



# Operation Manual

PRODUCT NAME

Direct Operated 3 Port Solenoid Valve

MODEL / Series / Product Number

Series: VT315

**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.



## VT315 Series

# 3 port solenoid valve/ Precautions (1)

Be sure to read before handling.

### Design / Selection

#### Warning

##### 1. Confirm the specifications

This product is designed only for use in compressed air systems (including vacuum).

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

Please contact SMC when using a fluid other than compressed air (including vacuum).

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 stopping

It is difficult to make a piston stop at the required position accurately 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 period of time.

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

##### 4. Effect of back pressure when using a manifold

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

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

##### 5. Holding 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.

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

These valves are not designed for safety applications such as an emergency shutoff valve. If the valves are used for the mentioned applications, additional safety measures should be adopted.

##### 7. Release of residual pressure

For maintenance purposes install a system for releasing residual pressure.

Especially, ensure that the residual pressure between the valve and the cylinder is released.

##### 8. 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.

In addition, at the time of vacuum adsorption, be sure to supply a constant supply of vacuum. Failure to do so may result in foreign matter sticking to the adsorption pad or air leakage, causing the workpiece to drop.

##### 9. Regarding a vacuum switch valve and vacuum release valves

If a non-vacuum valve is installed in the middle of a piping system that contains a vacuum, the vacuum condition will not

be maintained. Use a valve designed for use under vacuum conditions.

##### 10. Ventilation

Provide ventilation when using a valve in a confined area, such as in a closed control panel. For example, install a ventilation opening, etc., in order to prevent pressure from increasing inside of the confined area and to release the heat generated by the valve.

##### 11. Energizing for extended periods of time



#### Caution hot surface

\* Be aware that the valve surface may get hot.

● If a valve is continuously energized for an extended period of time, the temperature of the valve will increase due to the heat generated by the coil. This will likely adversely affect the performance of the solenoid valve and any nearby peripheral equipment. Therefore, when the total energizing time per day is expected to be longer than the total de-energizing time per day, use a continuous duty type valve.

Depending on the operating conditions, it may be possible to use valves which are not mentioned above. Please contact SMC. In addition, it is possible to shorten the energizing time by using a N.O. (normal open) valve.

● When the valve is mounted onto a control panel, incorporate measures to limit the heat radiation so that it is within the operating temperature range. Do not touch the valves by bare hand during or after energization.

For example, the temperature will be high when a 3 station manifold or larger is put next to other valves and continuously energized.

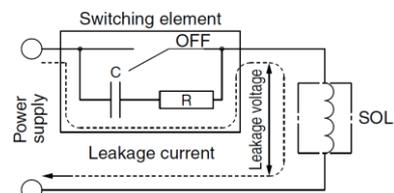
##### 12. Do not disassemble the product or make any modifications, including additional machining.

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

#### Caution

##### 1. Leakage voltage

Take note that the leakage voltage will increase when a resistor is used in parallel with a switching element or when a C-R circuit (surge voltage suppressor) is used for protecting a switching device because of the leakage voltage passing through the C-R circuit. The suppressor residual leakage voltage should be as follows.



**DC coil** 5% or less of rated voltage

**AC coil** 15% or less of rated voltage

##### 2. Solenoid valve drive for AC with a solid state output (SSR, TRIAC output, etc.)

###### 1) Current leakage

When using a snubber circuit (C-R element) for surge protection of the output, a very small amount of electrical current will continue to flow even during the OFF state.

This results in the valve not returning. In a situation where the tolerance is exceeded, as in the above case, take measures to install a bleeder resistor.



# VT315 Series

## 3 port solenoid valve/ Precautions (2)

Be sure to read before handling.

### Design / Selection

#### ⚠ Caution

##### 2) Minimum allowable load amount (Min. load current)

When the consumption current of a valve is less than the output's minimum allowable load volume or the margin is small, the output may not switch normally. Please contact SMC.

##### 3. Surge voltage suppressor

If a surge protection circuit contains nonstandard diodes, such as Zener diodes or varistor, a residual voltage that is in proportion to the protective circuit and the rated voltage will remain. Therefore, take into consideration the surge voltage protection of the controller.

