



# 2-Port Solenoid Valves for Fluid Control

## Precautions 1

Be sure to read this before handling products.

For detailed precautions on each series, refer to the main text.

### Design

#### Warning

##### 1. Cannot be used as an emergency shutoff valve, etc.

The valves presented in this catalog are not designed for safety applications such as an emergency shutoff valve. If the valves are used in this type of system, other reliable safety assurance measures should also be adopted.

##### 2. Extended periods of continuous energization

The solenoid coil will generate heat when continuously energized. Avoid using in a tightly shut container. Install the valve in a well-ventilated area. Furthermore, do not touch it while it is being energized or right after it has been energized.

##### 3. This solenoid valve cannot be used for explosion proof applications.

##### 4. Ensure sufficient space for maintenance activities.

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

##### 5. Closed liquid circuit

In a closed circuit, when liquid is static, pressure could rise due to changes in temperature. This pressure rise could cause malfunction and damage to components such as valves. To prevent this, install a relief valve in the system.

##### 6. 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.

##### 7. Pressure (including vacuum) holding

It is not usable for an application such as holding the pressure (including vacuum) inside of a pressure vessel because air leakage is entailed in valves.

##### 8. When the conduit type is used as an equivalent to an IP65 enclosure, install a wiring conduit, etc.

##### 9. When an impact, such as water hammer, etc., caused by rapid pressure fluctuation is applied, the solenoid valve may be damaged.

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

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

### Selection

#### Warning

##### 1. Confirm the specifications.

Give careful consideration to the operating conditions, such as the application, fluid, and environment, and use within the specified operating ranges indicated in the catalog.

##### 2. Fluid

###### 1) Type of fluids

Before using a fluid, confirm whether it is compatible with the materials from each model by referring to the fluids listed in the catalog. Use a fluid with a dynamic viscosity of 50 mm<sup>2</sup>/s or less. If there is anything you are unsure of, please contact SMC.

### Selection

#### Warning

##### 2) Flammable oil, gas, etc.

Do not use the product with combustion-supporting or flammable fluids.

##### 3) Corrosive fluids

Corrosive fluids or seawater cannot be used. If water is to be used as the fluid, use clear water equivalent to tap water. When using underground water, if the water is to be treated, be sure to check the disinfectant or corrosion treatment's compatibility with the product before use.

##### 4) When a brass body is used, depending on the water quality, corrosion and internal leakage may occur. If such abnormalities occur, exchange the product for a stainless steel body.

##### 5) Use an oil-free specification if the entrance of oil particles into the passage will cause problems.

##### 6) Applicable fluids on the list may not be used depending on the operating conditions. Give adequate confirmation, and then determine a model. Keep in mind that the compatibility list refers to common use applications.

##### 3. Fluid quality

The use of a fluid that contains foreign matter can cause problems, such as malfunction and seal failure by promoting the wear of the valve seat and armature, by sticking to the sliding parts of the armature, etc. Install a suitable filter (strainer) immediately upstream from the valve. As a general rule, use 80 to 100 mesh.

When used to supply water to boilers, substances such as calcium and magnesium, which generate hard scale and sludge, are included. Since scale and sludge can cause the valve to malfunction, install water softening equipment and a filter (strainer) directly upstream from the valve to remove these substances.

##### 4. Air quality

###### 1) 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.

###### 2) Install air filters.

Install air filters upstream near the valves. A filtration size of 5 μm or less should be selected.

###### 3) Install an aftercooler, air dryer, etc.

Compressed air that contains excessive drainage may cause the malfunction of valves and other pneumatic equipment. To prevent this, install an aftercooler, air dryer, etc.

###### 4) If excessive carbon powder is generated, eliminate it by installing mist separators on the upstream side of valves.

If excessive carbon powder is generated by the compressor, it may adhere to the inside of the valves and cause malfunction.

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

##### 5. Ambient environment

Use within the operable ambient temperature range. Confirm the compatibility between the product's composition materials and the ambient atmosphere. Be certain that the fluid used does not touch the external surface of the product.

##### 6. Countermeasures against static electricity

Take measures to prevent static electricity, since some fluids can cause static electricity.

