



Operation Manual

PRODUCT NAME

Angle Seat Valve

MODEL / Series / Product Number

JSB Series

SMC Corporation

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Safety Instructions

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

*1) ISO 4414: Pneumatic fluid power - General rules and safety requirements for systems and their components
ISO 4413: Hydraulic fluid power - General rules and safety requirements for systems and their components
IEC 60204-1: Safety of machinery - Electrical equipment of machines - Part 1: General requirements
ISO 10218-1: Robots and robotic devices - Safety requirements for industrial robots - Part 1: Robots
etc.



Danger

Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.



Warning

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



Caution

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



Warning

1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. Our products cannot be used beyond their specifications. Our products are not developed, designed, and manufactured to be used under the following conditions or environments. Use under such conditions or environments is not covered.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Use for nuclear power, railways, aviation, space equipment, ships, vehicles, military application, equipment affecting human life, body, and property, fuel equipment, entertainment equipment, emergency shut-off circuits, press clutches, brake circuits, safety equipment, etc., and use for applications that do not conform to standard specifications such as catalogs and operation manuals.
3. Use for interlock circuits, except for use with double interlock such as installing a mechanical protection function in case of failure. Please periodically inspect the product to confirm that the product is operating properly.



Safety Instructions

Caution

We develop, design, and manufacture our products to be used for automatic control equipment, and provide them for peaceful use in manufacturing industries.

Use in non-manufacturing industries is not covered.

Products we manufacture and sell cannot be used for the purpose of transactions or certification specified in the Measurement Act.

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

Limited warranty and Disclaimer/Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”. Read and accept them before using the product.

Limited warranty and Disclaimer

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

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

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

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

Compliance Requirements

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

Angle Seat Valve / Air Operated Type

JSB Series



RoHS



How to Order

JSB **4** **1** - **ST** **25A** **R** - **4** **S**

1
2
3
4
5
6
7
8

1 Valve size

Symbol	Series
1	10
2	20
3	30
4	40
5	50
6	60
7	70

2 Valve type/Pressure type

Symbol	Valve type/Pressure type
1	N.C./Standard pressure type
1L	N.C./Low-pilot pressure type

4 Seal material

Symbol	Material
T	Fluororesin

5 Port size

Symbol	Port size	1 Valve size						
		1	2	3	4	5	6	7
10A	3/8	●						
15A	1/2		●					
20A	3/4			●				
25A	1				●			
32A	1 1/4					●		
40A	1 1/2						●	
50A	2							●

3 Body material

Symbol	Material
S	Stainless steel

6 Thread type

Symbol	Thread type
R	Rc
N	NPT
F	G

* The pilot and breathing ports have the same thread type as the main port.

7 Head size

Symbol	Bore size	1 Valve size						
		1	2	3	4	5	6	7
2	ø40	●	●					
3	ø50			●				
4	ø63				●			
5	ø80					●		
6	ø100						●	
7	ø125							●

8 Head material

Symbol	Material
S	Stainless steel

Standard Specifications

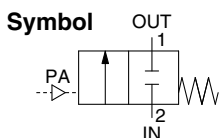
Valve specifications	Valve construction	Air operated piston type
	Withstand pressure	2.4 MPa
	Body material	Stainless steel 316L equivalent
	Seal material	Fluororesin
	Environment	Location without corrosive or explosive gases

Flow Rate Characteristics N.C./Standard pressure type (Normally closed)

Valve size	Port size	Flow rate characteristics*1		Max. operating pressure [MPa]	Pilot pressure [MPa]	Model	Weight [g]
		Kv	Cv				
1	3/8 (10A)	4.3	5.0	1.0	0.5 to 1.0	JSB11-ST10A□-2S	780
2	1/2 (15A)	6.9	8.0	1.0	0.5 to 1.0	JSB21-ST15A□-2S	850
3	3/4 (20A)	13.8	16.0	1.0	0.5 to 1.0	JSB31-ST20A□-3S	1350
4	1" (25A)	25.2	29.1	1.0	0.5 to 1.0	JSB41-ST25A□-4S	2100
5	1 1/4" (32A)	35.7	41.3	1.0	0.5 to 1.0	JSB51-ST32A□-5S	3700
6	1 1/2" (40A)	51.5	59.5	1.0	0.5 to 1.0	JSB61-ST40A□-6S	5400
7	2" (50A)	75.7	87.5	1.0	0.5 to 1.0	JSB71-ST50A□-7S	8700

*1 The values are based on SMC's measurement conditions (JIS B 2005-1:2012).

