



# Operation Manual

PRODUCT NAME

Proportional Control Valve

MODEL / Series / Product Number

JSP series

**SMC Corporation**

# Contents

Contents	P1
Safety Instructions	P2, 3
1. Precautions for Design	P4, 5
2. Operating Environment	P5
3. Precautions for Fluid	P6
4. Fluid quality	P6
5. Mounting	P7
6. Bracket mounting	P7, 8
7. Piping	P8, 9
8. Wiring	P10
9. Electric connection	P10~12
10. Electric circuit diagram	P13
11. Maintenance	P13
12. Return of Our Products	P13
13. Models	P14
14. Specifications	P15
15. Flow characteristics	P15
16. Flow characteristics/Hysteresis	P16
17. Construction	P17
18. Definition and Terminology	P18
19. Troubleshooting	P19
20. Trouble check sheet	P20~22



# 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)<sup>\*1)</sup>, 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. Our products cannot be used beyond their specifications. Our products are not developed, designed, and manufactured to be used under the following conditions or environments. Use under such conditions or environments is not covered.**

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, fuel 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

**We develop, design, and manufacture our products to be used for automatic control equipment, and provide them for peaceful use in manufacturing businesses.**

**Use in non-manufacturing business is not covered.**

Products we manufacture and sell cannot be used for the purpose of transactions or certification specified in the Measurement Act.

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. Check the specifications.

Fully understand the applications, fluids, environment, and other operating conditions to use this product within the specified range shown in this catalog.

Operation outside of the product operating range may cause damage to the product or operation failure.

SMC does not guarantee against any damage if the product is used outside of the specification range.

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

This product is not designed as a valve for safety applications such as an emergency shutoff valve. If the valves are used for safety applications, additional safety measures should be implemented.

### 3. This product cannot be used for holding pressure (including vacuum).

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

### 4. Countermeasure against static liquid

When flowing liquid is used, provide a bypass valve in the system to prevent forming a liquid-sealed circuit.

### 5. Actuator drive.

When an actuator such as a cylinder is to be driven by a valve, take appropriate measures to prevent potential danger caused by actuator operation.

### 6. Long-term continuous energization

The solenoid coil generates heat if continuously energized. Do not use the product in sealed containers. Install the product in a ventilated location. Do not touch the solenoid valves with bare hands during or after energization.

### 7. Water hammer

When an impact, such as water hammer caused by rapid pressure fluctuation is applied, the valve may get damaged.

Install water hammer relief equipment (accumulator, etc.) or use a water hammer relief valve VXR series of SMC. For details, please contact SMC.

### 8. Dual 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. Disassembly and modification prohibited

Do not disassemble or modify the product (including additional machining). It may cause human injury and/or an accident.

### 10. This product makes proportional control possible by means of current control.

With the power voltage set to the rated voltage, use the product while conducting current control.

If voltage control is used, flow rate control is not possible due to the change of current in association with coil temperature rise.

### 11. Pressure difference

The flow rate in the product is controlled by means of balancing of valve element by the pressure differential, electromagnetic force, and spring force.

If the secondary (downstream) side pressure becomes high due to a restrictor, such as nozzle, installed on the downstream side, stable flow rate control may not be possible even when the pressure is within the maximum operating pressure differential.

use the allowable downstream side pressures in the table below as a guide, but fully check the controllability under the actual operating conditions.

#### Allowable Secondary Side Pressure (Approx.)

Fluid	Size	Orifice diameter [mmφ]	Guide for allowable secondary side pressure [MPa]			
			Inlet pressure 0.1 MPa	Inlet pressure 0.2 MPa	Inlet pressure 0.35 MPa	Inlet pressure 0.4 MPa
Air	10	1.4	0.06 or less	0.12 or less	0.21 or less	—
		2.3	0.06 or less	0.12 or less	0.21 or less	—
	20	2.0	0.06 or less	0.12 or less	0.21 or less	0.24 or less
		3.2	0.06 or less	0.12 or less	0.21 or less	0.24 or less
Water	10	1.4	0.05 or less	0.09 or less	0.16 or less	—
		2.0	0.05 or less	0.09 or less	0.16 or less	0.18 or less

\* The value is taken when a nozzle of the same diameter as the orifice is connected to the end of the pipe on the secondary side and the rated current is applied.

## 12. Flow rate characteristics

The flow rate characteristics may differ depending on the individual unit, operating, and piping conditions.

Fully conduct a check under the actual operating conditions, and then select a model that has a sufficient margin with respect to the required flow rate.

## 13. PWM control

The product conducts PWM control to suppress the hysteresis.

Use the product under the frequency condition of 450 Hz (size 10) or 350 Hz (size 20).

## 14. The product is adjusted to individual specifications at the time of shipment from the factory.

Do not operate the adjustment screw by loosening the nut located at the upper part of the product.

Operating the adjustment screw may lead to a malfunction.

Do not perform disassembly or removal of parts as doing so will cause a failure.

## 15. The flow rate is controlled through balancing of the valve element.

Avoid external impact and vibration as they will change the flow rate.

## 16. Port size of size 20 (water)

If size 20 (orifice diameter of  $\varnothing 2$ ) is used for water, make the inner diameter of the secondary side pipe  $\varnothing 6.5$  mm or larger.

## 17. Nozzle diameter

When connecting a nozzle to the end of the pipe, the nozzle size diameter should be equal to or larger than the orifice diameter as a guide.

If the nozzle diameter is smaller than the orifice diameter, stable flow rate control may be disabled.

Sufficiently check the controllability under the actual operating conditions.

## 2. Operating Environment



### Warning

Do not use this product under any of the following conditions. It may lead to a malfunction or failure.

#### 1. Location where the product may be exposed to an atmosphere containing steam, corrosive fluid (chemicals), seawater, or water.

Even on a product with a protection classification (IP65, IP67), take appropriate protection measures if it is used in an environment where water is splashed to it for a long time. Water may enter from minute gaps on the outer surface of the product and it may cause coil burnout or short circuit with solenoid valves. Check that liquid or splatter does not splash on the product from peripheral equipment when installing this product near equipment that uses a large amount of water or oil, such as machining tool and machining equipment.

