



# Operation Manual

PRODUCT NAME

Pilot Valve Enclosure

MODEL / Series / Product Number

JSXFM Series

**SMC Corporation**

# Table of Contents

Table of Contents .....	1
<b>Safety Instruction</b> .....	<b>2</b>
1.Precautions for Design.....	4
2.Precautions for Operating Environment.....	4
3.Precautions for Fluid .....	5
4.Material of Fluid .....	5
5. Precautions for Mounting .....	5
6.Precautions for Piping.....	6
7. Precautions for Wiring.....	7
8. Notes on Appearance .....	7
9.Maintenance and Inspection .....	8
10.Return of Out Products .....	8
11. How to Order .....	9
12. Specifications.....	10
13. Component drawing.....	11
14. External dimensions.....	12
15. Wiring to PCB Type Terminal .....	15
15.1 Names and Functions of Boad .....	15
15.2 Wiring example and internal circuit.....	16
15.3 Wiring to the terminal block .....	17
16. Replacement parts.....	18
16.1 Replacement Parts Number .....	18
17.Trouble Check Sheet .....	19



# Safety Instruction

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. SMC 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

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

**Use in non-manufacturing industries is not allowed.**

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

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

## Limited warranty and Disclaimer/Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”.

Read and accept them before using the product.

### Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.\*2)  
Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.  
This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

**\*2) Vacuum pads are excluded from this 1 year warranty.**

A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.

Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty

### Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

# 1. Precautions for Design

## Warning

### 1. Confirm the specifications.

Give careful consideration to the operating conditions such as the applications, fluids, voltage and environment, and use within the specified operating range.

If the product is used outside the specification range, it could lead to damage and malfunction.

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

### 2. Cannot be used as an emergency shutdown valve, etc.

This product is not designed for safety applications such as an emergency shutdown valve.

If the valves are used in this type of system, other reliable safety assurance measures should also be adopted.

### 3. 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. Energizing valves continuously for an extended period of time

1) This is a valve for pulse operation. Do not energize it continuously.

2) As the coil becomes hot when energized, set the energizing time to 1 s or less and the de-energizing time to at least twice the energizing time.

Furthermore, do not touch the coil while it is being energized or right after it has been energized

### 5. Dual pressure

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

### 6. Disassembly and modification prohibited

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

# 2. Precautions for Operating Environment

## Warning

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

1) An environment containing corrosive gases, chemicals, sea water, water, steam, or locations where there is direct contact with any of these

2) Locations with explosive environment

3) Locations subject to direct sunlight

4) Locations subject to an excessive vibration or impact

5) Locations where radiant heat will be received from nearby heat sources

### 2. Take protective measures such as installing an enclosure (waterproof cover) in an environment where the product becomes wet with water.

The protection grade of this product is IP66 (IEC60529), but if water enters the product from a minute gap, it may lead to a malfunction or failure. Take protective measures when using the product in any of the following environments.

<Examples of environments where the product becomes wet with water>

1) Underwater

2) Locations where steam is generated

3) Locations where the product is exposed to water for a long time

4) Locations where water or oil splashes from the surrounding equipment

5) Locations where sea water is present

### 3. Use of the product outdoors

When using the product outdoors, take appropriate protective measures.

1) Provide a protective cover, etc. so that the product will not be exposed to direct sunlight.

2) Cover the product with an enclosure so that the product will not be exposed to rain or wind.

Even if you provide only a roof-type cover on top of the product, the product may become wet with water due to crosswind or rebounding of rain water from the ground. When covering the product with an enclosure, also take ventilation measures so that it will not be filled with heat due to long time energization.

### 4. Take measures against condensation when using the product in an environment it is exposed to condensation.

In a highly humid environment or another environment with significant changes in the temperature, condensation may occur.

If water enters the product, it may lead to a malfunction or failure. Be sure to take measures against condensation including room temperature control.

## 5. Take anti-freezing measures when using the product in any of the following low-temperature environments.

- 1) In cold regions or during winter
- 2) High dew - point temperature and low ambient temperature
- 3) When flowing at a high flow rate

Examples of anti-freezing measures include draining inside the pipelines, drain removal by an air dryer, and warming with a heater. When taking warming measures, be sure to avoid the coil section because doing so will deteriorate heat radiation.

## 3. Precautions for Fluid

### Warning

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

**2. Fluid temperature**

Use the product within the specified fluid temperature range for the product.

**3. Install a filter to use clean fluid.**

- 1) The use of a fluid that contains foreign matter can cause problems such as malfunction and seal failure by wearing of the valve seat and armature, and by sticking to the sliding parts of the armature, etc.  
Install a filter of 5 μm or less on the valve's inlet side to remove foreign matter.
- 2) Filter will clog. Replace or clean the filter when the pressure drop reaches 0.1 MPa.

## 4. Material of Fluid

### Warning

**1. Air**

- 1) Do not use compressed air that contains chemicals, synthetic oils including organic solvents, salt or corrosive gases, etc., as it can cause malfunction or damage.
- 2) Compressed air that contains excessive drainage may cause malfunction of valves and other pneumatic equipment.  
Install an aftercooler or an air dryer on the valve's inlet side as a drainage measure.
- 3) If excessive carbon powder is generated by the compressor, it may adhere to the inside of the valves 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 described above, 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.

## 5. Precautions for Mounting

### Warning

**1. When installing the product, secure enough space for maintenance and inspection.**

**2. When installing the product, avoid any sources of vibration, or adjust the arm from the body to the minimum length so that resonance will not occur.**

**3. Do not install the product near the heat source and install it where the product will not be affected by radiant heat.**

**4. Do not apply external force to the coil section.**

When installing the product, apply the wrench or another tool to the outside of the piping connection so that it will not come into contact with the coil section.

**5. Do not warm the coil section with a heat insulator, etc.**

When warming the product as an anti-freezing measure, warm only the piping and body sections and do not warm the coil section. Heating the coil may burn it out.

**6. If air leakage increases or the equipment does not operate properly, stop using it.**

After installation and during maintenance, connect the compressed air and power and perform appropriate functional and leakage inspections to make sure that the equipment is installed properly. Do not use the equipment if it does not operate properly.

**7. Do not touch valves with bare hands during or immediately after energization.**

Valves will reach high temperatures after energization. Do not touch valves carelessly. You may get burned if you failed to do so.

**Caution**

**1. Installation of a regulator and restrictor**

If a regulator or a restrictor is installed immediately before the valve inlet or immediately after the valve outlet, the valve may oscillate (chatter), causing a failure. Install it away from the valve or change the restriction.