* When using steam as fluid, see page 8 for selecting the pilot piping option.

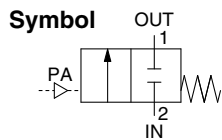


Flow Rate Characteristics N.C. Low Pilot Type

Valve size	Port size	Flow rate characteristics*1		Max. operating pressure [MPa]	Pilot pressure [MPa]	Model	Weight [g]
		Kv	Cv				
1	3/8 (10A)	4.3	5.0	0.5	0.3 to 0.5	JSB11L-ST10A□-2S	780
2	1/2 (15A)	6.9	8.0	0.5	0.3 to 0.5	JSB21L-ST15A□-2S	850
3	3/4 (20A)	13.8	16.0	0.5	0.3 to 0.5	JSB31L-ST20A□-3S	1300
4	1" (25A)	25.2	29.1	0.5	0.3 to 0.5	JSB41L-ST25A□-4S	2100
5	1 1/4" (32A)	35.7	41.3	0.5	0.3 to 0.5	JSB51L-ST32A□-5S	3600
6	1 1/2" (40A)	51.5	59.5	0.5	0.3 to 0.5	JSB61L-ST40A□-6S	5300
7	2" (50A)	75.7	87.5	0.5	0.3 to 0.5	JSB71L-ST50A□-7S	8100

*1 The values are based on SMC's measurement conditions (JIS B 2005-1:2012).

* When using steam as fluid, see page 8 for selecting the pilot piping option.



Fluid and Ambient Temperatures

Fluid temperature [°C]	Ambient temperature [°C]
Standard pressure type Steam: 183 or less Low-pilot pressure type Steam: 158 or less Water, Air: 99 or less	0 to 60

* No freezing

Valve Leakage Rate

Internal Leakage

Fluid	Seal material	Leakage rate*1
Steam, Air	Fluororesin	10 cm ³ /min or less*2
Water		1 cm ³ /min or less

External Leakage

Fluid	Seal material	Leakage rate*1
Steam, Air	Fluororesin	10 cm ³ /min or less*2
Water		1 cm ³ /min or less

*1 Leakage is the value at an ambient temperature of 20°C.

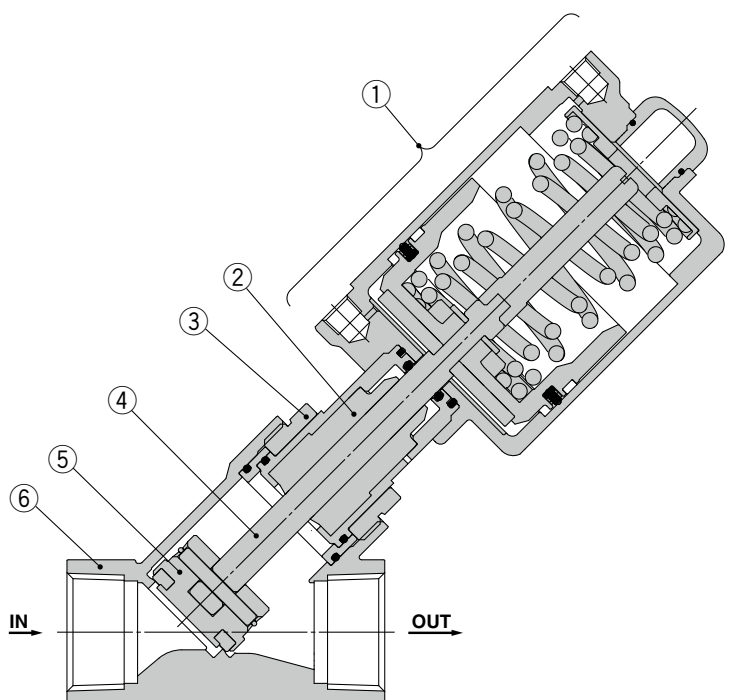
*2 With air

Construction

Component Parts

No.	Description	Material
1	Pilot head assembly	Stainless steel 304 equivalent, Iron, Resin, FKM
2	Shaft seal holder assembly	Stainless steel 316L, Fluororesin, PEEK, FKM, Resin
3	Body nut	Stainless steel 304 equivalent
4	Rod	Stainless steel 316L
5	Valve element assembly	Stainless steel 316L, Fluororesin
6	Body	Stainless steel 316L equivalent

