



ORIGINAL INSTRUCTIONS

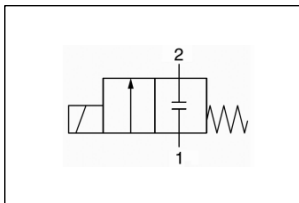


Refer to Declaration of Conformity for relevant Directives

Instruction Manual

JSX series

Direct Operated 2 Port Solenoid Valve



The intended use of this product is for the control of the downstream fluid supply.

1 Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of "Caution," "Warning" or "Danger." They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC) (1), and other safety regulations.

- 1) ISO 4414: Pneumatic fluid power - General rules relating to systems.
- ISO 4413: Hydraulic fluid power - General rules relating to systems.
- IEC 60204-1: Safety of machinery - Electrical equipment of machines. (Part 1: General requirements)
- ISO 10218-1: Manipulating industrial robots - Safety, etc.

- Refer to product catalogue, Operation Manual and Handling Precautions for SMC Products for additional information.
- Keep this manual in a safe place for future reference.

	<b>Caution</b>	Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
	<b>Warning</b>	Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
	<b>Danger</b>	Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

**Warning**

- Always ensure compliance with relevant safety laws and standards.
- All work must be carried out in a safe manner by a qualified person in compliance with applicable national regulations.

2 Specifications

2.1 Valve Specifications

Series	10	20	30	
<b>Valve construction</b>	Direct operated poppet			
<b>Valve Type</b>	Normally Closed			
<b>Fluid and Fluid Temperature</b>	Air	-10 to 60°C (Dew point temperature -10°C or less)		
	Water	1 to 60 °C (no freezing)		
	Oil	-5 to 60 °C (Kinematic viscosity 50mm <sup>2</sup> /s or less)		
<b>Max. System Pressure</b>	1 MPa			
<b>Proof Pressure</b>	2 MPa			
<b>Ambient Temperature</b>	-20 to 60°C			
<b>Maximum operating pressure differential [MPa]</b>	Ø1.6	0.9	/	
	Ø2.4	0.4		
	Ø3.2	0.7		
	Ø4.0	0.3		
	Ø5.6	0.2		0.5
	Ø7.1	0.1		0.2

Specifications – continued

Series	10	20	30
<b>Valve Leakage<sup>1)</sup></b>	Air	1 cm <sup>3</sup> /min (ANR) or less	
	Water/Oil	0.1 cm <sup>3</sup> /min or less	
<b>Enclosure</b>	IP67 <sup>2)</sup>		
<b>Body Material</b>	SUS		
<b>Seal Material</b>	NBR, FKM, EPDM		

Table 1.

Note 1) Value at 20°C ambient temperature.  
Pressure differential 0.01 MPa or more for air.  
Note 2) DIN connector is rated IP65.

2.2 Coil Specifications

Series	10	20	30	
<b>Rated Voltage</b>	AC	24V, 48V, 100V, 110V, 120V, 200V, 220V, 230V, 240V		
	DC	12V, 24V		
<b>Allowable Voltage Fluctuation</b>	±10% of rated voltage			
<b>Allowable Leakage Voltage</b>	AC	5% or less of rated voltage		
	DC	2% or less of rated voltage		
<b>Apparent Power<sup>3)</sup></b>	AC	4.5VA	8VA	9.5VA
<b>Power Consumption<sup>3)</sup></b>	DC	4W	6W	8W
<b>Temperature rise<sup>4)</sup></b>	65°C			

Table 2.

Note 3) At ambient temperature of 20°C and at rated voltage.  
Note 4) Temperature rise is the increase when rated voltage is applied to a valve with an ambient temperature of 20°C. However, it is a reference value because it varies depending on the surrounding environment.

3 Installation

3.1 Installation

**Warning**

- Do not install the product unless the safety instructions have been read and understood.

3.2 Environment

**Warning**

- Do not use in environment stated below:
  - Atmosphere having corrosive gases, chemicals, sea water or steam or where there is direct contact with any of these.
  - Explosive atmosphere.
  - Location exposed to direct sunlight.
  - Location subject to vibration or impact.
  - Location exposed to radiant heat.
- Do not use in water. This product (except DIN connector coil) has a protection rating of IP67 (IEC60529), however moisture may enter through microscopic gaps and possibly result in short-circuiting, burning out or ignition of coil. Take appropriate protective measures in environments where exposed to constant water splash or condensation caused by high humidity.
- This valve is for indoor use only.
- For low temperature operation, take appropriate measures to prevent solidification or freezing of drainage and moisture, etc. In case of use in environments such as cold regions, high dew point temperature with low ambient temperature and high flow rates:
  - Drain water from pipeline.
  - Apply thermal insulating material such as heater etc (avoid on coil portion).
  - Installation of a dryer.
- Employ suitable protective measures in locations where there is contact with oil or welding splatter, etc.