In the case of diodes, the residual voltage is approximately 1 V.

##### 4. Surge voltage intrusion

With non-polar type solenoid valves, at times of sudden interruption of the loading power supply, such as emergency shutdown, surge voltage intrusion may be generated from loading equipment with a large capacity (powerconsumption), and a solenoid valve in a de-energized state may switch over (see Figure 1).

When installing a breaker circuit for the loading power supply, consider using a solenoid valve with polarity (with polarity protection diode), or install a surge absorption diode between the loading equipment COM line and the output equipment COM line (see Figure 2).

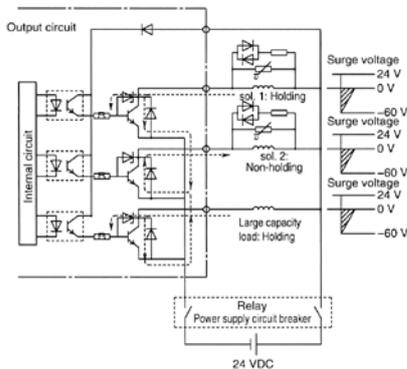


Figure 1. Surge intrusion circuit example (NPN outlet example)

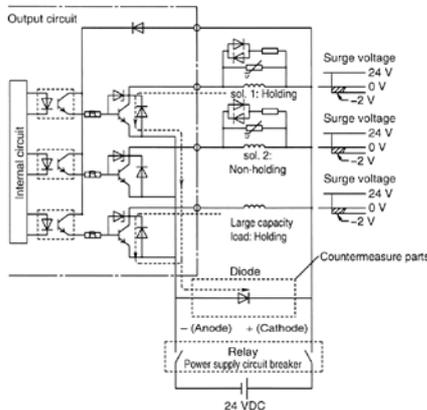


Figure 2. Surge intrusion countermeasure example (NPN outlet example)

##### 5. Operation in low temperature conditions

It is possible to operate this valve in extreme temperature, as low as -5°C. Take appropriate measures to avoid the freezing of drainage, moisture, etc., in low temperatures.

##### 6. Mounting orientation

Mounting orientation is unrestricted.

##### 7. Initial lubrication of main valve

The following initial lubricant has already been applied to the main valve.

### 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

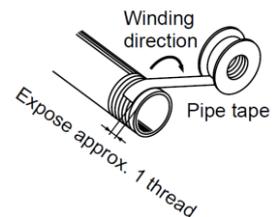
#### ⚠ Caution

##### 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.



##### 3. Connection of fittings

When screwing fittings into valves, tighten as follows.

##### Tightening Torque for Piping

Connection thread	Proper tightening torque (N·m)
Rc1/4	8 to 12
Rc3/8	15 to 20

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

##### 4. Piping to products

When piping to a product, refer to the instruction manual to avoid mistakes regarding the supply port, etc.

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



## VT315 Series

# 3 port solenoid valve/ Precautions (3)

Be sure to read before handling.

### Wiring

#### Warning

1. **The solenoid valve is an electrical product. For safety, install an appropriate fuse and circuit breaker before use.**

#### Caution

##### 1. Polarity

When connecting power to a solenoid valve with a DC specification and a light or surge voltage suppressor, check for polarity.

If the polarity connection is wrong, the valve will not operate.

##### 2. Applied voltage:

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

##### 3. Check the connections.

Check if the connections are correct after completing all wiring.

##### 4. External force applied to the lead wire

If an excessive force is applied to the lead wire, this may cause faulty wiring. Take appropriate measures so that a force of 30 N or more is not applied to the lead wire.

### Lubrication

#### Warning

##### 1. Lubrication

- 1) The product has been lubricated for life by the manufacturer and therefore, does not require lubrication while in service.
- 2) If a lubricant is used in the system, use class 1 turbine oil (no additives), ISO VG32.

Once a lubricant is used in the system, lubrication must be continued because the original lubricant applied during manufacture will be washed away.

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

##### 2. Lubrication amount

If too much oil is supplied, the oil will be accumulated in the product, causing malfunction or response delay.

### 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 detailed information regarding the quality of the compressed air described above, refer to SMC's Best Pneumatics catalog.