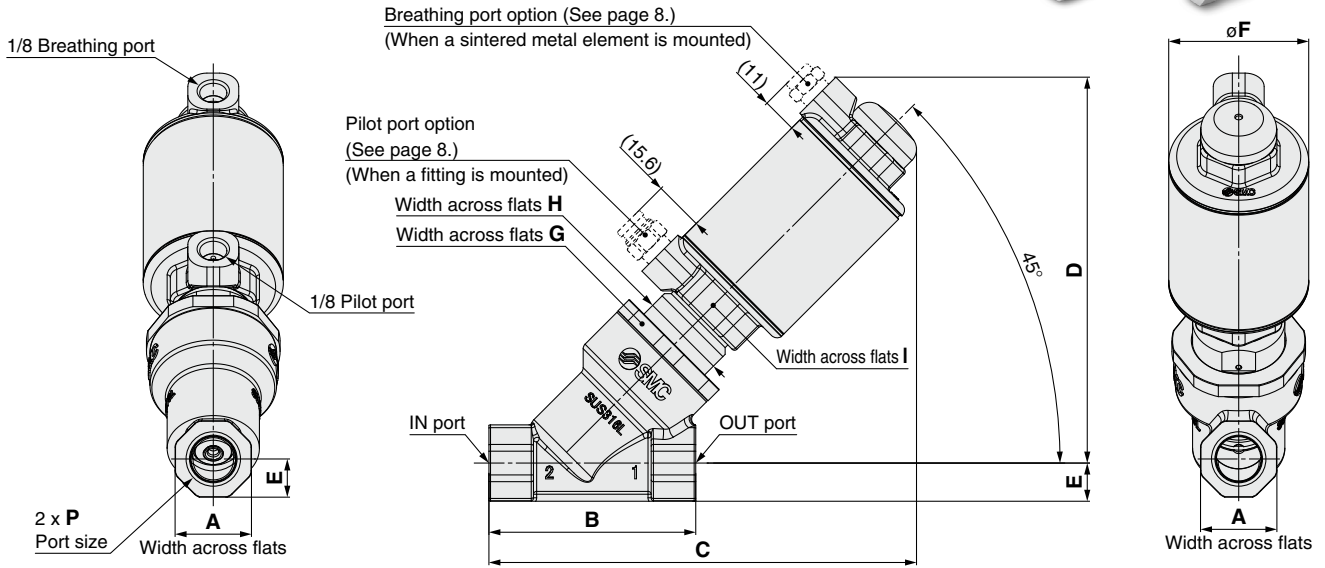
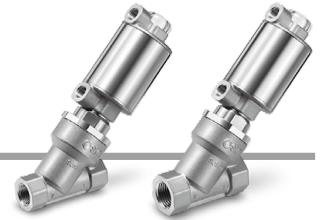
* Materials of parts in contact with fluid: Stainless steel 316L equivalent, Fluororesin, PEEK, FKM



JSB Series

Dimensions

JSB11(L), JSB21(L)

