



Installation and Maintenance Manual
Plug-in Manifold Valve
Series SQ1000/2000



1 Safety Instructions

This manual contains essential information for the protection of users and others from possible injury and/or equipment damage.

- Read this manual before using the product, to ensure correct handling, and read the manuals of related apparatus before use.
- Keep this manual in a safe place for future reference.
- These instructions indicate the level of potential hazard by label of "Caution", "Warning" or "Danger", followed by important safety information which must be carefully followed.
- To ensure safety of personnel and equipment the safety instructions in this manual and the product catalogue must be observed, along with other relevant safety practices.

Caution	Indicates a hazard with a low level of risk, which if not avoided, could result in minor or moderate injury.
Warning	Indicates a hazard with a medium level of risk, which if not avoided, could result in death or serious injury.
Danger	Indicates a hazard with a high level of risk, which if not avoided, will result in death or serious injury.

2 Specifications

Refer to the operation manual for this product.

2.1 Specifications
SQ1000 specifications

		Valve type	Metal seal	Rubber seal
Valve specifications	Fluid	Air / Inert gas		
	Maximum operating pressure	0.7 MPa (High pressure type: 1.0 MPa) ^{Note 3)}		
	Minimum operating pressure	2 position single	0.1 MPa	0.15 MPa
		2 position double	0.1 MPa	0.1 MPa
		3 position	0.1 MPa	0.2 MPa
		4 position dual 3 port	-	0.15 MPa
Ambient and fluid temperature	-10 to 50 °C (No freezing) ^{Note 1)}			
Lubrication	Not required			
Pilot valve manual override	Push type / Locking type (tool required)			
Vibration / Impact resistance ^{Note 2)}	30 / 150 m/s ²			
Enclosure	Dust proof			
Solenoid Spec.	Rated coil voltage	12, 24 VDC		
	Allowable voltage fluctuation	±10% of rated voltage		
	Coil insulation type	Equivalent to B type		
	Power consumption (current)	24 VDC	0.4 W (17 mA), 0.95 W (40 mA) ^{Note 4)}	
		12 VDC	0.4 W (34 mA), 0.95 W (80 mA) ^{Note 4)}	

Table 1

Note 1) Use dry air to prevent condensation at low temperatures.

Note 2) **Impact resistance:** No malfunction occurred when it was tested with a drop tester in the axial direction and at right angles to the main valve & armature; in both energized & de-energized states and for every time in each condition (Values at the initial period.)

Vibration resistance: No malfunction occurred in a one-sweep test between 45 and 2000 Hz. Tests are performed at both energized and de-energized states in the axial direction and at right angles to the main valve & armature. (Valves at the initial period.)

Note 3) Metal seal type only.

Note 4) Values for the Quick response (0.95 W) specification.

SQ2000 specifications

		Valve type	Metal seal	Rubber seal
Valve specifications	Fluid	Air / Inert gas		
	Maximum operating pressure	0.7 MPa		
	Minimum operating pressure	2 position single	0.1 MPa	0.15 MPa
		2 position double	0.1 MPa	0.1 MPa
		3 position	0.1 MPa	0.2 MPa
		4 position dual 3 port	-	0.15 MPa
Ambient and fluid temperature	-10 to 50 °C (No freezing) ^{Note 1)}			
Lubrication	Not required			
Pilot valve manual override	Push type(tool required) / Locking type (tool required) / Slide locking type(manual type)			
Vibration / Impact resistance ^{Note 2)}	30 / 150 m/s ²			
Enclosure	Dust proof			
Solenoid Spec.	Rated coil voltage	12, 24 VDC		
	Allowable voltage fluctuation	±10% of rated voltage		
	Coil insulation type	Equivalent to B type		
	Power consumption (current)	24 VDC	0.4W (17 mA), 0.95W (40 mA) ^{Note 3)}	
		12 VDC	0.4W (34 mA), 0.95W (80 mA) ^{Note 3)}	

Table 2

Note 1) Use dry air to prevent condensation at low temperatures.

Note 2) **Impact resistance:** No malfunction occurred when it was tested with a drop tester in the axial direction and at right angles to the main valve & armature; in both energized & de-energized states and for every time in each condition (Values at the initial period.)

