Aluminum

High Vacuum Angle Valves

Series XL□

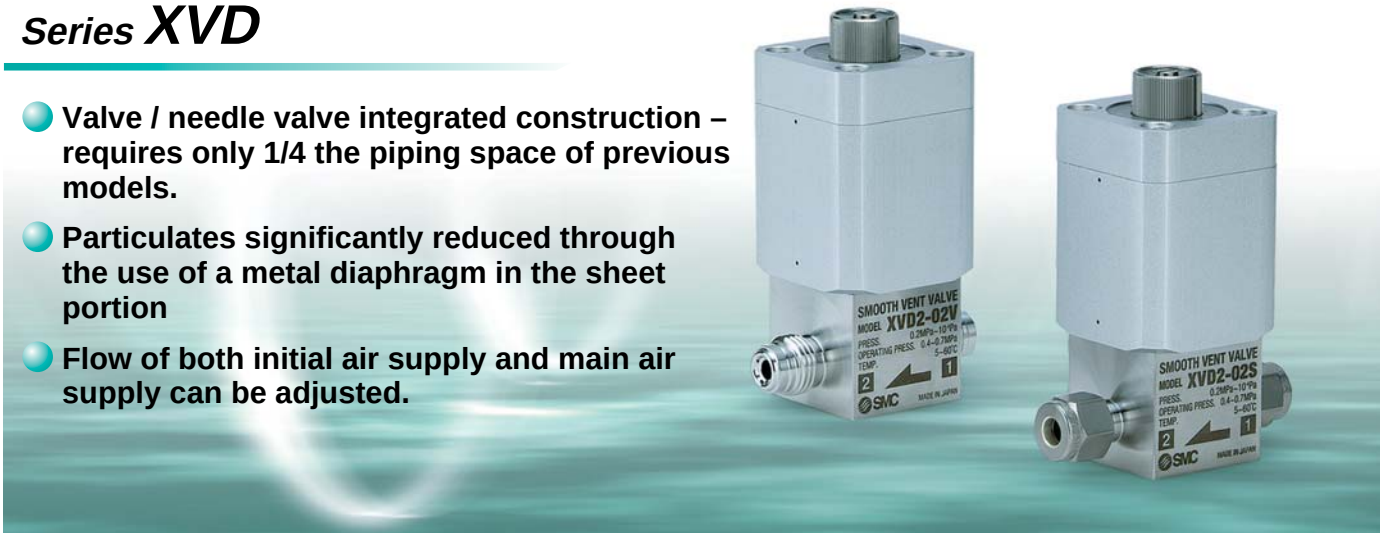
- High fluorine resistance
- Minimal outgassing
- Minimal contamination from heavy metals

Addition of ø100, ø160
XLF(V)

Smooth Vent Valve

Series XVD

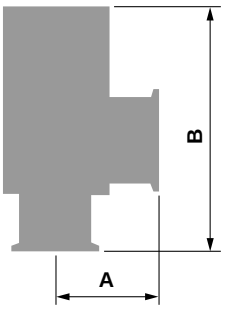
- Valve / needle valve integrated construction – requires only 1/4 the piping space of previous models.
- Particulates significantly reduced through the use of a metal diaphragm in the sheet portion
- Flow of both initial air supply and main air supply can be adjusted.



Aluminum
High Vacuum Angle Valves
Series XL

Lightweight, Compact

Large conductance, small body



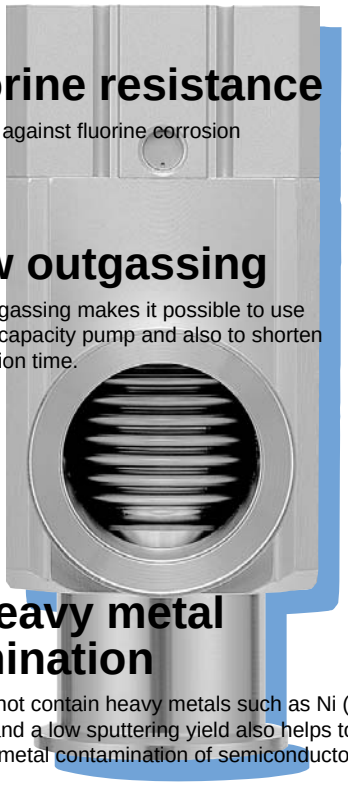
XL* Series Case

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
XLF-100	108	154	10.6	300
XLF-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.

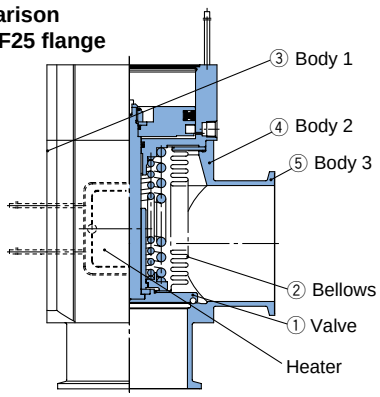
Little heavy metal contamination

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.

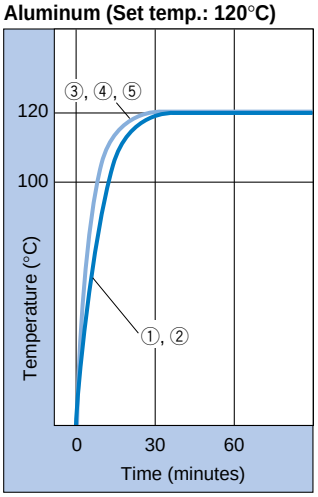
Uniform baking temperature

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.

