Installation and Maintenance Manual
Series SV Manifold Solenoid Valves

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

This manual should be read in conjunction with the leaflet Safety Instructions – Solenoid Valves and this products current catalogue available on request from SMC

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 [Note1], JIS B 8370 [Note2] 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	SV1000 SV2000 SV3000 SV4000		
Fluid			Air
Internal pilot operating pressure range (Mpa)	2 position single 4 position dual 3 port valve		0.15~0.7
	2 position double		0.1~0.7
	3 position		0.2~0.7
External pilot operating pressure range (Mpa)	Operating pressure range		-100kPa~0.7
	Pilot pressure range	2 position single, double 3 position	0.25~0.7
Ambient and fluid temperature ˚C			Max. 50
Max. operating frequency (Hz)	2 position single, double 4 position dual 3 port valve		5
	3 position		3
Manual override			Non-locking push type
			Slotted locking type screwdriver operated
Pilot exhaust	Internal pilot		Common exhaust for main and pilot valve
	External pilot		Individual exhaust for pilot valve
Lubrication			Not required
Mounting position			Free
Impact/vibration resistance m/s²			[Note] 150/30
Protection structure			IP67(IEC529)
Rated coil voltage (V)			24VDC, 12VDC
Allowable voltage			±10% of rated voltage
Power consumption (W)			0.6 (with light: 0.65)
Surge voltage suppresser			Zener diode
Indicator light			LED

Note: Impact resistance: No malfunction from test, using drop impact tester, to axis and right angle direction of main valve and armature, each one time when energised and de-energised.
Vibration resistance: No malfunction from test with from 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 (Value in the initial stage).

JIS symbol

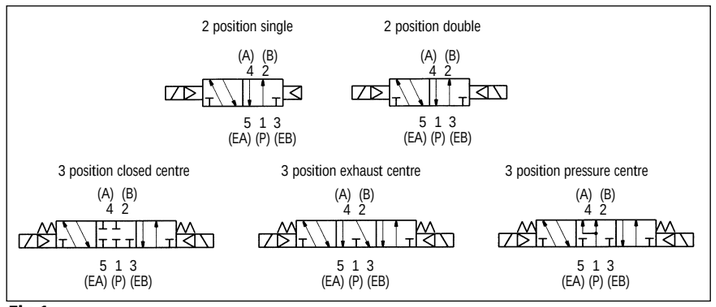


Fig 1

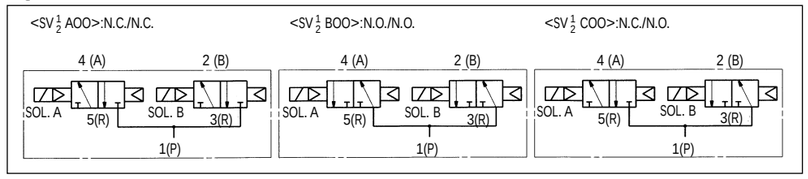


Fig 2

⚠ WARNING

Ensure all air and power supplies are ISOLATED before commencing installation.
DO NOT use these valves in explosive atmospheres.
Do not use in atmosphere where the valve is in direct contact with corrosive gases, chemicals, salt water, water or steam. However, the product of IP65 enclosure or IP67 corresponded (per IEC529) are protected against dust or water, still it is not suitable for the use under the water.
Specification of the product of IP65 enclosure or IP67 corresponded is firstly satisfied by mounting each product appropriately. Please thoroughly read caution of each product.
If it is intended to energise a valve for an extended period of time please consult SMC.
These valves are NOT intended to be used as emergency shut-off valves.
Double solenoid valves must be energised for AT LEAST 0.1 seconds to ensure correct operation.
DO NOT use these valves down to -10 ˚C.
Mount double solenoid, 3 position valves with the spool horizontal.
Ensure valves are operated within the specification range.
All valves series are NON-POLAR.

