Normal Close
High Vacuum Solenoid Valve New

CE (Note) RoHS

Note) Except grommet/AC

Minimum operating pressure

1×10^{-6}* Pa(abs)

* OUT side

Leakage

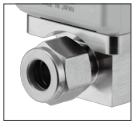
Internal

1.3×10^{-9} Pa·m³/s

External

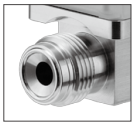
1.3×10^{-11} Pa·m³/s

2 types of fitting



Compression fitting

A self-aligning tube fitting that uses ferrule rings to compress the tubing, affecting the seal when the nut is tightened.



Face seal fitting

A fitting with high leak integrity from vacuum to positive pressure, that forms a seal through the placement of a metal gasket at the end of the sleeve and the tightening of the nut.

Power consumption

Max. **25% reduction**

Size	New XSA (W)	Existing model (W)
XSA1	4.5	6
XSA2	7	8
XSA3	10.5	11.5

Weight

Max. **18%*** **lighter**

* XSA2-$^{2}_{3}$2

New **0.5 kg → 0.41 kg**

Fluid temperature

5 to 60°C

Reverse pressure potential

0.5 MPa(G)*

* XSA1-12

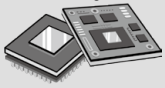
Rated voltage

AC	100 V, New 200 V, 110 V, 220 V, 240 V, 48 V, 24 V, 230 V
DC	24 V, 12 V

Applications

Photovoltaic cell manufacturing

Semiconductor manufacturing



LCD manufacturing

Medical

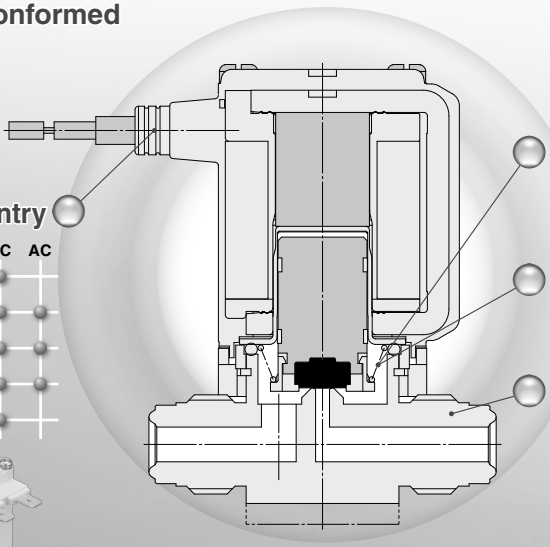
Food

Series XSA

Flame resistance UL94V-0 conformed

Electrical entry

	DC	AC
Grommet	●	●
DIN terminal	●	●
Terminal	●	●
Conduit	●	●
New Flat terminal	●	●



Power consumption:

* DC/Class B

4.5 W (Size 1)

7 W (Size 2)

10.5 W (Size 3)

Reduced particle generation

Moving the spring from the sliding part of the armature to the body reduced contact with the spring, reducing particle generation.

Improved sealing performance

Larger spring creates firm seal!
Leakage (Internal): 1.3 x 10^{-9} Pa·m^3/s

Face seal fitting and compression fitting are available.

Applicable to highly airtight piping.

Compression fitting

Face seal fitting

Variations

Model	Orifice diameter				Fitting/Port size (inch)		Minimum operating pressure Pa(abs)	Leakage Pa·m^3/s	
	ø2	ø3	ø4.5	ø6	1/4	3/8		Internal	External
XSA1	●	●	—	—	●	—	1 x 10^{-6}	1.3 x 10^{-9}	1.3 x 10^{-11}
XSA2	—	●	●	●	●	●			
XSA3	—	—	●	●	●	●			

