

## Instruction Manual

## Solenoid Operated Pulse Valve for Dust Collector

## 56-JSXF(E/F/H) Series



<b>Ex classification:</b>	II 3 G Ex ec h IIB T3 Gc II 3 D Ex h tc IIB T161°C Dc
<b>Ambient temperature:</b>	-20°C ≤ Ta ≤ +60°C
<b>Certificate reference:</b>	SMC 21.0041 X
<b>'X' Special conditions for safe use apply, see section 1.2.</b>	

The intended use of this product is to provide a pulse of air in dust collector and similar systems.

## 1 Safety Instructions

## 1.1 General safety instructions

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

<sup>1)</sup> ISO 4414: Pneumatic fluid power - General rules relating to systems.  
ISO 4413: Hydraulic fluid power - General rules relating to systems.  
IEC 60204-1: Safety of machinery - Electrical equipment of machines. (Part 1: General requirements)  
ISO 10218-1: Robots and robotic devices - Safety requirements for industrial robots - Part 1: Robots.

- Refer to product catalogue, Operation Manual and Handling

Precautions for SMC Products for additional information.

- Keep this manual in a safe place for future reference.

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

## Warning

- Always ensure compliance with relevant safety laws and standards.**
- All work must be carried out in a safe manner by a qualified person in compliance with applicable national regulations.
- If this equipment is used in a manner not specified by the manufacturer the protection provided by the equipment may be impaired.

## 1.2 Special conditions for safe use

## Warning

- To avoid the build-up of electrostatic charge, do not mount in areas subject to electrostatic charging mechanisms and clean only with a damp cloth and allow to dry naturally.
- The product shall be protected from impacts in compliance with the applicable explosive atmosphere standards.
- The product must be protected from UV light.
- Do not separate the DIN connector in hazardous locations.

## 2 Specifications

## 2.1 Valve specification

Valve construction	Diaphragm Type Pilot Operated			
Valve type	Normally closed (N.C.)			
Piping	JSXFE	Compression fitting <sup>Note 1)</sup>		
	JSXFF	Direct piping		
	JSXFH	Tank mounting (immersion) <sup>Note 2)</sup>		
Port size [inch]	3/4	1	1 1/2	2 <sup>Note 3)</sup>
Orifice, Ø [mm]	32	40	JSXFE/F:50 JSXFH:45	55 <sup>Note 3)</sup>
Tank size ANSI [inch] <sup>Note 3)</sup>	4, 5	5, 6	6, 8	8, 10
Fluid	Air			
Air filtration [µm]	5 (or less)			
Minimum operating pressure differential [MPa]	0.1			
Maximum operating pressure differential [MPa]	0.9			
Maximum system pressure [MPa]	0.9			
Fluid temperature [°C]	-20 <sup>Note 4)</sup> to +60			
Ambient temperature [°C]	-20 <sup>Note 4)</sup> to +60			
Flow characteristics	Contact SMC			
Response time [ms]	Contact SMC			
Duty cycle	≤33% (MAX ON 1s)			
Minimum operating frequency	1 cycle / 30 days			
Maximum operating frequency [Hz]	0.5			
Lubrication	Not required			
Mounting orientation	Unrestricted			
Operating environment	Indoor/Outdoor <sup>Note 5)</sup>			
Weight	Refer to catalogue			

Note 1) Seals and washers included.

Note 2) Valve and piping packed together, not assembled.

Note 3) Only available for JSXFH.

Note 4) Take measures to prevent condensation, freezing or solidification of impurities etc. The installation of a dryer is recommended to prevent freezing conditions (e.g. when dew point temperature is high and ambient temperature low or rate of flow is high).

Note 5) Ensure the product is protected from UV light and rainwater.

## 2.2 Solenoid specification

Electrical entry	DIN terminal
Coil rated voltage [V, DC]	24
Allowable voltage fluctuation	±10% of rated voltage
Enclosure	IP65

Power consumption [W,DC]	12
Allowable leakage voltage	≤ 2% of rated voltage
Surge voltage suppressor	Varistor
Coil insulation class	B

## 2.3 Production batch codes

Construction Year / Month	Production batch codes											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2022	Ao	AP	AQ	AR	AS	AT	AU	AV	AW	AX	Ay	AZ
2023	Bo	BP	BQ	BR	BS	BT	BU	BV	BW	BX	By	BZ
...	...	...	...	...	...	...	...	...	...	...	...	...
2026	Eo	EP	EQ	ER	ES	ET	EU	EV	EW	EX	Ey	EZ

Note: The batch code is included on the product label.