**2. Painting and coating**

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

**3. Apply the correct tightening torque.**

Tightening at a torque exceeding the tightening torque range may damage the mounting screws, enclosure, and so on. Tightening at a torque less than the tightening torque range may cause a displacement of the mounting position or the loosening of the screw sections.

**4. If a commercially available switching power supply is used, be sure to ground the frame ground (FG) terminal.**

**6. Precautions for Piping**

**Warning**

**1. Tubes may become unfixed and break loose while the product is used due to deterioration of the tube or damage to the fitting.**

To prevent the tube from breaking loose, install a protective cover or secure the tube.

**Caution**

**1. Refer to the Fittings and Tubing Precautions in the SMC catalog for tubes for which the handling one-touch fittings applies**

**2. Preparation before piping**

Before piping is connected, flush thoroughly with air or wash to remove chips, cutting oil and other debris from inside the pipe.

Connect piping in a way forces such as a tension, compression or bending will not be applied to the valve body.

**3. Wrapping of sealant tapes**

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

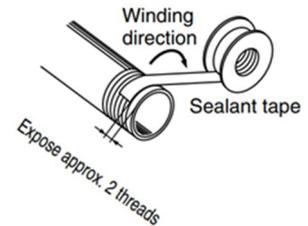
Furthermore, when pipe tape is used, leave 1.5 to 2 thread ridges exposed at the end of the threads.

**4. When using a fitting other than an SMC fitting**

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

**5. Be aware that connecting the ground wire to piping may cause corrosion of the system due to electrolytic corrosion.**

**6. When connecting piping to the product, pay attention not to make a mistake regarding the supply port, etc.**



**Notes for Piping**

**Caution**

**1. Screw tightening torque for piping**

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

**Tightening torque for piping**

Thread	Proper tightening torque N·m
1/8	3 to 5

## 7. Precautions for Wiring

### **Warning**

- 1. Check the terminal when wiring.**  
Incorrect wiring may lead to the breakage, failure or malfunction of the valve. Be sure to check the terminal before wiring.
- 2. Make sure that no excessive force is applied to the lead wires.**  
Broken lead wires will result if bending stresses or tensile forces are applied to the lead wires.
- 3. Check the insulation of the wiring.**  
Poor insulation (interference with other circuits, poor insulation between terminals, etc.) may apply excessive voltage or current to the product causing damage.
- 4. Do not pull the lead wire forcefully, or lift the product by the lead wire.**  
Hold the product itself when handling. Otherwise, the lead wire may be damaged, leading to the failure or malfunction of the product. In addition, the product may be damaged or the connectors may drop.
- 5. Do not perform wiring while the power is on.**  
Otherwise, the product may be damaged or malfunction.
- 6. Do not route wires and cables together with power or high voltage cables.**  
Route the wires separately from the power or high voltage cables to prevent a signal line noise or surge from them from entering.
- 7. For DC voltage specifications, when a surge from the solenoid affects the electrical circuitry, install a surge voltage suppressor, etc., in parallel with the solenoid.**  
**Residual voltage of the surge voltage suppressor .**  
AC specification: Approx. 1 V.

## 8. Notes on Appearance

### **Caution**

- 1. A surface treatment is applied to the product to improve corrosion resistance. There may be a spot pattern on the surface depending on the treatment condition, but there is no problem in use.**

## 9. Maintenance and Inspection

### **Warning**

#### **1. Removal of the 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 the filter regularly.**

- 1) Replace filter after a 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 drainage from air filters regularly.**

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

#### **4. Silencer**

When used for long hours, a silencer may clog and the response characteristic may change. Replace it after using it for 500,000 times as a guide though the timing of replacement depends on the quality of fluid and energized time.

#### **5. Disassembly**

Refer to the Disassembly/Assembly Procedure on page 17 for the replacement of components.

#### **6. When using at a low frequency**

Switch valves at least once every 30 days to prevent malfunction. Also perform a periodic inspection once every 6 months to use the product in the optimum conditions.

#### **7. 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 higher humidity to prevent rust and deterioration of rubber materials, etc.

#### **8. Perform regular maintenance and inspections.**

Regularly perform appropriate functional and leakage inspections to check if the product is mounted properly. If air leakage increases or the equipment does not operate properly, stop using it.

## 10. Return of Out Products

### **Warning**

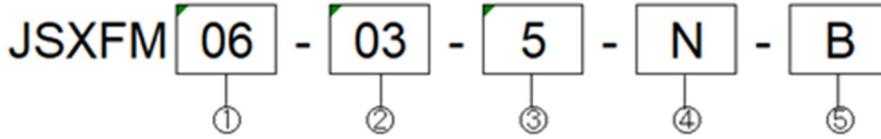
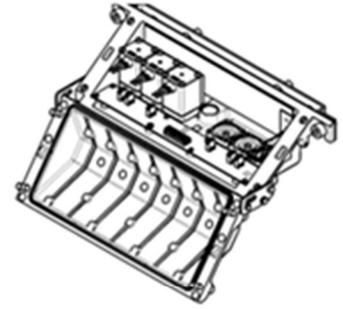
Before returning our product that is contaminated or possibly contaminated with a substance, fluid, or its residue that are considered harmful to humans, contact SMC for safety reasons. Appropriately clean (neutralize) the product, submit a Product Return Request Sheet or a Detoxification/Decontamination certificate to SMC, and then return the product to us after receiving an approval for return of the product from us.

With regard to harmful substances, check the International Chemical Safety Cards (ICSC) and the like. Contact your nearest SMC Sales representative should you have any questions or inquiries.

# 11. How to Order

## JSXFM Series

How to Order



① Enclosure size

Symbol	Station
06	6 Station
08	8 Station

② Valve QTY

Symbol	6 Station	8 Station
01	1	1
02	2	2
03	3	3
04	4	4
05	5	5
06	6	6
07	-	7
08	-	8

\*1) See fig. 1 for valve mounting.

③ Voltage

Symbol	Voltage *1)
1	AC100V
2	AC200V
3	AC120V(AC110V)
4	AC220V
5	DC24V
7	AC240V
J	AC230V

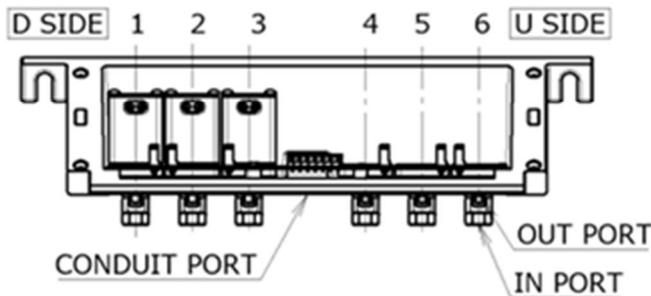
\*1) It is not possible to combine several voltages.

