



**Installation and Maintenance Manual**  
**Hygienic Valve Manifold**  
**Series SY3000/5000**



**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.

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

**Warning**

- 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, 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 microns.

**2 Specifications**

Refer to the operation manual for this product.

**2.1 Specifications**

**Valve specifications**

Valve type	Rubber seal	Metal seal
Fluid	Air	
Internal pilot	2 position single	0.15 to 0.7
Operating pressure Range (MPa)	2 position double	0.1 to 0.7
	3 position	0.2 to 0.7
	4 position dual 3 port	0.15 to 0.7
External pilot Operating pressure Range (MPa)	Operating pressure range	-100 kPa to 0.7
		(4 position: -100 kPa to 0.6)
		-100 kPa to 0.7
		(High pressure type: -100 kPa to 1)
Pilot pressure range	Pilot pressure range	2 position single
		2 position double
		3 position
		4 position dual 3 port
Ambient and fluid temperature/°C		-10 to 50 (No freezing)
Maximum Operating Frequency (Hz)	2 position single/double, 4 position dual 3 port	5
	3 position	3
Pilot exhaust type	Internal pilot	Main/Pilot valve common exhaust
	External pilot	Pilot valve individual exhaust
Lubrication		
Not required		
Mounting orientation	Unrestricted	Single: Unrestricted.
		Double/3 position: Main valve is horizontal.
Impact/vibration resistance <sup>Note 2)</sup> / ms <sup>2</sup>	150/30	

Table 1

- Note 1) 5 Hz or less for power saving circuit type.  
 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.)

**Solenoid Specifications**

Coil rated voltage (VDC)	24, 12	
Allowable voltage fluctuation	±10% of rated voltage <sup>Note)</sup>	
Power consumption (W)	Standard	0.35 (With indicator light: 0.4)
	High pressure type, Quick response type	0.9 (With indicator light: 0.95)
	With power saving circuit	Standard: 0.1 (With indicator light only), High pressure type: 0.4 (With indicator light only)
Surge voltage suppressor	Diode (Varistor for non-polar type)	
Indicator light	LED	

Table 2

Note) Since voltage drops due to the internal circuit in S/Z type and T type (with power saving circuit), the allowable voltage fluctuation should be within the following:  
 S/Z type 24 VDC: -7% to +10%    T type 24 VDC: -8% to +10%  
 12 VDC: -4% to +10%    12 VDC: -6% to +10%

**Manifold specifications**

	SY3000	SY5000
Enclosure	IP69K rated	
Number of stations	Max. 16 stations (32 solenoids)	
Manifold option	Blanking plate	
	SUP./EXH. block disk	
Manifold internal connection	Connector type	
Electrical entry	Parallel wiring for bottom entry	
Manual override	Non-locking push type	

Table 3

**One-touch fitting size of each port**

	SY3000	SY5000
Port size 4(A), 2(B)	4, 6, 8 mm	6, 8, 10 mm
	5/32, 1/4, 5/16 inch	1/4, 5/16, 3/8 inch
Port size 1(P), 3/5(R), SUP./EXH. block	8, 10, 12 mm	
	5/16, 3/8, 1/2 inch	
Port size X, PE	4 mm	
	5/32 inch	