Plug position		Port B	Port A
Switching		N.C.	N.O.
Number of solenoids	Single	Plug (A) (B) 4 (2) (EA)(P)(EB)	Plug (A) (B) (4) 2 (EA)(P)(EB)
	Double	Plug (A) (B) 4 (2) (EA)(P)(EB)	Plug (A) (B) (4) 2 (EA)(P)(EB)

Fig 3

Lubrication

The valves have been lubricated for life at manufacture and requires no additional lubrication.

⚠ CAUTION

However if a lubricant is to be used, a turbine oil type #(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
Rc 1/8	7~9
Rc 1/4	12~14
Rc 3/8	22~24
Rc 1/2	28~30

⚠ CAUTION

Exhaust restriction

Since the Series SV is a type in which the pilot valve exhaust joins the main valve exhaust inside the valve, care must be taken that the piping from the exhaust port is not restricted.

⚠ CAUTION

Series SV used as a 3 port valve

Using a 5 port valve as a 3 port valve
Series SV valves can be used as normally closed (N.C.) or normally open (N.O.) 3 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. They are convenient at times when a double solenoid type 3 port valve is required.

One touch fittings

⚠ CAUTION

Precautions for one-touch fittings

1. **Tube attachment/detachment for one-touch fittings**
   1) Attaching of tube.
   ① 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 pinchers, nippers, or scissors, etc. If cutting is done with tools other than tube cutters, the tube may be cut diagonally or become flattened etc, making a secure installation impossible, and causing problems such as the tube pulling out after installation or air leakage. Allow some extra length in the tube.
   ② Grasp the tube and push it in slowly, inserting it securely all the way into the fitting.
   ③ After inserting the tube, pull on lightly to confirm that it will not come out. If it is not installed securely all the way into the fitting, this can cause problems such as air leakage or the tube pulling out.

2) **Detaching of tube**
   ① Push in the release bushing sufficiently, and push the collar equally at the same time.
   ② 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 it out.
   ③ When the removed tube is to be used again, cut off the portion which has been chewed before re-using it. If the chewed portion of the tube is used as is, this can cause trouble such as air leakage or difficulty in removing the tube.

⚠ CAUTION

Precautions on other tube brands

1. **when using other than SMC brand tubes, confirm that the following specifications are satisfied with respect to the outside diameter tolerance of the tube.**
   1) Nylon tube within ±0.1mm
   2) Soft nylon tube within ±0.1mm
   3) Polyurethane tube within +0.15mm or less
      within -0.2mm or less

Do not use tubes which do not meet these outside diameter tolerances. It may not be possible to connect them, or they may cause other trouble, such as air leakage or the tube pulling out after connection.

⚠ CAUTION

Circuit board Assembly assembled into manifold

Circuit board Assembly assembled into manifold can't be disconnected. Disconnecting by force may damage components.

⚠ WARNING

Manual override operation

Exercise extreme CAUTION when operating a solenoid manual override as connected equipment will commence operation. Ensure all safety measures are in place.
Non locking push type (Fig. 4)
1. Push down on the manual override button, until it stops, using a small-bladed screwdriver.
2. Hold this position for the duration of the check (ON position).
3. Release the button and the override will re-set to the OFF position.

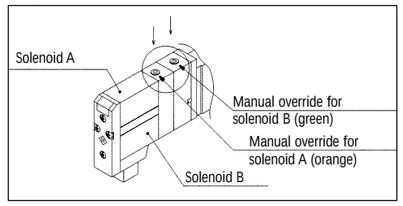


Fig 4

Slotted locking type screwdriver operated (Fig. 5)

To lock
1. Using a small-bladed screwdriver in the slot push the manual override down until it stops.
2. Turn the override 90˚ in the direction of the arrow until it stops (ON position)
3. Remove the screwdriver.

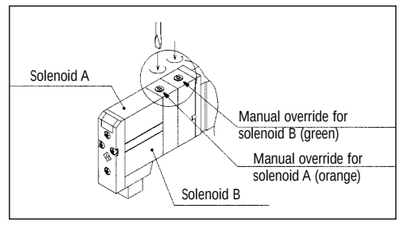


Fig 5

⚠ WARNING

In this position the manual override is in the locked 'ON' position.
To un-lock
1. Place a small-bladed screwdriver into the slot of the manual override.
2. Turn the screwdriver 90˚ in the reverse direction.
3. Remove the screwdriver. The manual override will re-set to the OFF position.

