



Operation Manual

PRODUCT NAME

Pilot Operated 2 Port Solenoid Valve

MODEL / Series / Product Number

JSXD 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 and safety requirements for systems and their components
 ISO 4413: Hydraulic fluid power - General rules and safety requirements for systems and their components
 IEC 60204-1: Safety of machinery - Electrical equipment of machines - Part 1: General requirements
 ISO 10218-1: Robots and robotic devices - Safety requirements for industrial robots - Part 1: Robots
 etc.



Danger

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



Warning

Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.



Caution

Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate 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. SMC products cannot be used beyond their specifications. They are not developed, designed, and manufactured to be used under the following conditions or environments. Use under such conditions or environments is not allowed.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Use for nuclear power, railways, aviation, space equipment, ships, vehicles, military application, equipment affecting human life, body, and property, combustion equipment, entertainment equipment, emergency shut-off circuits, press clutches, brake circuits, safety equipment, etc., and use for applications that do not conform to standard specifications such as catalogs and operation manuals.
3. Use for interlock circuits, except for use with double interlock such as installing a mechanical protection function in case of failure. Please periodically inspect the product to confirm that the product is operating properly.



Safety Instructions

Caution

SMC develops, designs, and manufactures products to be used for automatic control equipment, and provides them for peaceful use in manufacturing industries.

Use in non-manufacturing industries is not allowed.

Products SMC manufactures and sells cannot be used for the purpose of transactions or certification specified in the Measurement Act of each country.

The new Measurement Act prohibits use of any unit other than SI units in Japan.

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 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.

1. Precautions for Design

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. If the product is used beyond the specification range, this may cause the product to break or malfunction. We do not guarantee against any damage if the product is used outside of the specification range.

2. Cannot be used as an emergency shutoff valve, etc.

This product is not designed for use as an emergency shutoff valve. If the valve is used in this type of system, other reliable safety assurance measures should also be adopted.

3. Cannot be used for pressure (including vacuum) holding

This product cannot be used to hold the pressure (including vacuum) inside of a pressure vessel because valve air leakage is unavoidable.

4. Closed liquid circuit

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

5. Actuator driving

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.

6. 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.

7. Water hammer

When an impact, such as water hammer, etc., caused by rapid pressure fluctuation is applied, the valve may be damaged. Install water hammer relief equipment (an accumulator, etc.) or use an SMC water hammer relief valve (VXR series). Please contact SMC for details.

8. Back pressure

If there is a possibility of reverse pressure being applied to the valve, take countermeasures such as mounting a check valve on the downstream side of the valve.

9. Do not disassemble the product or replacement parts or make any modifications to either of them, including additional machining.

Doing so may lead to human injury and/or an accident.

2. Operating environment



Warning

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

1. **Locations with atmospheres in which water vapor is pre-sent or locations in which corrosive fluids (chemicals), sea water, or water may come into contact with the product**
Take appropriate 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 use 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**
5. **Locations where freezing may occur within piping lines [When the fluid is liquid]**

② **Location with explosive atmospheres**

③ **Location where vibration or impact is generated**

④ **Location where the product is exposed to heat sources or exposed to radiant heat**

⑤ **Outdoors (excluding valves with outdoor specifications)**

Outdoor use of a product with the indoor specification will be outside the product guarantee. However, when outdoor use is unavoidable, provide protection measures as described below.

1) Install a protective cover or shield to prevent being exposed to direct sunlight.

2) Cover the product with an enclosure to prevent being exposed to wind and rain.

*Installing only a roof-type cover on the upper area of the product may not protect the product from being exposed to crosswinds or splash of water from the ground. When covering the product with an enclosure, provide a ventilation system to release heat caused by long loading time.

3) Check that the installed location is not a location that easily generates condensation.

*When the product is used in an environment with a significant temperature change, condensation may be generated and water may adhere to the outer surface of the product. Provide condensation countermeasures including ambient temperature control when the location is prone to condensation.

⑥ **Location where freezing occurs inside the piping**

[When fluid is liquid]

Provide freezing countermeasures for the liquid when used in a cold region or in winter. When the fluid freezes, provide countermeasures such as discharging water inside the piping when the equipment is stopped or installing a heater or thermal insulator for the piping.

When heating the solenoid valve, avoid heating the coil area to prevent deterioration of heat dissipation.

[When fluid is air]

When a large flow rate is applied, drainage may be generated due to adiabatic expansion and it may freeze. Regularly discharge the drainage or remove the drainage using an air dryer.



Caution

1. Precautions for outdoor use

1) Although this product has improved weather resistance in outdoor environments, it is not guaranteed for outdoor use.

2) Install a protective cover or similar shelter to protect the product from direct sunlight.

3) Cover the product with an enclosure to prevent exposure to rain and wind. (Even if only a roof-type cover is installed on the top of the product, it will not protect the product from water due to crosswinds or splashes off the ground or other nearby surfaces.

If the enclosure is used to cover the product, it should also be ventilated to prevent heat buildup due to long-term power supply.

4) This product is not guaranteed against corrosion (no rusting or discoloration).

3. Precautions for Fluid

Warning

1. Selection of fluid

- 1) Compatibility between the component materials of the product and fluids should be checked in the actual application before use.
- 2) The compatibility of the fluid may differ according to the type, additives, concentration, temperature, and other conditions. Pay sufficient attention when selecting the materials. Please contact SMC for details, if necessary.
- 3) Use a fluid with a kinetic viscosity of 50 mm²/s or less.

2. Do not use the fluids described below.

- 1) Fluids harmful to the human body
- 2) Burnable, combustible fluids
- 3) Corrosive gas
- 4) Sea water, saline solution

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

4. Fluid temperature

Operate the product within the specified operating fluid temperature.

5. Install a filter (strainer) to use clean fluids.

- 1) The use of a fluid that contains foreign matter can cause issues such as malfunction and seal failure due to wear of the valve seat armature as well as adhesion of foreign matter on the sliding parts of the armature. Install a filter (strainer) on the upstream side of the valve to remove foreign matter.
Air: 5 µm or less, water: 100 mesh or more
- 2) The filter (strainer) gets clogged. Replace or clean it when the pressure drop reaches 0.1 MPa.

4. Fluid quality

Warning

1. Air supply

- 1) Do not use compressed air which includes chemicals, synthetic oils containing organic solvents, salt, corrosive gases, etc., as this can cause damage or malfunction.
- 2) Compressed air that contains excessive drainage may cause malfunction of valves and other pneumatic equipment.
Install an aftercooler or air dryer on the inlet side of the valve as a countermeasure against the drainage.
- 3) If excessive carbon dust is generated by the compressor, it may adhere to the inside of the valve and cause malfunction. Install a mist separator on the inlet side of the valve as a countermeasure for removing the carbon powder.
- 4) For detailed information regarding the quality of the compressed air, refer to SMC's Compressed Air Cleaning System.
- 5) When operating air with an ultra-low dew point of -70°C or lower, the valve may wear inside and the product life may be shortened.

2. Water

- 1) Operation failure due to rust generated or chloride flowing in the piping may result in the breakage of the product. Provide an appropriate protective measure against the scattering of fluids or components that may be caused when the product is broken.
- 2) Water contains substances that generate scale and sludge such as calcium and magnesium. The product may malfunction when they adhere to the internal surface of the valve. Therefore, install water-softening equipment and a filter (strainer) on the inlet side of the valve to remove those substances.
- 3) The water pressure of the tap water is 0.4 MPa or less, in general. However, the pressure may increase to 1.0 MPa in a high-rise building. Therefore, pay attention to the maximum operating pressure differential.

3. Oil

FKM that has high oil resistance is used in general as the sealing material. However, the resistance of the sealing material may deteriorate depending on the type of oil and additives of certain manufacturers. Check the oil resistance before using the product.

5. Mounting

Warning

1. When mounting the products, allow enough space to provide access for maintenance.
2. Avoid sources of vibration or adjust the arm from the body to the minimum length to prevent the generation of resonance.
3. Do not install the product near a heat source or a location exposed to radiant heat.
4. Do not apply external force to the coil section.
When mounting the product, apply a spanner on the outside of the piping connection while paying attention not to come into contact with the coil.
5. Do not warm the coil area with a heat insulator, etc.
When the product is heated as a countermeasure against freezing, the heating parts should be limited to the piping and body only. Do not heat the coil.
Heating the coil may burn it out.
6. If leakage increases or the equipment does not operate properly, stop the operation.
After mounting or during maintenance, check that the product is correctly mounted with appropriate functional and leakage inspections by supplying compressed air and power supplies.
Do not use the product when the equipment does not operate correctly.
7. Do not touch the valves with bare hands during or right after energization.
Valves will reach high temperatures during energization. Do not touch the valve carelessly as it may cause burns.

