NN66389400
Doc. No. DOC1072236

Operation Manual

PRODUCT NAME

Pilot Operated 2 Port Solenoid Valve

MODEL / Series / Product Number

JSXH21D-CH＊＊＊-＊＊-＊-X1

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. 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 industries. **Use in non-manufacturing industries 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.

Operation outside of the product operating range may cause it to be damaged or malfunction.

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 product is used in such a system, additional safety measures should also be implemented.

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

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

4. Driving of actuators

When an actuator, such as cylinder, is to be driven by the valve, take appropriate measures in advance to prevent danger due to actuator operation.

5. Energized use for extended period of time

If this product is used in an energized state for an extended period of time, the solenoid coil generates heat. Do not use the product in a sealed container. Install the product in a ventilated location. Do not touch the solenoid valves with bare hands during and after energization.

6. Leakage at time of fluid supply

Be aware that when the valve is closed and pressure is suddenly applied due to the startup of fluid supply source or for other reason, the valve may open momentarily, and fluid may leak.

7. Dual pressure

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

8. Sudden pressure fluctuations

If the product is used in the conditions in which rapid decrease in the inlet pressure and rapid increase in the outlet pressure of the valve are repeated, excessive stress will be applied to the diaphragm, which causes damage to the diaphragm, leading to the operation failure of the valve. Check the operating conditions before use.

9. 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 (pumps, compressors, etc.) or the type of pipe restrictions (the 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 due to shortage of pressure difference, which may cause valve opening or closing failure, or oscillation, leading to a failure.

10. Prohibition of disassembly and modification

Do not disassemble the product or make any modifications including additional machining. It may cause bodily injury and/or an accident.

11. Allowable leakage

Be aware that this product is subject to leakage (page 14), build a system considering the damage caused by leakage.

12. Generation of wear particles

Although this product has been designed considering low particle generation materials and structure, particles in certain amounts will be generated due to the collisions of sliding parts during operation. Build a system considering the effects of accumulation of generated particles to the flow downstream.

13. Condensation and freezing

If a gas at a high pressure or a high flow rate is released to the atmosphere, the moisture contained in the gas turns into condensation and freezes due to adiabatic expansion. Take measures such as reducing the flow rate or operation frequency, lowering the fluid dew point, or raising the fluid temperature (through the piping) with the use of heater, etc.

2. Operating environment

⚠ Warning

Do not use this product at any of the following locations.

1. **Location where the product may be exposed to an atmosphere containing steam, corrosive fluid (chemicals), seawater, or water.**
   Take appropriate protective measures in environments where the product is exposed to water for a long time even for products with protection codes (IP65, IP67). 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 spatter does not splash on the product from peripheral equipment when installing the product close to equipment such as machine tools and machining equipment that use a large amount of water or oil,

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**
   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.
   4) This product does not provide any corrosion resistance (anti-rust or antidiscoloration).

3. Precautions for Fluid

⚠Warning

1. Selection of fluid

1) Compressed air, nitrogen, oxygen, or argon can be used as a fluid.
2) The product suitability needs to be judged by the person who determines the system design and specifications. As conditions of use are varied, the person responsible should determine the use of products after an analysis or a test is conducted. Configure the system whilst considering all possibilities of failures.
3) The products need to be handled by someone who has sufficient knowledge and experience with the products. When using oxygen, it can be dangerous if handled incorrectly.
4) As oxygen is a flammable gas, it can be ignited by frictional heat or static electricity, and it can damage the metal and seal materials. Therefore, the following instructions should be strictly observed.
    1. Flush air through the product and install a filter in the pipe, so that metal chippings or fine particles do not enter the product.
    2. In the unlikely event that a malfunction occurs, take safety measures such as installing a safety circuit (e.g., stopping oxygen supply) in consideration of a fire or explosion.
5) To see whether given fluid can be used, check the compatibility between the component materials and the fluid before use. Take measures to prevent static electricity since some fluids can cause this.
6) Do not use compressed air containing chemicals, synthetic oils containing organic solvents, salt, corrosive gases, etc., as this can cause damage or malfunction.

2. Fluid temperature

1) Use the product with a fluid temperature within the product specification range.

3. Filter

1) Using 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. To remove foreign matters, install an appropriate filter (5 μm or less) on the upstream side.
2) The filter can become clogged. Replace or clean it when the pressure drop reaches 0.1 MPa.

4. Oil-free specifications

1) When building a machine, piping, or system that must not use oil, please select the oil-free specifications.
2) For information on how to select oil-free parts, refer to “How to order” (page 13).

4. Fluid quality

⚠Warning

1. Air supply

1) Do not use compressed air containing 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 or 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 dust.
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.

5. Installation

⚠Warning

1. **Before installing this product, allow enough space for maintenance or inspection.**
2. **Avoid sources of vibration, or adjust the arm from the body to the minimum length to prevent** resonance.
3. **Do not install the product near a heat source or exposed to radiant heat.**
4. **Do not apply external force to the coil.**
   When installing this product, apply a spanner to the exterior of the piping connection while paying attention so that it will not come into contact with the coil.
5. **Do not warm the coil with a heat insulator, etc.**
   When the product is heated as a countermeasure against freezing, the portions where the countermeasures are taken should be limited to the piping and body only. Do not heat the coil. Heating the coil may burn it out.
6. **If the leakage increases or the equipment does not operate properly, stop using the product.**
   After installation or during maintenance, check that the product is correctly installed by supplying compressed air and electric power and conducting appropriate functional and leakage inspections. Do not use the product when the equipment does not operate correctly.
7. **Do not touch the valve with bare hands during or immediately after energization.**
   The valve becomes very hot once it is energized. Pay attention not to touch it because doing so can cause burns.

⚠Caution

1. **Painting and coating**
   Do not erase, remove, or cover up the warnings or specifications printed or attached on the product.