④ Thread type

Symbol	IN Port 1/8	Conduit Port	
		6 Station 1/2(1 Hole)	8 Station 3/4(2 Hole)
R	Rc	NPT	
N	NPT	NPT	
F	G	G	

⑤ Option

Symbol	OPTION	
NIL	Non	-
A	Bracet for the prevention of cover fall-out	
B	Bracet	
AB	Bracet for the prevention of cover fall-out + Bracet	



### <Preparations example.>

Product No. : JSXFM06-03-5-N

1~3rd series...3 Valves

4~6rd series...3 Blanking plug Ass'ys

\*1) The mounted valve is the first series from the D side.

\*2) All serial numbers without valves are blanking plug Ass'y.

## 12. Specifications

### Specifications

Enclosure	Material	Box	ADC	
		Seal	NBR	
		Bracket	Stainless steel	
	Enclosure		IP66,NEMA4	
	Standards [DC ONLY]		CE/UKCA	
Valve	Valve construction		Pilot operated diaphragm	
	Valve type		Normally closed(N.C.)	
	Fluid		AIR	
	Orifice diameter	mmΦ	5	
	Max.operating pressure differential	Mpa	0.9	
	Max.system pressure	Mpa	0.9	
	Fluid temperature	℃	-10~60(No freeze)	
	Ambient temperature	℃	-20~60	
	Valve leakage	Internal	1cm <sup>3</sup> /min or less	
		External	1cm <sup>3</sup> /min or less	
Duty		≤33%[MAX ON 1 sec]		
Coil	Rated vantage	V	AC	100,120(110),200,220,230,240
		DC	24	
	Allowable voltage fluctuation		±10% Of the rated voltage	
	Allowable leakage voltage	AC	±5% Of the rated voltage	
		DC	±2% Of the rated voltage	
	Type of coil insulation		Class B	
Power consumption <sup>*1,2)</sup>	AC	14VA		
	DC	18W		
Substrate	Current consumption	A	AC	6.3
		DC	8	
Weight(g)	Enclosure	6 Station	1,418	
		8 Station	1,823	
	Valve	AC	365	
		DC	353	
	Blanking plug		33	
	Lid detachment prevention mechanism		52	
	Bracket	6 Station	365	
8 Station		471		

\*1)Maximum number of valves operating simultaneously is 2.

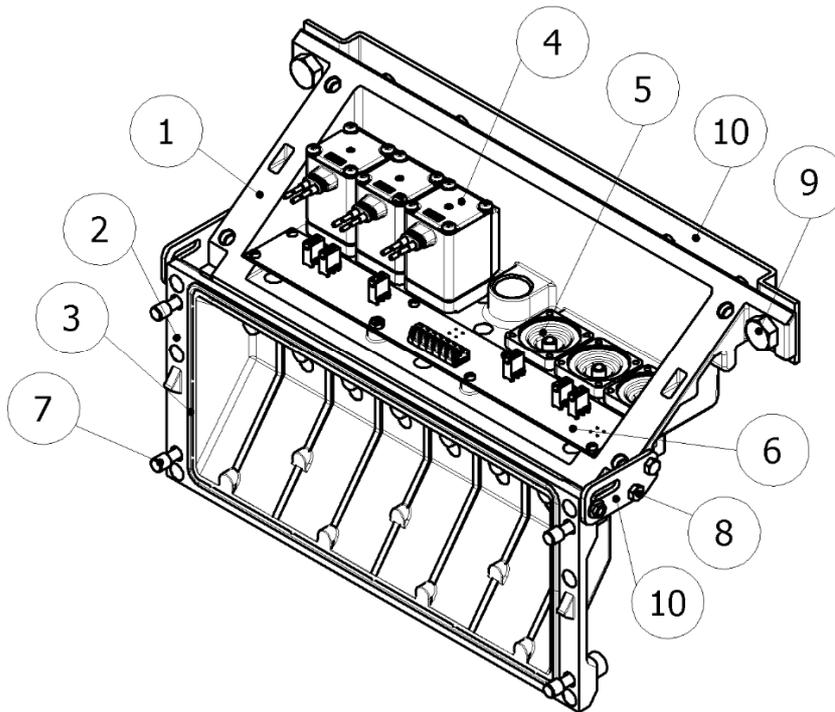
Maximum power consumption is valves x 2.

\*2)Power consumption is at an ambient temperature of 20 °C and rated voltage applied.

Variation range ±10%.

## 13. Component drawing

### Names of parts

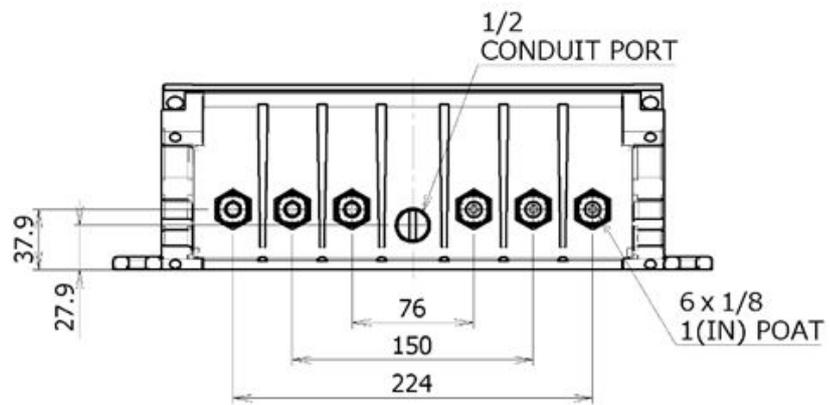
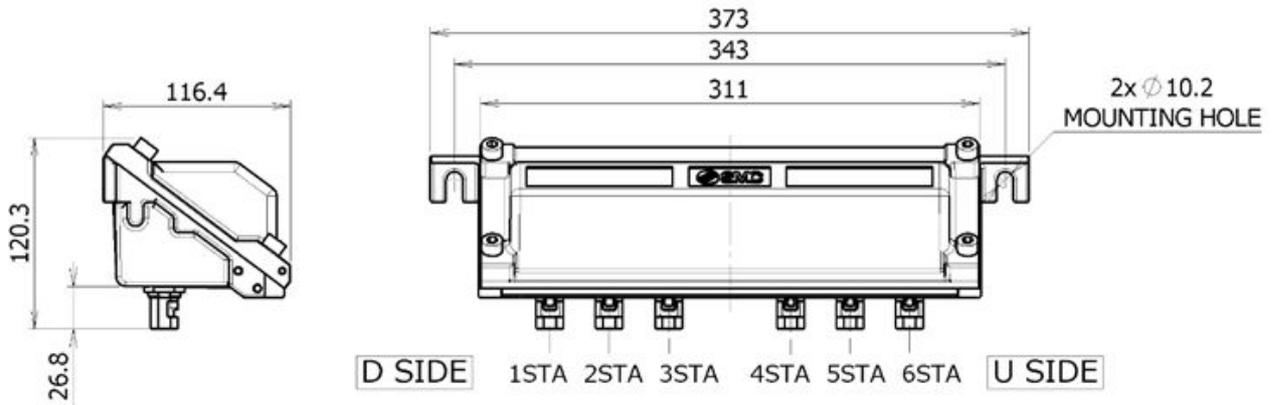


