



# Operation Manual

PRODUCT NAME

2 PORT SOLENOID VALVE  
FOR DUST COLLECTOR

MODEL / Series / Product Number

Series VXF(A)2

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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 relating to systems.

ISO 4413: Hydraulic fluid power -- General rules relating to systems.

IEC 60204-1: Safety of machinery -- Electrical equipment of machines .(Part 1: General requirements)

ISO 10218-1992: Manipulating industrial robots -Safety.

etc.



## Caution

**Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.



## Warning

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



## Danger

**Danger** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious 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. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.**

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.

2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.

3. An application which could have negative effects on people, property, or animals requiring special safety analysis.

4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.



# Safety Instructions

## Caution

### **1. The product is provided for use in manufacturing industries.**

The product herein described is basically provided for peaceful use in manufacturing industries.

If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.

If anything is unclear, contact your nearest sales branch.

## **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 regulation 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.**

## Caution

### **SMC products are not intended for use as instruments for legal metrology.**

Measurement instruments that SMC manufactures or sells have not been qualified by type approval tests relevant to the metrology (measurement) laws of each country.

Therefore, SMC products cannot be used for business or certification ordained by the metrology (measurement) laws of each country.



## Warning

### 1. Extended periods of continuous energization

-This product is the pulse operation type, so continuous energization can cause failure.

1. The pulse energization time (ON time) should be 300ms or less.

### 2. Not applicable as an explosion proof solenoid valve

### 3. Ensure sufficient space for maintenance activities

Allow sufficient space for maintenance and inspection.

### 4. Ensure sufficient capacity of header tank

The valve has high flow rate, so if header tank capacity is small, pressure drop during operation might be large, and the valve may oscillate due to insufficient pressure differential.

The pressure drop of the header tank per one pulse operation should be 0.1MPa or less as a guide.



## Warning

### 1. Quality of operating air

(1) Use clean air.

1) Piping sealing material, rust or debris entering the valve can result in a shorter valve life or malfunction in the early stages of operation.

2) If corrosive gas enters the valve, malfunction may occur due to corrosion and deterioration of the valve.

(2) Installation of air filter

Contaminated compressor oil and high moisture content can lead to performance deterioration of the valve. Install the filter with auto drain (filtration 5 $\mu$ m or less) to the system where the compressed air is cooled.

For detailed information regarding the quality of the compressed air described above, refer to "SMC's Cleaning Systems".

### 2. Ambient environment

Operate within the operating ambient temperature range (5~60°C).

### 3. Install the regulator and restrictor

If a regulator, or a restrictor, is installed immediately before the IN port or immediately after the OUT port of the valve, the main valve may oscillate.

Install them away from the valve or select the regulator or restrictor with higher flow rate.

### 4. Selection of pilot solenoid valve

The orifice diameter of the pilot solenoid valve which controls the air operated valve (VXFA) should be  $\phi$  4.5 or more.

### 5. Selection of piping for pilot solenoid valve

The terminal diameter (I.D.) of the piping between the air operated valve (VXFA) and pilot solenoid valve should be  $\phi$  6 or more.

The longer the piping length, the slower the response will be.



## Caution

### 1. Leakage current

If there is leakage current, valve may not turn off.

The leakage current should be 5% or less (AC coil) or 2% or less (DC coil) of the rated voltage.

### 2. Use in low temperature environments

Protection against freezing or solidification of impurities etc. When heating the valve body and piping by a heater, etc., be careful not to heat the coil with the heater.



## Warning

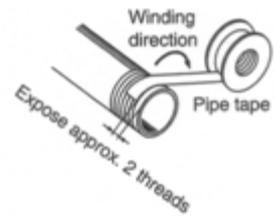
1. **If air leakage increases or the equipment does not operate properly, stop operation.**  
After installing, supply compressed air or electricity to the product and perform appropriate functional inspections to check it is mounted properly.
2. **Do not apply external force to the coil section.**
3. **Do not place the coil downward.**  
If the coil is installed downward, foreign matter in the fluid may stick to the armature, causing malfunction.
4. **Do not keep the coil assembly warm using a heat insulating material.**  
A tape heater to prevent freezing should be limited only to the piping and body. This can cause the coil to burn out.
5. **If the product is installed close to a vibration source, the distance from the body should be as short as possible to prevent resonance.**
6. **Operation Manual**  
Install only after reading the operation manual carefully and understanding the contents. Keep the manual where it can be referred to as necessary.
7. **Painting and coating**  
Do not erase or paint out the product number which is printed or attached to the product.

## Piping



## Caution

1. **Preparation before piping**  
Before piping, perform air blow (flushing) or cleaning to remove any cutting chips, cutting oil, dust, etc. from the piping. Connect piping so that force such as tension, compression or bending is not applied to the valve body.
2. **Wrapping of pipe tape**  
When screwing piping or fittings into ports, ensure that chips from the pipe threads or sealing material do not enter the piping.  
If a sealant tape is used, leave 1.5 to 2 threads exposed at the end of threads.
3. **Avoid connection of ground lines to piping, as this may cause electric corrosion of the system.**
4. **Tighten thread with the proper tightening torque.**  
When screwing fittings into valves, tighten with the proper tightening torque as shown below.



Tightening torque for piping

| Connection thread | Appropriate tightening torque(Nm) |
|-------------------|-----------------------------------|
| Rc 1/4            | 8 to 12                           |
| Rc 3/8            | 15 to 20                          |
| Rc 1/2            | 20 to 25                          |
| Rc 3/4            | 28 to 30                          |
| Rc 1              | 36 to 38                          |
| Rc 1 · 1/2        | 40 to 42                          |
| Rc 2              | 48 to 50                          |
| Rc 2 · 1/2        |                                   |
| Rc 3              |                                   |

## 5. Piping to products

When connecting piping to the product, avoid mistakes regarding the supply port, etc.

## Wiring



### Caution

#### 1. Wire

Use electric wires with a conduction area of 0.5 to 1.25mm<sup>2</sup> for wiring.

Make sure that no excessive force is applied to the wires.

#### 2. Adopt an electric circuit without chattering at the contacts.

#### 3. Keep the voltage within -10 to +10% of the rated voltage.

The voltage drop is measured at the lead wire with the coil connected.

If there is voltage drop, the valve response may decrease.

#### 4. If no solenoid surge is allowed in the electric circuit system, mount a surge absorber and the solenoid in parallel.

## Electrical Connection



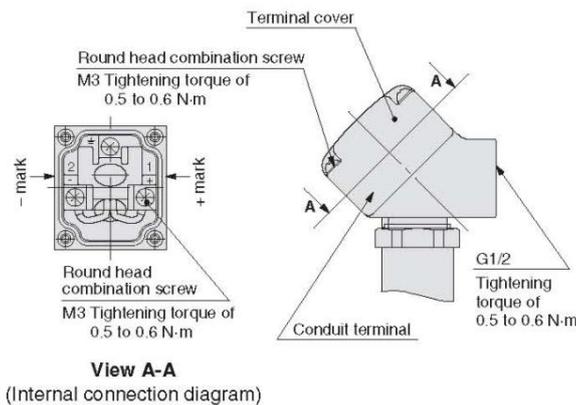
### Caution

#### Conduit terminal

The conduit terminal should be wired as indicated by the marks on the figure below.