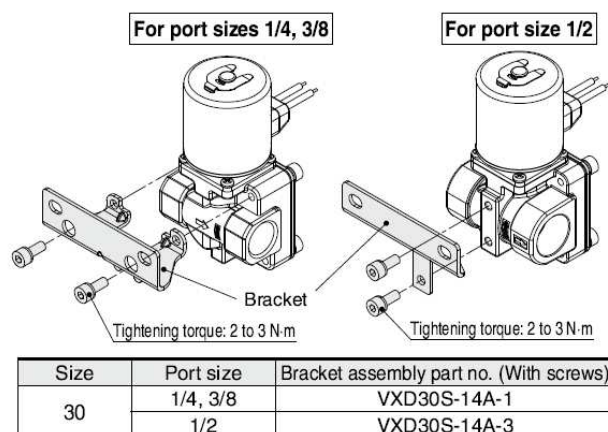
Caution

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

6. Bracket mounting

Caution

Bracket mounting method of JSXD30 series



* For the JSXD30 series, the bracket is shipped together with the product.

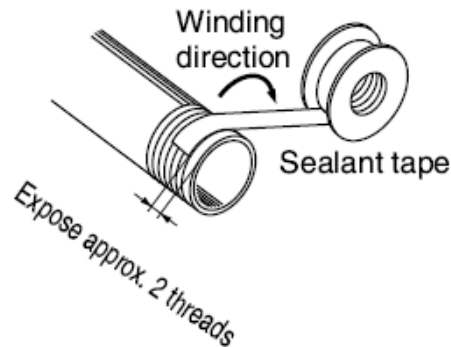
7. Piping

Warning

1. **Tubing may detach abruptly from the fitting while the product is in use due to degradation of the tube or fitting breakage.**
To prevent abrupt detachment, install a protective cover or fix the tube securely.
2. **For piping the tube, fix the product securely using the mounting holes on the bottom of the body or a bracket to prevent the product from being lifted.**

Caution

1. **Refer to the Fittings and Tubing Precautions in the SMC catalog for handling One-touch fittings and applicable tubes.**
2. **Preparation before piping**
Before piping, perform air blow (flushing) or cleaning to remove any cutting chips, cutting oil, dust, etc. from the piping. Connect piping without applying forces such as tension, compression, or bending to the valve body.
3. **Wrapping of sealant tape**
When connecting pipes, fittings, etc., pay attention not to let chips from the pipe threads and sealing material enter the valve.
Furthermore, when using sealant tape, leave 1.5 to 2 thread ridges exposed at the end of the threads.



4. **Connection of piping and fittings**
When attaching piping to valves, tighten with proper tightening torque shown below.

Tightening torque when piping

| Connection thread | Proper tightening torque [Nm] |
|-------------------|-------------------------------|
| Rc1/8 | 7~9 |
| Rc1/4 | 12~14 |
| Rc3/8 | 22~24 |
| Rc1/2 | 28~30 |
| Rc3/4 | 28~30 |
| Rc1 | 36~38 |
| Rc1 1/2 | 40~42 |
| Rc2 | 48~50 |

5. **When using a fitting of a manufacturer other than SMC**
Follow the instruction of the manufacturer of the fitting.
6. **Connecting ground lines to the piping may cause electric corrosion of the system due to electric erosion.**
7. **When piping to a product, pay attention to connect to a proper supply port, etc.**

8. Recommended piping conditions

When connecting piping to a One-touch fitting, use pipe length with sufficient margin in accordance with the piping conditions shown in Fig. 1.

Also, when using a tying band or a similar item to bind the piping together, make sure that external force will not be applied to the fitting. (See Fig. 2.)

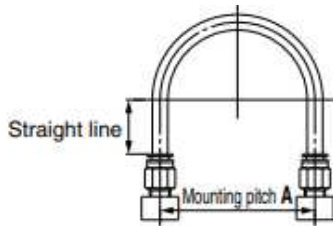


Fig. 1 Recommended piping

| Tube size | Mounting pitch A | | | Straight part length |
|-----------|------------------|-----------------|-------------------|----------------------|
| | Nylon tube | Soft nylon tube | Polyurethane tube | |
| φ1/8" | 44 or more | 29 or more | 25 or more | 16 or more |
| φ6 | 84 or more | 39 or more | 39 or more | 30 or more |
| φ1/4" | 89 or more | 56 or more | 57 or more | 32 or more |
| φ8 | 112 or more | 58 or more | 52 or more | 40 or more |
| φ10 | 140 or more | 70 or more | 69 or more | 50 or more |
| φ12 | 168 or more | 82 or more | 88 or more | 60 or more |

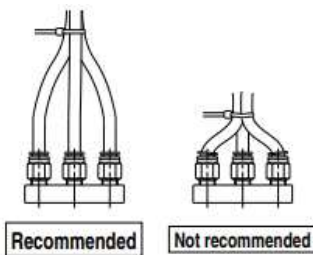


Fig. 2 When using a tying band to bind the piping together

8. Wiring

Warning

1. Solenoid valves are electrical products. Install an appropriate fuse and circuit breaker for safety.

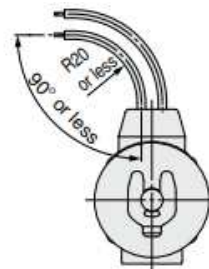
Caution

1. Use wiring cable with a conductor cross-section of 0.5 to 1.25 mm².

2. External force on the lead wire

Excessive force applied to the lead wire may break the wire.

Make sure that no excessive force larger than 30 N is applied to the lead wires.
Do not use the product when the base of the lead wire is bent 90 degrees or R20 or less.



3. Use electrical circuits that do not generate chattering within their contacts.

4. Use voltages within +/-10% of the rated voltage.

When using a direct current power supply and the priority is on responsiveness, the voltage should be within +/-5% of the rated value.

Voltage drop is the value inside the lead wire when the coil is connected.

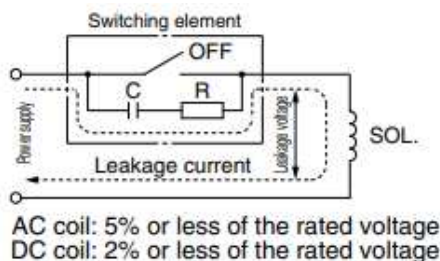
5. If no solenoid surge is allowed in the electrical circuit system, mount a voltage protective circuit, etc. in parallel to the solenoid.

Or use a product with a surge voltage suppressor.

6. Leakage voltage

When operating the solenoid valve with a controller, make sure that the leakage voltage is at the product's allowable leakage voltage or less.

Note that voltage leakage passes through the resistor or C-R device and the valve may not turn off when using a resistor in parallel with a switching device or a C-R device for the protection of a switching device.



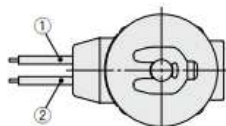
9. Electric connection

Caution

1. Grommet

Lead wire: AWG20 insulator outside diameter 2.6 mm
insulator outside diameter 2.8 mm

| Rated voltage | Lead wire color | |
|---------------|-----------------|------|
| | ① | ② |
| DC | Black | Red |
| 100 VAC | Blue | Blue |
| 200 VAC | Red | Red |
| Other AC | Gray | Gray |



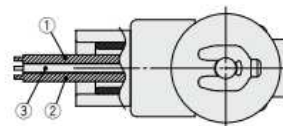
* There is no polarity.

However, the high flow/ power saving type has polarity. Refer to the "Electrical Circuits" on page 66.

2. Conduit

Lead wire: AWG18

| Rated voltage | Lead wire color | | |
|---------------|-----------------|------|--------------|
| | ① | ② | ③ |
| DC | Black | Red | Green/Yellow |
| 100 VAC | Blue | Blue | Green/Yellow |
| 200 VAC | Red | Red | Green/Yellow |
| Other AC | Gray | Gray | Green/Yellow |



* There is no polarity.

However, the high flow/ power saving type has polarity. Refer to the "Electrical Circuits" on page 66.