##### 7. For the low particle generation specification, please consult with SMC separately.



# 2-Port Solenoid Valves for Fluid Control Precautions 2

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## Selection

### ⚠ Warning

#### 8. Low temperature operation

1. The valve can be used in an ambient temperature of between  $-10$  to  $-20^{\circ}\text{C}$ . However, take measures to prevent the freezing or solidification of impurities, etc.
2. When using valves for water applications in cold climates, take appropriate countermeasures to prevent the water from freezing in tubing after cutting the water supply from the pump, by draining the water, etc. When warming by a heater, etc., be careful not to expose the coil portion to the heater. The installation of a dryer, retaining the heat of the body, etc., is recommended to prevent a freezing condition in which the dew point temperature is high and the ambient temperature is low, or the high flow is running.

## Mounting

### ⚠ Warning

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

After mounting is completed, confirm that it has been done correctly by performing a suitable function test.

#### 2. Do not apply external force to the coil section.

When tightening is performed, apply a wrench or other tool to the outside of the piping connection ports.

#### 3. Mount a valve with its coil position upwards, not downwards.

When mounting a valve with its coil positioned downwards, foreign objects in the fluid will adhere to the iron core, leading to a malfunction. Especially for strict leakage control, such as with vacuum applications and non-leak specifications, the coil must be positioned upwards.

#### 4. Do not warm the coil assembly with a heat insulator, etc.

Use tape, heaters, etc., for freeze prevention on the piping and body only. This can cause the coil to burn out.

#### 5. Secure with brackets, except in the case of steel piping and copper fittings.

#### 6. Avoid sources of vibration, or adjust the arm from the body to the minimum length so that resonance will not occur.

#### 7. Painting and coating

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

## Piping

### ⚠ Caution

#### 1. Refer to the Fittings and Tubing Precautions for handling One-touch fittings.

#### 2. 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. Install piping so that it does not apply pulling, pressing, bending, or other forces on the valve body.

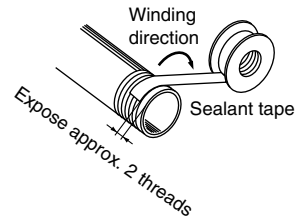
## Piping

### ⚠ Caution

#### 3. Winding of sealant tape

When connecting pipes, fittings, etc., be sure that chips from the pipe threads and sealing material do not enter the valve.

Furthermore, when sealant tape is used, leave 1.5 to 2 thread ridges exposed at the end of the threads.



#### 4. Avoid connecting ground lines to piping, as this may cause the electric corrosion of the system.

#### 5. Tighten threads with the proper tightening torque.

When attaching fittings to valves, tighten with the proper tightening torque shown below.

#### Tightening Torque for Piping

Connection thread	Proper tightening torque (N·m)	Connection thread	Proper tightening torque (N·m)
Rc 1/8	7 to 9	Rc 1 1/4	40 to 42
Rc 1/4	12 to 14	Rc 1 1/2	48 to 50
Rc 3/8	22 to 24	Rc 2	48 to 50
Rc 1/2	28 to 30	Rc 2 1/2	48 to 50
Rc 3/4	28 to 30	Rc 3	48 to 50
Rc 1	36 to 38		

#### 6. Connection of piping to products

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

#### 7. Steam generated in a boiler contains a large amount of drainage. Be sure to operate it with a drain trap installed.

#### 8. In applications such as vacuum and non-leak specifications, be sure to use caution to prevent contamination by foreign matter and air leakage of the fittings.

## Operating Environment

### ⚠ Warning

Do not use the product in such locations as those described below.

#### 1. Locations with atmospheres where water vapor is present or locations where corrosive fluids (chemicals), sea water, or water may come into contact with the product

Implement appropriate protective measures if water will be applied to the product for long periods of time, even for products which have IP65 or IP67 enclosures. Such water may enter through microscopic gaps in the product's external surfaces, resulting in fire damage or short-circuiting of the solenoid valve coils. If installing the product in close proximity to equipment, such as machine tools, processing machines, etc., which uses large amounts of liquids or oils, be sure to confirm that liquid dispersal or spatter from the peripheral equipment does not come into contact with the product.

#### 2. Locations with explosive atmospheres

#### 3. Locations subject to vibration or impact

#### 4. Locations where radiated heat will be received from nearby heat sources



# 2-Port Solenoid Valves for Fluid Control

## Precautions 3

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### Operating Environment

#### Warning

##### 5. Locations that are outdoors (Excludes outdoor specification valves)

Although using an indoor specification product outdoors voids its product warranty, if outdoor use proves unavoidable, be sure to implement the protective measures mentioned below.