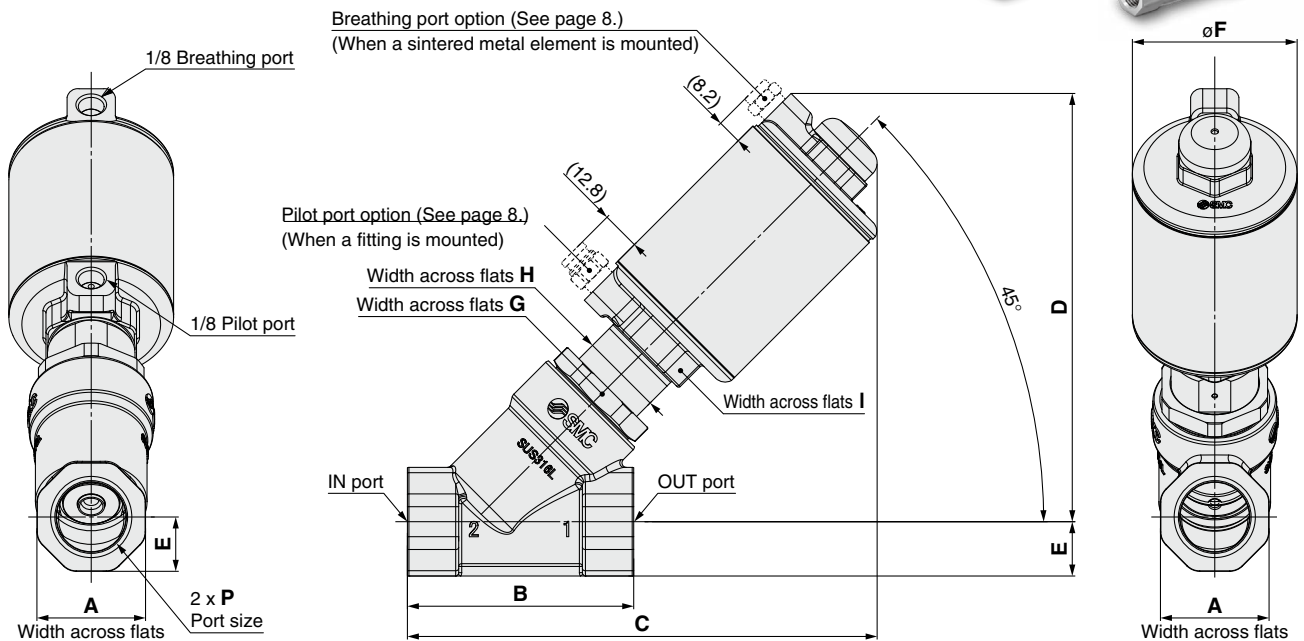


Dimensions

[mm]

Model	Port size P	A	B	C	D	E	F	G	H	I
JSB11(L)	3/8	24	65	134.4	121.3	12	44	40	27	27
JSB21(L)	1/2	29	65	134.9	122.3	14.5	44	40	27	27

JSB31(L), JSB41(L)



