



Installation and Maintenance Manual

Series SZ3000 Cassette Type Manifold Solenoid Valves

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

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

Safety Instructions

These safety instructions are intended to prevent a hazardous situation and/or equipment damage. These instructions indicate the level of potential hazard by label of "Caution", "Warning" or "Danger". To ensure safety, be sure to observe ISO 4414¹⁾, JIS B 8370²⁾ 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. **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		SZ3000		
Fluid		Air		
Internal pilot operating pressure range MPa (kgf/cm ²)	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)		
	4 position dual 3 port	0.15-0.7 (1.5-7.1)		
External pilot operating pressure range MPa (kgf/cm ²)	Operating pressure range			
	-100kPa-0.7 (10 Torr-7.1)			
	Pilot pressure range	2 position single	0.25-0.7 (2.5-7.1)	
		2 position double	0.25-0.7 (2.5-7.1)	
3 position		0.25-0.7 (2.5-7.1)		
Ambient and fluid temperature °C		Max. 50		
Max. operating frequency Hz	2 position single, double	10		
	3 position	3		
Manual override		Non-locking push type, Push & turn locking slotted type		
Pilot		Common exhaust for main and pilot valve		
Lubrication		Not required		
Mounting position		Free		
Impact/vibration resistance m/s ²		150/30 ^{NS}		
Protection structure		IP40		

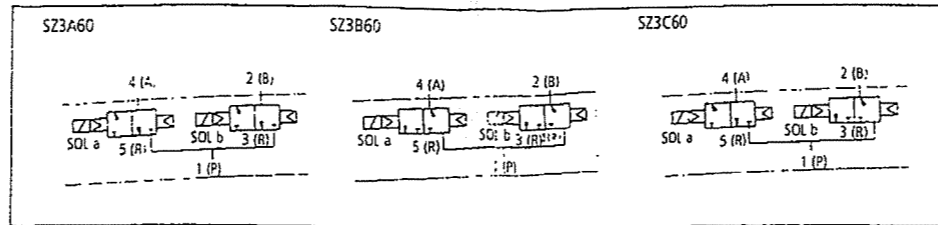
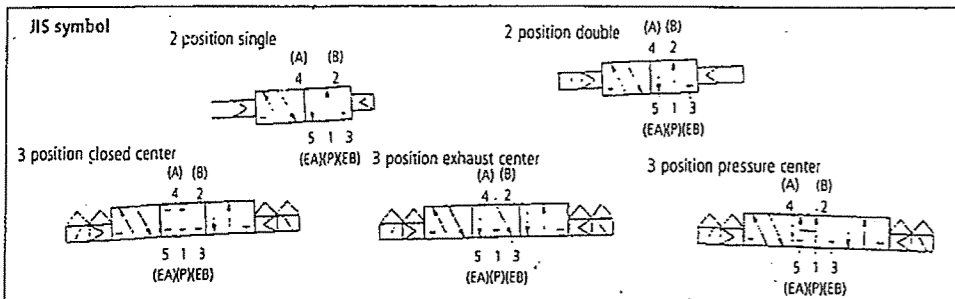
Note: impact resistance: No malfunction from test, using drop impact tester, to axis and right angle direction of main valve and armature, each one time when energized and de-energized.

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 energized and de-energized. (Value in the initial stage.)

Solenoid Specifications

Electrical entry	L Type (for plug-in) connector (M)
Rated coil voltage V ^{AC}	24, 12, 6, 5, 3DC
Allowable voltage fluctuation	±10% of rated voltage
Power consumption W	0.6 (with light: 0.65)
Surge voltage suppressor	Diode
Indicator light	LED

Note) Only 24V and 12VDC are available for plug-in use.



WARNING

Ensure all air and power supplies are ISOLATED before commencing installation. DO NOT use these valves in explosive atmospheres. Protect these valves from oil and water splashes. 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 second 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.