6. Piping

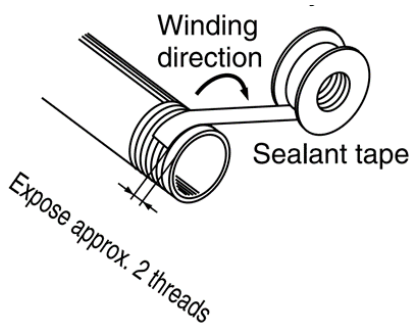
⚠ Warning

1. A tube may detach from the fitting and uncontrollably move when in use due to the deterioration or breakage of the tube.
To prevent the tube from breaking loose, install a protective cover or fix the tube securely.

2.When piping the tubing, fix the valve securely by 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 one-touch fittings and applicable tubes, refer to "Tube fitting and tube/common Precautionns" on the SMC catalog.**
2. **Preparation before piping**
   Before piping, sufficiently perform air blow (flushing) or cleaning to remove any cutting chips, cutting oil, dust, etc. from the piping. Connect piping so that forces including tension, compression, and bending forces are not applied to the valve body.
3. **Wrapping of sealant tape**
   When screwing pipes or fittings into ports, ensure that chips from the pipe threads and sealing material does not enter the valve.When using sealant tape, leave 1.5 to 2 thread ridges exposed at the end of the threads.



4. Screwing-in of pipe and fittings

When connecting a pipe to the valve, tighten it within the allowable torque range below.

Tightening torque for piping

Connection thread	Proper tightening torque [N・m]
3/8	22～24
1/2	28～30

5. When using a fitting other than an SMC fitting

Follow the manufacturer's instructions.

6. Avoid connecting ground lines to piping, as this may cause the system to be corroded by electric corrosion.

7. When piping to a product, pay attention not to make connection to wrong supply ports etc.

8. Recommended piping conditions

When connecting a pipe to a one-touch fitting, conduct piping with a sufficient margin in tube length in accordance with the recommended piping conditions shown in Fig. 1.

Also, when using a cable tie, etc. to bind pipes together, make sure that an external force does not apply to the fitting. (Refer to Fig. 2.)

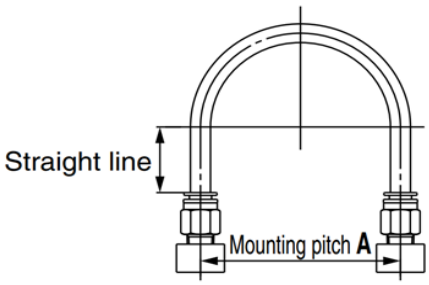


Fig. 1 Recommended piping

Unit:mm

Tubing size	Mounting pitch A			Straight line length
	Nylon tubing	Soft nylon tubing	Polyurethane tubing	
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

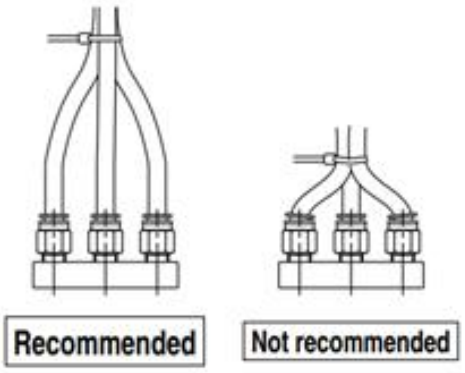


Fig. 2 When using a tying band to bind the piping together

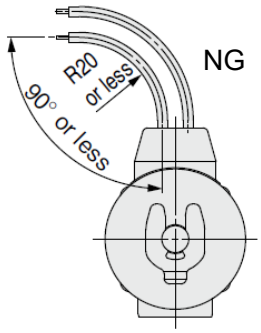
7. Wiring

Warning

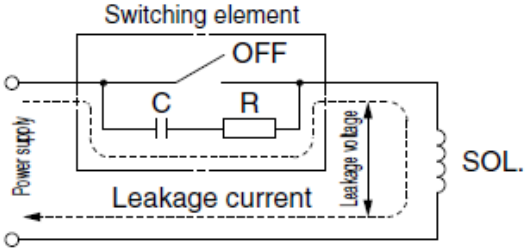
1. **The solenoid valve is an electrical product. For safety, install an appropriate fuse and circuit breaker before use.**
   When using multiple solenoid valves, it is not sufficient to install one fuse. For higher protection of the equipment, select an appropriate fuse for each solenoid valve circuit.

Caution

1. **Use electric wires for wiring use with a cross section of 0.5 to 1.25 mm².**
2. **External force applied to lead wire.**
   Excessive force applied to the lead wire may cause the wire to be broken.Make sure that no excessive force greater than 30 N is applied to the lead wire.Do not use the product when the base of the lead wire is bent at 90 degrees or R20 or less.



3. **Use such an electrical circuit free from chattering at the contact points.**
4. **Use voltages in the range of within ±10% of the rated voltage.**
   If a direct current power supply is used and the response is prioritized, 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, install a voltage suppressor or similar in parallel to the solenoid.**
   Or use a model with a surge voltage suppressor.
6. **Leakage voltage**
   When operating a solenoid valve with a controller or similar, make sure that the leakage voltage is equal to or lower than products allowable leakage voltage.
   In particular be aware that when a resistor is used in parallel with the switching device or a C-R device is used for the protection of a switching device, the valve may not be turned off as leakage voltage passes through the resistor and the C-R device.



AC coil: 5% or less of the rated voltage
DC coil: 2% or less of the rated voltage

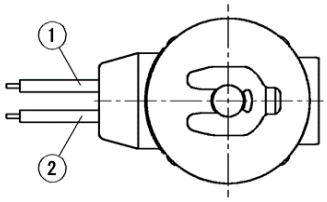
8. Electrical Connection

Caution

1. **Grommet**
   Lead wire：AWG20　Insulator O.D.:2.6mm

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

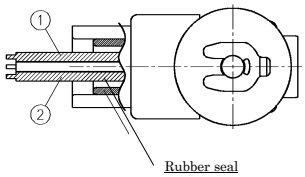
＊ There is no polarity.