Table 4

**2 Specifications (continued)**

**2.2 Symbol**

**Rubber seal**

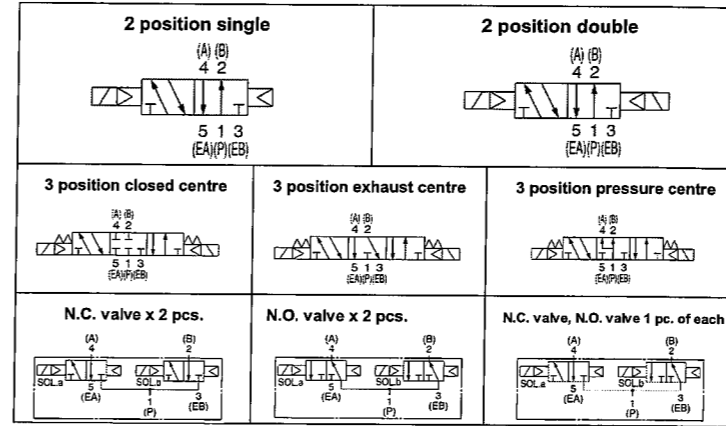


Figure 1

**Metal seal**

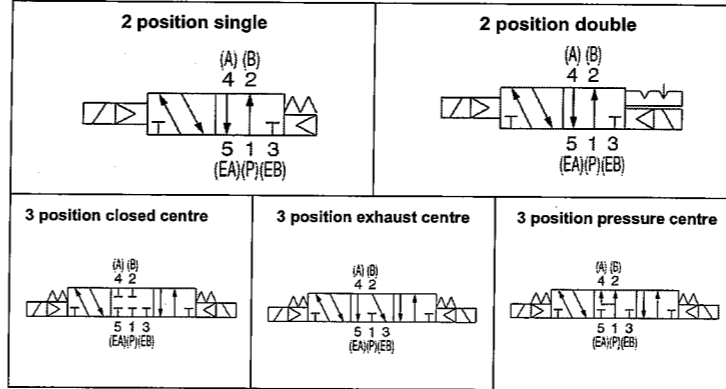


Figure 2

**3 Installation (continued)**

**Do not use the valve manifold in a "food zone" environment.**

Cannot be installed:

Food zone: Environment where the food will come into direct contact with the valve manifold parts, and that food will be treated as a product.

Can be installed:

Splash zone: Environment where the food may possibly come into direct contact with valve manifold parts, but the food that has been in contact will not be used as a product.

Non-food zone:

Environment where it will not come into contact with food.

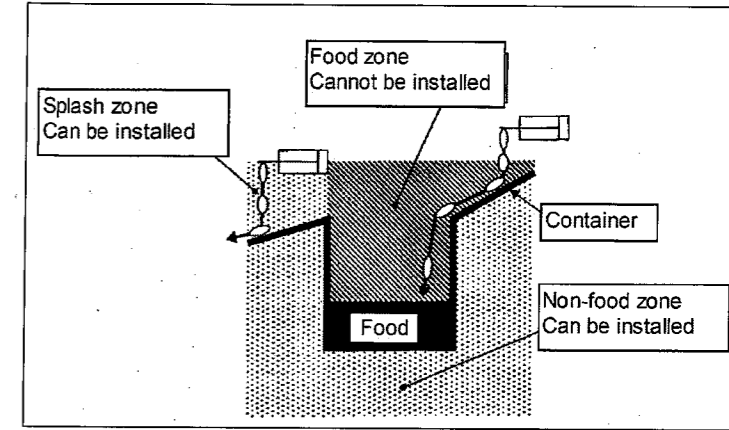


Figure 3

**3 Installation**

**3.1 Installation**

**Warning**

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

**3.2 Environment**

**Warning**

- Do not use in an environment where corrosive gases, chemicals\*, salt water or steam are present. \*See 5.3 Cleaning.
- 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.
- Products with IP69K enclosures (based on IEC60529) are protected against dust and water, however, these products cannot be used in water.
- Products compliant to IP69K satisfy the specifications through mounting.
- 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 Precautions on Design**

**Caution**

- **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 stopping.** When a 3 position closed centre valve used to stop a cylinder at 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. 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, as actuator malfunction due to back-pressure may occur. Special caution must be taken when using 3 position exhaust centre valve or when driving a single acting cylinder. To prevent a malfunction, implement counter measures such as using a single EXH. spacer assembly 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 catalogue 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.)
- **Release of residual pressure.** Provide a residual pressure release function for maintenance activities (removal of valve, etc.)

### 3 Installation (Continued)

**• Vacuum applications.**

When a valve is used for vacuum switching, etc., take measures against the suction of exhaust ports, etc. Moreover, an external pilot type valve should be used in this case. Contact SMC in case of an internal pilot type or air operated valve etc.