#### 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. 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. Use of the product outdoors

1) Although the weather resistance of the product has been improved, its outdoor use is not guaranteed.

2) The product does not guarantee anti-corrosion performance (being free from rust generation and discoloration).

## 3. Precautions for Fluid



### Warning

#### 1. Fluid selection

Compatibility between the components and fluids should be checked in the application before use.

**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

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

#### 3. Fluid temperature

Operate the product within the specified operating fluid temperature.

#### 4. 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) Replace or clean the filter or strainer when the pressure drop reaches 0.1 MPa to prevent them from getting clogged.

#### 5. If the product is used with water or warm water, a malfunction or leakage may occur due to dezincification symptom, erosion, corrosion, or the like.

Stainless steel body type with improved anti-corrosion performance is also available.

Please select the products depending on what best suits the application.

## 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 air with an ultra-low dew point of  $-70^{\circ}\text{C}$  or lower, the inside of the valve may wear, reducing the product life.

#### 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.

## 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 if 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.
8. **Mounting of base piping type**  
When installing the product on a base, check the fitting condition of the O-ring on the interface surface, and then securely tighten the screw to the tightening torque shown in the table below.

#### Appropriate tightening torque (Nm)

JSP10(Base ported type)	0.9±10%
JSP20(Base ported type)	1.4±10%

#### Mounting direction of base piping type

For mounting, refer to the full view.

9. **Orientation**  
As a preventive measure against accumulation of foreign matter and others, we recommend that the coil be installed in the upward direction.



### Caution

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

## 6. Bracket mounting



### Caution

1. **JSP10 series Body material: SUS, Brass (Port size 1/8)**  
**JSP20 series Body material: Brass (Port size 1/4, 3/8)**

Assembling method

- 1) Mount the bracket(①) to the bottom of the valve using 2 mounting screws(②).

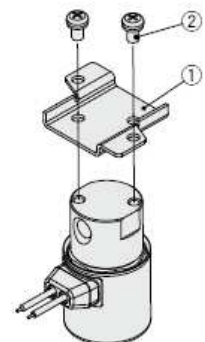
Tightening torque

JSP10 : 0.6Nm±5%

JSP20 : 1.5Nm±5%

#### Part No. of bracket assembly (with mounting screw)

Size	Body material	Port size	Thread type	Bracket assembly part number	Bracket material
10	Brass, SUS	1/8	Rc, NPT,	JSX021-12A-3	SUS
20	Brass	1/4, 3/8	G	JSX20-12A-4	

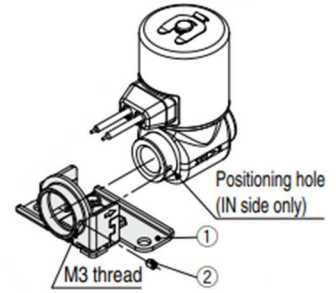




## 2. JSP20 series Body material : SUS (Port size 1/4, 3/8)

### Assembling method

- 1) Insert bracket (①) to the IN side port of the valve.
- 2) Secure the bracket with the hexagon socket head set screw (②).  
Tightening torque : 0.4 N·m±0.5%



### Caution on Assembly

- 1) Pay attention to the bracket insertion direction.  
The positioning hole is on the IN side only.  
The bracket cannot be mounted to the OUT side.
- 2) The bracket should be mounted after connecting the fitting (Refer to “7. Piping.” )  
\* The bracket is bundled with the product.

### Bracket assembly part number (with set screw)

Size	Port size	Thread type	Bracket assembly part number	Material
20	1/4	Rc, NPT, G	JSX022-12A-2-1	SUS
	3/8	Rc, NPT	JSX022-12A-2-1	
		G	JSX022-12A-2-2	

## 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.

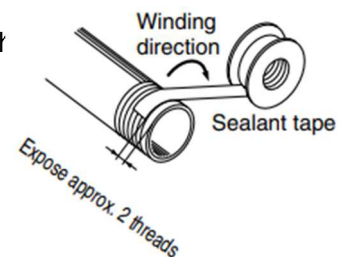


### Caution

1. For handling of pipe fitting, refer to **Fittings and tubing Precautions** in the SMC catalog.
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 the valve, tighten it to the appropriate torque st

### Tightening torque for piping

Connection thread (R, NPT)	Proper tightening torque (Nm)
1/8	7~9
1/4	12~14
3/8	22~24



If the tightening torque is applied to the fitting while the valve is secured to the bracket, the bracket might be damaged.

### 5. When using a fitting other than SMC fitting

Follow the instructions given by the manufacturer of the fitting used.

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. (Fig. 2)

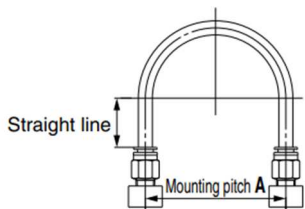


Fig. 1 Recommended piping

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

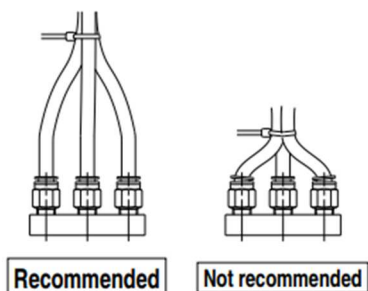
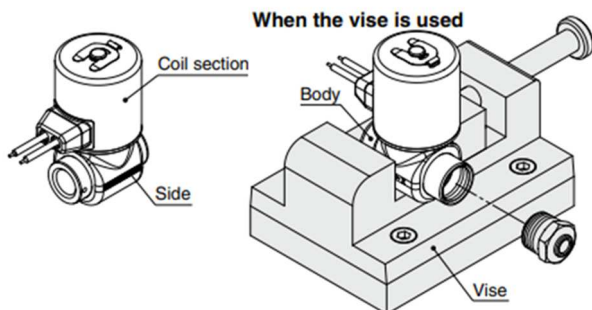


Fig. 2 When using a tying band to bind the piping together

9. When a fitting is connected to the valve, clamp the side of the body with a vise.



**!** If the tightening torque is applied to the fitting while the valve is secured to the bracket, the bracket might be damaged.