2. **Conduit**
   Lead wire：AWG18　Insulator O.D.:2.8mm

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.



3. DIN terminal

Disassembly

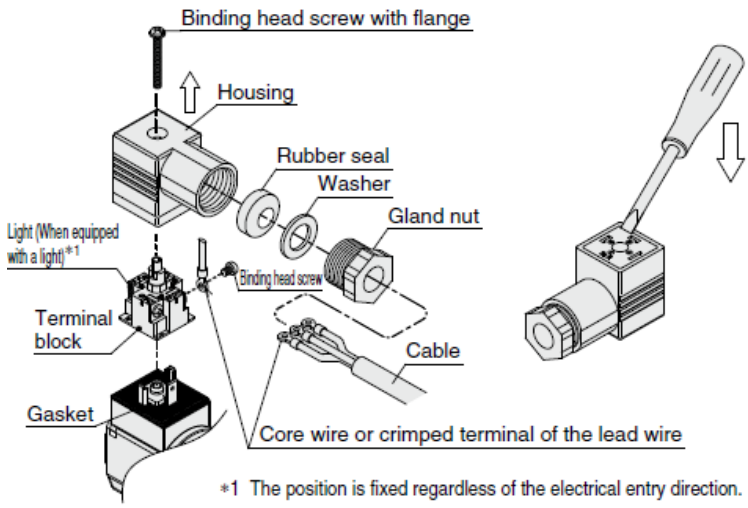
1. Loosen the binding head screw with the flange, pull the housing up in the arrow direction to remove the solenoid valve from the connector.
2. Pull out the binding head screw with the flange from the housing.
3. Insert a small flat blade screwdriver to the notch at the bottom of the terminal block,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

Wiring

1. Put the gland nut, washer, and rubber seal onto the cable in this order, and then insert it into the housing.
2. Loosen the small binding screw of the terminal block, insert the lead wire core or crimp terminal of the lead wire into the terminal, and securely fix it with the small binding screw. The size of the small binding screw of the terminal block is M3.
   1) Tighten the screw to the tightening torque of 0.5 to 0.6 N·m.
   2) Cables with an outside diameter of ϕ6 to ϕ12 mm can be used.
   3)When using cables with an outside diameter of ϕ9 to ϕ12 mm, remove the internal part of the rubber seal.

Assembly

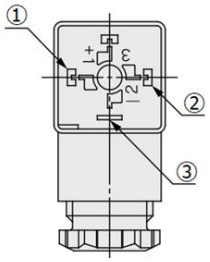
1. Put the gland nut, washer, rubber seal, and housing onto the cable in this order, connect the cable to the terminal block, and then mount the terminal block in the housing (insert the terminal block until it makes a click sound).
2. Insert the rubber seal and washer to the cable entry of the housing in this order, and then securely tighten the gland nut.
3. Insert the gasket into the gap between the bottom of terminal block and the plug on the equipment, insert the binding screw with flange from the top of housing, and then tighten it.
   Note1) Tighten the screw to the tightening torque of 0.5 to 0.6 N·m.
   Note2) Depending on the way the housing and terminal block are assembled, it is possible to change the orientation of the connector in units of 90 degrees.



⚠Caution

Internal connections are as shown below.

Make connections to the power supply accordingly.



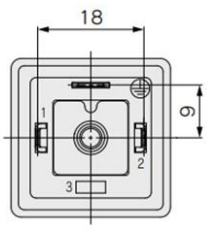
Terminal no.	1	2
DIN terminal	+(-)	-(+)

There is no polarity.

3:Ground wire

DIN (EN 175301-803) Terminal

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



Applicable cable O.D.: ø6 to ø12

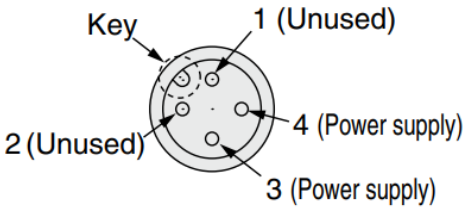
4. M12 connector

1. IP67 (enclosure) of the valve can be obtained by using a female connector (with cable) compliant with IP67.
   Note that the product cannot be used underwater.
2. Mounting the connector using tools may break the connector. Securely tighten the connector by hand. (0.39~0.49N·m)
3. Avoid repeatedly bending or stretching the cable, putting a heavy object on it, or applying a force to the product.
4. Do not pull the connector or cable carelessly.
5. When installing a connector, do not bend the cable from the base of the connector body.

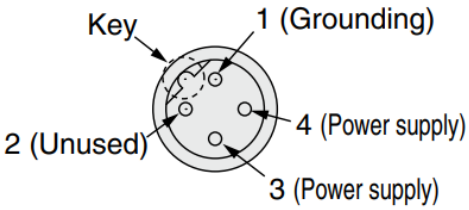
■ Coding and pin layout of M12 connector on valve side

The shape (coding) and pin layout of M12 connector are as follows.

DC specification: A-coded, 4-pin



AC specification: B-coded, 4-pin



* There is no polarity for DC voltages.

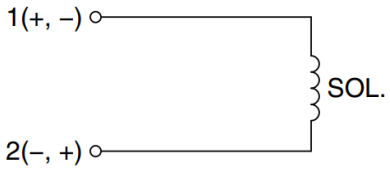
When using the cable with a female connector, make sure that the coding is correct. When installing the cable, be sure to align the key on the cable side connector (female side) with the key on the valve side connector (male side).

Be careful not to squeeze it in the wrong direction as pin damage, etc., may occur.