##### 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  $\mu\text{m}$  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 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 detailed information regarding the quality of the compressed air described above, refer to SMC's Best Pneumatics catalog.

### 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.**
5. **Remove any sources of excessive heat.**
6. **If it is used in an environment where there is possible contact with oil, weld spatter, et., exercise preventive measures.**
7. **When the solenoid valve is mounted in a control panel or it's energized for a long period of time, make sure the ambient temperature is within the specifications of the valve.**



## VT315 Series

# 3 port solenoid valve/ Precautions (4)

Be sure to read before handling.

### Operating Environment

#### 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 inspection according to the procedures indicated in the operation manual (this document).

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

Before components are 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, and exhaust all air pressure 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 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. Manual override

When a manual override is operated, connected equipment will be actuated.

Operate only after safety is confirmed.

##### 5. 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.



# VT315 Series 3 port solenoid valve Specific Product Precautions (1)

Be sure to read this before handling.

## How to wire DIN terminal

### 1. Disassembly

- 1) After loosening the screw (1), then if the housing (4) is pulled in the direction of the screw (1), the connector will be removed from the body of equipment (solenoid, etc.).
- 2) Pull out the screw (1), then remove the gasket (2) .
- 3) On the bottom part of the terminal block (3), there's a cut-off part (indication of an arrow) (3a). If a small flat head screwdriver is inserted between the opening in the bottom, terminal block (3) will be removed from the housing (4). (Refer to graph at right.)
- 4) Remove the cable gland (5) and plain washer (6) and rubber seal (7).

### 2. Wiring

- 1) Pass the cable (8) through the cable gland (5), washer (6), rubber seal (7), in this order and then insert them into the housing (4).
- 2) Dimensions of the cable (8) are as shown in the right figure. Skin the cable and crimp the crimped terminal (9) to the edges.
- 3) Remove the screw (3f) from the bracket (3e). (Loosen in the case of Y-shape type terminal.) As shown in the right figure, mount a crimped terminal (9), and then again tighten the screw (3f).

Note) Tighten within the tightening torque of 0.5 N·m  $\pm$ 15%.

Note: a) It is possible to wire even in the state of bare wire. In that case, loosen the screw (3f) and place a lead wire into the bracket (3d), and then tighten it once again.

b) The maximum size for the round terminal (9) is 1.25 mm<sup>2</sup>—3.5 and for the Y terminal is 1.25 mm<sup>2</sup>—4.

c) Cable (8) outside diameter:  $\phi$ 6 to  $\phi$ 12 mm

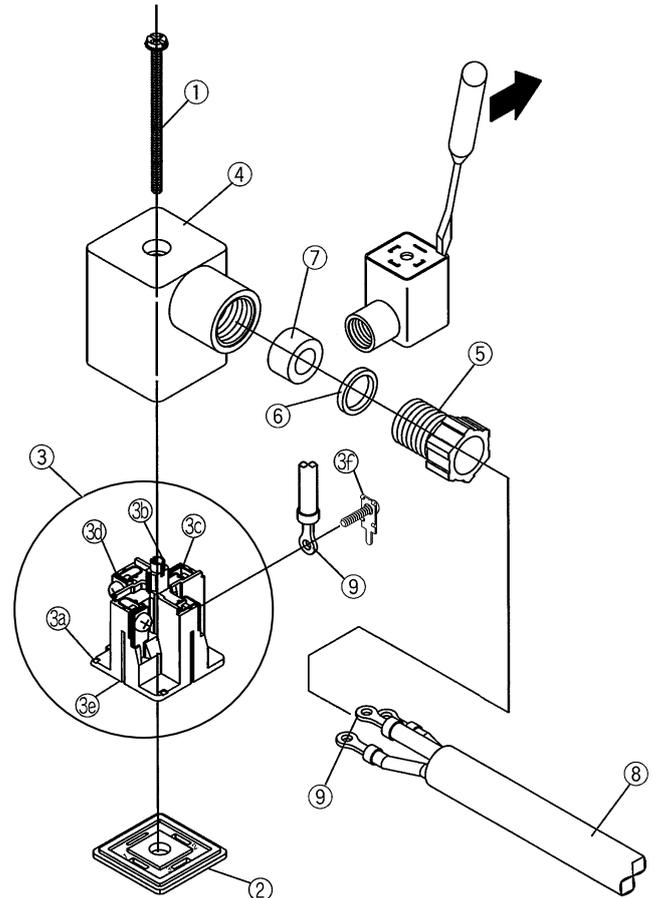
Note) For the one with outside diameter ranged between  $\phi$ 9 to  $\phi$ 12 remove the inside parts of the rubber seal (7) before using.

