SMC

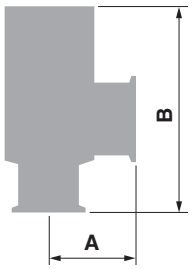
High Vacuum Angle Valve

Series XL

High Vacuum Angle Valve
Series XL

Light weight & compact

Large conductance with a small valve body.
Excellent resistance against fluorine corrosion (body)



Series XLA

Model	A * mm	B mm	Weight kg	Conductance * ℓ/s
XLA-16	40	103	0.25	5
XLA-25	50	113	0.45	14
XLA-40	65	158	1.1	45
XLA-50	70	170	1.6	80
XLA-63	88	196	2.9	160
XLA-80	90	235	5.0	200
XLA-100	108	154	10.6	300
XLA-160	138	200	18.5	800

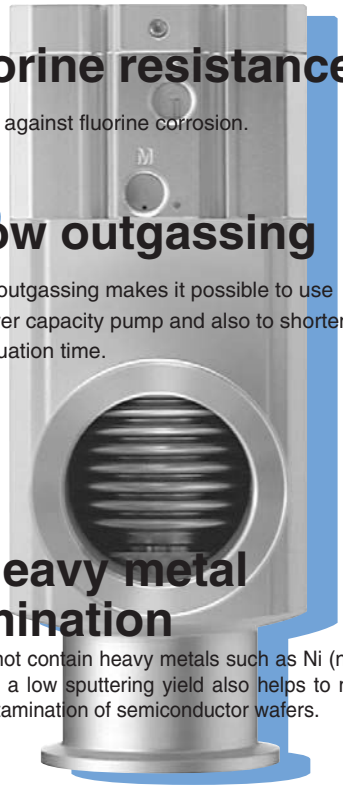
* Common to all series.

High fluorine resistance

Excellent resistance against fluorine corrosion.

Low outgassing

Low outgassing makes it possible to use a lower capacity pump and also to shorten evacuation time.



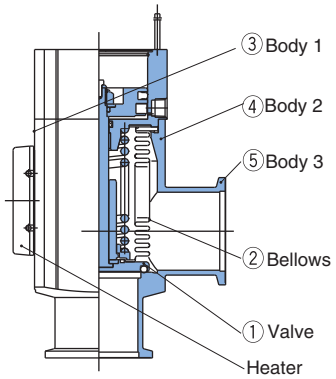
Little heavy metal contamination

The valve does not contain heavy metals such as Ni (nickel) or Cr (chrome) and a low sputtering yield also helps to minimize heavy metal contamination of semiconductor wafers.

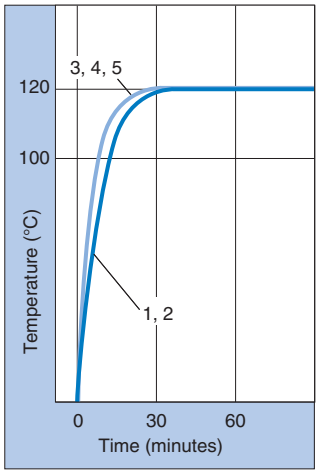
Uniform baking temperature

Excellent thermal conductivity results in a uniform temperature for the entire valve body and a marked decrease in the condensation of gases inside the valve.

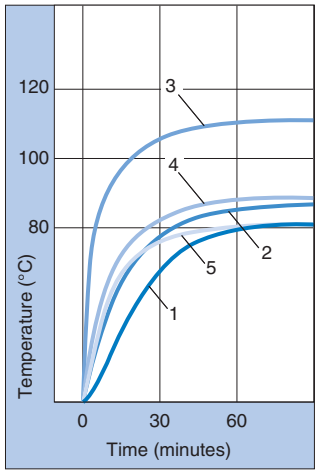
Comparison with KF25 flange



Aluminum (setting temp.: 120°C)



Stainless steel (setting temp.: 120°C)



High Vacuum Angle Valve XL□ Series Features

XLA/XLAV (Bellows seal, Single acting)
- Bellows type is particulate free and completely cleaned.
- Pressure balance mechanism allows unrestricted exhaust direction.

XLC/XLCV (Bellows Seal, Double acting)
- Bellows type is particulate free and completely cleaned.
- Pressure balance mechanism allows unrestricted exhaust direction.
- Overtravel mechanism maintains constant O-ring compression (size 50, 63, 80).

XLF/XLFV (O-ring seal, Single acting)
- Low gas entrainment with employment of O-ring seal system.
- High speed response and long service life.
- Particulates are reduced through special surface treatment of shaft seal.

XLG/XLGV (O-ring seal, Double acting)
- Low gas entrainment with employment of O-ring seal system.
- High speed response and long service life.
- Overtravel mechanism maintains constant O-ring compression (size 50, 63, 80).
- Particulates are reduced through special surface treatment of shaft seal.

XLD/XLDV (2 stage control, Single acting)
- Initial exhaust valve and main exhaust valve have been integrated (2 stage flow control valve).
- Makes compact system design and reduced piping possible.
- Minimizes particulates by eliminating turbulence during exhaust.
- Prevents pump overload.
- Initial exhaust valve flow is adjustable and adjustment can be locked.

XLH (Bellows seal, Manual operation)
- Bellows type is particulate free and completely cleaned.
- Pressure balance mechanism allows unrestricted exhaust direction.
- Low actuation torque (0.5N·m or less).
- Spring provides standard sealing load.
- Handle height is the same when valve is open or closed.
- Indicator to confirm opening and closing of valve is standard equipment.

XLS (Bellow pressure balance, Normally closed solenoid)
- Particulates are reduced because there are no sliding metal parts.
- Pressure balance mechanism allows unrestricted exhaust direction.
- A control power supply circuit for solenoid valve drive has been made standard.
- Can be used in portable equipment since air for drive is not necessary.

XSA (Direct solenoid operation)
- Solenoid valve with metal seal fittings (VCR®/Swagelok®)
- Particulates are reduced because there are no sliding metal parts.
- Improved reverse pressure performance.

Series Variations

High Vacuum Angle Valve

Actuation	Application	Shaft seal system	Models	Valve type	Operating pressure Pa	Leakage Pa m³/sec Internal	Leakage Pa m³/sec External	Service life (Million cycles)	Flange size 16	25	40	50	63	80	100	160	Options Switch	Heater	Indicator	High temp. specification	
Air operated	Particulate free completely cleaned	Bellows Seal	XLA	Single acting (N.C.)	10^5 to 10^{-6}	10^{-10}	10^{-11}	2	●	●	●	●	●	●			●		●	●	P.1 to P.4
			XLAV (With solenoid valve)						●	●	●	●	●	●			●		●		
			XLC	Double acting					●	●	●	●	●	●			●			●	P.5 to P.9
			XLCV (With solenoid valve)						●	●	●	●	●	●			●				
	High speed operation High volume operation	O-ring Seal	XLF	Single acting (N.C.)	2×10^5 to 10^{-5}	10^{-10}	10^{-10}	1	●	●	●	●	●	●	●	●	●		●	●	P.10 to P.13
			XLFV (With solenoid valve)						●	●	●	●	●	●	●	●	●		●		
			XLG	Double acting					●	●	●	●	●	●	●	●	●			●	P.14 to P.18
			XLGV (With solenoid valve)						●	●	●	●	●	●	●	●	●				
	Reduces particulates Eliminates pump over loads	Bellows, O-ring Seal	XLD	Single acting (N.C.)	10^5 to 10^{-6}	10^{-10}	10^{-11}	2	●	●	●	●	●	●			●		Standard		P.19 to P.24
			XLDV (With solenoid valve)						●	●	●	●	●	●			●		Standard		
Manual	For portable equipment not requiring air Particulate free completely cleaned	Bellows Seal	XLH	Manual	10^5 to 10^{-6}	10^{-10}	10^{-11}	0.1	●	●	●	●					●		Standard	Standard	P.25, P.26
Electromagnetic	For portable equipment not requiring air	(Bellows Balance)	XLS	Single acting (N.C.)	2×10^5 to 10^{-6}	10^{-8}	10^{-11}	0.5	●	●											P.27 to P.29

∗ Heater and high temperature specifications are not available with switches.

Straight Solenoid Valve (with Metallic Seal Fitting)

Model	Valve type	Piping size	Orifice mmø	Effective sectional area mm²	Operating pressure Differential pressure MPa	Operating pressure Port A Pa	Leakage Pa m³/sec Internal	Leakage Pa m³/sec External	Leakage Pa m³/sec Fitting	Service life million cycles	
XSA1-12	Direct solenoid operation (N.C.)	1/4	2	3	0.8	10^{-6}	10^{-9}	10^{-11}	VCR® 10^{-11} SWJ® 10^{-10}	2	P.30 to P.32
XSA1-22			3	6	0.3						
XSA2-22					1.0						
XSA2-32			4.5	11	0.3						
XSA3-32					0.8						
XSA3-43		3/8	6	19	0.3						

∗ Differential Pressure: Indicates the maximum operable pressure difference between port P and port A. In the case of 0.8MPa, when port A is a vacuum, port P can be pressurized to 0.8MPa (7kgf/cm²G).

∗ VCR® Fitting and Swagelok® Fitting are registered trade marks of the Cajon Company and the Crawford Fitting Company Inc. respectively.

High Vacuum Angle Valve

Series XLA, XLAV

Normally Closed/Bellows Seal

Air Operated Type

How to Order

XLA — 16 □ □ □ — M9N A

High vacuum angle valve
(Normally closed, bellows seal, air operated type)

Flange size

16
25
40
50
63
80

Flange type

Symbol	Type	Applicable flange size
Nil	KF(NW)	16, 25, 40, 50, 63, 80
D	K(DN)	63, 80

Indicator/Actuation port direction

Nil	Without indicator/Flange side
A	With indicator/Flange side
F	With indicator/Left flange surface
G	With indicator/Rear flange surface
J	With indicator/Right flange surface
K	Without indicator/Left flange surface
L	Without indicator/Rear flange surface
M	Without indicator/Right flange surface

Note) Actuation port direction
(Example) Left flange surface: Indicates that the direction of the actuation port is to the left side when the flange surface is viewed from the front.

Switch quantity/ Mounting position

Symbol	Quantity	Mounting position
Nil	–	–
A	2pcs.	Valve open/closed
B	1pc.	Valve open
C	1pc.	Valve closed

Auto switch type

Symbol	Auto switch model	Remarks
Nil	—	Without auto switch (without built-in magnet)
M9N(L)(M)(Z)	D-M9N(L)(M)(Z)	Solid state auto switch
M9P(L)(M)(Z)	D-M9P(L)(M)(Z)	
M9B(L)(M)(Z)	D-M9B(L)(M)(Z)	
A90(L)(Z)	D-A90(L)(Z)	Reed auto switch (Not applicable to flange size 16)
A93(L)(Z)	D-A93(L)(Z)	
M9//	—	Without auto switch (with built-in magnet)

Note 1) Auto switches shown above cannot be mounted on the high temperature type. For the high temperature type, a semi-standard product that uses the heat resistant auto switch D-F7NJ* is available. For details, please contact SMC.
Note 2) Standard lead wire length is 0.5 m. Add "L" to the end of the part number when 3 m is desired, "M" when 1 m, and "Z" when 5 m.
Example) -M9NL

Temperature specifications/Heater

Symbol		Temperature	Heater
Nil		5 to 60°C	—
High temperature type	H0	5 to 150°C	—
	H4		With 100°C heater
	H5		With 120°C heater

XLA

High temperature type combination table

High temperature specifications	Symbol	Model					
		XLA-16	XLA-25	XLA-40	XLA-50	XLA-63	XLA-80
Without heater	H0	•	•	•	•	•	•
With heater for 100°C	H4	–	–	•	•	•	•
With heater for 120°C	H5	–	•	•	•	•	•

Air Operated Type/with Solenoid Valve

How to Order

XLAV — 16 ☐ F — M9N A — 5 G ☐ — Q

High vacuum angle valve

(Normally closed, bellows seal, air operated type with solenoid valve)

Flange size

16
25
40
50
63
80

Flange type

Symbol	Type	Applicable flange size
Nil	KF(NW)	16, 25, 40, 50, 63, 80
D	K(DN)	63, 80

Solenoid valve/Indicator direction

F	With indicator/Left flange surface
G	With indicator/Rear flange surface
J	With indicator/Right flange surface
K	Without indicator/Left flange surface
L	Without indicator/Rear flange surface
M	Without indicator/Right flange surface

Note) Actuation port direction
(Example) Left flange surface: Indicates that the direction of the actuation port is to the left side when the flange surface is viewed from the front.

Auto switch type

Symbol	Auto switch model	Remarks
Nil	—	Without auto switch (without built-in magnet)
M9N(L)(M)(Z)	D-M9N(L)(M)(Z)	Solid state auto switch
M9P(L)(M)(Z)	D-M9P(L)(M)(Z)	
M9B(L)(M)(Z)	D-M9B(L)(M)(Z)	
A90(L)(Z)	D-A90(L)(Z)	Reed auto switch (Not applicable to flange size 16)
A93(L)(Z)	D-A93(L)(Z)	
M9//	—	Without auto switch (with built-in magnet)

Standard lead wire length is 0.5 m. Add "L" to the end of the part number when 3 m is desired, "M" when 1 m, and "Z" when 5 m.
Example) -M9NL

Switch quantity/Mounting position

Symbol	Quantity	Mounting position
Nil	—	—
A	2pcs.	Valve open/closed
B	1pc.	Valve open
C	1pc.	valve closed

Rated voltage

5	24VDC
6	12VDC

Electrical entry

G	Grommet (lead wire length 300mm)
H	Grommet (lead wire length 600mm)
L	L type plug connector
M	M type plug connector

Light/Surge voltage suppressor

Nil	None
S	With surge voltage suppressor
Z	With light/surge voltage suppressor
U	With light/surge voltage suppressor (non-polar type)

XLAV

Note 1) Option specifications/Combinations
This model has indicator, auto switch and K(DN) flange options, but high temperature/heater options are not available.

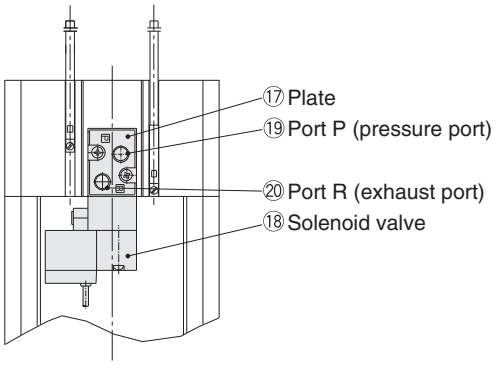
Note 2) Solenoid valves
XLAV-16, 25, 40, 50: SYJ319 XLAV-63, 80: SYJ519 Example) SYJ319-1GS, etc.
For further details on solenoid valves, refer to the SMC solenoid valve catalog "SYJ 300, 500, 700" (E143-B).

Specifications

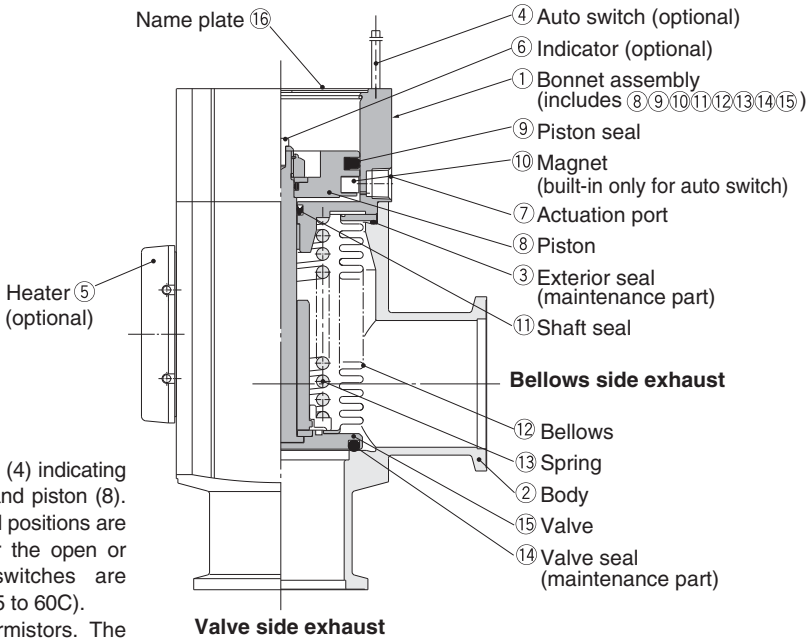
Model		XLA(V)-16	XLA(V)-25	XLA(V)-40	XLA(V)-50	XLA(V)-63	XLA(V)-80
Valve type		Normally closed (pressurize to open, spring seal)					
Fluid		Non-corrosive gas for aluminum alloy (A6063) and SUS304/316					
Operating temperature °C	XLA	5 to 60 (high temperature type: 5 to 150)					
	XLAV	5 to 50					
Operating pressure Pa {Torr}		Atmospheric pressure to 1 x 10^{-6} {760 to 7.5 x 10^{-9}}					
Conductance ℓ/s Note 1)		5	14	45	80	160	200
Leakage Pa m^3/s {Torr ℓ/s}	Internal	1.3 x 10^{-10} {1 x 10^{-9}} at ordinary temperatures, excluding gas permeation					
	External	1.3 x 10^{-11} {1 x 10^{-10}} at ordinary temperatures, excluding gas permeation					
Operating time s Note 2)		0.05	0.1	0.21	0.24	0.26	0.28
Flange type		KF (NW)				KF (NW), K (DN)	
Principle materials		Body: Aluminum alloy Bellows: Stainless steel Seal: FKM (fluoro rubber)					
Surface treatment		Exterior: Hard anodized Interior: Machined for clean environment					
Actuation pressure MPa {kgf/cm²}		0.4 to 0.7 {4 to 7}					
Actuation port size	XLA	M5		Rc(PT) 1/8			
	XLAV	M5 (Ports P, R)				Rc(PT) 1/8 (Port P): M5 (Port R)	
Actuating solenoid valve recommended Cv factor (XLA)		0.05	0.06	0.09	0.11	0.3	0.35
Service life (Million cycles)		2					
Weight kg	XLA	0.25	0.45	1.1	1.6	2.9	5.0
	XLAV	0.29	0.49	1.14	1.64	2.96	5.06

Note 1) Conductance is the same as that of an elbow with the same dimensions.
Note 2) The time required for 90% valve movement when an actuation pressure of 0.5MPa {5kgf/cm²} is applied. There is a difference of about 20% in this value at the upper and lower pressure limits.
Note 3) For valve heater specifications, refer to "Common Option Specifications, [1] Heaters" on page 38.

Construction /Operation



With solenoid valve



Valve side exhaust

<<Options>>

④ Auto switch: The magnet (10) actuates the auto switch (4) indicating the position of the integrated valve (15) and piston (8). With 2 auto switches, the open and closed positions are detected, and with 1 auto switch, either the open or closed position is detected. Auto switches are applicable at ordinary temperatures only (5 to 60C).

⑤ Heater: Simple heating is performed using thermistors. The valve body can be heated to approximately 80, 100 or 120C, depending on the heater option and the valve size. The type and number of thermistors to be used will vary depending upon size and setting temperature. In the case of high temperature specifications, the bonnet assembly (1) is a heat resistant structure.

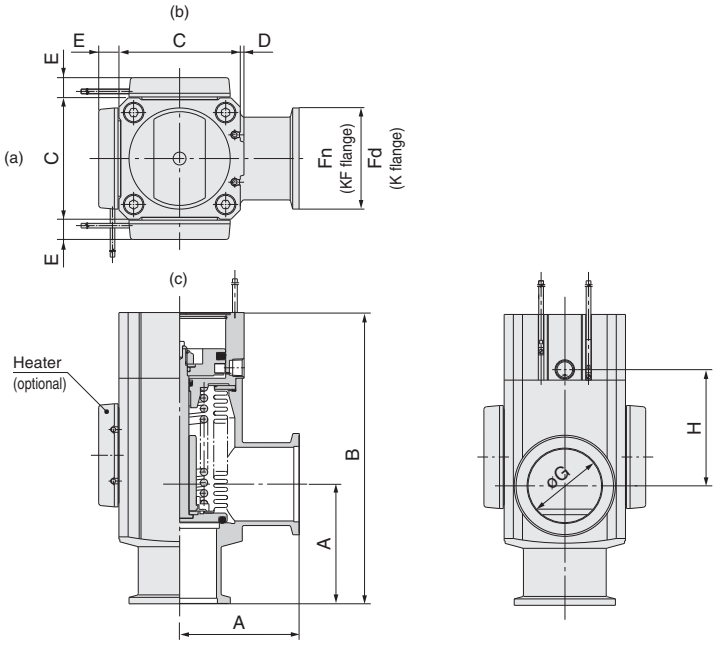
⑥ Indicator: When the valve is open, an orange marker about 1mm in height appears in the center of the name plate (16).

<<Operation principle>>

By applying pressure from the actuation port (7), the piston (8), which is sealed by the shaft seal (11) and the piston seal (9), overcomes the force of the spring (13), and the valve (15) opens.
With the exhaust of air pressure, the valve (15) is closed by the force of the spring (13) and is sealed by the valve seal (14).
In the case of the XLAV, port P(19) is normally pressurized, and the valve (15) opens when the solenoid valve (18) is turned ON and closes when it is turned OFF. Operation is the same as that of the XLA.