9. Electric Circuit

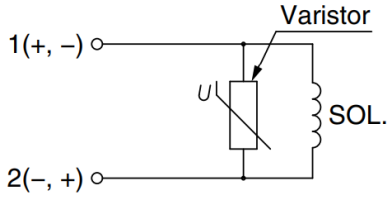
1. DC circuit

●Grommet



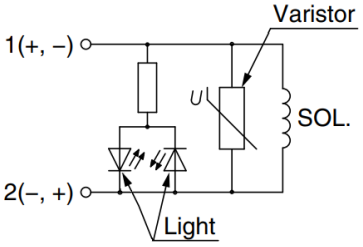
Without electrical option

●Grommet/Conduit/DIN terminal



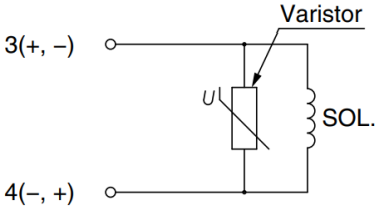
With surge voltage suppressor

●DIN terminal



With light/surge voltage suppressor

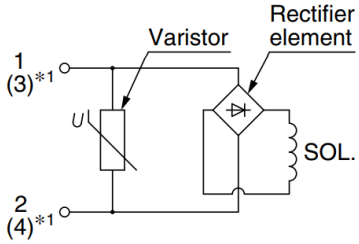
●M12 connector



With surge voltage suppressor

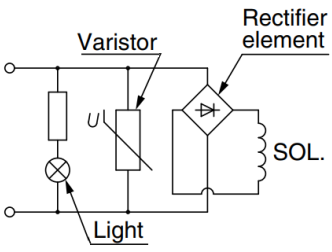
2. AC circuit The standard product is equipped with a surge voltage suppressor.

●Grommet/Conduit/DIN terminal/M12 connector ●DIN terminal



*1 For M12 connector

Without electrical option



With light

10.Maintenance and Inspection

⚠ Warning

1.Removal of product

1) Shut off the fluid supply and release the fluid pressure in the system.
2) Shut off the power supply.
3) Confirm that the valve temperature has dropped sufficiently before removing the product.

2. Replace or clean filters (strainers) regularly .

1) Replace filters after one year of use, or earlier if the pressure drop reaches 0.1 MPa.
2) Clean strainers when the pressure drop reaches 0.1 MPa.

3. Remove the drainage from air filters regularly.

If condensation in the drain bowl is not emptied on a regular basis, the bowl will overflow and allow the condensation to enter the compressed air lines. This causes the malfunction of pneumatic equipment. If the drain bowl is difficult to check and remove, the installation of a drain bowl with an auto drain option is recommended.

4.Low frequency operation

Switch valves at least once every 30 days to prevent malfunction.
To use the product in an optimum state, conduct a regular inspection every six months.

5. Storage

In the 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 inspection.

Confirm that the product is mounted correctly by conducting suitable function and leakage tests periodically. If leakage increases or equipment does not operate properly, do not use the product.

11. Replacement Parts

If a replacement part is required for maintenance, make an inquiry to SMC.

12. Return of Product

⚠ Warning

If the product being returned is attached or possibly attached with substances, fluid, or its residue that is harmful to humans, for the purpose of securing safety, please first contact SMC, conduct appropriate cleaning (detoxifying processing), submit Product Return Request Sheet or Detoxification/Decontamination certificate to SMC, and receive approval from SMC before returning the product.
Please refer to International Chemical Safety Cards (ICSC) or others for a list of harmful substances.
If you have any questions, contact your nearest SMC sales representative.

13. Models

How to order

JSX H 2 1 D – C H 04 R – 5 G – D – X1
❶ ❷ ❸ ❹ ❺ ❻ ❼ ❽ ❾ ❿ ⓫ ⓬

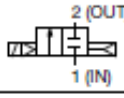
❶ Series

Symbol	Series
H	High-pressure/ Pilot operated

❷ Size

Symbol	Size
2	20

❸ Valve type

Symbol	Valve type
1	N.C. 

❹ Main valve construction

Symbol	Main valve construction
D	Diaphragm

❺ Body material

Symbol	Body material
C	Brass

❻ Seal material

Symbol	Seal material	
	Main valve	Pilot valve
H	PUR	HNBR

❼ Port size and orifice diameter

Symbol	Port size	Orifice diameter [mmø]
03	3/8	16
04	1/2	

❽ Thread type

Symbol	Thread type
R	Rc
N	NPT
F	G

❾ Rated voltage

AC

Symbol	Rated voltage	Symbol	Rated voltage
1	100 VAC	4	220 VAC
2	200 VAC	7	240 VAC
3	120 (110) VAC	8	48 VAC
		B	24 VAC
		J	230 VAC

DC

Symbol	Rated voltage
5	24 VDC
6	12 VDC

⓫ Option

Symbol	Option
Nil	None
D	Oil-free

⓬ Pressure type

Symbol	Specifications
X1	Operating pressure: 0.15 to 4.0 MPa Fluid: Air, Nitrogen, Oxygen, Argon

❿ Electrical entry

Symbol	Electrical entry		CE/UKCA-compliant
G	Grommet*1		24 VDC 12 VDC
GS	Grommet with PCB (With surge voltage suppressor)		100 VAC 24 VDC 12 VDC 48 VAC 24 VAC
CS	Conduit (With surge voltage suppressor)		All voltages
DS	DIN terminal (With surge voltage suppressor)		All voltages
DZ	DIN terminal with light (With surge voltage suppressor)		All voltages
DN	Without DIN connector (With surge voltage suppressor)		All voltages
WN	M12 connector/Without connector cable (With surge voltage suppressor)*2		All voltages

*1 DC voltage only
*2 A cable for the M12 connector is not included with the product.