Lubrication

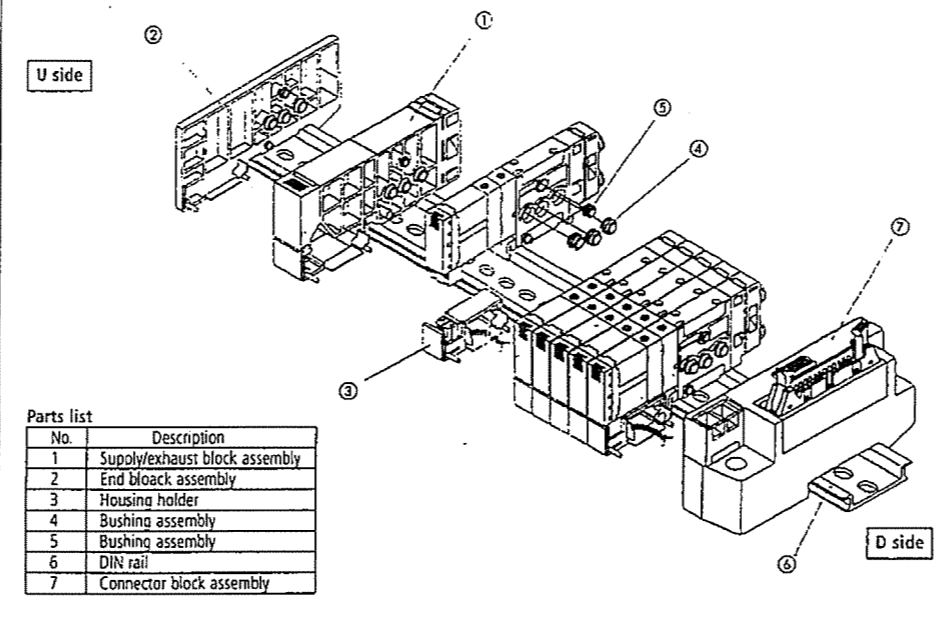
The valves has been lubricated for life at manufacture and requires no additional lubrication.

CAUTION

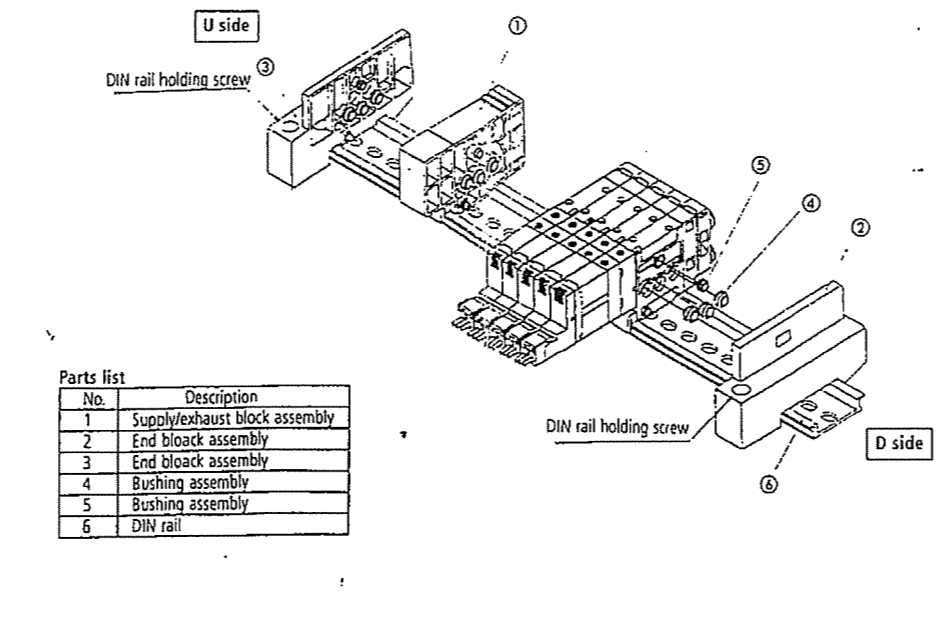
However if a lubricant is to be used, a turbine oil type # (ISO VG32) should be used. If a lubricant is used, continuous lubrication must be carried out, as the original lubricant will be washed away.

Manifold Exploded View

60P manifold (plug-in, flat cable type)



Type 60 (non-plug-in) manifold



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 a 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 reusing 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

Precautions for One-touch fittings

The pitch of each piping port (P, A, B, a, etc.) for Series SZ is based on the assumption that Series KJ One-touch fittings will be used. For this reason, when other fittings are used, they may interfere with one another depending on their types and sizes. Therefore, the dimensions of the fittings to be used should first be confirmed in their respective catalogs.

CAUTION

Exhaust restriction

Since the Series SZ 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 SZ3000 used as a 3 port valve

Using a 5 port valve as a 3 port valve
Series SZ3000 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.

Plug position	Switching	
	Port B	Port A
Single	N.C.	N.O.
Double	N.C.	N.O.

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 5)

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.