### Component

No.	PART NAME	MATERIAL
1	Enclosure bottom	ADC
2	Enclosure top	ADC
3	Gasket	NBR
4	Pilot valve	-
5	Plug Ass'y	ADC
6	Boad Ass'y	-
7	Captive screw	SUS
8	Hexagon head screw	SUS
9	Hexagon socket head cap screw	SUS
10	Bracket	SUS

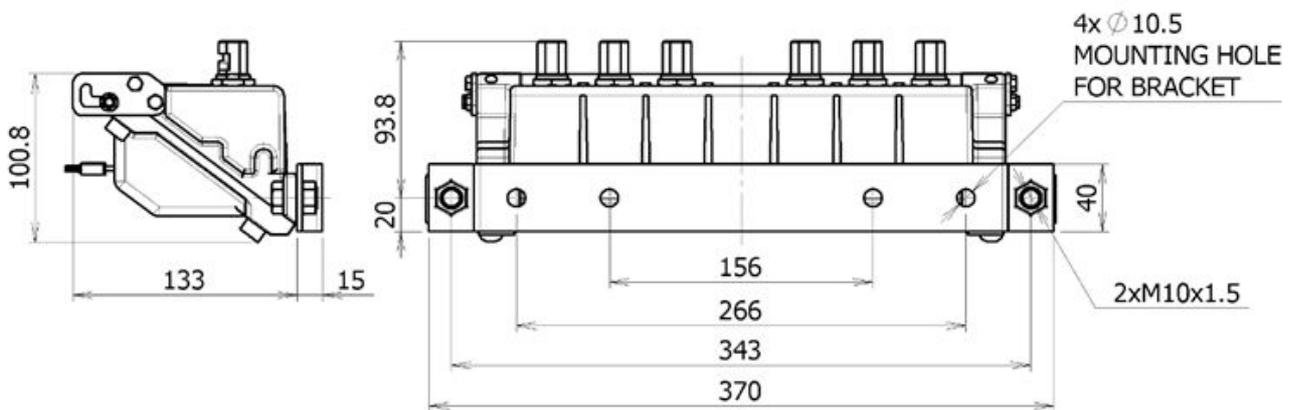
# 14. External dimensions

## 6 STATION

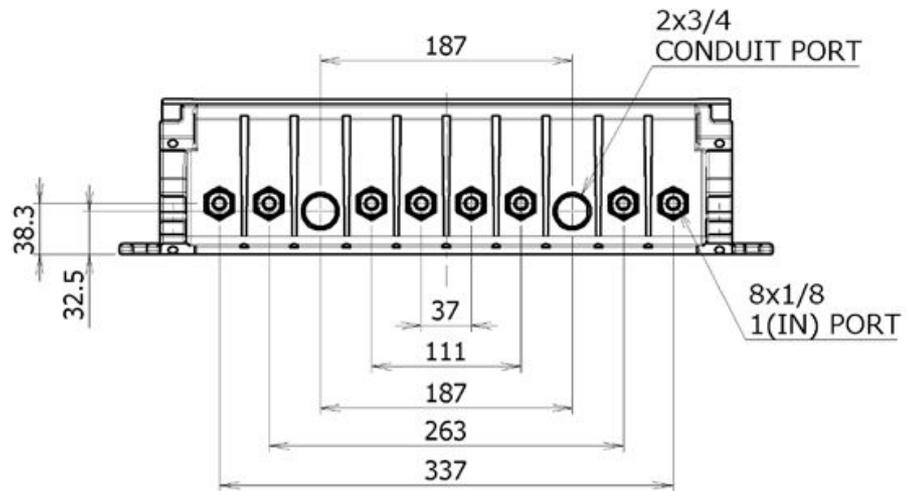
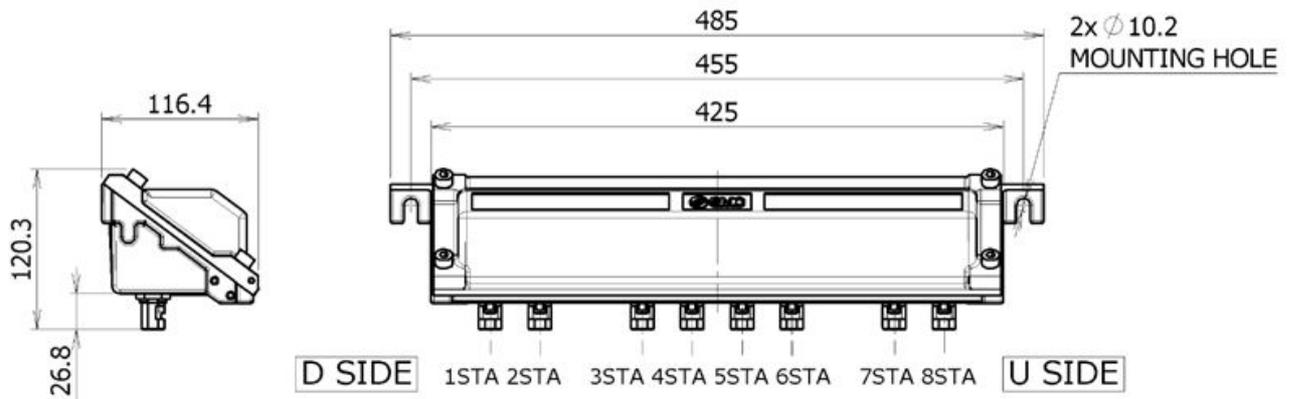


Dimensions when bracket mounted

When using the lid fall-off prevention bracket, ensure that there is sufficient space for opening and closing.

