



ORIGINAL INSTRUCTIONS

**Instruction Manual**  
**SYA3000/5000/7000**  
**5 Port Air Operated Valve**



The intended use of this product is to control the movement of an actuator.

**1 Safety Instructions**

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of "Caution," "Warning" or "Danger." They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC<sup>\*)</sup>, and other safety regulations.

- <sup>\*)</sup> ISO 4414: Pneumatic fluid power - General rules relating to systems.
- ISO 4413: Hydraulic fluid power - General rules relating to systems.
- IEC 60204-1: Safety of machinery - Electrical equipment of machines. (Part 1: General requirements)
- ISO 10218-1: Manipulating industrial robots - Safety, etc.

- Refer to product catalogue, Operation Manual and Handling Precautions for SMC Products for additional information.
- Keep this manual in a safe place for future reference.

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

**Warning**

- Always ensure compliance with relevant safety laws and standards.
- All work must be carried out in a safe manner by a qualified person in compliance with applicable national regulations.

**2 Specifications**

**2.1 Specifications**

Fluid	Air	
Operating pressure range [MPa]	2 position single	0.15 to 0.7
	2 position double	-100 kPa to 0.7
	3 position	-100 kPa to 0.7
Pilot pressure range <sup>Note 1)</sup> [MPa]	2 position single	(0.7 × P + 0.1) to 0.7 P: Operating pressure range
	2 position double	0.1 to 0.7
	3 position	0.2 to 0.7
Ambient and fluid temperature [°C]	-10 to +60 (no freezing)	
Manual override (Manual operation)	Non-locking push type	
Maximum operating frequency (Hz)	2 position single	5
	2 position double	5
	3 position	3
Minimum operating frequency	1 cycle / 30days	
Lubrication	Not required (refer to 3.4)	
Mounting orientation	Unrestricted	
Impact/Vibration resistance <sup>Note 2)</sup> [m/s <sup>2</sup> ]	150 / 30	
Flow characteristics	Refer to catalogue	

Table 1.

**2 Specifications - continued**

**Notes:**

Note 1) In case of single type, be certain that pressure within operating pressure range is supplied to the supply port, because return pressure is introduced from supply port {1(P)} for activation.

Note 2) **Impact resistance:** No malfunction resulted from the impact test using a drop impact tester. The test was performed on the axis and right angle directions of the main valve, when pilot signal is ON and OFF. (Values quoted are for a new valve)

**Vibration resistance:** No malfunction occurred in one sweep test between 45 and 2000 Hz. Test was performed to axis and right angle directions of the main valve when pilot signal is ON and OFF. (Values quoted are for a new valve)

**2.2 Pilot Pressure Range (Single pilot)**

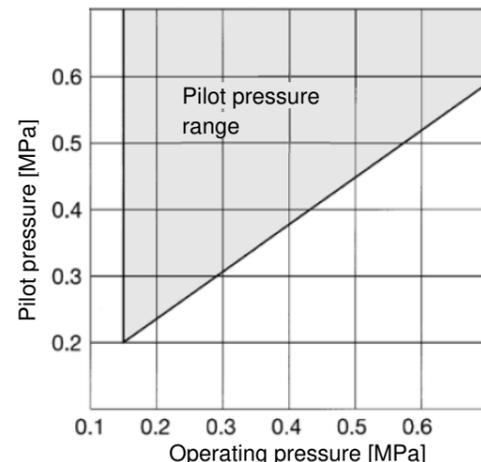


Figure 1

**2.3 Symbols**

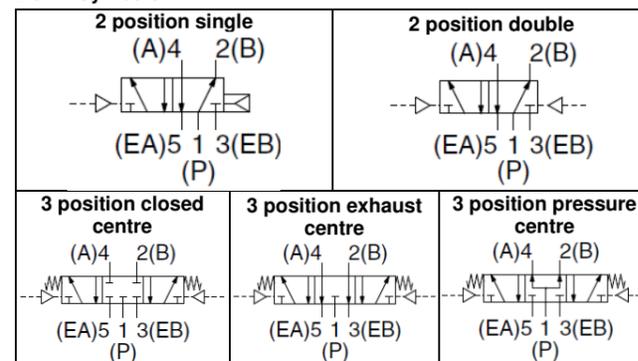


Figure 2

Note) Refer to section "7.9 Limitations of Use" for valves with air return spool.

**2.4 Manual Override Operation**

**Warning**

- Non-locking push type [Standard]**  
Press in the direction of the arrow.

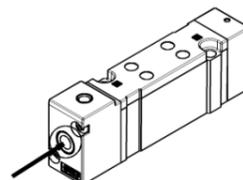


Figure 3

**Warning**

Special products might have specifications different from those shown in this section. Contact SMC for specific drawings.