**• About using the double solenoid type.**

When using the double solenoid type for the first time, actuators may travel in an unexpected direction depending on the switching position of a valve. Implement countermeasures not to occur any danger by the actuator's operation.

**• About ventilation.**

When it is used inside a sealed control panel, etc., provide ventilation to prevent a pressure increase caused by exhausted air inside the control panel or temperature rise caused by the heat generated by valve.

### 3.4 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.

**• Voltage leakage.**

When C-R device (surge suppressor) is used for the protection of switching device, note that voltage leakage will be increased by passing voltage leakage through C-R device. Therefore, select circuit or device which can limit residual voltage leakage to following value. And for recovery failure due to voltage leakage, bleeder resistance should be placed. For further information of bleeder resistance, contact SMC.

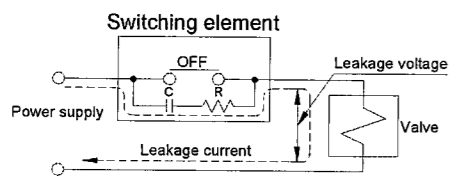


Figure 4: 3% or less of rated voltage.

**• Low temperature operation.**

Valve use is possible to temperature extremes of -10°C. Take appropriate measures to avoid freezing of drainage, moisture etc in pilot air line. by using an air dryer.

**• Using for air blow**

When using a solenoid valve for air blow, use an external pilot type. Take note that when internal pilots and external pilots are used on the same manifold, the pressure drop caused by the air blowing can have an effect on the internal pilot type valves. Moreover, when compressed air within the pressure range of the established specifications is supplied to the external pilot port, and a double solenoid should normally be energized when air is being blown.

### 3 Installation (Continued)

#### 3.5 Mounting



**• If air leakage increases of equipment does not operate properly, stop operation.**

Check mounting conditions after air and power supplies are connected. Initial function and leakage tests should be performed after installation.

**• Instruction manual (this documentation)**

Install only after reading and understanding the safety instructions. Keep on life so that it can be referred to when necessary.

**• About vent and exhaust ports**

A vent port is located on every SUP/EXH manifold slice (see Figure 13 in section 4.1). As the product is IP69K rated with potentially water and wet air locally the exhaust and vent ports should be vented away from the wet area to prevent ingress into the product.

**• Cleaning spray direction**

Direct spraying on the pneumatic tubing entry face should be avoided.

#### 3.6 Wiring



**• Applied voltage.**

When electric power is connected to the solenoid valve, be careful to apply the proper voltage. Improper voltage may cause malfunction or coil damage.

**• Confirm the connections.**

After completing the wiring, confirm that the connections are made correctly.

### 3 Installation (Continued)

#### 3.8 Indicator Light/Surge Voltage Suppressor

**• Polar type**

When the solenoid valve has polarity:

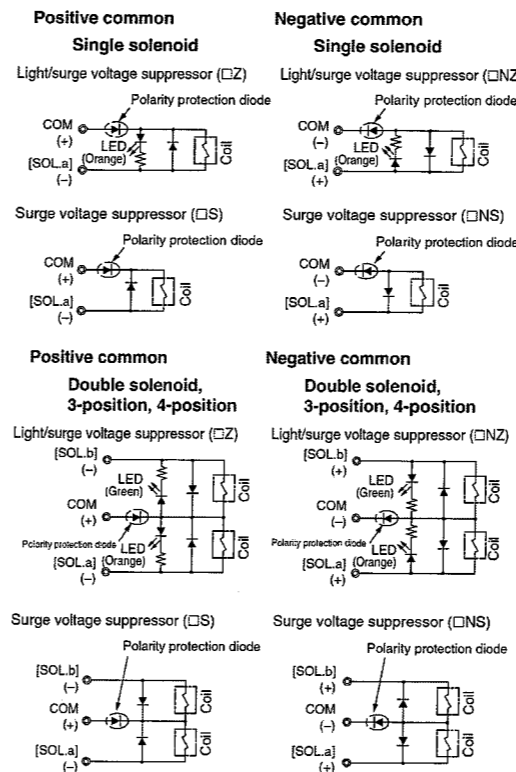
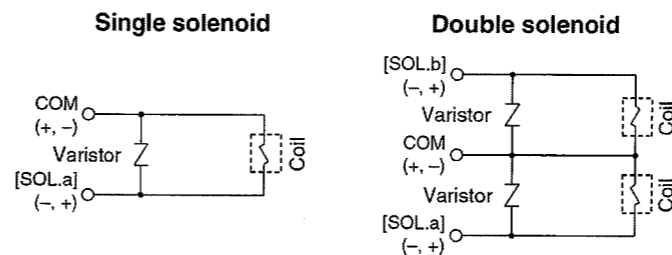


