

ORIGINAL INSTRUCTIONS

Instruction Manual

Air Operated Valve

VSA7-6/7-8





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

Validated according to ISO13849. Refer to Specifications section 2 for details.

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)¹¹, and other safety regulations. ¹¹ 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.

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.
- To ensure safety of personnel and equipment the safety instructions in this manual must be observed, along with other relevant safety practices.

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

Warning

- The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.
- Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalogue information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

1 Safety Instructions - Continued

• Only personnel with appropriate training should operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly.

The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

• Do not service or attempt to remove product and machinery/equipment until safety is confirmed.

1) The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.

2) When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.3) Before machinery/equipment is restarted, take measures to

prevent unexpected operation and malfunction.

 Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

1) Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.

2) Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustions and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specification described in the product catalogue.

3) An application which could have negative effects on people, property, or animals requiring special safety analysis outside the scope of ISO 13849 described in this document.

4) Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

• Always ensure compliance with relevant safety laws and standards.

All electrical work must be carried out in a safe manner by a qualified person in compliance with applicable national regulations.

Caution

• The product is provided for use in manufacturing industries. The product herein described is basically provided for peaceful use in manufacturing industries.

If considering using the product in other industries consult SMC beforehand and exchange specifications or a contract if necessary. If anything is unclear, contact your nearest sales branch.

2 Specifications

2.1 General Specifications

Valve specifications	Series		VSA7-6/VSA7-8	
	Fluid		Air	
	Max. operating pressure		1.0 MPa	
	Min. operating pressure ⁽³⁾	YZ-S, FG-S ⁽¹⁾	0.1 MPa	
		Others	0 MPa	
	Proof pressure		1.5 MPa	
	Ambient and fluid temperature		-10 to +60°C ⁽²⁾	
	Lubrication		Not required	
	Shock/Vibration resistance ⁽⁴⁾		150/50m/s ²	
	Enclosure		Dust proof IP40	
	Manual override		Non-locking push style (option)	
	Pilot air pressure ⁽³⁾		0.1 to 1.0 MPa	
	Air quality		5 µm filtration or better	
Safety	Standards		Complies with the basic and well- tried safety principles of ISO 13849-1:2008 & ISO 13849-2:2012	
	B ₁₀ ⁽⁵⁾		7.4x10 ⁶ cycles	
	B _{10d} ⁽⁵⁾		14.8x10 ⁶ cycles	

Note 1) Min. operating pressure should be equivalent to or lower than pilot supply pressure.

- Note 2) Use dry air at the low temperatures.
- Note 3) Use controlled clean air.
- Note 4) Shock 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. (Value in the initial stage)

Vibration resistance: No malfunction occurred in a onesweep test between 8.3 and 2000 Hz. Test was performed at both energized and de-energized states to the axis and right angle directions of the main valve (Value in the initial stage).

Note 5) Under SMC test conditions. The B10 figure is estimated from SMC life tests. The B10d figure is derived from B10 using the assumption in EN ISO 13849-1:2008 Annex C. Contact SMC for details.

2.2 Flow data

	No. of positions	Model	Effective area (mm ²) (NI/min)
	2 (Single)	VSA7-6-FG-S	27 (1472.25)
	2 (Double)	VSA7-6-FG-D	27 (1472.25)
Cine 1	3 (Closed)	VSA7-6-FHG-D	25.5 (1374.10)
Size I Sorios	3 (Exhaust)	VSA7-6-FJG-D	27 (1472.25)
	3 (Pilot check)	VSA7-6-FPG-D	20 (1079.65)
V3A 7-0	3 (Pressure)	VSA7-6-FIG-D	25.5 (1374.10)
	2 (Reverse	VSA7-6-YZ-S	27 (1472.25)
	pressure)		
	2 (Single)	VSA7-8-FG-S	58 (3140.80)
	2 (Double)	VSA7-8-FG-D	58 (3140.80)
	3 (Closed)	VSA7-8-FHG-D	58 (3140.80)
Size z	3 (Exhaust)	VSA7-8-FJG-D	58 (3140.80)
	3 (Pilot check)	VSA7-8-FPG-D	40 (2159.30)
V3A 7-0	3 (Pressure)	VSA7-8-FIG-D	58 (3140.80)
	2 (Reverse	VSA7-8-YZ-S	58 (3140.80)
	pressure)		

2.3 Symbols





* Option

Figure 1 – ISO 1219 Symbols

Caution

• Special products might have specifications different from those shown in this section. Contact SMC for specific drawings. These drawings will give the appropriate specification details and compliance with the safety principles of ISO 13849, if applicable.

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.
- 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.

3.3 Piping

Caution

- 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 to the specified tightening torque.

Thread	Tightening Torque (Nm)
Rc 1/8	3 to 5
Rc 1/4	8 to 12
Rc 3/8	15 to 20
Rc 1/2	20 to 25
Rc 3/4	28 to 30
Rc 1	36 to 38
Rc 1 ¼	40 to 42
Rc 1 ½	48 to 50
Rc 2	48 to 50

3 Installation - Continued

One-touch fittings:

Caution

Tube attachment

- 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 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.
- 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. 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.