## 2.4 JSXF(E/F/H) port sizes and options

Model	Tank size	Port size			
		06	10	14	20
JSXFE	-	•	•	•	-
JSXFF	-	•	•	•	-
JSXFH	4 Inch	•	-	-	-
	5 Inch	•	•	-	-
	6 Inch	-	•	•	-
	8 Inch	-	-	•	•
	10 Inch	-	-	-	•
Silencer		•	•	•	•

## 3 Installation

## 3.1 General

## Warning

- Do not install the product unless the safety instructions have been read and understood.
- The valve is designed for pulse operation. Do not energise the valve continuously as it can cause oscillation (chattering) of the diaphragm leading to product failure due to the large amount of air consumed causing insufficient air supply on the inlet side. In addition, continuous energisation may lead to excessive temperature rise. See 2.1 for maximum operating frequency and duty cycle limitations.
- Customer shall ensure that the sudden pulse of air released by the valve when operated does not generate an ignition source within the system.
- See 3.3 regarding internal earthing and external bonding.
- Use clean air filtered to 5 µm or less. Filtration to be installed upstream near to the valve.

## Caution

- Use steel tubing for the inlet and outlet piping.
- Do not rely on the valve piping ports to support the piping. Ensure that the piping is independently supported so that pulling, pressing, bending or other forces are not applied to the valve body.
- For details regarding pipe sizes, refer to the standard JSXF Series catalogue.
- Ensure that the air supply is sufficient to meet the high flow demand of the valve when operated. If the inlet is restricted or the supply tank capacity is low, then the main valve may oscillate (chatter) due to pressure drop or insufficient supply.

## 3.2 Environment

## Warning

- Do not use in an environment where corrosive gases, chemicals, salt water or steam are present.
- The product must be protected from UV light.
- Do not install in a location subject to vibration or impact.
- Do not mount in a location exposed to radiant heat that would result in temperatures in excess of the product's specifications.
- The valves are certified to Ex category 3GD (Zones 2, 22).
- Do not mount in areas subject to electrostatic charging mechanisms.
- Do not install in locations subject to the accumulation of water.

Exposure to natural weather is not permitted.

- Products compliant with IP65 enclosures are protected against dust and water, however, these products cannot be used in water.
- Products compliant with IP65 enclosures satisfy the specifications by mounting each product properly. Be sure to read the Specific Product Precautions for each product.

## 3.3 Earthing and Bonding

## Warning

## 3.3.1 Internal earthing

An internal earth connection is not required for this 24 VDC, 2-wire product. The earth connection facility of the DIN connector has no function. Only pins 1 and 2 (+/-) of the connector shall be wired, see 3.7 for connection diagram.

## Warning

## 3.3.2 External bonding

- An external bonding facility is mandatory for this product. A ring terminal is provided (included in product packaging) for this purpose to be installed using the marked main valve bonnet hexagon bolt, see Fig.6. Locations shown in Fig.1.
- Refer to the disassembly and assembly procedures, 6.2 and 6.3, for mounting the ring terminal.
- Use cable with insulated wires, stranded, 4 to 6.64 mm<sup>2</sup>.
- Terminate wire to the ring terminal using an appropriate crimping tool.
- After crimping, check the crimp by slightly pulling the insulated wire.
- Check valve continuity with external bonding circuit after installation.
- Check marked main valve bonnet hexagon bolt tightness periodically, see section 6.1.