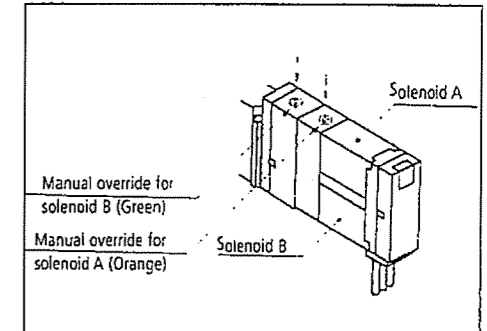


Fig 5

Push-locking slotted type (Fig 6)

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.

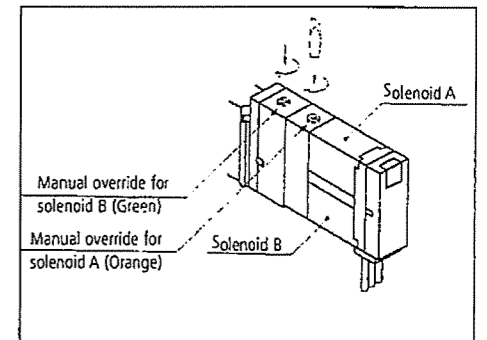


Fig 6

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

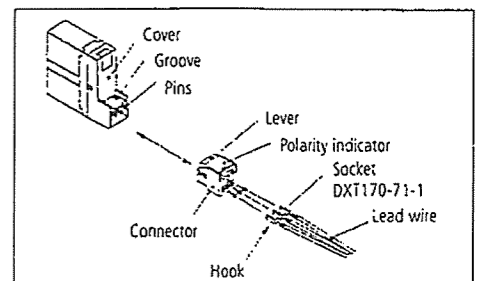
How to use plug connectors

When attaching and detaching a connector, first shut off the electric power and the air supply.

Also, crimp the lead wires and sockets securely.

1. Attaching and detaching connectors

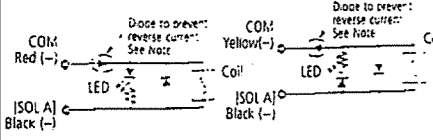
- To attach a connector, hold the lever and connector unit between your fingers and insert straight onto the pins of the solenoid valve so that the lever's pawl is pushed into the groove and locks.
- To detach a connector, remove the pawl from the groove by pushing the lever downward with your thumb, and pull the connector straight out.



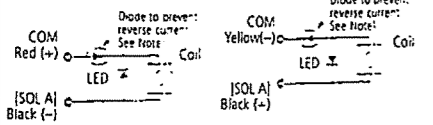
CAUTION

Light/Surge voltage suppressor

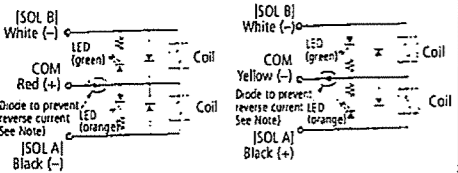
Pos. common specifications
Single solenoid type
Light/Surge voltage suppressor



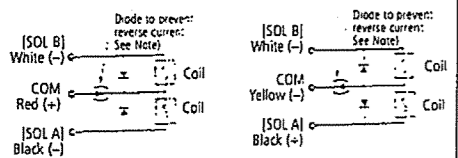
Surge voltage suppressor:



Pos. common specifications
Double solenoid type,
3 position type
Light/Surge voltage suppressor



Surge voltage suppressor:



Note) Connect so that polarity is matched to the connector's (+), (-) and A, B, COM indicators. In case of voltage specifications other than 12 or 24VDC, take care to avoid taking polarity, as there is no diode to prevent reverse current. In the event that lead wires are connected in advance, they will be as shown below.

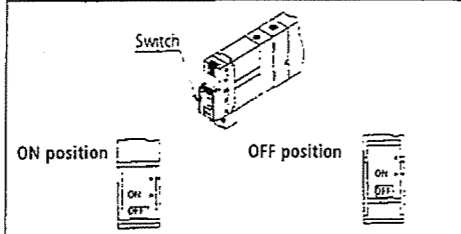
Pos. common specifications A (-): Black
COM (+): Red
B (-): White (no lead wire in case of single solenoid)

Neg. common specifications A (+): Black
COM (-): Yellow
B (+): White (no lead wire in case of single solenoid)

WARNING

Valves with switches

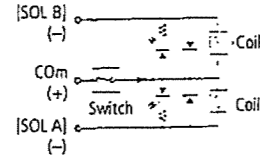
When turning Off with the switch, be sure to move the switch to the locked position. Connected equipment may be actuated if current flow occurs with the switch at an improper position.