Normal Close
High Vacuum Solenoid Valve
Series XSA

CE Note) RoHS

Note) Except grommet/AC

How to Order

XSA 1 – 1 2 S – 1 G 2 – ☐

Valve size

1	Size 1
2	Size 2
3	Size 3

Orifice diameter

1	ø2	Size 1
2	ø3	Size 1
2	ø3	Size 2
3	ø4.5	Size 2
4	ø6	Size 2
3	ø4.5	Size 3
4	ø6	Size 3

Fitting size

2	1/4	Size 1
2	1/4	Size 2
3	3/8	Size 2
2	1/4	Size 3
3	3/8	Size 3

Fitting type

V	Face seal fitting
S	Compression fitting

Voltage

1	100 VAC
2	200 VAC
3	110 VAC
4	220 VAC
5	24 VDC
6	12 VDC
7	240 VAC
8	48 VAC
B	24 VAC
J	230 VAC

Spacer

Nil	None
A	With spacer

* A spacer used to raise the body when fastening it onto a flat area. Refer to the table below in case only spacers are required separately.

Electrical entry

		DC	AC
G	Grommet	●	—
GS	Grommet (With surge voltage suppressor)	●	Note) ●
D	DIN terminal (With surge voltage suppressor)	●	●
DL	DIN terminal with light (With surge voltage suppressor)	●	●
DO	DIN terminal without connector (With surge voltage suppressor)	●	●
T	Terminal (With surge voltage suppressor)	●	●
TL	Terminal with light (With surge voltage suppressor)	●	●
C	Conduit (With surge voltage suppressor)	●	●
F	Flat terminal	●	—

Note) Not CE-compliant

For other special option, refer to page 1025.

Special electrical entry direction

Table: Spacer Part No.

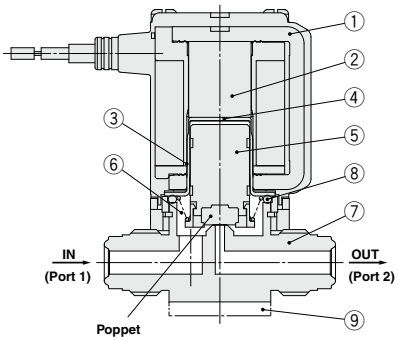
Model	Part no.
XSA1	XSA1R-8-1
XSA2	XSA2R-8-1
XSA3	

Specifications

Model		XSA1-12	XSA1-22	XSA2-22	XSA2-32	XSA2-43	XSA3-32	XSA3-43
Action		Normally closed						
Fluid		Air, Inert gas						
Orifice diameter mmø		2	3		4.5	6	4.5	6
Withstand pressure MPa(G)		1.5						
Minimum operating pressure Pa(abs)/OUT side		1×10^{-6}						
Maximum operating pressure MPa(G)/IN side		1.0						
Maximum operating pressure differential MPa Note 1)		0.8	0.3	1.0	0.3	0.1	0.8	0.3
Reverse pressure potential MPa(G) Note 2)		0.5	0.25	0.4	0.2	0.05	0.2	0.15
Leakage Pa·m³/s Note 3)	**Internal**	1.3×10^{-9}						
	External	1.3×10^{-11}						
Piping connection system		Face seal fitting/Compression fitting						
Connection size (inch)		1/4				3/8	1/4	3/8
Ambient and fluid temperature °C		5 to 60						
Rated voltage Note 4)		100/110/200/220/230/240/24/48 VAC 12/24 VDC						
Power consumption W Note 5)	**DC**	4.5		7			10.5	
Apparent power VA Note 5)	**AC**	7		9.5			12	
Coil temperature rise °C Note 6)	**DC**	50		55			65	
	AC	60		70			70	
Allowable voltage fluctuation		±10% or less of rated voltage						
Allowable leakage voltage	**DC**	2% or less of rated voltage						
	AC	5% or less of rated voltage						
Coil insulation type		Class B						
Weight kg Note 7)	**Face seal fitting**	0.28		0.41		0.42	0.53	0.62
	Compression fitting	0.28		0.41		0.42	0.53	0.55