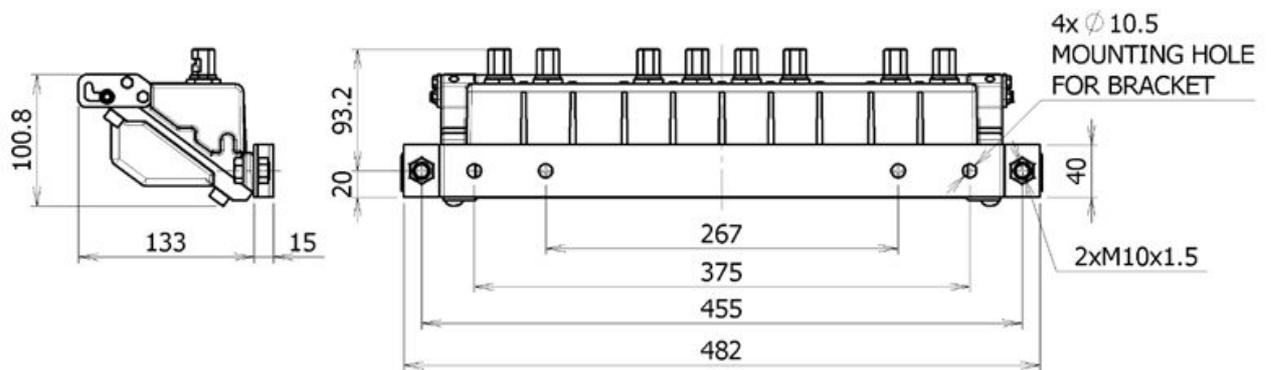


# 8 STATION



Dimensions when bracket mounted

When using the lid fall-off prevention bracket, ensure that there is sufficient space for opening and closing.



## Disassembly/Assembly Procedures

### **Caution**

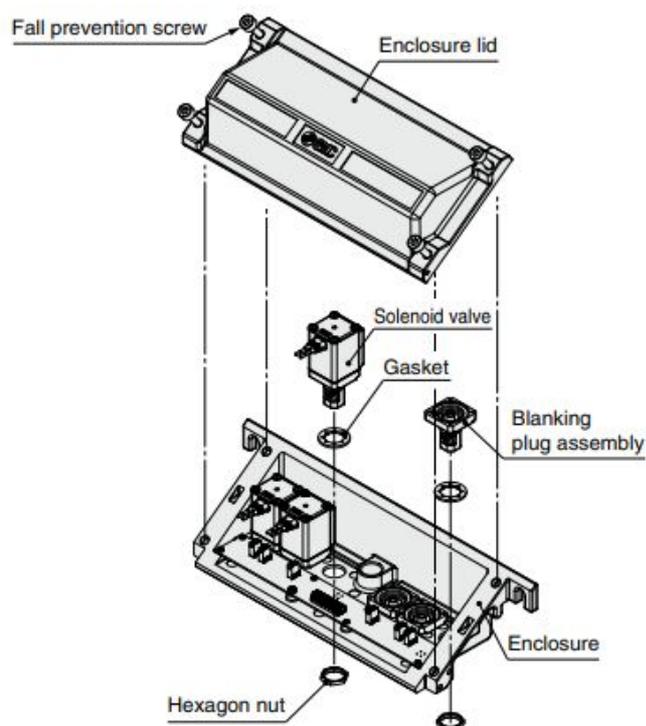
**Before starting the disassembly work, be sure to shut off the power supply and pressure supply, and then release the residual pressure.**

#### Disassembly procedure

- 1) Loosen the fall prevention screw and remove it from the enclosure.
- 2) Open the enclosure lid.
- 3) Remove the valve connector from the board.
- 4) Remove the hexagon nut.
- 5) Remove the solenoid valve, blanking plug assembly, and gasket

#### Assembly procedure

- 1) Attach the gasket to the solenoid valve and blanking plug assembly.
  - 2) Insert the solenoid valve and blanking plug into the hole at the base of the unit.
  - 3) Fix the solenoid valve into place using the hexagon nut.
  - 4) Connect the valve connector to the board.
  - 5) Fix the lid into place with the fall prevention screw.
  - 6) Tighten the fall prevention screws evenly in diagonal order.
- (Fig. Tightening order of the fall prevention screws)



#### **Proper Tightening Torque**

(N·m)

Description	Size	Proper tightening Torque
Fall Prevention screw	M10	11 to 14
Hexagon nut	Width across flats 22	5.4 to 6.6