⚠ CAUTION

Indication mark of manifold

Manifold block of series SV are marked with "S" or "D" as following diagram. This mark indicates the type of board Assembly (for single wiring or double wiring) which is mounted inside the manifold block. All stations will be double wiring specification (D) unless wiring method is specified in a manifold specification. In this case, either single or double valve can be mounted at optional position, however, when single valve is used, there will be blank number in the control signal. To avoid making blank number, please indicate position of the manifold block, whether single wiring (S) or double wiring (D), by manifold specification. (Please note that double, 3 position nor 4 position valve cannot be used for manifold block of single wiring specification (S).)

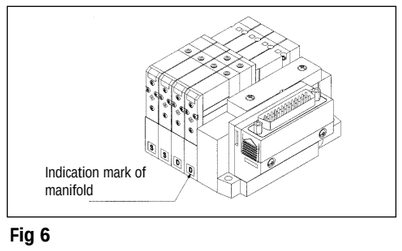
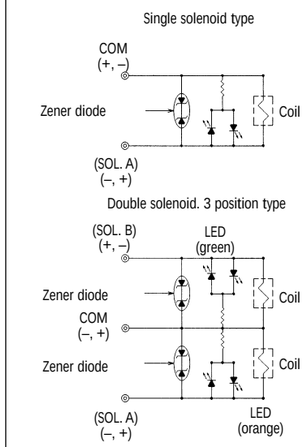


Fig 6

⚠ CAUTION

Light surge voltage suppresser

NO POLARITY TYPE in the solenoid valve Light/Surge voltage suppresser



Surge voltage suppresser

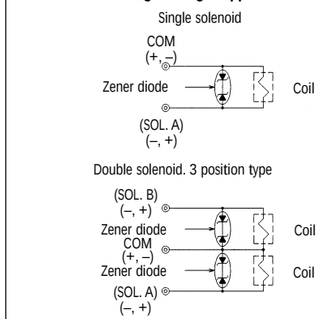


Fig 7

⚠ CAUTION

Light indication

In the case of light/surge voltage suppresser, the light window turns orange when solenoid A is energised, and it turns green when solenoid B is energised.

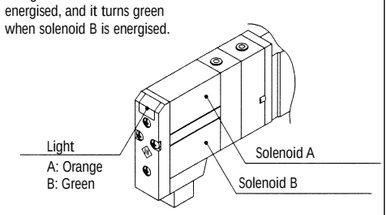


Fig 8

⚠CAUTION

Changing the connector entry direction

Direction of the entry of connector such as D sub connector and flat cable can be changed. To change the direction of entry, push lever at both ends to remove the connector and change the direction as following diagram. As there is lead wire Assembly in the connector, do not pull by force or twist, or it would cause breakage, such as breakage of wire. Please be careful that lead wire would not be caught in when mounting connector.

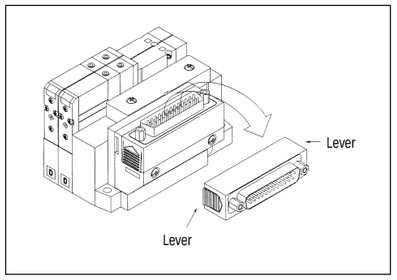
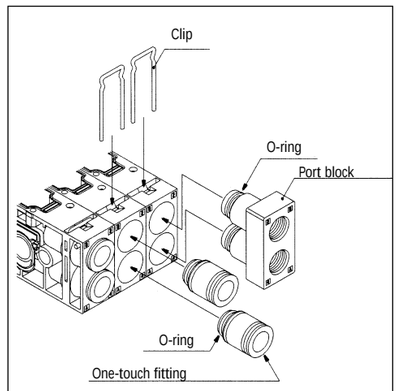


Fig 9



Note 1) Take care not to get scratches or dirt, etc. on O-rings, as this can cause air leakage.