* ③: Ground wire

3. DIN terminal

Disassembly

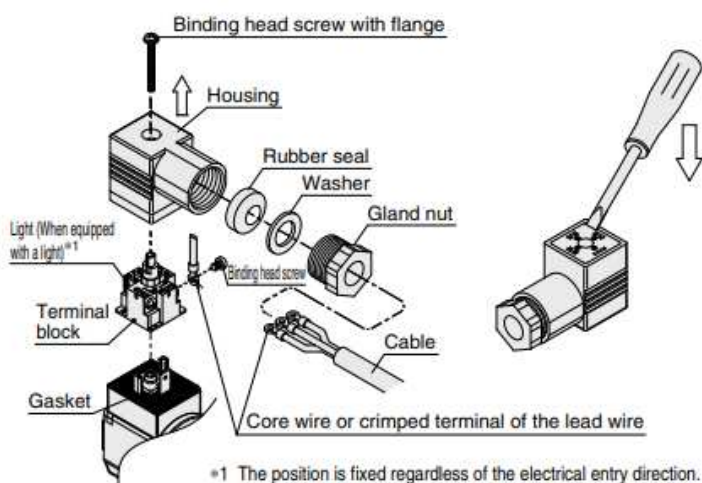
1. Loosen the binding head screw with the flange and pull up the housing in the direction of the arrow to remove the connector from the solenoid valve.
2. Pull out the binding head screw with the flange from the housing.
3. Detach the terminal block from the housing using the recess at the bottom of the terminal block, using a flat-blade screwdriver. (Refer to the figure below.)
4. Remove the gland nut and remove the washer and rubber seal.

Wiring

1. Put the gland nut, washer, and rubber seal onto the cable sequentially and insert it into the housing.
2. Loosen the small binding screw of the terminal block, insert the lead wire core or crimp terminal into the terminal, and securely fix it with the small binding screw. The small binding screw of the terminal block is M3.
 - 1) The tightening torque should be 0.5 Nm to 0.6 Nm.
 - 2) The outside diameter of the cable is $\phi 6$ to 12 mm.
 - 3) When using a cable with an outside diameter of $\phi 9$ to 12 mm, remove the inner part of the rubber seal.

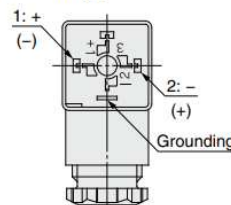
Assembly

1. Put the gland nut, washer, rubber seal, and housing onto the cable sequentially, connect the cable to the terminal block, and mount the terminal block to the housing. (Insert the terminal block until it makes a click sound.)
2. Insert the rubber seal and washer sequentially into the cable entry of the housing and tighten the gland nut securely.
3. Mount the gasket between the bottom of the terminal block and the plug installed on the equipment, and insert and tighten the binding head screw with the flange from the top of the housing.
 - 1) The tightening torque should be 0.5 to 0.6 Nm.
 - 2) The orientation of the connector can be changed by a 90-degree increment according to the mounting of the housing to the terminal block.



Caution

Internal connections are as shown below. Make connections to the power supply accordingly.



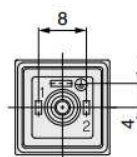
| Terminal no. | 1 | 2 |
|--------------|-------|-------|
| DIN terminal | + (-) | - (+) |

* There is no polarity. However, the high flow/ power saving type has polarity. Refer to the "Electrical Circuits" on the right.

DIN (EN 175301-803) Terminal

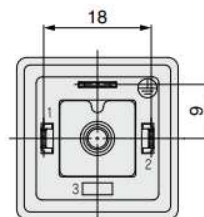
This DIN terminal corresponds to the Form C DIN connector with an 8 mm terminal pitch.

This DIN terminal corresponds to the Form A DIN connector with an 18 mm terminal pitch.



Size: 10

Applicable cable O.D.: $\phi 3.5$ to $\phi 7$



Size: 20, 30

Applicable cable O.D.: $\phi 6$ to $\phi 12$

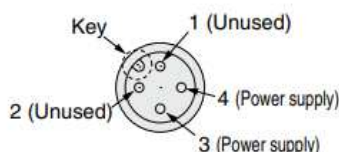
4. M12 connector

1. IP67 (protection structure) of the valve can be achieved by using a female connector (with a cable) of the IP67 specification.
However, do not use the product underwater.
2. Mounting a connector using tools may break the connector. Securely tighten the connector manually. (0.39~0.49N·m)
3. Avoid bending or stretching the cables repeatedly, placing a heavy load, or applying force to the product.
4. Do not pull the connector and cable carelessly.
5. When mounting, do not bend the cable at the base of the connector.

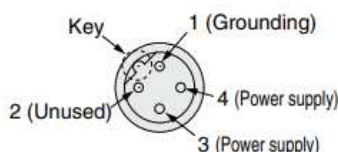
■Valve M12 connector coding and pin layout

M12 connector shape (coding) and pin layout are described below.

DC specification: A-coded, 4-pin



AC specification: B-coded, 4-pin



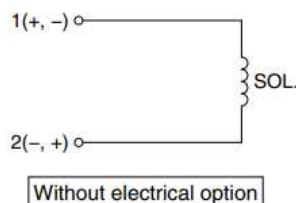
* There is no polarity for DC voltages. However, the high flow/ power saving type has polarity. Refer to the "Electrical Circuits" on the right.

Use the female connector with a cable that matches the coding. In addition, align the key of the connector on the cable (female) with the key of the connector on the valve side (male) when connecting them. Connecting the connectors with force may cause failures such as the breakage of a pin.

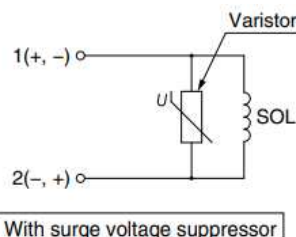
10. Electric circuit

1. Circuit for DC

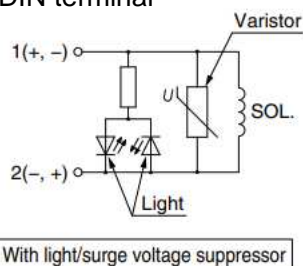
- Grommet



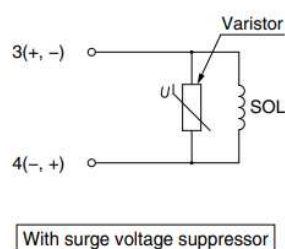
- Grommet/Conduit/DIN terminal



- DIN terminal



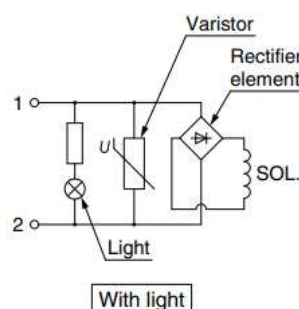
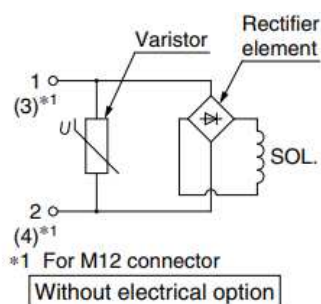
- M12 connector



2. Circuit for AC The standard product is with a surge voltage suppressor

- Grommet/Conduit/DIN terminal/M12 connector

- DIN terminal



11. Maintenance

Warning

1. Detaching of the product

- 1) Shut off the fluid supply and discharge the fluid pressure in the system.
- 2) Shut down the power.
- 3) Check that the valve temperature has decreased sufficiently and detach the product.

2. Regularly replace or clean the filter (strainer).

- 1) Replace the filter after a year of use or earlier if the pressure drop reaches 0.1 MPa.
- 2) Clean the strainer when the pressure drop reaches 0.1 MPa.

3. Regularly remove drainage from the air filter.

If drainage is not removed on a regular basis, it may overflow into the downstream side and may cause malfunction of pneumatic equipment.

If removing of drainage is difficult, installation of a filter with an auto drain is recommended.

4. Low-frequency operation

The valve should be operated at least once every 30 days to prevent malfunction.

This product requires periodic inspection every 6 months for optimum operating conditions.

5. Storage

In case of long-term storage after use, thoroughly remove all moisture and store it in a location where the product is not exposed to sunlight and high humidity to prevent rust and deterioration of rubber materials, etc.

6. Perform regular maintenance and inspections.

Regularly perform appropriate functional and leakage inspections and check that it is mounted properly.