14. Specifications

	Size		20	
Valve specifications	Valve construction		Pilot operated diaphragm	
	Valve type		Normally closed (N.C.)	
	Fluid		Compressed air, Nitrogen, Argon, Oxygen	
	Orifice diameter		16 mmø	
	Port size		3/8"	1/2"
	Flow rate characteristics*1	C [dm³/(s·bar)]	15	17.7
		b	0.36	0.22
		Cv	3.9	4.3
	Max. operating pressure differential		4.0 MPa	
	Min. operating pressure differential		0.15 MPa	
	Fluid temperature		–10 to 50°C	
	Ambient temperature		–10 to 50°C	
	Leakage*1	Internal leakage	1 cm³/min or less	
		External leakage		
	Thread type		G, Rc, NPT	
	Max. system pressure		4.0 MPa	
	Proof pressure		6.0 MPa	
	Body material		Brass	
	Degrees of protection		IP67 (IP65 for the DIN terminal)	
	Seal material	Main valve	PUR	
		Pilot valve	HNBR	
	Impact/Vibration resistance*2		150/30 m/s²	
	Mounting orientation		Unrestricted	
	Weight*6	Grommet	3/8"	1/2"
			713 g	671 g
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*3, *4	AC	8 VA	
	Power consumption*3	DC	6 W	
	Temperature rise*5	AC	70°C	
		DC	65°C	
	Electrical entry		Grommet type, Conduit terminal DIN terminal, M12 connector	

*1 The value for air at a differential pressure of 0.15 MPa or higher and an ambient temperature of 20°C

*2 Impact resistance: No malfunction occurred when tested with a drop tester in the axial direction and at a right angle to the main valve and armature in both an energized and a de-energized state, once in each condition. (Value in the initial state)
Vibration resistance: No malfunction occurred in a one-sweep test between 5 and 2000 Hz. The test was performed at both energized and de-energized states in the axial direction and at the right angles to the main valve and armature. (Value in the initial state)

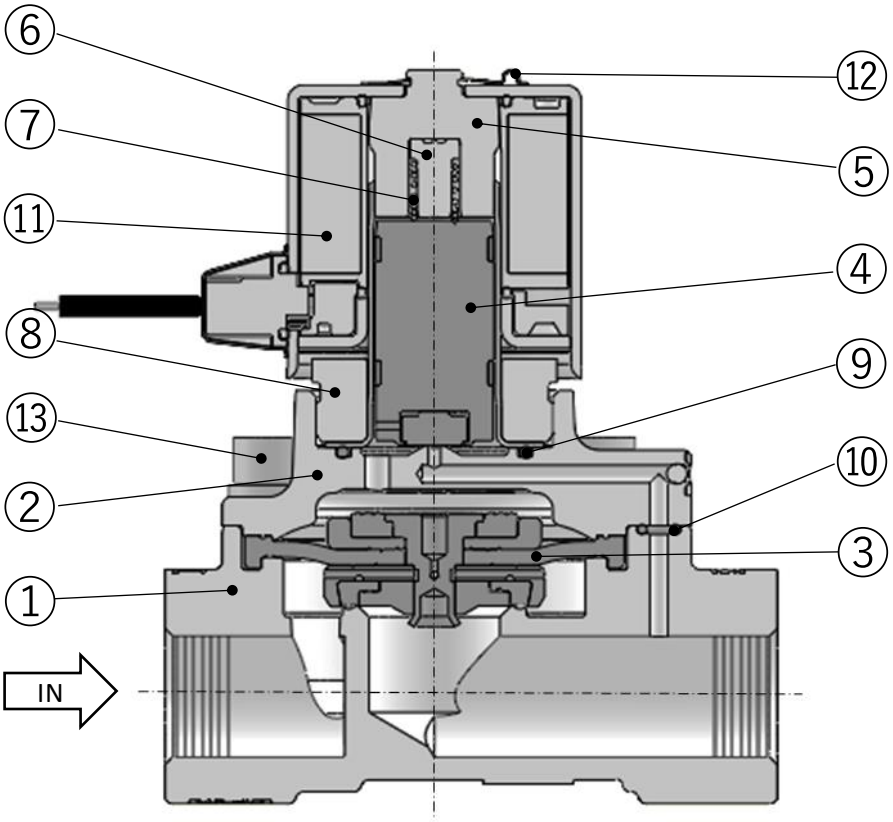
*3 Power consumption/Apparent power: The value at an ambient temperature of 20°C and when the rated voltage is applied (Variation: ±10%)

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

*5 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

*6 The values are for the 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 type without a DIN connector and the M12 connector type.

15. Construction



Component Parts

No.	Description	Material	Qty.
1	Body	Brass	1
2	Bonnet Ass'y	Brass,Steel	1
3	Diaphragm Ass'y	PUR,AL,SUS	1
4	Armature Ass'y	SUS,HNBR,PPS	1
5	Tube Ass'y	SUS	1
6	Stopper	PPS	1
7	Spring	SUS	1
8	Nut plate	AL	1
9	O-ring	HNBR	1
10	O-ring	HNBR	1
11	Solenoid coil Ass'y	SUS,Cu,Resin	1
12	Clip	SUS	1
13	Cap screw	Steel	4

16. CE/UKCA-compliant Products

JSXH-X1 Series

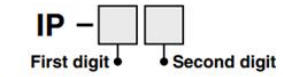
Table of CE/UKCA-compliant Products

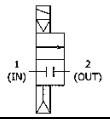
* Refer to the table below for CE/UKCA -compliant products.

○ : Support、× : Unsupported (Product number setting available)、- : No product number setting

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

17. Definition and Terminology

<table>
<tr><td rowspan="4">Pressure Terminology</td><td>Max.operating pressure differential</td><td>The max. pressure differential (the difference between the inlet and outlet pressure) which is allowed for operation. When the outlet pressure is 0 MPa, this becomes the max. operating pressure.</td></tr>
<tr><td>Max. system pressure</td><td>The max. pressure that can be applied inside the pipelines (line pressure).
[The pressure differential of the solenoid valve portion must not exceed the max. operating pressure differential.]</td></tr>
<tr><td>Withstand pressure</td><td>The pressure in which the valve must be withstood without a drop in performance after holding for one minute under prescribed pressure and returning to the operating pressure range. (value under the prescribed conditions</td></tr>
<tr><td></td><td></td></tr>
<tr><td rowspan="3">Electrical Terminology</td><td>Apparent power (VA)</td><td>Volt-ampere is the product of voltage (V) and current (A).
Power consumption (W): For AC, W = V·A·cos θ.
For DC, W = V·A.
* cos θ shows power factor. cos θ ≈ 0.9</td></tr>
<tr><td>Surge voltage</td><td>A high-voltage which is momentarily generated by shutting off the power in the shut-off area.</td></tr>
<tr><td>Degrees of protection</td><td>degree defined in the “JIS C 0920: Waterproof test of electric machinery/appliance and the degree of protection against the intrusion of solid foreign objects.”
 