## 3 Installation (continued)

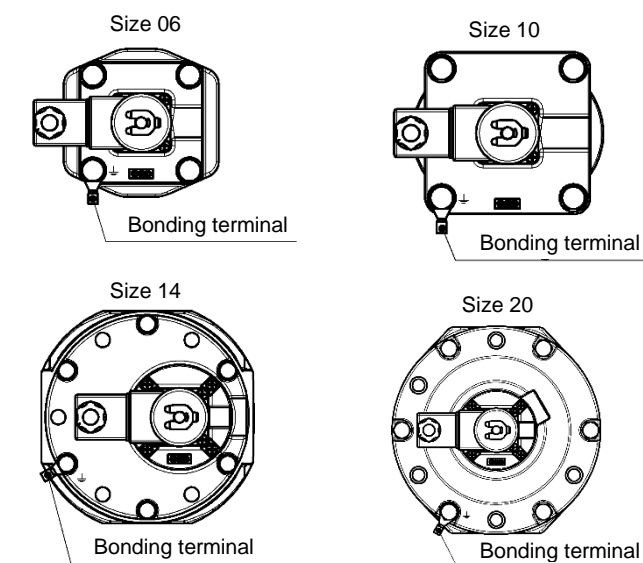


Fig.1

## 3.4 Piping

## Caution

- Before connecting piping make sure to clean up chips, cutting oil, dust etc.
- When installing piping or fittings, ensure sealant material does not enter inside the port. When using seal tape, leave 1.5 to 2 threads exposed on the end of the pipe/fitting.
- Tighten fittings to the specified tightening torque.

Fitting tightening torque	
Connection thread [Rc]	Tightening torque [N·m]
1/4	12 to 14
3/8	22 to 24
1/2	28 to 30
3/4	28 to 30
1	36 to 38
1 1/2	40 to 42

## 3.5 Valve mounting - JSXFE and JSXFH

## 3.5.1 JSXFE

## Warning

- The compression fitting is used to seal the connection between the valve and the pipework. Do not rely on the compression fitting to support the piping as it could become detached. Ensure that inlet and outlet piping is secured with separate fixings.

## Caution

- Mount the valve to fixed metal piping (to ensure correct sealing of the fitting, do not expose the piping to oil or moisture).
- Insert the piping into the valve body until it stops to prevent misalignment of the piping in relation to the valve body, see Fig.2.

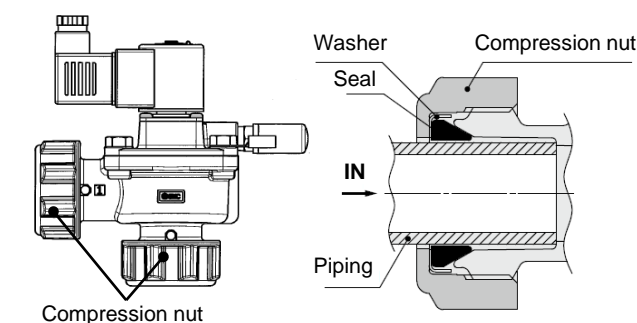


Fig.2

- Tighten the compression nut sufficiently to prevent nut becoming loose and leakage occurring. Hand tighten, then secure with a wrench.

Tightening angle after hand-tightening	
Size	Wrench tightening angle [°]
3/4 (20A)	90 to 270
1 (25A)	135 to 315
1 1/2 (40A)	150 to 330

**3 Installation (continued)**

**3.5.2 JSXFH**

- The valve and pipe assembly are mounted to the tank, see Fig.3.
- Note: Tank to be provided by the customer.

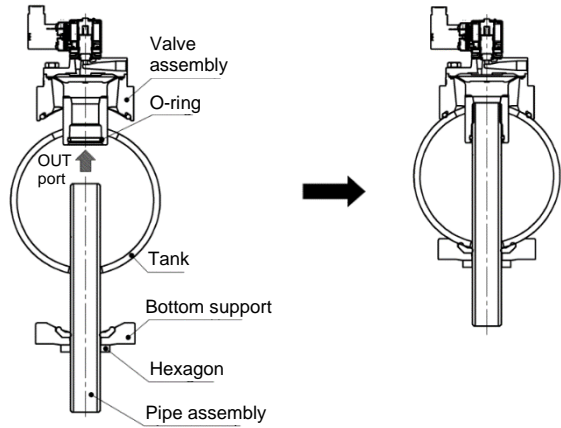


Fig.3

- Insert the pipe assembly vertically through the tank and screw it into the OUT port of the valve. Take care when engaging the pipe assembly into the valve assembly as incorrect alignment of the pipe assembly may damage the O-ring inside the valve.
- Once the pipe assembly thread is correctly engaged with the OUT port thread, continue tightening the pipe assembly until the body and the bottom support touch the tank.
- Tighten with a wrench or other tool so that the bottom support does not rotate, see Fig.4.