Vibration resistance: No malfunction occurred in a one-sweep test between 45 and 2000 Hz. Tests are performed at both energized and de-energized states in the axial direction and at right angles to the main valve & armature. (Valves at the initial period.)

Note 3) Values for the Quick response (0.95 W) specification.

2 Specifications (Continued)

2.2 Symbol

SQ1000/SQ2000 series

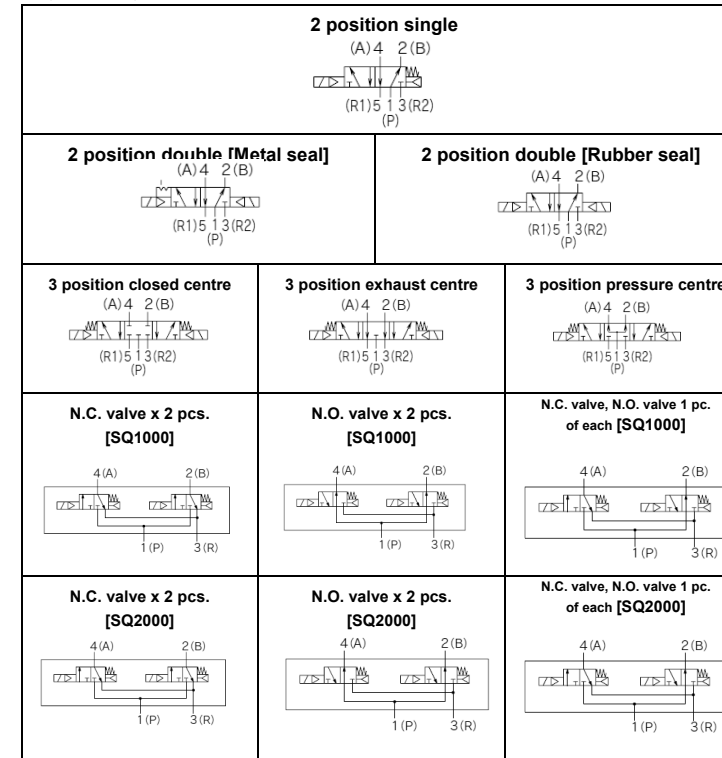
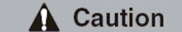


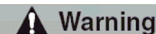
Figure 1

3 Installation (Continued)

3.4 Precautions on Design



- **Actuator drive**
When an actuator, such as a cylinder, is to be driven using a valve, take appropriate measures to prevent potential danger caused by actuator operation.
- **Intermediate stops**
When a 3 position closed centre valve is used to stop a cylinder in an intermediate position, accurate stopping of the piston in a predetermined position is not possible due to the compressibility of air. Furthermore, since valves and cylinders are not guaranteed for zero air leakage, it may not be possible to hold a stopped position for an extended length of time. Please contact SMC if it is necessary to hold a stopped position for an extended time.
- **Effect of back pressure when using a manifold**
Use caution when valves are used on a manifold, because an actuator may malfunction due to back-pressure. For 3-position exhaust centre valve or single acting cylinder, take appropriate measures to prevent malfunction by using it with an individual EXH spacer assembly, a back pressure check valve or an individual exhaust manifold.
- **Holding of pressure (including vacuum)**
Since valves are subject to air leakage, they cannot be used for applications such as holding pressure (including vacuum) in a pressure vessel.
- **Cannot be use as an emergency shut-off valve**
The valves presented in this IMM are not designed for safety applications such as an emergency shut off valve. If the valves are used in this type of system, other positive measures for safety should be also adopted in conjunction.
- **Maintenance space**
The installation should provide with sufficient space for maintenance activities. (removal of valve, etc.)



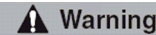
- The compatibility of pneumatic equipment is the responsibility of the person who designs the pneumatic system or decides its specifications. Since the products specified here can be used in various operating conditions, their compatibility with the specific pneumatic system must be based on specifications or after analysis and/or tests to meet specific requirements.
- **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 personnel.
- **Do not service machinery/equipment or attempt to remove components 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. (Supply air into the system gradually to create back pressure, i.e. incorporate a soft-start valve).
- **Do not use this product outside of the specifications. Contact SMC if it is to be used in any of the following conditions:**
1) Conditions and environments beyond the given specifications, or if the product is to be 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.