●First Digit:
Degree of protection against solid foreign objects
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
●Second Digit:
Degree of protection against water
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</td></tr>
<tr><td rowspan="3">Others</td><td>Material</td><td>PUR：Polyurethane
HNBR：Hydrogenated nitrile rubber
PPS：Polyphenylene sulfide</td></tr>
<tr><td>Oil free</td><td>It means degreasing cleaning of fluid contact parts.</td></tr>
<tr><td>Symbol
 
</td><td>When the valve is closed, flow is blocked from port 1 to port 2. However, if the pressure in port 2 is higher than port 1, the valve will not be able to block the fluid and it will flow from port 2 to port 1.</td></tr>
</table>

18. Troubleshooting

If any failure is found during operation, please check and take measures in accordance with the trouble check sheet.

18. Trouble Check Sheet (target series: JSXH21D-CH***-**-*-X1)

Operating conditions

Deliver 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 diagnosis check sheet for early solution in the event of trouble.

Phenomenon		Possible cause	Confirmation of condition	Countermeasures
Does not operate	□ Does not turn ON	Power supply voltage is not applied.	□ Is there any abnormality, such as failure, with the power supply and control circuit? Is there any abnormality, such as wiring disconnection or miswiring? →	There is a possibility of an abnormality with the power supply, control circuit, or wiring . 1) Replace or repair the power supply, control circuit, or wiring system.
		Abnormal supply pressure	□ Is the operating pressure above the operating pressure differential range? →	There is a possibility that the operating pressure may be above the operating pressure differential range. 1) Use this product within the operating pressure differential range.
		Drop of solenoid coil attraction force	□ Is the applied voltage below the allowable voltage range? 1)Lower limit of voltage range: −10% V of rated voltage. →	As the applied voltage was below the allowable voltage range, the attraction force of the solenoid coil dropped, and the armature did not operate. 1) Use this product in the range of rated voltage ±10% V.
		Burnout and broken wire of solenoid coil	□ Does water or other liquids come into contact with the coil? →	If this product is used in an environment where the product is subject to moisture, steam, dew or water etc. may enter the solenoid coil. 1) Take a waterproof countermeasure such as installation of a cover on the solenoid coil.
			□ Is surge voltage applied? →	There is a possibility that an excessive surge voltage caused burnout or damaged the wire of the solenoid coil. 1) Replace the solenoid coil with one incorporated with a surge voltage suppressor.
			□ Is the applied voltage above the upper limit of the allowable voltage range? *Higher limit of voltage range: +10% V of rated voltage →	There is a possibility that the applied voltage is above the upper limit of the allowable voltage range. 1) Use this product in the range of rated voltage ±10% V.
		Armature operation failure	□ Has foreign matter mixed in the fluid? Has foreign matter entered the inside of the solenoid valve? →	There is a possibility that foreign matter caught in the sliding part of the armature, caused the sticking of the armature or drop of valve sealing performance. 1) Install an appropriate filter (5 μm or less as a guide) on the upstream side of the valve. 2) After piping, blow air to the piping including the solenoid valve.
			□ Is the product subject to vibration or impact? →	Malfunction of armature or damage to parts due to resonance. 1) Use this product at a location free from vibration or impact. 2) If a part is broken, please replace the product.
		Operation failure of diaphragm	□ Has any foreign matter mixed in the fluid? Has any foreign matter entered the solenoid valve? →	As foreign matter is caught in the stroke range of the diaphragm, the diaphragm may have become unable to operate. 1) Install an appropriate filter (5 μm or less as a guide) on the upstream side of the valve. 2) After piping, blow air to the piping including the solenoid valve.
			□ Is the product subject to vibration or impact? →	Malfunction of armature or damage to parts due to resonance. 1) Use this product at a location free from vibration or impact. 2) If a part is broken, please replace the product.
		Deterioration or breakage of seal part	□ Are the materials of the solenoid valve parts compatible with the fluid? →	There is a possibility that malfunction occurred because of shrinkage, deterioration and breakage, or swelling of a seal part. 1) Check the compatibility between the fluid and the part material. 2) If a part is broken, please replace the product.
			□ Is the fluid or ambient temperature above the upper limit of the operating temperature range? →	There is a possibility that the rubber seal has deteriorated due to high temperatures. 1) Use this product within the operating temperature range.
			□ Is the product used with fluid or ambient temperature below the lower limit of the operating temperature range? →	There is a possibility that due to low temperatures, the rubber seal has hardened or a part has broken due to the freezing of the fluid. 1) Use this product within the operating temperature range. 2) Take countermeasures including installation of a heater on the pipe. 3) If a part is broken, please replace the product.
			□ Is the operating pressure differential above the maximum operating pressure differential? →	There is a possibility that a seal part was broken due to excessive pressure. 1)Use this product at the maximum operating pressure differential or below. 2) If a part is broken, please replace the product.