Note 2) When removing a fitting assembly from a valve, after removing the clip, connect a tube or plug (KQP-□ □) to the one-touch fitting and pull it out by holding the tube (or plug). If the fitting assembly is pulled out by holding its release bushing (resin part), the release bushing may be damaged.
However, as for port block Assembly 02 and 03, pull out as it is.

Note 3) Before disassembly, be sure to turn off the electric power and air supplies. Also, since air may still remain inside actuators, piping and manifolds, confirm that this air has been completely exhausted before performing any work.

Fig 10

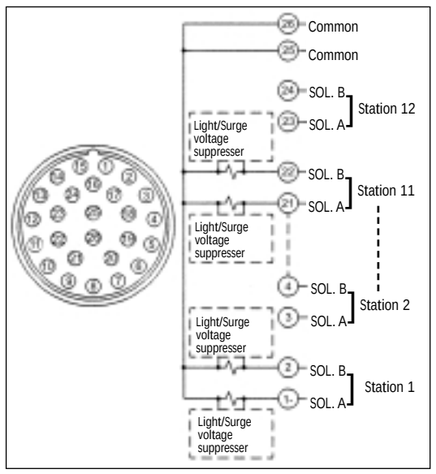
⚠CAUTION

Replacement of fittings

By replacing a valve's fitting assembly, it is possible to change the connection diameter of the A and B ports.
When replacing it, pull out the fitting assembly after removing the clip with a flat head screwdriver, etc. To mount a new fitting assembly, put it into place and then fully reinsert the clip.

Manifold electrical wiring

10C/16C Multi connector type (26 pins)



Number of solenoids which can be used

Model		Maximum number of solenoids
10 Type Tie-rod base	SV1000 to SV4000	24
16 Type Cassette base	SV1000	18
	SV2000	24

- This circuit is for double wiring of up to 12 stations. Please refer to the table as number of the solenoid valves that can be used may differ depending on the manifold type. In case of single solenoid, connect to SOL A. When wiring is specified by manifold specification, they are connected from 1, 2, 3, 4 ..... in order, without leaving any connector blank, to signal A in case of single and to signal A and B in case of double.
- Units are counted from the D side (connector side), starting with the first station.
- Either +COM or -COM can be used as there is no polarity in the solenoid valve.

Fig 11

10F/16F D-sub connector type (25 pins)

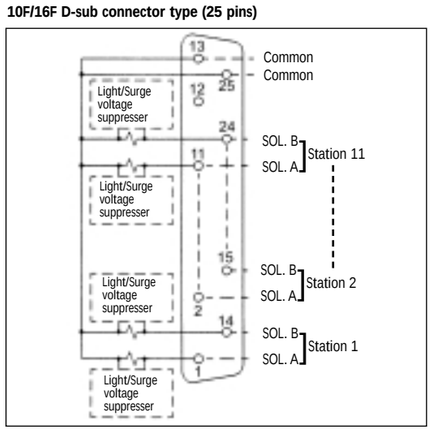


Fig 12

Number of solenoids which can be used

Model		Maximum number of solenoids
10 Type Tie-rod base	SV1000 to SV4000	23
16 Type Cassette base	SV1000	18
	SV2000	23

- This circuit is for double wiring of up to 11 stations. Please refer to the table as number of the solenoid valves that can be used may differ depending on the manifold type. In case of single solenoid, connect to SOL A. When wiring is specified by manifold specification, they are connected from 1, 14, 2, 15 ..... in order, without leaving any connector blank, to signal A in case of single and to signal A and B in case of double.
- Units are counted from the D side (connector side), starting with the first station.
- Either +COM or -COM can be used as there is no polarity in the solenoid valve.