Normal operating condition. Switching of valve is based on an electric signal from the connector.

The valve coil is kept in a deenergized state even when there is an electric signal from the connector

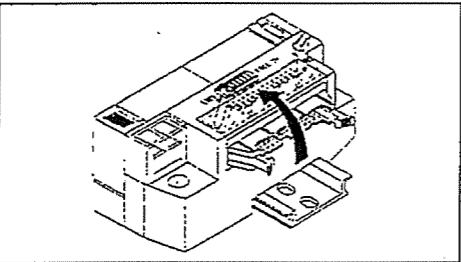
Electric circuit diagram (with positive common and light/surge voltage protection circuit)



CAUTION

Changing the connector entry direction

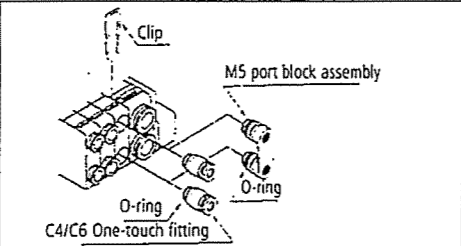
In case of change direction for the connector, please adjust the switch at the top surface of connector block of the "FREE" position before attempting to turn the connector. Also the switch must be to the "Lock" position before connecting to the connector. Damage may occur to the connector block if the connector block receives excessive load when in the "Lock" position. Connector lead wires may be broken if the switch is in the "FREE" position during operation.



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 screw driver, etc. To mount a new fitting assembly, put it into place and then fully reinsert the clip.



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

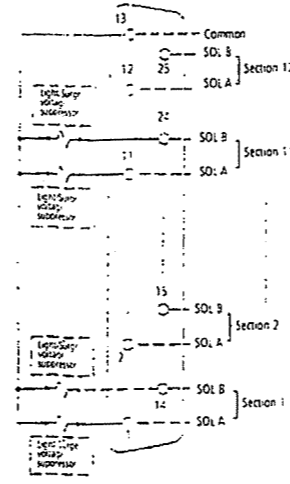
Note 2) When removing a fitting assembly from a valve, after removing the clip, connect a tube or plug (KQP-□□) to the One-touch fitting and pull it out by holding the tube (or plug). If the fitting assembly is pulled out by holding its release bushing (resin part), the release bushing may be damaged.

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.

Manifold Electrical Wiring

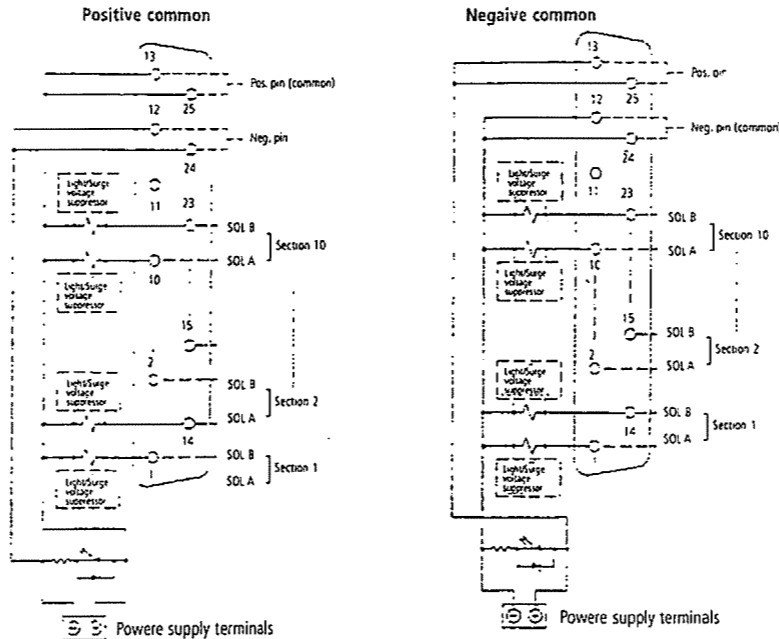
60F-D-sub connector type (25 pins)

Without power supply terminals



- The Common polarity should be the same as the common specifications of the valve to be used.
- The maximum number of stations that can be accommodated is 20 manifold stations, with up to 24 solenoids.

With power supply terminals

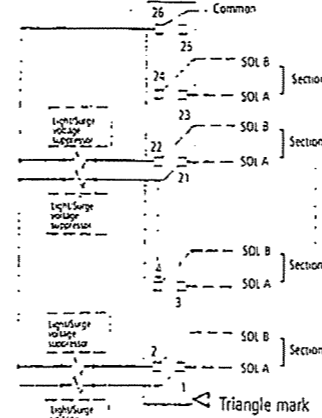


- The maximum number of stations that can be accommodated is 20 manifold stations, with up to 21 solenoids.