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

12. Return of product

Warning

If the product being returned is contaminated or possibly contaminated with substances that are harmful to humans, contact SMC in the first instance and have the product appropriately decontaminated (detoxification treatment) to secure safety. After decontamination, submit the Product Return Request Sheet or Detoxification/Decontamination certificate to SMC and receive an agreement from SMC before returning the product.

Please refer to International Chemical Safety Cards (ICSC) for a list of harmful substances.

Contact your SMC Sales representative for any inquiries.

13. Precautions of JSXD

Warning

1. If there is a possibility of reverse pressure being applied to the valve, take countermeasures such as mounting a check valve on the downstream side of the valve.
2. When the pilot-type 2-way solenoid valve is closed and pressure is applied suddenly by starting of fluid supply sources such as pump and compressor, the valve may open momentarily and fluid may leak.
3. If the product is used in conditions in which a rapid decrease in the inlet pressure of the valve and rapid increase in the outlet pressure of the valve are repeated, excessive stress will be applied to the diaphragm, which causes the diaphragm to be damaged or detached, leading to the operation failure of the valve. Check the operating conditions before use.

4. Minimum operating pressure differential

Be aware that even if the pressure difference is above the minimum operating pressure differential when the valve is closed, the pressure difference may fall below the minimum operating pressure differential when the valve opens, depending on the capacity of the supply source (pump, compressor, etc.) or the type of pipe contraction (piping is bent continuously due to elbow or tee, or narrow tube nozzle is installed in the end). If the product is used below the minimum operating pressure differential, the operation becomes unstable, which might cause valve opening/closing failure, or oscillation, leading to failure due to insufficient pressure differential. Select an appropriate valve size referring to the flow-rate characteristics and flow-rate characteristics table in the catalog.

14. Models

Model indication method

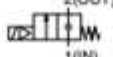
JSXD **3** **1** - **C** **N** **02** **R** - **5** **G** - **D** - **B**

1 2 3 4 5 6 7 8 9 10

1 Size

| Symbol | Size |
|--------|------|
| 3 | 30 |
| 4 | 40 |
| 5 | 50 |
| 6 | 60 |
| 7 | 70 |
| 8 | 80 |
| 9 | 90 |

2 Valve type

| Symbol | Valve type |
|--------|----------------------------------------------------------------------------------------|
| 1 | N.C.  |

3 Body material

| Symbol | Body material | Size | | | |
|--------|-----------------|------|------------|------------|--|
| | | 30 | 40, 50, 60 | 70, 80, 90 | |
| C | Brass | ● | ● | — | |
| S | Stainless steel | ● | ● | — | |
| B | Bronze | — | — | ● | |
| A | Aluminum | ● | — | — | |

4 Seal material

| Symbol | Seal material |
|--------|---------------|
| N | NBR |
| F | FKM |
| E*1 | EPDM |

*1 Cannot be used in combination with the aluminum body

5 Port size

| Symbol | Connection | Port size | Size | | | | | | | |
|--------|------------|-----------|------|----|----|----|----|----|----|--|
| | | | 30 | 40 | 50 | 60 | 70 | 80 | 90 | |
| 02 | Thread | 1/4 | ● | — | — | — | — | — | — | |
| 03 | | 3/8 | ● | ● | — | — | — | — | — | |
| 04 | | 1/2 | ● | ● | — | — | — | — | — | |
| 06 | | 3/4 | — | — | ● | — | — | — | — | |
| 10 | | 1 | — | — | — | ● | — | — | — | |
| 12 | | 1 1/4 | — | — | — | — | ● | — | — | |
| 14 | | 1 1/2 | — | — | — | — | — | ● | — | |
| 20 | | 2 | — | — | — | — | — | — | ● | |
| 32 | Flange | 32A | — | — | — | — | ● | — | — | |
| 40 | | 40A | — | — | — | — | — | ● | — | |
| 50 | | 50A | — | — | — | — | — | — | ● | |

6 Thread type

| Symbol | Thread type | Connection |
|--------|-------------|------------|
| R | Rc | Thread |
| N | NPT | |
| F | G | |
| Nll | — | Flange |

7 Rated voltage

| AC | | | | DC | | | |
|--------|---------------|--------|---------------|--------|---------------|--------|---------------|
| Symbol | Rated voltage | Symbol | Rated voltage | Symbol | Rated voltage | Symbol | Rated voltage |
| 1 | 100 VAC | 7 | 240 VAC | 5 | 24 VDC | | |
| 2 | 200 VAC | 8 | 48 VAC | 6 | 12 VDC | | |
| 3 | 120 (110) VAC | B | 24 VAC | | | | |
| 4 | 220 VAC | J | 230 VAC | | | | |

9 Oil-free option








| Symbol | Option |
|--------|----------|
| Nll | None |
| D | Oil-free |

10 Bracket

| Symbol | With bracket | Size | | | |
|--------|--------------|------|------------|------------|--|
| | | 30 | 40, 50, 60 | 70, 80, 90 | |
| Nll | None | ● | ● | ● | |
| B | With bracket | ● | ● | —*1 | |

*1 Sizes 70 to 90 are not available with a bracket.

8 Electrical entry

| Symbol | Electrical entry | |
|--------|----------------------------------------------------------------|---------------------------------------------------------------------------------------|
| G | Grommet*1 |  |
| GS | Grommet with PCB (With surge voltage suppressor) |  |
| CS | Conduit (With surge voltage suppressor) |  |
| DS | DIN terminal (With surge voltage suppressor) |  |
| DZ | DIN terminal with light (With surge voltage suppressor) |  |
| DN | DIN terminal without connector (With surge voltage suppressor) |  |
| WN | M12 connector without cable (With surge voltage suppressor) |  |

*1 DC voltage only

Flow-rate characteristics

| Size | Body material | Port size | Orifice diameter [mm] | Flow rate characteristics*1 | | | | | | Min. operating pressure differential [MPa] | Max. operating pressure differential [MPa] | Model | Weight*2 [g] |
|------|--------------------------|------------|-----------------------|------------------------------|------|-----|-----------------------------------|------|-------------------|--------------------------------------------|--------------------------------------------|-------------------|--------------|
| | | | | Air | | | Water, Oil | | | | | | |
| | | | | C [dm ³ /(s·bar)] | b | Cv | Effective area [mm ²] | Kv | Conversion Cv | | | | |
| 30 | Aluminum | 1/4 | 10 | 8.5 | 0.35 | 2.0 | — | — | | 0.02 | 1.0 | JSXD31-A□02 | 410 |
| | | 3/8 | | 9.2 | | 2.4 | | | | | | JSXD31-A□03 | 410 |
| | | 1/2 | | 9.2 | | 2.4 | | | | | | JSXD31-A□04 | 410 |
| | Brass Stainless steel | 1/4 | | 8.5 | 0.35 | 2.0 | | 1.6 | 1.9 | | | JSXD31-□02 | 500 |
| | | 3/8 | | 9.2 | | 2.4 | | 2.0 | 2.4 | | | JSXD31-□03 | 500 |
| | | 1/2 | | 9.2 | | 2.4 | | 2.0 | 2.4 | | | JSXD31-□04 | 500 |
| 40 | Brass Stainless steel | 3/8 | 15 | 18 | 0.35 | 5.0 | — | 3.9 | 4.5 | 0.03 | 1.0 | JSXD41-□03 | 720 |
| 1/2 | | 20 | | 5.5 | | 4.6 | | 5.5 | JSXD41-□04 | | | 720 | |
| 50 | Brass/Stainless steel | 3/4 | 20 | 38 | 0.30 | 9.5 | | 8.2 | 9.5 | | | JSXD51-□06 | 880 |
| 60 | Brass/Stainless steel | 1 | 25 | — | — | 225 | | 11.0 | 13.0 | | | JSXD61-□10 | 1460 |
| 70 | Bronze | 1 1/4, 32A | 35 | | | 415 | | 19.6 | 23.0 | | | JSXD71-B□(12, 32) | 5500/3000 |
| 80 | Bronze | 1 1/2, 40A | 40 | | | 560 | | 26.4 | 31.0 | | | JSXD81-B□(14, 40) | 6900/4100 |
| 90 | Bronze | 2, 50A | 50 | | | 880 | 42.8 | 49.0 | JSXD91-B□(20, 50) | 8500/5500 | | | |

*1 The flow rate characteristics of this product vary.