10P/16P Flat cable type (26 pins)

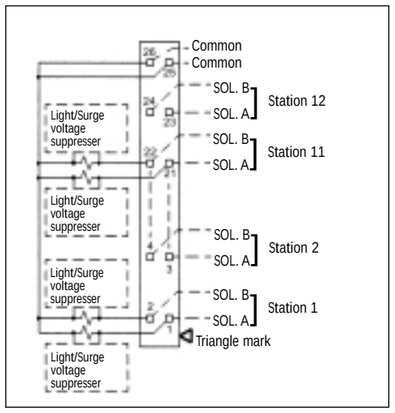


Fig 13

Number of solenoids which can be used

Model		Maximum number of solenoids
10 Type Tie-rod base	SV1000 to SV4000	24
16 Type Cassette base	SV1000	18
	SV2000	24

- This circuit is for double wirig of up to 12 stations. Please refer to the table as number of the solenoid valves that can be used may differ depending on the manifold type. In case of single solenoid, connect to SOL A. When wiring is specified by manifold specification, they are connected from 1, 2, 3, 4 ..... in order, without leaving any connector blank, to signal A in case of single and to signal A and B in case of double.
- Units are counted from the D side (connector side), starting with the first station.
- Wire with a triangle mark as a criteria, as terminal numbers are not indicated on a flat cable.
- Either +COM or -COM can be used as there is no polarity in the solenoid valve.

10PG/16PG Flat cable type (20 pins)

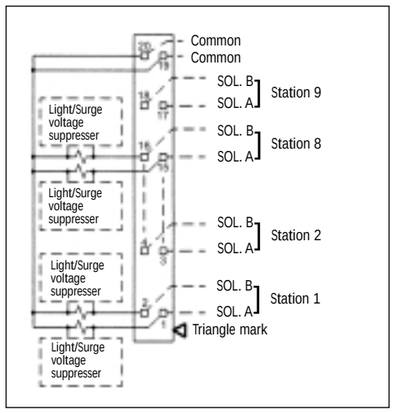


Fig 14

Number of solenoids which can be used

Model		Maximum number of solenoids
10 Type Tie-rod base	SV1000 to SV4000	18
16 Type Cassette base	SV1000	
	SV2000	

- This circuit is for double wiring of up to 9 stations. Please refer to the table as number of the solenoid valves that can be used may differ depending on the manifold type. In case of single solenoid, connect to SOL A. When wiring is specified by manifold specification, they are connected from 1, 2, 3, 4 ..... in order, without leaving any connector blank, to signal A in case of single and to signal A and B in case of double.
- Units are counted from the D side (connector side), starting with the first station.
- Wire with a triangle mark as a criteria, as terminal numbers are not indicated on a flat cable.
- Either +COM or -COM can be used as there is no polarity in the solenoid valve.

10PH/16PH Flat cable type (10 pins)