Fig.4

Note: Secure the bottom support with a wrench (method 'a' or 'b' can be used). When securing, align the tank with the curved surface of the bottom support.

- Tighten the pipe assembly hexagon nut with a wrench to the specified tightening torque in the table below.

Size	Tightening torque [N•m]
3/4 (20A)	30
1 (25A)	50
1 1/2 (40A)	50
2 (50A)	120

**Caution**

- Excessive tightening may damage the valve or deform or damage the tank.
- It is recommended that the tank be constructed from ANSI SCH40 pipe (or pipe of equivalent strength). If a custom tank is to be fabricated suitably rated material should be used. For recommended tank hole dimensions and spacing, see Fig.5.

**3 Installation (continued)**

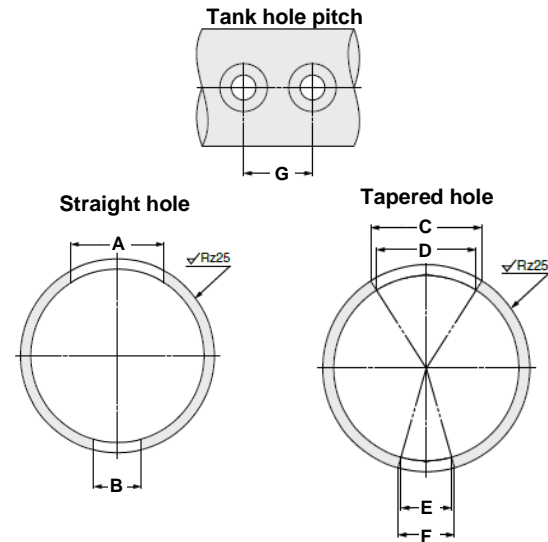


Fig.5

Port size	A	B	C	D	E	F	G (min.)
06	55	28	61.5	55	28	31.3	95
10	69	36	76	69	36	39.7	100
14	95	52	103.8	95	52	56.8	135
20	117	62	126.4	117	62	67	175

Dimensions in mm; tolerance +1, 0.

**3.6 Electrical connection**

**Warning**

**3.6.1 Electrical instructions**

- Do not connect or disconnect the DIN connector while energised.
- Do not separate the DIN connector in hazardous locations.
- Whenever the DIN connector is disconnected, protection shall be provided to prevent:
  - dust and/or water from entering the coil or connector and
  - the accumulation of water and/or dust on the DIN connector and coil mating surfaces.

- See 3.3 regarding internal earthing and external bonding.

**3.6.2 Wiring instructions**

The electrical connection shall be made using the DIN connector provided. Use of any other connector renders the SMC Declaration of Conformity for the 56-JSXF invalid.

DIN connector (SMC part No. EVS7060-61)

Components:

- Terminal block
- Housing with cable gland
- Mounting screw and sealing washer  
Hexagon socket SW2
- Cable sealing rings  
1 pc for cable diameter 4 - 6 mm  
1 pc for cable diameter 6 - 8 mm
- Cable clamping ring
- Gland nut
- Gasket

Specifications:

Rated voltage [VAC/VDC]	<= 250
Current rating [A]	<= 3
Conductor cross-section [mm <sup>2</sup> ]	0.5 ~ 1.25
Gland nut torque [N•m]	1.8 (± 0.2)
Mounting screw torque [N•m]	0.4 (± 0.1)

Preparation for wiring the DIN connector:

- Make sure that the sealing ring and gasket do not become damaged during assembly.
- Select the correct size sealing ring, 4-6 mm or 6-8 mm, for the cable used. Only one sealing ring to be used per installation.
- Observe the properties of the cable regarding respective requirements and ambient conditions at the point of wiring (see EN 60079-14). Prevent the cables and wires from being damaged.

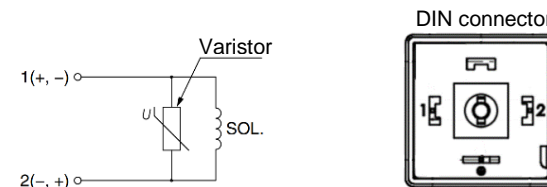
**3 Installation (continued)**

- The installation shall provide strain relief for the cable close to the connector to ensure that strain and torsion are not transmitted to the connector.
- Stranded and fine-stranded conductors with end sleeves or solid conductors may be used. Only one wire end may be used for each clamp. Soldering of stranded and fine-stranded wire ends is not permitted.
- The housing can be orientated about the terminal block in any of the 4 available positions (increments of 90°).