- The circuit above is for the double wiring specifications with up to 10 or 12 stations. Connect to SOL A in the case of a single solenoid. Moreover, when wiring instructions are given on a manifold specification sheet, the A signal for single and the A, B signals for double should be wire in order 1, 14, 2, 15... etc. without skipping or leaving any connectors remaining.
- Station are counted starting with station 1 on D side.

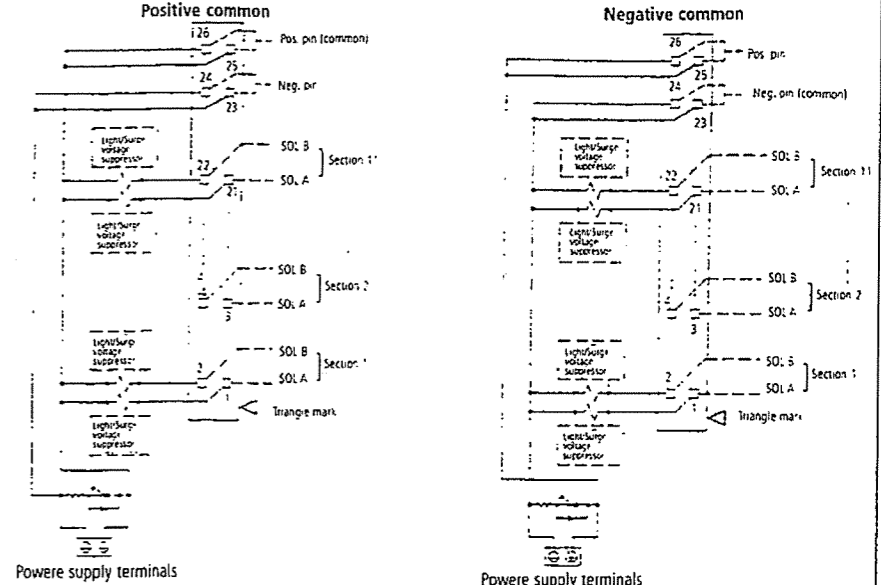
60P Flat cable type (26 pins)

Without power supply terminals



- The Common polarity should be the same as the common specifications of the valve to be used.
- The maximum number of stations that can be accommodated is 20 manifold stations, with up to 25 solenoids.

With power supply terminals

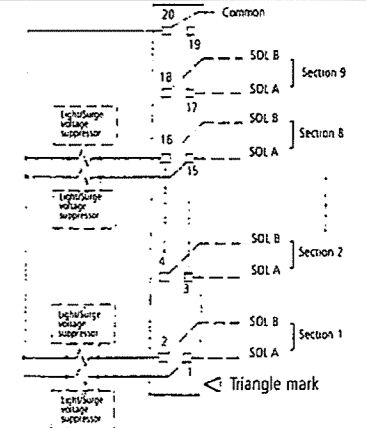


- The maximum number of stations that can be accommodated is 20 manifold stations, with up to 22 solenoids.

- The circuit above is for the double wiring specifications with up to 11 or 12 stations. Connect to SOL A in the case of a single solenoid. Moreover, when wiring instructions are given on a manifold specification sheet, the A signal for single and the A, B signals for double should be wire in order 1, 2, 3, 4... etc. without skipping or leaving any connectors remaining.
- Station are counted starting with station 1 on D side.
- Since terminal numbers are not indicated on the flat cable, use the triangle mark as a reference when wiring.