### 3. Assembly

- 1) Terminal block (3) connected with housing (4) should be reinstated. (Push it down until you hear the click sound.)
- 2) Putting rubber seal (7), plain washer (6), in this order into the cable introducing slit on the housing (4), then further tighten the cable gland (5) securely.
- 3) By inserting gasket (2) between the bottom part of the terminal block (3) and a plug on an equipment, screw in (1) on top of the housing (4) and tighten it.

Note) Tighten within the tightening torque of 0.5 N·m  $\pm$ 20%.

### Exploded view



### Changing the entry direction

The cable entry direction of a connector can be changed as desired (4 directions at 90° intervals), depending on the combination of a housing (4) and a terminal block (3).

## Electric connection (DIN terminal)

If the rated voltage for the solenoid valve is DC type and there is polarity, connect terminal No.1 to the positive (+) side and No.2 to the negative (-) side.

## Connector for DIN Terminal

Description	Part no.
DIN connector	GDM2B



# VT315 Series 3 port solenoid valve Specific Product Precautions (2)

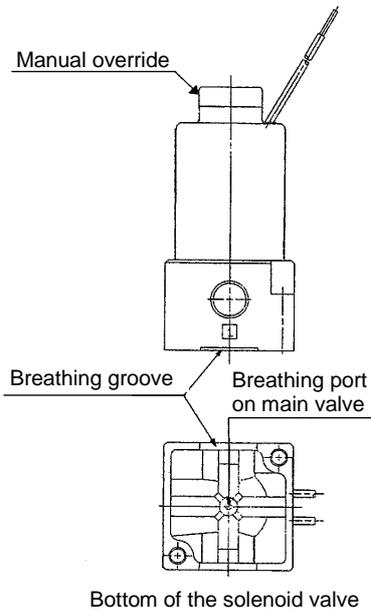
Be sure to read this before handling.

## Breathing port

### ⚠ Caution

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

\*If the solenoid valve is mounted on a metal surface, it can breathe through the breathing hole. However, if the valve is to be mounted on a surface made of rubber, it could deform and block the breathing hole.



2. Make sure that dust and/or other foreign matters should not enter the solenoid valve from the unused port such as the exhaust port.

Also, since there is the breathing port for the armature on the manual override, do not allow accumulation of dust and/or other foreign matters to block the breathing port.

## Lead wire color (grommet, conduit terminal)

Voltage	Color
100 VAC	Blue
200 VAC	Red
DC (With surge voltage suppressor)	Red (+), Black (-)
Other	Gray

\*The DC type without the surge voltage suppressor does not have polarity.

## Semi-standard

### 1. Continuous duty type [VT/O 315E]

**Exclusive use recommended for continuous energizing for an extended period of time.**

1) This model is for continuous energizing for an extended period of time, not for high operating frequency. But even at low operating frequency, if energizing the solenoid valve more than once a day, consult with SMC.

2) Energizing the solenoid valve should be done at least once in 30 days.

Coil rated voltage (V)	Apparent power	
	AC (50/60Hz)	Holding: 18VA (50Hz)
DC	100, 110, 200, 220	
		12, 24

### 2. Vacuum type [VT/O 315V]

Operating pressure range	-101.2kPa to 0.1MPa
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The vacuum model has less air leakage than the standard model under low pressure. It is recommended for vacuum application.

### ⚠ Caution

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

If the product is used in an environment where it is exposed to dust, install a filter to prevent dust from entering the valve.