3.3 Piping

**Warning**

- To prevent uncontrolled tube movement, install protective covers or fasten tubes securely in place.
- If using tube piping, secure the product to a permanent fixture. Do not suspend it by the tubing.

3 Installation – continued

**Caution**

- Before connecting piping make sure to clean up chips, cutting oil, dust etc.
- When installing piping or fittings, ensure sealant material does not enter inside the port. When using seal tape, leave 1 thread exposed on the end of the pipe/fitting.
- Tighten fittings to the specified tightening torque.

Port Size	Tightening Torque (N·m)
1/8	3 to 5
1/4	8 to 12
3/8	15 to 20

Table 3.

- When connecting tubes using the one-touch fitting, provide tube length with sufficient margin. Refer to Specific Precautions in the catalogue for more details.
- When using non-SMC brand tubes and fittings, refer to the Specific Precautions in the catalogue.
- When connecting piping to the product, avoid mistakes regarding the supply ports etc.
- Avoid connecting ground lines to piping, as this may cause electric corrosion of the system.
- When connecting piping/fitting to the valve, clamp the side of the body with a vice, etc. See figure 1.

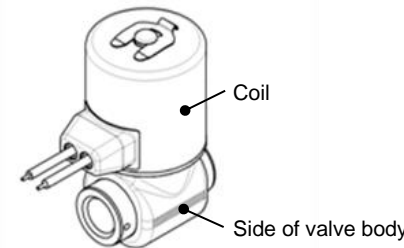


Figure 1. Clamp area of valve

3.4 Bracket installation (See Figure 2)

3.4.1 Port size 1/8

- Install bracket to bottom of valve body and fix by screws with tightening torque;
  - Series 10: 0.6N·m ±5%, Series 20: 1.5 N·m ±5%

3.4.2 Port size 1/4 and 3/8

- 1) Install fitting on outlet side of the valve.
  - 2) Insert bracket to inlet side of the valve.
  - 3) Hold the hexagonal surface of fitting body installed to outlet side of the valve with an appropriate spanner and install fitting on inlet side of the valve.
  - 4) Fix the valve and bracket with a hexagon socket set screw.
- If tightening torque is applied to the fitting with the hexagon socket set screw already fixed to the valve body and bracket, the hexagon socket set screw will be loosened and the bracket may be damaged.

Series	Port size	Thread type	Bracket Assembly No. (Screws include)
10	1/8	Rc, NPT, G	JSX021-12A-3
20	1/8	Rc, NPT, G	JSX022-12A-3
20/30	1/4	Rc, NPT, G	JSX022-12A-2-1
	3/8	Rc, NPT	JSX022-12A-2-1
	3/8	G	JSX022-12A-2-2

Table 4

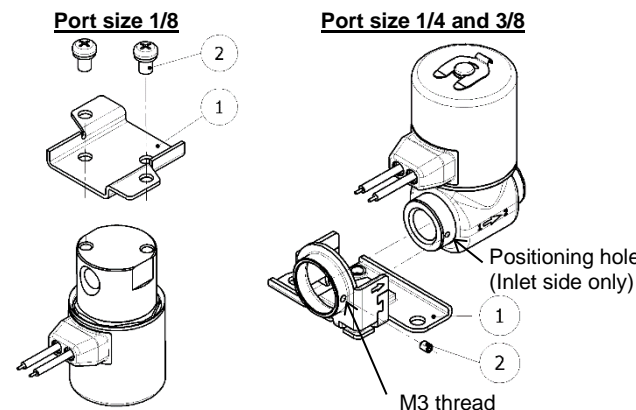


Figure 2. Bracket installation

3 Installation – continued

3.5 Mounting

**Warning**

- Ensure sufficient space for maintenance activities.
- Avoid sources of vibration or adjust the distance from the body to a minimum length so that resonance will not occur.
- Do not apply external force to the coil section: When tightening fittings, apply a wrench or other tool to the outside of the piping connection parts.
- Do not warm the coil assembly with a heat insulator, etc. Use tape, heaters, etc, for freeze prevention on the piping and body only. They can cause the coil to burn out.
- After installation, apply operating pressure and power to the equipment and perform appropriate functional and leakage tests to make sure the equipment is installed correctly. If leakage increases or equipment does not operate properly, stop operation.
- Valve becomes hot during and after energization. Do not touch it with bare hands as it may cause burns.