Dimensions

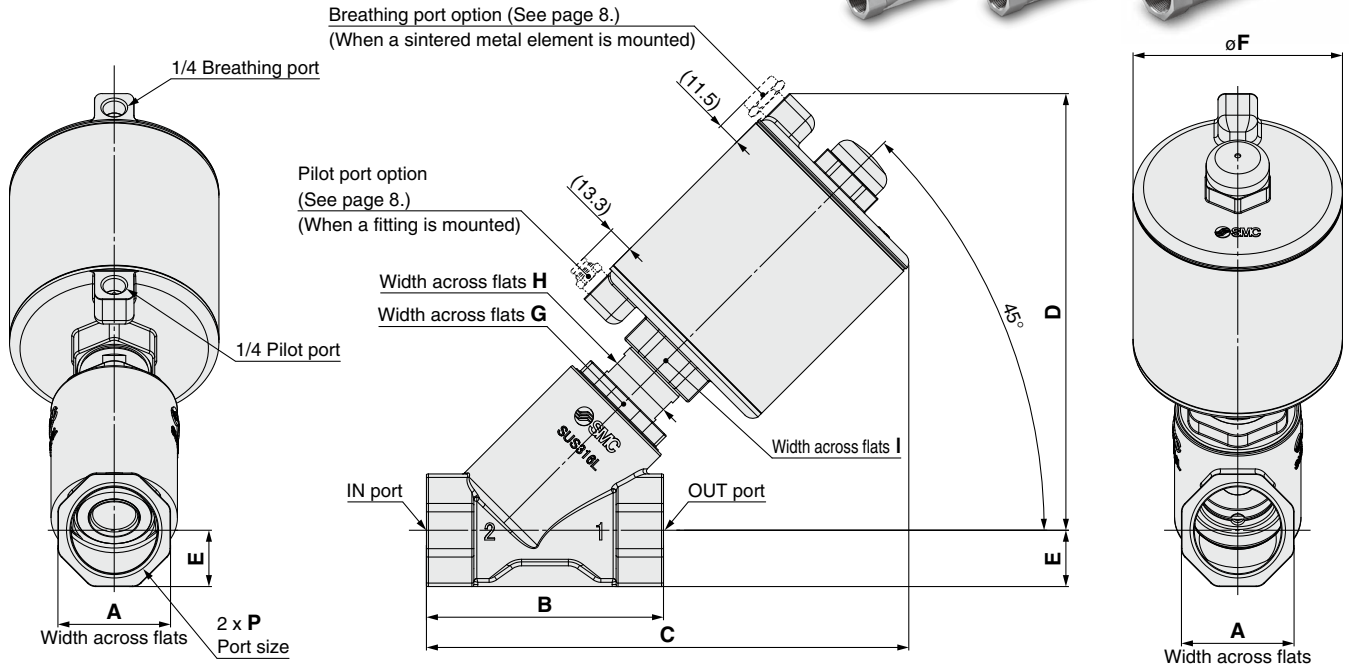
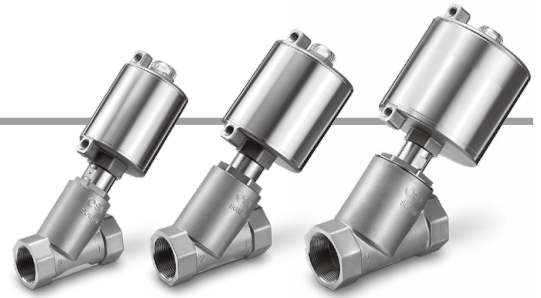
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Model	Port size P	A	B	C	D	E	F	G	H	I
JSB31(L)	3/4	36	75	155.7	141.9	18	54.6	35	27	30
JSB41(L)	1	41	90	186.1	164.5	20.5	68	38	27	36

Angle Seat Valve / Air Operated Type **JSB Series**

Dimensions

JSB51(L), JSB61(L), JSB71(L)



Dimensions

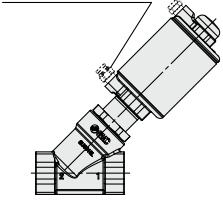
Model	Port size P	A	B	C	D	E	F	G	H	I
JSB51(L)	1 1/4	51	110	222.9	200.5	25.5	86	41	33	41
JSB61(L)	1 1/2	57	120	244.2	221	28.5	106	50	33	41
JSB71(L)	2	70	150	277.7	242.4	35	131	55	33	41

[mm]

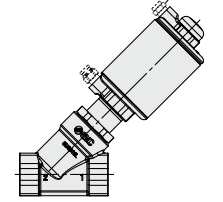
JSB Series Options

Caution Recommended tube fittings when using steam as fluid

For Pilot Port

Mounting position	Description	Applicable tubing O.D.	Head size: 1 to 4 (1/8 thread)			Head size: 5 to 7 (1/4 thread)		
			Rc	NPT	G	Rc	NPT	G
 <p>* Mounted by the customer</p>	Metal One-touch fittings KQB2 series (Brass, Electroless nickel plating)	ø6 (Millimeter size)	KQB2H06-01S	—	KQB2H06-G01	KQB2H06-02S	—	KQB2H06-G02
		1/4" (Inch size)	—	KQB2H07-N01S	—	—	KQB2H07-N02S	—
	Stainless steel 316 One-touch fittings KQG2 series	ø6 (Millimeter size)	KQG2H06-01S	—	KQG2H06-G01-F	KQG2H06-02S	—	KQG2H06-G02-F
		1/4" (Inch size)	—	KQG2H07-N01S	—	—	KQG2H07-N02S	—