—Tighten each part to the following torque.

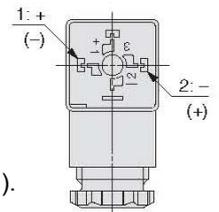
—Seal the piping (G1/2) firmly, using a specific electric wire tube.



#### DIN terminal (B only)

The DIN terminal is wired internally as shown below. Connect each of them to the corresponding wire of the power supply.

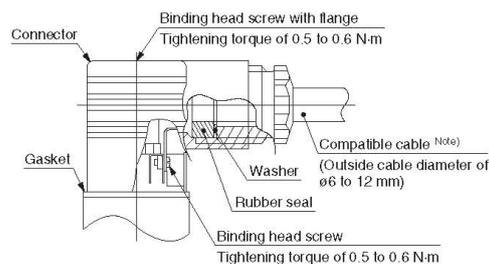
|              |      |      |
|--------------|------|------|
| Terminal no. | 1    | 2    |
| DIN terminal | +(-) | -(+) |



The polarity is not specified.

The applicable heavy-duty cord can be used up to 6 to 12mm of the cable outside diameter(O.D.).

Tighten each part to the following torque.



Note) If using a cable with outside diameter of  $\Phi 9$  to 12mm, remove the internal part of the rubber seal before using.

## Operating Environment



### Caution

1. Do not use in an atmosphere containing corrosive gases, chemicals, sea water, water, steam, or where there is direct contact with any of these.
2. Do not use in potentially explosive environments.
3. Do not mount the product in locations where it is exposed to radiant heat.
4. Employ suitable protective measures in locations where there is contact with water droplets, oil or welding spatter, etc.

## Maintenance



### Warnig

1. **Removing the product**
  - (1) Shut off the fluid supply and release the fluid pressure in the system.
  - (2) Shut off the power supply.
  - (3) Remove the product.
2. **Low frequency operation**

The valve should be switched at least once every 30 days to prevent malfunction.  
The product requires periodic inspection every 6 month for optimum operating conditions.
3. **Disassembly**

Do not disassemble the product except the replacement of the diaphragm assembly.



### Caution

1. **Filter**
  - (1) Make sure that the filter is not clogged.
  - (2) Replace filter elements after one year of use, or earlier if the pressure drop reaches 0.1MPa
2. **Remove the condensate from the air filter regularly**
3. **Diaphragm assembly**
  - (1) Diaphragm assembly is a consumable part. Replace the diaphragm assembly when wear or damage is found
  - (2) The guideline for replacement of the diaphragm assembly is one year or the number of operations shown below. (The life will be shorter depending on the operating condition)

The number of operations

| Size        | Cycles        |
|-------------|---------------|
| VXF21,22,23 | 500,000 times |
| VXF24,25    | 100,000 times |
| VXF26,27,28 | 50,000 times  |

## Handling precautions



### Caution

1. Internal leakage value given is when the inspection pressure is 0.7MPa. When the pressure is low, internal leakage may increase.

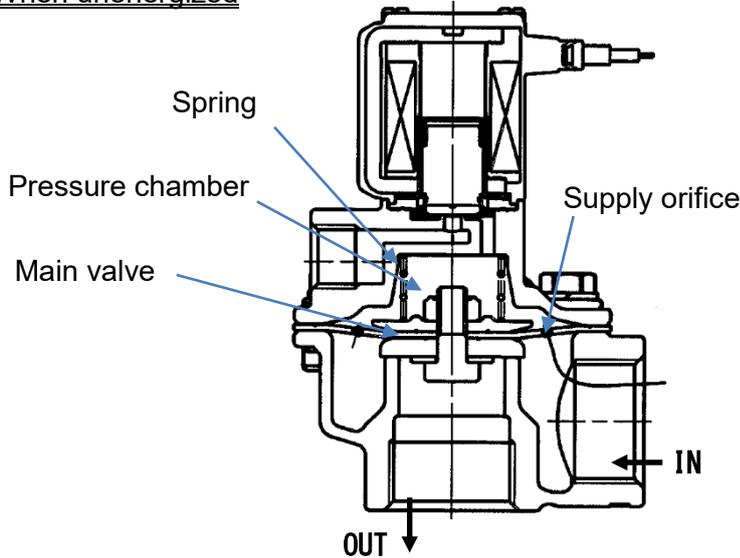
### 3. Outline

This operation manual introduces L shape 2-port valve with high response and instantaneous mass flow rate controlling capacity which discharges air in acoustic velocity and brushes off dust on the back filter or blows out work by taking advantage of impact wave.

Though main valve opens and closes by the pressure operation from the pressure working chamber, the opening velocity of the main valve is set as high velocity to gain maximum efficiency with smaller air consumption.

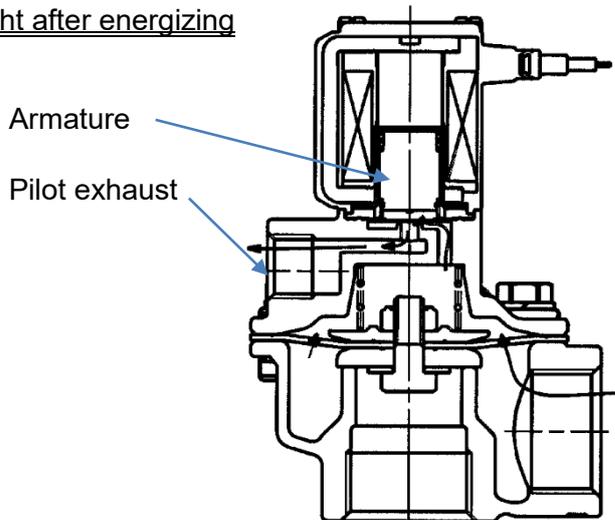
### 4. Operation principle

#### When unenergized



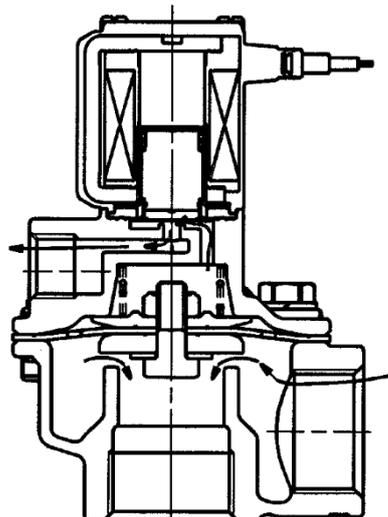
The fluid enters the IN side and goes through the supply orifice to fill the pressure chamber. The main valve is closed by the force which pushes down the valve and the spring reaction force.

#### Right after energizing



When the solenoid valve is energized, the armature will turn on and the fluid filled in the pressure chamber will be exhausted to the pilot exhaust side.

#### When energized



The pressure in the pressure chamber reduces by exhausting air to the pilot exhaust.