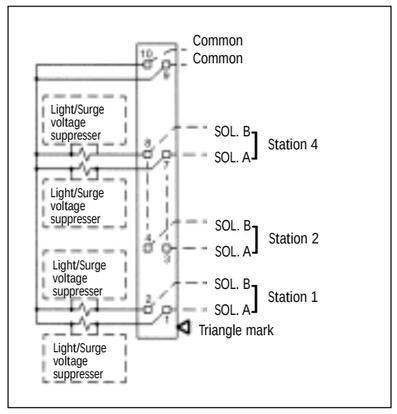


Fig 15

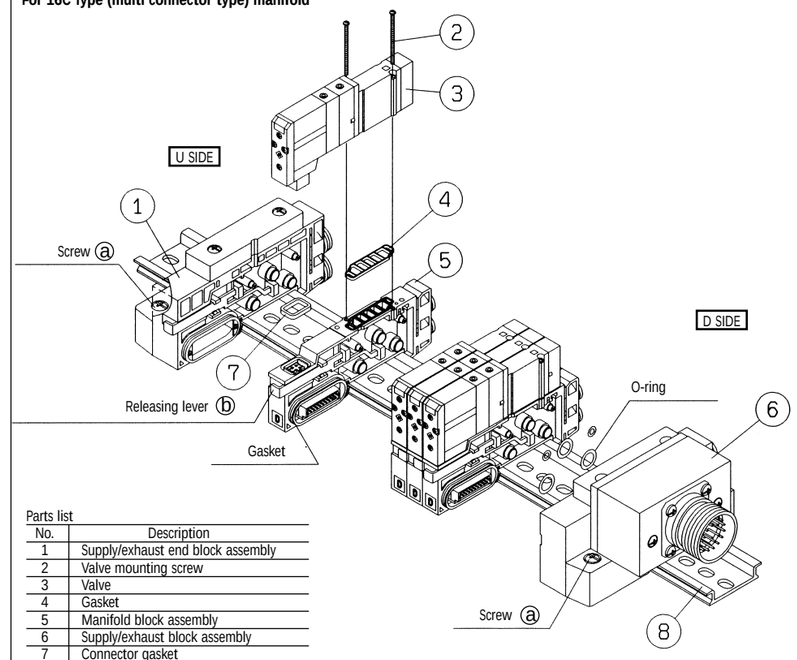
Number of solenoids which can be used

Model		Maximum number of solenoids
10 Type Tie-rod base	SV1000 to SV4000	8
16 Type Cassette base	SV1000	
	SV2000	

- Thiscircuit is for double wiring of up to 4 stations. Please refer to the table as number of the solenoid valves that can be used may differ depending on the manifold type. In case of single solenoid, connect to SOL A. When wiring is specified by manifold specification, they are connected from 1, 2, 3, 4 ..... in order, without leaving any connector blank, to signal A in case of single and to signal A and B in case of double.
- Units are counted from the D side (connector side), starting with the first station.
- Wire with a triangle mark as a criteria, as terminal numbers are not indicated on a flat cable.
- Either +COM or -COM can be used as there is no polarity in the solenoid valve.

16 Type: Exploded view/cassette base manifold

For 16C Type (multi connector type) manifold



Parts list

No.	Description
1	Supply/exhaust end block assembly
2	Valve mounting screw
3	Valve
4	Gasket
5	Manifold block assembly
6	Supply/exhaust block assembly
7	Connector gasket
8	Din rail

Fig 16

⚠CAUTIONS

1) Be sure to cut off the power and the air supply, and confirm that no air is left in actuators, piping and manifolds before disassembling, as remaining air may cause an accident.
2) If the connection between blocks or tightening of the screw s ⓐ are insufficient, it may cause air leakage. Before supplying air, check that there is no clearance between the blocks and the manifold blocks are firmly mounted on the DIN rail in order to ensure air supply without leakage.
3) Before disassembling and installation, confirm that rubber parts such as gaskets and O-rings are assembled to every block. If it is missing the rubber parts, air leakage may occur and the specifications of IP65 and IP67 can not be satisfied.

16 Type: How to increase cassette base manifold

1 Loosen the screws ⓐ fixing the manifold base (2 places on one side). (Loosen the fixing screws on 4 places to dismount the manifold base from the DIN rail).

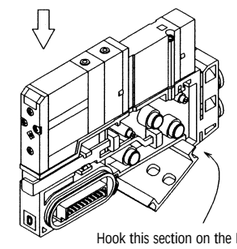
2 Pull the releasing lever ⓑ of the manifold block assembly where an additional manifold block assembly is mounted with a minus screwdriver, and disconnect the manifold block assemblies.

3 Mount the additional manifold block assembly on the DIN rail as shown in the figure.

4 Connect the block assemblies pressing against each other and firmly press the releasing lever ⓑ to the end.

⚠CAUTION

(Screw torque: 1.4 N-m)