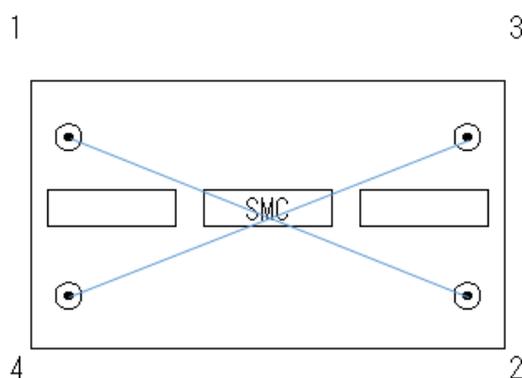


Fig. Tightening order of the fall prevention screws

# 15. Wiring to PCB Type Terminal

## 15.1 Names and Functions of Board

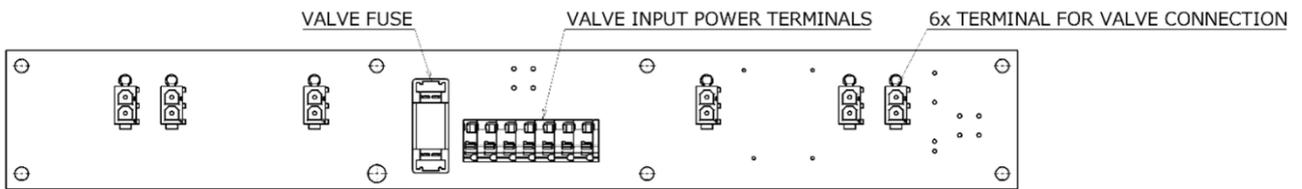


Figure 1: 6-Station Terminal Board

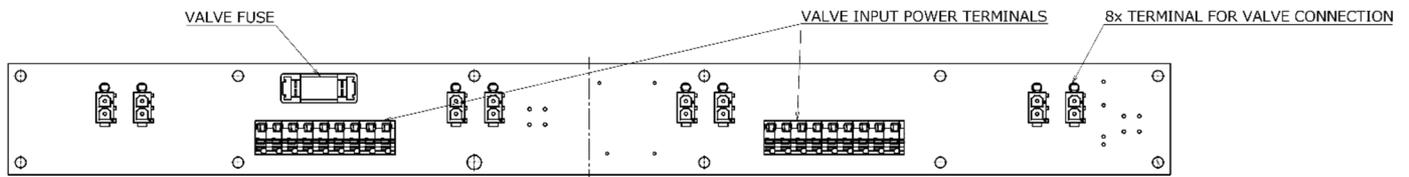


Figure 2: 8-Station Terminal Board

## 15.2 Wiring example and internal circuit

Note) Be sure to turn off the power supply before wiring.

Connect the common wire to the terminal marked "COM".

The 8-series box has two terminal blocks, and you can use by connecting to either one of the terminal blocks.

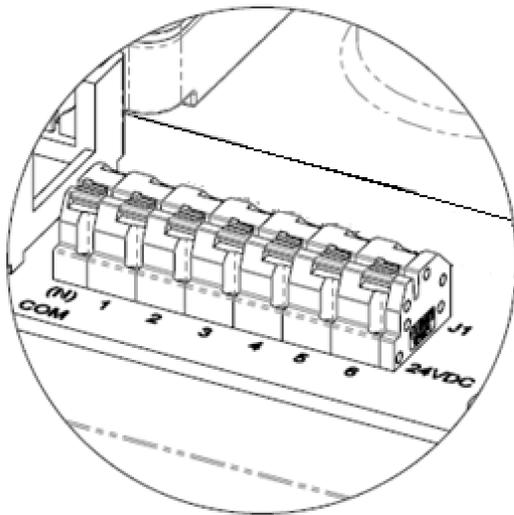


Figure 3: 6-Station Valve Input Power Terminals

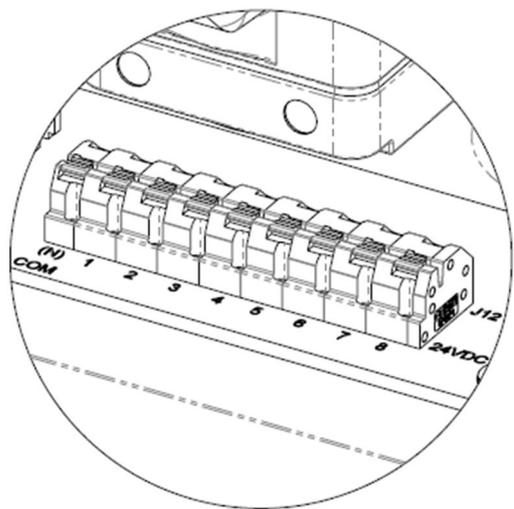
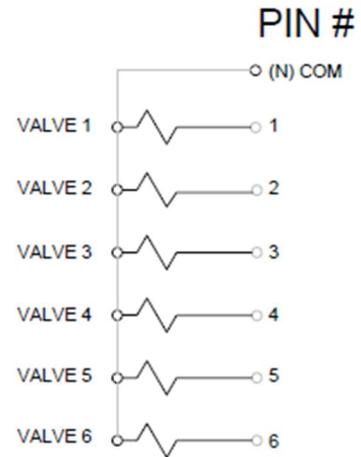
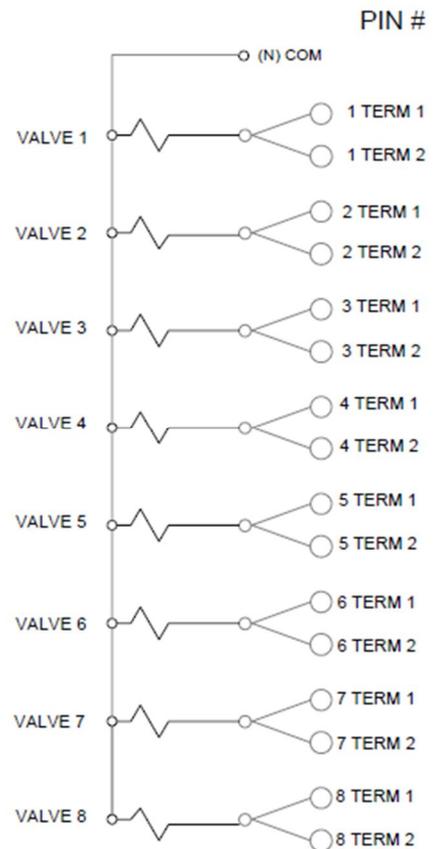
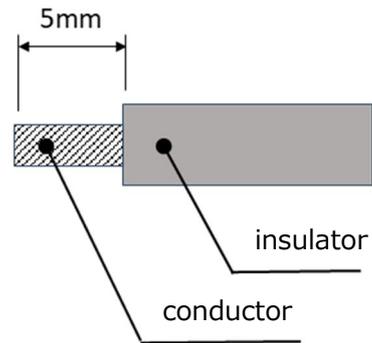
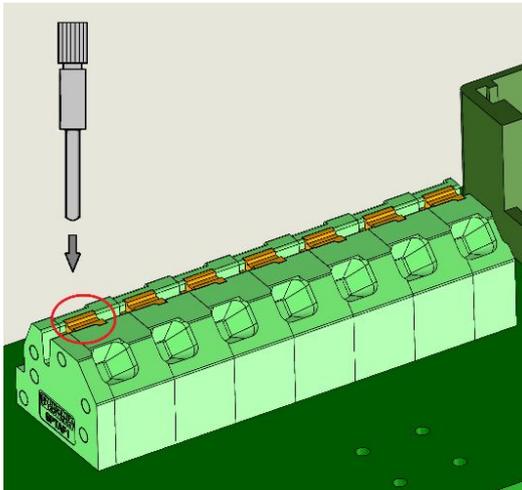


Figure 4: 8-Station Valve Input Power Terminals



## 15.3 Wiring to the terminal block



Lead wire specification

<b>Supported lead wires</b>	AWG 26 to 18
<b>Recommended Strip Length</b>	5 mm

(Note) All stranded conductive wires must be connected to the terminal block so that they do not come apart. If the wires come into contact with other wires, it may lead to malfunction or malfunction.