Because the force which pushes down the valve reduces by the discharge of the fluid, the force which pushes up the valve surpasses the push down force, opening the main valve.

5. **Specifications**  
Air operated type

|                            |     |                          |                  |                  |                  |                      |                           |                  |                  |
|----------------------------|-----|--------------------------|------------------|------------------|------------------|----------------------|---------------------------|------------------|------------------|
| Product number             |     | VXFA21A<br>A B □         | VXFA22A<br>A B □ | VXFA23A<br>A B □ | VXFA24A<br>A B □ | VXFA25(A,B)<br>A B □ | VXFA26(A,B,<br>C,D) A B □ | VXFA27B<br>A B □ | VXFA28B<br>A B □ |
| Orifice size               | mmφ | 22                       | 28               | 44               | 53               | 70                   | 80                        | 90               | 100              |
| Fluid                      |     | Air                      |                  |                  |                  |                      |                           |                  |                  |
| Minimum operating pressure | MPa | 0.03                     |                  |                  | 0.1              |                      |                           |                  |                  |
| Maximum operating pressure | MPa | 0.7                      |                  |                  |                  |                      |                           |                  |                  |
| Fluid temperature          | °C  | -10 (Non-freezing) to 60 |                  |                  |                  |                      |                           |                  |                  |
| Ambient temperature        | °C  | -10 to 60                |                  |                  |                  |                      |                           |                  |                  |
| Environment                |     | Indoor/Outdoor           |                  |                  |                  |                      |                           |                  |                  |

Solenoid valve type

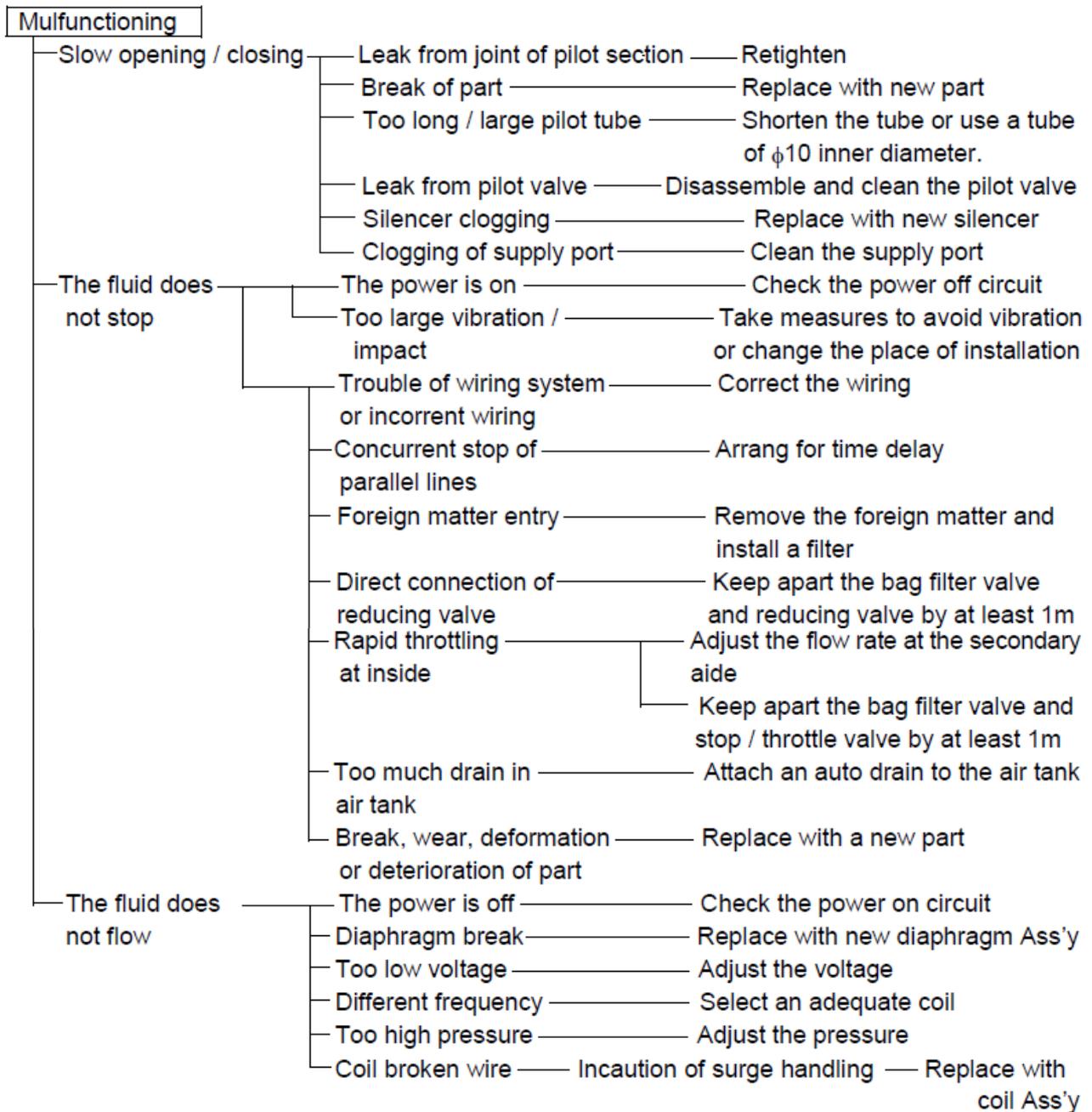
|                              |     |                          |               |               |               |                   |                        |               |               |
|------------------------------|-----|--------------------------|---------------|---------------|---------------|-------------------|------------------------|---------------|---------------|
| Product number               |     | VXF21A<br>□ □            | VXF22A<br>□ □ | VXF23A<br>□ □ | VXF24A<br>□ □ | VXF25(A,B)<br>□ □ | VXF26(A,B,<br>C,D) □ □ | VXF27B<br>□ □ | VXF28B<br>□ □ |
| Orifice size                 | mmφ | 22                       | 28            | 44            | 53            | 70                | 80                     | 90            | 100           |
| Fluid                        |     | Air                      |               |               |               |                   |                        |               |               |
| Minimum operating pressure   | MPa | 0.03                     |               |               | 0.1           |                   |                        |               |               |
| Maximum operating pressure   | MPa | 0.7                      |               |               |               |                   |                        |               |               |
| Fluid temperature            | °C  | -10 (Non-freezing) to 60 |               |               |               |                   |                        |               |               |
| Ambient temperature          | °C  | -10 to 60                |               |               |               |                   |                        |               |               |
| Coil insulation type         |     | Class B                  |               |               |               |                   |                        |               |               |
| Enclosure                    |     | IP65                     |               |               |               |                   |                        |               |               |
| Alloable voltage fluctuation |     | ±10% of rated voltage    |               |               |               |                   |                        |               |               |
| Power consumption            | AC  | VA                       | 7             | 10            | 7             |                   |                        |               |               |
|                              | DC  | W                        | 4.5           | 8             | 4.5           |                   |                        |               |               |
| Environment                  |     | Indoor                   |               |               |               |                   |                        |               |               |

※1: Use within the allowable voltage fluctuation range of the load to be connected.