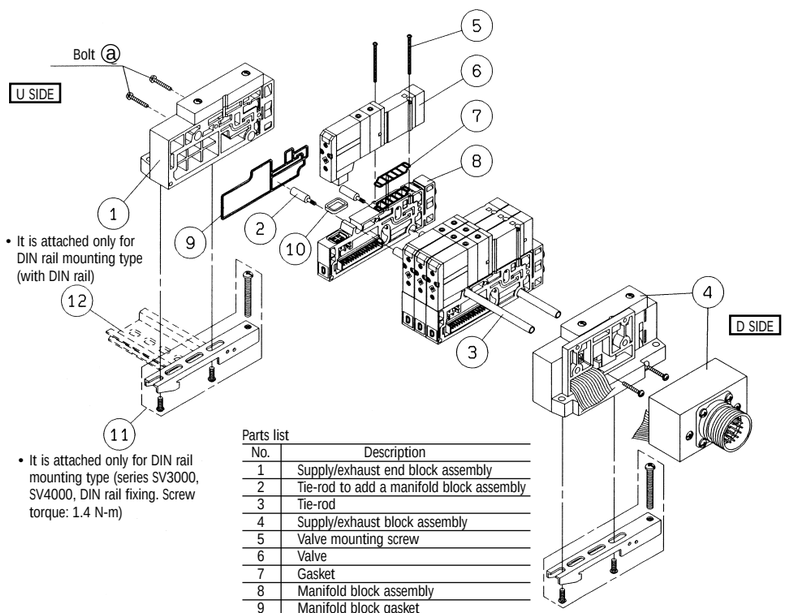
Hook this section on the DIN rail and press in the direction of the arrow.

Figure. Mounting procedure of block

Fig.17

10 Type: Exploded view/tie-rod base manifold

For 10C Type (multi connector type) manifold



Parts list

No.	Description
1	Supply/exhaust end block assembly
2	Tie-rod to add a manifold block assembly
3	Tie-rod
4	Supply/exhaust block assembly
5	Valve mounting screw
6	Valve
7	Gasket
8	Manifold block assembly
9	Manifold block gasket
10	Connector gasket
11	Clamp metal fitting assembly
12	Din rail

Fig 18

⚠ CAUTIONS

1) Be sure to cut off the power and the air supply, and confirm that no air is left in actuators, piping and manifolds before disassembling, as remaining air may cause an accident.
2) If the tightening of the bolts ⓐ are insufficient, it may cause air leakage. Before supplying air, check that there is no clearance between the blocks are firmly mounted on the DIN rail in order to ensure air supply without leakage.
3) Before disassembling and installation, confirm that rubber parts such as gaskets are assembled to every block. If it is missing the rubber parts, air leakage may occur and the specifications of IP65 and IP67 can not be satisfied.

10 Type: How to increase tie-rod base manifold

1 Loosen bolts ⓐ on the U side to dismount the SUP/EXH end block assembly ①.

2 Screw in the additional tie-rod ②. (Screw it in until there is no clearance between the tie-rods).

3 Connect the additional manifold block assembly to the supply/exhaust end block assembly, and tighten the bolts ⓐ.

⚠ CAUTION

Screw torque	
SV1000, SV2000	0.6 N-m
SV3000	1.4 N-m
SV4000	2.9 N-m

Note) For reducing the number of manifolds, order your required number of tie-rods (3) to reduce the manifold separately. (In the case of DIN rail mounting type, be sure to tighten a tension bolt before tightening a DIN rail fixing screw).

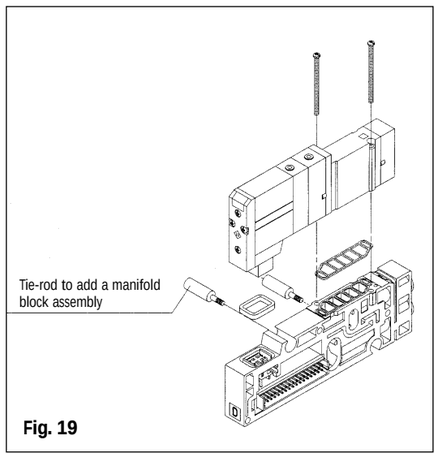
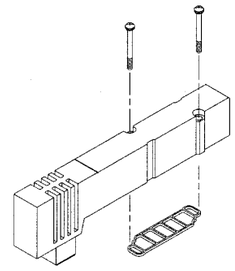


Fig. 19

Manifold options

■ Blanking plate assembly

When the valve is scheduled to be increased and maintains uses.