Note: Select the thickest possible lead wires for power supply and BUS to reduce voltage drop and power loss.

AWG20 or larger and 3m (118in) or smaller is recommended. Lead wires longer than 3 m should be used after confirmation with the actual device.

Note: Be careful to prevent foreign objects from entering the joint.

Adhesion of foreign matter may cause contact failure or heat generation.

Note: When inserting or removing lead wires, do so horizontally or vertically.

Excessive stress may cause damage or poor contact.

Also, consider fixing the connected lead wires so that tension is not applied to them.

Note: Even if stripped at the recommended strip length, over or under conductivity may occur depending on the type of lead wire.

In such cases, adjust the strip length to ensure conductivity.

Note: When making connections, hold the terminal block with one hand to prevent excessive stress from being applied to the solder pins.

Note: Be careful not to get moisture on the board by working with wet hands or by water intrusion.

## 16. Replacement parts

### 16.1 Replacement Parts Number

Product Name	Replacement parts No.	
Solenoid valve <sup>*1)</sup>	VX220ZA*X387	24VDC
	VX220ZB*X387	100VAC
	VX220ZC*X387	110/120VAC
	VX220ZD*X387	200VAC
	VX220ZZ1B*X387	220VAC
	VX220ZZ1E*X387	230VAC
	VX220ZZ1C*X387	240VAC
Blanking plug Ass'y	VXF20-60A	

\*1) \* in the part number indicates the screw type.

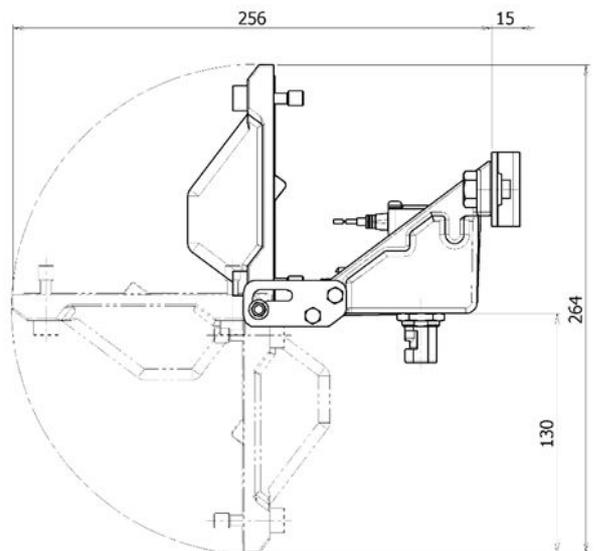
NIL: Rc thread    A: G thread    B: NPT thread

#### Bracket mounting

When mounting the bracket, ensure that the space for the following dimensions is available.

#### Opening and closing method

- 1) Loosen the anti-detachment screw and remove it from the box.
  - 2) Open the box lid by rotating it towards you.
  - 3) Close the box lid in the reverse order.
- For the tightening torque of the drop-out prevention, see p. 31-7.



17. Trouble Check Sheet (target series: JSXF : PILOT VALVE BOX)

Warranty period: Within 1.5 years after the product is delivered or 1 year in service.  
 Refer to and use this trouble check sheet as a cause diagnosis check sheet when a trouble has occurred to solve it early.