- Ensure that the air supply system is filtered to 5 microns.

3 Installation

3.1 Installation



- Do not install the product unless the safety instructions have been read and understood.

3.2 Environment



- Do not use in an environment where corrosive gases, chemicals, salt water or steam are present.
- Do not use in an explosive atmosphere.
- Do not expose to direct sunlight. Use a suitable protective cover.
- Do not install in a location subject to vibration or impact. Check the product specifications.
- Do not mount in a location exposed to radiant heat.
- If using in an atmosphere where there is possible contact with water drop-lets, oil, weld spatter, etc., take suitable preventive measures.
- When the solenoid valve is mounted in a control panel or it is energised for a long time, make sure that the ambient temperature is within the specification of the valve.

3.3 Piping

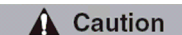


- Before piping make sure to clean up chips, cutting oil, dust etc.
- When installing piping or fittings, ensure sealant material does not enter inside the port. When using seal tape, leave 1.5 to 2 threads exposed on the end of the pipe/fitting.
- Tighten fittings according to appropriate tightening torque.

Thread	Tightening Torque
Rc 1/8	7 to 9 N·m
Rc 1/4	12 to 14 N·m

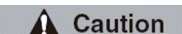
Table 3

3.5 Selection



- **Confirm the specifications**
Do not operate at pressures or temperatures, etc. beyond the range of specifications, as this can cause damage or malfunction. (Refer to specifications in catalogue.)

3.6 Lubrication



- SMC products have been lubricated for life at manufacture, and do not require lubrication in service.
- If a lubricant is used in the system, use turbine oil Class 1 (no additive), ISO VG32. Once lubricant is used in the system, lubrication must be continued because the original lubricant applied during manufacturing will be washed away.

3 Installation (Continued)

3.7 Indicator Light/Surge Voltage Suppressor

Caution

Indicator lights are all positioned on one side for both single solenoid and double solenoid types. For double, 3 position and 4 position dual 3 port types, 2 colours are used to indicate the energisation of A side or B side.

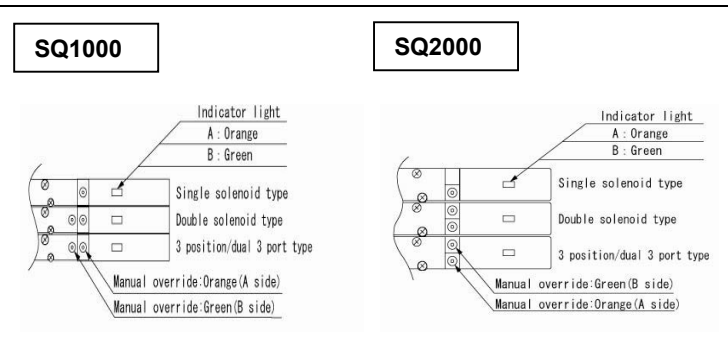


Figure 2

Single solenoid type (SQ1000/2000)

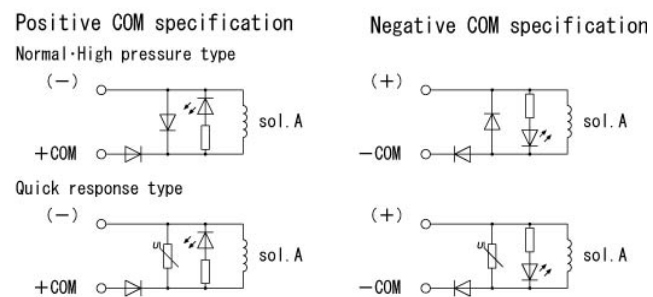


Figure 3

Double solenoid type (SQ1000/2000)