## Light/Surge voltage suppressor

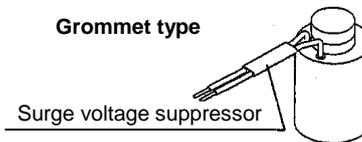
### Surge Voltage Suppressor

	AC	DC
Grommet (GS)		
Conduit (CS)		
Conduit terminal (TS)		

### Circuit for Indicator Light

	AC	DC
DIN terminal with indicator light (DL)		
Conduit terminal with indicator light (TL)		

### Grommet type



## Manual override with lock (option)

- Using a flat blade screwdriver, press the manual override button that is located in the head portion of the solenoid valve in order to directly push the spool valve downward, thus causing the solenoid valve to switch.
- With the button remaining pressed down, turn it approximately 90° clockwise or counterclockwise to maintain the manual override locked state.
- To revert to the original state, keep the button pressed down and turn it approximately 90° clockwise.



# VT315 Series 3 port solenoid valve Specific Product Precautions (3)

Be sure to read this before handling.

## Manifold specifications

### Manifold

- 1) For more than 6 stations, supply air to both sides of P port. The common exhaust type should exhaust from both of the R port.
- 2) The mounting bracket can change the P and R port (only P port for the individual exhaust type) to 3/8". The common exhaust type needs a specific base.

### Accessory for manifold applicable solenoid Valve [VO315]

Description	Part no.	Qty
O-ring	KA00087 (P8)	4
Screw	DXT010-66-2	2

### Option

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

□ : Thread type (Refer to catalog "How to order".)

### 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.

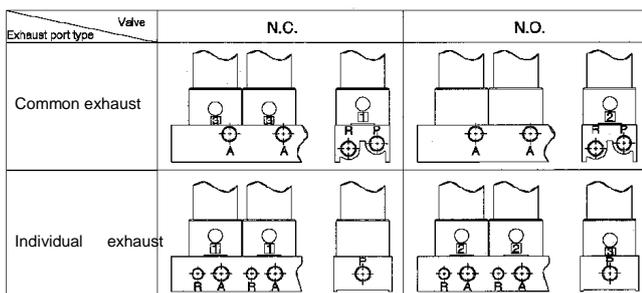
By removing the two mounting screws from the desired valves, and rotating each valve body 180° and reassembling it on the manifold base, it is possible to reassemble an N.C. valve as an N.O. valve. (When doing so, make sure that the gasket is attached to the mounting surface of the valve.) Properly tighten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

The tightening torque of the mounting screws is 3 N·m.