For Breathing Port

Mounting position	Description	Applicable tubing O.D.	Head size: 1 to 4 (1/8 thread)			Head size: 5 to 7 (1/4 thread)		
			Rc	NPT	G	Rc	NPT	G
 <p>* Mounted by the customer</p>	Sintered metal element (Stainless steel)	—	ESKA-Z2811-120	ESKA-Z2811N-120	ESKA-Z2811F-120	ESKA-Z2812-120	ESKA-Z2812N-120	ESKA-Z2812F-120
	Metal One-touch fittings KQB2 series (Brass, Electroless nickel plating)	ø6 (Millimeter size)	KQB2H06-01S	—	KQB2H06-G01	KQB2H06-02S	—	KQB2H06-G02
		1/4" (Inch size)	—	KQB2H07-N01S	—	—	KQB2H07-N02S	—
	Stainless steel 316 One-touch fittings KQG2 series	ø6 (Millimeter size)	KQG2H06-01S	—	KQG2H06-G01-F	KQG2H06-02S	—	KQG2H06-G02-F
1/4" (Inch size)		—	KQG2H07-N01S	—	—	KQG2H07-N02S	—	

Tightening Torque

Thread size	Thread type	Tightening torque [N·m]	Option part no.
1/8 thread	Rc NPT	3 to 5	KQ(B, G)2H06-01S
			KQ(B, G)2H07-N01S
			ESKA-Z2811(N)-120
	G	2.9 to 3.2	KQB2H06-G01
			KQG2H06-G01-F
			ESKA-Z2811F-120
1/4 thread	Rc NPT	8 to 12	KQ(B, G)2H06-02S
			KQ(B, G)2H07-N02S
			ESKA-Z2812(N)-120
	G	5.7 to 6.3	KQB2H06-G02
			KQG2H06-G02-F
			ESKA-Z2812F-120

* When using fluids other than steam, select the fitting and tubing according to the operating environment.

* When using steam as fluid, use of a nylon tube T0604 (millimeter size: Rc, G) or T1A07 (inch size: NPT) is recommended for pilot piping.

Metal
One-touch Fittings
KQB2 Series



Stainless Steel 316
One-touch Fittings
KQG2 Series





JSB Series

Specific Product Precautions 1

Be sure to read this before handling the products. Refer to the back cover for safety instructions. For 2-port solenoid valve for fluid control precautions, refer to the “Handling Precautions for SMC Products” and the “Operation Manual” on the SMC website: <https://www.smcworld.com>

Design

Warning

1. For usage of reverse pressure, please contact SMC.

2. Cannot be used as an emergency shutoff valve, etc.

The valves presented in this catalog are not designed for safety applications such as an emergency shutoff valve. If the valves are used in this type of system, other reliable safety assurance measures should also be adopted.

3. Closed liquid circuit

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

4. Pressure holding

It cannot be used for an application such as holding the pressure inside of a pressure vessel because air leakage is entailed in a valve.

5. When an impact, such as steam hammer, etc., caused by rapid pressure fluctuation is applied, the valve may be damaged. Please use with caution.

Selection

Warning

1. Fluid

Corrosive gases cannot be used since cracks caused by stress corrosion or other incidents may result.

2. Air quality

<Steam, Water>

The use of a fluid that contains foreign matter can cause problems, such as malfunction and seal failure, by promoting the wear of the valve seat and seal. Install a suitable filter (strainer) immediately upstream from the valve.

As per standard, the mesh count for the strainer should be 100 mesh. However, the size and shape of the foreign matter that occur depends on the operating environment. Check the fluid status and choose an appropriate mesh count.

The supply water to a boiler includes materials that create a hard sediment or sludge, such as calcium and magnesium.

Sediment and sludge from steam can cause the valve to not operate properly. Install a water softening device which removes these materials. Do not use operation steam which contains chemicals, synthetic oils that contain organic solvents, salts, corrosive gases, etc., as these can cause damage or deterioration.

The seal material (special FKM) used for wetted parts of the product can withstand steam in standard conditions. However, the resistance of the sealing material can deteriorate depending on the types of additives such as boiler compounds and water conditioners within the boiler steam. Please only utilize the product after determining the sealing material resistance within the actual usage conditions.

Selection

Warning

<Air>

• **Use clean air.**

Do not use compressed air which contains chemicals, synthetic oils that contain organic solvents, salts, corrosive gases, etc., as these can cause damage or malfunction.

• **Install an air filter.**

Install air filters close to the valves on the upstream side. A filtration size of 5 μm or less should be selected.