Dimensions

XLA/Air operated type

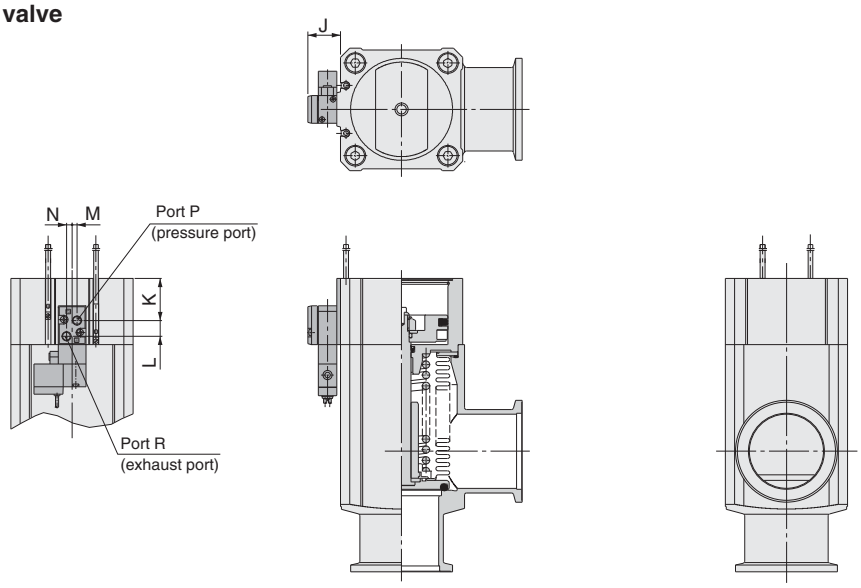


(mm)

Model	A	B	C	D	E Note 1)	Fn	Fd	G	H
XLA-16	40	103	38	1	—	30	—	17	40
XLA-25	50	113	48	1	12	40	—	26	39
XLA-40	65	158	66	2	11	55	—	41	63
XLA-50	70	170	79	2	11	75	—	52	68
XLA-63	88	196	100	3	11	87	95	70	69
XLA-80	90	235	117	3	11	114	110	83	96

Note 1) Dimension E applies when heater option is included. (lead wire length: approx. 1m)
Note 2) (a), (b) and (c) in the above drawing indicate heater mounting positions.
Moreover, heater mounting positions will differ depending on the type of heater.
For further details, refer to mounting positions under Replacement heaters/Part Nos. on page 43.

XLAV/With solenoid valve



(mm)

Model	J	K	L	M	N
XLAV-16	16.5	13.4	8.5	3	3
XLAV-25	16.5	14.9	8.5	3	3
XLAV-40	17.5	22.7	8.5	3	3
XLAV-50	17.5	25.7	8.5	3	3
XLAV-63	29	28.7	12	4	2
XLAV-80	29	38.7	12	4	2

∗ Other dimensions are the same as XLA.

High Vacuum Angle Valve

Series XLC, XLCV

Double Acting/Bellows Seal

Air Operated Type

How to Order

XLC — 16 □ □ □ — □ M9N A

High vacuum angle valve
(Double acting, bellows seal, air operated type)

Flange size

16
25
40
50
63
80

Flange type

Symbol	Type	Applicable flange size
Nil	KF(NW)	16, 25, 40, 50, 63, 80
D	K(DN)	63, 80

Actuation port direction

Nil	Flange side
K	Left flange surface
L	Rear flange surface
M	Right flange surface

Note) Actuation port direction
(Example) Left flange surface: Indicates that the direction of the actuation port is to the left side when the flange surface is viewed from the front.

Switch quantity/Mounting position

Symbol	Quantity	Mounting position
Nil	–	–
A	2pcs.	Valve open/closed
B	1pc.	Valve open
C	1pc.	Valve closed

Auto switch type

Symbol	Auto switch model	Remarks
Nil	—	Without auto switch (without built-in magnet)
M9N(L)(M)(Z)	D-M9N(L)(M)(Z)	Solid state auto switch
M9P(L)(M)(Z)	D-M9P(L)(M)(Z)	
M9B(L)(M)(Z)	D-M9B(L)(M)(Z)	
A90(L)(Z)	D-A90(L)(Z)	Reed auto switch (Not applicable to flange size 16)
A93(L)(Z)	D-A93(L)(Z)	
M9//	—	Without auto switch (with built-in magnet)

Note 1) Auto switches shown above cannot be mounted on the high temperature type. For the high temperature type, a semi-standard product that uses the heat resistant auto switch D-F7NJ* is available. For details, please contact SMC.
Note 2) Standard lead wire length is 0.5 m. Add "L" to the end of the part number when 3 m is desired, "M" when 1 m, and "Z" when 5 m.
Example) -M9NL

Symbol	Applicable flange size
Nil	16, 25, 40
1	50, 63, 80

Temperature specifications/Heater

Symbol		Temperature	Heater
Nil		5 to 60°C	—
High temperature type	H0	5 to 150°C	—
	H4		With 100°C heater
	H5		With 120°C heater

XLC

High temperature type combination table

High temperature specifications	Symbol	Model					
		XLC-16	XLC-25	XLC-40	XLC-50	XLC-63	XLC-80
Without heater	H0	•	•	•	•	•	•
With heater for 100°C	H4	–	–	•	•	•	•
With heater for 120°C	H5	–	•	•	•	•	•

Air Operated Type/with Solenoid Valve

How to Order

XLCV — 16 ☐ K — ☐ M9N ☐ — 5 ☐ G ☐ — Q

High vacuum angle valve
Double acting, bellows seal, air operated type with solenoid valve

Flange size

16
25
40
50
63
80

Flange type

Symbol	Type	Applicable flange size
Nil	KF(NW)	16, 25, 40, 50, 63, 80
D	K(DN)	63, 80

Solenoid valve direction

K	Left flange surface
L	Rear flange surface
M	Right flange surface

∗ M: Size 16, 25, 40 only.
∗ Nil: Size 50, 63, 80 only.
Note) Solenoid valve direction
(Example) Left flange surface: Indicates that the direction of the solenoid valve is to the left side when the flange surface is viewed from the front.

Symbol	Applicable flange size
Nil	16, 25, 40
1	50, 63, 80

Auto switch type

Symbol	Auto switch model	Remarks
Nil	—	Without auto switch (without built-in magnet)
M9N(L)(M)(Z)	D-M9N(L)(M)(Z)	Solid state auto switch
M9P(L)(M)(Z)	D-M9P(L)(M)(Z)	
M9B(L)(M)(Z)	D-M9B(L)(M)(Z)	
A90(L)(Z)	D-A90(L)(Z)	Reed auto switch (Not applicable to flange size 16)
A93(L)(Z)	D-A93(L)(Z)	
M9//	—	Without auto switch (with built-in magnet)

Standard lead wire length is 0.5 m. Add "L" to the end of the part number when 3 m is desired, "M" when 1 m, and "Z" when 5 m.
Example) -M9NL

Switch quantity/Mounting position

Symbol	Quantity	Mounting position
Nil	–	–
A	2pcs.	Valve open/closed
B	1pc.	Valve open
C	1pc.	Valve closed

Rated voltage

5	24VDC
6	12VDC

Solenoid valve action

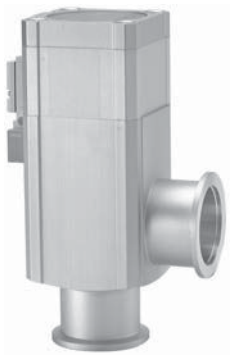
Nil	2 position single
W	2 position double

Electrical entry

G	Grommet (lead wire length 300mm)
H	Grommet (lead wire length 600mm)
L	L type plug connector
M	M type plug connector

Light/Surge voltage suppressor

Nil	None
S	With surge voltage suppressor
Z	With light/surge voltage suppressor
U	With light/surge voltage suppressor (non-polar type)


XLCV

Note 1) Option specifications/Combinations
This model has auto switch and K(DN) flange options, but high temperature/heater options are not available.

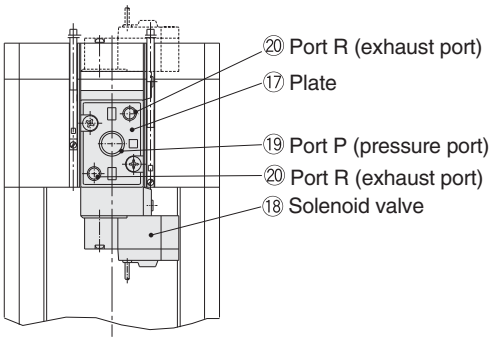
Note 2) Solenoid valves
2 position single : XLCV-16, 25, 40, 50 : SYJ3190 XLCV-63, 80 : SYJ5190
2 position double: XLCV-16, 25, 40, 50 : SYJ3290 XLCV-63, 80 : SYJ5290
Examples) SYJ3190-1GS SYJ3290-1GS
For further details on solenoid valves, refer to the SMC solenoid valve catalog "SYJ 3000, 5000, 7000" (E144-A).

Specifications

Model		XLC(V)-16	XLC(V)-25	XLC(V)-40	XLC(V)-50	XLC(V)-63	XLC(V)-80
Valve type		Double acting (dual operation), pressurize to open/close					
Fluid		Non-corrosive gas for aluminum alloy (A6063) and SUS304/316					
Operating temperature °C	XLC	5 to 60 (high temperature type: 5 to 150)					
	XLCV	5 to 50					
Operating pressure Pa {Torr}		Atmospheric pressure to 1 x 10^{-6} {760 to 7.5 x 10^{-9}}					
Conductance ℓ/s Note 1)		5	14	45	80	160	200
Leakage Pa m³/s {Torr ℓ/s}	Internal	1.3 x 10^{-10} {1 x 10^{-9}} at ordinary temperatures, excluding gas permeation					
	External	1.3 x 10^{-11} {1 x 10^{-10}} at ordinary temperatures, excluding gas permeation					
Operating time s Note 2)		0.08	0.15	0.35	0.4	0.54	0.7
Flange type		KF (NW)				KF (NW), K (DN)	
Principle materials		Body: Aluminum alloy Bellows: Stainless steel Seal: FKM (fluoro rubber)					
Surface treatment		Exterior: Hard anodized Interior: Machined for clean environment					
Actuation pressure MPa {kgf/cm²}		0.3 to 0.6 {3 to 6}					
Actuation port size	XLC	M5		Rc(PT) 1/8			
	XLCV	M5 (Ports P, R1/R2)				Rc(PT) 1/8(Port P): M5(Ports R1/R2)	
Actuating solenoid valve recommended Cv factor (XLC)		0.05	0.06	0.09	0.11	0.3	0.35
Service life (Million cycles)		2					
Weight kg	XLC	0.28	0.46	1.1	1.7	3.1	5.1
	XLCV	0.32	0.5	1.15	1.74	3.16	5.16

Note 1) Conductance is the same as that of an elbow with the same dimensions.
Note 2) The time required for 90% valve movement when an actuation pressure of 0.5MPa {5kgf/cm²} is applied. There is a difference of about 20% in this value at the upper and lower pressure limits.
Note 3) For valve heater specifications, refer to "Common Option Specifications, [1] Heaters" on page 38.

Construction/Operation



With solenoid valve

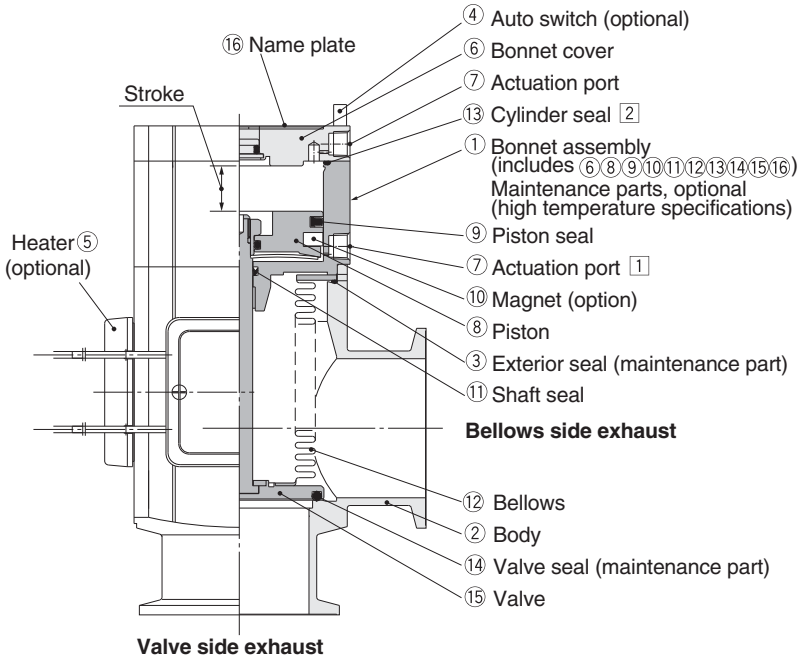
<<Operating principle>>

By applying pressure from the actuating port [1]-(7), the piston (8), sealed by the shaft seal (11) and the piston seal (9), is operated opening the valve. (actuation port [2]-(7) is released)

Conversely, by applying pressure to actuation port [2]-(7), the piston (8), sealed by the cylinder seal (13) and the piston seal (9), is operated closing the valve (15) which is sealed by the valve seal (14). (actuation port [1]-(7) is released)

In the case of the XLCV, port P (19) is normally pressurized, and the valve (15) opens when the solenoid valve (18) is turned ON, and closes when it is turned OFF. Moreover, in the case of a double solenoid, the valve moves to the side where the solenoid valve (18) is turned ON. Operation is the same as that of the XLC.

For sizes 50, 63 and 80, the valve is sealed with a standard load by means of an overrun mechanism.



Valve side exhaust

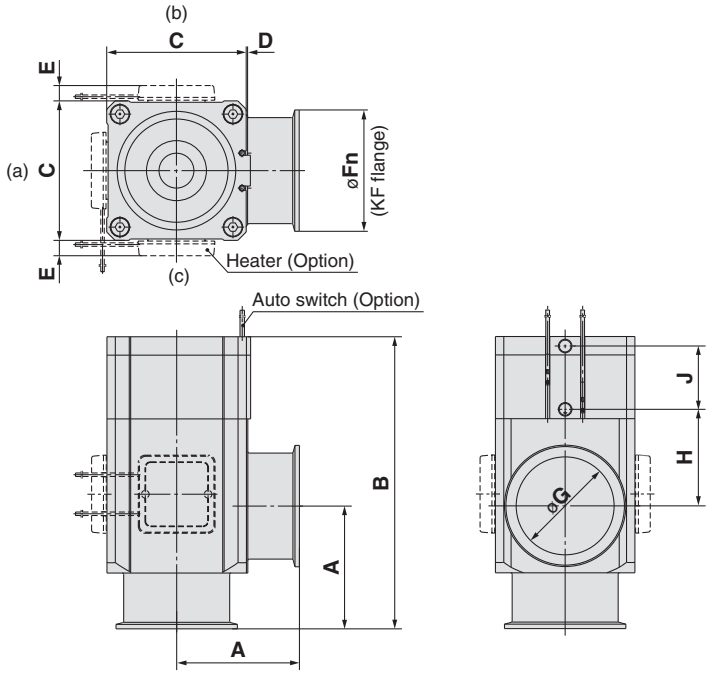
<<Options>>

④ Auto switch: The magnet (10) actuates the auto switch (4) indicating the position of the integrated valve (15) and piston (8). With 2 auto switches, the open and closed positions are detected, and with 1 auto switch, either the open or closed position is detected. Auto switches are applicable at ordinary temperatures only (5 to 60C).

⑤ Heater: Simple heating is performed using thermistors. The valve body can be heated to approximately 80, 100 or 120C, depending on the heater option and the valve size. The type and number of thermistors to be used will vary depending upon size and setting temperature. In the case of high temperature specifications, the bonnet assembly (1) is a heat resistant structure.

Dimensions

XLC16, 25, 40/Air operated

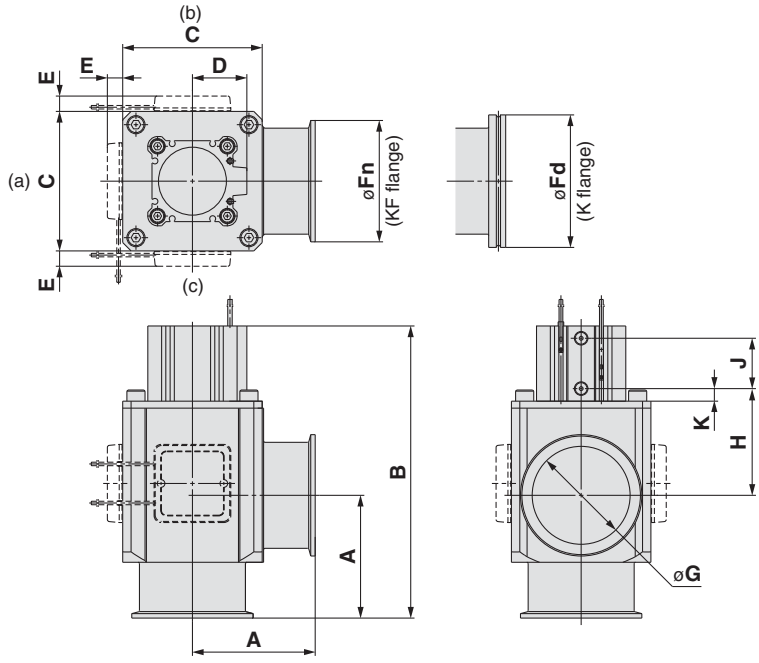


(mm)

Model	A	B	C	D	E Note 1)	Fn	G	H	J
XLC-16	40	110	38	1	—	30	17	40	26
XLC-25	50	121	48	1	12	40	26	39	28
XLC-40	65	171	66	2	11	55	41	63	36

Note 1) Dimension E applies when heater option is included. (Lead wire length: approx. 1 m)
Note 2) (a), (b) and (c) in the above drawing indicate heater mounting positions.Moreover, heater mounting positions will differ depending on the type of heater.For further details, refer to mounting positions under “Replacement Heaters” on page 43.

XLC50, 63, 80/Air operated



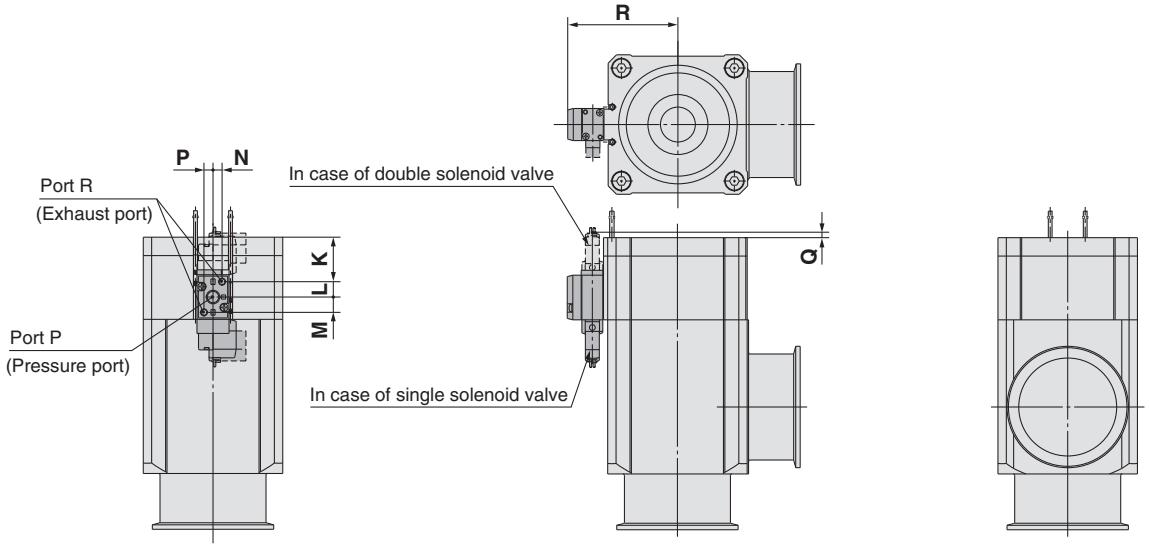
(mm)

Model	A	B	C	D	E Note 1)	Fn	Fd	G	H	J	K
XLC-50	70	183	80	31	10.5	75	—	52	77	29	10.5
XLC-63	88	209	100	39	11	87	95	70	76.5	36	9
XLC-80	90	250	117	45.5	11	114	110	83	105	44	9

Note 1) Dimension E applies when heater option is included. (Lead wire length: approx. 1 m)
Note 2) (a), (b) and (c) in the above drawing indicate heater mounting positions.Moreover, heater mounting positions will differ depending on the type of heater.For further details, refer to mounting positions under “Replacement Heaters” on page 43.

Dimensions

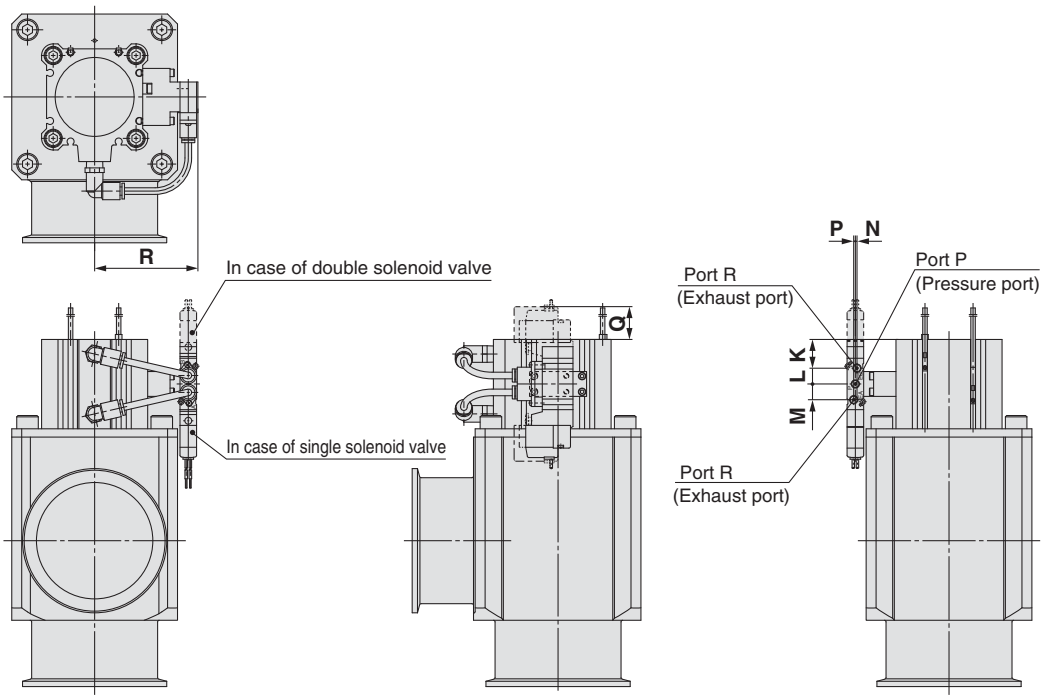
XLCV/With solenoid valve



(mm)

Model	K	L	M	N	P	Q	R
XLCV-16	14.3	9.2	6.4	3.5	2.7	17.3	36
XLCV-25	15.8	9.2	6.4	3.5	2.7	15.8	41
XLCV-40	29	9.2	6.4	3.5	2.7	2.6	51

∗ Other dimensions are the same as the XLC.
Note) For details, consult your SMC sales representative.