Phenomenon		Possible cause	Confirmation of condition	Countermeasures
Does not operate	□ Does not turn OFF	Power supply voltage is applied	□ Is there any abnormality, such as failure,with the power supply and control circuit? Is there any abnormality, such as wiring disconnection or miswiring?	→ There is a possibility of an abnormality with the power supply, control circuit, or wiring. 1) Replace or repair the power supply, control circuit, or wiring system.
			□ Is the product used with a leakage voltage above the product specifications?	→ There may be an influence of the residual magnetic force. 1) During operation, ensure the leakage voltage is equal to or lower than the allowable value (refer to page 9).
		Abnormality in supply pressure	□ Is the operating pressure below the minimum operating pressure differential?	→ There is a possibility that the operating pressure is below the minimum operating pressure differential. 1) Use this product within the operating pressure differential range.
		Reverse pressure circuit	□ Are piping connections on the inlet and outlet ports correct? Is there back pressure?	→ There is a possibility that the sealing malfunctioned due to an applied back pressure. 1) Check the piping connection direction. In particular, when using the product with vacuum pressure. 2) If back pressure is applied in the piping circuit, install a check valve.
		Armature operation failure	□ Has foreign matter mixed in the fluid? Has foreign matter entered the inside of the solenoid valve?	→ There is a possibility that foreign matter caught in the sliding part of the armature, caused the sticking of the armature or drop of valve sealing performance. 1) Install an appropriate filter (5 μm or less as a guide) on the upstream side of the valve. 2) After piping, blow air to the piping including the solenoid valve.
			□ Is the product subject to vibration or impact?	→ Malfunction of armature or damage to parts due to resonance. 1) Use this product at a location free from vibration or impact. 2) If a part is broken, please replace the product.
		Operation failure of diaphragm	□ Has foreign matter mixed in the fluid? Has foreign matter entered the inside of the solenoid valve?	→ As foreign matter is caught in the stroke range of the diaphragm, the diaphragm may have become unable to operate. 1) Install an appropriate filter (5 μm or less as a guide) on the upstream side of the valve. 2) After piping, blow air to the piping including the solenoid valve.
			□ Is the product subject to vibration or impact?	→ Malfunction of armature or part breakage due to resonance. 1) Use this product at a location free from vibration or impact. 2) If a part is broken, please replace the product.
		Deterioration or breakage of seal part	□ Are the materials of the solenoid valve parts compatible with the fluid?	→ There is a possibility that malfunction occurred because of shrinkage, deterioration and breakage, or swelling of a seal part. 1) Check the compatibility between the fluid and the part material. 2) If a part is broken, please replace the product.
			□ Is the fluid or ambient temperature above the upper limit of the operating temperature range?	→ There is a possibility that the rubber seal part has deteriorated due to high temperature. 1) Use this product within the operating temperature range.
			□ Is the fluid or ambient temperature below the lower limit of the operating temperature range?	→ There is a possibility that due to low temperatures,the rubber seal has hardened or a part has broken due to the freezing of the fluid. 1) Use this product within the operating temperature range. 2) Take countermeasures including installation of a heater on the pipe. 3) If a part is broken, please replace the product.
			□ Is the operating pressure above the maximum operating pressure differential?	→ There is a possibility that a seal part was broken due to excessive pressure. 1)Use this product at the maximum operating pressure differential or below. 2) If a part is broken, please replace the product.
Fluid leakage occure	□ Leakage from valve (internal leakage)	Power supply voltage is applied.	□ Is there any abnormality, such as failure,with the power supply and control circuit? Is there any abnormality, such as wiring disconnection or miswiring?	→ There is a possibility of an abnormality with the power supply, control circuit, or wiring. 1) Replace or repair the power supply, control circuit, or wiring system.
			□ Is the product used with a leakage voltage above the product specifications?	→ There may be an influence of the residual magnetic force. 1) During operation, ensure the leakage voltage is equal to or lower than the allowable value (refer to page 9).
		Abnormality in supply pressure	□ Is the operating pressure above the operating pressure differential range?	→ There is a possibility that the operating pressure may be above the operating pressure differential range. 1) Use this product within the operating pressure differential range.
			□ Is the operating pressure below the minimum operating pressure differential?	→ There is a possibility that the operating pressure is below the minimum operating pressure differential. 1) Use this product within the operating pressure differential range.
		Reverse pressure circuit	□ Are piping connections on the upstream side and downstream side correct? Is there back pressure?	→ There is a possibility that the sealing malfunctioned due to an applied back pressure. 1) Check the piping connection direction. In particular, when using the product with vacuum pressure. 2) If back pressure is applied in the piping circuit, install a check valve.
		Malfunction of armature	□ Has foreign matter mixed in the fluid? Has foreign matter entered the inside of the solenoid valve?	→ There is a possibility that foreign matter caught in the sliding part of the armature, caused the sticking of the armature, or drop of valve sealing performance of the armature lowered. 1) Install an appropriate filter (5 μm or less as a guide) on the upstream side of the valve. 2) After piping, blow air to the piping including the solenoid valve.
			□ Is the product subject to vibration or impact?	→ Malfunction of armature or damage to parts due to resonance. 1) Use this product at a location free from vibration or impact. 2) If a part is broken, please replace the product.
		Operation failure of diaphragm	□ Has foreign matter mixed in the fluid? Has foreign matter entered the inside of the solenoid valve?	→ As foreign matter is caught in the stroke range of the diaphragm, the diaphragm may have become unable to operate. 1) Install an appropriate filter (5 μm or less as a guide) on the upstream side of the valve. 2) After piping, blow air to the piping including the solenoid valve.
			□ Is the product subject to vibration or impact?	→ Malfunction of armature or damage to parts due to resonance. 1) Use this product at a location free from vibration or impact. 2) If a part is broken, please replace the product.
		Deterioration or breakage of seal part	□ Is the fluid or ambient temperature above the upper limit of the operating temperature range?	→ There is a possibility that the rubber seal has deteriorated due to high temperatures. 1) Use this product within the operating temperature range.
			□ Is the fluid or ambient temperature below the lower limit of the operating temperature range?	→ There is a possibility that due to low temperatures, the rubber seal has hardened or a part has broken due to the freezing of the fluid. 1) Use this product within the operating temperature range. 2) Take countermeasures including installation of a heater on the pipe. 3) If a part is broken, please replace the product.