Note 1) Operating pressure differential indicates the difference between Port 1 (high pressure side) and Port 2 (low pressure side).
Example) In the case of 0.3 MPa, Port 2 is a vacuum (1 Torr or less), while Port 1 can be pressurized to 0.2 MPa(G).
Note 2) Reverse pressure potential indicates the pressure which can be applied from Port 2 when Port 1 is at atmospheric pressure.
Note 3) Leakage at 20°C of ambient temperature, 0.1 MPa of differential pressure. Gas permeation is not included.
Note 4) AC type is equipped with full-wave rectifier.
Note 5) Power consumption/Apparent power: The value at 20°C of ambient temperature and when the rated voltage is applied. (Variation: ±10%)
Note 6) The value at 20°C of ambient temperature and when the rated voltage is applied. The value depends on the ambient environment. This is for reference.
Note 7) Indicates case of grommet type.

Construction/Operation



Component Parts

No.	Description	Material
1	**Solenoid coil**	Cu + Fe + Resin
2	**Core**	Fe
3	**Tube**	Stainless steel
4	**Seat (PET seat to shut the residual magnetism)**	PET
5	**Armature assembly**	FKM, Stainless steel, Resin (PPS)
6	**Spring**	Stainless steel
7	**Body**	Stainless steel
8	**O-ring**	FKM
9	**Spacer**	Al

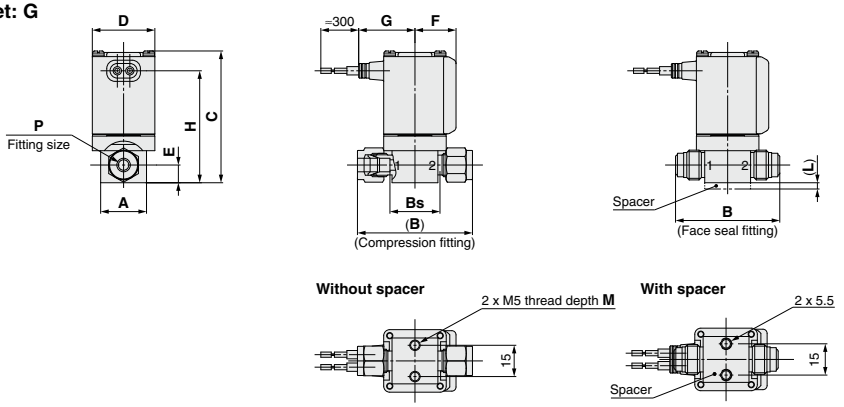
: Parts in contact with gas

<Option>
⑨ Spacer: A spacer used to raise the body when fastening it onto a flat area.

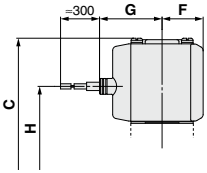
<Operating principle>
By energizing the solenoid coil ①, the armature assembly ⑤ overcomes the composite force, consisting of the force acting on the poppet due to differential pressure and the reactive force of the spring ⑥, and is adsorbed to the core ② side, opening the poppet.
When energizing of the solenoid coil ① is canceled, the armature assembly ⑤ is separated from the core ② side by the reactive force of the spring ⑥, closing the poppet.

Dimensions

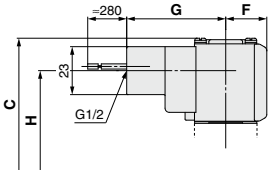
Grommet: G



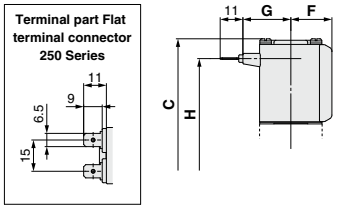
Grommet: GS



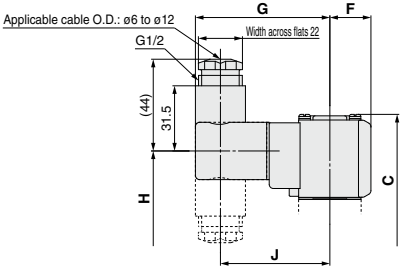
Conduit: C



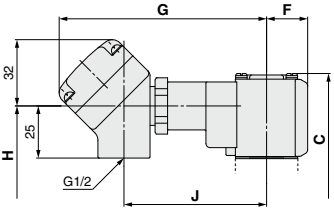
Flat terminal: F



DIN terminal: D



Terminal: T



Dimensions

(mm)