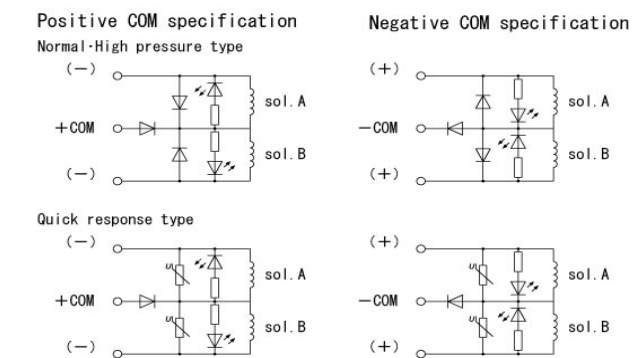


Figure 4

3.8 Continuous Duty

Caution

If a valve is energised continuously for a long period of time, the rise in temperature due to heat rise of the coil assembly may cause a decline in solenoid valve performance, reduce service life, or have adverse effects on peripheral equipment. If the valve is energised continuously for a long period of time, be sure to use the standard type (0.4 W) at an ambient temperature of 40 °C or less, and make sure to radiate heat sufficiently. In particular, if three or more adjacent stations on the manifold are energised simultaneously for extended periods of time or if the valves on A side and B side are energised simultaneously for a long period of time, take special care as the temperature rise will be greater.

3 Installation (Continued)

3.9 Mounting

- If air leakage increases or equipment does not operate properly, stop operation;**
After mounting or maintenance, connect the compressed and power supplies, and perform appropriate function and leakage tests to confirm that the unit is mounted properly.
- Instruction manual**
Mount and operate the product after reading the manual carefully and understanding its contents. Also keep the manual where it can be referred to as necessary.
- Painting and coating**
Warnings or specifications printed or pasted on the product should not be erased, removed or covered up. Furthermore, confirm before painting the resin parts, because this may cause an adverse effect depending on the solvent.

3 Installation (Continued)

3.11 Mounting and Removal of valves

- Insert the hook of the valve into the fitting on the manifold block, then push the valve down into place and tighten the mounting screw.
- Tighten the screw with the appropriate tightening torque shown below:

Model	Tightening torque
SQ1000	0.17 to 0.23 N·m
SQ2000	0.25 to 0.35 N·m

Table 5

- When pushing the valve down, press it on the area near the manual override. Be careful not to push the solenoid cover.

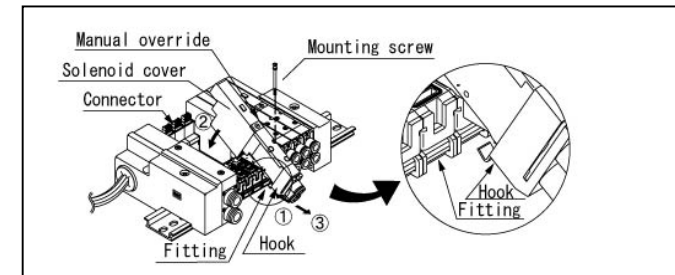


Figure 6

Removal

- Loosen the valve mounting screw, lift the valve from the solenoid cover side and remove it by sliding it in the direction of arrow 3.

Note: If it difficult to loosen the screw, loosen it while pressing the valve gently on the area near the manual override.

3 Installation (Continued)

3.14 Manual override

Warning

Use to switch the main valve.

Push type (tool required)

Push the manual override all the way in using a small screwdriver, etc.

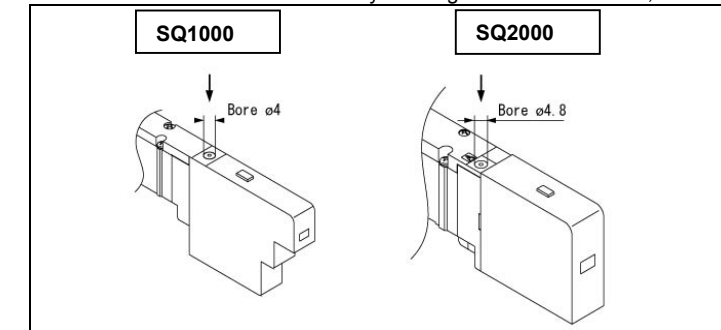


Figure 9

Locking type (tool required)

The manual override is locked by pushing it all the way in and turning it 90° clockwise using a small flat head screwdriver. Turn it counter clockwise to release it.