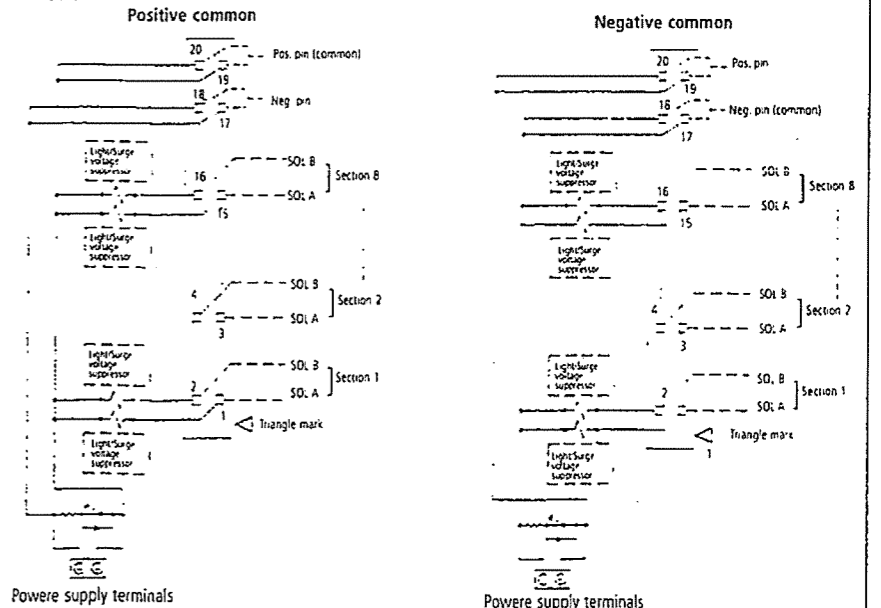
60PG Flat cable type (20 pins)

Without power supply terminals



- The Common polarity should be the same as the common specifications of the valve to be used.
- The maximum number of stations that can be accommodated is 19 manifold stations, with up to 19 solenoids.

With power supply terminals



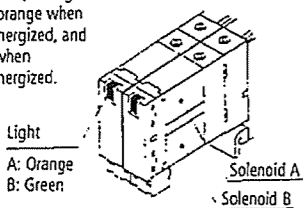
- The maximum number of stations that can be accommodated is 16 manifold stations, with up to 16 solenoids.

- The circuit above is for the double wiring specifications with up to 8 or 9 stations. Connect to SOL A in the case of a single solenoid. Moreover, when wiring instructions are given on a manifold specification sheet, the A signal for single and the A, B signals for double should be wire in order 1, 2, 3, 4... etc. without skipping or leaving any connectors remaining.
- Station are counted starting with station 1 on D side.
- Since terminal numbers are not indicated on the flat cable, use the triangle mark as a reference when wiring.

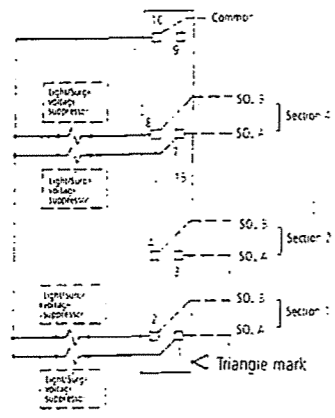
CAUTION

Light indication

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

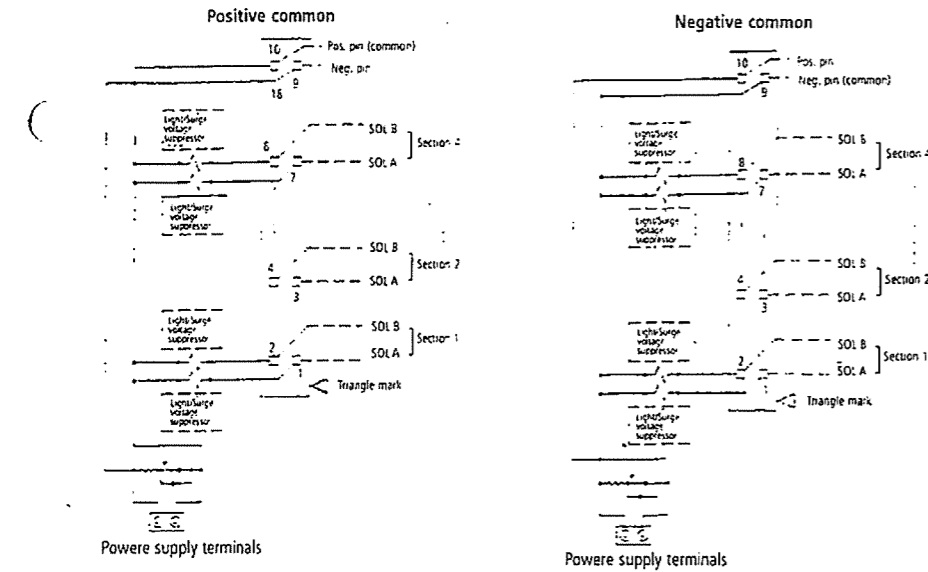


Without power supply terminals



- The Common polarity should be the same as the common specifications of the valve to be used.
- The maximum number of stations that can be accommodated is 9 manifold stations, with up to 9 solenoids.