(mm)

Model	K	L	M	N	P	Q	R
XLCV-50	12.5	9.5	9.5	1	1	23.5	52.6
XLCV-63	17.4	9.5	9.5	1	1	18.6	62.3
XLCV-80	23.5	9.5	9.5	1	1	12.4	70.8

∗ Other dimensions are the same as the XLC.
Note) For details, consult your SMC sales representative.

High Vacuum Angle Valve

Series XLF, XLFV

Normally Closed/O-ring Seal

Air Operated Type

How to Order

XLF — 16 □ □ □ — M9N A

High vacuum angle valve
(Normally closed, O-ring seal, air operated type)

Flange size

16
25
40
50
63
80
100
160

Switch quantity/Mounting position

Symbol	Quantity	Mounting position
Nil	–	–
A	2pcs.	Valve open/closed
B	1pc.	Valve open
C	1pc.	Valve closed

Auto switch type

Symbol	Auto switch model	Remarks
Nil	—	Without auto switch (without built-in magnet)
M9N(L)(M)(Z)	D-M9N(L)(M)(Z)	Solid state auto switch
M9P(L)(M)(Z)	D-M9P(L)(M)(Z)	
M9B(L)(M)(Z)	D-M9B(L)(M)(Z)	
A90(L)(Z)	D-A90(L)(Z)	Reed auto switch (Not applicable to flange size 16)
A93(L)(Z)	D-A93(L)(Z)	
M9//	—	Without auto switch (with built-in magnet)

Note 1) Auto switches shown above cannot be mounted on the high temperature type. For the high temperature type, a semi-standard product that uses the heat resistant auto switch D-F7NJ* is available. For details, please contact SMC.

Note 2) Standard lead wire length is 0.5 m. Add "L" to the end of the part number when 3 m is desired, "M" when 1 m, and "Z" when 5 m.

Example) -M9NL

Flange type

Symbol	Type	Applicable flange size
Nil	KF(NW)	16, 25, 40, 50, 63, 80
D	K(DN)	63, 80, 100, 160

Indicator/Actuation port direction

Nil	Without indicator/Flange side
A	With indicator/Flange side
F	With indicator/Left flange surface
G	With indicator/Rear flange surface
J	With indicator/Right flange surface
K	Without indicator/Left flange surface
L	Without indicator/Rear flange surface
M	Without indicator/Right flange surface

Note) Actuation port direction
(Example) Left flange surface: Indicates that the direction of the actuation port is to the left side when the flange surface is viewed from the front.

Temperature specifications/Heater

Symbol		Temperature	Heater
Nil		5 to 60°C	—
High temperature type	H0	5 to 150°C	—
	H4		With 100°C heater
	H5		With 120°C heater

XLF

High temperature type combination table

High temperature specifications	Symbol	Model							
		XLF-16	XLF-25	XLF-40	XLF-50	XLF-63	XLF-80	XLF-100	XLF-160
Without heater	H0	•	•	•	•	•	•	•	•
With heater for 100°C	H4	–	–	•	•	•	•	•	•
With heater for 120°C	H5	–	•	•	•	•	•	•	•

Air Operated Type/with Solenoid Valve

How to Order

CE

XLFV — 16 ☐ F — M9N A — 5 G ☐ — Q

High vacuum angle valve
Normally closed, O-ring seal, air operated type with solenoid valve

Flange size

16
25
40
50
63
80
100
160

Flange type

Symbol	Type	Applicable flange size
Nil	KF(NW)	16, 25, 40, 50, 63, 80
D	K(DN)	63, 80, 100, 160

Solenoid valve/Indicator direction

F	With indicator/Left flange surface
G	With indicator/Rear flange surface
J	With indicator/Right flange surface
K	Without indicator/Left flange surface
L	Without indicator/Rear flange surface
M	Without indicator/Right flange surface

Note) Actuation port direction
(Example) Left flange surface: Indicates that the direction of the actuation port is to the left side when the flange surface is viewed from the front.

Auto switch type

Symbol	Auto switch model	Remarks
Nil	—	Without auto switch (without built-in magnet)
M9N(L)(M)(Z)	D-M9N(L)(M)(Z)	Solid state auto switch
M9P(L)(M)(Z)	D-M9P(L)(M)(Z)	
M9B(L)(M)(Z)	D-M9B(L)(M)(Z)	
A90(L)(Z)	D-A90(L)(Z)	Reed auto switch (Not applicable to flange size 16)
A93(L)(Z)	D-A93(L)(Z)	
M9//	—	Without auto switch (with built-in magnet)

Standard lead wire length is 0.5 m. Add "L" to the end of the part number when 3 m is desired, "M" when 1 m, and "Z" when 5 m.
Example) -M9NL

Switch quantity/Mounting position

Symbol	Quantity	Mounting position
Nil	—	—
A	2pcs.	Valve open/closed
B	1pc.	Valve open
C	1pc.	Valve closed

Rated voltage

5	24VDC
6	12VDC

Electrical entry

G	Grommet (lead wire length 300mm)
H	Grommet (lead wire length 600mm)
L	L type plug connector
M	M type plug connector

Light/Surge voltage suppressor

Nil	None
S	With surge voltage suppressor
Z	With light/surge voltage suppressor
U	With light/surge voltage suppressor (non-polar type)

XLFV

Note 1) Option specifications/Combinations
This model has indicator, auto switch and K(DN) flange options, but high temperature/heater options are not available.

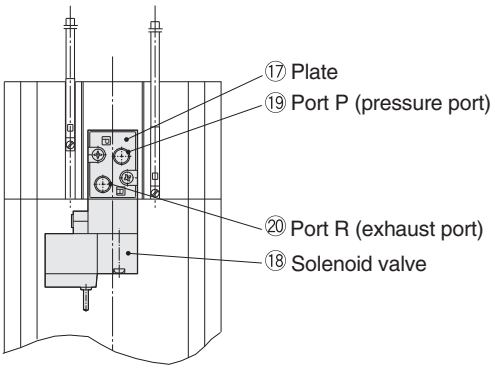
Note 2) Solenoid valves
XLFV-16, 25, 40: SYJ319 XLFV-50, 63, 80: SYJ519 Example) SYJ319-1GS
For further details on solenoid valves, refer to the SMC solenoid valve catalog "SYJ300, 500, 700" (E143-B).

Specifications

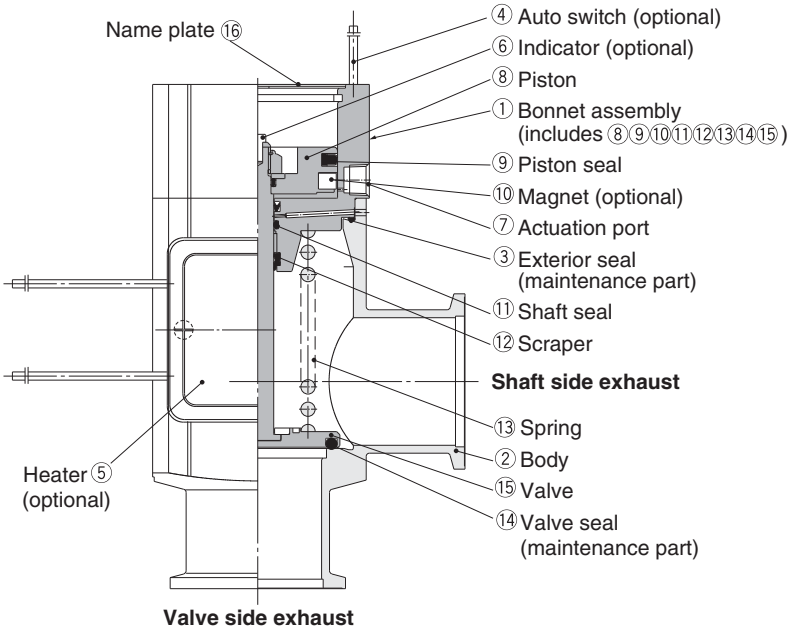
Model		XLF(V)-16	XLF(V)-25	XLF(V)-40	XLF(V)-50	XLF(V)-63	XLF(V)-80	XLF(V)-100	XLF(V)-160
Valve type		Normally closed (pressurize to open, spring seal)							
Fluid		Non-corrosive gas for aluminum alloy (A6063) and SUS304/316							
Operating temperature °C	XLF	5 to 60 (high temperature type: 5 to 150)							
	XLFV	5 to 50							
Operating pressure Pa Torr}		Atmospheric pressure to 1 x 10^{-5} {760 to 7.5 x 10^{-8}}							
Conductance ℓ/s Note 1)		5	14	45	80	160	200	300	800
Leakage Pa m³/s {Torr ℓ/s}	Internal	1.3 x 10^{-10} {1 x 10^{-9}} at ordinary temperatures, excluding gas permeation							
	External	1.3 x 10^{-10} {1 x 10^{-9}} at ordinary temperatures, excluding gas permeation							
Operating time ms Note 2)	XLF	30	35	40	45	65	85	150	300
	XLFV	30	35	60	60	100	130	450	850
Flange type		KF (NW)				KF (NW), K (DN)			
Principle materials		Body: Aluminum alloy Bellows: Stainless steel Seal: FKM (fluoro rubber)							
Surface treatment		Exterior: Hard anodized Interior: Machined for clean environment							
Actuation pressure MPa {kgf/cm²}		0.4 to 0.7 {4 to 7}							
Actuation port size	XLF	M5			Rc 1/8				Rc 1/4
	XLFV	M5: Port 1(P), Port 3(R)				Rc1/8: Port 1(P), M5: Port 3(R)			
Actuating solenoid valve recommended Cv factor (XLF)		≤ 0.14 (comparable SYJ512)							
Service life (Million cycles)		1							
Weight kg	XLF	0.25	0.45	1.1	1.6	3.0	4.8	10	18
	XLFV	0.29	0.49	1.14	1.66	3.06	4.86	10.1	18.1

Note 1) Conductance is the same as that of an elbow with the same dimensions.
Note 2) The operating time with no solenoid valve (XLF) is the same value as the case of the solenoid valve piped directly to the bonnet, where the actuation pressure is 0.5MPa {5kgf/cm²}. The operating time becomes faster under high pressure.
Note 3) For valve heater specifications, refer to "Common Option Specifications, [1] Heaters" on page 38.

Construction/Operation



With solenoid valve



Valve side exhaust

<<Operating principle>>

By applying pressure from the actuation port (7), the piston (8), which is sealed by the shaft seal (11) and the piston seal (9), overcomes the force of the spring (13), and the valve (15) opens.

With the exhaust of air pressure, the valve (15) is closed by the force of the spring (13) and is sealed by the valve seal (14).

In the case of the XLFV, port P (19) is normally pressurized, and the valve (15) opens when the solenoid valve (18) is turned ON, and closes when it is turned OFF. Operation is the same as that of the XLF.

<<Options>>

For selections, refer to item 3, model number and option symbol table.

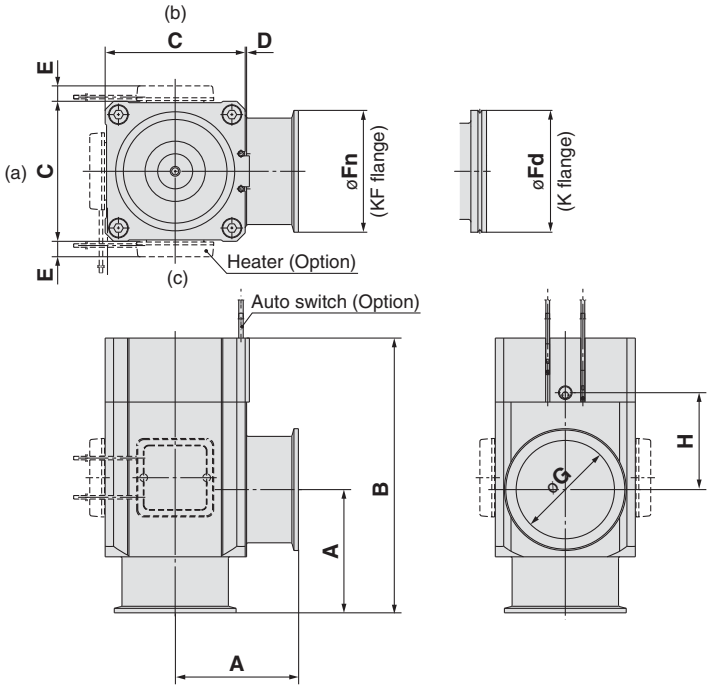
④ Auto switch: The magnet (10) actuates the auto switch (4) indicating the position of the integrated valve (15) and piston (8). With 2 auto switches, the open and closed positions are detected, and with 1 auto switch, either the open or closed position is detected. Auto switches are applicable at ordinary temperatures only (5 to 60C).

⑤ Heater: Simple heating is performed using thermistors. The valve body can be heated to approximately 80, 100 or 120C, depending on the heater option and the valve size. The type and number of thermistors to be used will vary depending upon size and setting temperature. In the case of high temperature specifications, the bonnet assembly (1) is a heat resistant structure. This is not available with solenoid valve.

⑥ Indicator: When the valve is open, an orange marker about 1mm in height appears in the center of the name plate (16).

Dimensions

XLF/Air operated type

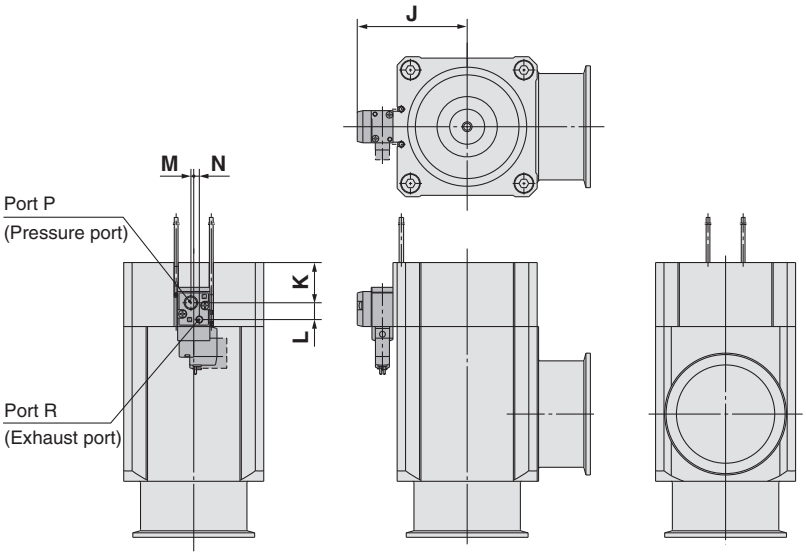


(mm)

Model	A	B	C	D	E Note 1)	Fn	Fd	G	H
XLF-16	40	103	38	1	—	30	—	17	40
XLF-25	50	113	48	1	12	40	—	26	39
XLF-40	65	158	66	2	11	55	—	41	63
XLF-50	70	170	79	2	11	75	—	52	68
XLF-63	88	196	100	3	11	87	95	70	69
XLF-80	90	235	117	3	11	114	110	83	96
XLF-100	108	300	154	3	11	134	130	102	131
XLF-160	138	315	200	3	11	190	180	153	112

Note 1) Dimension E applies when heater option is included. (Lead wire length: approx. 1 m)
Note 2) (a), (b) and (c) in the above drawing indicate heater mounting positions.
Moreover, heater mounting positions will differ depending on the type of heater.
For further details, refer to mounting positions under “Replacement Heaters” on page 43.

XLFV/With solenoid valve



(mm)

Model	J	K	L	M	N
XLFV-16	35.5	13.4	8.5	3	2.7
XLFV-25	40.5	15	8.5	3	2.7
XLFV-40	50.5	22.7	8.5	3	2.7
XLFV-50	67	21.7	12	4	2
XLFV-63	78.5	28.7	12	4	2
XLFV-80	87	38.7	12	4	2
XLFV-100	105.5	49.7	12	4	2
XLFV-160	128.5	58	12	4	2

∗ Other dimensions are the same as the XLF.
Note) For details, consult your SMC sales representative.

High Vacuum Angle Valve

Series XLG, XLGV

Double Acting/O-ring Seal

Air Operated Type

How to Order

XLG — 16 □ □ □ — □ M9N A

High vacuum angle valve
(Double acting, O-ring seal, air operated type)

Flange size

16
25
40
50
63
80
100
160

Flange type

Symbol	Type	Applicable flange size
Nil	KF(NW)	16, 25, 40, 50, 63, 80
D	K(DN)	63, 80, 100, 160

Actuation port direction

Nil	Flange side
K	Left flange surface
L	Rear flange surface
M	Right flange surface

Note) Actuation port direction
(Example) Left flange surface: Indicates that the direction of the actuation port is to the left side when the flange surface is viewed from the front.

Symbol	Applicable flange size
Nil	16, 25, 40
1	50, 63, 80, 100, 160

Temperature specifications/Heater

Symbol		Temperature	Heater
Nil		5 to 60°C	—
High temperature type	H0	5 to 150°C	—
	H4		With 100°C heater
	H5		With 120°C heater

Auto switch type

Symbol	Auto switch model	Remarks
Nil	—	Without auto switch (without built-in magnet)
M9N(L)(M)(Z)	D-M9N(L)(M)(Z)	Solid state auto switch
M9P(L)(M)(Z)	D-M9P(L)(M)(Z)	
M9B(L)(M)(Z)	D-M9B(L)(M)(Z)	
A90(L)(Z)	D-A90(L)(Z)	Reed auto switch (Not applicable to flange size 16)
A93(L)(Z)	D-A93(L)(Z)	
M9//	—	Without auto switch (with built-in magnet)

Note 1) Auto switches shown above cannot be mounted on the high temperature type. For the high temperature type, a semi-standard product that uses the heat resistant auto switch D-F7NJ* is available. For details, please contact SMC.
Note 2) Standard lead wire length is 0.5 m. Add "L" to the end of the part number when 3 m is desired, "M" when 1 m, and "Z" when 5 m.
Example) -M9NL

Switch quantity/Mounting position

Symbol	Quantity	Mounting position
Nil	–	–
A	2pcs.	Valve open/closed
B	1pc.	Valve open
C	1pc.	Valve closed

XLG

High temperature type combination table

High temperature specifications	Symbol	Model						
		XLG-16	XLG-25	XLG-40	XLG-50	XLG-63	XLG-100	XLG-160
Without heater	H0	•	•	•	•	•	•	•
With heater for 100°C	H4	–	–	•	•	•	•	•
With heater for 120°C	H5	–	•	•	•	•	•	•

Air Operated Type/with Solenoid Valve

How to Order

XLGV — 16 ☐ K — ☐ M9N A — 5 ☐ G ☐ — Q

High vacuum angle valve
Double acting, O-ring seal, air operated type with solenoid valve

Flange size

16
25
40
50
63
80

Flange type

Symbol	Type	Applicable flange size
Nil	KF(NW)	16, 25, 40, 50, 63, 80
D	K(DN)	63, 80

Solenoid valve direction

K	Left flange surface
L	Rear flange surface
M	Right flange surface

∗ M: Size 16, 25, 40 only.
∗ Nil: Size 50, 63, 80 only.
Note) Solenoid valve direction
(Example) Left flange surface: Indicates that the direction of the solenoid valve is to the left side when the flange surface is viewed from the front.

Symbol	Applicable flange size
Nil	16, 25, 40
1	50, 63, 80

Auto switch type

Symbol	Auto switch model	Remarks
Nil	—	Without auto switch (without built-in magnet)
M9N(L)(M)(Z)	D-M9N(L)(M)(Z)	Solid state auto switch
M9P(L)(M)(Z)	D-M9P(L)(M)(Z)	
M9B(L)(M)(Z)	D-M9B(L)(M)(Z)	
A90(L)(Z)	D-A90(L)(Z)	Reed auto switch (Not applicable to flange size 16)
A93(L)(Z)	D-A93(L)(Z)	
M9//	—	Without auto switch (with built-in magnet)

Standard lead wire length is 0.5 m. Add "L" to the end of the part number when 3 m is desired, "M" when 1 m, and "Z" when 5 m.
Example) -M9NL

Switch quantity/Mounting position

Symbol	Quantity	Mounting position
Nil	–	–
A	2pcs.	Valve open/closed
B	1pc.	Valve open
C	1pc.	Valve closed

Rated voltage

5	24VDC
6	12VDC

Solenoid valve action

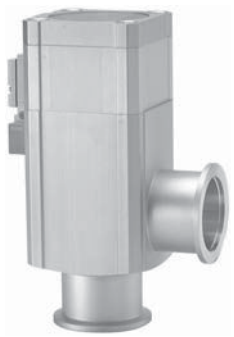
Nil	2 position single
W	2 position double

Electrical entry

G	Grommet (lead wire length 300mm)
H	Grommet (lead wire length 600mm)
L	L type plug connector
M	M type plug connector

Light/Surge voltage suppressor

Nil	None
S	With surge voltage suppressor
Z	With light/surge voltage suppressor
U	With light/surge voltage suppressor (non-polar type)



XLGV

Note 1) Option specifications/Combinations
This model has auto switch and K(DN) flange options, but high temperature/heater options are not available.

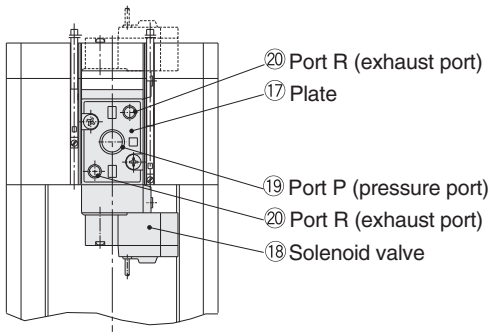
Note 2) Solenoid valves
2 position single: XLGV-16, 25, 40: SYJ3190 XLGV-50, 63, 80: SYJ5190
2 position double: XLGV-16, 25, 40: SYJ3290 XLGV-50, 63, 80: SYJ5290
Examples) SYJ3190-1GS SYJ3290-1GS
For further details on solenoid valves, refer to the SMC solenoid valve catalog "SYJ 3000, 5000, 7000" (E144-A).