Figure 6

When the solenoid valve does not have polarity:

**■ Non-polar type**

**With surge voltage suppressor (□R)**



**With light/surge voltage suppressor (□U)**

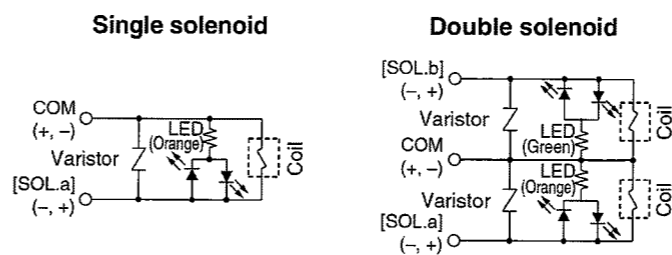


Figure 7

### 3 Installation (Continued)

#### 3.9 With power saving circuit

Power consumption is decreased by approx. 1/3 by reducing the wattage required to hold the valve in an energized state. (Effective energizing time is over 67 ms at 24 VDC.)

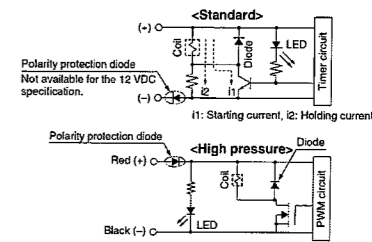


Figure 8

The above circuit reduces the current consumption when holding in order to save energy. Refer to the electrical power waveform as shown below.

**<Electrical power waveform with power saving circuit>**

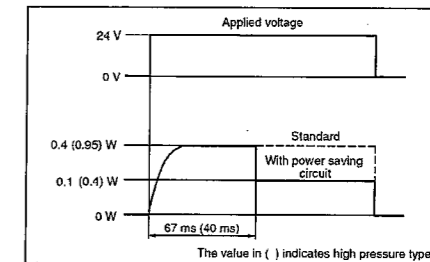


Figure 9

- The 12 VDC specification with power saving circuit (standard specification) does not have the polarity protection diode. Do not make a mistake with the polarity.
- Since the voltage will drop by approx. 0.5 V due to the transistor, pay attention to the allowable voltage fluctuation. (For details, refer to the solenoid specifications of each type of valve.)