10. When using a bracket (bore size of 1/4 or 3/8) made of the body material SUS, connect the fittings in accordance with the following procedure.

Step 1) Connect the fittings to both the IN and OUT sides of the valve.

Step 2) Insert the IN side port of the valve into the bracket hole.

Step 3) Secure the valve to the bracket with the hexagon socket set screw.

## 8. Wiring



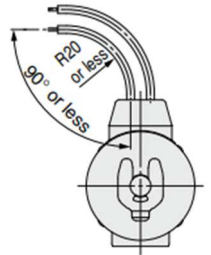
### Warning

- Solenoid valves are electrical products. Install an appropriate fuse and circuit breaker for safety.  
When multiple solenoid valves are used, installation of a single fuse only is insufficient. For protecting the equipment more safely, select an appropriate fuse to each circuit of the solenoid valve.



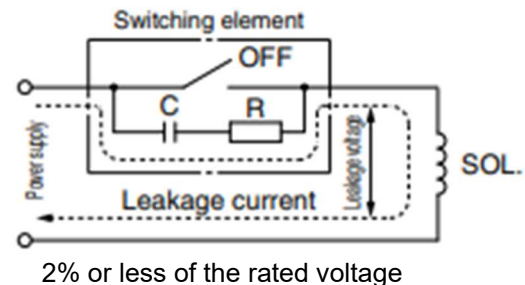
### Caution

- Use wiring cable with a conductor cross-section of 0.5 to 1.25 mm<sup>2</sup>.
- External force on the lead wire**  
Excessive force to the lead wire may cause a wire to break.  
Make sure that no excessive force larger than 10 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.
- Use electrical circuits that do not generate chattering within their contacts.
- Use voltages in the range of within  $\pm 10\%$  of the rated voltage.
- If no solenoid surge is allowed in the electrical circuit system, mount a voltage protective circuit, etc. in parallel to the solenoid.



### 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



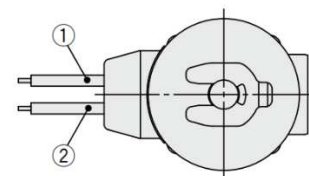
### Caution

#### 1. Grommet

Lead wire: AWG20 insulator outside diameter 2.6mm

Rated voltage	Lead wire color	
	①	②
DC	Black	Red

There is no polarity.



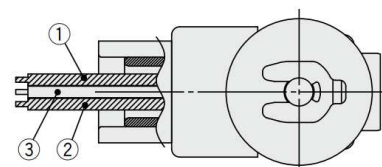
#### 2. Conduit

Lead wire: AWG18 insulator outside diameter 2.8 mm

Rated voltage	Lead wire color		
	①	②	③
DC	Black	Red	Green/Yellow

There is no polarity.

\* (③) is a grounding 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.

Note 1) The tightening torque should be 0.5 Nm to 0.6 Nm.

Note 2) The outside diameter of the cable is  $\varnothing 6$  to 12 mm.

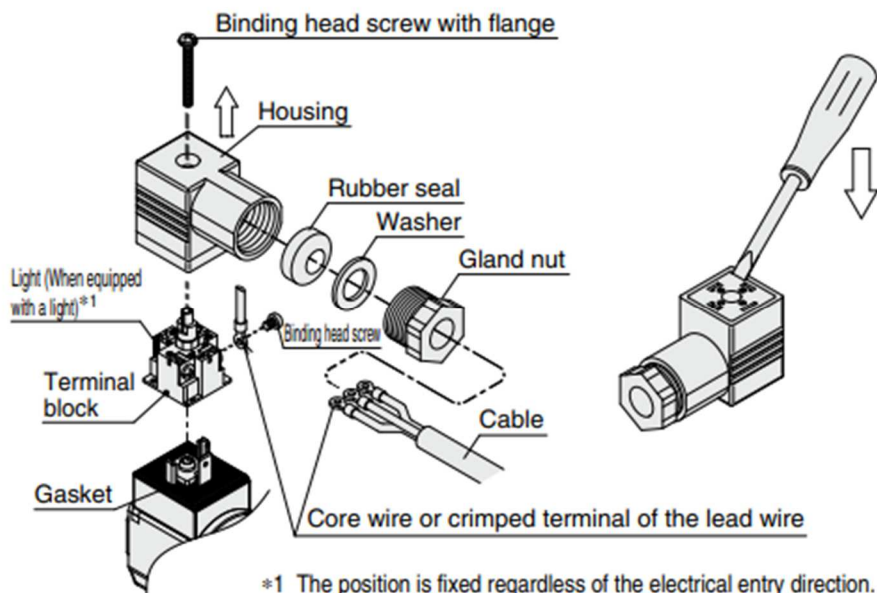
Note 3) When using a cable with an outside diameter of  $\varnothing 9$  to 12 mm, remove the inner part of the rubber seal.

#### 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.

Note 1) The tightening torque should be 0.5 Nm.

Note 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.

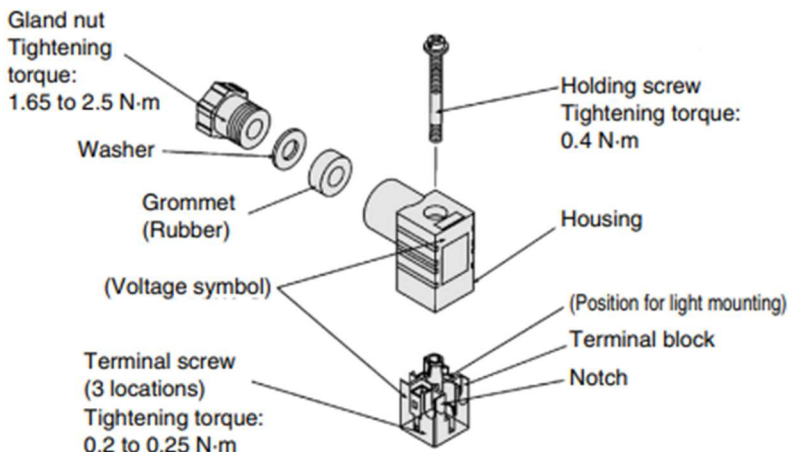


For JSP10

**Applicable cable**

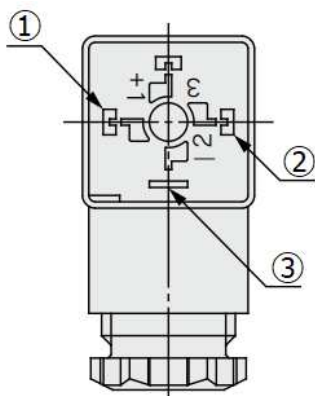
Cable outer diameter  $\varnothing 3.5$  to  $\varnothing 7$

(Reference) JIS C 3306 equivalent 0.5 mm<sup>2</sup>, 2 or 3 core.