※2: Check the current of the connected load does not exceed the load output current.

## 6. Trouble shooting

When a failure during the operation, check in the procedure and take the countermeasures as shown below.



## 7. Disassembly/ Assembly Procedure (Refer to page 13.)

### 7.1 For diaphragm assembly

When disassembling, shut off the pressure source and release the residual pressure, then disassemble according to the following procedure.

#### 7.1.1. Disassembly Procedure

- 1) Loosen hexagon socket head cap screw 1 so that bonnet 2, spring 3 and diaphragm Ass'y 4 are disassembled.

#### 7.1.2. Assembly Procedure

- 1) Assemble main body of diaphragm Ass'y 4 (white resin part) to face body side. Please note if assembling it in opposite, body seat face may cause leakage due to the scratch.
- 2) There is a supply orifice hole on diaphragm Ass'y 4. Assemble this hole on the opposite side of body IN side.
- 3) Tighten hexagon socket head cap screw 1 with gradually adding tightening torque in diagonal order. Final tightening torque should be following.

| Product number           | Diaphragm Assembly Note4) |                     | Tightening torque(N.m) |                     |
|--------------------------|---------------------------|---------------------|------------------------|---------------------|
|                          | At normal temperature     | At high temperature | At normal temperature  | At high temperature |
| VXF(A)21A(A,B,C,D)       | VXF-21AA                  | VXF-21AC            | 5.2~6.3                | 6.3~7.3             |
| VXF(A)22A(A,B,C,D)       | VXF-22AA                  | VXF-22AC            |                        |                     |
| VXF(A)23A(A,B,C,D)       | VXF-23AA                  | VXF-23AC            | 24.5~29.5              | 29.5~34.3           |
| VXF(A)24A(A,B,C,D)       | VXF-24AA                  | VXF-24AC            |                        |                     |
| VXF(A)25A(A,B,C,D)       | VXF-25AA                  | VXF-25AC            | 12.5~15                | 15~17.5             |
| VXF(A)26A(A,C) Note.5)   | VXF-26AA                  | VXF-26AC            | 24.5~29.5              | 29.4~34.3           |
| VXF(A)26A(B,D) Note.5)   | VXF-26AB                  | VXF-26AD            |                        |                     |
| VXF(A)25B(A,B,C,D)       | VXF-25AA                  | VXF-25AC            | 12.5~15                | 15~17.5             |
| VXF(A)26B(A,C) Note.5)   | VXF-26BA                  | VXF-26BC            | 24.5~29.5              | 29.4~34.3           |
| VXF(A)26B(B,D) Note.5)   | VXF-26BB                  | VXF-26BD            |                        |                     |
| VXF(A)26C(A,C) Note.5)   | VXF-26CA                  | VXF-26CC            |                        |                     |
| VXF(A)26C(B,D) Note.5)   | VXF-26CB                  | VXF-26CD            |                        |                     |
| VXF(A)26D(A,C) Note.5,6) | VXF-26CA                  | VXF-26CC            |                        |                     |
| VXF(A)26D(B,D) Note.5,6) | VXF-26CB                  | VXF-26CD            |                        |                     |
| VXF(A)27B(A,B,C,D)       | VXF-27BA                  | VXF-27BC            |                        |                     |
| VXF(A)28B(A,B,C,D)       | VXF-28BA                  | VXF-28BC            |                        |                     |

#### Note

- 1) Check visually that thread part of hexagon socket head cap screw is completely got through the bolt hole of diaphragm Ass'y at assembly. If thread is not properly screwed in the bolt hole at tightening, leakage or diaphragm damage might be caused.  
Screw-in thread part of hexagon socket head cap screw to the bonnet and diaphragm Ass'y before assembling them on the body so that the risk of diaphragm falling is minimized.
- 2) If hexagon socket head cap screw is partially tightened, it may cause leakage.  
Assembly tightening should comply with Assembly Procedure 3).
- 3) If tightening hexagon socket head cap screw by eye, hexagon socket head cap screw may come off during the operation or diaphragm might be torn. Therefore, be sure to follow the tightening torque.

- 4) Includes springs.
- 5) VXF26: If the customer ordered a product without a silencer and retrofitted the silencer, the operation at ON may become unstable.  
When retrofitting a silencer, it is necessary to replace the diaphragm assembly.  
Even if the silencer is removed from a product with a silencer, the diaphragm assembly must be replaced. This is because the operation may become unstable when it is OFF.
- 6) The tightening torque for M4 bolts is 1.3 to 1.5 N · m.

## 7.2 For diaphragm assembly of pilot valve.

When disassembling, shut off the pressure source and release the residual pressure, then disassemble according to the following procedure.

### 7.2.1. Disassembly Procedure

- 1) Loosen hexagon socket head cap screw 1 so that bonnet 2, spring 3 and diaphragm Ass'y 4 are disassembled.

### 7.2.2. Assembly Procedure

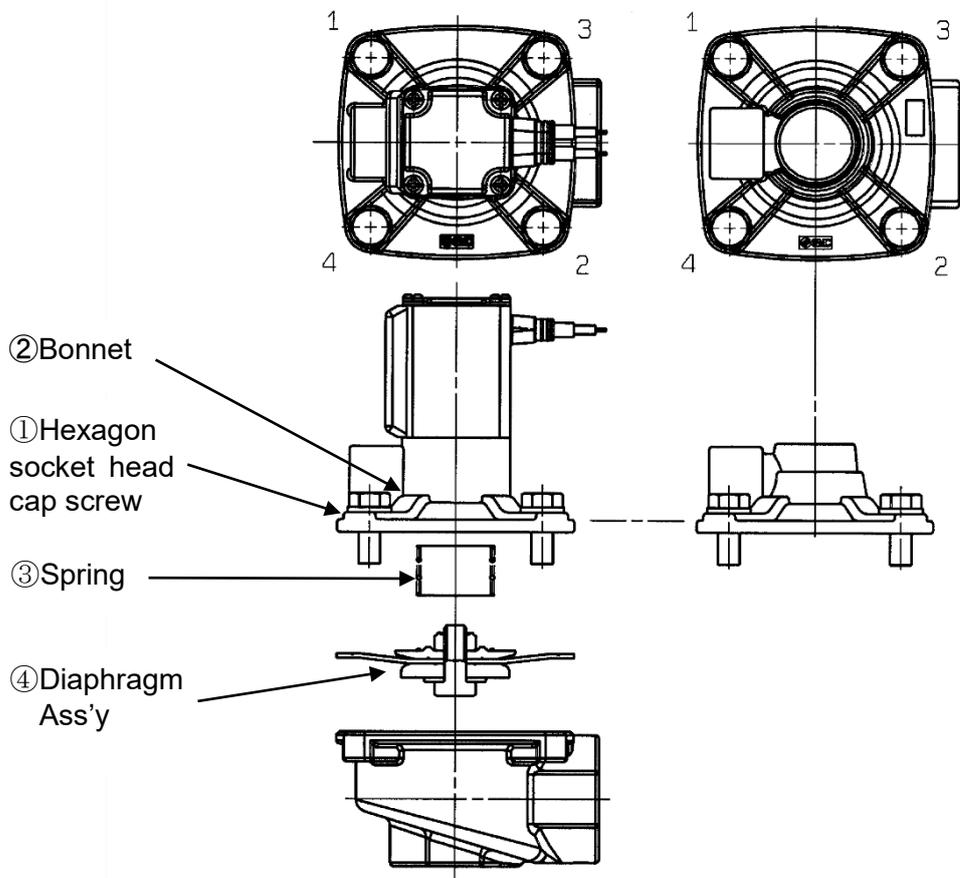
- 1) Assemble crimped side of diaphragm Ass'y 4 (white resin part) to face body side. Please note if assembling it in opposite, body seat face may cause leakage due to the scratch.
- 2) There is a supply orifice hole on diaphragm Ass'y 4. Assemble this hole on the opposite side of body IN side.
- 3) Tighten hexagon socket head cap screw 1 with gradually adding tightening torque in diagonal order. Final tightening torque should be following.