Wiring the connector:

- Remove the housing screw and insert a screwdriver into the slot on the underside of the DIN cap and carefully remove the block.
- Insert the cable through the gland nut, clamp ring, sealing ring and housing.
- Loosen the terminal screws on the block and insert the prepared ends of the conductors. Secure each conductor by tightening the terminal screw to a torque of 0.2 (+ 0.1) N•m.
- Locate the terminal block into the housing in the desired orientation.
- Tighten the housing gland nut to secure the cable to a torque of 1.8 (± 0.2) N•m.
- Mount the DIN connector to the coil ensuring that the gasket provided is installed correctly. Tighten the mounting screw, with sealing washer, to a torque of 0.4 (± 0.1) N•m.

**3.7 Electrical circuit**



**3.8 Residual voltage**

**Caution**

The varistor (surge suppressor) arrests the back EMF voltage from the coil to approximately 60 V. Ensure the transient voltage is within the specification of the host controller.

**3.9 Countermeasure for surge voltage**

**Caution**

Sudden interruption of power supplied to large inductive devices may cause non-polar type valves in a de-energised state to switch. When installing a breaker circuit to isolate the power to such devices, consider installation of a surge absorption diode across the output of the breaker.

**3.10 Lubrication**

**Caution**

The JSXF Series of valves do not require lubrication for correct operation and are therefore supplied un-lubricated. Lubricated air should not be supplied to these valves.

**4 How to Order**

Refer to 56-JSXF customer drawings.

**5 Outline Dimensions**

Refer to 56-JSXF customer drawings.

**6 Maintenance**

**Warning**

- Before performing maintenance, ensure section 3.6.1 is read and understood.
- Use only the DIN connector supplied with the product, see replacement parts (6.4).

**6.1 General maintenance**

**Caution**

- Not following proper maintenance procedures could cause the product to malfunction and lead to equipment damage.
- If handled improperly, compressed air can be dangerous.
- Maintenance of pneumatic systems should be performed only by qualified personnel.

**6 Maintenance (continued)**

- Before performing maintenance, turn off the power supply and be sure to cut off the supply pressure. Confirm that the air is released to atmosphere.
- After installation and maintenance, apply operating pressure and power to the equipment and perform appropriate functional and leakage tests to make sure the equipment is installed correctly.
- If any electrical connections are disturbed during maintenance, ensure they are reconnected correctly and safety checks are carried out as required to ensure continued compliance with applicable national regulations.
- Do not make any modification to the product.
- Do not disassemble the product, unless required by installation or maintenance instructions.
- Refer to the Disassembly/Assembly procedures in sections 6.2 to 6.3 for the replacement of the main valve and sub valve.
- If a silencer is used for a long period of time, clogging may occur and the response characteristics may change. Depending on the quality of the fluid and the energizing time, replace the silencer after 500,000 cycles.
- JSXFE type: Check the tightness of the compression nut periodically to ensure proper sealing between the valve body and the piping.
- JSXFH type: Vibration due to the discharge of air during operation may cause loosening of the hexagon nut leading to air leakage. Check the tightness of the hexagon nut periodically to ensure the correct torque is applied.
- To maintain a good connection between the marked main valve bonnet hexagon bolt and the ring terminal (see section 3.3.2), the bolt tightness is to be checked periodically. Refer to section 6.3 for main valve bolt tightening torques.
- When the valves are used for infrequent operation:
  - Switch valves at least once every 30 days to prevent malfunction.
  - To maintain the product in optimum condition, conduct a regular inspection every 6 months.

**6.2 Disassembly procedure**

**Warning**

Do not remove the solenoid coil.

**Caution**

- Before starting the disassembly work, be sure to shut off the power

supply and pressure supply, and then release the residual pressure.

- Loosen the hexagon bolts (and/or cross recessed round head screws) and remove the bonnet, O-ring, and main valve (and/or sub-valve). See Fig.6.