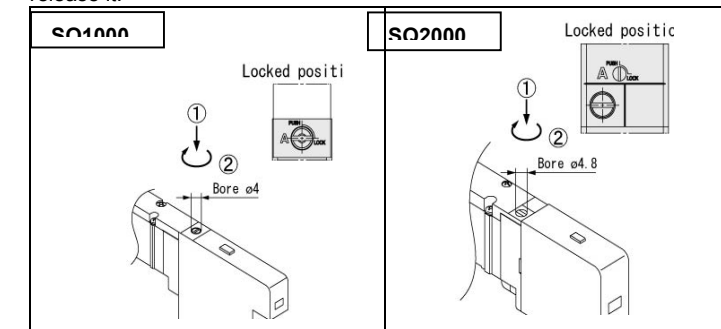


Figure 10

3.10 Adding Manifold Stations

As shown in Table 4, wiring specifications for spare connectors are based on the remaining number of connector pins (remaining number of pins against the maximum number of solenoids for each kit). The following procedures are for using spare connectors to add stations.

Spare connector wiring

Remaining connector pins	4 pins or more	3 pins	2 pins	1 pin	0 pin
Spare connector wiring	2 for double wiring	1 for double wiring (on the low no. station side) 1 for single wiring	1 for double wiring	1 for single wiring	None

Table 4

Steps for adding stations

- Loosen the clamp screw on the U side end plate and open the manifold.
- Mount the manifold block to be added.
- Open the junction cover and attach the spare connector. Match the station position of the added station and the spare connector station number.
- Press on the end plate to eliminate any space between the manifold blocks and tighten the clamping screw.

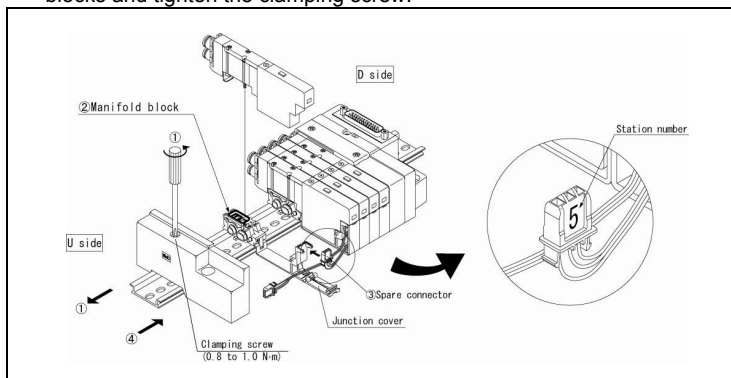


Figure 5

3.12 Mounting and Removal of Manifold with DIN Rail.

Removing Manifold from DIN Rail

- Loosen the end plate clamping screw on both sides until they turn freely. (The screw does not come out.)
- Remove the manifold from the DIN rail by lifting it from the solenoid cover side.

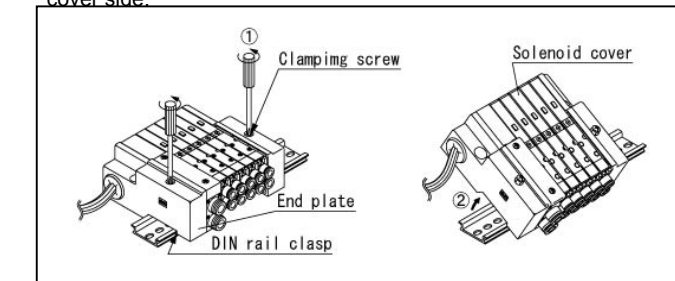


Figure 7

Note: When a manifold contains a large number of stations and is difficult to remove all at once, separate the manifold into several sections before removing it.

3.13 Mounting manifold on DIN Rail

The procedure is the reverse of that above. After tightening the clamping screw on one side, push on the opposite end plate so that there are no gaps between the manifold blocks and then tighten the other clamping screw.