*2 Indicates case of grommet type

Add 20 g for the grommet type with PCB, 70 g for the conduit type, 50 g for the DIN terminal type, and 15 g for the M12 connector type.
For sizes 70, 80, and 90, the weight on the left is for the flange type, and the weight on the right is for the thread type.

15. Specifications

| Size | | 30 | | 40 | 50 | 60 | 70 | 80 | 90 | |
|----------------------|-------------------------------|------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|------------------------|----|--------------------------|--------|----|--|
| Valve specifications | Body material | | Aluminum | Brass, Stainless steel | Brass, Stainless steel | | | Bronze | | |
| | Valve construction | | Pilot operated diaphragm | | | | | | | |
| | Valve type | | Normally closed (N.C.) | | | | | | | |
| | Fluid and fluid temperature | Air*1 | -10 to 60°C | | | | | | | |
| | | Water, Oil | — | Water: 1 to 60°C (No freezing), Oil: -5 to 60°C (Kinematic viscosity: 50 mm²/s or less) | | | | | | |
| | Withstand pressure | | 2 MPa | | | | | | | |
| | Max. system pressure | | 1 MPa | | | | | | | |
| | Ambient temperature | | -20 to 60°C | | | | | | | |
| | Valve leakage*2 | Air | 15 cm³/min (ANR) or less | 2 cm³/min (ANR) or less | | | 10 cm³/min (ANR) or less | | | |
| | | Water, Oil | — | 0.2 cm³/min or less | | | 1 cm³/min or less | | | |
| | External leakage*2 | Air | 15 cm³/min (ANR) or less | 1 cm³/min (ANR) or less | | | | | | |
| | | Water, Oil | — | 0.1 cm³/min or less | | | | | | |
| | Mounting orientation | | Unrestricted | | | | | | | |
| | Enclosure*3 | | IP67 (IP65 for the DIN terminal) | | | | | | | |
| | Standards*4 | | CE/UKCA | | | | | | | |
| | Operating environment | | Location without the presence of corrosive gases, explosive gases, or constant water adhesion | | | | | | | |
| | Seal material | | NBR, FKM, EPDM | | | | | | | |
| Coil specifications | Rated voltage | AC | 24 V, 48 V, 100 V, 110 V, 120 V, 200 V, 220 V, 230 V, 240 V | | | | | | | |
| | | DC | 12 V, 24 V | | | | | | | |
| | Allowable voltage fluctuation | | ±10% of the rated voltage | | | | | | | |
| | Allowable leakage voltage | AC | 5% or less of the rated voltage | | | | | | | |
| | | DC | 2% or less of the rated voltage | | | | | | | |
| | Apparent power*5, *6 | AC | 8 VA | | | | 9.5 VA | | | |
| | Power consumption*5 | DC | 6 W | | | | 8 W | | | |
| Temperature rise*7 | AC/DC | 70/65°C | | | | | | | | |

*1 Dew point temperature: -10°C or less

*2 Leakage: The value at a differential pressure the same as or higher than the min. operating pressure differential, and an ambient temperature of 20°C

*3 This product has an IP67 enclosure, but if water enters the product, it may result in malfunction or breakage.

Therefore, take appropriate measures to prevent water from entering the product when using in an environment where it is constantly exposed to water.

*4 Standards compliance varies depending on the model. For details, refer to page 17.

*5 Power consumption/Apparent power: The value at an ambient temperature of 20°C and when the rated voltage is applied (Variation: ±10%)

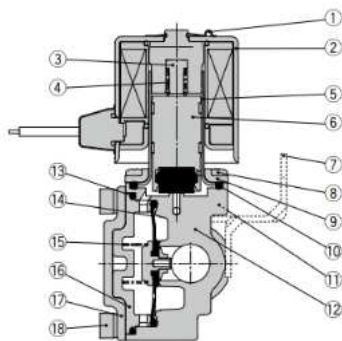
*6 There is no difference in the frequency and the inrush and energized apparent power, since a rectifying circuit is used in the AC.

*7 Temperature rise: The value at an ambient temperature of 20°C and when the rated voltage is applied. Use this value as a reference as the actual value varies depending on the ambient environment.

Be sure to read the "Specific Product Precautions" before handling the product.

16. Construction

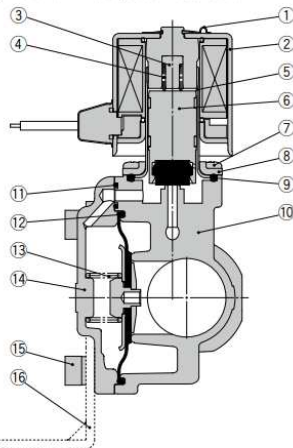
JSXD30, Normally closed (N.C.)
Body material: Brass, Stainless steel, Aluminum



Component Parts

| No. | Description | Material | | |
|-----|--------------------|----------------------------------------|----------------------------------|------------|
| | | Brass | Stainless steel | Aluminum |
| 1 | Clip | | Stainless steel | |
| 2 | Solenoid coil | | Stainless steel, Cu, Resin | |
| 3 | Stopper | | PPS | |
| 4 | Spring | | Stainless steel | |
| 5 | Tube assembly | | Stainless steel | |
| 6 | Armature assembly | Stainless steel, PPS, NBR, (FKM, EPDM) | Stainless steel, PPS, NBR, (FKM) | |
| 7 | Bracket | | Fe | |
| 8 | Mounting screw | | Fe | |
| 9 | Bonnet | | Stainless steel | |
| 10 | Gasket | NBR, (FKM, EPDM) | | NBR, (FKM) |
| 11 | Bolt | | Fe | |
| 12 | Body | Brass | Stainless steel | Aluminum |
| 13 | O-ring | NBR, (FKM, EPDM) | | NBR, (FKM) |
| 14 | Diaphragm assembly | Stainless steel, NBR, (FKM, EPDM) | Stainless steel, NBR, (FKM) | |
| 15 | Valve spring | | Stainless steel | |
| 16 | Buffer | | PPS | |
| 17 | Bonnet | | Stainless steel | |
| 18 | Bolt | | Fe | |

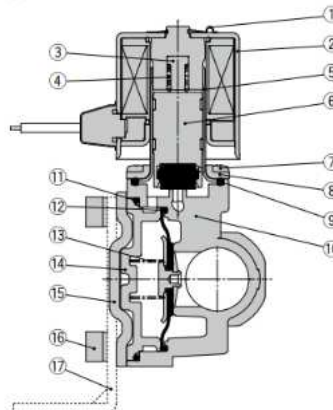
JSXD50, 60, Normally closed (N.C.)
Body material: Brass, Stainless steel



Component Parts

| No. | Description | Material | |
|-----|--------------------|----------------------------------------|----------------------------|
| | | Brass | Stainless steel |
| 1 | Clip | | Stainless steel |
| 2 | Solenoid coil | | Stainless steel, Cu, Resin |
| 3 | Stopper | | PPS |
| 4 | Spring | | Stainless steel |
| 5 | Tube assembly | | Stainless steel |
| 6 | Armature assembly | Stainless steel, PPS, NBR, (FKM, EPDM) | |
| 7 | Mounting screw | | Fe |
| 8 | Bonnet | | Stainless steel |
| 9 | Gasket | NBR, (FKM, EPDM) | |
| 10 | Body | Brass | Stainless steel |
| 11 | O-ring | NBR, (FKM, EPDM) | |
| 12 | Diaphragm assembly | Stainless steel, NBR, (FKM, EPDM) | |
| 13 | Valve spring | | Stainless steel |
| 14 | Bonnet | Brass | Stainless steel |
| 15 | Bolt | | Fe |
| 16 | Bracket | | Fe |

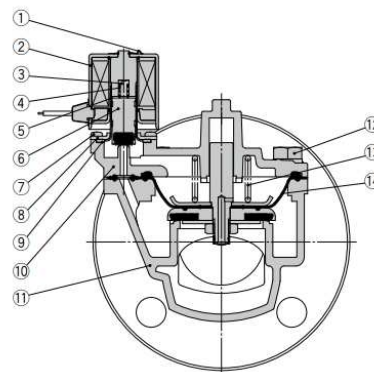
JSXD40, Normally closed (N.C.)
Body material: Brass, Stainless steel