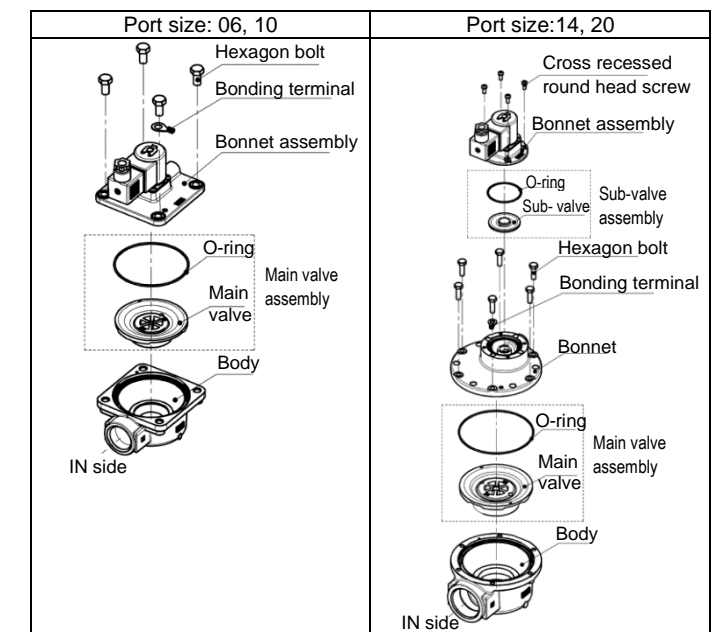


Fig.6

**6.3 Assembly procedure**

**Caution**

- Assemble the main valve (and/or sub-valve) to the body, with reference to the mounting orientation shown in Fig.7.
- Note: Incorrect assembly can lead to product malfunction.



## 6 Maintenance (continued)

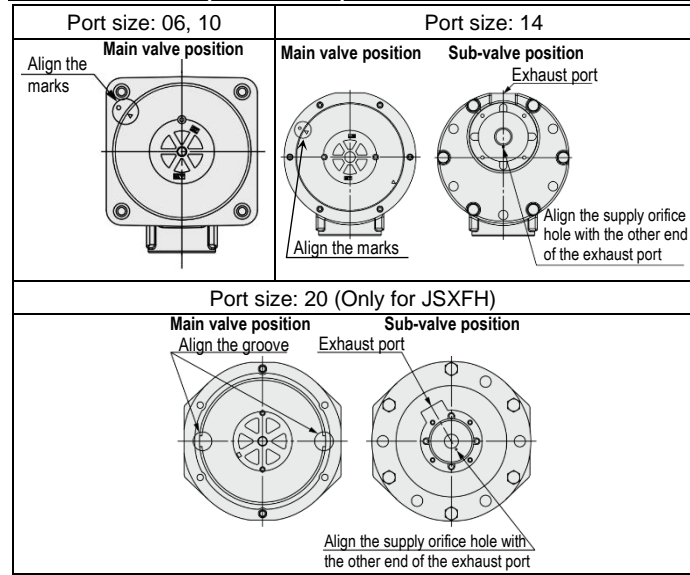


Fig.7

- Mount the O-ring into the groove in the body, see Fig.8.

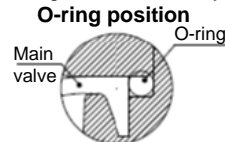


Fig.8

- Ensure that the O-ring is correctly positioned in the groove otherwise external leakage and/or operation failure may occur.
- Assemble the bonnet onto the body (refer to Fig.6).
- Tighten the hexagon bolts (and/or cross recessed round head screws) diagonally, ensuring the ring terminal (see 3.3.2) is correctly mounted (see Figs.9 & 1), using the correct tightening torque values shown in the table below.