**Caution**

Internal connections are connected as shown below, connect each of them to the power supply accordingly.



Terminal No.	①	②
DIN Terminal※1	+(-)	-(+)

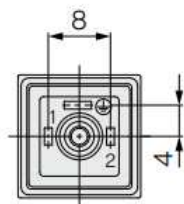
\*1 Polarity (positive and negative) does not matter.

\*2 (③) is a grounding wire.

**DIN (EN175301-803) type terminal**

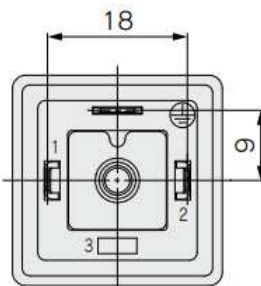
The product is compatible with the Form C DIN type connector with an inter-terminal pitch of 8 mm.

The product is compatible with the Form A DIN type connector with an inter-terminal pitch of 18 mm.



**Size : 10**

Applicable cable size:  $\varnothing 3.5$  to  $\varnothing 7$



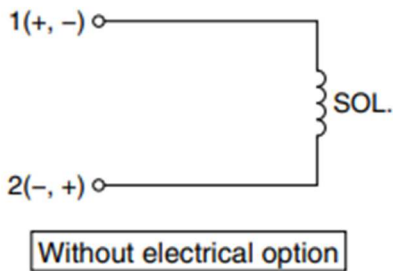
**Size : 20**

Applicable cable size:  $\varnothing 6$  to  $\varnothing 12$

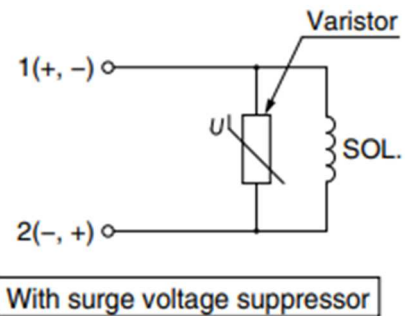
## 10. Electric circuit diagram

### 1. Circuit for DC

- Grommet



- Conduit/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 Our Products



### 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.

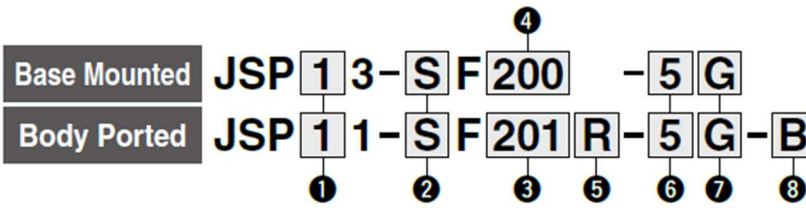
After decontamination, submit the Product Return Request Sheet or Detoxification/Decontamination certificate to SMC and receive an agreement from SMC before returning the product.

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

Contact your SMC Sales representative for any inquiries.

# 13. Models

## How to Order



### ① Size

Symbol	Size
1	10
2	20

### ② Body material

Symbol	Material
S	Stainless steel
C	Brass

### ③ [Body Ported] Orifice diameter and port size

Symbol	Orifice diameter [mm]	Port size	Size	
			10	20
101	1.4	1/8	●	—
201	2.3	1/8	●	—
202	2.0	1/4	—	●
203		3/8	—	●
302	3.2	1/4	—	●
303		3/8	—	●

### ④ [Base mounted] Orifice diameter and port size

Symbol	Orifice diameter [mm]	Port size	Size	
			10	20
100	1.4	—	●	—
200	2.3	—	●	—
200	2.0	—	—	●
300	3.2	—	—	●

\* 4 mounting screws are included.





### ⑤ Thread type

Symbol	Thread type
R	Rc
N	NPT
F	G



### ⑥ Voltage type

Symbol	Voltage type
5	24 VDC
6	12 VDC

### ⑦ Electrical entry

Symbol	Electrical entry	Size	
		10	20
G	Grommet 	●	●
CS	Conduit (With surge voltage suppressor) 	—	●
DS	DIN terminal (With surge voltage suppressor) 	●	●
DN	DIN terminal without connector (With surge voltage suppressor) 	●	●

### ⑧ Bracket

Symbol	Bracket	
B	Without bracket	
	With bracket	
	Size: 10	Size: 20
		
	Stainless steel, Brass	Stainless steel Brass

### Bracket Assembly Part Nos.

#### Size 10

Part no.	Body material	Bracket material	Note
JSX021-12A-3	Stainless steel, Brass	Stainless steel	With mounting screw (Stainless steel)

#### Size 20

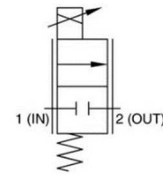
Part no.	Body material	Port size	Bracket material	Note
JSX022-12A-2-1	Stainless steel	(Rc, NPT, G)1/4	Stainless steel	With set screw (Stainless steel)
JSX022-12A-2-1		(Rc, NPT)3/8		
JSX022-12A-2-2		(G)3/8		
JSX20-12A-4	Brass	(Rc, NPT, G)1/4, 3/8		With mounting screw (Stainless steel)

# 14. Specifications

Size		10	20
Valve specifications	Valve construction	Direct operated poppet	
	Fluid and fluid temperatures	Air: 0 to 50°C Water: 1 to 50°C (No freezing)*1	
	Ambient temperature	0 to 50°C	
	Withstand pressure	0.6 MPa	
	Max. system pressure	1.0 MPa	
	Valve leakage/External leakage*2	1 cm <sup>3</sup> /min (ANR) or less	
	Mounting orientation*3	Unrestricted	
	Enclosure*4	IP67 (IP65 for the DIN terminal)	
	Body material	Stainless steel, Brass	
	Seal material	FKM	
Coil specifications	Rated current/Rated voltage*5	200 mA/24 VDC 400 mA/12 VDC	260 mA/24 VDC 520 mA/12 VDC
	Power consumption*6	4 W	5.6 W
	Temperature rise*6	80°C	

Applicable fluid	Orifice diameter [mm]			
	Size: 10		Size: 20	
	ø1.4	ø2.3	ø2	ø3.2
Air	●	●	●	●
Water	●	—	●	—

Symbol



\* When the valve is open, flow from port 1 (IN) to port 2 (OUT) is blocked (-| -). However, if the pressure in port 2 is higher than that of port 1, the valve will not be able to block the fluid.