#### 3.10 Electrical connection

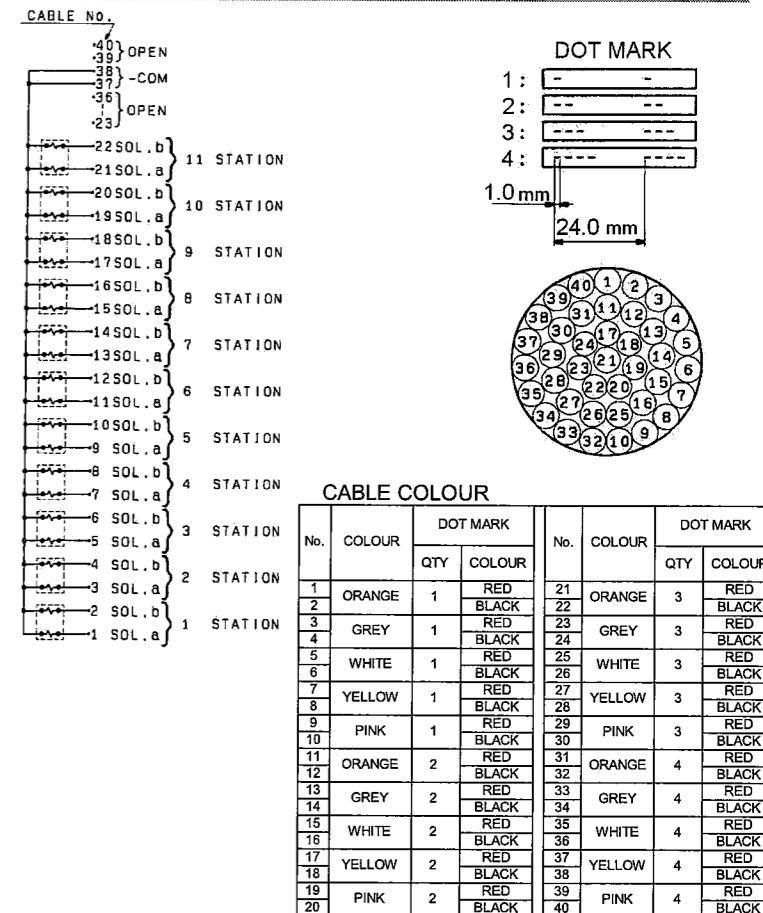


Figure 10

### 3 Installation (Continued)

#### 3.11 Light indication

##### Caution

When equipped with indicator light and surge voltage suppressor, the light window turns orange when solenoid A is energized, and green when solenoid B is energized.

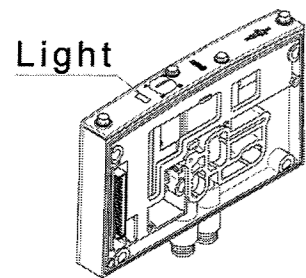


Figure 11

#### 3.12 Precautions on other tube brands

##### Caution

- When using non-SMC brand tubes, confirm that the following specifications are satisfied with respect to the outside diameter tolerance of the tube.
 

Nylon tube	±0.1 mm
Soft nylon tube	±0.1 mm
Polyurethane tube	+0.15 mm -0.2 mm
- Do not use tubes that do not meet these outside diameter tolerances. It may not be possible to connect them, or they may cause other problems, such as air leakage or the tube pulling out after connection.

#### 3.13 One-touch fittings

##### Caution

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 pincers, nippers or scissors etc. If cutting is done with tools other than tube cutters, the tube may be cut diagonally or become flattened. This makes a secure installation impossible, and causes problems such as air leakage or the tube being pulled out after installation. Allow some extra length in the tube.

- Grasp the tube and push it in slowly, inserting it securely all the way into the fitting. After inserting the tube, pull on it lightly to confirm that it will not come out. Problems such as air leakage or the tube being pulled out can occur if the tube is not inserted securely all the way into the fittings.

#### Tube detachment

- Push in the release bushing and the collar at the same time.
- 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 out. When the removed tube is to be used again, cut off the portion which has been damaged before reusing it. If this is not done then the damaged portion of the tube can cause problems such as air leakage or difficulty in removing the tube from the fitting.