Specifications

Model		XLG(V)-16	XLG(V)-25	XLG(V)-40	XLG(V)-50	XLG(V)-63	XLG(V)-80	XLG-100	XLG-160
Valve type		Double acting (dual operation), pressurize to open/close							
Fluid		Non-corrosive gas for aluminum alloy (A6063) and SUS304/316							
Operating temperature °C	XLG	5 to 60 (high temperature type: 5 to 150)							
	XLGV	5 to 50							
Operating pressure Pa Torr}		Atmospheric pressure to 1 x 10^{-5} {760 to 7.5 x 10^{-8}}							
Conductance ℓ/s Note 1)		5	14	45	80	160	200	300	800
Leakage Pa m^3/s {Torr ℓ/s}	Internal	1.3 x 10^{-10} {1 x 10^{-9}} at ordinary temperatures, excluding gas permeation							
	External	1.3 x 10^{-10} {1 x 10^{-9}} at ordinary temperatures, excluding gas permeation							
Operating time ms Note 2)	XLG	40	45	60	60	95	105	200	350
	XLGV	45	50	85	90	135	150	—	—
Flange type		KF (NW)				KF (NW), K (DN)			
Principle materials		Body: Aluminum alloy Bellows: Stainless steel Seal: FKM (fluoro rubber)							
Surface treatment		Exterior: Hard anodized Interior: Machined for clean environment							
Actuation pressure MPa {kgf/cm²}		0.3 to 0.6			0.4 to 0.6				
Actuation port size	XLG	M5			Rc 1/8				
	XLGV	M5 (Ports P, R1/R2)			Rc(PT) 1/8 (Ports P), M5 (Ports R1/R2)			—	
Actuating solenoid valve recommended Cv factor (XLF)		≤ 0.18 (comparable SY3120)							
Service life (Million cycles)		1							
Weight kg	XLG	0.28	0.46	1.1	1.4	2.3	4.1	7.6	14.9
	XLGV	0.32	0.5	1.14	1.5	2.4	4.2	—	

Note 1) Conductance is the same as that of an elbow with the same dimensions.
Note 2) The operating time with no solenoid valve (XLF) is the same value as the case of the solenoid valve piped directly to the bonnet, where the actuation pressure is 0.5MPa {5kgf/cm²}. The operating time becomes faster under high pressure.
Note 3) For valve heater specifications, refer to "Common Option Specifications, [1] Heaters" on page 38.

Construction/Operation



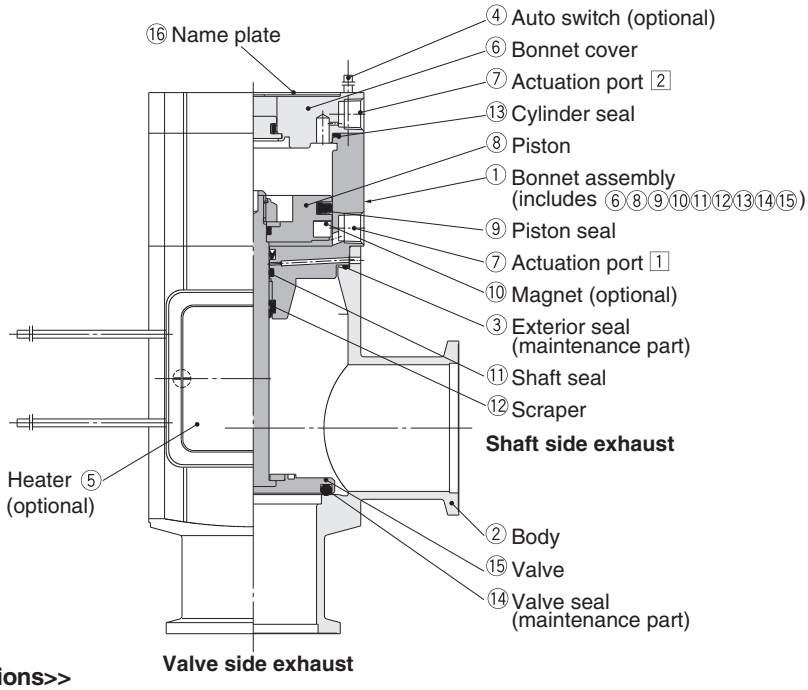
<<Operating principle>>

By applying pressure from the actuating port [1]-(7), the piston (8), sealed by the shaft seal (11) and the piston seal (9), is operated opening the valve (actuation port [2]-(7) is released). Conversely, by applying pressure to actuation port [2]-(7), the piston (8), sealed by the cylinder seal (13) and the piston seal (9), is operated closing the valve (15) which is sealed by the valve seal (14) (actuation port [1]-(7) is released). In the case of the XLCV, port P (19) is normally pressurized, and the valve (15) opens when the solenoid valve (18) is turned ON, and closes when it is turned OFF.

Moreover, in the case of a double solenoid, the valve moves to the side where the solenoid valve (18) is turned ON.

Operation is the same as that of the XLC.

For sizes 50, 63 and 80, the valve is sealed with a standard load by means of an overrun mechanism.



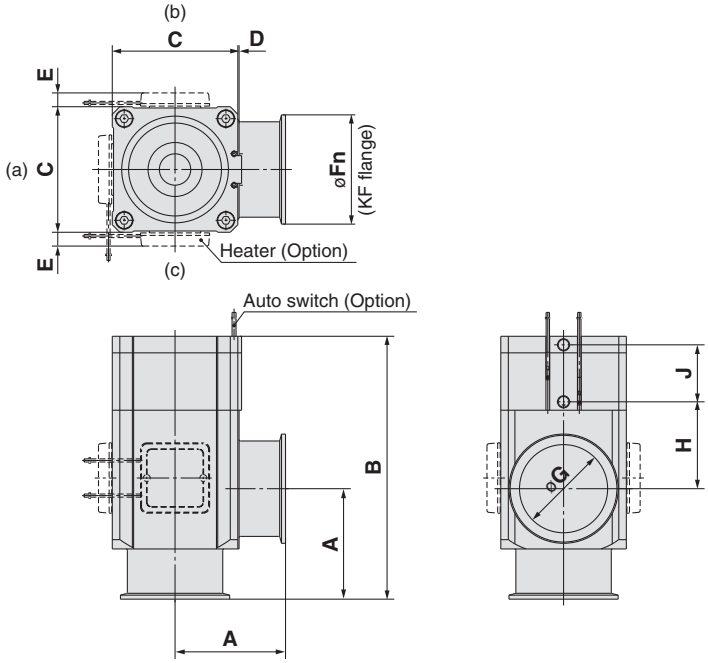
<<Options>>

④ Auto switch: The magnet (10) actuates the auto switch (4) indicating the position of the integrated valve (15) and piston (8). With 2 auto switches, the open and closed positions are detected, and with 1 auto switch, either the open or closed position is detected. Auto switches are applicable at ordinary temperatures only (5 to 60C).

⑤ Heater: Simple heating is performed using thermistors. The valve body can be heated to approximately 80, 100 or 120C, depending on the heater option and the valve size. The type and number of thermistors to be used will vary depending upon size and setting temperature. In the case of high temperature specifications, the bonnet assembly (1) is a heat resistant structure. This is not available with solenoid valve.

Dimensions

XLG16, 25, 40/Air operated

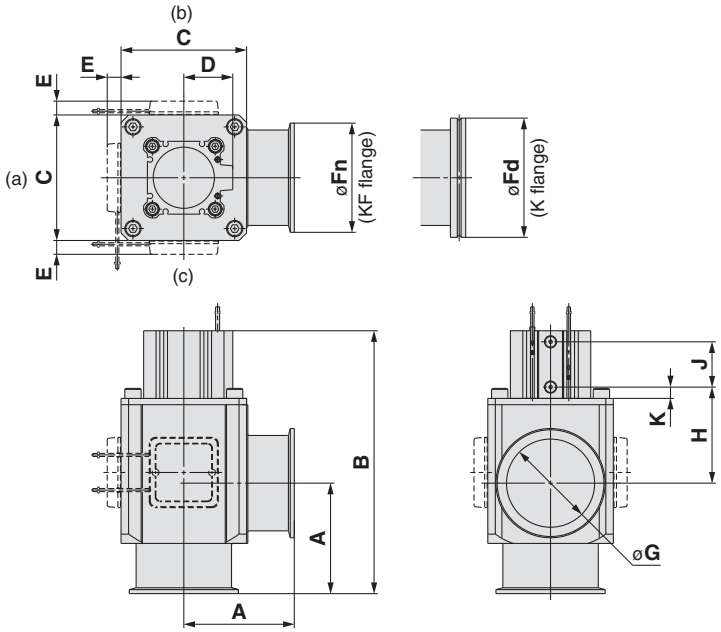


(mm)

Model	A	B	C	D	E Note 1)	Fn	G	H	J
XLG-16	40	110	38	1	—	30	17	40	26
XLG-25	50	121	48	1	12	40	26	39	28
XLG-40	65	171	66	2	11	55	41	63	36

Note 1) Dimension E applies when heater option is included. (Lead wire length: approx. 1 m)
Note 2) (a), (b) and (c) in the above drawing indicate heater mounting positions.
Moreover, heater mounting positions will differ depending on the type of heater.
For further details, refer to mounting positions under “Replacement Heaters” on page 43.

XLG50, 63, 80, 100, 160/Air operated



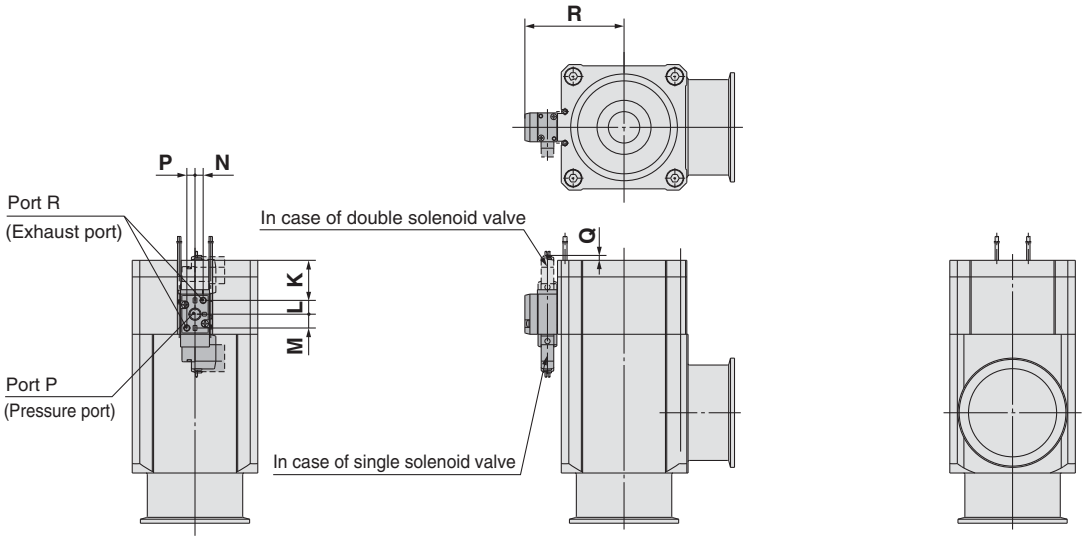
(mm)

Model	A	B	C	D	E Note 1)	Fn	Fd	G	H	J	K
XLG-50	70	183	80	31	10.5	75	—	52	77	29	10.5
XLG-63	88	209	100	39	11	87	95	70	76.5	36	9
XLG-80	90	250	117	45.5	11	114	110	83	105	44	9
XLG-100	108	270.5	154	55	11	134	130	102	92	58	9
XLG-160	138	339	200	65	11	190	180	153	124	62	12.5

Note 1) Dimension E applies when heater option is included. (Lead wire length: approx. 1 m)
Note 2) (a), (b) and (c) in the above drawing indicate heater mounting positions.
Moreover, heater mounting positions will differ depending on the type of heater.
For further details, refer to mounting positions under “Replacement Heaters” on page 43.

Dimensions

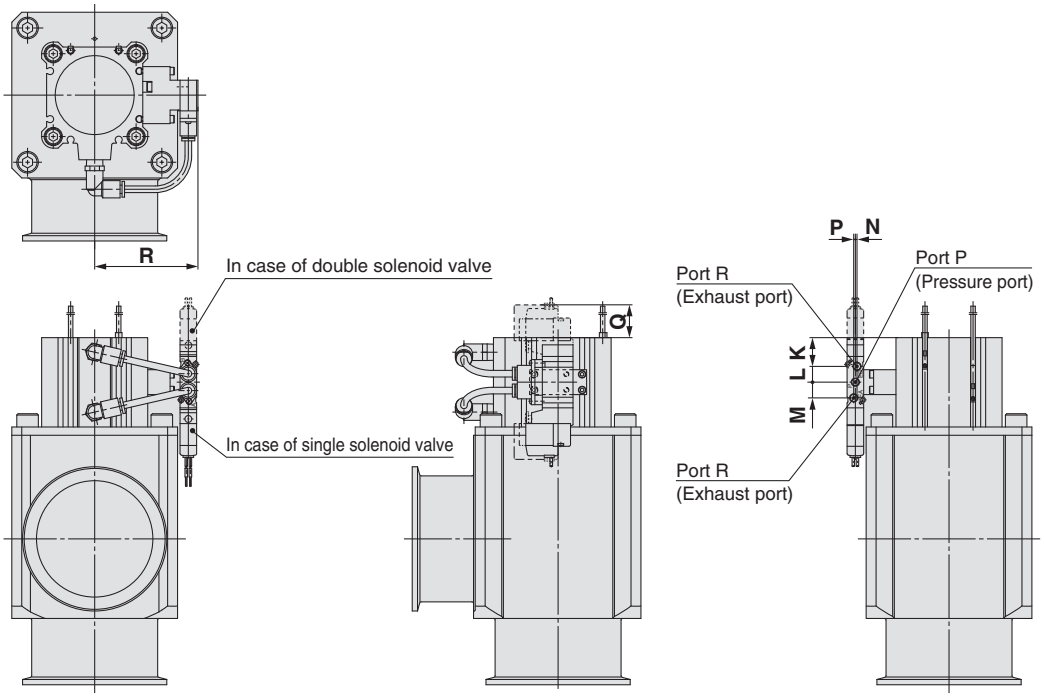
XLGV/With solenoid valve



(mm)

Model	K	L	M	N	P	Q	R
XLGV-16	14.3	9.2	6.4	3.5	2.7	17.3	36
XLGV-25	15.8	9.2	6.4	3.5	2.7	15.8	41
XLGV-40	29	9.2	6.4	3.5	2.7	2.6	51

∗ Other dimensions are the same as the XLG.
Note) For details, consult your SMC sales representative.



(mm)

Model	K	L	M	N	P	Q	R
XLGV-50	12.5	9.5	9.5	1	1	23.5	52.6
XLGV-63	17.4	9.5	9.5	1	1	18.6	62.3
XLGV-80	23.5	9.5	9.5	1	1	12.4	70.8

∗ Other dimensions are the same as the XLG.
Note) For details, consult your SMC sales representative.

High Vacuum Angle Valve

Series XLD, XLDV

Smooth Exhaust Valve Normally Closed/Bellows, O-ring Seal

Air Operated Type

How to Order

XLD — 25 □ □ □ — M9N A

High vacuum angle valve
Smooth exhaust valve, normally closed, air operated type

Flange size

25
40
50
63
80

Flange type

Symbol	Type	Applicable flange size
Nil	KF(NW)	25, 40, 50, 63, 80
D	K(DN)	63, 80

Actuation port direction

Nil	Flange side
K	Left flange surface
L	Rear flange surface
M	Right flange surface

Note) Actuation port direction
(Example) Left flange surface: Indicates that the direction of the actuation port is to the left side when the flange surface is viewed from the front.

Switch quantity/Mounting position

Symbol	Quantity	Mounting position
Nil	–	–
A	2pcs.	Both sides
B	1pc.	Valve open
C	1pc.	Valve closed

Auto switch type

Symbol	Auto switch model	Remarks
Nil	—	Without auto switch (without built-in magnet)
M9N(L)(M)(Z)	D-M9N(L)(M)(Z)	Solid state auto switch
M9P(L)(M)(Z)	D-M9P(L)(M)(Z)	
M9B(L)(M)(Z)	D-M9B(L)(M)(Z)	
A90(L)(Z)	D-A90(L)(Z)	Reed auto switch (Not applicable to flange size 16)
A93(L)(Z)	D-A93(L)(Z)	
M9//	—	Without auto switch (with built-in magnet)

Note 1) Auto switches shown above cannot be mounted on the high temperature type. For the high temperature type, a semi-standard product that uses the heat resistant auto switch D-F7NJ* is available. For details, please contact SMC.
Note 2) Standard lead wire length is 0.5 m. Add "L" to the end of the part number when 3 m is desired, "M" when 1 m, and "Z" when 5 m.
Example) -M9NL

Temperature specifications/Heater

Symbol		Temperature	Heater
Nil		5 to 60°C	—
High temperature type	H0	5 to 150°C	—
	H4		With 100°C heater
	H5		With 120°C heater

XLD

High temperature type combination table

High temp. specifications	Symbol	Model				
		XLD-25	XLD-40	XLD-50	XLD-63	XLD-80
Without heater	H0	•	•	•	•	•
With heater for 100°C	H4	–	•	•	•	•
With heater for 120°C	H5	•	•	•	•	

Air Operated Type/with Solenoid Valve

How to Order

XLDV — 25 ☐ K — M9N ☐ — 5 G ☐ — Q

High vacuum angle valve

Smooth exhaust valve, normally closed, air operated type with solenoid valve

Flange size

25
40
50
63
80

Flange type

Symbol	Type	Applicable flange size
Nil	KF(NW)	25, 40, 50, 63, 80
D	K(DN)	63, 80

Solenoid valve direction

K	Left flange surface
L	Rear flange surface
M	Right flange surface

Note) Solenoid valve direction
(Example) Left flange surface: Indicates that the direction of the solenoid valve is to the left side when the flange surface is viewed from the front.

∗ M type is not available for size 25

Auto switch type (for main exhaust valve)

Symbol	Auto switch model	Remarks
Nil	—	Without auto switch (without built-in magnet)
M9N(L)(M)(Z)	D-M9N(L)(M)(Z)	Solid state auto switch
M9P(L)(M)(Z)	D-M9P(L)(M)(Z)	
M9B(L)(M)(Z)	D-M9B(L)(M)(Z)	
A90(L)(Z)	D-A90(L)(Z)	Reed auto switch (Not applicable to flange size 16)
A93(L)(Z)	D-A93(L)(Z)	
M9//	—	Without auto switch (with built-in magnet)

Standard lead wire length is 0.5 m. Add "L" to the end of the part number when 3 m is desired, "M" when 1 m, and "Z" when 5 m.
Example) -M9NL

Switch quantity/Mounting position

Symbol	Quantity	Mounting position
Nil	–	–
A	2pcs.	Valve open/closed
B	1pc.	Valve open
C	1pc.	Valve closed

Rated voltage

5	24VDC
6	12VDC

Electrical entry

G	Grommet (lead wire length 300mm)
H	Grommet (lead wire length 600mm)
L	L type plug connector
M	M type plug connector

Light/Surge voltage suppressor

Nil	None
S	With surge voltage suppressor
Z	With light/surge voltage suppressor
U	With light/surge voltage suppressor (non-polar type)

XLDV

Note 1) Option specifications/Combinations
This model has indicator, auto switch and K(DN) flange options, but high temperature/heater options are not available.