Tightening torque [N·m]			
56-JSXF#-06#	Main valve bolt	M8	12.5 to 13.8
	Sub-valve screw	M4	1.5 to 1.7
56-JSXF#-10#	Main valve bolt	M6	5.2 to 5.7
	Sub-valve screw	M4	1.5 to 1.7
56-JSXF#-14#	Main valve bolt	M8	12.5 to 13.8
	Sub-valve screw	M4	1.5 to 1.7
56-JSXF#-20#	Main valve bolt	M8	12.5 to 13.8
	Sub-valve screw	M4	1.5 to 1.7

### Tightening sequence:

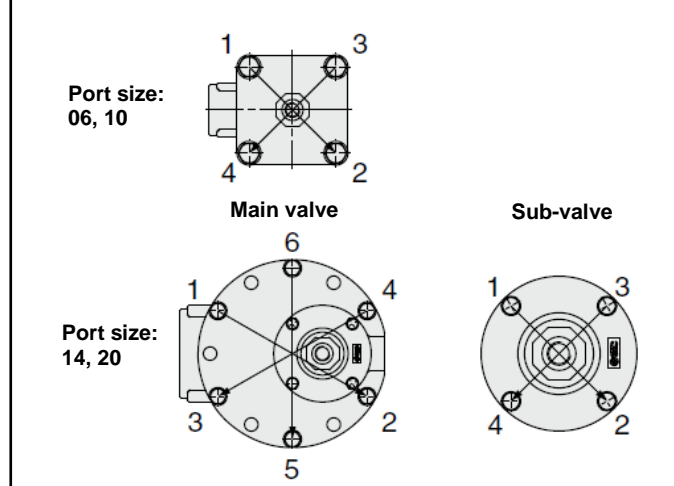


Fig.9

### Caution

- Check valve continuity with external bonding circuit after assembly, see 3.3.2.

## 6 Maintenance (continued)

### 6.4 Replacement parts

The main valve and sub-valve elements (including O-ring), silencer, and DIN connector are available as replacement parts. A list of the spare part kits is shown below.

Port size	Model	Replacement part number	
		Main valve (valve + O-ring)	Sub-valve (valve + O-ring)
06	56-JSXF(E/F/H)#-06#-5DSB-(S)	JSXF-06B-KT	-
10	56-JSXF(E/F/H)#-10#-5DSB-(S)	JSXF-10B-KT	-
14	56-JSXF(E/F)#-14#-5DSB-(S)	JSXF-14B-KT	JSXF-14B-KT2
	56-JSXFH#-14#-5DSB-(S)	JSXF-14B-1-KT	
20	56-JSXFH#-20#-5DSB-(S)	JSXF-20B-KT	

Silencer (Size 06/10): AN20-02 (Rc, G thread)  
AN20-N02 (NPT thread)

Silencer (Size 14/20): AN30-03 (Rc, G thread)  
AN30-N03 (NPT thread)

DIN connector: EVS7060-61

### 6.5 Storage

#### Caution

In the case of long-term storage after use, thoroughly remove all moisture to prevent rust and deterioration of rubber materials, etc.

## 7 Limitations of Use

### 7.1 Limited warranty and disclaimer/compliance requirements

Refer to Handling Precautions for SMC Products.

#### Warning

- Do not exceed any of the specifications laid out in this document.
- Refer to the Ex classification for the product.
- Refer to the 'Special conditions for safe use', section 1.2.
- Use of the JSXFH immersion type valve requires mounting onto a suitable tank supplied by the customer. It is the customer's responsibility to ensure compliance with the applicable explosive atmosphere standards of the final valve/tank assembly.

### 7.2 Low temperature operation

#### Warning

- The valve can be used in an ambient temperature of -20°C. However, take measures to prevent freezing or solidification of impurities, etc.
- A high dew point in low ambient temperature or a high flow rate may cause freezing. In such cases, take measures to prevent freezing by, for example, installing an air dryer or keeping the body warm.

### 7.3 Holding of pressure (including vacuum)

#### Warning

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

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

#### Warning

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

### 7.5 Normally closed valves

#### Warning

Although the valves are normally closed (IN and OUT port blocked), and flow is blocked from Port 1 to Port 2, the fluid will not be blocked if Port 2 pressure is greater than Port 1 pressure, and fluid will flow from Port 2 to Port 1.

## 7 Limitations of Use - continued

### 7.6 Leakage voltage

#### Caution

Ensure that any leakage voltage caused by the leakage current when the switching element is OFF causes  $\leq 2\%$  of the rated voltage across the valve.

## 8 Product Disposal

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

## 9 Contacts

Refer to [www.smcworld.com](http://www.smcworld.com) or [www.smc.eu](http://www.smc.eu) for your local distributor/importer.

## SMC Corporation

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