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

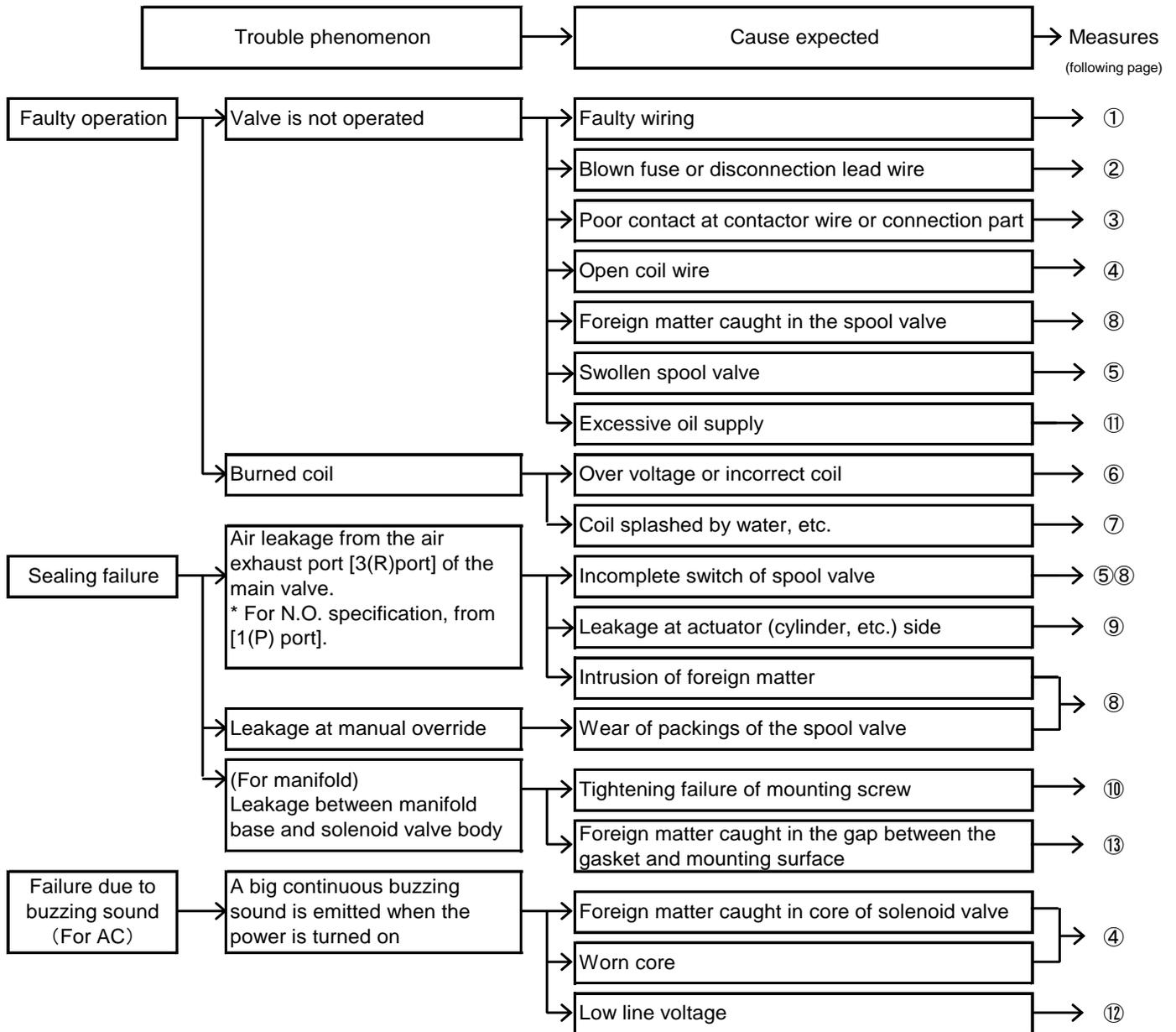
Universal porting permits convertibility N.C./N.O. by a simple 180° rotation.

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



# TROUBLE SHOOTING

Should any trouble be found during operation, trace the source of the trouble in the following order and take corrective action.



## Remedy

No.	Remedy
①	Re-wire correctly.
②	Replace part.
③	Replace part or re-wire positively.
④	Replace valve.
⑤	<ul style="list-style-type: none"> <li>·If wrong oil is used, completely air blow to remove oil, and replace valve. After valve is replaced, use turbine oil class 1 (ISO VG32).</li> <li>·When a large quantity of drain is given and cannot carry out drain omission surely, install either an auto-drain or a dryer. The valve should be replaced.</li> </ul>
⑥	Check voltage. Replace valve.
⑦	Protect the valve so that water does not splash the coil. Replace valve.
⑧	In case of intrusion of foreign matter, to remove foreign matter by air blow of piping and then replace valve.
⑨	Repair or replace actuators.
⑩	After stopping air and re-tighten the bolts.
⑪	Reduce the supply oil to the amount at which the oil does not splash from the exhaust port (R port).
⑫	Regulate voltage so that the voltage at the time of the operation becomes specifications range.
⑬	Remove foreign matter.

If no improvement is achieved in spite of the above countermeasure, inside of the valve may have some abnormality. In this case, stop using the valve immediately.

If any of followings are carried out, inside of the valve may have some failure. In this case, stop using the valve immediately.

1. Voltage out of rated voltage has been used.
2. Oil other than the specified one has been lubricated.
3. Lubrication has been stopped intermediately, or lubrication was suspended temporary.
4. Water splashed directly.
5. Strong impact was given.
6. Alien substance such as drain and particle got into. Drain or garbage invaded a valve.
7. Prohibited way of using the valve which is written at "Precautions" section in this operation manual

In addition, in the case of trouble, please send it back to the supplier for repair or replacement.

Revision	
<input checked="" type="checkbox"/> Tightening torque change	2018.8

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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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