With power supply terminals



- The maximum number of stations that can be accommodated is 8 manifold stations, with up to 8 solenoids.

- The circuit above is for the double wiring specifications with up to 4 stations. Connect to SOL A in the case of a single solenoid. Moreover, when wiring instructions are given on a manifold specification sheet, the A signal for single and the A, B signals for double should be wired in order, 3, 4... etc., without skipping or leaving any connectors remaining.
- Station are counted starting with station 1 on D side.
- Since terminal numbers are not indicated on the flat cable, use the triangle mark as a reference when wiring.

Manifold Options

SUP blocking disk
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.

Series	Part No.
SZ3000	SZ3000-114-4A

EXH blocking disk

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. (Two blocking disk are needed to divide both exhausts.)

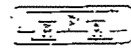
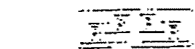
Series	Part No.
SZ3000	SZ3000-114-4A

Pilot port blocking disk
By installing a pilot port blocking disk in the pilot passage of a manifold valve, it can function as an internal pilot/external pilot mixed manifold.

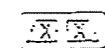
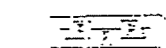
Indicator stickers for blocking disk
These stickers are to be put on valves in which SUP and EXH blocking disk have been installed so that confirmation is possible from the outside. (3pcs. of each are included.)

SZ3000-1 55-1 A

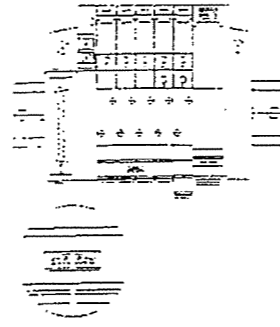
Sticker for SUP/EXH blocking disk Sticker for EXH blocking disk



Sticker for SUP blocking disk Sticker for pilot passage blocking disk

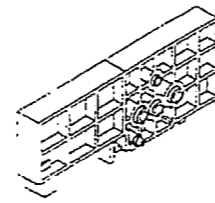


- If blocking disk are ordered on manifold specification sheet etc. at the same time that manifold are ordered, stickers will be attached to the valves with blocking disk installed before shipment



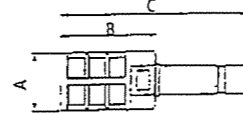
Blanking block assembly SZ30001-55-1 A

These are mounted when later addition of valves is planned, etc.



Silencer with One-touch fitting

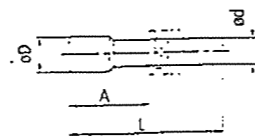
This silencer can be mounted on the manifold's port R (exhaust) with a single touch.



Series	Model	Effective sectional area	A	B	C
(for SZ3000[08])	AN203-KM8	14mm ²	ø16	26	51

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.