Phenomenon		Possible cause	Confirmation of condition	Countermeasures
Fluid leakage occurs	□ Insufficient air tightness (external leakage)	Abnormality in supply pressure	□ Is the operating pressure above the maximum system pressure?	There is a possibility that the operating pressure may be above the maximum system pressure. 1) Use this product at the maximum system pressure or below.
		Inconsistency between allowable leakage values	□ Is the allowable leakage value of the valve (refer to page14) above the allowable leakage value of the system?	Check the allowable leakage value, and build a system that can be used within the allowable value. 1) Use the product within the allowable leakage range.
		Deterioration of rubber seal part	□ Are the materials of the solenoid valve parts compatible with the fluid?	There is a possibility that a malfunction occurred because of shrinkage, deterioration and breakage, or swelling of a rubber seal part. 1) Check the compatibility between the fluid and the part. 2) If a part is broken, please replace the product.
			□ Is the fluid or ambient temperature above the upper limit of the operating temperature range?	There is a possibility that the rubber seal has deteriorated due to high temperatures. 1) Use this product within the operating temperature range.
			□ Is the fluid or ambient temperature below the lower limit of the operating temperature range?	There is a possibility that due to low temperatures, the rubber seal has hardened or a part has broken due to the freezing of the fluid. 1) Use this product within the operating temperature range. 2) Take countermeasures including installation of a heater on the pipe. 3) If a part is broken, please replace the product.
			□ Is the operating pressure differential above the maximum operating pressure differential?	There is a possibility that a seal part was broken due to excessive pressure. 1)Use this product at the maximum operating pressure differential or below. 2) If a part is broken, please replace the product.
Low flow	□ Abnormal flow rate	Malfunction of armature	Has foreign matter mixed in the fluid? □ Has foreign matter entered the inside of the solenoid valve?	There is a possibility that foreign matter caught in the sliding part of the armature, caused the sticking of the armature, or drop of valve sealing performance of the armature lowered. 1) Install an appropriate filter (5 μm or less as a guide) on the upstream side of the valve. 2) After piping, blow air to the piping including the solenoid valve.
			□ Is the product subject to vibration or impact?	Malfunction of armature or part breakage due to resonance. 1) Use this product at a location not subject to vibration or impact. 2) If a part is broken, please replace the product.
		Operation failure of diaphragm	Has foreign matter mixed in the fluid? □ Has foreign matter entered the inside of the solenoid valve?	It is possible that foreign matter is caught in the stroke range of the diaphragm, the valve stroke has been decreased, the pilot path is clogged with foreign matter, or a part is broken. 1) Install an appropriate filter (5 μm or less as a guide) on the upstream side of the valve. 2) After piping, blow air to the piping including the solenoid valve. 3) If a part is broken, please replace the product.
			Is the operating pressure below the minimum operating pressure differential? □ Has the pressure become unstable due to extreme restriction at the end of the circuit or insufficient supply on the upstream side?	There is a possibility that the operating pressure is below the minimum operating pressure differential. 1) Use this product within the operating pressure differential range. 2) The insufficiency of operating pressure is due to the insufficiency of differential pressure caused by the supply capability, restrictor, or for other reason. Check the pressures on the upstream side and downstream side.
			□ Is the product subject to vibration or impact?	Malfunction of armature or damage to parts due to resonance. 1) Use this product at a location free from vibration or impact. 2) If a part is broken, please replace the product.
		Abnormality in supply pressure	□ Is the operating pressure differential above the maximum operating pressure differential?	The operating pressure may be above the operating pressure differential range. 1) Use this product within the operating pressure differential range.
			□ Is the operating pressure below the minimum operating pressure differential?	There is a possibility that the operating pressure is below the minimum operating pressure differential. 1) Use this product within the operating pressure differential range.
		Deterioration and breakage of seal part	□ Are the materials of the solenoid valve parts compatible with the fluid?	An operation failure may have occurred due to shrinkage, deterioration and breakage, or swelling of the seal part. 1) Check the compatibility between the fluid and the part.
			□ Is the fluid or ambient temperature above the upper limit of the operating temperature range?	There is a possibility that the rubber seal has deteriorated due to high temperatures. 1) Use this product within the operating temperature range.
			□ Is the fluid or ambient temperature below the lower limit of the operating temperature range?	There is a possibility that due to low temperatures, the rubber seal has hardened or a part has broken due to the freezing of the fluid. 1) Use this product within the operating temperature range. 2) Take countermeasures including installation of a heater on the pipe. 3) If a part is broken, please replace the product.
			□ Is the operating pressure differential above the maximum operating pressure differential?	There is a possibility that a seal part was broken due to excessive pressure. 1)Use this product at the maximum operating pressure differential or below. 2) If a part is broken, please replace the product.
There is noise	□ Abnormal operating sound	Drop of attraction force of solenoid coil	□ Is the applied voltage below the allowable voltage range? 1)Lower limit of voltage range: −10% V of rated voltage.	As the applied voltage was below the allowable voltage range, the attraction force of the solenoid coil dropped, and the armature did not operate. 1) Use this product in the range of rated voltage ±10% V.
		Abnormality in supply pressure	□ Is the operating pressure differential above the maximum operating pressure differential?	The operating pressure may be above the operating pressure differential range. 1) Use this product within the operating pressure differential range. 2) Select an appropriate model.
		Malfunction of armature	Has foreign matter mixed in the fluid? □ Has foreign matter entered the inside of the solenoid valve?	There is a possibility that foreign matter caught in the sliding part of the armature, caused the sticking of the armature, or drop of valve sealing performance of the armature lowered. 1) Install an appropriate filter (5 μm or less as a guide) on the upstream side of the valve. 2) After piping, blow air to the piping including the solenoid valve.
		Oscillation of diaphragm	Is the operating pressure below the minimum operating pressure differential? □ Has the differential pressure decreased due to extreme restriction downstream or insufficient supply upstream?	The differential pressure may be lower than the minimum operating pressure due to the piping conditions. 1) Use the product within the operating pressure differential range.
			□ Has foreign matter mixed in the pilot path?	Mixing in of foreign matter in the pilot path may have made the pressure in the pilot chamber unstable. 1) Install a filter with a pore size of 5 μm or below on the upstream side of the valve. 2) After piping, conduct air blow for the piping including the solenoid valve.

Revision history

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