Note 2) Solenoid valves

Model	Initial exhaust valve	Main exhaust valve	Example
XLDV-25	V114		V114-1GS
XLDV-40, 50, 63, 80	V114	SYJ314	SYJ314-1GS

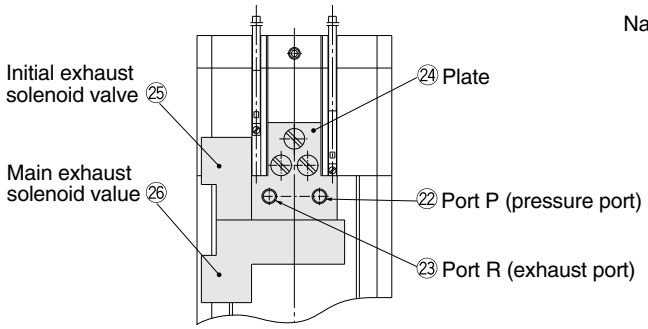
For further details on solenoid valves, refer to the SMC solenoid valve catalogs "SY100" (E142-A) and "SYJ 300, 500, 700" (E143-B)

Specifications

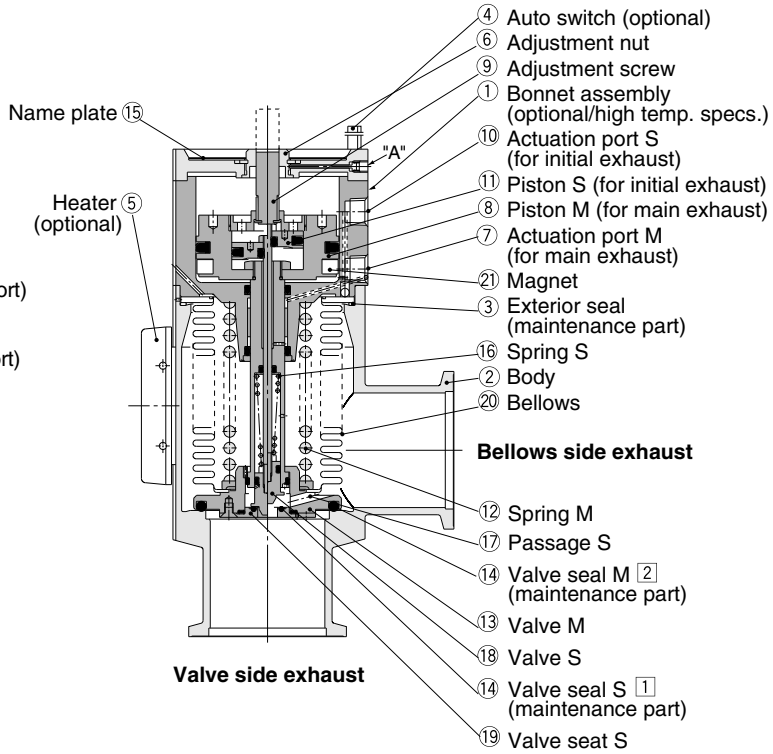
Model		XLD(V)-25	XLD(V)-40	XLD(V)-50	XLD(V)-63	XLD(V)-80
Valve type		Normally closed (spring return & seal) [both main & initial exhaust valves]				
Fluid		Non-corrosive gas for aluminum alloy (A6063) and SUS304/316				
Operating temperature °C	XLD	5 to 60 (high temperature type: 5 to 150)				
	XLDV	5 to 50				
Operating pressure Pa {Torr}		Atmospheric pressure to 1 x 10^{-6} {760 to 7.5 x 10^{-9}}				
Conductance ℓ/s Note 1)	Main exhaust valve	14	45	80	160	200
	Initial exhaust valve	0.5 to 3	2 to 8	2.5 to 11	4 to 18	4 to 18
Leakage Pa m^3/s {Torr ℓ/s}	Internal	1.3 x 10^{-10} {1 x 10^{-9}} at ordinary temperatures, excluding gas permeation				
	External	1.3 x 10^{-11} {1 x 10^{-10}} at ordinary temperatures, excluding gas permeation				
Operating time s Note 2)	Main exhaust valve	0.10	0.21	0.24	0.26	0.28
	Initial exhaust valve	0.07	0.08	0.09	0.23	0.27
Flange type		KF (NW)			KF (NW), K (DN)	
Principle materials		Body: Aluminum alloy Bellows: Stainless steel Seal: FKM (fluoro rubber)				
Surface treatment		Exterior: Hard anodized Interior: Machined for clean environment				
Actuation pressure MPa {kgf/cm^2}		0.4 to 0.7 {4 to 7} [both main & initial exhaust valves]				
Actuation port size	XLD	M5	Rc(PT) 1/8			
	XLDV	M5 (Ports P, R)				
Actuating solenoid valve recommended Cv factor (XLD)	Main exhaust valve	0.06	0.09	0.11	0.3	0.35
	Initial exhaust valve	0.01	0.01	0.02	0.02	0.03
Service life (Million cycles)		2				
Weight kg	XLD	0.5	1.2	1.8	3.4	5.6
	XLDV	0.57	1.3	1.9	3.5	5.7

Note 1) The main exhaust valve conductance is the value for the molecular flow of an elbow having the same dimensions. The initial exhaust valve conductance is the value for the viscous flow.
Note 2) The time required for 90% valve movement when an actuation pressure of 0.5MPa {5kgf/cm^2} is applied. There is a difference of about 20% in this value at the upper and lower pressure limits.
Note 3) For valve heater specifications, refer to "Common Option Specifications, [1]Heaters" on page 38.

Construction/Operation



With solenoid valve



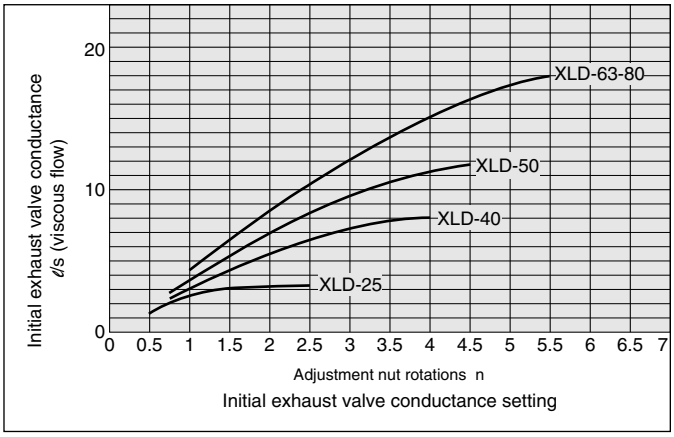
<<Operating principle>>

1 **Initial exhaust valve opening adjustment**
The initial exhaust rate should be adjusted before operation. With actuation port S (10) in an unpressurized state on model XLD, or with initial exhaust solenoid valve (25) in the OFF state on model XLDV, the initial exhaust rate is set to zero by gently turning the adjustment nut (6) to the right until it stops. After confirming the position of the angle adjustment scale on the name plate (15) and the angle adjustment mark on the adjustment nut (6), the initial exhaust rate is adjusted by turning the nut to the left. The pitch of the adjustment screw (9) is 1mm. The number of turns and initial exhaust conductance should be confirmed referring to the figure on the right.
A space is established between the end of the adjustment screw (9) and the shaft of valve S (18), which regulates the amount of movement of the piston S (11). The initial exhaust conductance is determined by the amount of opening between valve S (18) and the valve seal S [1]-(14). Further turning is prevented by locking after adjustment. When the initial exhaust rate will not be adjusted, or when it will be set at a fixed rate, it can be locked by tightening the Section "A" screw with a torque of approximately 5kgf·cm.

2 **Operation of the initial exhaust valve**
The left section in the drawing shows the initial exhaust valve in a closed condition.
When pressure is applied to the actuation port S (10) on model XLD, or the initial exhaust solenoid valve (25) is turned ON with port P (22) in a pressurized state on model XLDV, air follows the dotted line passing through the space by the shaft and fills the area below the piston S (11). Piston S (11) is stopped when it strikes the adjustment screw (9). Through the movement of piston S (11), the valve S (18) is removed from the valve S seal assembly [1]-(14), and initial exhaust takes place through the passage S(17).

3 **Operation of the main exhaust**
When pressure is applied the the actuation port M (7) on model XLD, or the main exhaust solenoid valve (26) is turned ON with port P in a pressurized state on model XLDV, the piston M (8) moves upward opening valve M (13). Port S (10) remains pressurized and valve S (18) remains open.

4 **Closing of both valves**
By removing pressure from actuation port S (10) and actuation port M (7) on model XLD, or turning OFF initial exhaust solenoid valve (25) and main exhaust solenoid valve (26) on model XLDV, the force of spring S (16) and spring M (12) cause valve S (18) and valve M (13) to contact their respective valve seats and seals, thereby sealing them.



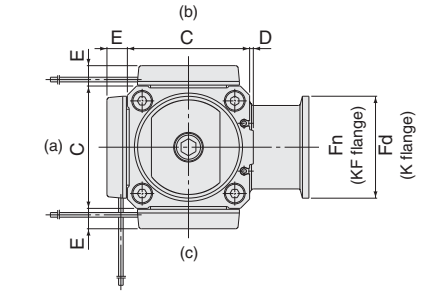
<<Options>>

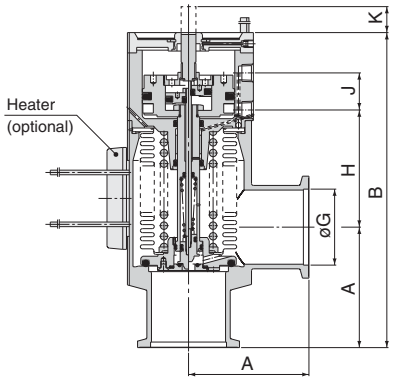
④ Auto switch: (for main exhaust valve) The magnet (21) actuates the auto switch (4) indicating the position of the integrated valve M (13) and the piston M (8). With two auto switches, the open and closed positions are detected, and with one auto switch, either the open or closed position is detected. Auto switches are applicable at ordinary temperatures only (5 to 60°C).

⑤ Heater: Simple heating is performed using thermistors. The valve body can be heated to approximately 80, 100 or 120°C, depending on the heater option and valve size. The type and number of thermistors to be used will vary depending upon size and setting temperature. In the case of high temperature specifications, the bonnet assembly (1) is a heat resistant structure. This is not available with solenoid valve.

Dimensions

XLD/Air operated type



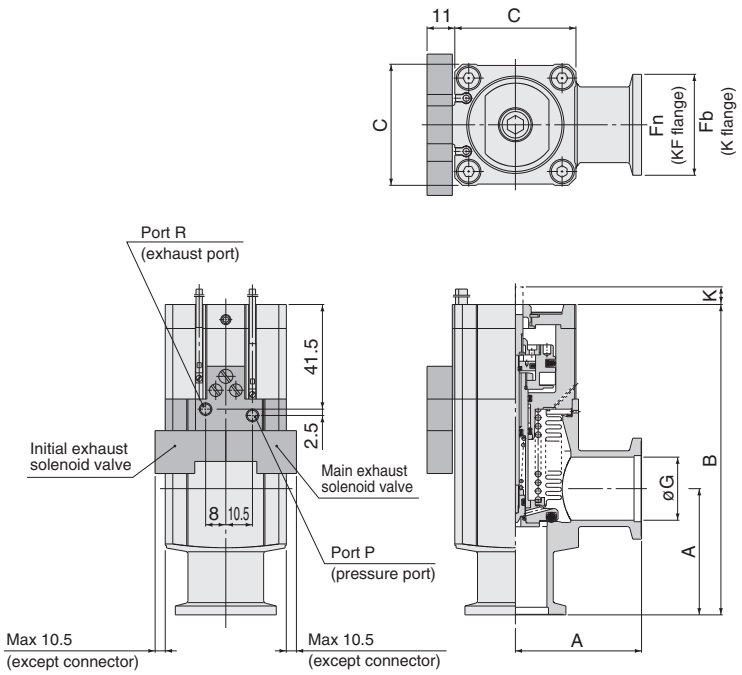


(mm)

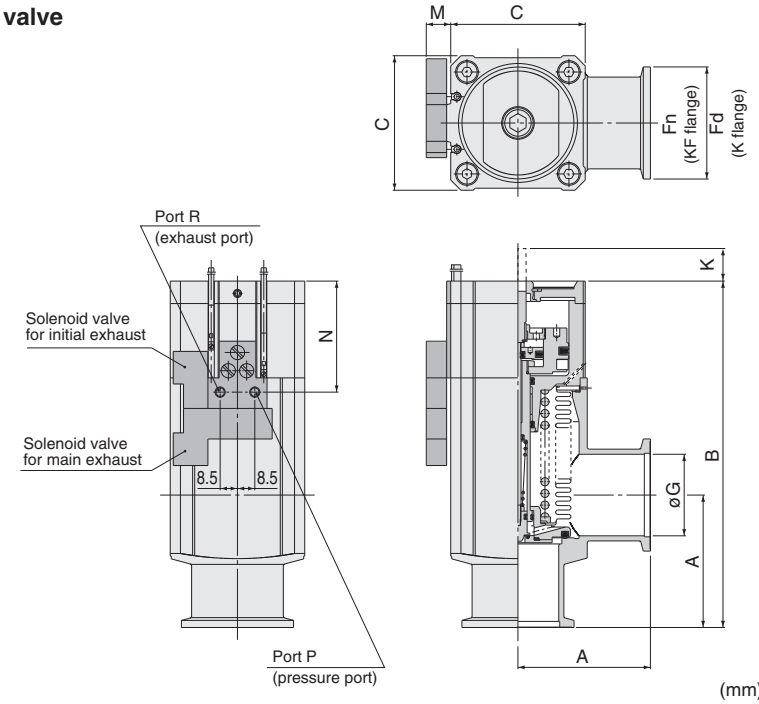
Model	A	B	C	D	E	Fn	Fd	G	H	J	K
XLD-25	50	123	48	1	12	40	—	26	41	16	7.5
XLD-40	65	170	66	2	11	55	—	41	63	20	15
XLD-50	70	183	79	2	11	75	—	52	68	20	17.5
XLD-63	88	217	100	3	11	87	95	70	72	20	20
XLD-80	90	256	117	3	11	114	110	83	98	20	26.5

Note 1) Dimension E applies when heater option is included. (lead wire length: approx. 1m)
Note 2) (a), (b) and (c) in the above drawing indicate heater mounting positions.
Moreover, heater mounting positions will differ depending on the type of heater.
For further details, refer to mounting positions under Replacement heaters/Part Nos. on page 43.

XLDV-25/With solenoid valve



XLDV-40 to 80/With solenoid valve



(mm)

Model	A	B	C	Fn	Fd	G	M	N	K
XLDV-25	50	123	48	40	–	26	–	–	7.5
XLDV-40	65	170	66	55	–	41	12	54.5	15
XLDV-50	70	183	79	75	–	52	12	58.5	17.5
XLDV-63	88	217	100	87	95	70	13	73.2	20
XLDV-80	90	256	117	114	110	83	13	83.6	25.5

High Vacuum Angle Valve

Series XLH

Manual Valve Bellows Seal

How to Order

XLH — 16 □

High vacuum manual angle valve
(Bellows seal)

Flange size

16
25
40
50

Heater

Symbol	Heater type
Nil	None
H4	With heater for 100°C
H5	With heater for 120°C

XLH

Heater combination table

Setting temperature	Symbol	Model			
		XLH-16	XLH-25	XLH-40	XLH-50
100°C	**H4**	–	–	•	•
120°C	**H5**	–	•	•	•

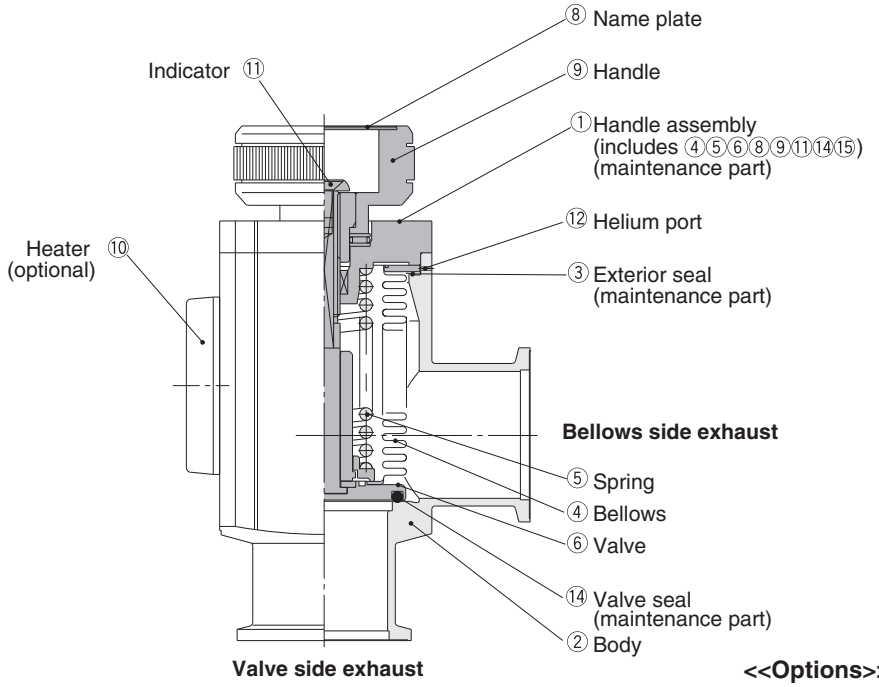
Note) Heater cannot be retrofitted.

Specifications

Model		XLH-16	XLH-25	XLH-40	XLH-50
Fluid		Non-corrosive gas for aluminum alloy (A6063) and SUS304/316			
Operating temperature °C		5 to 150			
Operating pressure Pa {Torr}		Atmospheric pressure to 10^{-6} {760 to 7.5 x 10^{-9}}			
Conductance ℓ/s Note 1)		5	14	45	80
Leakage Pa m³/s {Torr ℓ/s}	Internal	1.3 x 10^{-10} {1 x 10^{-9}} at ordinary temperatures, excluding gas transmission			
	External	1.3 x 10^{-11} {1 x 10^{-10}} at ordinary temperatures, excluding gas transmission			
Flange type		KF (NW)			
Principle materials		Body: Aluminum alloy Bellows: Stainless steel Seal: FKM (fluoro rubber)			
Surface treatment		Exterior: Hard anodized Interior: Machined for clean environment			
Actuation torque N◊m {kgf◊cm}		0.1{1}	0.15{1.5}	0.35{3.5}	0.5{5}
Handle revolutions		5	7	10	13
Service life (Million cycles)		0.1			
Weight kg		0.23	0.41	1.05	1.62

Note 1) The conductance is the same as that of an elbow of the same dimensions.
Note 2) For valve heater specifications, refer to "Common Option Specifications, [1] Heaters" on page 38.

Construction/Operation



<<Operating principle>>

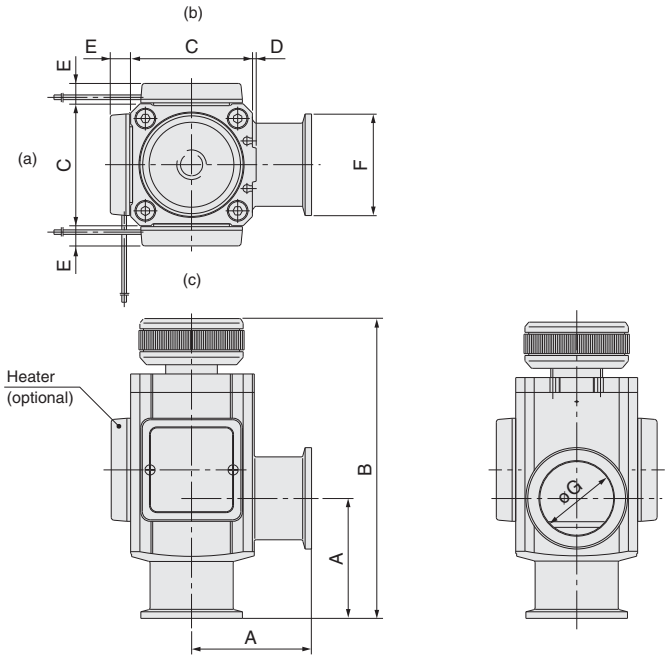
By turning the handle (9) to the left, the valve (6) opens. The handle (9) does not move up and down, but the indicator (11) shows the open or closed position of the valve. As the handle (9) is turned to the right, the valve (6) closes, and when the turning force of the handle (9) suddenly ceases to be felt, the valve (6) is sealed. The sealing force for the valve (6) comes from the spring (5) , and is constant.

<<Options>>

⑩ Heater: Simple heating is performed using thermistors. The valve body can be heated to approximately 80, 100 or 120C, depending on the heater option and the valve size.
The type and number of thermistors to be used will vary depending upon size and setting temperature.

⑪ Indicator: When the valve is open, an orange marker appears in the center of the name plate (8).

Dimensions



(mm)

Model	A	B	C	D	E Note 1)	F	G
XLH-16	40	100.5	38	1	–	30	17
XLH-25	50	114	48	1	12	40	26
XLH-40	65	162.5	66	2	11	55	41
XLH-50	70	179.5	79	2	11	75	52

Note 1) Dimension E applies when heater option is included. (lead wire length: approx. 1m)
Note 2) (a), (b) and (c) in the above drawing indicate heater mounting positions.
Moreover, heater mounting positions will differ depending on the type of heater.
For further details, refer to mounting positions under Replacement heaters/Part Nos. on page 43.

High Vacuum Angle Valve

Series XLS

Electromagnetic Type Bellows Pressure Balance

How to Order

Starting voltage

5	24VDC

Note 1) Holding voltage is 25% of starting voltage.
Note 2) For other rated voltages (48, 100 VDC), please consult with SMC.

Electrical entry

G	Grommet
C	Conduit
T	Terminal
D	DIN terminal

Without control power supply **XLS** — **25** — **5** **G** — **Q**

High vacuum angle valve
Bellows pressure balance,
2 stage voltage switching type

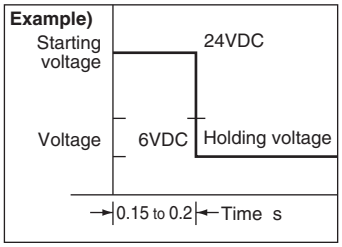
Valve size

16	KF16
25	KF25

CE -compliant
Note) DIN terminal "D" only for 100 VDC

⚠ Warning

(1) Starting voltage should be applied for only 0.15 to 0.2s, in accordance with the prescribed method (indicated on the back of the coil). Continuously applying starting voltage can cause overheating of the coil and fire. Holding voltage is 25% of the starting voltage (the application method is shown on the back of the solenoid coil).



Specifications

Model		XLS-16	XLS-25
Valve type		Normally closed (N.C.)	
Fluid		Inert gas under vacuum	
Operating temperature (°C)		5 to 40	
Operating pressure (Pa)		0.1 MPa (G) to 1 x 10^{-6} (abs)	
Conductance (ℓ/s) Note 1)		5	8
Leakage (Pa•m³/s)	**Internal**	1.3 x 10^{-8} at normal temperature, excluding gas permeation	
	External	1.3 x 10^{-11} at normal temperature, excluding gas permeation	
Flange type/size		KF16	KF25
Principal materials Note 2)		Body: Aluminum alloy, Main part: Stainless steel, PFA, FKM (Standard seal material)	
Surface treatment		External: Hard anodized Internal: Raw material	
Control power supply		No	
Operating power supply voltage		24/6, 48/12, 100/24 VDC	
Allowable voltage fluctuation (%)		±10	
Electrical entry		G, C, D, T type	
Coil insulation		Class B	
Maximum operating frequency (Hz)		0.17	
Weight (kg)		0.4	0.7

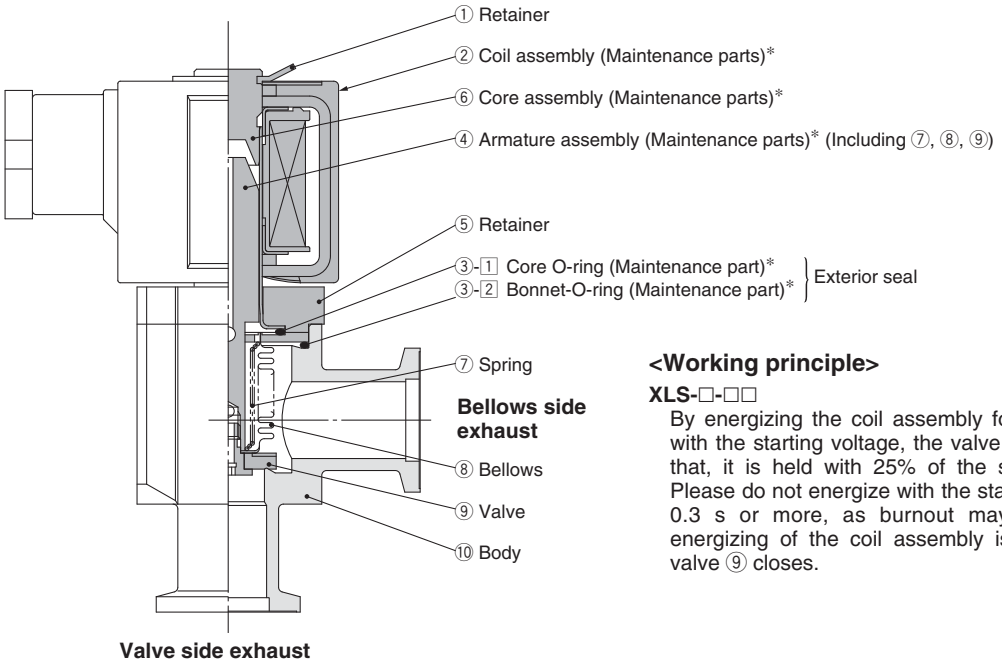
Note 1) Conductance is the value for an elbow with the same dimensions.
Note 2) A coating of vacuum grease [Y-VAC3] is applied to the valve seat of the vacuum part.