Series	Assembly parts No.
SV1000	SV1000-67-1A
SV2000	SV2000-67-1A
SV3000	SV3000-67-1A
SV4000	SV4000-67-1A

Fig 20

■ Blocking disk assembly

[SUP. Blocking disc]
By installing a SUP. blocking disk in the pressure supply passage of a manifold valve, it is possible to supply more than two different high and low pressures to one manifold.
[EXH. Blocking disc]
By installing an EXH. blocking disk in the exhaust passage of a manifold valve, it is possible to divide the valve's exhaust so that it does not affect another valve. Also, can be used for combination positive pressure and vacuum application. (Two blocking disks are needed to divide both exhausts. However, in case of 10 type manifold of series SV1000 and 2000, only 1 piece is required).

TYPE 10 (Tie-rod base manifold) TYPE 16 (Cassette base manifold)

Fig 21

		10 TYPE (Tie-rod base manifold)	16 TYPE (Cassette base manifold)
SV1000	SUP.	SV1000-59-1A	SX3000-77-1A
	EXH	SV1000-59-2A	
SV2000	SUP.	SV2000-59-1A	SX5000-77-1A
	EXH.	SV2000-59-2A	
SV3000	SUP.	SV3000-59-1A	
	EXH.	SV3000-59-1A	
SV4000	SUP.	SY9000-61-2A	
	EXH.	SY9000-61-2A	

■ Indicator stickers for blocking disk

These stickers are to be put on valves in which SUP and EXH blocking disk have been installed so that confirmation is possible from the outside (3pcs. of each are included).

SV1000-74-1A

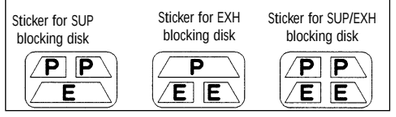


Fig 22

- If blocking disks are ordered on manifold specification sheet etc. at the same time that manifold are ordered, stickers will be attached to the valves with blocking disk installed before shipment.

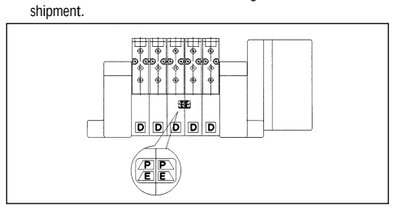
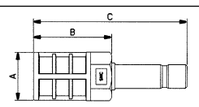


Fig 23

■ Silencer with one-touch fitting

This silencer can be mounted on the manifold's port R (exhaust) with a single touch.



Dimension table

Series	Model	Effective sectional area	A	B	C
SV1000 (ø8)	AN203-KMB	14mm	ø16	26	51
SV2000 (ø10)	AN200-KM10	26mm	ø22	53.8	80.8
	AN300-KM10	30mm	ø25	70	87

Fig 24

■ Plugs (white)

These are inserted in cylinder ports or SUP/EXH ports which are not being used.
They can be ordered in multiples of 10 pieces.

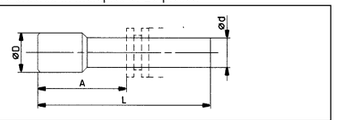


Fig 25

Applicable fitting size ød	Model	A	L	D
ø4	KQ2P-04	16	32	ø6
ø6	KQ2P-06	18	35	ø8
ø8	KQ2P-08	20.5	39	ø10
ø10	KQ2P-10	22	43	ø12
ø12	KQ2P-12	24	44.5	ø14
ø1/8	KQ2P-01	16	31.5	ø5
ø5/32	KQ2P-03	16	32	ø6
ø1/4	KQ2P-07	18	35	ø8.5
ø5/16	KQ2P-09	20.5	39	ø10
ø3/8	KQ2P-11	22	43	ø11

If additional information is required, please contact your local SMC office, details are shown below:

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	**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 22-610 8922