Component Parts

| No. | Description | Material | |
|-----|--------------------|----------------------------------------|----------------------------|
| | | Brass | Stainless steel |
| 1 | Clip | | Stainless steel |
| 2 | Solenoid coil | | Stainless steel, Cu, Resin |
| 3 | Stopper | | PPS |
| 4 | Spring | | Stainless steel |
| 5 | Tube assembly | | Stainless steel |
| 6 | Armature assembly | Stainless steel, PPS, NBR, (FKM, EPDM) | |
| 7 | Mounting screw | | Fe |
| 8 | Bonnet | | Stainless steel |
| 9 | Gasket | NBR, (FKM, EPDM) | |
| 10 | Body | Brass | Stainless steel |
| 11 | O-ring | NBR, (FKM, EPDM) | |
| 12 | Diaphragm assembly | Stainless steel, NBR, (FKM, EPDM) | |
| 13 | Valve spring | | Stainless steel |
| 14 | Buffer | | PPS |
| 15 | Bonnet | | Stainless steel |
| 16 | Bolt | | Fe |
| 17 | Bracket | | Fe |

JSXD70, 80, 90, Normally closed (N.C.)
Body material: Bronze



Component Parts

| No. | Description | Material | |
|-----|--------------------|----------------------------------------|----------------------------|
| | | Brass | Stainless steel |
| 1 | Clip | | Stainless steel |
| 2 | Solenoid coil | | Stainless steel, Cu, Resin |
| 3 | Stopper | | PPS |
| 4 | Spring | | Stainless steel |
| 5 | Tube assembly | | Stainless steel |
| 6 | Armature assembly | Stainless steel, PPS, NBR, (FKM, EPDM) | |
| 7 | Mounting screw | | Fe |
| 8 | Bonnet | | Stainless steel |
| 9 | Gasket | NBR, (FKM, EPDM) | |
| 10 | Bonnet | | Bronze |
| 11 | Body | | Bronze |
| 12 | Bolt | | Fe |
| 13 | Valve spring | | Stainless steel |
| 14 | Diaphragm assembly | Stainless steel, NBR, (FKM, EPDM) | |

17. Table of CE/UKCA-compliant Products



○ : support、× : unsupported、- : No part number setting

| Rated voltage | G Grommet | GS Grommet with PCB (With surge voltage suppressor) | CS Conduit (With surge voltage suppressor) | DS DIN terminal (With surge voltage suppressor) | DZ DIN terminal with light (With surge voltage suppressor) | DN DIN terminal without connector (With surge voltage suppressor) | WN M12 connector/Without connector cable (With surge voltage suppressor) |
|---------------|--------------|--------------------------------------------------------------|-----------------------------------------------------|----------------------------------------------------------|------------------------------------------------------------------------|-------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| 24VDC | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 12VDC | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 100VAC | - | ○ | ○ | ○ | ○ | ○ | ○ |
| 200VAC | - | × | ○ | ○ | ○ | ○ | ○ |
| 120(110)VAC | - | × | ○ | ○ | ○ | ○ | ○ |
| 220VAC | - | × | ○ | ○ | ○ | ○ | ○ |
| 240VAC | - | × | ○ | ○ | ○ | ○ | ○ |
| 48VAC | - | ○ | ○ | ○ | ○ | ○ | ○ |
| 24VAC | - | ○ | ○ | ○ | ○ | ○ | ○ |
| 230VAC | - | × | ○ | ○ | ○ | ○ | ○ |

18. Definition and Terminology

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------------|----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---------------|---|--------------------------------------------------------------|---|--------------------------------------------------------------|---|---------------------------------------------------------------|---|---------------------------------------------------------------|---|----------------|---|------------|---|---------------|---|---|-----------------------------------------------------|------------------|---|----------------------------------------------------------------------------------------|------------------|---|---------------------------------------------------------------|----------------|---|-----------------------------------|------------------|---|------------------------------|----------------------|---|---------------------------------------|-------------------------------|---|---------------------------------------------------------------|-----------------|---|----------------------------------------------------------------|
| Pressure | Maximum operating pressure differential | The maximum pressure difference (difference between the inlet pressure and outlet pressure) that is allowed for operation. When the outlet pressure is 0 MPa, it becomes the maximum operating pressure. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Minimum operating pressure differential | The minimum pressure difference (difference between the inlet pressure and outlet pressure) required for stable operation of the main valve. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Maximum system pressure | The maximum pressure that can be applied inside the piping. (Line pressure) The pressure differential of the solenoid valve should be not more than the maximum operating pressure differential. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Withstand pressure | The pressure in which the product must withstand without performance deterioration after maintaining the specified pressure (static pressure) for one minute and returned within the operating pressure range. (Value under the specified condition) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Electrical | Apparent power value (VA) | Product of voltage (V) and current (A). The relationship with power consumption [W] is, for AC, $W = V \cdot A \cdot \cos\theta$, and for DC, $W = V \cdot A$. Note) $\cos\theta$ is the power factor. $\cos\theta \approx 0.9$ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Surge voltage | The high voltage that is instantaneously generated at the cut-off area when the electrical power supply is cut off. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Protection code | <p>Protection code specified in JIS C 0920: Degrees of protection provided by enclosures (IP Code).</p> <div><div>IP –</div><div><div></div><div></div></div><div><div>First digit</div><div>Second digit</div></div></div> <p>● First Digit: Degree of protection against solid foreign objects</p> <table><tr><td>0</td><td>Not protected</td></tr><tr><td>1</td><td>Protected against solid foreign objects of 50 mmø and larger</td></tr><tr><td>2</td><td>Protected against solid foreign objects of 12 mmø and larger</td></tr><tr><td>3</td><td>Protected against solid foreign objects of 2.5 mmø and larger</td></tr><tr><td>4</td><td>Protected against solid foreign objects of 1.0 mmø and larger</td></tr><tr><td>5</td><td>Dust protected</td></tr><tr><td>6</td><td>Dust-tight</td></tr></table> <p>● Second Digit: Degree of protection against water</p> <table><tr><td>0</td><td>Not protected</td><td>—</td></tr><tr><td>1</td><td>Protected against vertically falling water droplets</td><td>Dripproof type 1</td></tr><tr><td>2</td><td>Protected against vertically falling water droplets when enclosure is tilted up to 15°</td><td>Dripproof type 2</td></tr><tr><td>3</td><td>Protected against rainfall when enclosure is tilted up to 60°</td><td>Rainproof type</td></tr><tr><td>4</td><td>Protected against splashing water</td><td>Splashproof type</td></tr><tr><td>5</td><td>Protected against water jets</td><td>Water-jet-proof type</td></tr><tr><td>6</td><td>Protected against powerful water jets</td><td>Powerful water-jet-proof type</td></tr><tr><td>7</td><td>Protected against the effects of temporary immersion in water</td><td>Immersible type</td></tr><tr><td>8</td><td>Protected against the effects of continuous immersion in water</td><td>Submersible type</td></tr></table> | 0 | Not protected | 1 | Protected against solid foreign objects of 50 mmø and larger | 2 | Protected against solid foreign objects of 12 mmø and larger | 3 | Protected against solid foreign objects of 2.5 mmø and larger | 4 | Protected against solid foreign objects of 1.0 mmø and larger | 5 | Dust protected | 6 | Dust-tight | 0 | Not protected | — | 1 | Protected against vertically falling water droplets | Dripproof type 1 | 2 | Protected against vertically falling water droplets when enclosure is tilted up to 15° | Dripproof type 2 | 3 | Protected against rainfall when enclosure is tilted up to 60° | Rainproof type | 4 | Protected against splashing water | Splashproof type | 5 | Protected against water jets | Water-jet-proof type | 6 | Protected against powerful water jets | Powerful water-jet-proof type | 7 | Protected against the effects of temporary immersion in water | Immersible type | 8 | Protected against the effects of continuous immersion in water |
| 0 | Not protected | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Protected against solid foreign objects of 50 mmø and larger | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Protected against solid foreign objects of 12 mmø and larger | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | Protected against solid foreign objects of 2.5 mmø and larger | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | Protected against solid foreign objects of 1.0 mmø and larger | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | Dust protected | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | Dust-tight | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | Not protected | — | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Protected against vertically falling water droplets | Dripproof type 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Protected against vertically falling water droplets when enclosure is tilted up to 15° | Dripproof type 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | Protected against rainfall when enclosure is tilted up to 60° | Rainproof type | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | Protected against splashing water | Splashproof type | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | Protected against water jets | Water-jet-proof type | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | Protected against powerful water jets | Powerful water-jet-proof type | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | Protected against the effects of temporary immersion in water | Immersible type | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | Protected against the effects of continuous immersion in water | Submersible type | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Others | Material | NBR: Nitrile rubber FKM : Fluorine rubber EPDM: Ethylene - propylene rubber | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Configuration symbol | When the valve is closed, flow is blocked from IN and OUT according to the JIS symbols. However, if the pressure in port 2 is higher than in port 1, the valve will not be able to block the fluid. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

19. Trouble Check Sheet (target series: JSXD)

Operating conditions

| | |
|------------------------------|----------------|
| Deliver date | MM/DD, YYYY |
| Operating period | months |
| Accumulated operating cycles | Approx. cycles |

Warranty period: Within 1.5 years after the product is delivered or 1 year in service.