| Product number | Diaphragm for pilot valve | Tightening torque(N.m) |
|----------------|---------------------------|------------------------|
| VXF(A)24       | VXD30-3A-(F)-1,2A         | 1.3 to 1.5             |
| VXF(A)25       | VXD40S-3A-(F)-1,2A        | 2.8 to 3.0             |
| VXF(A)26       |                           |                        |
| VXF(A)27       |                           |                        |
| VXF(A)28       |                           |                        |

### Note

- 1) If hexagon socket head cap screw is partially tightened, it may cause leakage. Assembly tightening should comply with Assembly Procedure 3).
- 2) If tightening hexagon socket head cap screw by eye, hexagon socket head cap screw may come off during the operation or diaphragm might be torn. Therefore, be sure to follow the tightening torque.

## VXF(A)21,22,23A\*\* Disassembly/ Assembly Procedure



Assemble the pilot port position of the diaphragm assembly as shown in the figure below.

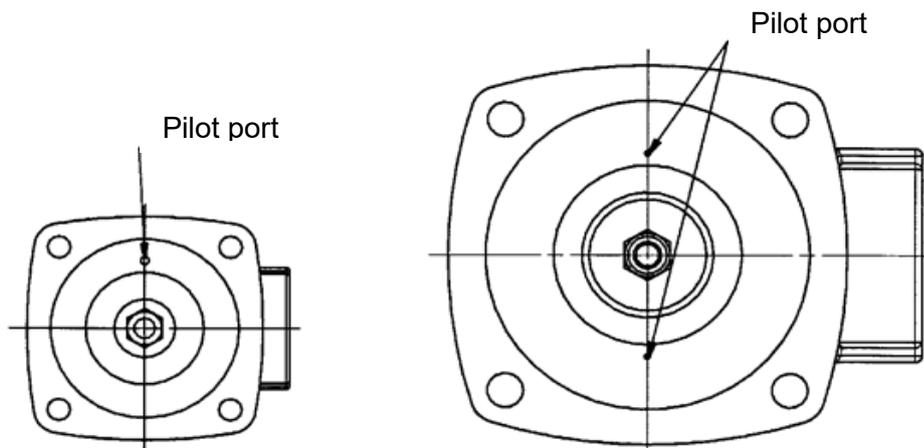
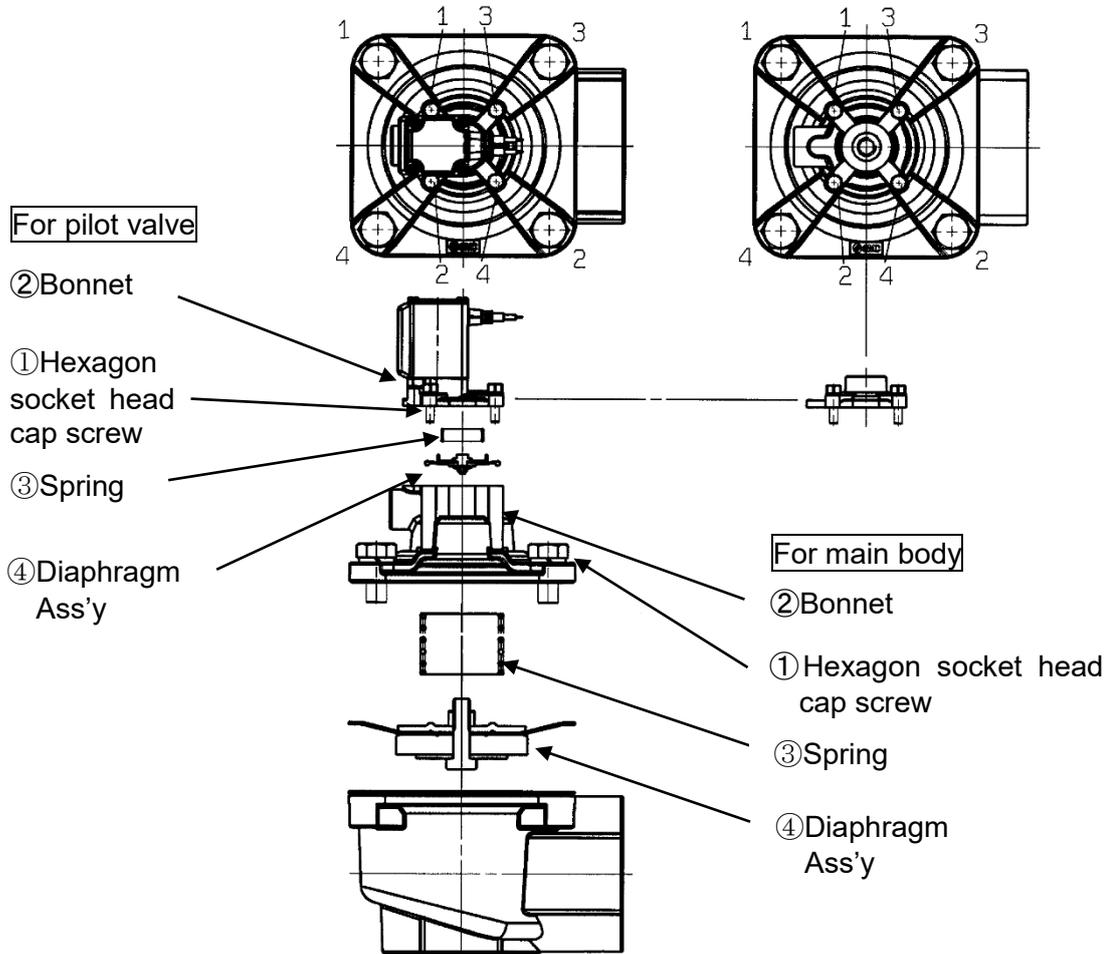


Fig. Pilot port position of the diaphragm assembly

# VXF(A)24A\*\* Disassembly/ Assembly Procedure



Assemble the pilot port position of the diaphragm assembly as shown in the figure below.