- 1) Install a protective cover, etc., to protect the product from direct sunlight.
- 2) Encase the product in an enclosure to protect it from rain and wind.
  - \* If only a roof-type cover is provided for the product, it will not be sufficiently protected from side winds or rain splashing up from the ground, which will result in water adhering to and entering the product. In addition, when the product is encased in an enclosure, be sure to implement proper ventilation measures to prevent overheating due to long-term energizing of the product.
- 3) Be sure to confirm that the location is not one in which condensation is easily generated. If the product is used in an environment with large temperature changes, etc., condensation may be generated and water may adhere to the external surface of the product. Be sure to implement protective measures against condensation, such as ambient temperature control, in such locations where condensation is easily generated.

##### 6. Locations where freezing may occur within piping lines

(When the fluid is liquid)

If the product is to be used in cold regions or in winter, be sure to implement measures to prevent the freezing of fluids.

If the fluid is likely to freeze, implement measures such as draining the water in the piping when the equipment is OFF, or installing a heater or insulation in the piping.

If warming the solenoid valve, be sure to avoid the coil portion as it will result in poor heat dissipation.

(When the fluid is air)

With large flow rates, drain may be generated due to adiabatic expansion, resulting in freezing.

Be sure to periodically drain the product or conduct drain removal using an air dryer.

### Maintenance

#### Warning

##### 1. Removal of product

The valve will reach a high temperature when used with high temperature fluids. Confirm that the valve temperature has dropped sufficiently before performing work. If touched inadvertently, there is a danger of being burned.

1. Shut off the fluid supply and release the fluid pressure in the system.
2. Shut off the power supply.
3. Dismount the product.

##### 2. Low frequency operation

Switch valves at least once every 30 days to prevent malfunction. Also, in order to use them under the optimum state, conduct a regular inspection biannually.

#### Caution

##### 1. Filters and strainers

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

##### 2. Lubrication

When using after lubricating, do not forget to lubricate continuously.

##### 3. Storage

In case of long term storage after use with heated water, thoroughly remove all moisture to prevent rust, the deterioration of rubber materials, etc.

##### 4. Exhaust the drainage from air filters periodically.

### Precautions

#### Warning

1. Valves will reach high temperatures when used with high temperature fluids. Use caution, as there is a danger of being burned if a valve is touched directly.
2. For pilot type 2-port solenoid valves, when the valve is closed, sudden pressure resulting from the startup of the fluid supply source (pump, compressor, etc.) may cause the valve to open momentarily and leakage to occur, so please exercise caution.
3. When problems are caused by a water hammer, install water hammer relief equipment (accumulator, etc.), or use an SMC water hammer relief valve (VXR series). Please consult with SMC for details.
4. Make sure when using pilot type 2-port solenoid valves that the flow direction is from 1 (IN) to 2 (OUT). The valve is designed based on a flow direction of 1 (IN) to 2 (OUT) and harnesses the fluid pressure of port 1 (IN) when the valve opens or closes. If reverse pressure (2 (OUT) to 1 (IN)) is applied, it may lead to a reduced service life or cause premature damage to parts, due to chattering or pulses from the main valve (diaphragm, piston, etc.). If there is a possibility that reverse pressure will be applied, take countermeasures by installing a check valve, etc., on the downstream side. When installing the check valve, allow ample space between the valve and the check valve. If it is placed near the valve, it may cause chattering and pulses in the main valve.

Applicable models

- Pilot type 2-port solenoid valve  
VXD, VXED, VXZ, VXEZ, VXS, VXP, and VXR series

### Return of Product

#### Warning

If the product to be returned is contaminated or is possibly contaminated with substances that are harmful to humans, for safety reasons, please contact SMC beforehand and then employ a specialist cleaning company to decontaminate the product. After the decontamination prescribed above has been carried out, submit a Product Return Request Sheet or the Detoxification/Decontamination Certificate to SMC and await SMC's approval and further instructions before attempting to return the item. Please refer to the International Chemical Safety Cards (ICSC) for a list of harmful substances. If you have any further questions, please don't hesitate to contact your SMC sales representative.