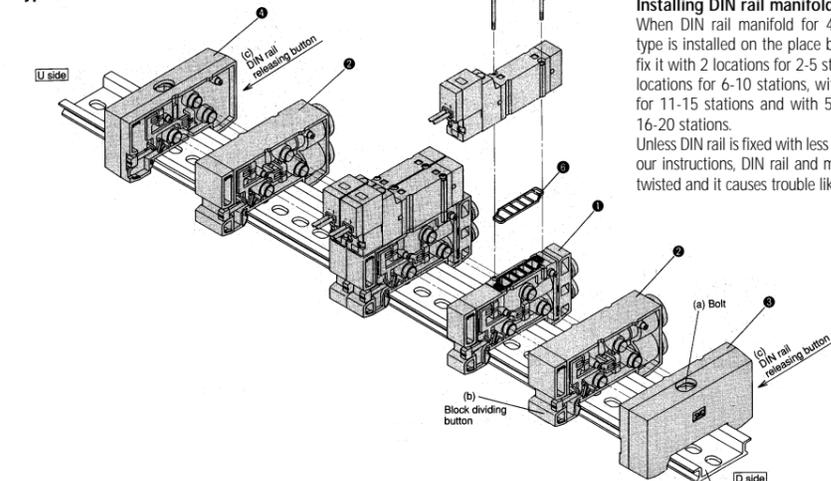


Fig. 8

Type 45



**CAUTION**

**Installing DIN rail manifold**  
 When DIN rail manifold for 45 and 45 □ type is installed on the place by bolt, please fix it with 2 locations for 2-5 stations, with 3 locations for 6-10 stations, with 4 locations for 11-15 stations and with 5 locations for 16-20 stations.  
 Unless DIN rail is fixed with less locations than our instructions, DIN rail and manifold might twisted and it causes trouble like air leakage.

- Note 1: When adding manifold bases to use more than 10 stations, add SUP/EXH block assemblies, as well.  
 Note 2: When bolt (a) for the end block is not sufficiently tightened during reassembly, air leakage may result. Before supplying air, check that there is no gap between blocks and that the manifold block is firmly fixed to the DIN rail in order to ensure air supply without leakage.

Fig. 9

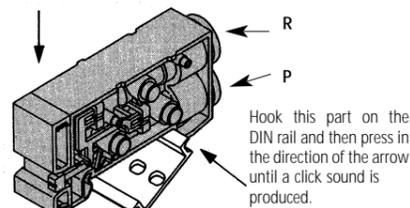


Fig. 10 Supply and Exhaust Block

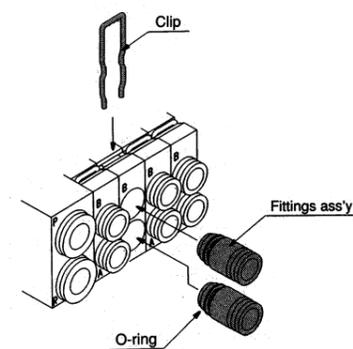


Fig. 11

■ Non-locking push type [standard type]

Press in the direction of the arrow.



■ Push-locking slotted type [D]

While pressing, turn in the direction of the arrow. If you do not turn, the mechanism is the same as that of a non-locking type.



Locked position

■ Push-locking lever type [E]

While pressing, turn in the direction of the arrow. If you do not turn, the mechanism is the same as that of a non-locking type.



Locked position

- Note 1) Manual operation can be accomplished from both the top and the side on the non-locking push type operator.  
 Note 2) Be careful since manual operation will actuate the connected actuators.