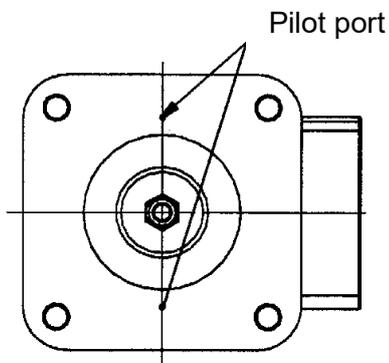


Fig. Pilot port position for main body

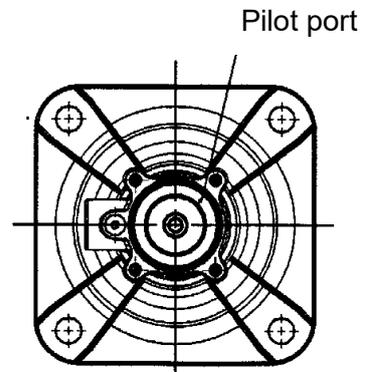
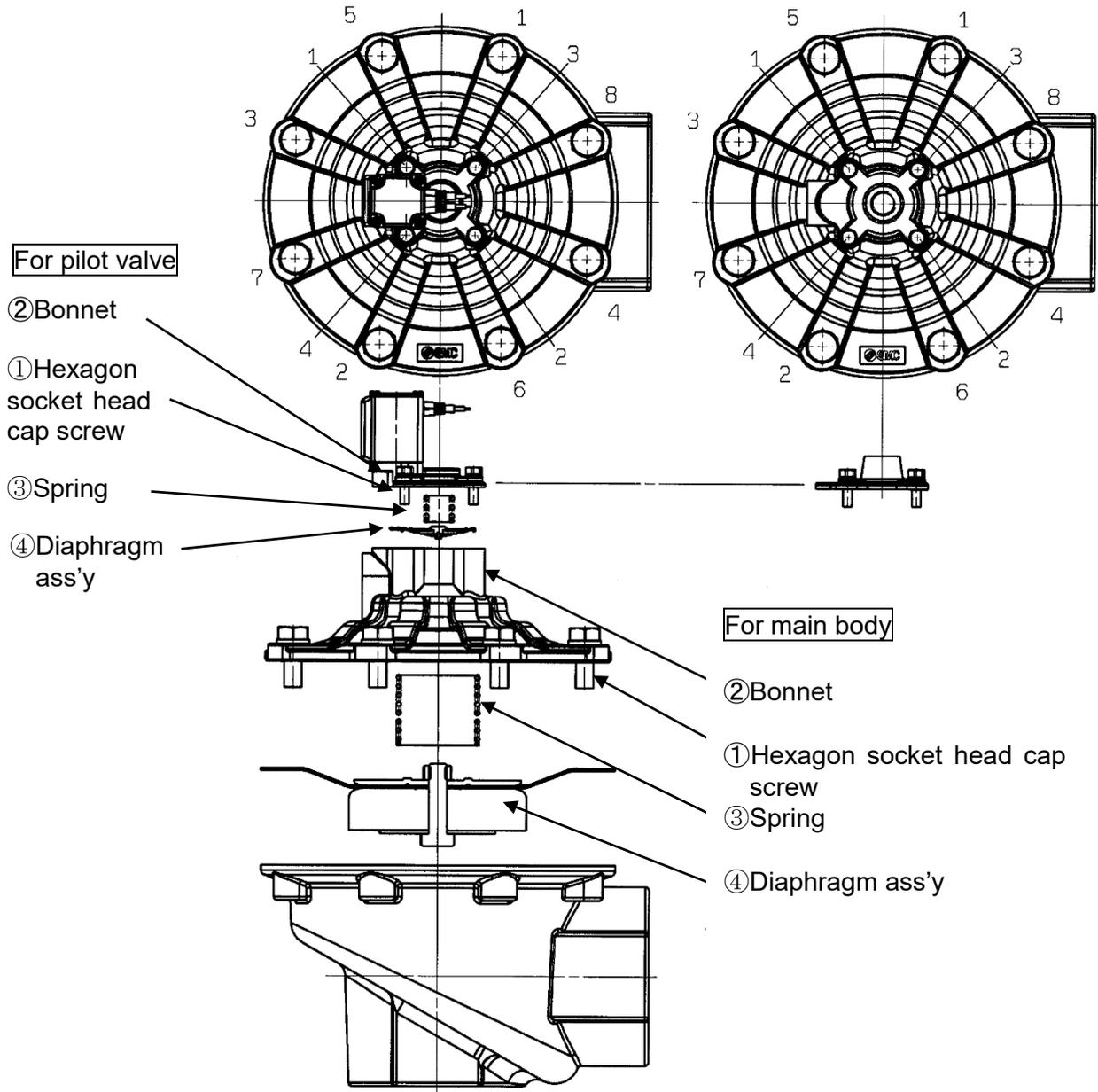


Fig. Pilot port position for pilot valve

## VXF(A)25,26A\*\* Disassembly/ Assembly Procedure



Assemble the pilot port position of the diaphragm assembly as shown in the figure below.