Refer to and use this trouble check sheet as a cause diagnosis check sheet when a trouble has occurred to solve it early.

| Phenomenon | | Possible cause | Condition check | Countermeasures |
|--------------------------------------------------------------------------------------------------|---|------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>The product does not operate.</p> <p><input type="checkbox"/> ON Does not turn ON.</p> | ⇒ | The power supply voltage is not applied. | <input type="checkbox"/> Is there any abnormality, such as failure, with the power supply or control circuit? <input type="checkbox"/> Is there any abnormality, such as broken wire or mis wiring, in the wiring system? | There is a possibility of an abnormality with the power supply, control circuit, or wiring system. (1) Replace or repair the power supply, control circuit, or wiring system. |
| | | Abnormal supply pressure | <input type="checkbox"/> Is the operating pressure beyond the operating pressure differential range? | The operating pressure may be beyond the operating pressure differential range. (1) Use the product within the operating pressure differential range. (2) Select an appropriate model. |
| | | Drop of solenoid coil attraction force | <input type="checkbox"/> Are you using the product with an applied voltage below the allowable voltage range lower limit? * Allowable voltage range lower limit value: 90% of the rated voltage | There is a possibility that because the applied voltage was below the allowable voltage range lower limit, the attraction force of the solenoid coil dropped and the armature did not operate. (1) Use the product within the range of $\pm 10\%$ of the rated voltage. |
| | | Broken or blown solenoid coil | <input type="checkbox"/> Is water or other liquid splashed to the coil? | When the product is used in such an environment where water, steam, or condensation may attach to the product, water or other liquid may have entered the solenoid coil. (1) Take a waterproof countermeasure such as installation of a cover on the solenoid coil unit. |
| | | | <input type="checkbox"/> Is the product subject to surge voltage? | An excessively high surge voltage may have broken or blown the solenoid coil. (1) Replace the solenoid coil with a solenoid coil equipped with a surge voltage suppressor. |
| | | | <input type="checkbox"/> Does a surge pressure such as water hammer occur? | Surge pressures such as water hammer may be breaking parts. (1) Install a surge pressure alleviating component (e.g. accumulator). (2) Select the water hammer resistant valve VXR series. |
| | | | <input type="checkbox"/> Is the applied voltage above the upper limit of the allowable voltage range? * Allowable voltage range upper limit value: 110% of the rated voltage | There is a possibility that the applied voltage is above the upper limit of the allowable voltage range. (1) Use the product within the range of $\pm 10\%$ of the rated voltage. (2) Replace the solenoid coil. |
| | | Armature operation failure | <input type="checkbox"/> Has any foreign matter mixed in the fluid? <input type="checkbox"/> Has any foreign matter entered the solenoid valve? | There is a possibility that biting of a foreign matter at the armature sliding part caused sticking of the armature, a suction failure, or drop of the valve sealing performance. (1) On the upstream side of the valve, install an appropriate filter or strainer. * In general, the gas filtration rating of filter element is 5 μm or below. The liquid filtration rating is 100 mesh or above as a guide. (2) After conducting piping, blow air to the piping including solenoid valves. |
| | | | <input type="checkbox"/> Is the product subject to vibrations and impacts? | Erroneous armature operation and breakage of part caused by resonance (1) Use the product at a location free from vibration and impact. |
| | | | <input type="checkbox"/> Is the kinematic viscosity of the fluid above the allowable value? * Allowable value: 50 mm^2/s | The increase of sliding resistance may have caused the armature to malfunction. (1) Use the product at the allowable kinematic viscosity or below. (2) When using the product with high-viscosity fluid, select an air operated valve. |
| | | Deterioration and breakage of rubber seal part | <input type="checkbox"/> Is the solenoid valve part material compatible with the fluid? | Malfunction may have occurred due to shrinkage, deterioration breakage, or swelling of the rubber seal part. |
| | | | <input type="checkbox"/> Is the fluid or ambient temperature above the operating temperature range upper limit? | The rubber seal part may be deteriorated due to high temperature. (1) Use the product within the operating temperature range. |
| | | | <input type="checkbox"/> Is the fluid or ambient temperature below the operating temperature range lower limit? | The rubber seal part may be hardened due to low temperature, or freezing of fluid may have broken a part. (1) Use the product within the operating temperature range. (2) Take anti-freezing measures such as installation of heaters on the piping. |
| | | | <input type="checkbox"/> Is the operating pressure above the maximum operating pressure differential? | The rubber seal part may be broken due to an excessively high pressure. Use the product at the maximum operating pressure differential or below. |

| Phenomenon | | Possible cause | Condition check | Countermeasures |
|------------------------------------------------------------------------------------------------|---|------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The product does not operate. <input type="checkbox"/> OFF Does not turn OFF. | ⇒ | The power supply voltage is applied. | <input type="checkbox"/> Is there any abnormality, such as failure, with the power supply or control circuit? <input type="checkbox"/> Is there any abnormality, such as broken wire or mis wiring, in the wiring system? <input type="checkbox"/> Is the product used with the power supply leakage voltage exceeding the allowable value? | There is a possibility of an abnormality with the power supply, control circuit, or wiring system. (1) Replace or repair the power supply, control circuit, or wiring system. There is a possibility that the residual magnetic force exerted an influence. (1) Use the product at the allowable leakage voltage value or below. |
| | | Abnormal supply pressure | <input type="checkbox"/> Is the operating pressure below the minimum operating pressure differential? | The operating pressure may be below the minimum operating pressure differential. (1) Use the product within the operating pressure differential range. (2) Select an appropriate model. |
| | | Reverse pressure circuit | <input type="checkbox"/> Is the piping connection direction such that a reverse pressure is applied to the circuit in a reverse system manner? | The sealing may have failed because a reverse pressure was applied in the circuit. (1) Check the connecting direction of piping. In particular, when the circuit is used for drawing a vacuum, conduct piping so that the upstream side of the solenoid valve is on the atmosphere side and the downstream side on the vacuum pump side. (2) If a reverse pressure is applied in the piping circuit, install a check valve. |
| | | Armature operation failure | <input type="checkbox"/> Has any foreign matter mixed in the fluid? <input type="checkbox"/> Has any foreign matter entered the solenoid valve? | There is a possibility that biting of a foreign matter at the sliding part of the armature caused sticking of the armature or drop of the valve sealing performance. (1) On the upstream side of the valve, install an appropriate filter or strainer. * In general, the gas filtration rating of filter element is 5 μ m or below. The liquid filtration rating is 100 mesh or above as a guide. (2) After conducting piping, blow air to the piping including solenoid valves. |
| | | | <input type="checkbox"/> Is the product subject to vibrations and impacts? | Erroneous armature operation and breakage of part caused by resonance (1) Use the product at a location free from vibration and impact. |
| | | | <input type="checkbox"/> Is the kinematic viscosity of the fluid above the allowable value? * Allowable value: 50 mm ² /s | The increase of sliding resistance may have caused the armature to malfunction. (1) Use the product at the allowable kinematic viscosity or below. (2) When using the product with high-viscosity fluid, select an air operated valve. |
| | | Deterioration and breakage of rubber seal part | <input type="checkbox"/> Is the solenoid valve part material compatible with the fluid? | Malfunction may have occurred due to shrinkage, deterioration breakage, or swelling of the rubber seal part. |
| | | | <input type="checkbox"/> Is the fluid or ambient temperature above the operating temperature range upper limit? | The rubber seal part may be deteriorated due to high temperature. (1) Use the product within the operating temperature range. |
| | | | <input type="checkbox"/> Is the fluid or ambient temperature below the operating temperature range lower limit? | The rubber seal part may be hardened due to low temperature, or freezing of fluid may have broken a part. (1) Use the product within the operating temperature range. (2) Take anti-freezing measures such as installation of heaters on the piping. |
| | | | <input type="checkbox"/> Is the operating pressure above the maximum operating pressure differential? | The rubber seal part may be broken due to an excessively high pressure. Use the product at the maximum operating pressure differential or below. |
| Fluid leakage occurs. <input type="checkbox"/> Leakage from valve (Internal leakage) | ⇒ | The power supply voltage is applied. | <input type="checkbox"/> Is there any abnormality, such as failure, with the power supply or control circuit? <input type="checkbox"/> Is there any abnormality, such as broken wire or mis wiring, in the wiring system? <input type="checkbox"/> Is the product used with the power supply leakage voltage exceeding the allowable value? | There is a possibility of an abnormality with the power supply, control circuit, or wiring system. (1) Replace or repair the power supply, control circuit, or wiring system. There is a possibility that the residual magnetic force exerted an influence. (1) Use the product at the allowable leakage voltage value or below. |
| | | Abnormal supply pressure | <input type="checkbox"/> Is the operating pressure beyond the operating pressure differential range? | The operating pressure may be beyond the operating pressure differential range. (1) Use the product within the operating pressure differential range. (2) Select an appropriate model. |
| | | Reverse pressure circuit | <input type="checkbox"/> Is the piping connection direction such that a reverse pressure is applied to the circuit in a reverse system manner? | The sealing may have failed because a reverse pressure was applied in the circuit. (1) Check the connecting direction of piping. In particular, when the circuit is used for drawing a vacuum, conduct piping so that the upstream side of the solenoid valve is on the atmosphere side and the downstream side on the vacuum pump side. (2) If a reverse pressure is applied in the piping circuit, install a check valve. |
| | | Inconsistency between allowable leakage values | <input type="checkbox"/> Is the allowable leakage value of the solenoid valve (refer to the catalog) above the allowable leakage value of the system? | Select a model with non-leak specification. |
| | | Armature operation failure | <input type="checkbox"/> Has any foreign matter mixed in the fluid? <input type="checkbox"/> Has any foreign matter mixed in the solenoid valve? | There is a possibility that biting of a foreign matter at the sliding part of the armature caused sticking of the armature or drop of the valve sealing performance. (1) On the upstream side of the valve, install an appropriate filter or strainer. * In general, the gas filtration rating of filter element is 5 μ m or below. The liquid filtration rating is 100 mesh or above as a guide. (2) After conducting piping, blow air to the piping including solenoid valves. |
| | | | <input type="checkbox"/> Is the product subject to vibrations and impacts? | Erroneous armature operation and breakage of part caused by resonance (1) Use the product at a location free from vibration and impact. |
| | | | | |

