



Operation Manual

PRODUCT NAME

3 Port Air Operated Valve

MODEL / Series / Product Number

VTA/VOA315 Series

SMC Corporation

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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)*1), and other safety regulations.

*1) 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: Manipulating industrial robots -Safety.

etc.



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.



Danger

Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

Warning

1. 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 catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. 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.

3. 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.

4. 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, combustion 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 specifications described in the product catalog.

3. An application which could have negative effects on people, property, or animals requiring special safety analysis.

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.



Safety Instructions

Caution

1. 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.

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.*2)

Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.

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 catalog for the particular products.

***2) 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 regulation 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.

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.



VT/VOA315 Series 3 Port Air Operated Valve Precautions 1

Be sure to read this before handling products.

Design/Selection

⚠ Warning

1. Confirm the specifications.

This product is designed only for use in compressed air systems. Do not operate at pressures, temperatures, etc., beyond the range of specifications, as this can cause damage or malfunction. (See catalog specifications)

Please contact SMC when using a fluid other than compressed air.

We do not guarantee against any damage if the product is used outside of the specification range.

2. Actuator drive

When an actuator, such as a cylinder, is to be driven using a valve, take appropriate measures (such as the installation of a cover or the restricting of access to the product) to prevent potential danger caused by actuator operation.

3. Intermediate stops

Due to the compressibility of air, it is difficult for this product to make a piston stop at the required intermediate position accurately and precisely.

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 period of time.

Please contact SMC if it is necessary to hold a stopped position for an extended period of time.

4. Effects of back pressure when using a manifold

Use caution when valves are used on a manifold because actuators may malfunction due to back pressure.

When a single acting cylinder is operated, caution is necessary. When there is the danger of such a malfunction, take countermeasures such as using an individual EXH manifold.

5. Holding pressure

Since valves are subject to air leakage, they cannot be used for applications such as holding pressure in a pressure vessel.

6. Not suitable for use as an emergency shutoff valve, etc.

The valves presented in this catalog are not designed for safety applications (e.g. emergency shutoff valve). If the valves are used in such applications, additional safety measures should be adopted.

7. Release of residual pressure

For maintenance and inspection purposes install a system for releasing residual pressure.

8. Ventilation

When using the valve in a closed control panel, etc., install ventilating openings to prevent an increase of pressure inside the control panel.

9. Do not disassemble the product or make any modifications, including additional machining.

Doing so may cause human injury and/or an accident.

⚠ Caution

1. Operation in low temperature conditions

It is possible to operate the valve in extreme temperatures, as low as -10°C . Take appropriate measures to avoid the freezing of drainage, moisture, etc. in low temperatures.

2. Mounting orientation

Mounting orientation is not specified.

3. Initial lubrication of main valve

Grease has been applied to the main valve as initial lubricant.

Mounting

⚠ Warning

1. Operation Manual (this document)

Install the products and operate them only after reading the operation manual carefully and understanding its contents. Also, keep the manual where it can be referred to as necessary.

2. Ensure sufficient space for maintenance activities.

When installing the products, allow access for maintenance and inspection.

3. Tighten threads with the proper tightening torque.

When installing the products, follow the listed torque specifications.

4. If air leakage increases or equipment does not operate properly, stop operation.

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

5. Painting and coating

Warnings or specifications printed on or affixed to the product should not be erased, removed, or covered up.

Please consult with SMC before applying paint to resinous parts, as this may have an adverse effect due to the solvent in the paint.

Piping

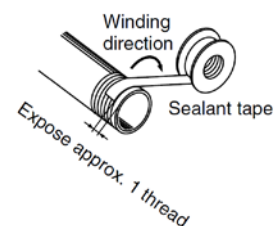
⚠ Caution

1. Preparation before piping

Before piping is connected, it should be thoroughly blown out with air (flushing) or washed to remove chips, cutting oil, and other debris from inside the pipe.

2. Winding of sealant tape

When screwing piping or fittings into ports, ensure that chips from the pipe threads or sealing material do not enter the piping. Also, if sealant tape is used, leave 1 thread ridge exposed at the end of the threads.





VTA/VOA315 Series 3 Port Air Operated Valve Precautions 2

Be sure to read this before handling products.

Piping

⚠ Caution

3. Connection of piping and fittings

When screwing piping or fittings into the valve, tighten them as follows.

Connection thread size (R, NPT)	Proper tightening torque (N·m)
1/8	3 to 5
1/4	8 to 12

Follow the procedure of the manufacturer when fittings other than SMC fittings are used.