• **Install an aftercooler, air dryer, etc.**

Compressed air that contains excessive drainage may cause the malfunction of valves and other pneumatic equipment. To prevent this, install an aftercooler, air dryer, etc.

• **If excessive carbon powder is generated, eliminate it by installing mist separators on the upstream side of valves.**

If excessive carbon powder is generated by the compressor, it may adhere to the inside of the valves and cause a malfunction.

Refer to the **Web Catalog** for further details on compressed air quality.

3. Ambient environment

Use within the operable ambient temperature range. Check the compatibility between the product's composition materials and the ambient atmosphere. Be certain that the fluid used does not touch the external surface of the product.

4. Low-temperature operation

1) The valve can be used in an ambient temperature of 0°C. However, take measures to prevent the freezing or solidification of impurities, etc.

2) When using valves for water applications in cold climates, take appropriate countermeasures to prevent the water from freezing in the tubing after cutting the water supply from the pump, by draining the water, etc. The installation of a dryer and heat retaining of the body is recommended to prevent a freezing condition in which the dew point temperature is high and the ambient temperature is low, and the high flow runs.



JSB Series

Specific Product Precautions 2

Be sure to read this before handling the products. Refer to the back cover for safety instructions. For 2-port solenoid valve for fluid control precautions, refer to the "Handling Precautions for SMC Products" and the "Operation Manual" on the SMC website: <https://www.smcworld.com>

Mounting

Warning

1. If air leakage increases or equipment does not operate properly, stop operation.

After mounting is completed, confirm that it has been done correctly by performing a suitable function test.

2. Do not apply external force to the operating section.

When tightening is performed, apply a wrench or other tool to the outside of the piping connection parts.

3. Mount a valve with its operating section upward, not downward.

If the operating section is installed downward, foreign matter in the fluid may stick to the seal, causing a malfunction.

4. Avoid sources of vibration, or adjust the arm from the body to the minimum length so that resonance will not occur.

5. Painting and coating

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

Piping

Caution

1. Preparation before piping

Before piping is connected, it should be thoroughly blown out with air (flushing) or washed to remove chips, cutting oil, and other debris from inside the pipe. Avoid pulling, compressing, or bending the valve body when piping.

2. Avoid connecting ground lines to piping, as this may cause electric corrosion of the system.

3. Always tighten threads with the proper tightening torque.

Refer to the tightening torque in the table below for connecting steel piping. Insufficient tightening torque will lead to fluid leakage. For mounting the fittings, refer to the specified torque.

Tightening Torque for Piping

Connection thread	Proper tightening torque [N·m]	Connection thread	Proper tightening torque [N·m]
Rc3/8	22 to 24	Rc1 1/4	40 to 42
Rc1/2	28 to 30	Rc1 1/2	48 to 50
Rc3/4			
Rc1	36 to 38		

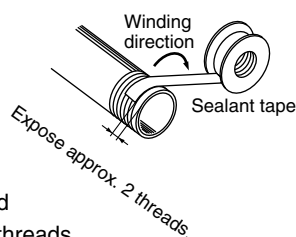
4. When connecting piping to a product, avoid mistakes regarding the connecting direction of the product.

5. Winding of sealant tape

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

Furthermore, when sealant tape is used, leave 1.5 to 2 thread

ridges exposed at the end of the threads.



Piping

Caution

6. If an excessive amount of thread sealant, such as sealant tape or liquid thread sealant, is used during piping, it will get inside the product and lead to a malfunction.

7. Steam generated in a boiler contains a large amount of drainage. Be sure to operate it with a drain trap installed.

8. Arrange piping so that condensate will not accumulate in the valve.

Install the piping to the valve higher than the peripheral piping. Be sure to avoid installing the piping to the valve at the lowest part of the piping layout. If condensate accumulates in the valve or peripheral piping, the steam entering the piping will cause steam hammer. This will lead to the destruction and malfunction of the valve and piping. If steam hammer causes problems, install bypass piping to thoroughly discharge condensate from the piping. Apply steam to the device afterward to start operation.