**3 Installation**

**3.1 Installation**

**Warning**

- Do not install the product unless the safety instructions have been read and understood.
- If air leakage increases or equipment does not operate properly, stop operation.**  
Check mounting conditions when the air supply is connected. Initial function and leakage tests should be performed after installation.
- Ensure sufficient space for maintenance activities.**  
When installing the products, allow access for maintenance.
- Operation in a vacuum condition**  
When a valve is used for switching a vacuum, take measures to install a suction filter or similar to prevent external dust or other foreign matter from entering inside the valve.
- 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 any heat generated.

**3.2 Environment**

**Warning**

- 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 in excess of the product's specifications.
- Do not mount in a location exposed to radiant heat that would result in temperatures in excess of the product's specifications.

**3.3 Piping**

**Caution**

- Before connecting 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 thread** exposed on the end of the pipe/fitting.
- Tighten fittings to the specified tightening torque.

Connection thread	Tightening torque [N m]
M5	1 to 1.5
1/8"	3 to 5
1/4"	8 to 12
3/8"	15 to 20

Table 2.

**Closed centre valves**

When using closed centre type valves, check carefully to be sure there are no air leaks from the piping between the valves and cylinders.

**3.4 Lubrication**

**Caution**

- SMC products have been lubricated for life at manufacture, and do not require lubrication in service.
- If a lubricant is used in the system, refer to catalogue for details.

**3.5 Air supply**

**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 upstream of the valve. Select an air filter with a filtration size of 5µm or smaller.

**3.6 One-touch Fittings**

**3.6.1 Tube attachment and detachment**

**Caution**

Refer to the Specific Precautions in the catalogue.

**3.7 Precautions on other tubing brands**

**Caution**

- When using non-SMC brand tubes, refer to the Specific Precautions in the catalogue.

**3 Installation - continued**

**3.8 Manual override**

**Warning**

Since connected equipment will operate when the manual override is activated, confirm that conditions are safe prior to activation.

**4 How to Order**

**4.1 Standard products**

Refer to catalogue for 'How to order' information.

**4.2 Special products**

For special products (-X number) refer to product drawing for 'How to order' details and specifications.

**5 Outline Dimensions (mm)**

Refer to [catalogue](#) for outline dimensions.

**6 Maintenance**

**6.1 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.
- If any electrical connections are disturbed during maintenance, ensure they are reconnected correctly and safety checks are carried out as required to ensure continued compliance with applicable national regulations.
- Do not make any modification to the product.
- Do not disassemble the product, unless required by installation or maintenance instructions.

**6.2 Low frequency operation**

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

**6.3 Drain flushing**

Remove drainage from air filters regularly.

**6.4 Release of residual pressure**

Provide a residual pressure release function for maintenance purposes. Especially in case of 3 position closed centre valve or perfect valve, ensure the release of residual pressure between valve and cylinder.

**7 Limitations of Use**

**7.1 Limited warranty and Disclaimer/Compliance Requirements**

Refer to Handling Precautions for SMC Products.

**Caution**

**7.2 Intermediate stopping**

Refer to Precautions of 3/4/5 port Solenoid Valves.

**7.3 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.

**7.4 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.

**7.5 Vacuum absorption**

Stopping of continuous vacuum absorption can result in leakage, a workpiece dropping or problems from foreign matter sticking to the vacuum pad.

## 7 Limitations of Use - continued

### 7.6 About using the 2 position double type

When using the 2 position double type for the first time, actuators may travel in an unexpected direction depending on the switching position of a valve. Implement countermeasures not to incur any danger by the actuator's operation.

### 7.7 Momentary operation

If a 2 position double valve is operated with impulse air signals, the air signal should be applied until the cylinder reaches the stroke end position, as there is a possibility of malfunction.

### 7.8 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.

### Warning

### 7.9 Valves with air return spool

The use of these valves needs to be carefully considered.

The return of the main spool depends on the supply air pressure being present.

Take measures to ensure, that the supply air is applied for the return of the spool.

If the supply air pressure drops below the specified minimum operating pressure the following might occur:

- Unexpected movement of the actuator when the supply air pressure is restored.
- Prevention or delay of a stopping or reversing of movement.
- An uncontrolled change of the original position (without an input signal). Refer to Section 2.3 Symbols for applicable products.

## 8 Product disposal

This product should not be disposed of as municipal waste. Check your local regulations and guidelines to dispose this product correctly, in order to reduce the impact on human health and the environment.

## 9 Contacts

Refer to [www.smcworld.com](http://www.smcworld.com) or [www.smc.eu](http://www.smc.eu) for contacts.

## SMC Corporation

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0021  
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