| Phenomenon | | Possible cause | Condition check | Countermeasures |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Fluid leakage occurs <input type="checkbox"/> Leakage from valve (Internal leakage) <input type="checkbox"/> Air tightness is insufficient. (External leakage) | ⇒ | Deterioration and breakage of rubber seal part | <input type="checkbox"/> Is the fluid or ambient temperature above the operating temperature range upper limit? | → The rubber seal part may be deteriorated due to high temperature. (1) Use the product within the operating temperature range. |
| | | | <input type="checkbox"/> Is the fluid or ambient temperature below the operating temperature range lower limit? | → The rubber seal part may be hardened due to low temperature, or freezing of fluid may have broken a part. (1) Use the product within the operating temperature range. (2) Take anti-freezing measures such as installation of heaters on the piping. |
| | ⇒ | Abnormal supply pressure | <input type="checkbox"/> Is the operating pressure above the maximum system pressure? | → The operating pressure may be above the maximum system pressure. (1) Use the product at the maximum system pressure or below. (2) Select an appropriate model. |
| | | Inconsistency between allowable leakage values | <input type="checkbox"/> Is the allowable leakage value of the solenoid valve (refer to the catalog) above the allowable leakage value of the system? | → Select a model with non-leak specification. |
| | | Deterioration of rubber seal part | <input type="checkbox"/> Is the solenoid valve part material compatible with the fluid? | → Malfunction may have occurred due to shrinkage, deterioration breakage, or swelling of the rubber seal part. |
| | | | <input type="checkbox"/> Is the fluid or ambient temperature above the operating temperature range upper limit? | → The rubber seal part may be deteriorated due to high temperature. (1) Use the product within the operating temperature range. |
| | | | <input type="checkbox"/> Is the fluid or ambient temperature below the operating temperature range lower limit? | → The rubber seal part may be hardened due to low temperature, or freezing of fluid may have broken a part. (1) Use the product within the operating temperature range. (2) Take anti-freezing measures such as installation of heaters on the piping. |
| | | | <input type="checkbox"/> Is the operating pressure above the maximum operating pressure differential? | → The rubber seal part may be broken due to an excessively high pressure. Use the product at the maximum operating pressure differential or below. |
| Small flow - | ⇒ | Armature operation failure | <input type="checkbox"/> Has any foreign matter mixed in the fluid? Has any foreign matter mixed in the solenoid valve? | → There is a possibility that biting of a foreign matter at the armature sliding part caused sticking of the armature, a suction failure, or drop of the valve sealing performance. (1) On the upstream side of the valve, install an appropriate filter or strainer. * In general, the gas filtration rating of filter element is 5 μ m or below. The liquid filtration rating is 100 mesh or above as a guide. (2) After conducting piping, blow air to the piping including solenoid valves. |
| | | | <input type="checkbox"/> Is the kinematic viscosity of the fluid above the allowable value? * Allowable value: 50 mm ² /s | → The increase of sliding resistance may have caused the armature to malfunction. (1) Use the product at the allowable kinematic viscosity or below. (2) When using the product with high-viscosity fluid, select an air operated valve. |
| | ⇒ | Abnormal supply pressure | <input type="checkbox"/> Is the operating pressure beyond the operating pressure differential range? | → The operating pressure may be beyond the operating pressure differential range. (1) Use the product within the operating pressure differential range. (2) Select an appropriate model. |
| | | Deterioration and breakage of rubber seal part | <input type="checkbox"/> Is the solenoid valve part material compatible with the fluid? | → Malfunction may have occurred due to shrinkage, deterioration breakage, or swelling of the rubber seal part. |
| | | | <input type="checkbox"/> Is the fluid or ambient temperature above the operating temperature range upper limit? | → The rubber seal part may be deteriorated due to high temperature. (1) Use the product within the operating temperature range. |
| | | | <input type="checkbox"/> Is the fluid or ambient temperature below the operating temperature range lower limit? | → The rubber seal part may be hardened due to low temperature, or freezing of fluid may have broken a part. (1) Use the product within the operating temperature range. (2) Take anti-freezing measures such as installation of heaters on the piping. |
| | | | <input type="checkbox"/> Is the operating pressure above the maximum operating pressure differential? | → The rubber seal part may be broken due to an excessively high pressure. Use the product at the maximum operating pressure differential or below. |
| There is noise. - | ⇒ | Drop of solenoid coil attraction force | <input type="checkbox"/> Is the product used with the applied voltage below the allowable voltage range lower limit? * Allowable voltage range lower limit: 90% of the rated voltage | → There is a possibility that because the applied voltage was below the allowable voltage range lower limit, the attraction force of the solenoid coil dropped and the armature did not operate. (1) Use the product within the range of $\pm 10\%$ of the rated voltage. |
| | | Abnormal supply pressure | <input type="checkbox"/> Is the operating pressure beyond the operating pressure differential range? | → The operating pressure may be beyond the operating pressure differential range. (1) Use the product within the operating pressure differential range. (2) Select an appropriate model. |
| | | Armature operation failure | <input type="checkbox"/> Has any foreign matter mixed in the fluid? Has any foreign matter mixed in the solenoid valve? | → There is a possibility that biting of a foreign matter at the armature sliding part caused sticking of the armature, a suction failure, or drop of the valve sealing performance. (1) On the upstream side of the valve, install an appropriate filter or strainer. * In general, the gas filtration rating of filter element is 5 μ m or below. The liquid filtration rating is 100 mesh or above as a guide. (2) After conducting piping, blow air to the piping including solenoid valves. |

| Revision history |
|-------------------------|
| 1 : Safety Instructions |

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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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