If the fitting is tightened with excessive torque, a large amount of sealant will seep out. Remove the excess sealant.

Insufficient tightening may cause seal failure or loosen the threads.

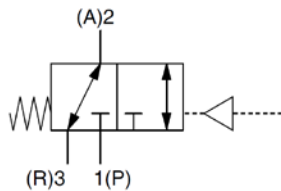
4. Piping to products

When connecting piping to the product, refer to the catalog to avoid mistakes in the position of the supply port, etc.

Note) Pilot port size of this product is 1/8.

This product is universal porting type. N.C type, N.O. type, divider type and selector type can be used.

Symbol



Lubrication

⚠ Warning

1. Lubrication

The valve has been lubricated for life by the factory and does not require any further lubrication.

If a lubricant is used in the system, use class 1 turbine oil (no additives), ISO VG32.

Once lubricant is utilized within the system, since the original lubricant applied within the product during manufacturing will be washed away, please continue to supply lubrication to the system. Without continued lubrication, malfunctions could occur.

If turbine oil is used, refer to the Safety Data Sheet (SDS) of the oil.

2. Lubrication amount

If too much oil is applied, it may accumulate inside the valve, causing malfunction or response delay. So, do not apply a large amount of oil.

Air Supply

⚠ Warning

1. Type of fluids

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

2. When there is a large amount of drainage

Compressed air containing a large amount of drainage can cause the malfunction of pneumatic equipment. An air dryer or water separator should be installed upstream from filters.

3. Drain flushing

If condensation in the drain bowl is not emptied on a regular basis, the bowl will overflow. This may cause the malfunction of pneumatic equipment. If the drain bowl is difficult to check and remove, the installation of a drain bowl with an auto drain option is recommended.

For compressed air quality, refer to the SMC Best Pneumatics catalog No. 6.

4. Use clean air

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

⚠ Caution

1. 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.

2. Install an air filter.

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

3. Take measures to ensure air quality, such as by installing an aftercooler, air dryer, or water separator.

Compressed air that contains a large amount of drainage can cause the malfunction of pneumatic equipment, such as valves. Therefore, take appropriate measures to ensure air quality, such as by providing an aftercooler, air dryer, or water separator.

4. If an excessive amount of carbon powder is present, 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.

For compressed air quality, refer to the SMC Best Pneumatics catalog No. 6.



VTA/VOA315 Series

3 Port Air Operated Valve

Precautions 3

Be sure to read this before handling products.

Operating Environment

Warning

1. Do not use in an atmosphere containing corrosive gases, chemicals, sea water, water, water steam, or where there is direct contact with any of these.
2. Do not use in an environment where flammable gas or explosive gas exists. Usage may cause a fire or explosion. The products do not have an explosion proof construction.
3. Do not use in a place subject to heavy vibration and/or shock.
4. The valve should not be exposed to prolonged sunlight. Use a protective cover. Note that the valve is not for outdoor use.
5. Remove any sources of excessive heat.
6. If it is used in an environment where there is possible contact with oil, weld spatter, etc., exercise preventive measures.

Caution

1. Temperature of ambient environment

Use the valve within the range of the ambient temperature specification of each valve. In addition, pay attention when using the valve in environments where the temperature changes drastically.

2. Humidity of ambient environment

- When using the valve in environments with low humidity, take measures to prevent static.
- If the humidity rises, take measures to prevent the adhesion of water droplets on the valve.

Maintenance

Warning

1. Perform maintenance and inspection according to the procedures indicated in the operation manual.

If handled improperly, human injury and/or malfunction or damage of machinery and equipment may occur.

2. Removal of equipment, and supply/exhaust of compressed air

When equipment is removed, first confirm that measures are in place to prevent workpieces from dropping, run-away equipment, etc. Then, cut off the supply air and electric power supply for solenoid valves, and exhaust all compressed air from the system using its residual pressure release function.

When the equipment is operated after remounting or replacement, first confirm that measures are in place to prevent the lurching of actuators, etc. Then, confirm that the equipment is operating normally.

3. Low-frequency operation

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

4. If the volume of air leakage increases or the valve does not operate normally, do not use the valve.

Perform periodic maintenance on the valve to confirm the operating condition and check for any air leakage.

Caution

1. Drain flushing

Remove drainage from the air filters regularly.

2. Lubrication

Once lubrication has been started, it must be continued.

Use class 1 turbine oil (with no additives), VG32. If other lubricant oil is used, it may cause a malfunction.

Please contact SMC for suggested class 2 turbine oil (without additives), ISO VG32.