**Caution**

- Do not install with the coil downwards. If a valve is mounted with the coil positioned downwards, foreign objects in the fluid will adhere to the core/armature leading to a malfunction.
- Painting and coating: Warnings or specifications printed or labelled on the product should not be erased, removed or covered up.

3.6 Electrical Connection

**Warning**

- The solenoid valve is an electrical product. For safety, install an appropriate fuse and circuit breaker before use according to local regulations. When using a number of solenoid valves, installing one fuse on the primary side is not enough. To protect the device more safely, select and install a fuse for each circuit.

**Caution**

- Avoid mis-wiring, as this can cause malfunction and damage to the product.
- Use electrical wire with cross sectional area 0.5 to 1.25 mm<sup>2</sup>.
- Use electrical circuits that do not generate chattering in their contacts.

- When a surge from the solenoid affects the electrical circuitry, install a surge absorber, etc., in parallel with the solenoid.
- Use voltage that is within ±10% of the rated voltage. In case of direct current, if the response time is important, ensure that voltage is within ±5% of the rated value. (The voltage drop is the value in the lead wire section connecting the coil.)
- Ensure that any leakage voltage caused by the leakage current when the switching element is OFF causes <2% of the rated voltage across the valve for DC coil and 5% for AC coils.
- Do not bend or pull lead wires and cables repeatedly.
- Do not apply more than 30N of force to the lead wires or damage may occur.
- Do not bend the lead wires beyond 90° with a radius of less than 20mm or damage may occur. See figure 3.

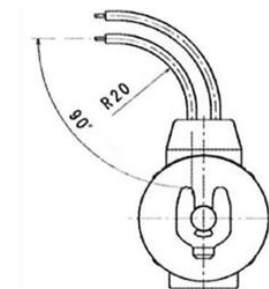


Figure 3. Lead wire bending

### 3 Installation – continued

#### 3.6.1 Grommet

Lead wire AWG20, outer diameter 2.6mm.

Voltage Type	Lead Wire Colour	
	1	2
DC	Black	Red
AC 100V	Blue	Blue
AC 200V	Red	Red
Other AC	Grey	Grey

Table 5

Notes: There is no polarity.

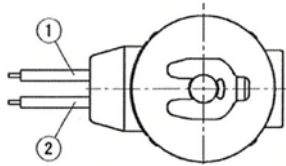


Figure 5. Grommet and grommet with surge voltage suppressor

#### 3.6.2 Conduit

Lead wire AWG18, outer diameter 2.8mm.

Voltage Type	Conduit Wire Colour		
	1	2	3
DC	Black	Red	Green/Yellow
AC 100V	Blue	Blue	Green/Yellow
AC 200V	Red	Red	Green/Yellow
Other AC	Grey	Grey	Green/Yellow

Table 6

Notes: There is no polarity.

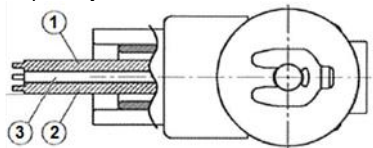


Figure 4. Conduit

#### 3.6.3 DIN terminal

- Internal connections are as shown in Figure.6. Make connections to the power supply accordingly.

Contact	1	2
DIN Terminal	+(-)	-(+)

Table 7

Note: There is no polarity.