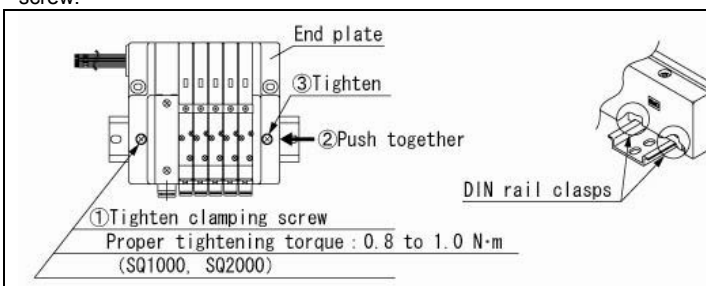


Figure 8

Sliding locking type (SQ2000 only)

The manual override is locked by sliding it all the way to the pilot valve side (ON side) with a small flat head screwdriver or finger. Slide it to the fitting side (OFF side) to release it. In addition, it can also be used as a push type by using a screwdriver, etc. of Ø2 or less.

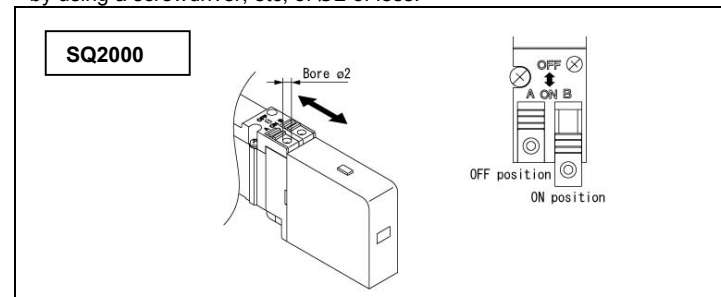


Figure 11

4 Maintenance

4.1 General Maintenance

Caution

- Not following proper maintenance procedures could cause the product to malfunction and lead to equipment damage.
- If handled improperly, compressed air can be dangerous. Maintenance of pneumatic systems should be performed only by qualified personnel.
- Before performing maintenance, turn off the power supply and be sure to cut off the supply pressure. Confirm that the air is released to atmosphere.
- After installation and maintenance, apply operating pressure and power to the equipment and perform appropriate functional and leakage tests to make sure the equipment is installed correctly.
- Do not make any modification to the product.
- Do not disassemble the product, unless required by installation or maintenance instructions.
- When the 3-position closed centre type is in its rest position, air can be trapped between the valve and the cylinder. Exhaust this air pressure before removing piping or performing any maintenance.
- When the equipment is operated after remounting or replacement, first confirm that measures are in place to prevent lurching of actuators, etc. Then, confirm that the equipment is operating normally.

Low frequency operation

Valves should be operated at least once every 30 days to prevent malfunction. (Use caution regarding the air supply.)

4.2 Throttle

- The pilot valve and the main valve share exhausts, therefore care must be taken to ensure that the piping does not become restricted.

4.3 Supply air

Warning

Use clean air

If the compressed air supply includes chemicals, synthetic materials (including organic solvents), salinity, corrosive gas etc., it can lead to damage or malfunction.

Caution

Install an air filter

Install air filters close to valves at their upstream side. Filtration degree should be $5\mu\text{m}$ or less.

4.4 Replacing Cylinder Port Fitting

Cylinder port fittings are available in cassette type and can be replaced easily. Fittings are secured with a clip that is inserted from the top side of the valve. Remove the clip with a flat head screw driver, etc., to replace the fittings. To mount a fitting, insert the fitting assembly until it stops and reinsert the clip to its designated position.

Applicable tube O.D. (mm)	Fitting assembly part No.	
	SQ1000	SQ2000
3.2	VVQ1000-50A-C3	-
4	VVQ1000-50A-C4	VVQ1000-51A-C4
6	VVQ1000-50A-C6	VVQ1000-51A-C6
8	-	VVQ1000-51A-C8

Table 6

*Part numbers above are for one fitting: however, order them in 10 piece units.

Caution

Do not scratch or put foreign matter on the o-rings as this will cause air leakage.