Model	A	B	Bs	C	D	E	F	L	M	P [inch]	Grommet: G		Grommet: GS		Conduit: C		Flat terminal: F		DIN terminal: D			Terminal: T		
											G	H	G	H	G	H	G	H	G	H	J	G	H	J
XSA1-□2S	22	55	24	63	30	8.5	20	3	8	1/4	27	53.5	30	40	47.5	47.5	23	53.5	64.5	45.5	52.5	99.5	47.5	68.5
XSA1-□2V		50	—																					
XSA2-□2S	25	63	31.5	73.5	35	11.5	22	5	10	1/4	29.5	63	32.5	49.5	50	57	25.5	63	67	55	55	102	57	71
XSA2-□2V		56	—																					
XSA2-43S		64.5	31							3/8														
XSA2-43V		67	—																					
XSA3-32S		63	31.5	78	40		24.5			1/4	32	67.5	35	54	52.5	61.5	28	67.5	69.5	59.5	57.5	104.5	61.5	73.5
XSA3-32V		56	—																					
XSA3-43S		64.5	31							3/8														
XSA3-43V		67	—	82.5								72		58.5		66		72		64			66	

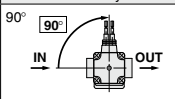
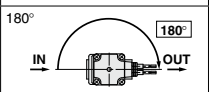
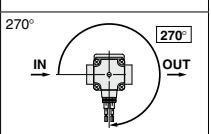
Special Option

Special Electrical Entry Direction

XSA 1 – 1 2 S – 1 G 2 ☐ – ☐

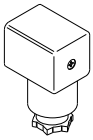
Enter standard product number.

Special electrical entry direction

Symbol	Electrical entry direction
A	
B	
C	

Replacement Parts

● DIN Connector Part No.



<For Class B Coil>

Electrical option	Rated voltage	Connector part no.
None	24 VDC	**C18312G6GCU**
	12 VDC	
	100 VAC	
	110 VAC	
	200 VAC	
	220 VAC	
	230 VAC	
	240 VAC	
	24 VAC	
	48 VAC	
With light	24 VDC	**GDM2A-L5**
	12 VDC	**GDM2A-L6**
	100 VAC	**GDM2A-L1**
	110 VAC	**GDM2A-L1**
	200 VAC	**GDM2A-L2**
	220 VAC	**GDM2A-L2**
	230 VAC	**GDM2A-L2**
	240 VAC	**GDM2A-L2**
	24 VAC	**GDM2A-L5**
	48 VAC	**GDM2A-L15**

∗ Select an appropriate DIN connector suitable for the coil insulation type.

● Gasket Part No. for DIN Connector

VCW20-1-29-1 (For Class B Coil)

● Lead Wire Assembly for Flat Terminal (Set of 2 pcs.)

VX021S-1-16FB

Series XSA
Specific Product Precautions 1

Be sure to read this before handling. Refer to page 1154 for Safety Instructions. For Common Precautions, refer to "Handling Precautions for SMC Products" and the Operation Manual on SMC website, http://www.smcworld.com

Design

⚠Warning

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

2. Extended periods of continuous energization
The solenoid coil will generate heat when continuously energized. Avoid using in a tightly shut container. Install it in a well ventilated area. Furthermore, do not touch it while it is being energized or right after it is energized.

Selection

⚠Warning

1. Fluid

1) Type of fluid
Before using a fluid, check whether it is compatible with the materials of each model by referring to the fluids listed in this catalog. (Refer to the Component Parts on page 1023.)