9. For the convenience of maintenance and repair, install a bypass circuit and use a union for piping.

10. To control the fluid in the tank, connect the piping slightly higher than the bottom of the tank.

11. Pilot piping

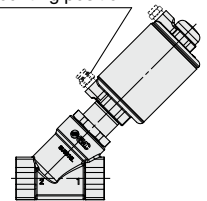
When using steam as fluid, use the following fittings and tubing:

- Metal One-touch fittings
KQB2 series, KQG2 series
- Insert fittings
KF series (Brass sleeve)
- Nylon tubing
T0604 (ø6), TIA07 (1/4")

When using other fluids, select the fitting and tubing according to the operating environment.

* Pilot port option

Pilot port option mounting position



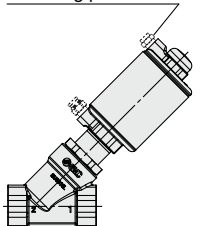
* Mounted by the customer

12. Breathing port

The breathing port has a small orifice hole.

When there is a risk of dust and foreign matter entering inside the pilot head, consider mounting a sintered metal element or provide tube piping (up to a clean location) to prevent intrusion of foreign matter.

* Breathing port option
Breathing port option mounting position



* Mounted by the customer



JSB Series

Specific Product Precautions 3

Be sure to read this before handling the products. Refer to the back cover for safety instructions. For 2-port solenoid valve for fluid control precautions, refer to the “Handling Precautions for SMC Products” and the “Operation Manual” on the SMC website: <https://www.smcworld.com>

Maintenance

Warning

1. Removing the product

The valve will reach a high temperature when used with high-temperature fluids. Confirm that the valve temperature has dropped sufficiently before performing work. If touched inadvertently, there is a danger of being burned.

- 1) Shut off the fluid supply and release the fluid pressure in the system.
- 2) Shut off the power supply.
- 3) Dismount the product.

2. Low-frequency operation

Switch valves at least once every 30 days to prevent a malfunction. Also, in order to use them under the optimum state, conduct a regular inspection biannually.

3. Disassembly

The pilot head assembly cannot be disassembled. It may lead to a serious accident when it is forcefully disassembled.

Caution

1. Strainers

- 1) Be careful regarding the clogging of strainers.
- 2) Clean strainers when the pressure drop reaches 0.1 MPa.

2. Lubrication

When using after lubricating, be sure to lubricate continuously.

3. Storage

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

4. Exhaust the drainage from the piping periodically.

Operating Precautions

Warning

1. The valve will reach a high temperature when used with high-temperature fluids. Use caution, as there is a danger of being burned if a valve is touched directly.
2. When problems are caused by steam hammer, install a steam hammer relief device, such as an accumulator.
3. When the valve is closed and pressure exceeding the maximum operating pressure is applied suddenly, due to the starting of a fluid supply source such as a boiler, the valve may open momentarily and fluid may leak.

Replacement Parts

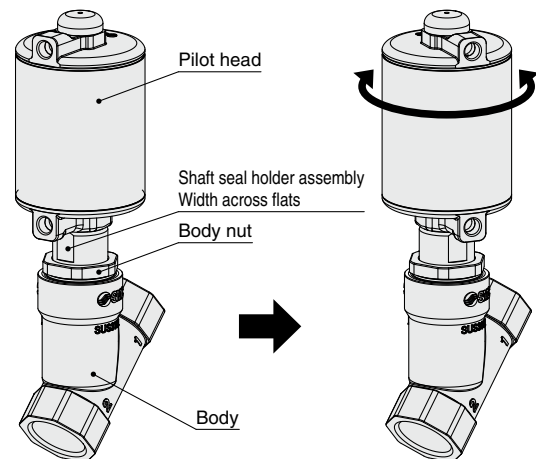
Warning

Contact your SMC representative when replacement parts are necessary for maintenance.

How to Change the Pilot Port Direction

Warning

- 1) Hold the body and the body nut and loosen the body nut.
 - 2) Turn the pilot head and move the pilot port in the desired direction.
 - 3) Hold the body and the body nut and tighten the body nut to the recommended tightening torque described below.
- * When holding the pilot head side, hold the width across flats of the shaft seal holder assembly using a wrench.



Body Nut Tightening Torque

Valve size	Recommended tightening torque [N·m]
JSB10	24 to 26
JSB20	
JSB30	
JSB40	33 to 37
JSB50	
JSB60	
JSB70	

Revision history

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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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