### 4 Settings and Programming

#### 4.1 Manifold tightening torque

##### Caution

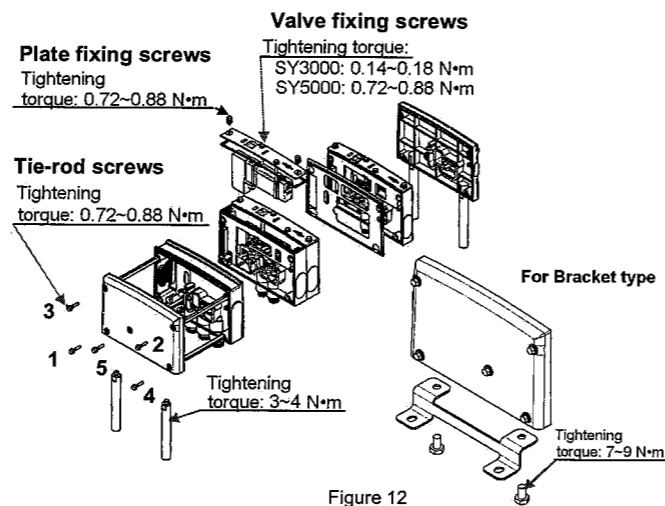


Figure 12

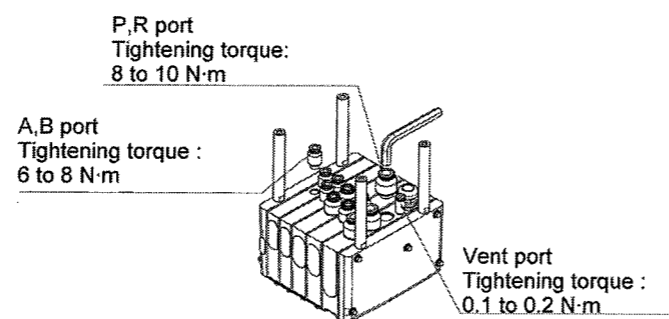


Figure 13

##### Caution

- When reassembling the valve manifold, all slice gaskets and top plate gaskets should be firmly in position on the station slices throughout assembly to prevent them being 'gripped' or 'twisted'.
- For plates (top covers), all manual override pistons should be checked to be secure and aligned in the underside of the manual override buttons. (Manual override button shown in 3.7.)
- When assembling plates to manifold slices the plates should be pushed firmly from the top while the two inner screws are tightened followed by the outer two screws. Tightening torque should be done in two stages. The recommended sequence is as follows: - a) Tighten valve fixing screws (inner two) → b) tighten plate fixing screws (outer two screws) → c) torque valve fixing screws → d) torque plate fixing screws.
- When tightening the tie-rod screws for final assembly the unit slices should be lightly compressed prior to tightening the tie-rod screws to prevent damage to the tie-rod screw seal-washers.
- Tie-rod screws should be tightened in two stages in the recommended sequence (1→5) indicated in Figure 13. This ensures even compression of the slice gaskets. (1→5 – tight, then 1→5 to torque.)
- After tightening the tie-rod screws to specification the valve manifold should be inspected thoroughly to ensure slice gaskets are gripped evenly by the manifold slices with no twists, turns or detents formed in the gasket.
- Incorrect assembly and improper care of parts during disassembly may damage seal parts and/ or compromise the IP performance of the unit.

#### 4.2 Valve replacement guide

Customers need to remove / replace covers when changing valves. Valves gaskets should be checked to be in good condition and replaced if required when valves are changed or replaced.

### 5 Maintenance

#### 5.1 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.
- Perform maintenance procedures as shown in the instruction manual.
- If handled incorrectly, malfunction or possible damage of machinery / equipment may occur.
- Removal of equipment, and supply/exhaust of compressed air
  - When components are removed, first confirm that measures are in place to prevent workpieces from dropping, run-away equipment, etc. Then, cut the supply pressure and power, and exhaust all compressed air from the system using the residual pressure release function.
  - 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.)

#### 5.2 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 an air filter at the upper streamside of the valve. Filtration degree should be 5 μm or less.

#### 5.3 Cleaning

##### Caution

Product basic materials are PA, PP, EPDM, SUS316, SUS430 and NICKEL PLATED BRASS.

User should ensure that all cleaning fluids used are compatible with these material types. Fluid supplier guidelines for general use with these materials should be followed at all times.

- Cleaning spray direction
  - Direct spraying on the pneumatic tubing entry face should be avoided.

### 6 Limitations of Use

##### 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.

### 6 Limitations of Use (Continued)

- 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. See section 3.5

### 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

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