- \*1) Availability depends on the orifice diameter. Refer to the applicable fluid table.
- \*2) The valve leakage rate is determined when the pressure differential is 0.05 MPa or more, upward orientation of the solenoid, and ambient temperature of 20°C. Since the leakage from this product is not zero, it cannot be used for applications such as holding pressure in a pressure vessel.
- \*3) It is recommend that the solenoid is mounted upwards to prevent accumulation of foreign matter.
- \*4) This product has an IP67 enclosure, but if water enters the product, it may result in malfunction or breakage.
- \*5) With the power voltage set to the rated voltage, use the product while conducting current control. If voltage control is conducted, flow rate control is not possible due to the change of current associated with coil temperature rise.
- \*6) This is the value when current control was conducted at the rated voltage

# 15. Flow characteristics

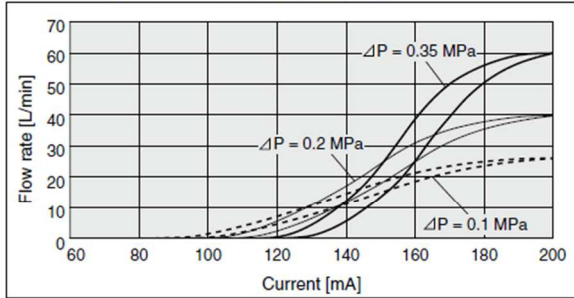
Size	Body material	Body type	Port size	Orifice diameter [mmø]	Max. flow rate *1 [Air] [L/min]	Max. flow rate *1, *2, *3 [Water] [L/min]	Max. operating pressure differential*4 [MPa]	Repeatability	Sensitivity	Model
10	Stainless steel	Body ported	1/8	1.4	50	1.5	0.35	±3% F.S. or less	2% F.S. or less	JSP1 <sub>3</sub> - <sub>C</sub> F10 <sub>1</sub> <sup>0</sup>
	Brass	Base mounted		2.3	100	—				JSP1 <sub>3</sub> - <sub>C</sub> F20 <sub>1</sub> <sup>0</sup>
20	Stainless steel	Body ported	1/4	2	125	3	0.4	±3% F.S. or less	2% F.S. or less	JSP2 <sub>3</sub> - <sub>C</sub> F20 <sub>3</sub> <sup>0</sup>
	Brass	Base mounted	3/8	3.2	300	—				JSP2 <sub>3</sub> - <sub>C</sub> F30 <sub>3</sub> <sup>0</sup>

- \*1) This is the value at the max operating pressure differential.
- \*2) When using size 20 with water, the inner diameter of the outlet pipe must be  $\phi$  6.5 mm or more.
- \*3) When a nozzle or similar is connected at the end of the pipe, the nozzle diameter should be larger than the orifice diameter.
- \*4) Even when the pressure differential is within the max. operating pressure differential, if the secondary side pressure becomes high due to a restrictor, such as nozzle, on the secondary side, stable flow rate control may not be possible. For guidance on allowable secondary side pressure, refer to “1.Precautions for Design” .
- \*5) For hysteresis, refer to the “16.Flow characteristics graph”.



# 16. Flow characteristics/Hysteresis

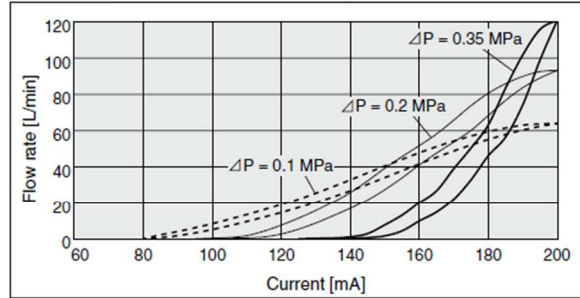
**Size 10 Orifice diameter  $\phi 1.4$  [Air]**



**Hysteresis (% F.S.)**

$\Delta P$	With PWM control	Without PWM control
0.1 MPa	4	12
0.2 MPa	4	13
0.35 MPa	6	17

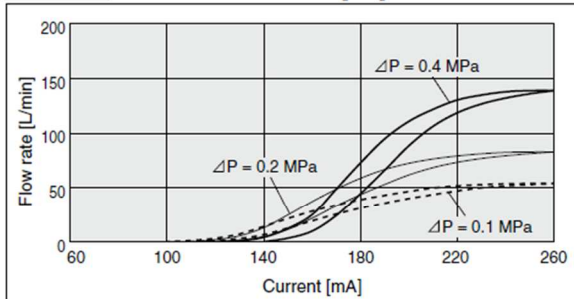
**Size 10 Orifice diameter  $\phi 2.3$  [Air]**



**Hysteresis (% F.S.)**

$\Delta P$	With PWM control	Without PWM control
0.1 MPa	3	9
0.2 MPa	4	13
0.35 MPa	7	19

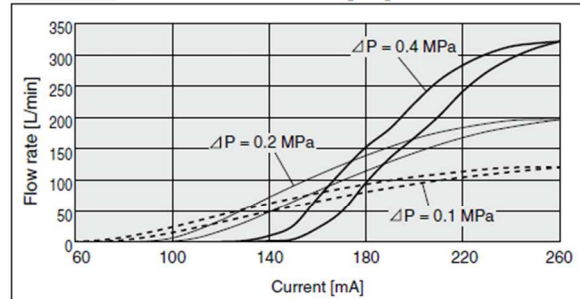
**Size 20 Orifice diameter  $\phi 2.0$  [Air]**