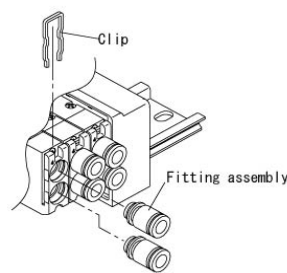


Figure 12

4 Maintenance (Continued)

4.5 Build-in Silencer Elements

A filter element is built into the manifold base end plate. When the element becomes dirty and clogged, this will cause trouble such as a drop in the cylinder speed, etc. Therefore, replace the element regularly.

Element part

Type	Fitting assembly part No.	
	SQ1000	SQ2000
Direct exhaust outlet with built-in silencer (-S)	SSQ1000-SE	SSQ2000-SE

Table 7

* Part numbers above are for a set of ten elements.

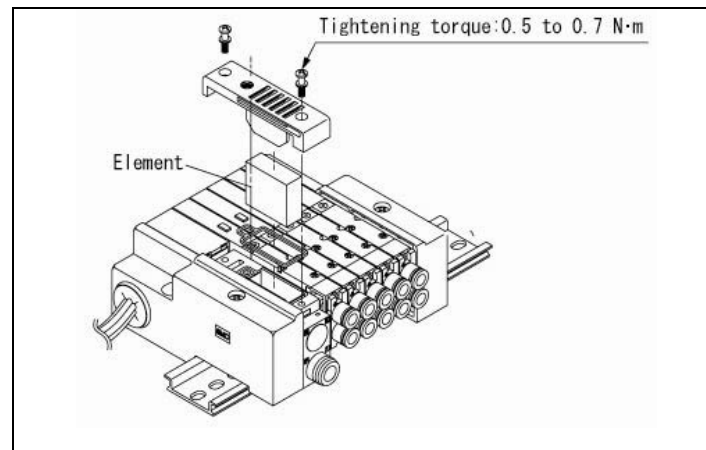


Figure 13

To replace an element, remove the cover on the top side of the end plate and remove the old element with a flat head screwdriver, etc.

5 Limitations of Use

Warning

Do not exceed any of the specifications laid out in section 2 of this document or the specific product catalogue.

Caution

Leakage voltage

The suppressor residual voltage should be 3 % or less of the rated voltage.

Surge voltage suppressor

If a surge protection circuit contains non-ordinary diodes such as zener diodes or varistor, a residual voltage will remain that is in proportion to the protective elements & the rated voltage. Therefore, give consideration to surge voltage protection of the controller. In the case of diodes, the residual voltage is approximately 1 V.

Low temperature operation

Unless otherwise indicated in the specifications for each valve, operation is possible to -10°C , but appropriate measures should be taken to avoid solidification or freezing of drainage and moisture, etc.

Mounting orientation

Mounting orientation is universal.

7 Contacts

AUSTRIA	(43) 2262 62280-0	LATVIA	(371) 781 77 00
BELGIUM	(32) 3 355 1464	LITHUANIA	(370) 5 264 8126
BULGARIA	(359) 2 974 4492	NETHERLANDS	(31) 20 531 8888
CZECH REP.	(420) 541 424 611	NORWAY	(47) 67 12 90 20
DENMARK	(45) 7025 2900	POLAND	(48) 22 211 9600
ESTONIA	(372) 651 0370	PORTUGAL	(351) 21 471 1880
FINLAND	(358) 207 513513	ROMANIA	(40) 21 320 5111
FRANCE	(33) 1 6476 1000	SLOVAKIA	(421) 2 444 56725
GERMANY	(49) 6103 4020	SLOVENIA	(386) 73 885 412
GREECE	(30) 210 271 7265	SPAIN	(34) 945 184 100
HUNGARY	(36) 23 511 390	SWEDEN	(46) 8 603 1200
IRELAND	(353) 1 403 9000	SWITZERLAND	(41) 52 396 3131
ITALY	(39) 02 92711	UNITED KINGDOM	(44) 1908 563888

SMC Corporation

URL : [http:// www.smcworld.com](http://www.smcworld.com) (Global) <http:// www.smceu.com> (Europe)

Specifications are subject to change without prior notice from the manufacturer.

© 2012 SMC Corporation All Rights Reserved.