VT/VOA315 Series

Specific Product Precautions (1)

Be sure to read this before handling the products.

Pilot pressure range

Regardless of the main pressure, the product can be operated within pilot pressure range (0.1 to 1MPa).

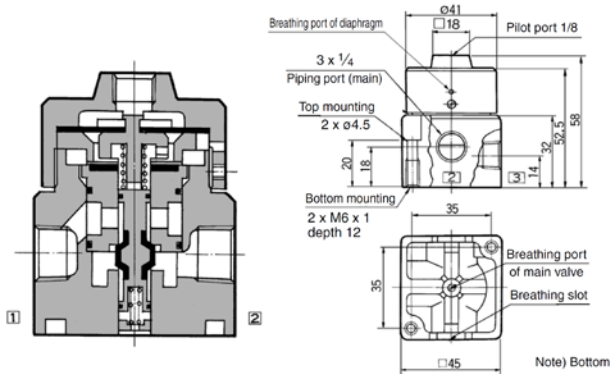
Breathing hole

Caution

1. The bottom of the solenoid valve has a breather hole for the main valve. Take proper measures to prevent this hole from being blocked as this will lead to a malfunction.

There is a breathing hole for the diaphragm on the side of the valve. If the breathing hole is blocked, a malfunction may occur. Therefore, please do not block it.

* Ordinarily, when the solenoid valve is mounted on a metal surface, it can breathe through the breather hole, via the breather groove. However, in particular, if the surface to be mounted is made of the rubber, the rubber could deform and block the hole.



2. Take measures to prevent ingress of dust and foreign matter from the exhaust port and other unused ports. Also, take measures to prevent ingress of water and foreign matter from the breathing port of the diaphragm.

Manifold specification

Manifold

- For more than 6 stations, supply air from both P ports on. For common exhaust type, exhaust from both R ports.
- P and R ports can be 3/8 by mounting the optional mounting bracket to the manifold base.

Mounting

Warning

When mounting valves on the manifold base, the mounting orientation is decided. If it is mounted in the wrong direction, connected equipment may malfunction.

Accessory for manifold applicable solenoid Valve

Model	Applicable manifold model	Accessories
VOA315	Common/Individual exhaust	O-ring KA00087 (P8), 4 pcs. round head combination screw DXT010-66-2, 2 pcs.

Option

Description	Part no.	Note
Mounting bracket assembly	DXT010-37-4□A	Common exhaust type
	DXT010-37-3□A	Individual exhaust type
Blanking plate assembly (with packing and screws)	DXT010-36-2A	Common exhaust type
		Individual exhaust type

□: Thread type

Nil	Rc
F	G
N	NPT
T	NPTF

Mounting

Warning

When the solenoid valves are mounted on the manifold base, the mounting orientation is decided. If it is mounted in the wrong direction, connected equipment may malfunction. Mount it by referring to how to switch over from N.C. to N.O..

Caution

The solenoid valves are assembled as N.C. valves at the time of shipment.

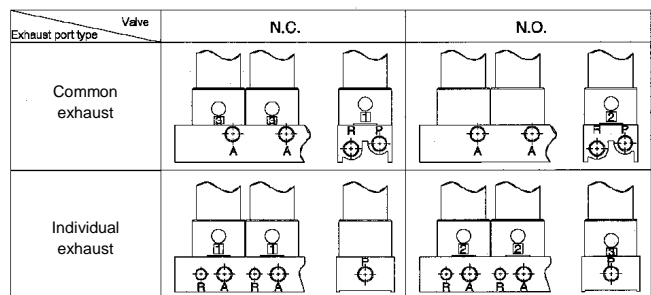
By removing the two mounting screws from the desired valves, and rotating each valve body 180° and reassembling it on the manifold base, it is possible to reassemble an N.C. valve as an N.O. valve. (When doing so, make sure that the gasket is attached to the mounting surface of the valve.) Properly tighten the screws.

The tightening torque of the mounting screws is 1.4 N·m.

How to switch over from N.C. to N.O.