**Hysteresis (% F.S.)**

$\Delta P$	With PWM control	Without PWM control
0.1 MPa	5	15
0.2 MPa	6	16
0.4 MPa	6	19

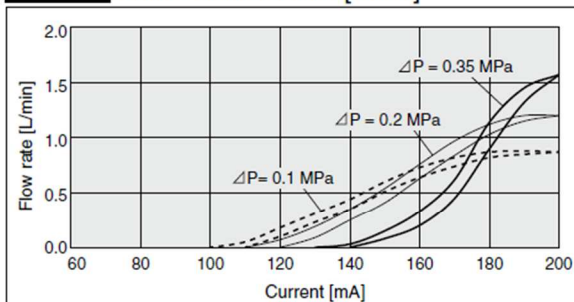
**Size 20 Orifice diameter  $\phi 3.2$  [Air]**



**Hysteresis (% F.S.)**

$\Delta P$	With PWM control	Without PWM control
0.1 MPa	4	11
0.2 MPa	6	14
0.4 MPa	8	17

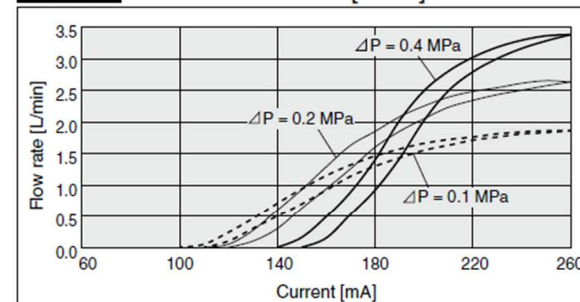
**Size 10 Orifice diameter  $\phi 1.4$  [Water]**



**Hysteresis (% F.S.)**

$\Delta P$	With PWM control	Without PWM control
0.1 MPa	4	12
0.2 MPa	4	13
0.35 MPa	6	17

**Size 20 Orifice diameter  $\phi 2.0$  [Water]**



**Hysteresis (% F.S.)**

$\Delta P$	With PWM control	Without PWM control
0.1 MPa	5	15
0.2 MPa	6	16
0.4 MPa	6	19

\* The flow characteristics graph and hysteresis are only guide, and they indicate values when the secondary side is open to the atmosphere. The hysteresis shown are average values.

\* Recommended conditions of PWM control: voltage=24 VDC, frequency=450 Hz (size 10) /350 Hz (size 20)

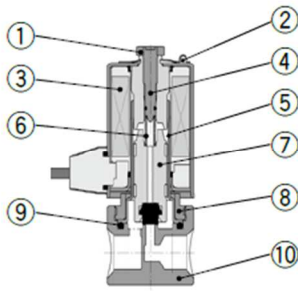
\* The flow rate characteristics may differ depending on the individual unit, operating condition, and piping conditions.

Fully conduct a check under the actual operating conditions, and select a model with a sufficient margin with respect to the required flow rate.

# 17. Construction

## JSP10 Body Ported

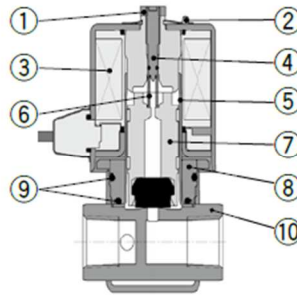
Body Material: Stainless steel, Brass



No.	Description	Material
1	Nut	Stainless steel
2	Clip	Stainless steel
3	Solenoid coil	Stainless steel, Cu, Resin
4	Adjusting screw	Stainless steel
5	Tube assembly	Stainless steel
6	Return spring	Stainless steel
7	Armature assembly	Stainless steel, PTFE, FKM
8	Set nut	Stainless steel
9	Gasket	FKM
10	Body	Stainless steel   Brass

## JSP20 Body Ported

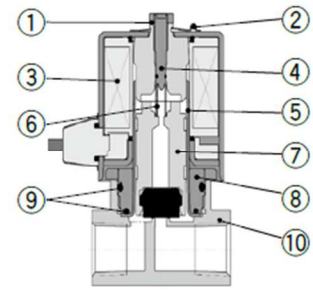
Body Material: Stainless steel



No.	Description	Material
1	Nut	Stainless steel
2	Clip	Stainless steel
3	Solenoid coil	Stainless steel, Cu, Resin
4	Adjusting screw	Stainless steel
5	Tube assembly	Stainless steel
6	Return spring	Stainless steel
7	Armature assembly	Stainless steel, PTFE, FKM
8	Nut	Stainless steel
9	Gasket	FKM
10	Body	Stainless steel

## JSP20 Body Ported

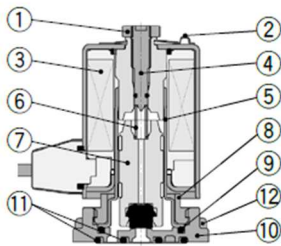
Body Material: Brass



No.	Description	Material
1	Nut	Stainless steel
2	Clip	Stainless steel
3	Solenoid coil	Stainless steel, Cu, Resin
4	Adjusting screw	Stainless steel
5	Tube assembly	Stainless steel
6	Return spring	Stainless steel
7	Armature assembly	Stainless steel, PTFE, FKM
8	Nut	Stainless steel
9	Gasket	FKM
10	Body	Brass

## JSP10 Base Mounted

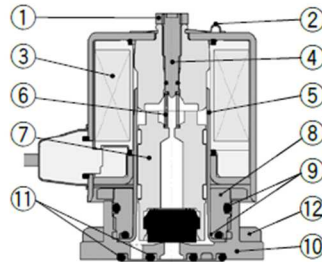
Body Material: Stainless steel, Brass



No.	Description	Material
1	Nut	Stainless steel
2	Clip	Stainless steel
3	Solenoid coil	Stainless steel, Cu, Resin
4	Adjusting screw	Stainless steel
5	Tube assembly	Stainless steel
6	Return spring	Stainless steel
7	Armature assembly	Stainless steel, PTFE, FKM
8	Set nut	Stainless steel
9	Gasket	FKM
10	Base mounted body	Stainless steel   Brass
11	Interface O-ring	FKM
12	Mounting screw	Stainless steel