Power/Voltage

At the Rated Voltage

Model	Starting		Holding	
	Power (W)	Current (A)	Power (W)	Current (A)
XLS-16-	36	1.5	4.8	0.38
XLS-25-	47	2.0	5.3	0.5

Construction/Operation



<Working principle>

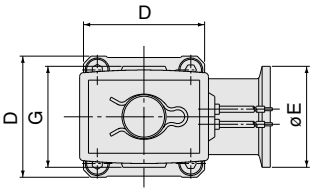
XLS-□-□□

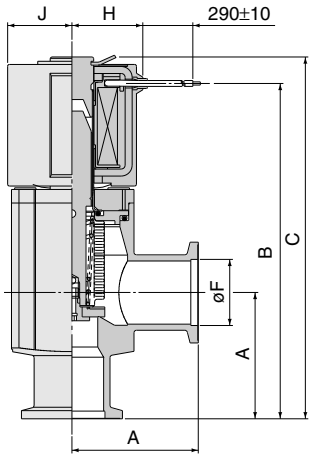
By energizing the coil assembly for 0.15 to 0.2 s with the starting voltage, the valve ⑨ opens. After that, it is held with 25% of the starting voltage. Please do not energize with the starting voltage for 0.3 s or more, as burnout may result. When energizing of the coil assembly is canceled, the valve ⑨ closes.

* Refer to page 43 for “Maintenance Parts”.

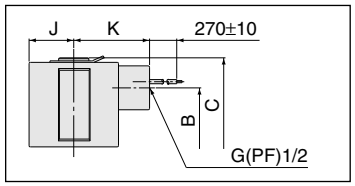
Dimensions

XLS/Without control power supply
Grommet (G)

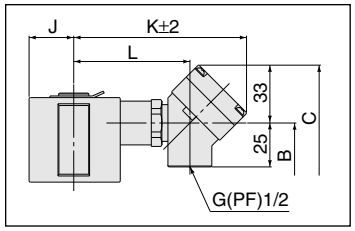




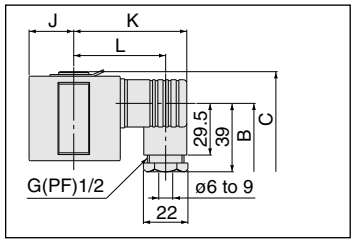
Conduit (C)



Terminal (T)



DIN terminal (D)



(mm)

Model	A	B	C	D	E	F	G	H	J	K	L
XLS-16-□G	40	104	113	38	30	17.1	35	25.5	23	–	–
XLS-16-□C		96								41	–
XLS-16-□D										60	48
XLS-16-□T			129							95	62
XLS-25-□G	50	128.5	138.5	48	40	26.2	40	28	25.5	–	–
XLS-25-□C		121.5								43	–
XLS-25-□D		120.5								63	51
XLS-25-□T		121.5	154.5							97	66

Series XSA

Normally Closed Type High Vacuum Straight Solenoid Valve

How to Order

XSA 1 — 1 2 S — 5 G ☐ — ☐ — Q

Normally closed high vacuum straight solenoid valve

Solenoid size

1	No.1
2	No.2
3	No.3

Orifice symbol

1	ø2
2	ø3
3	ø4.5
4	ø6

∗ Refer to table 1 below for applications.

Fitting size

2	1/4 B
3	3/8 B

∗ Refer to table 1 below for applications.

Fitting Type

V	VCR®
S	Swagelok®

∗ VCR® Fitting and Swagelok® Fitting are registered trademarks of the Cajon Company and the Crawford Fitting Company Inc. respectively.

Voltage

5	24VDC
6	12VDC
9	Other (6VDC, 48VDC, 100VDC)

∗ Refer to Table 2 below for applications.

Electrical entry

G	Grommet
C	Conduit
T	Terminal
D	DIN terminal

∗ Refer to Table 2 below for applications.

Electrical options

Nil	None
S	With surge voltage suppressor
L	With light
Z	With light/Surge voltage suppressor

∗ Refer to Table 2 below for applications.

Spacer

Nil	None
A	With spacer

∗ Refer to Table 3 below in case spacers only are required separately.

Table 1: Model, Fitting size, Orifice

Solenoid valve model (fitting size)			Orifice symbol (diameter)			
XSA1	XSA2	XSA3	1 (ø2)	2 (ø3)	3 (ø4.5)	4 (ø6)
2(1/4)	–	–	•	•	–	–
–	2(1/4)	–	–	•	•	–
–	–	2(1/4)	–	–	•	–
–	–	3(3/8)	–	–	–	•

Table 3: Spacer part nos.

Model	Part No.
XSA1	XSA122-8-4
XSA2	XSA232-8-4
XSA3	

Table 2: Voltage, Electrical entry, Electrical options

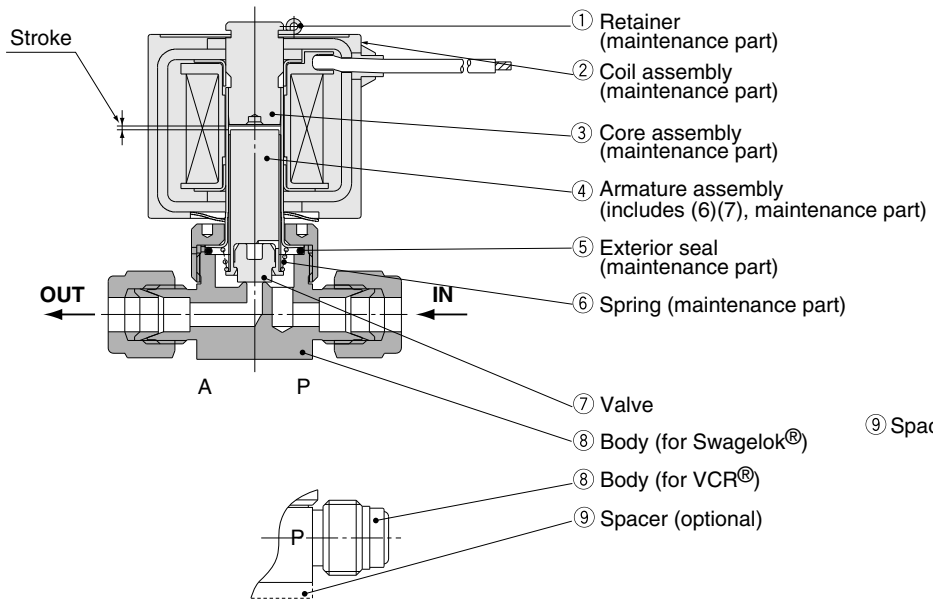
Electrical entry		G	G	C	D, T		
Electrical options		–	S	–	–	S	L, Z
DC	5(24V)	•	•	•	•	•	•
	6(12V)	•	•	•	•	•	–

Specifications

Model			XSA1-12	XSA1-22	XSA2-22	XSA2-32	XSA3-32	XSA3-43
Action			Normally closed direct acting 2 port solenoid valve					
Fluid			Non corrosive gas for stainless steel (SUS405 equivalent)					
Orifice diameter mmø			2	3		4.5		6
Cv factor			0.17	0.33		0.6		1.05
Actuation pressure difference MPa Note 1)			0.8	0.3	1.0	0.3	0.8	0.3
Reverse pressure potential MPa Note 2)			0.5	0.25	0.4	0.2	0.2	0.15
Port A pressure Pa			1×10^{-6}					
Leakage Pa m³/s {Torr ℓ/s}	Internal		1.3×10^{-9} {1×10^{-8}} at ordinary temperatures, excluding gas permeation					
	External		1.3×10^{-11} {1×10^{-10}} at ordinary temperatures, excluding gas permeation					
	Fitting	VCR®	1.3×10^{-11} {1×10^{-10}}					
		Swagelok®	1.3×10^{-10} {1×10^{-9}}					
Piping connection system			VCR®/SWJ (Swagelok)®					
Connection size			1/4B					3/8B
Operating temperature °C			5 to 40					
Rated voltage			100VAC (with full wave rectifier) 6/12/24/48/100VDC					
Power consumption W			5		8		11	
Allowable voltage fluctuation %			±10					
Weight kg			0.3		0.5		0.6	
Service life (Million cycles)			2					

Note 1) The actuation pressure difference indicates the difference between Port P (high pressure side) and Port A (low pressure side).
Example) In the case of 0.3MPa, Port A is a vacuum (1Torr or less), while Port P can be pressurized to 0.2MPa {2kgf/cm²}.
Note 2) Reverse pressure potential indicates the pressure which can be applied from Port A when Port P is at atmospheric pressure.
Note 3) Indicates case of grommet type electrical entry.

Construction/Operation



<<Operating principle>>

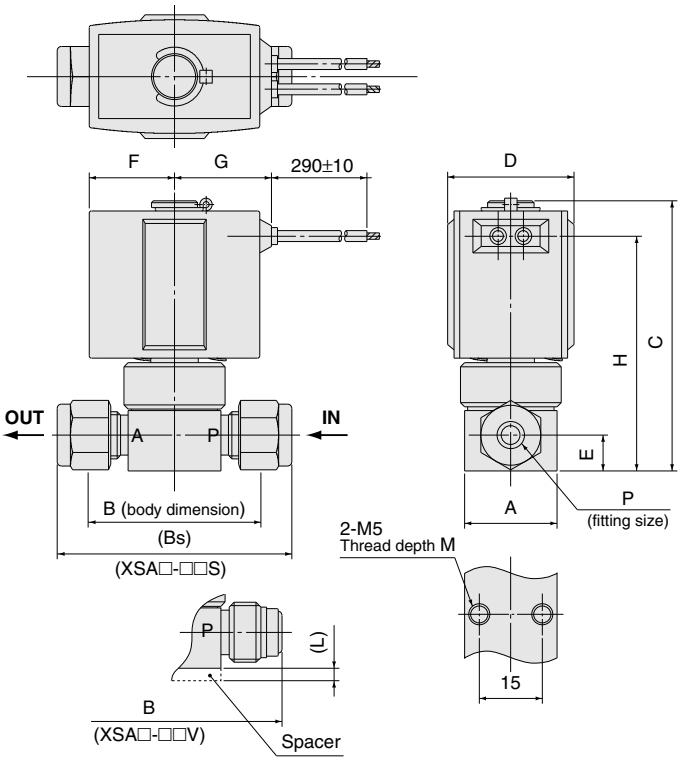
By energizing the coil assembly (2), the armature assembly (4) overcomes the composite force, consisting of the force acting on the valve (7) due to differential pressure and the reactive force of the spring (6), and is adsorbed to the core assembly (3), opening the valve (7).
When energizing of the coil assembly (2) is canceled, the armature assembly (4) is separated from the core assembly (3) by the reactive force of the spring (6), closing the valve (7).

<<Options>>

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

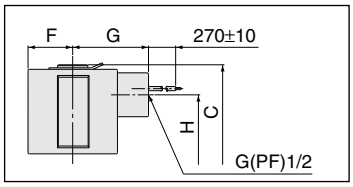
Dimensions

Electrical entry
Grommet (G)

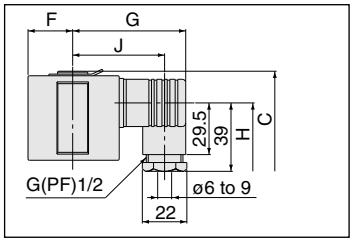


Electrical entry

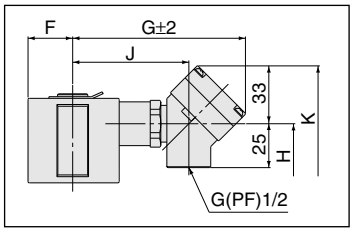
Conduit (C)



DIN terminal (D)



Terminal (T)



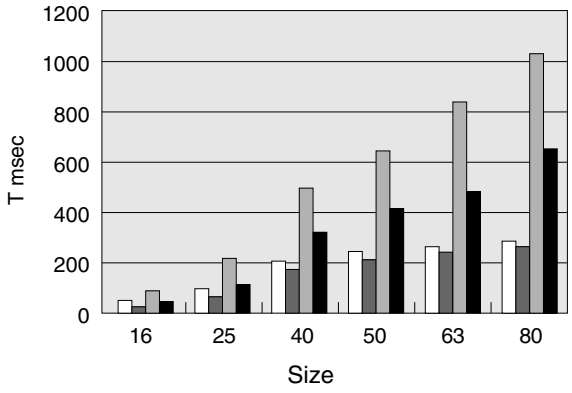
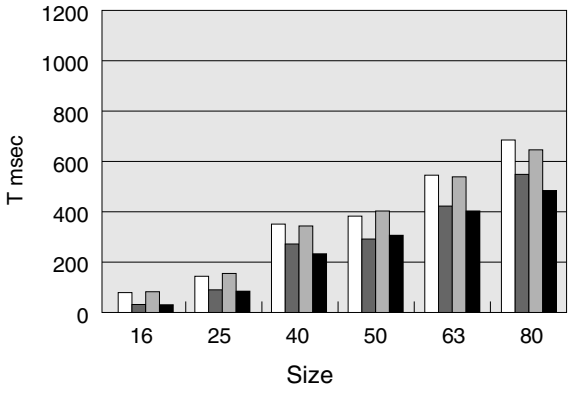
(mm)

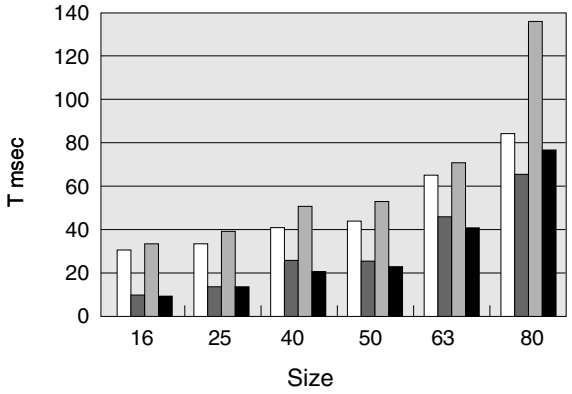
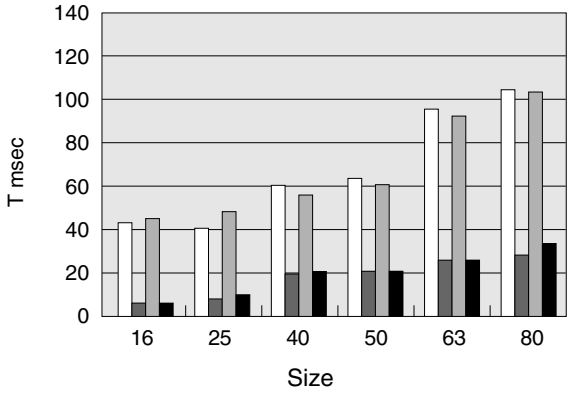
Model	A	B	Bs	C	D	E	F	Grommet		Conduit		Terminal			
		( ) are VCR® type	Swagelok® type					G	H	G	H	G	H	J	K
XSA1-□2S(V)	22	41(51)	56	64	30	8.5	20	23	56	39	48	92	48	59	81
XSA2-□2S(V)	25	46.5(57)	61	75.5	35	11.5	23	25.5	66	41	58.5	95	58.5	62	91.5
XSA3-32S(V)	25	46.5(57)	61	82	40	11.5	25.5	28	72	43	64	97	64	66	97
XSA3-43S(V)	25	50(66)	65	82	40	11.5	25.5	28	72	43	64	97	64	66	97

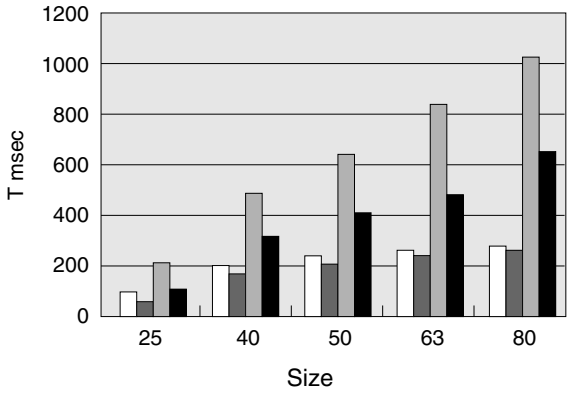
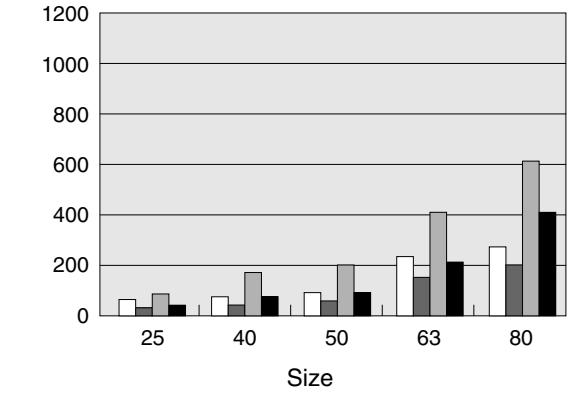
Model	DIN terminal			L	M	P
	G	H	J			(Unit: inch)
XSA1-□2S(V)	59	48	47	3	8	1/4
XSA2-□2S(V)	60	58.5	48	5	10	1/4
XSA3-32S(V)	63	64	51	5	10	1/4
XSA3-43S(V)	63	64	51	5	10	3/8

Response/Operation Time

1 With pilot pressure at 0.5MPa

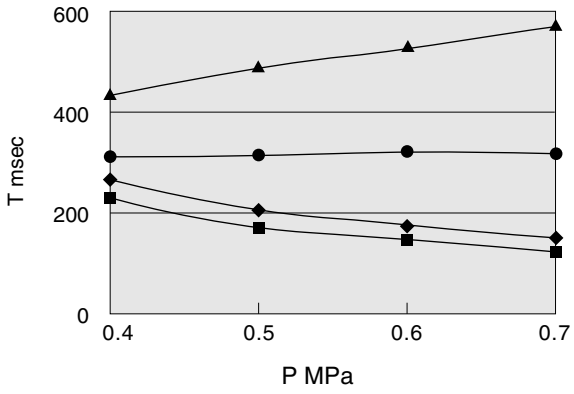
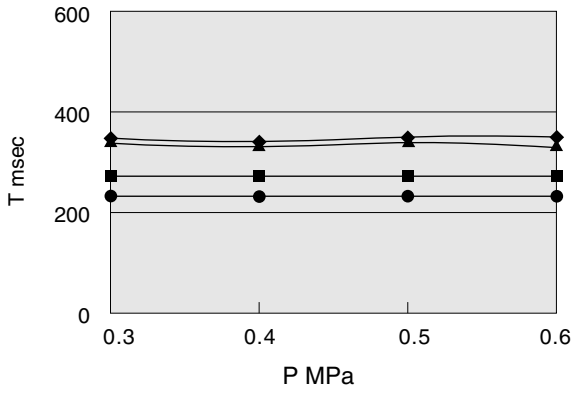
Valve type	Normally closed	Double acting (dual operation)
Model	XLA	XLC
Bellows seal		

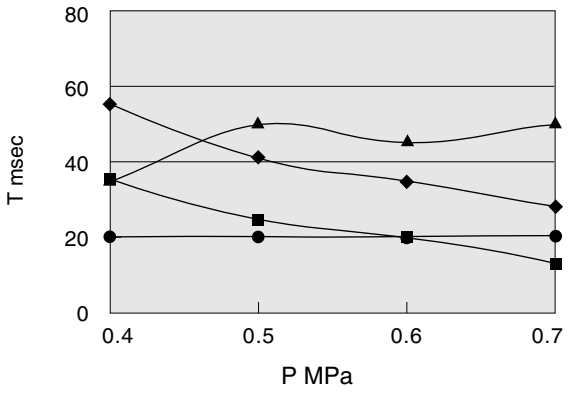
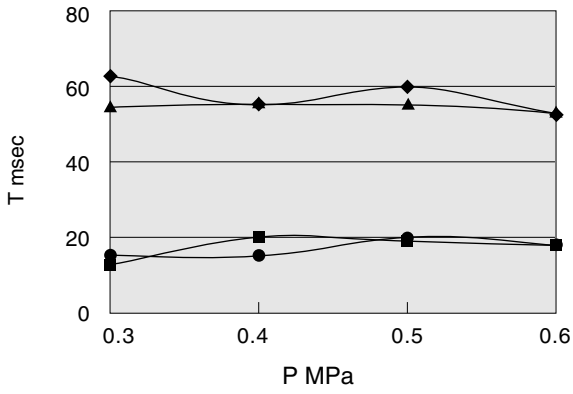
Valve type	Normally closed	Double acting (dual operation)
Model	XLF	XLG
O-ring seal		

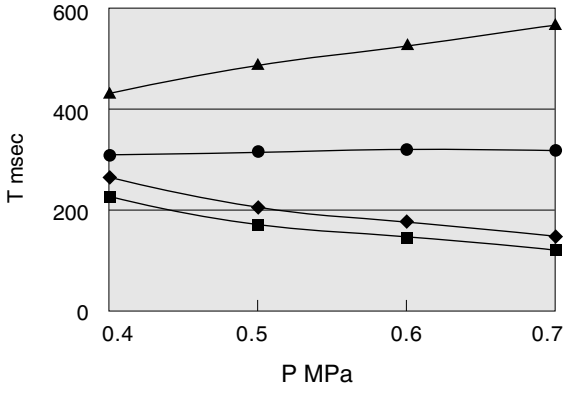
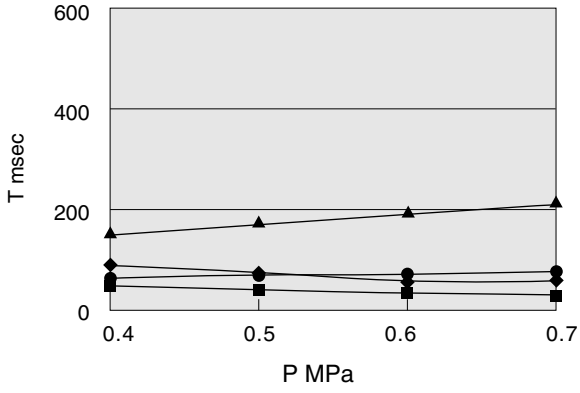
Valve type	Normally closed	
Model	XLD	
	Exhaust	Initial exhaust valve
Smooth exhaust valve		

Response time when open (including pneumatic valve)
Operation time when open (vacuum valve only)
Response time when closed (including pneumatic valve)
Operation time when closed (vacuum valve only)

2 As a function of pilot pressure

Valve type	Normally closed	Double acting (dual operation)
Model	XLA-40	XLC-40
Bellows seal		

Valve type	Normally closed	Double acting (dual operation)
Model	XLF-40	XLG-40
O-ring seal		

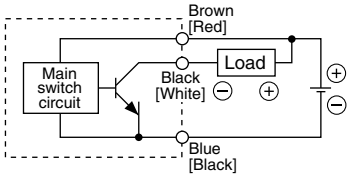
Valve type	Normally closed	
Model	XLD-40	
	Main valve	Initial exhaust valve
Smooth exhaust valve		

- Response time when open (including pnematic valve)
- Operation time when open (vacuum valve only)
- Response time when closed (including pnematic valve)
- Operation time when closed (vacuum valve only)

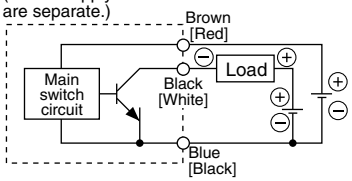
Auto Switches Connections and Examples

Basic Wiring

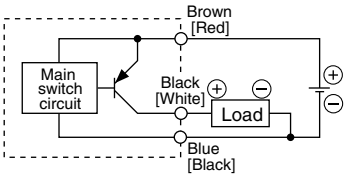
Solid state 3 wire, NPN



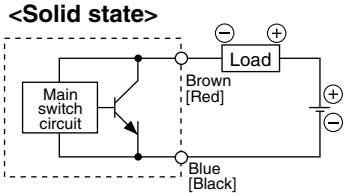
(Power supply for switch and load are separate.)