Phenomenon	Possible causes	Part that could be the cause of nonconformity	Check methods	Measures	Solution	Permanent countermeasure		
<b>Operation Failure</b>	Valve does not open		- Is the minimum operating pressure within the specification range? * Min. operating pressure differential: 0.1 MPa	- Check the differential pressure when the valve is open.	<b>A</b>	<p>Measures against supply pressure abnormality</p> <p>(1) Due to insufficiency of the minimum operating pressure differential, the nonconformity may have occurred.</p> <ul style="list-style-type: none"> <li>- Increase / decrease the supply pressure or review the piping and operation frequency / time to satisfy the minimum operating pressure differential.</li> </ul> <p>(2) As the maximum operating pressure differential exceeded the upper limit, the nonconformity may have occurred.</p> <ul style="list-style-type: none"> <li>- When the operating pressure differential exceeds the maximum operating pressure differential (0.9 MPa), it is possible that the pilot valve seating load becomes larger than the coil attraction force, making the valve unable to open. Reduce the supply pressure.</li> </ul> <p>The non-conformance may have occurred as foreign matter in the fluid was caught in the sliding part or seat.</p> <ul style="list-style-type: none"> <li>- Purify the fluid by installing an appropriate filter (filtration rating: approximately 5 μm) or by other means.</li> <li>- Perform air blow (flushing) sufficiently for the valve and piping before piping.</li> </ul> <p>The valve element may have been deteriorated (swelling, shrinkage) or broken due to the influence of the temperature or fluid component, which led to the nonconformity.</p> <ul style="list-style-type: none"> <li>- Use the valve within its specified temperature range.</li> <li>- Specifications to check: Fluid temperature, ambient temperature, and fluid quality (type, mixture, additives, etc.)</li> </ul> <p>Measures against exhaust abnormality</p> <p>(1) When the pilot valve exhaust time is short, the nonconformity may have occurred due to insufficient exhaust of residual pressure in the pressurized chamber.</p> <ul style="list-style-type: none"> <li>- Take measures to increase the valve ON time.</li> </ul> <p>(2) The nonconformity may have occurred because as the pilot pressure kept being exhausted, the pressure is not built up in the pressurized chamber.</p> <ul style="list-style-type: none"> <li>- Check whether any leakage has occurred in the pilot circuit or pilot valve.</li> </ul> <p>Do not use the product where it is subject to vibration or impact.</p> <p>Check if the valve fluid direction and system fluid direction are consistent with each other.</p> <p>Check the name of the terminal block and polarity, and conduct wiring again.                      Check whether there is any contact failure of the lead wire, and if a broken wire is found, replace the wiring parts.                      * Refer to pages 15 to 18.</p> <p>A failure of the board or coil has occurred.                      Repair is not allowed. Replace the valve.                      (1) When the product is used in such an environment where moisture such as water, steam, or dew condensation attaches the product, water or other substance may have entered the board and coil.                      Take waterproof measures including installation of covers.                      (2) Install a surge protection device or eliminate the cause of the failure.</p> <ul style="list-style-type: none"> <li>- Check the power supply system. Power voltage: 24 VDC±10%</li> <li>- If the capacity is insufficient, select a power supply with sufficient current capacity.                          Example) Calculation of necessary current capacity: One base (25 mA), 31 remote valves (15 mA x 31), simultaneous turning on of two remote valves (18 W x 2) allowed 24 VDC  <math>25mA + (15mA \times 31) + (18W \times 2 / 24V) = 1,990mA</math></li> </ul>		
		The operating pressure differential is above the upper limit.		- Is the maximum operating pressure within the specification range? * Max. operating pressure differential: 0.9 MPa	- Check the differential pressure when the valve is closed.		<b>A</b>	
		Adhesion of foreign matter in the pilot valve sliding part	pilot valve	- Is foreign matter contained in the fluid?	- Check the fluid / filter. - Check for and remove foreign matter.		<b>B</b>	
		Breakage of the valve poppet due to deterioration (swelling or shrinkage)	pilot valve	- Is the ambient / fluid temperature within the specification range? Fluid temperature : -10 to 60°C Ambient temperature : -20 to 60°C	- Check the ambient / fluid temperature.		<b>C</b>	
		Deterioration of the pilot valve rubber part (swelling, sticking, etc.)	pilot valve	- Is the ambient / fluid temperature within the specification range of the pilot valve in use?	- Check the ambient / fluid temperature.		<b>C</b>	
		- Insufficient coil attraction force of the pilot valve due to the influence of the temperature	pilot valve	- Is the ambient / fluid temperature within the specification range of the pilot valve in use?	- Check the ambient / fluid temperature.		<b>C</b>	
		Insufficient air exhaust from the pilot valve	Pilot valve	- Check if the air exhaust flow from the pilot valve is adequate. - Set a longer ON time for the valve from the controller.	- Check the exhaust air flow of the pilot valve. - Adjust the time set by the controller.		<b>A·D</b>	
		Supply voltage is not applied.	Board assembly	- Is there any contact failure, broken wire, or incorrect wiring? - Has the board been burned?	- Check the wiring condition. - Check for entry of water and presence / absence of surge voltage.		<b>G·H</b>	
		The voltage is not supplied normally.	Board assembly	- Is the power voltage supplied normally? Is there any earth leakage?	- Check the supply voltage and current capacity.		<b>I</b>	
		The valve does not close.						
	Pilot valve sealing failure	Pilot valve	- Is the pilot valve closed?	- Check the pilot pressure.	<b>D</b>			
	Insufficient supply pressure		- Is the minimum operating pressure within the specification range? * Min. operating pressure differential: 0.1 MPa	- Check the differential pressure when the valve closes.	<b>A</b>			
	Sealing failure or sliding failure due to adhesion of foreign matter in the pilot valve sliding part	Pilot valve	- Is foreign matter contained in the fluid?	- Check the fluid / filter. - Check for and remove foreign matter.	<b>B</b>			
	The supply voltage is applied.	Board assembly	- Is there any contact failure or incorrect wiring of the wiring system?	- Check the wiring condition.	<b>G</b>			
<b>leakage</b>	Leakage across valve seat (Internal leakage)		Deterioration (swelling or shrinkage) or breakage of the main valve.	main valve	- Is the ambient / fluid temperature within the specification range? Fluid temperature : -10 to 60°C Ambient temperature : -20 to 60°C	- Check the ambient / fluid temperature.	<b>C</b>	
			Sealing failure due to the deterioration (swelling, shrinkage) or breakage of the pilot valve rubber part.	pilot valve	- Is the ambient / fluid temperature within the specification range of the pilot valve in use?	- Check the ambient / fluid temperature.	<b>C</b>	
			The main valve or pilot valve malfunctions due to resonance with the facilities around the product.		- Is vibration or impact applied?	- Check the vibration and impact.	<b>E</b>	
			Sealing failure or sliding failure due to adhesion of foreign matter in the pilot valve sliding part	Pilot valve	- Is foreign matter contained in the fluid?	- Check the fluid / filter. - Check for and remove foreign matter.	<b>B</b>	
			Sealing failure due to back pressure.		- Is the connection direction of the piping (fluid direction) opposite to the correct direction for the system?	- Check the connection direction of the piping.	<b>F</b>	
		Leakage from valve (External leakage)		Sealing failure due to the deterioration of the external O-ring (swelling, shrinkage) caused by the influence of temperature.	O-ring	- Is the ambient / fluid temperature within the specification range? Fluid temperature : -10 to 60°C Ambient temperature : -20 to 60°C	- Check the ambient / fluid temperature.	<b>C</b>
			Sealing failure or sliding failure due to adhesion of foreign matter in the pilot valve sliding part	Sub-valve, pilot valve	- Is foreign matter contained in the fluid?	- Check the fluid / filter. - Check for and remove foreign matter.	<b>B</b>	
			The pilot valve malfunctions due to resonance with the facilities around the product.		- Is vibration or impact applied?	- Check the vibration and impact.	<b>E</b>	
<b>Low flow rate</b>	Drop in the discharge flow rate		The main valve did not open adequately because of foreign matter caught in the main valve.	main valve	- Is foreign matter contained in the fluid?	- Check the fluid / filter. - Check for and remove foreign matter.	<b>B</b>	
			The main valve did not open sufficiently because of foreign matter caught in the sliding part of the pilot valve.	pilot valve	- Is foreign matter contained in the fluid?	- Check the fluid / filter. - Check for and remove foreign matter.	<b>B</b>	
<b>Noise</b>	Excessive Noise is generated.		Oscillation of the main valve due to insufficient operating pressure		- Is the minimum operating pressure within the specification range? * Min. operating pressure differential: 0.1 MPa	- Check the differential pressure at the time of valve opening operation.	<b>A</b>	
			Noise is generated in resonance with the vibration of facilities around the product.		- Is vibration or impact applied?	- Check the vibration and impact.	<b>E</b>	
			Oscillation of the diaphragm due to back pressure		- Is the connection direction of the piping (fluid direction) opposite to the correct direction for the system?	- Check the connection direction of the piping.	<b>F</b>	

#### Revision History

- 1: P14 Change of tightening torque value
- 2: P10 Substrate deletion  
P14 Figure3-1 replacement,  
Change of procedure content  
P20 deletion
- 3: P10 Duty addition  
P15 FG pin deletion , etc.

## SMC Corporation

Tel: + 81 3 5207 8249 Fax: +81 3 5298 5362

URL <https://www.smcworld.com>

---

Note: Specifications are subject to change without prior notice and any obligation on the part of the manufacturer.  
© SMC Corporation All Rights Reserved