Fig. 12

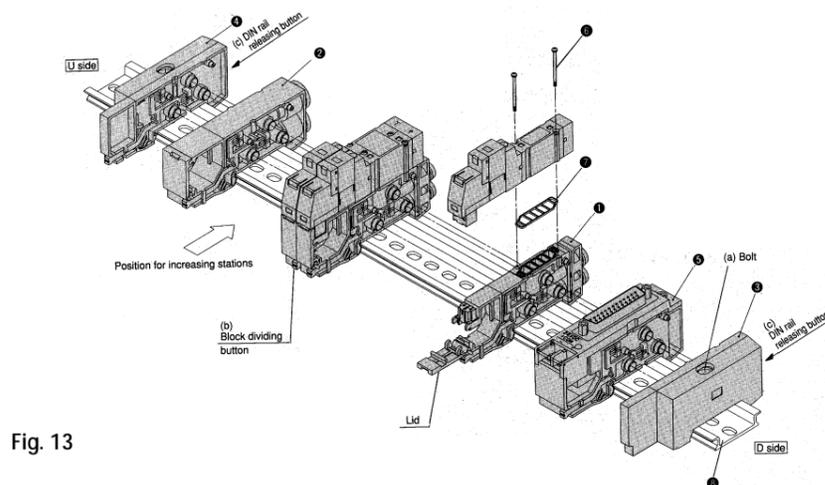


Fig. 13

■ Individual EXH spacer ass'y

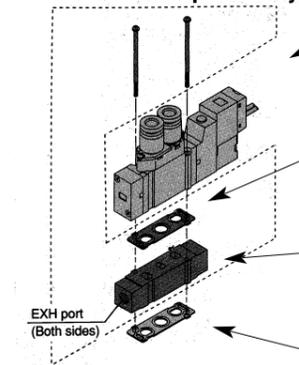


Fig. 18

■ Individual SUP spacer ass'y

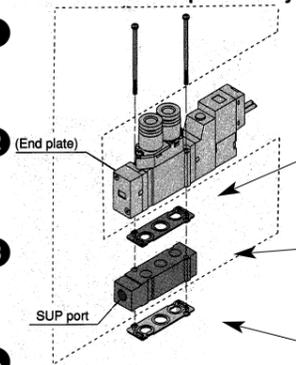


Fig. 19

**CAUTION**

The supply and exhaust ports may be fitted either at the lead wire end of the valve or the end plate side. If supplied factory-assembled they are fitted at the end plate side.

Note: For protection of the wiring unit section from drain, piping at the EA port shall be so arranged that it will not be directly exposed to exhaust from the valve.

One-touch fittings

The size of the ports on the SY manifolds (P, A, B etc.), subplates, valves determines the pitch between the ports, permitting the use of one-touch fittings of the KJ series. However, some fittings of this series will cause clearance problems depending on the type size. Please check catalogue for fitting dimensions before ordering.

■ Blanking plate ass'y



Fig. 20

■ Blanking plate ass'y

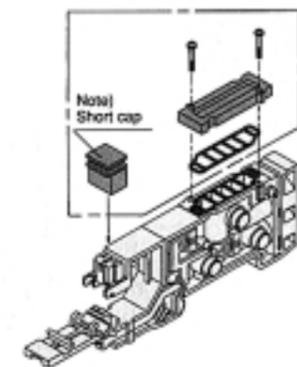


Fig. 21

Fig. 14

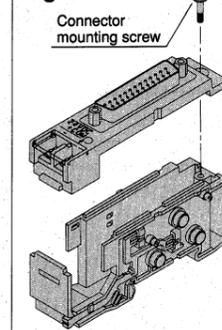


Fig. 15

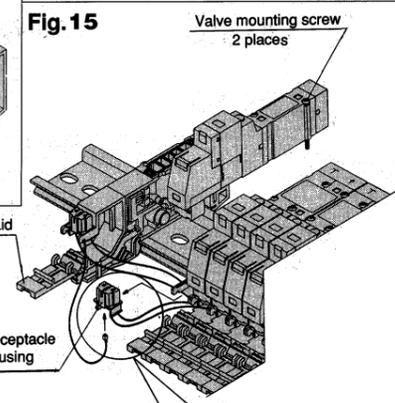


Fig. 16

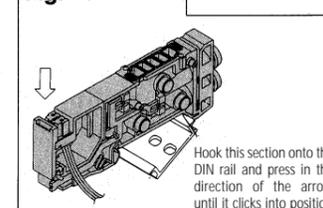
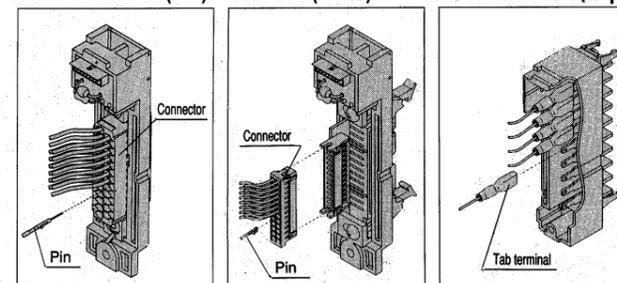


Fig. 17

D-sub connector (45F) Flat cable (45P) Terminal block (45T)



Note: After inserting pins, lightly pull lead wires to check that the pins are locked.

Note: Insert pins after removing the connector from the main unit. After inserting pins, lightly pull lead wires to check that the pins are locked.

Note: Insert tab terminals fully.

■ SUP block disc

When supplying a manifold with more than one pressure, insert a block disc in between the stations subjected to different pressures.

**CAUTION**

- Depending on the type of connector, there is a limit to the number of solenoids that can be used. Manifold bases that can be added cannot exceed the number of usable solenoids.
- The manifold block assembly mounting position for addition of manifold bases is always on the U side, because wires are connected to respective connectors sequentially from the D side.
- When bolt (a) for the end block is not sufficiently tightened during reassembly, air leakage may result. Before supplying air, check that there is no gap between blocks and that the manifold block is firmly fixed to the DIN rail in order to ensure air supply without leakage.

Fig. 22

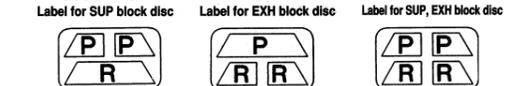
■ EXH block disc

When a valve exhaust affects the other station in the circuit or when an externally piloted, dual pressure valve is used on a standard manifold, insert EXH block disc(s) in between stations to isolate the exhaust.

Block disc indication seal

These seals are attached to the block when SUP and EXH block discs are fitted, for confirmation from outside. (3 sheets respectively)

VZ3000-123-1A



Note: When ordering block discs for installation at the factory, labels will be attached to the manifold showing the locations.

Fig. 23

Fig. 24