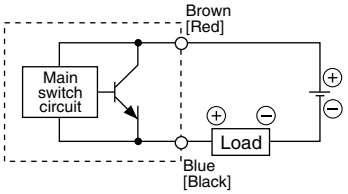


Solid state 3 wire, PNP



2 wire
<Solid state>

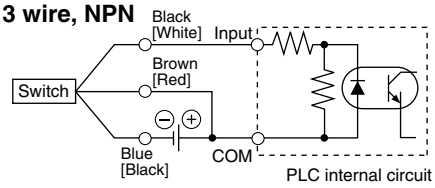




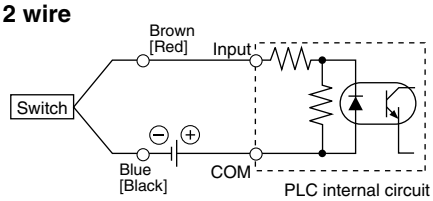
Examples of Connection to PLC (Programmable Logic Controller)

Specification for sink input

3 wire, NPN

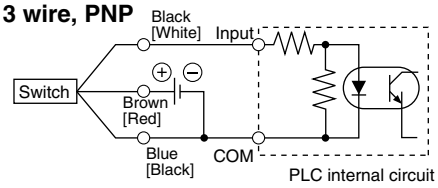


2 wire

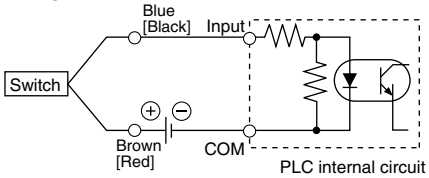


Specification for source input

3 wire, PNP



2 wire

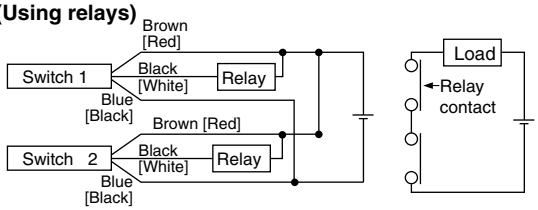


Connect according to the applicable PLC input specifications, as the connection method will vary depending on the PLC input specifications.

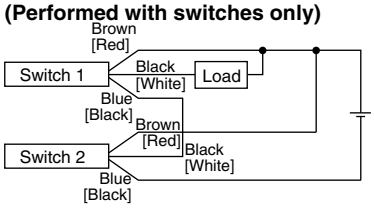
Connection Examples for AND (Series) and OR (Parallel)

3 wire

AND connection for NPN output (Using relays)

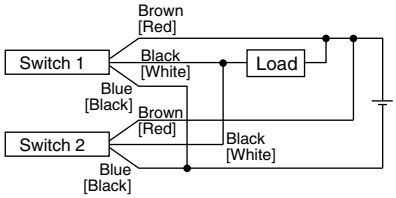


AND connection for NPN output (Performed with switches only)

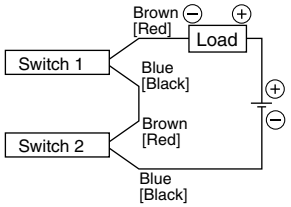


The indicator lights will light up when both switches are turned ON.

OR connection for NPN output



2 wire with 2 switch AND connection



When two switches are connected in series, a load may malfunction because the load voltage will decline when in the ON state.
The indicator lights will light up if both of the switches are in the ON state.

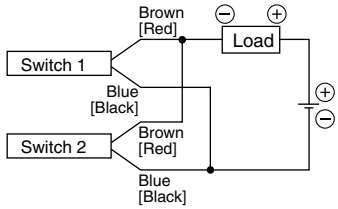
Load voltage at ON = $\frac{\text{Power supply voltage}}{\text{Residual voltage}}$ - x 2 pcs.

= 24V - 4V x 2 pcs.

= 16V

Example: Power supply is 24VDC
Voltage decline in switch is 4V

2 wire with 2 switch OR connection



<Solid state>
When two switches are connected in parallel, malfunction may occur because the load voltage will increase when in the OFF state.

<Reed switch>
Because there is no current leakage, the load voltage will not increase when turned OFF, but due to the number of switches in the ON state, the indicator lights will sometimes get dark or not light up, because of dispersion and reduction of the current flowing to the switches.

Load voltage at OFF = $\frac{\text{leakage current}}{\text{load impedance}}$ x 2 pcs. x

= 1mA x 2 pcs. x 3kΩ

= 6V

Example: Load impedance is 3kΩ
Leakage current from switch is 1mA

1 Seal Materials Available

FKM (fluoro rubber)
With low outgassing, low permanent-set and low gas permeation rate, this is the most popular seal material for high vacuum. SMC's seal material has undergone a high vacuum degassing process, and at normal temperatures can exhibit performance equivalent to metal seals. For usage in the tens of thousands of hours, a temperature ceiling of 180°C is recommended. When baking under high vacuum, mass numbers 18, 28 and 44 exceed the hydrogen peak, however, after returning to room temperature, these are undetectable, comparable to vacuums with metal sealing. (from SMC data)

Kalrez®
This is an elastomer with the most outstanding resistance to heat and chemicals, but its permanent-set is large, and special caution is required when used in other than static applications. Keeping other conditions the same as in the case of FKM, the recommended temperature ceiling is 250°C. Variations are available with improved plasma (O_2, CF_4) and particulate resistance. Therefore, it is advisable to select types based upon the application.
* Kalrez® is a registered trade mark of DuPont, Inc.

Chemraz®
This material has excellent chemical and plasma resistance and has slightly higher heat resistance than FKM. The recommended operating temperature ceiling is 200°C. Several variations of Chemraz® are available and it is advisable to make a selection based upon the particular plasma being used and other conditions, etc.
* Chemraz® is a registered trade mark of Greene, Tweed & Co.

Silicone
This material is relatively inexpensive, has good plasma resistance and can be used at high temperatures, but its gas permeation rate is large. It is most useful in differentially pumped applications where permeation is not an issue.

2 Shaft Sealing Method

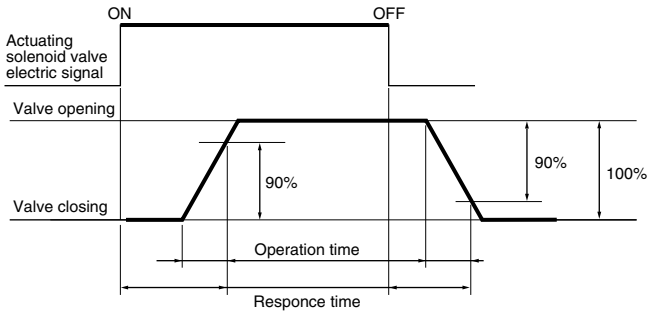
Bellows
SMC valves employ formed-bellows that produce few particulates yet have very long life. Welded-bellows are not used despite their longer life because they generate many more particulates. The cleaning and durability of SMC bellows have been improved through consistent control of surface treatment and handling.

O-ring, etc.
Due to entrainment of gases and generation of particulates, vacuum performance is somewhat inferior to the bellows type. However, high speed operation is possible and durability is comparatively high. The SMC sealing system has an especially long life because, it employs seals that are specially designed to retain the low vapor pressure grease while keeping particulates out.

3 Response time/Operation time

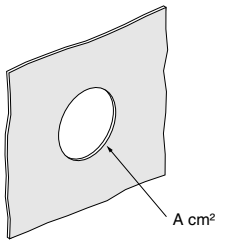
Valve opening
The time from the application of voltage to the actuation solenoid valve until 90% of the valve (XL□) stroke has been completed is the valve opening response time. Valve opening operation time indicates the time from the start of the stroke until 90% of movement has been completed. Both of these become faster as the operating pressure is increased.

Valve closing
The time from the cut off of power to the actuation solenoid valve until 90% of the valve (XL□) return stroke has been completed is the valve closing response time. Valve closing operation time indicates the time from valve opening until 90% of return movement has been completed. Both of these become slower as the operating pressure is increased.



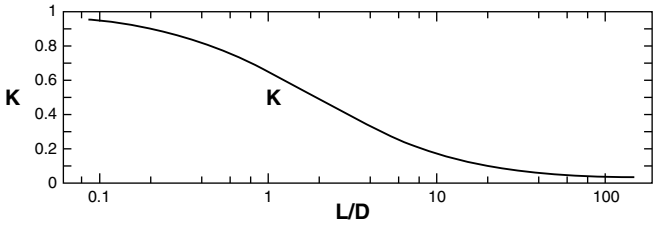
4 Molecular flow conductance

Orifice conductance
In the case of a øA (cm^2) hole in an ultra-thin plate, the conductance "C" results from "V" the average velocity of the gas, "R" the gas constant, "M" the molecular weight and "T" the absolute temperature. From the formula $C=VA/4=(RT/2\ M)^{0.5}A$, the conductance for 1cm^2 is C=11.6A ℓ/sec, at an air temperature of 20°C.



Cylinder conductance
With length "L" (cm) and diameter "D" (cm) where L>>D, from the formula $C=(2\ RT/M)^{0.5}D^3/6L$, the conductance $C=12.1D^3/L$ ℓ/sec, at an air temperature of 20°C.

Short pipe conductance
From the Clausing's factor "K" and the hole conductance "C" in the drawing below (Clausing's factor drawing), the short pipe conductance C_K is easily found as $C_K=KC$.



Conductances combined
When each of the separate conductances are given as C_1, C_2 and Cn, the composite conductance ∑C is expressed as:
$\sum C=1/(1/C_1+1/C_2+...1/Cn)$ when in series, and $\sum C=C_1+C_2+...Cn$, when in parallel.

Technical Data

5 He leakage

Surface leakage
Leakage that occurs between the deformable seal material and the sealing surface at room temperature (20 to 30°C). This is read within a few minutes after the start of the test.

Gas permeation
This is leakage caused by diffusion through the deformable seal material. As the temperature increases, the diffusion rate increases, and in many cases, becomes greater than surface leakage. The diffusion rate is proportional to the cross-sectional area (cm^2) of the seal, and inversely proportional to the seal width (the distance between the vacuum side and the atmosphere). In the case of metal gaskets, only hydrogen diffusion needs to be considered.

6 Outgassing

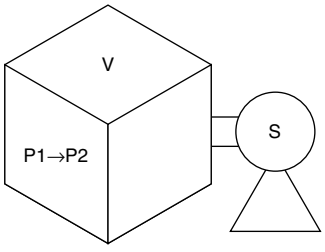
This is a phenomenon in which gases that are absorbed or adsorbed to chamber surfaces and/or its pores are released into the vacuum. It is lowest on smooth surfaces with a fine oxidize layer. The process of forming the oxidize layer has a particularly large effect. Reductions in outgassing can be achieved by methods such as EL processing to control the oxidation process in the case of aluminum alloys, and anhydrous high temperature oxidation in the case of stainless steel. Processes, such as anodization, can entrap gases in pores causing high outgassing rates. However, after high vacuum baking, the difference in the ultimate pressure with or without anodization is extremely minute.

7 Ultimate pressure

The ultimate pressure P(Torr) is P=Q/S, where the sum of the mass flow rates for outgassing (Qg) and leakage (Qℓ) is Q(Torr ℓ/sec) and the exhaust pumping speed is S (ℓ/sec). In cases of very low pressure, the exhaust characteristics of the pump itself may be the limiting factor. In particular, deterioration of pumping speed due to contamination of the pump by atmospheric moisture can be a major factor.

8 Exhaust time (low/medium vacuum)

The time ($\triangle$t) required to exhaust a chamber at low vacuum with volume V (ℓ), from pressure P1 to P2, using a pump with pumping speed S (ℓ/sec) is $\triangle t=2.3(V/S)\log(P1/P2)$. In high vacuums, this is subject to the ultimate pressure limit imposed by outgassing and leakage as characterized above.



9 Baking

Gases such as oxygen and nitrogen, which have a small adsorption activation energy (E) and a short adsorption residence time (τ), are evacuated quickly. However, in the case of water, which has a high activation energy, evacuation does not progress quickly unless the temperature is raised to shorten residence time. This time may be characterized as $\tau=\tau o \exp(E/RT)$ where R is the ideal gas constant and τo=(approx.)10^{-13}sec.
Residence time of water at 20°C is 5.5 x 10^{-6} sec, whereas at 150°C it is 2.8 x 10^{-8} sec, or 200 times shorter.
As an example, it took 800 minutes to evacuate moist air from a ø150mm x 500mm SMC test chamber to 10^{-9}Torr. The same process took only 4 minutes with dry (20ppb) nitrogen.

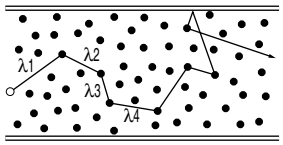
10 Body materials

Stainless steel has been the traditional material for vacuum systems but the use of aluminum alloys is becoming more common. Stainless steel has good corrosion resistance and strength, but poor thermal conductivity causes large temperature variations, and heavy metal contamination is a problem. Aluminum offers superior temperature uniformity (with 12 times higher thermal conductivity) and in many cases better gas corrosion resistance. Also, it has lower sputter yields from stray energetic particles and contributes no heavy metal contamination. Special anodization and electroless nickel plating are made available by SMC for highly corrosive gases.

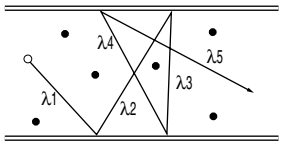
11 Flow classification

The relation of the average free path of gas molecules λ and the pipe diameter D expressed as λ/D is the Knudsen number, and the relation of the pressure p(Torr) converted to air at 20°C is expressed as pD. These are the flow classifications shown in the table below.

Item / Classification	λ/D (Knudsen number)	pD(Torr·cm)
Viscous flow	<0.01	>0.5
Intermediate flow	0.01 to 0.3	0.5 to 0.015
Molecular flow	>0.3	<0.015



(a) When the pressure is high, there are many collisions among the molecules.



(b) When the pressure is low, collisions are mainly against the walls.

12 Partial pressure

This indicates the residual gas constituents in a vacuum (usually measured with a quadrupole mass spectrometer). At 10^{-7} to 10^{-9}Torr, 90% or more is moisture, at 10^{-12}Torr or below, 98% or more is hydrogen. The other main residual gases have mass numbers of 28 and 35. (from SMC data)

13 Total pressure

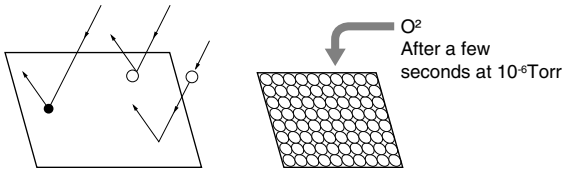
This is the sum of all partial pressures and is equal to P=nkT, where the pressure is P, the number of gas molecules is n, Boltzmann's constant is k, and the absolute temperature is T.

14 Average free path

This is the average flight distance (λcm) that gas molecules travel between collisions with one another. It is inversely proportional to the molecular density (pressure) and may be characterized as $\lambda=0.7/\ n\delta^2$ or $\lambda=2.33 \times 10^{-20}T/P\delta^2$. Here δ is the molecular diameter (cm), n is the molecular density (units/cm^3), T is the absolute temperature (K), and P is the pressure (Torr). In the case of air, for example, this becomes approximately 5cm at room temperature with 10^{-3} Torr. (Refer to the drawing in section [11] Flow classification.)

15 Impingement frequency

The impingement frequency of gas molecules on a unit surface area is $Z=3.53 \times 10^{22}P/(MT)^{1/2}$ collisions/sec cm^2 where M is the quantity of molecules, T is the absolute temperature (K), and P is the pressure. In the case of oxygen at room temperature and 10^{-6}Torr, one atomic layer impinges in a few seconds.



Series XL□
Common Option

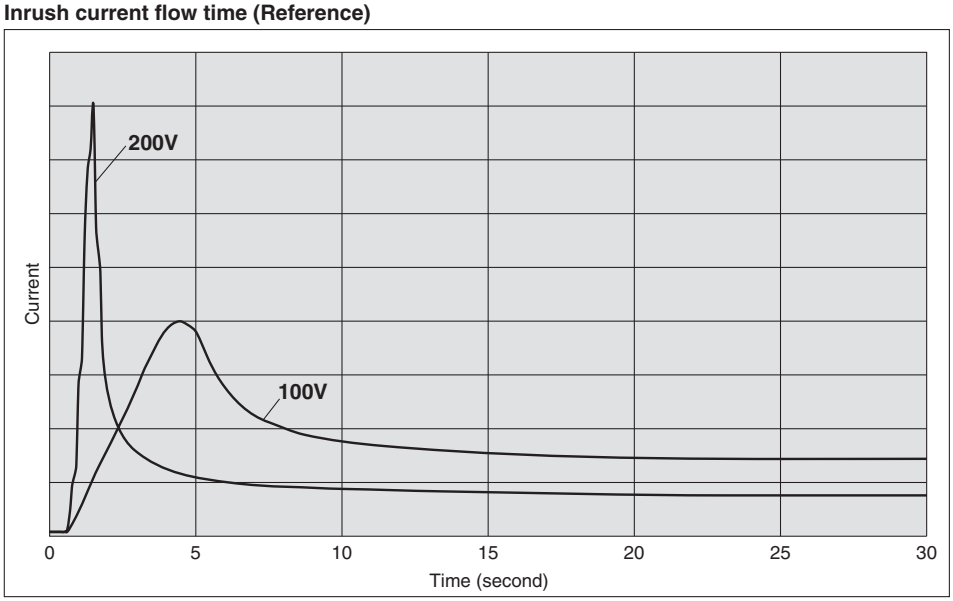
1 Heater

Valve heaters are common for models **XLA, XLC, XLD, XLF, XLG** and **XLH**.
Power consumption specifications are shown in the below table.

Item			XL□-25	XL□-40	XL□-50	XL□-63	XL□-80	XL□-100	XL□-160
Rated heater voltage			90 to 240 VAC						
Heater assembly quantity used Heater power W (Nominal value) In-rush/Power consumption (Option symbol·Operating voltage)	Heater assembly quantity		—	1 pc.	1 pc.	1 pc.	1 pc.	2 pcs.	3 pcs.
	H4 100°C	100V	—	200/40	200/50	400/100	600/150	800/220	1200/350
		200V	—	800/40	800/50	800/100	2400/150	3200/220	4800/350
	Heater assembly quantity		1 pc.	1 pc.	1 pc.	1 pc.	2 pcs.	3 pcs.	4 pcs.
	H5 120°C	100V	200/40	400/70	400/80	600/130	800/180	1200/300	1600/400
		200V	800/40	1600/80	1600/80	2400/130	3200/180	4800/300	6400/400

∗ The inrush current of the heater flows for several ten seconds when using 100V while it flows for several seconds when using 200V. However, this inrush current decreases momentarily.
∗ When the valve uses multiple heater assemblies, do not turn ON the power to each heater assembly at the same time. Turn ON the power to each heater assembly one-by-one in order at intervals of 30 sec. since the inrush current is large.
∗ Refer to "Maintenance Parts" on page 43 for further details regarding quantity and type.