2. Fluid quality

<Air>

1) Use clean air.
Do not use compressed air that contains chemicals, synthetic oils including organic solvents, salt or corrosive gases, etc., as it can cause damage or malfunction.

2) Install an air filter, if necessary.
Install an air filter close to the valve on the upstream side. A filtration degree of 5 μm or less should be selected.

3) Install an aftercooler or air dryer, if necessary.
Compressed air that contains excessive drainage may cause a malfunction of the valve and other pneumatic equipment. To prevent this, install an aftercooler or air dryer, etc.

4) If excessive carbon powder is generated, eliminate it by installing a mist separator on the upstream side of the valve.
If excessive carbon powder is generated by the compressor, it may adhere to the inside of the valve and cause a malfunction.

Refer to the Best Pneumatics No.5 catalog for further details on compressed air quality.

<Vacuum>

Vacuum piping direction: Connect the piping so that the pressure in the secondary side is lower.

Avoid entry of foreign matter.

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.

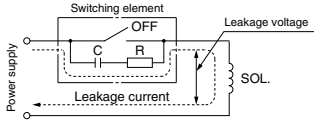
Selection

⚠Warning

4. Countermeasures against static electricity
Take measures to prevent static electricity since some fluids can cause static electricity.

⚠Caution

1. Leakage voltage
Particularly when using a resistor in parallel with a switching element and using a C-R element (surge voltage suppressor) to protect the switching element, take note that leakage current will flow through the resistor, C-R element, etc., creating a possible danger that the valve may not turn off.



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

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

3. The solenoid valve can be mounted to any direction, but recommended mounting direction of the coil is upward.
When mounting a valve with its coil positioned downward, foreign matter in the fluid will adhere to the iron core leading to a malfunction. Especially for strict leakage control, the coil must be positioned upward.

4. Do not warm the coil assembly with a heat insulator etc.
Use tape, heaters, etc., for freeze prevention on the piping and body only. They can cause the coil to burn out.

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

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

Series XSA
Specific Product Precautions 2

Be sure to read this before handling. Refer to page 1154 for Safety Instructions. For Common Precautions, refer to "Handling Precautions for SMC Products" and the Operation Manual on SMC website, http://www.smcworld.com

Piping

⚠Caution

1. Preparation before piping

Before mounting, clean the sealing surface with ethanol etc.

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

3. Mounting of fitting

Tighten the fitting as follows.

After the tightening, confirm that there is no leakage from the fitting.

Tightening of Fitting

Face seal fitting	1/8 turn after tightening by hand
Compression fitting	1 1/4 turns after tightening by hand

4. Connection of piping to products

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

Wiring

⚠Caution

1. As a rule, use electrical wire with a cross sectional area of 0.5 to 1.25 mm^2 for wiring.
Furthermore, do not allow excessive force to be applied to the lines.

2. Use electrical circuits which do not generate chattering in their contacts.

3. Use voltage which is within ±10% of the rated voltage. In cases with a DC power supply where importance is placed on responsiveness, stay within ±5% of the rated value. The voltage drop is the value in the lead wire section connecting the coil.

4. When a surge from the solenoid affects the electrical circuitry, install a surge voltage suppressor etc., in parallel with the solenoid. Or, adopt an option that comes with the surge voltage protection circuit. (However, a surge voltage occurs even if the surge voltage protection circuit is used. For details, please consult with SMC.)

Operating Environment

⚠Warning

1. Do not use in an atmosphere having corrosive gases, chemicals, sea water, water, water vapor, or where there is direct contact with any of these.

2. Do not use in explosive atmospheres.

3. Do not use in locations subject to vibration or impact.

4. Do not use in locations where radiated heat will be received from nearby heat sources.

5. Employ suitable protective measures in locations where there is contact with water droplets, oil or welding spatter, etc.

Maintenance

⚠Warning

1. Removing the product

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 it under the optimum state, conduct a regular inspection once a half year.