## JSP20 Base Mounted

Body Material: Stainless steel, Brass



No.	Description	Material
1	Nut	Stainless steel
2	Clip	Stainless steel
3	Solenoid coil	Stainless steel, Cu, Resin
4	Adjusting screw	Stainless steel
5	Tube assembly	Stainless steel
6	Return spring	Stainless steel
7	Armature assembly	Stainless steel, PTFE, FKM
8	Nut	Stainless steel
9	Gasket	FKM
10	Base mounted body	Stainless steel   Brass
11	Interface O-ring	FKM
12	Mounting screw	Stainless steel

## 18. Definition and Terminology

Pressure/proportional control terms	Proportional control	Control the fluid proportionally according to the input signal (current).																																								
	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.																																								
	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)																																								
	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.																																								
	Hysteresis	Hysteresis indicates the flow rate difference between when the current is increasing and when the current is decreasing (when the current is the same). (Percentage divided by maximum current)																																								
	Repeatability	Repeatability indicates the variation of flow rates that are output when the same current is applied in a condition where a given product has been repetitively operated in a short period under the same conditions. (Percentage divided by maximum current)																																								
	Sensitivity	Sensitivity refers to the value of minimum current that is necessary for changing the flow rate in the same direction (further increasing or decreasing flow rate), represented by the percentage obtained through division by the rated current.																																								
	PWM control (Pulse width modulation)	Pulse width modulation is a control in which the output current is changed as turning ON/OFF of switch is repeated at certain intervals to change the ON time or OFF time.																																								
Electric terms	Surge voltage	The high voltage that is instantaneously generated at the cut-off area when the electrical power supply is cut off.																																								
	Protection classifications	<p>Protection code specified in JIS C 0920: Degrees of protection provided by enclosures (IP Code).</p> <p style="text-align: center;">  </p> <p>● <b>First Digit:</b> Degree of protection against solid foreign objects</p> <table border="1" data-bbox="699 1444 1311 1630"> <tbody> <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> </tbody> </table> <p>● <b>Second Digit:</b> Degree of protection against water</p> <table border="1" data-bbox="699 1691 1311 1926"> <tbody> <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> </tbody> </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																																									
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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	Rubber material	FKM: Fluorine 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. Troubleshooting

If any failure is found during operation, please check using the trouble check sheet and provide countermeasures.

# 20. Trouble check sheet(target series: JSP)

## Operating conditions

Delivery date	YY/MM/DD
Operating period	XX months
Accumulated operating cycles	Approx. ___ cycles

Warranty period: Within 1.5 years after the product is delivered or 1 year in service  
Please refer to and use this trouble check sheet as a cause diagnosis check sheet for early solution in the event of trouble.

Symptom	Possible cause	Confirmation of condition	Countermeasures
<b>Did not operate</b> <input type="checkbox"/> Does not turn ON	No voltage and current are applied to the coil.	<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 disconnection of wiring system and erroneous wiring?	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 exceeding the product specification (maximum operating pressure differential)?	The operating pressure may be exceeding the maximum operating pressure differential. (1) Use the product at the maximum operating pressure differential or below. (2) Use a product with an appropriate specification.
	Drop of solenoid coil attraction force	<input type="checkbox"/> Is the fluid or ambient temperature exceeding the operating temperature range upper limit?	The flow rate may be decreased as the attraction force of the solenoid coil has been reduced due to high temperature. (1) Use the product within the operating temperature range.
	Broken or blown solenoid coil	<input type="checkbox"/> Has water or other liquid been in contact with the coil?	If the product was used in an environment where water content in the form of water, steam, or dew condensation adheres for a long time, water or other substance may have entered the solenoid coil to cause the wire to be broken. (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) Take measures for preventing surge voltage.
	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?	As foreign matter is caught by the sliding part of the armature, sticking of the armature or sliding failure may occur. (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 installing piping, blow air through the piping up to the solenoid valves.
<input type="checkbox"/> Has limescale in the fluid adhered to the interior of the product?		It is possible that substances in the water, such as calcium and magnesium, have turned into scales, and have adhered to the armature to cause sticking and sliding failures. (1) Please install suitable filters (strainers) each on the hard water softening device and the upstream side of the product. (2) When the product is not used, please remove the water remaining in the product.	
<input type="checkbox"/> Is the product subject to vibrations and impacts?		The operation failure or part breakage of the armature may have occurred due to vibration or impact. (1) Use the product at a location free from vibration and impact.	
<b>Did not operate</b> <input type="checkbox"/> Does not turn OFF	Leakage voltage	<input type="checkbox"/> Is leakage voltage above the product specifications applied while the power supply is turned off?	There is a possibility that the power supply, control circuit, or wiring system is- faulty. (1) Check if the control system operating normally. (2) Keep the leakage voltage from the control system at the allowable value or below. DC coil: 2% or less of the rated voltage
	Reverse pressure circuit	<input type="checkbox"/> Is the pressure at the OUT port higher than that at the IN port? (Is there reverse pressure in the circuit?)	The sealing may have failed because a reverse pressure was applied in the circuit. (1) Check the connecting direction of piping. (2) If 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?	As foreign matter is caught by the sliding part of the armature, sticking of the armature or sliding failure may occur. (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"/> Has limescale in the fluid adhered to the interior of the product?	It is possible that substances in the water, such as calcium and magnesium, have turned into scales, and they adhered to the armature to cause sticking and sliding failures. (1) Please install suitable filters (strainers) each on the hard water softening device and the upstream side of the product. (2) When the product is not used for a long period, please remove the water remaining in the product by performing air blow or the like.
	<input type="checkbox"/> Is the product subject to vibrations and impacts?	The operation failure or breakage of the armature may have occurred due to vibration or impact. (1) Use the product at a location free from vibration and impact.	
	Deterioration or breakage of rubber seal part	<input type="checkbox"/> Is the solenoid valve part material compatible with the fluid?	Due to the properties of the fluid, the rubber seal part may have shrunk, deteriorated, broken, or swollen and the sealing performance may have reduced. (1) Check the compatibility between the materials of the product components and the fluid in use.
<input type="checkbox"/> Is the fluid or ambient temperature exceeding the operating temperature range upper limit?		The rubber seal may have deteriorated due to high temperature. (1) Use the product within the operating temperature range.	
<input type="checkbox"/> Is the fluid or ambient temperature less than the operating temperature range lower limit?		The rubber seal may have hardened due to low temperatures, or the part may be broken due to the freezing of the fluid. (1) Use the product within the operating temperature range. (2) Take anti-freezing measures such as installation of heaters on the piping.	