Inrush current flow time (Reference)



High Vacuum Valve *Series XL, XSA*
Safety Instructions

These safety instructions are intended to prevent a hazardous situation and/or equipment damage. These instructions indicate the level of potential hazard by a label of **"Caution", "Warning" or "Danger"**. To ensure safety, be sure to observe these precautions.

⚠ **Caution :** Operator error could result in injury or equipment damage.

⚠ **Warning :** Operator error could result in serious injury or loss of life.

⚠ **Danger :** In extreme conditions, there is a possible result of serious injury or loss of life.

⚠ Specific product Precautions 1

Be sure to confirm the specifications and read the following precautions before handling these valves.
Contact SMC regarding cases which are outside of specifications.

Air Operated Angle Valves/Series XLA(V), XLC(V), XLD(V), XLF(V), XLG(V)

Precautions on Design

⚠ Warning

- **All models**

1. The body material is A6063, the bellows and other parts are SUS316L and SUS304, and the seal material is fluoro rubber (Viton®). Use fluids which are compatible with these materials.
2. Select materials for the actuation pressure piping, and heat resistance for fittings that are suitable for the applicable operating temperatures.

- **Models with auto switch/XLA(V), XLC(V), XLD(V), XLF(V), XLG(V)**

1. The switch section should be kept at a temperature no greater than 60°C.

- **Models with heater/XLA, XLC, XLD, XLF, XLG**

1. When using a model with a heater (thermistor), a device should be installed to prevent over heating.

- **Models with solenoid valve/XLAV, XLCV, XLDV, XLFV, XLGV**

1. For models with a solenoid valve, the temperature of the solenoid valve section should be no greater than 50°C.

Selection

⚠ Caution

- **All models**

1. When controlling valve responsiveness, take note of the size and length of piping, as well as the Cv factor (flow rate characteristics) of the actuating solenoid valve. Refer to “Specifications/ Recommended Cv factor for actuating solenoid valve” regarding the actuating solenoid valve Cv factor.
2. Actuating pressure should be kept within the specified range. 0.4 to 0.5MPa (4 to 5kgf/cm²) is recommended.
3. Use within the limits of the operating pressure range. Pressure up to 0.2MPa (2kgf/cm²) can be applied momentarily from the bellows side [XLA(V), XLC(V), XLD(V)], or from the shaft side [XLF(V), XLG(V)]. However, the valve side should not be raised above atmospheric pressure, as internal leakage will increase.

- **High temperature types/XLA, XLC, XLD, XLF, XLG**

1. In the case of gases which cause a large amount of deposits, heat the valve body or use a model with heater to prevent deposits in the valve.

Specific Product Precautions 2

Be sure to read before handling.

Mounting

⚠ Caution

• All models

1. In high humidity environments, keep valves packaged until the time of installation.
2. In cases with switches or solenoid valves, secure the lead wires so that they have sufficient slack, without any unreasonable force applied to them.
3. Perform piping so that excessive force is not applied to the flange sections. In case there is vibration of heavy objects or attachments, etc., secure them so that torque is not applied directly to the flanges.

• High temperature types (Models/XLA, XLC, XLD, XLF, XLG; Temperature specifications/H0, H1, H2, H3)

1. In models with heater (thermistor), take care not to damage the insulation components of the lead wires and connector section.
2. The setting temperature for models with heater should be established without a draft or heat insulation. It will change depending on conditions such as heat retaining measures and the heating of other piping. Fine adjustment is not possible.
3. When installing heater accessories or mounting a heater, check insulation resistance at the actual operating temperature. The installation of a short circuit breaker, etc. is recommended.
4. When a valve is to be heated, only the body section should be heated, excluding the bonnet section.
5. When a heater is in operation, the entire valve becomes hot. Be careful not to touch it with bare hands, as burns will result.

Piping

⚠ Caution

1. Before mounting, clean the surface of the flange seal and the O-ring with ethanol, etc.
2. Be sure that the flange O-ring is compressed by 15% or more.
3. There is an indentation of 0.1 to 0.2mm in order to protect the flange seal surface, and it should be handled so that the seal surface is not damaged in any way. When using an outer ring, be sure that the O-ring is compressed sufficiently. (There is basically no problem with the outer ring.)

Operating Environment & Vacuum Characteristics

⚠ Caution

1. The actuating piston chamber and the bellows chamber [except for XLF(V)/XLG(V)] are directly connected to atmosphere. In cases where it is necessary to avoid the discharge of particulates, use a type (-X12) with piping that conducts both chambers to the outside. When generating a vacuum, do not reduce below 700Torr.
2. The gas permeation through the O-ring (FKM) seal is minute at normal temperatures, but there is a marked increase at high temperatures. Take special precautions against leaks and permeation at high temperatures.
3. O-ring seal types [XLF(V), XLG(V)] suppress the entrainment of gases and the generation of particulates, however, caution should be used as these are not particulate free types, such as the bellows types [XLA(V), XLC(V), XLD(V)].

Maintenance

⚠ Caution

1. When removing deposits from a valve, take care not to damage any of its parts.
2. /Replace the bonnet assembly when the end of its service life is approached.
3. If damage is suspected prior to the end of the service life, perform early maintenance.
4. When operating at high temperatures, the compression set of the O-ring becomes larger, and a danger of external leakage arises. Confirm that clamps are tightened, etc.
5. SMC specified parts should be used for service. Refer to the Construction/Replacement parts/Service parts table.
6. When removing valve or exterior seals, take care not to damage the sealing surfaces. When installing the valve seal, be sure that the O-ring is not twisted.

Specific Product Precautions 3

Be sure to read before handling.

Manual Angle Valves/Series XLH

Precautions on Design

⚠ Warning

1. The body material is A6063, the bellows and other parts are SUS316 and SUS304, and the seal material is fluoro rubber (Viton®). Use fluids which are compatible with these materials.
2. When using a model with a heater (thermistor), a device should be installed to prevent over heating.

Selection

⚠ Caution

1. Use within the limits of the operating pressure range. Pressure up to 0.2MPa (2kgf/cm²) can be applied only momentarily from the bellows side. However, applying pressure from the valve side tends to increase internal leakage.
2. In the case of gases which cause a large amount of deposits, heat the valve body or use a model with heater to prevent deposits in the valve.

Mounting

⚠ Caution

1. In models with heater (thermistor), take care not to damage the insulation components of the lead wires and connector section.
2. The setting temperature for models with heater should be established without a draft or heat insulation. It will change depending on conditions such as heat retaining measures and the heating of other piping. Fine adjustment is not possible.
3. When installing heater accessories or mounting a heater, check insulation resistance at the actual operating temperature. A short circuit breaker or fuse should be installed.
4. When a valve is to be heated, only the body section should be heated.
5. In high humidity environments, keep valves packaged until the time of installation.
6. When a heater is in operation, the entire valve becomes hot. Be careful not to touch it with bare hands, as burns will result.
7. Perform piping so that excessive force is not applied to the flange sections. In case there is vibration of heavy objects or attachments, etc., secure them so that torque is not applied directly to the flanges.

Piping

⚠ Caution

1. Before mounting, clean the surface of the flange seal and the O-ring with ethanol, etc.
2. Be sure that the flange O-ring is compressed by 15% or more.
3. There is an indentation of 0.1 to 0.2mm in order to protect the flange seal surface, and it should be handled so that the seal surface is not damaged in any way. When using an outer ring, be sure that the O-ring is compressed sufficiently. (There is basically no problem with the outer ring.)

Vacuum Characteristics

⚠ Caution

1. The gas permeationof the seal O-ring (FKM) is minute at normal temperatures, but there is a marked increase at high temperatures. Take care regarding gas discharge and gas permeation at high temperatures.

Maintenance

⚠ Caution

1. When removing deposits from a valve, take care not to damage any of its parts.
2. /Replace the handle assembly when the end of its service life is approached.
3. If damage is suspected prior to the end of the service life, perform early maintenance.
4. When operating at high temperatures, the compression set of the O-ring becomes larger, and a danger of external leakage arises. Confirm that clamps are tightened, etc.
5. SMC specified parts should be used for service. Refer to the Construction/Replacement parts/Service parts table.
6. When removing valve or exterior seals, take care not to damage the sealing surfaces. When installing the valve seal, be sure that the O-ring is not twisted.

Specific Product Precautions 4

Be sure to read before handling.

Angle Solenoid Valve/Series XLS

Precautions on Design

⚠ Warning

1. The body material is A6063, the bellows and other parts are SUS316L and 13Cr stainless steel, and the seal material is fluoro rubber (Viton®). Use fluids which are compatible with these materials.
2. In cases without an operating power supply, the starting voltage is applied for only 0.15 to 0.2s, and after this, a holding voltage (25% of the starting voltage) must be applied. If not performed properly, this can cause burning of the coil and fire, etc.
3. Be certain to install a fuse or short circuit breaker in the power supply circuit.

Selection

⚠ Caution

1. Use within the limits of the operating pressure range. There will be a marked decrease in durability at pressures above specification.

Mounting

⚠ Caution

1. In high humidity environments, keep valves packaged until the time of installation.
2. Secure the lead wires so that they have sufficient slack, without any unreasonable force applied to them.

Piping

⚠ Caution

1. Before mounting, clean the surface of the flange seal and the O-ring with ethanol, etc.
2. Be sure that the flange O-ring is compressed by 15% or more.
3. There is an indentation of 0.1 to 0.2mm in order to protect the flange seal surface, and it should be handled so that the seal surface is not damaged in any way. When using an outer ring, be sure that the O-ring is compressed sufficiently. (There is basically no problem with the outer ring.)

Maintenance

⚠ Caution

1. /Replace the core and armature assemblies when the end of their service life is approached.
2. If damage is suspected prior to the end of the service life, perform early maintenance.
3. SMC specified parts should be used for service parts. Refer to Replacement parts on page 43 for further details.

Straight Solenoid Valve/Series XSA

Precautions on Design

⚠ Warning

1. The body material is SUS304, the electromagnet is 13Cr stainless steel, and the seal material is fluoro rubber (Viton®). Use fluids which are compatible with these materials.
2. Be certain to install a fuse or short circuit breaker in the power supply circuit.

Mounting

⚠ Caution

1. In high humidity environments, keep valves packaged until the time of installation.
2. Secure the lead wires so that they have sufficient slack, without any unreasonable force applied to them.

Piping

⚠ Caution

1. Before mounting, clean the sealing surface with ethanol, etc.
2. Fasten the VCR® and SWJ (Swagelok)® properly, in accordance with the specified torque and methods prescribed by both companies.

   Reference VCR: 1/8 turn after tightening by hand SWJ: 1 1/4 turns after tightening by hand
3. Attach the valve using body bottom mounting screws (2-M5 P=15).

* VCR® Fitting is a registered trade mark of the Cajon Company, and Swagelok ® Fitting is a registered trade mark of the Crawford Fitting Company Inc..

Maintenance

⚠ Caution

1. Replace the armature and core assemblies when the end of their service life is approached.
2. If damage is suspected prior to the end of the service life, perform early maintenance.
3. SMC specified parts should be used for service parts.

Specific Product Precautions 5

Be sure to read before handling.

Maintenance Parts

Air operated angle valve/Manual valve
Bonnet & handle assembly/Construction part number: (1)

Model	Temperature specifications	Valve size					
		XL□□-16	XL□□-25	XL□□-40	XL□□-50	XL□□-63	XL□□-80
XLA	General use	XLA16-30-1	XLA25-30-1	XLA40-30-1	XLA50-30-1	XLA63-30-1	XLA80-30-1
	High temperature	XLA16-30-1H	XLA25-30-1H	XLA40-30-1H	XLA50-30-1H	XLA63-30-1H	XLA80-30-1H
XLAV	General use	XLAV16-30-1	XLAV25-30-1	XLAV40-30-1	XLAV50-30-1	XLAV63-30-1	XLAV80-30-1
XLC	General use	XLC16-30-1	XLC25-30-1	XLC40-30-1	XLC50-30-1	XLC63-30-1	XLC80-30-1
	High temperature	XLC16-30-1H	XLC25-30-1H	XLC40-30-1H	XLC50-30-1H	XLC63-30-1H	XLC80-30-1H
XLCV	General use	XLCV16-30-1	XLCV25-30-1	XLCV40-30-1	XLCV50-30-1	XLCV63-30-1	XLCV80-30-1
XLF	General use	XLF16-30-1	XLF25-30-1	XLF40-30-1	XLF50-30-1	XLF63-30-1	XLF80-30-1
	High temperature	XLF16-30-1H	XLF25-30-1H	XLF40-30-1H	XLF50-30-1H	XLF63-30-1H	XLF80-30-1H
XLFV	General use	XLFV16-30-1	XLFV25-30-1	XLFV40-30-1	XLFV50-30-1	XLFV63-30-1	XLFV80-30-1
XLG	General use	XLG16-30-1	XLG25-30-1	XLG40-30-1	XLG50-30-1	XLG63-30-1	XLG80-30-1
	High temperature	XLG16-30-1H	XLG25-30-1H	XLG40-30-1H	XLG50-30-1H	XLG63-30-1H	XLG80-30-1H
XLGV	General use	XLGV16-30-1	XLGV25-30-1	XLGV40-30-1	XLGV50-30-1	XLGV63-30-1	XLGV80-30-1
XLD	General use	–	XLD25-30-1	XLD40-30-1	XLD50-30-1	XLD63-30-1	XLD80-30-1
	High temperature	–	XLD25-30-1H	XLD40-30-1H	XLD50-30-1H	XLD63-30-1H	XLD80-30-1H
XLDV	General use	–	XLDV25-30-1	XLDV40-30-1	XLDV50-30-1	XLDV63-30-1	XLDV80-30-1
XLH	Standard	XLH16-30-1	XLH25-30-1	XLH40-30-1	XLH50-30-1	–	–

Exterior seal, (M) Valve seal, S Valve seal Assemblies

Construction No.	Description	XL(A, C, H) [V]-16	XL(F, G) [V]-16	XLD [V]-25	XL(A, C, H) [V]-25	XL(F, G) [V]-25	XLD [V]-40	XL□ [V]-40	XLD [V]-50	XL□ [V]-50	XLD [V]-63	XL□ [V]-63	XLD [V]-80	XL□ [V]-80
③	Exterior seal	AS568 -025V	XLF16-6	AS568-030V		XLF25-6	AS568-035V		AS568-039V		AS568-043V		AS568-045V	
⑭ (-2)	(M) Valve seal	B2401-V15V		B2401-V24V			B2401-P42V		AS568-227V		AS568-233V		B2401-V85V	
⑭ (-2)	S Valve seal assembly	–		AS568 -009V	–		XLD40 -2-9-1A	–	XLD50 -2-9-1A	–	XLD63 -2-9-1A	–	XLD80 -2-9-3A	–

∗ Refer to the Construction/Operation drawing of each series for the construction numbers.

Replacement heaters/Part Nos. (XLA, XLC, XLD, XLF, XLG, XLH)

Model	Part Nos./Mounting positions/Set quantity								
	H1 (heater for 80°C)	Mounting position	Set quantity	H2 (heater for 100°C)	Mounting position	Set quantity	H3 (heater for 120°C)	Mounting position	Set quantity
XL□-25	XLA25-60B-1	(a)	1	–	–	–	XLA25-60M-1	(a)	1
XL□-40	XLA25-60B-1	(a)	1	XLA25-60M-1	(a)	1	XLA25-60M-2	(b) (c)	1
XL□-50	XLA25-60B-2	(b) (c)	1	XLA25-60M-1	(a)	1	XLA25-60M-2	(b) (c)	1
XL□-63	XLA25-60B-2	(b) (c)	1	XLA25-60M-2	(b) (c)	1	XLA25-60M-3	(a) (b) (c)	1
XL□-80	XLA25-60B-3	(a) (b) (c)	1	XLA25-60M-3	(a) (b) (c)	1	XLA25-60M-2	(b) (c)	2

Note 1) The above (a), (b), (c) indicate heater mounting positions. The heater mounting positions (a), (b), (c) are shown in the dimension drawing for each series.
Note 2) Heater set quantity indicates multiple heaters.
(Example) The heaters included with XLA-80-H3 are 2 pieces of XLH25-60M-2 (a set including 2 heater units).

Angle solenoid valve

Construction No.	Description	XLS-16-□□	XLS-16-P□□	XLS-25-□□	XLS-25-P□□
②	Coil assembly	XLS16-20-※G, C, T, D	XLS16-20-P※G	XLS25-20-※G, C, T, D	XLS25-20-P※G
⑥	Core assembly	XLS16-30-1		XLS25-30-1	
④	Armature assembly	XLS16-30-2		XLS25-30-2	
③-1	Core O-ring	AS568-018V		AS568-018V	
③-2	Bonnet O-ring	AS568-025V		AS568-030V	

Note) The voltage symbol is entered here. (Refer to "How to Order")
The letters G, C, T and D following ※ indicate grommet, conduit, terminal and DIN respectively.
∗ Refer to the Construction/Operation sections for construction numbers.

Specific Product Precautions 6

Be sure to read before handling.

Maintenance Parts

Straight solenoid valve (normally closed)

Construction No.	Description		XSA1	XSA2	XSA3
①	Retainer		VX070-010-1	VX070-011	VX070-012
②	Coil assembly	100VAC	VX021-001GB-X44	VX021-002GB-X44	VX021-003GB-X44
		DC	(Refer to the section "How to Order Coil Assembly")		
③	Core assembly		XSA122-30-1	XSA232-30-1	XSA343-30-1
④	Armature assembly		XSA122-30-4	XSA232-30-4	XSA343-30-4
⑤	Exterior seal		AS568-016V	AS568-019V	

∗ Refer to the Construction/Operation sections for construction numbers.

How to Order Coil Assembly (DC for XSA)

VX021 — 001 C B □ □ — 05

Coil assembly

Applications

Size part no.		Applicable Series
001	No.1 Solenoid	XSA1
002	No.2 Solenoid	XSA2
003	No.3 Solenoid	XSA3

Electrical entry

G	Grommet
C	Conduit
D	DIN terminal

Coil insulation type

B	Class B insulation

Terminal box

Nil	None
T	With terminal box

Electrical options

Nil	None
S	With Surge voltage suppressor
L	With light
Z	With light/surge voltage suppressor

Rated voltage Note1)

05	24VDC
06	12VDC
51	6VDC
53	48VDC
55	100VDC

Note 1) If the leading "0" is removed from voltage symbols 05, 06, these are the same as the solenoid valve symbols.

• How to Order

(Example) Series XSA1 with 12VDC grommet.
Mode: VX021-001GB-06
(Example) Series XSA2 with 24VDC DIN terminal (terminal box).
Mode: VX021-002DBT-05
(Example) Series XSA3 with 24VDC terminal, surge voltage suppressor and light.
Mode: VX021-003CBTZ-05

Coil combinations

(Electrical entry, Coil insulation type, Electrical options)

Electrical entry	Without electrical options	With electrical options		
		With surge voltage suppressor	With light	With light/surge voltage suppressor
Grommet	GB	GBS	–	–
Conduit	CB	–	–	–
	CBT	CBTS	CBTL	CBTZ
DIN terminal	DB	–	–	–
	DBT	DBTS	DBTL	DBTZ

∗ The applicable voltage with light, and with light/surge voltage suppressor, is 24VDC only.

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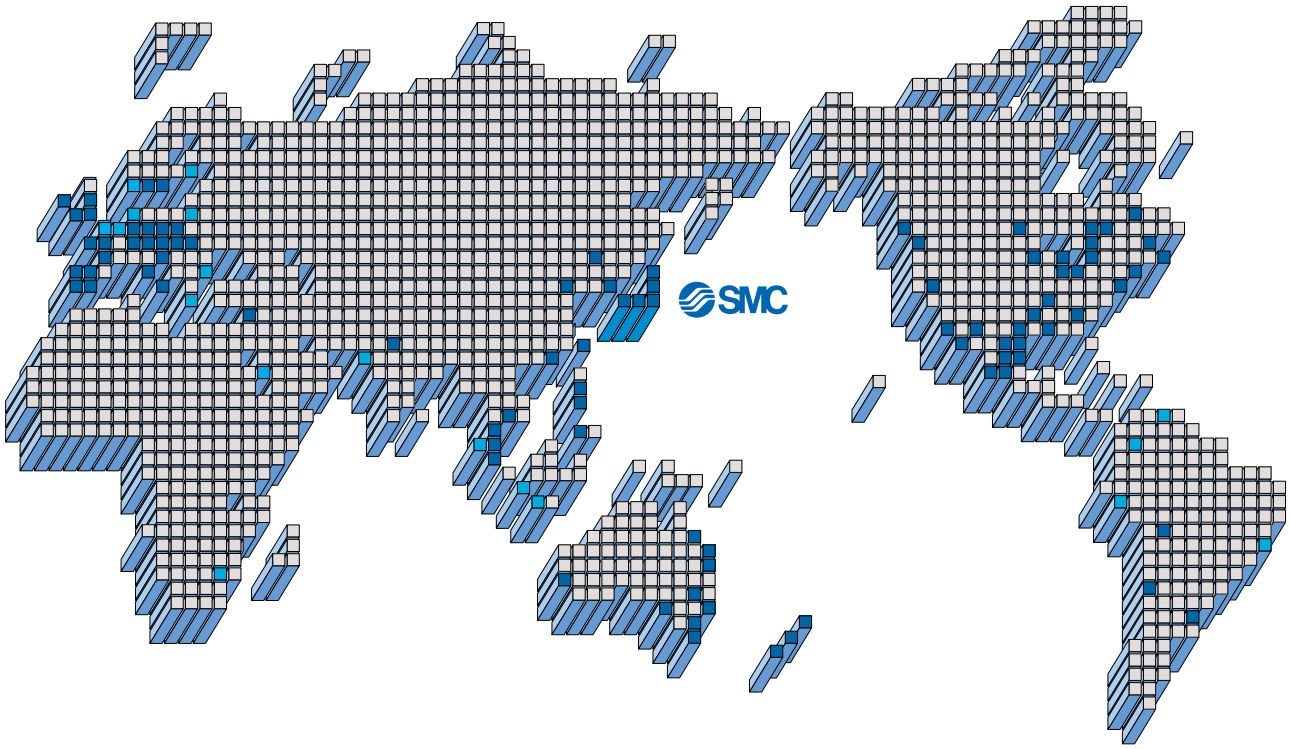

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