Tube detachment

- Push in the release bushing sufficiently and push 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 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 from the fitting.

Precautions on other tube brands

Tube attachment

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

A Caution

Nylon tube	±0.1mm
Soft nylon tube	±0.1mm
Polyurethane tube	+0.15mm
	-0.2mm

• 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.

3.4 Mounting

Valve series VSA7-6 and VSA7-8 can be mounted on a sub-plate or manifold.

Caution

- Be sure to cut off 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.
- If the connection between blocks or tightening of the tie-rod screws is insufficient, it may cause air leakage. Before supplying air, check that there is no clearance between the blocks, and the manifold blocks are firmly secured in order to ensure air supply without leakage.
- Before assembly and installations, confirm that rubber parts such as gaskets and O-rings are assembled to every block. If rubber parts are missing, air leakage may occur.

3 Installation - Continued

Tightening torque

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	Series	Thread	Appropriate tightening torque (Nm)
	VSA7-6	M5	2.3 to 3.7
	VSA7-8	M6	4.0 to 6.0

3.5 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, 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.

3.6 Air supply

Caution

Type of fluids

Please consult with SMC when using the product in applications other than compressed air.

- When there is a large amount of drainage
 Compressed air containing a large amount of drainage can cause malfunction of pneumatic equipment. An air dryer or water separator should be installed upstream from filters.
- Drain flushing

If condensation in the drain bowl is not emptied on a regular basis, the bowl will overflow and allow the condensation to enter the compressed air lines. It causes malfunction of pneumatic equipment. If the drain bowl is difficult to check and remove, installation of a drain bowl with an auto drain option is recommended.

Use clean air

Do not use compressed air that contains chemicals, synthetic oils including organic solvents, salt or corrosive gases, etc., as it can cause damage or malfunction.

- When extremely dry air is used as the fluid, degradation of the lubrication properties inside the equipment may occur, resulting in reduced reliability (or reduced service life) of the equipment. Please consult with SMC.
- Install an air filter upstream near the valve. Select an air filter with a filtration size of 5 μm or smaller.
- If excessive carbon powder is seen, install a mist separator on the upstream side of the valve.

If excessive carbon dust is generated by the compressor it may adhere to the inside of a valve and cause it to malfunction.

4 Settings

4.1 Manual Override

A Warning

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



6 Outline Dimensions (mm)

5.1 Size 1 VSA7-6-(FG, YG)-S-□□-□ Size 2 VSA7-8-(FG, YG)-S-□□-□





(): In case of VSA7-8

5 How To Order



5.3 Size 1 VSA7-6-(FHG, FJG, FIG)-□□-□ Size 2 VSA7-8- (FHG, FJG, FIG)-□□-□



(): In case of VSA7-8

6 Outline Dimensions (mm) - Continued

5.4 Size 1 VSA7-6-FPG-FPG-DD-Size 2 VSA7-8-FPG-FPG-DD-D



(): In case of VSA7-8

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.

7 Limitations of Use

- 8.1 Limited warranty and Disclaimer/Compliance Requirements
- The product used is subject to the following "Limited warranty and Disclaimer" and "Compliance Requirements". Read and accept them before using the product.

• Limited warranty and Disclaimer

1) The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is $first^{(1)}$. Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.

7 Limitations of Use - Continued

2) For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.

This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.

3) Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalogue for the particular products.

⁽¹⁾ Vacuum pads are excluded from this 1 year warranty.

A vacuum pad is a consumable part, so it is warranted for a year after it is delivered. Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

Compliance Requirements

1) The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.

2) The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

A Caution

 SMC products are not intended for use as instruments for legal metrology.

Measurement instruments that SMC manufactures or sells have not been qualified by type approval tests relevant to the metrology (measurement) laws of each country.

Therefore, SMC products cannot be used for business or certification ordained by the metrology (measurement) laws of each country.

Warning

Any use in an ISO 13849 system must be within the specified limits and application conditions. The user is responsible for the specification, design, implementation, validation and maintenance of the safety system (SRP/CS).

Danger

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

7.2 Filters and strainers

- Be careful regarding clogging of filters and strainers.
- Replace filter elements after one year of use, or earlier, if the pressure drop reaches 0.1MPa.
- Clean strainers when the pressure drop reaches 0.1MPa.

7.3 Drain flushing

• Remove drainage from air filters regularly. (Refer to the specifications).

7.4 Lubrication

· Once lubrication has begun, lubrication must be continued.

7.5 Multiple Pressure SUP Style

- When 2 or more different pressures are required, install a gallery blank disc (AXT502-14/AXT502-14-1A) between the stations to operate at different pressures.
- A dual pressure supply can be supplied from both left and right sides of the manifold.
- If 3 or more pressures are supplied, the individual SUP spacer should be used.

7 Limitations of Use - Continued

7.6 Individual EXH Style

- If there are many valve stations operating at the same time or operation frequency is high, problems caused by back pressure will be prevented by using individual EXH style.
- An individual EXH spacer (VVA71-R-□/ VVA72-R-□) mounted on the manifold block allows each valve to exhaust individually.

8 Contacts

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