Specific Product Precautions 3

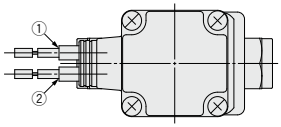
Be sure to read this before handling. Refer to page 1154 for Safety Instructions. For Common Precautions, refer to "Handling Precautions for SMC Products" and the Operation Manual on SMC website, http://www.smcworld.com

Electrical Connections

⚠Caution

■ Grommet

Class B coil: AWG20 Insulator O.D. 2.5 mm

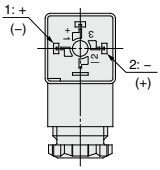


Rated voltage	Lead wire color	
	①	②
DC	Black	Red
100 VAC	Blue	Blue
200 VAC	Red	Red
Other AC	Gray	Gray

∗ There is no polarity.

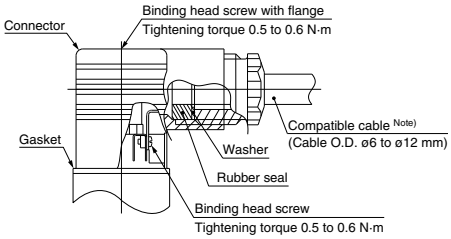
■ DIN terminal

Since internal connections are shown below for the DIN terminal, make connections to the power supply accordingly.



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

∗ There is no polarity.
• Use a heavy-duty cord with cable O.D. of ø6 to ø12 mm.
• Use the tightening torques below for each section.

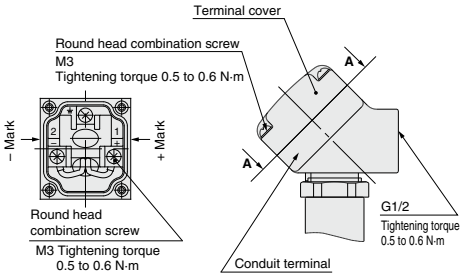


Note) For cable O.D. of ø9 to ø12 mm, remove the internal parts of the rubber seal before using.

⚠Caution

■ Conduit terminal

In the case of the conduit terminal, make connections according to the marks shown below.
• Use the tightening torques below for each section.
• Properly seal the terminal connection (G1/2) with the special wiring conduit etc.



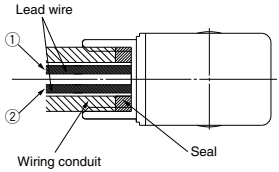
View A-A

(Internal connection diagram)

■ Conduit

Use the tightening torque below for the conduit.

Class B coil: AWG20 Insulator O.D. 2.5 mm



(Bore size G1/2 Tightening torque 0.5 to 0.6 N·m)

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

∗ There is no polarity.

Description	Part no.
Seal	VCW20-15-6

Note) Please order separately.

Specific Product Precautions 4

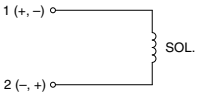
Be sure to read this before handling. Refer to page 1154 for Safety Instructions. For Common Precautions, refer to "Handling Precautions for SMC Products" and the Operation Manual on SMC website, http://www.smcworld.com

Electrical Circuits

⚠ Caution

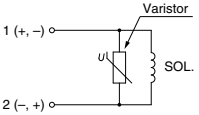
[DC circuit]

Grommet, Flat terminal



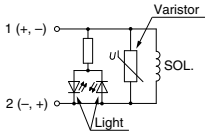
Without electrical option

Grommet, DIN terminal, Conduit terminal, Conduit



With surge voltage suppressor

DIN terminal, Conduit terminal

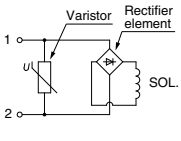


With light/surge voltage suppressor

[AC circuit]

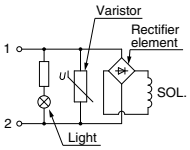
∗ For AC, the standard product is equipped with surge voltage suppressor.

Grommet, DIN terminal, Conduit terminal, Conduit



Without electrical option

DIN terminal, Conduit terminal



With light/surge voltage suppressor