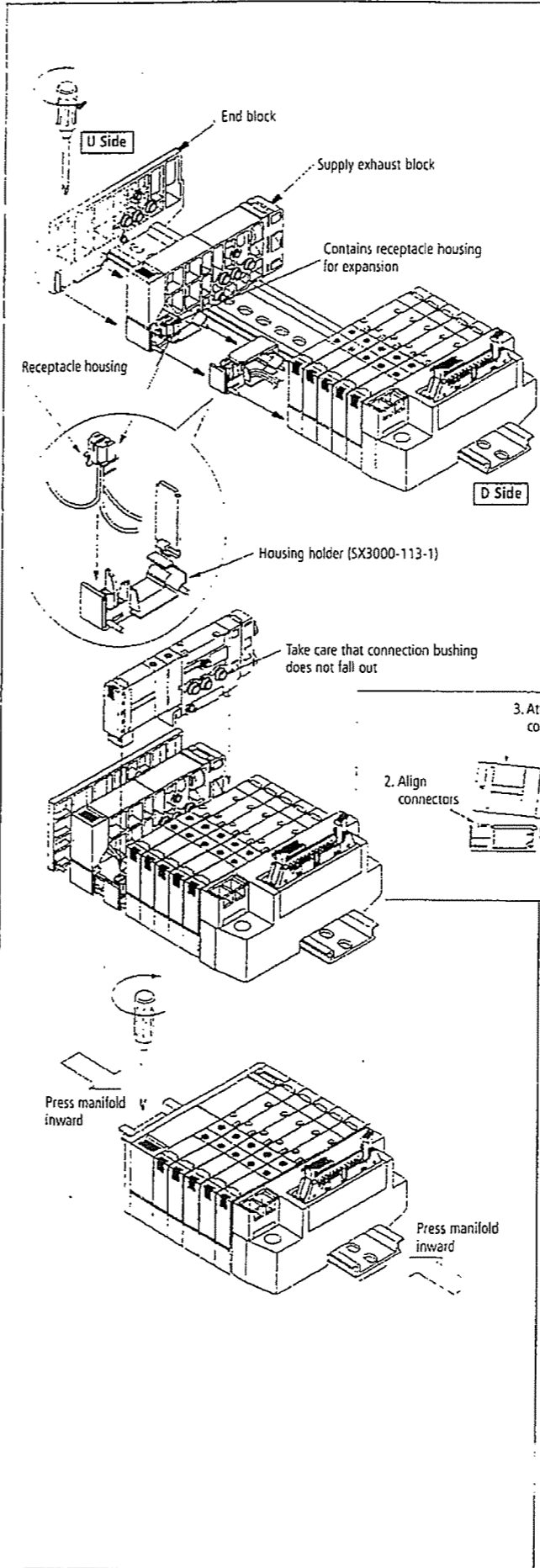
Dimension table

Application fitting size ød	Model	A	L	D
4	KQ2P-04	16	32	6
6	KQ2P-06	18	35	8
8	KQ2P-08	20.5	39	10

Plug-in Manifold station Expansion

CAUTION

In addition to solenoid valves, housing holders (SX3000-113-1) are necessary for expansion of manifold stations.
•Double wiring specification manifolds which do not have the maximum number of stations, contain spare receptacle housings for expansion in the housing holder of the last station, or inside the supply/exhaust block assembly (for a maximum of 2 stations). When expanding stations, perform the disassembly and assembly of the manifold while referring to the expansion method shown below.



1. Loosen the DIN rail holding screw of the end block on U side.

2. Separate the end block and supply/exhaust block.

3. Take out the receptacle housing for expansion which is inside the supply/exhaust block, attach it to the newly added housing holder, and attach to the manifold. (Number are displayed on the side of the receptacle housing, and they should be used in order from the lowest number.)

4. Mount the valve on the DIN rail.

3. Attach to rail by pushing on coil area

2. Align connectors

1. Hook on rail

5. While pressing the manifold together from both sides, refasten the side U end block's DIN rail holding screw.
CAUTION (fastening torque: 1.4Nm)

CAUTION

- Be sure to shut off the power and air supplies before disassembling. Since air may remain inside actuators, piping and manifolds, confirm that the air is completely exhausted before beginning work.
- When disassembly and assembly are performed, air leakage may result if connections between blocks and tightening of the end block's holding screw, etc. are inadequate. Before supplying air, confirm that there are no gaps, etc. between blocks, and that manifold blocks are securely fastened to the DIN rail. Then, supply air and confirm that there is no air leakage before operating.
- Note that for manifolds specified with other than double wiring, spare receptacle housings for expansion are not included unless indicated at the time of order.

Manifold Station Expansion

Station expansion is possible at any position.

- Loosen one DIN rail holding screw on either U side or D side.
- Separate the blocks at the location when station expansion is desired.
- Mount the valve on the DIN rail.
- While pressing the manifold together from both sides, retighten the DIN rail holding screw of the end block assembly which was loosened.

CAUTION (fastening torque: 1.4Nm)

CAUTION

- Be sure to shut off the power and air supplies before disassembling. Since air may remain inside actuators, piping and manifolds, confirm that the air is completely exhausted before beginning work.
- When disassembly and assembly are performed, air leakage may result if connections between blocks and tightening of the end block's holding screw, etc. are inadequate. Before supplying air, confirm that there are no gaps, etc. between blocks, and that manifold blocks are securely fastened to the DIN rail. Then, supply air and confirm that there is no air leakage before operating.

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

SMC Corporation:		TURKEY	Phone 212-2211512
ENGLAND	Phone 01908-563888	GERMANY	Phone 6103-402-0
ITALY	Phone 02-92711	FRANCE	Phone 01-64-76-10-00
HOLLAND	Phone 020-5318888	SWEDEN	Phone 08-603 07 00
SWITZERLAND	Phone 052-395 31 31	AUSTRIA	Phone 02262-62-280
SPAIN	Phone 945-184100	IRELAND	Phone 01-4501822
	Phone 902-252555	DENMARK	Phone 70 25 29 00
GREECE	Phone 01-3426076	NORWAY	Phone 67-12 90 20
FINLAND	Phone 09-68 10 21	POLAND	Phone 48-22-6131847
BELGIUM	Phone 03-3551464	PORTUGAL	Phone 02-610 8922