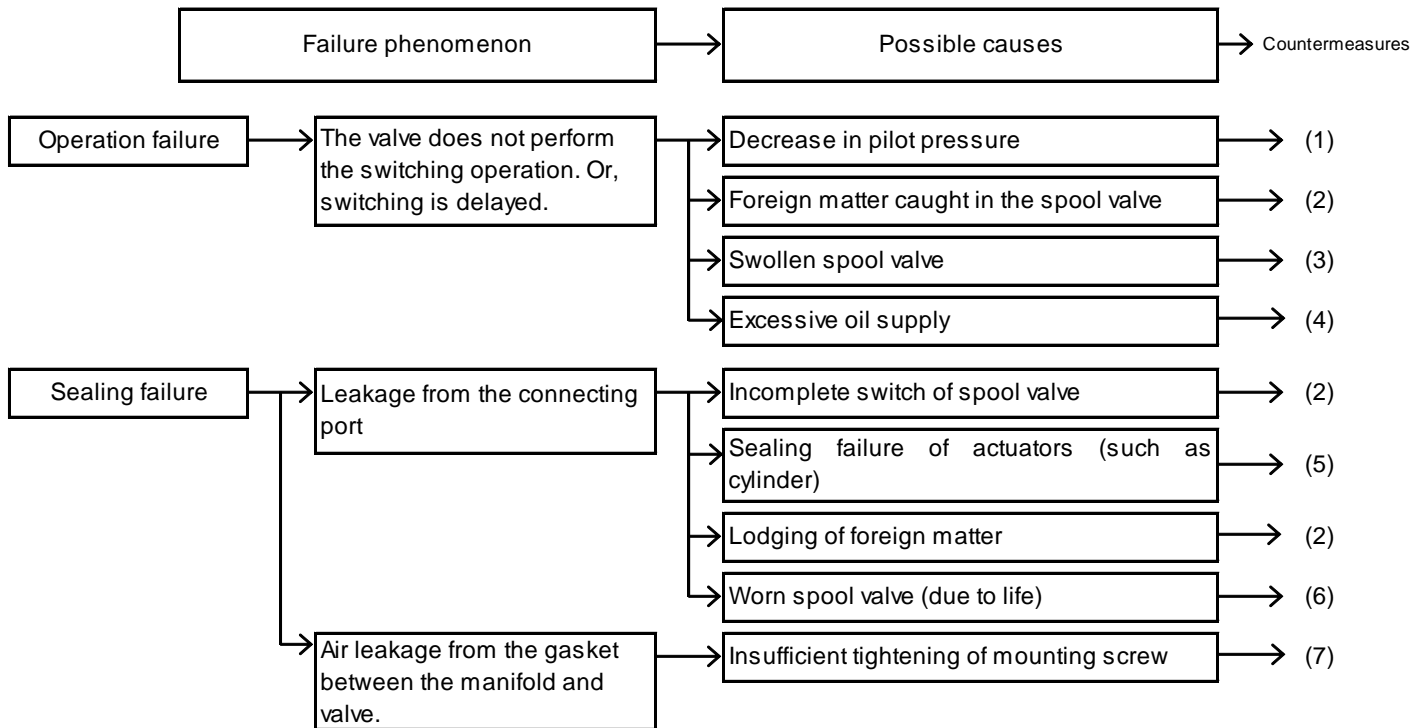
Universal porting permits convertibility N.C./N.O. by a simple 180° rotation.

Mounting conditions for N.C. and N.O. are shown in the figure below.



Troubleshooting

Perform troubleshooting with higher possibility based on the failure phenomenon.



Countermeasures

No.	Countermeasures
(1)	Adjust the pressure so that pilot pressure is within the specified range during operation.
(2)	If air leakage is caused by foreign matter, remove foreign matter in the piping by air blow and replace the valve.
(3)	<ul style="list-style-type: none"> If incorrect oil has been used for lubrication, remove the oil with air blow, and replace the valve with a new one. If a lubricant is used in the system after replacing the valve, use turbine oil Class 1 (with no additive) ISO VG32. If there is a large amount of condensate or condensate cannot be removed completely, mount an auto drain or install a dryer and replace the valve.
(4)	Reduce the supply oil to the amount at which the oil does not splash from the exhaust port .
(5)	Repair or replace the actuators.
(6)	Replace the valve.
(7)	Stop the air and ensure that the bolts are correctly tighten

If the countermeasures above are not effective, there may be a problem with the valve. Stop using the valve immediately.

If any of the examples below are applicable, there may be an internal problem with the valve. Stop using the valve immediately.

1. The oil supplied was not the specified type.
2. Lubrication was stopped during operation or lubrication was interrupted temporarily.
3. The product was directly exposed to water.
4. Severe impact was applied.
5. Foreign matter such as condensate or dust has entered the product.
6. Other than those specified, if precautions on the operation manual apply.

* If the product has failed, then please return the valve as it is.

Revision history

A	Renewal	NP
B	Safety Instructions	Po
C	Safety instructions and change of tightening torque during piping.	WR

1st printing: --

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Note: Specifications are subject to change without prior notice and any obligation on the part of the manufacturer.
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