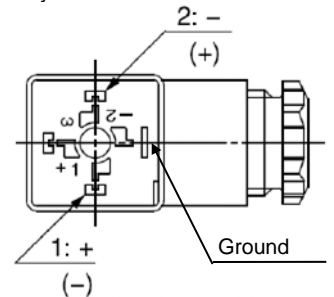


Figure 6. DIN terminal

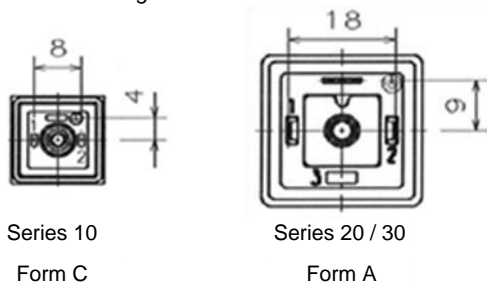


Figure 7. DIN terminal type (conforming to DIN EN 175301-803)

- Use a cord with an outside cable diameter of  $\varnothing 6$  to  $\varnothing 12$  mm.
- Tighten screws and fittings according to Figure.8.
- For an outside cable diameter of  $\varnothing 9$  to  $\varnothing 12$  mm, remove the internal parts of the rubber seal before using.

### 3 Installation – continued

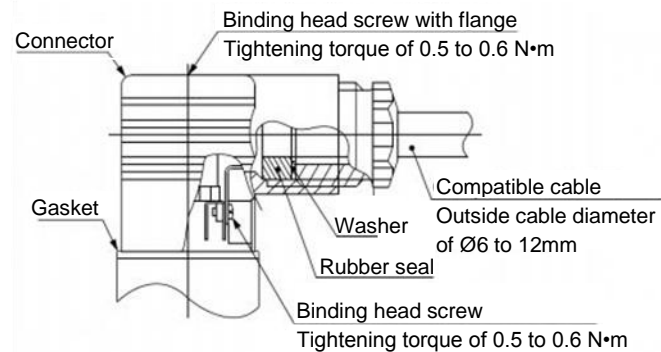


Figure 8. DIN connector construction

#### 3.7 Electrical Circuits

##### 3.7.1 DC Circuit

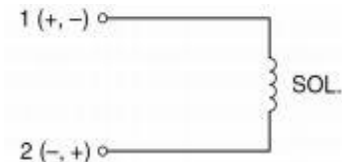


Figure 9. Grommet without electrical option

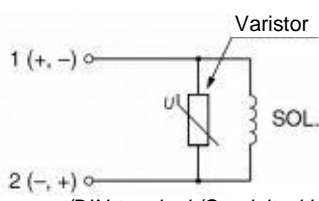


Figure 10. Grommet/DIN terminal/Conduit with surge voltage suppressor

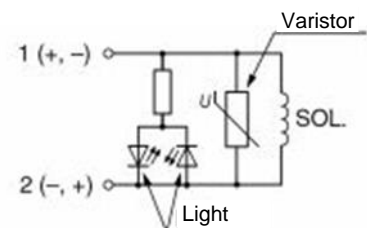


Figure 11. DIN terminal with light and surge voltage suppressor

##### 3.7.2 AC Circuit

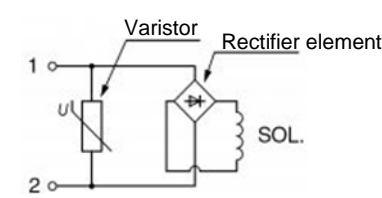


Figure 12. Grommet/DIN terminal/Conduit with surge voltage suppressor

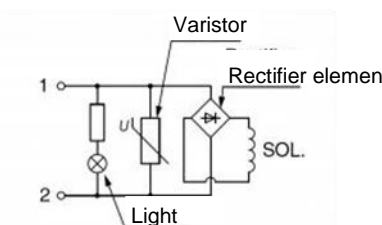


Figure 13. DIN terminal with light and surge voltage suppressor

### 4 How to order

Refer to product catalogue or SMC website (URL <https://www.smcworld.com>) to obtain more detail information for 'How to Order'.

### 5 Outline dimensions

Refer to catalogue product catalogue or SMC website (URL <https://www.smcworld.com>) to obtain more detail information for outline dimensions.

### 6 Maintenance

#### Caution

- Perform maintenance inspection according to the procedures indicated in the operation manual. If handled improperly, malfunction and damage of machinery or equipment may occur. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.
- Removal of product
  - Cut off the supply pressure and exhaust pressure from the system.
  - Cut off electric power.
  - Make sure that temperature of the valve has reduced sufficiently and remove the valve.
- Perform appropriate functional and leakage tests periodically to confirm the operating condition. If leakage increases or equipment does not operate properly, stop operation.
- Periodic maintenance of filter and strainer
  - Replace filter element every 1 year or when the pressure drop becomes 0.1MPa, whichever comes first.
  - Wash strainer when the pressure drop becomes 0.1MPa.
- Exhaust drainage from the air filters periodically. If drainage overflows and enters the air line, this may cause malfunction of pneumatic equipment.
- Low frequency operation
  - Switch valves at least once every 30 days to prevent malfunction. Also, in order to use it under the optimum state, conduct a regular inspection once every 6 months.
- Storage
  - In the case of long term storage after use, thoroughly remove all moisture to prevent rust and deterioration of rubber materials, etc.