Symptom		Possible cause	Confirmation of condition	Countermeasures
<b>Fluid leaks out</b>	□ Leakage from valve (internal leakage)	Leakage voltage	□ Is leakage voltage above the product specifications applied while the power supply is turned off?	There is a possibility that the power supply, control circuit, or wiring system is faulty. (1) Check if the control system operating normally. (2) Keep the leakage voltage from the control system at the allowable value or below. DC coil: 2% or less of the rated voltage
		Reverse pressure circuit	□ Is the pressure at the OUT port higher than that at the IN port? (Is there reverse pressure in the circuit?)	The sealing may have failed because a reverse pressure was applied in the circuit. (1) Check the connecting direction of piping. (2) If reverse pressure is applied in the piping circuit, install a check valve.
		Armature operation failure	□ Is the product subject to vibrations and impacts?	The operation failure or breakage of the armature may have occurred due to vibration or impact. (1) Use the product at a location free from vibration and impact.
		Reduction in the sealing of the rubber seal part	□ Has any foreign matter mixed in the fluid? □ Has any foreign matter entered the solenoid valve?	As foreign matter has been caught by the valve sealing part of the armature, the valve sealing performance of the armature may have been reduced. (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.
		Deterioration or breakage of rubber seal part	□ Is the solenoid valve part material compatible with the fluid?	The rubber seal may have shrunk, deteriorated and broken, or swollen due to the nature of the fluid, which possibly led to the reduction in the valve sealing. (1) Check the compatibility between the materials of the product components and the fluid in use.
	□ Is the fluid or ambient temperature exceeding the operating temperature range upper limit?		The rubber seal may have deteriorated due to high temperature. (1) Use the product within the operating temperature range.	
	□ Sealing failure (External leakage)	□ Is the fluid or ambient temperature less than the operating temperature range lower limit?	The rubber seal may have 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.	
			Damage to parts in contact with fluid, such as tube and body	□ Is the product subject to vibrations and impacts? (1) Use the product at a location free from vibration and impact.
		Reduction in the sealing of the rubber seal part ※Base ported type	□ Is foreign matter stuck on the solenoid valve mounting surface?	As foreign matter has been caught by the sealing part of the solenoid valve mounting surface, the sealing performance may have been degraded. (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.
			□ Are mounting screws of the solenoid valve tightened to the appropriate torque?	As the tightening torque of the mounting screws was less than the appropriate tightening torque, the sealing performance may have deteriorated. (1) After confirming that the installation condition of the O-ring on the solenoid valve mounting surface is appropriate and that no foreign matter is attached, securely tighten the mounting screws to the appropriate tightening torque. • JSP10: 0.9±10% • JSP20: 1.4±10%
Deterioration of rubber seal part		□ Is the solenoid valve part material compatible with the fluid?	The rubber seal part may have shrunk, deteriorated and broken, or swollen due to the nature of the fluid, which possibly led to the operation failure. (1) Check the compatibility between the materials of the product components and the fluid in use.	
	□ Is the fluid or ambient temperature exceeding the operating temperature range upper limit?	The rubber seal may have deteriorated due to high temperature. (1) Use the product within the operating temperature range.		
□ Is the fluid or ambient temperature less than the operating temperature range lower limit?	The rubber seal 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.			
	<b>Small flow</b>	-	Armature operation failure	□ Has any foreign matter mixed in the fluid? □ Has any foreign matter entered the solenoid valve? (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.
Drop of solenoid coil attraction force			□ Is the fluid or ambient temperature exceeding the operating temperature range upper limit? (1) Use the product within the operating temperature range.	

Symptom		Possible cause	Confirmation of condition	Countermeasures
<b>Unstable flow rate</b>	-	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?	<p>As foreign matter has been caught by the sliding part of the armature, a sliding failure of the armature may occur.</p> <p>(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.</p> <p>(2) After conducting piping, blow air to the piping including solenoid valves.</p>
			<input type="checkbox"/> Is the product subject to vibrations and impacts?	<p>The position of the armature may have been changed due to vibration or impact, and the flow rate may have fluctuated.</p> <p>(1) Use the product at a location free from vibration and impact.</p>
		Drop of solenoid coil current	<input type="checkbox"/> Is the product operated in the voltage control mode? <input type="checkbox"/> * In this product, flow rate control by means of constant current is possible.	<p>There is a possibility that as the mode was the voltage control mode, the current may have dropped due to rise of coil temperature and the flow rate may have fluctuated.</p> <p>(1) With the power voltage set to the rated voltage, use the product while conducting current control.</p>
		Power supply failure	<input type="checkbox"/> Is the applied current fluctuating? <input type="checkbox"/> * In this product, flow rate control by means of constant current is possible.	<p>As the power current is not stable, the flow rate may be fluctuating.</p> <p>(1) Please check the current applied to the solenoid coil.            (2) Please conduct control with constant current.</p>
Fluctuation of pressure differential	<input type="checkbox"/> Is the pressure on the solenoid valve downstream side increasing? <input type="checkbox"/> * For allowable secondary side pressure, refer to [Pressure differential] in P4 "1.Precautions for Design".	<p>As the side pressure has been increased due to the restrictor on the downstream side of the solenoid valve, stable flow rate control may not be possible.</p> <p>(1) Set a downstream side pressure equal to or smaller than the allowable downstream side pressure, and sufficiently check the controllability under the actual operating conditions.            (2) When a nozzle is to be installed at the end of the downstream side pipe, make the nozzle diameter equal to or greater than the orifice diameter.</p>		

Revision history
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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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