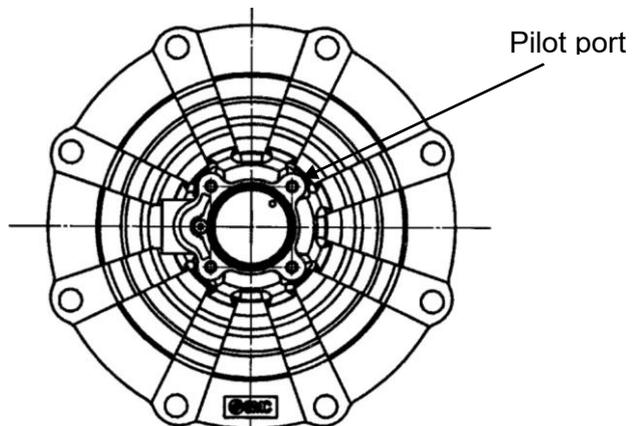
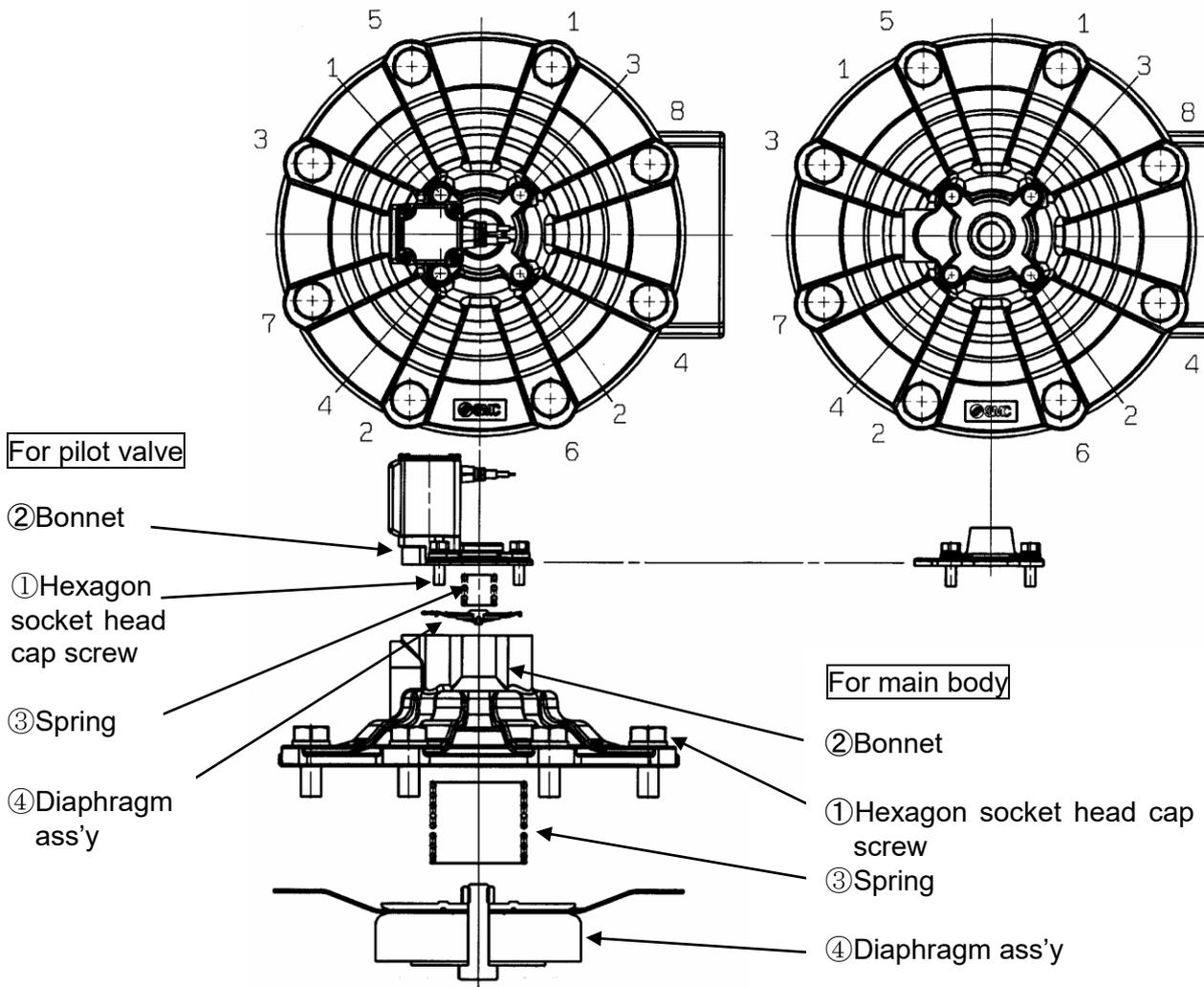


Fig. Pilot port position for pilot valve

VXF(A)25,26,27,28B\*\* Disassembly/ Assembly Procedure



Assemble the pilot port position of the diaphragm assembly as shown in the figure below.

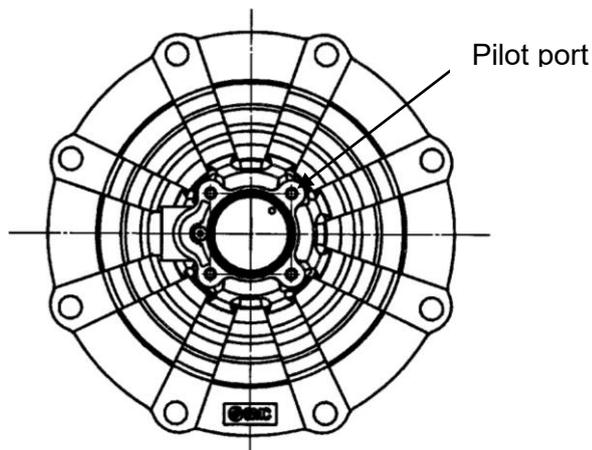
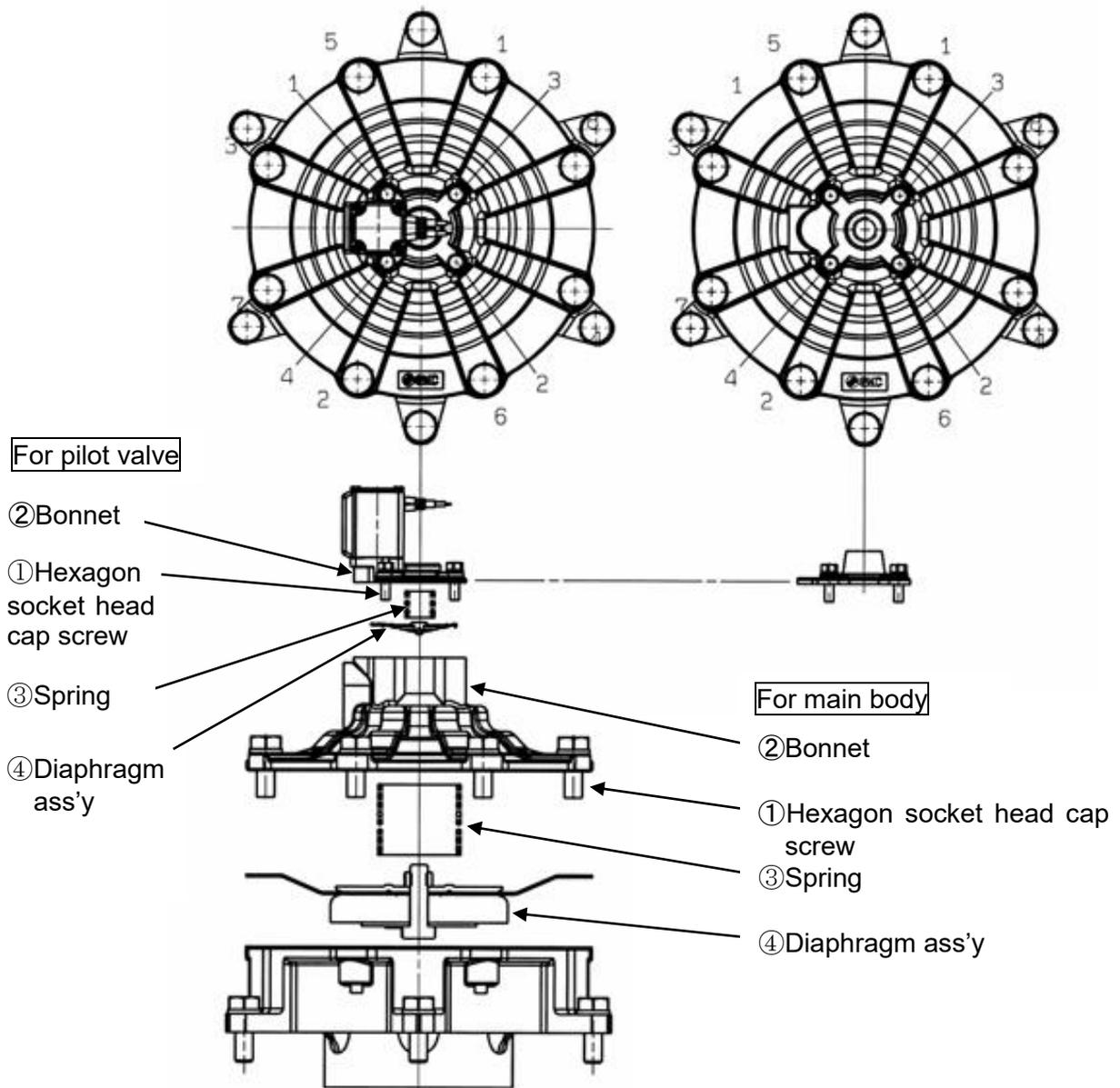


Fig. Pilot port position for pilot valve

VXF(A)26C\*\* Disassembly/ Assembly Procedure



Assemble the pilot port position of the diaphragm assembly as shown in the figure below.