### 7 Limitations of use

#### Warning

- Do not exceed any of the specifications laid out in section 2 of this document or the specific product catalogue, as this can cause damage or malfunction. We do not guarantee against any damage if the product is used outside of the specification range.

#### 7.1 Limited warranty and Disclaimer/Compliance Requirements

- Refer to Handling Precautions for SMC Products.

#### 7.2 Cannot be used as an emergency shut-off valve

- This product is not designed for safety applications such as an emergency shut-off valve. If the valves are used in this type of system, other reliable safety assurance measures should be adopted.

#### 7.3 Pressure holding

- Do not use for applications such as holding the pressure inside a pressure vessel due to the possibility of air leakage of the valve.

#### 7.4 Closed liquid circuit

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

#### 7.5 Extended periods of continuous energization

- The solenoid coil will generate heat when continuously energized, so avoid installing in an enclosed space. Install in a well-ventilated area.
- Do not touch the coil while it is being energized or immediately after energization.

#### 7.6 Impact by rapid pressure fluctuation

- When an impact caused by the rapid pressure fluctuation, such as water hammer etc., is applied, the solenoid valve may be damaged. Install water hammer relief equipment (accumulator, etc.), or use a SMC water hammer relief valve (e.g. VXR series).

### 7 Limitations of Use - continued

#### 7.7 Back pressure

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

#### 7.8 Do not disassemble or modify

- Do not disassemble or make any modification, including additional machining, to the product and replacement parts. It may cause an accident and/or injury to persons.

#### 7.9 Fluids

- The compatibility of the components of this product with the fluid used may vary depending on the type of fluid, additives, concentration, temperature, etc. Check the compatibility with the actual machine before use.
- The kinematic viscosity of fluid must not exceed 50 mm<sup>2</sup>/s.
- Do not use the product with the fluids listed below:
  - Fluids that are harmful to the human body.
  - Combustible or flammable fluids.
  - Corrosive gas and fluid.
  - Sea water, saline.
- Take measures to prevent static electricity since some fluids can cause static electricity.
- The use of a fluid that contains foreign objects can cause problems such as malfunction and seal failure by promoting wear of the valve seat and armature and by sticking to the sliding parts of the armature etc. Install a suitable filter (strainer) immediately upstream from the valve. Filtration size is 5  $\mu$ m or less for air, and 100 mesh for water.

#### 7.9.1 Air

- Use clean air. Do not use compressed air which includes chemicals, synthetic oils containing organic solvents, salt or corrosive gases, etc., as it can cause damage or malfunction of the valve.
- Compressed air that includes excessive drainage may cause malfunction of valves and other pneumatic equipment. To prevent this, install an air dryer or after cooler, etc.
- If excessive carbon powder is generated by the compressor, it may adhere to the inside of the valves and cause a malfunction. Install mist separators upstream of the valves to eliminate it.

#### 7.9.2 Water

- Corrosion resulting from rust stains, chloride, etc., from the piping may cause malfunction, seal failure, or damage. Also, such damage may result in the spraying of fluids or scattering of parts. Please be sure to have protective measures in place in case such incidents should occur.
- In the case that water contains substances such as calcium and magnesium, which generate hard scale and sludge, install water softening equipment and a filter (strainer) directly upstream from the valve to remove these substances, as this scale and sludge can cause the valve to malfunction.

#### 7.9.3 Oil

- Generally, FKM is used as seal material, as it is resistant to oil. However, the resistance of the seal material may deteriorate depending on the type of oil, manufacturer, or additives. Check the resistance before using.

### 8 Product disposal

This product should not be disposed of as municipal waste. Check your local regulations and guidelines to dispose this product correctly, in order to reduce the impact on human health and the environment.

### 9 Contacts

Refer to [www.smcworld.com](http://www.smcworld.com) or [www.smc.eu](http://www.smc.eu) for contacts.

## SMC Corporation

URL : <https://www.smcworld.com> (Global)  
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Specifications are subject to change without prior notice from the manufacturer.

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