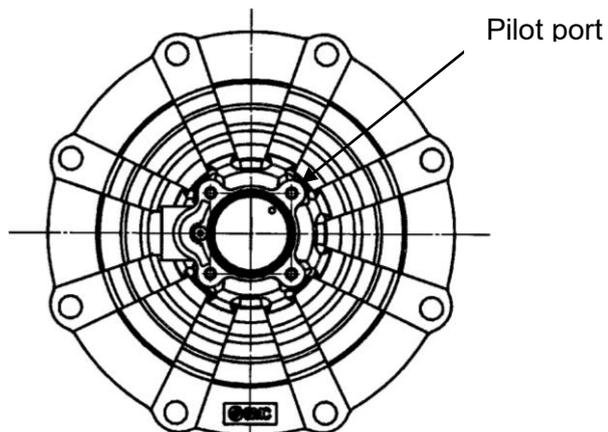
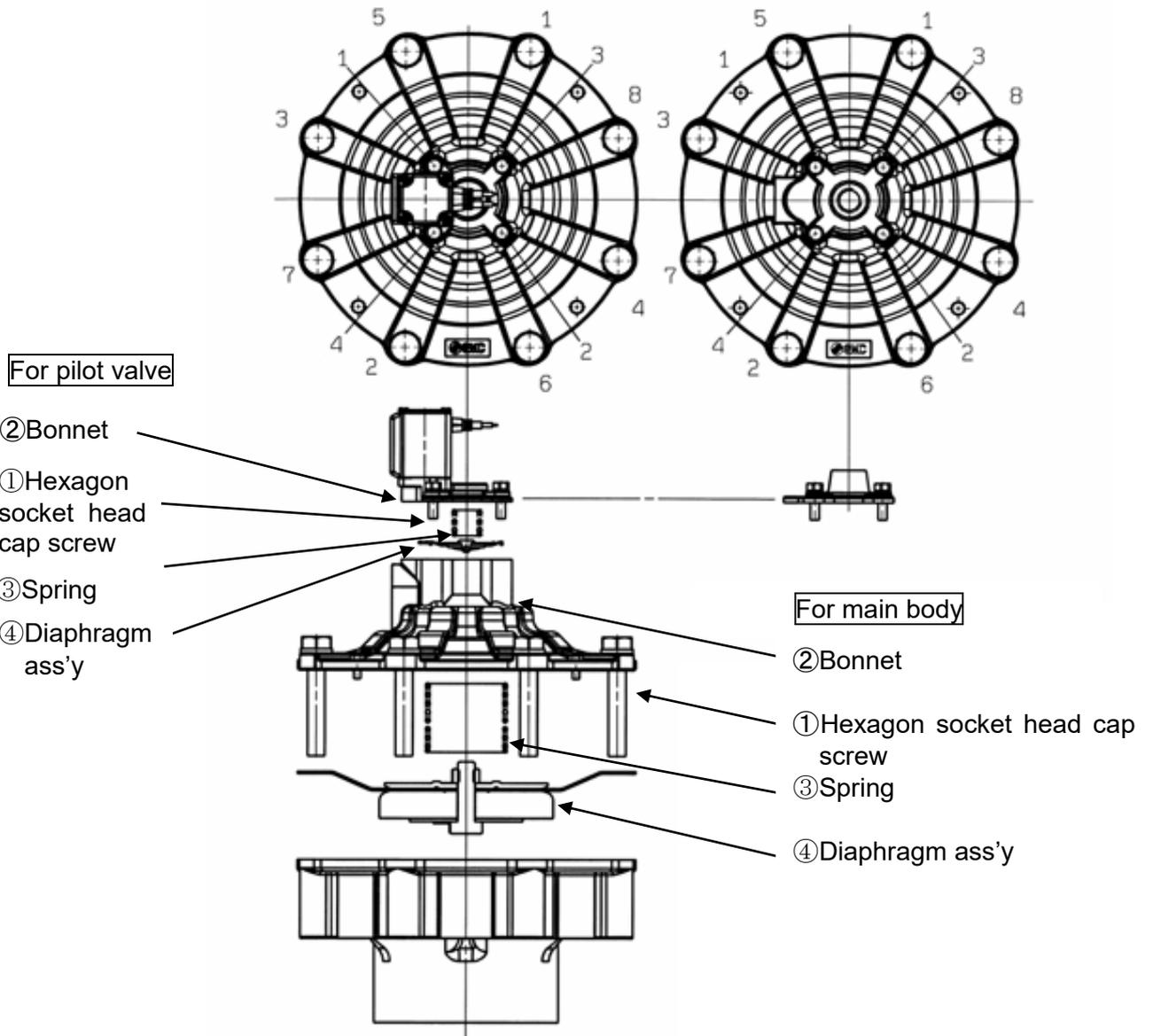


Fig. Pilot port position for pilot valve

# VXF(A)26D\*\* Disassembly/ Assembly Procedure



Assemble the pilot port position of the diaphragm assembly as shown in the figure below.

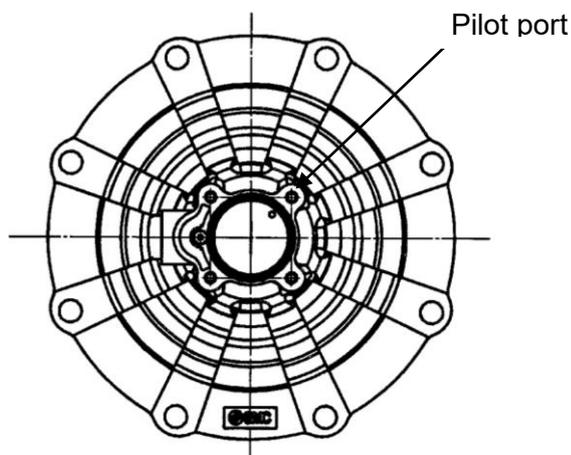


Fig. Pilot port position for pilot valve

| Revision history |
|------------------|
| A:Create New     |

## SMC Corporation

4-14-1, Sotokanda, Chiyoda-ku, Tokyo 101-0021 JAPAN

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

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

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Note: Specifications are subject to change without prior notice and any obligation on the part of the manufacturer.  
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