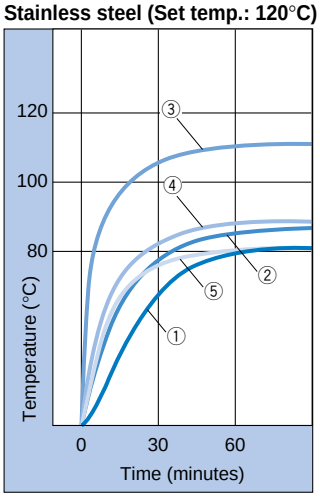
Comparison with KF25 flange



Aluminum (Set temp.: 120°C)



Stainless steel (Set temp.: 120°C)



High Vacuum Angle Valves XL□ Series Features

XLA/XLAV (Bellows seal, Single acting)
- Particulate-free and clean room compatible bellows type
- Pressure-balance mechanism

XLC/XLCV (Bellows seal, Double acting)
- Particulate-free and clean room compatible bellows type
- Pressure-balance mechanism

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

XLD/XLDV (2-Step control, Single acting)
- Initial stage exhaust valve and main exhaust valve are combined. (flow rate 2-step control valve)
- Designed with a compact system and reduced piping
- Prevents particulate turbulence inside the chamber during exhaustion.
- Prevents pumps from running while overloaded.
- Initial exhaust valve flow is adjustable.

XLH (Bellows seal, Manual)
- Bellows type is particulate free and cleaned.
- Pressure balance mechanism allows unrestricted exhaust direction.
- Low actuation torque (0.5 N·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 (Bellows pressure balance, Normally closed electromagnetic)
- 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.

XVD (Supply line)
- Valve / needle valve integrated construction – requires only 1/4 the piping space of previous models.
- Particulates significantly reduced through the use of a metal diaphragm in the sheet portion
- Flow of both initial air supply and main air supply can be adjusted.

High Vacuum Angle Valves

Actuation	Application	Shaft seal system	Model	Valve type	Operating pressure	Leakage (Pa·m³/s) Note) Internal	Leakage (Pa·m³/s) Note 1) External	Flange size 16	25	40	50	63	80	100	160	Option Switch	Heater	Indicator	High temperature spec.	Page
Air operated	Particle free completely cleaned	Bellows seal	XLA	Single acting (N.C.)	Atmospheric pressure to 10^{-6}	10^{-10}	10^{-11}	●	●	●	●	●	●			(Size 16: None)				P.1 to 4
			XLAV (With solenoid valves)					●	●	●	●	●	●					●		
			XLC	Double acting				●	●	●	●	●	●			(Size 16: None)				P.5 to 8
			XLCV (With solenoid valves)					●	●	●	●	●	●					●		
	High speed operation High volume operation	O-ring seal	XLF	Single acting (N.C.)	Atmospheric pressure to 10^{-5}	10^{-10}	10^{-10}	●	●	●	●	●	●	●	●	(Size 16: None)				P.9 to 18
			XLFV (With solenoid valves)					●	●	●	●	●	●	●	●			●		
			XLG	Double acting				●	●	●	●	●	●	● Note 2)	● Note 2)	(Size 16: None)				P.19 to 32
			XLGV (With solenoid valves)					●	●	●	●	●	●					●		
	Prevents turbulence of particulates. Prevents a pump from running overloaded.	Bellows seal O-ring seal	XLD	Single acting (N.C.)	Atmospheric pressure to 10^{-6}	10^{-10}	10^{-11}	●	●	●	●	●	●			Standard				P.33 to 38
			XLDV (With solenoid valves)					●	●	●	●	●	●			Standard				
Manual	Particle free completely cleaned	Bellows seal	XLH	Manual	Atmospheric pressure to 10^{-6}	10^{-10}	10^{-11}	●	●	●	●					Standard (Size 16: None)	Standard			P.39, 40
Electromagnetic	For portable equipment not requiring air	(Bellows balance)	XLS	Single acting (N.C.)	0.1 MPa (G) to 10^{-6}	10^{-8}	10^{-11}	●	●											P.41 to 43

Note 1) In case of standard seal material (FKM)
Note 2) Made to Order

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

Smooth Vent Valve

Model	Valve type	Piping size	Orifice (mmø)	Effective area (mm²)	Operating pressure (Pa)	Leakage (Pa·m³/s) Internal	Leakage (Pa·m³/s) External	Leakage (Pa·m³/s) Fitting	Service life cycles (10 thousand)	Page
XVD2-02V	Single acting (N.C.)	1/4	3	Main air supply: 4.6 Initial air supply: 0.2 to 4.6	0.2 MPa (G) to 1 x 10^{-6}	5 x 10^{-9}	1.3 x 10^{-11}	For VCR® 1.3 x 10^{-11}	50	P.44 to 46
XVD2-02S						Values at normal temperature, excluding gas permeation		For Swagelok® 1.3 x 10^{-10}		

Aluminum
High Vacuum Angle Valve
Series XLA/XLAV
Normally Closed/Bellows Seal

XLA

How to Order

XLA − 16 ① □ ② □ ③ □ ④ − M9N ⑤ A ⑥ − □ ⑦

① Flange size

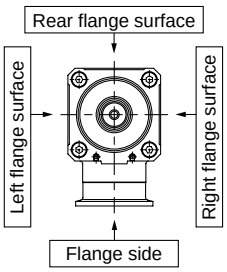
Size
16
25
40
50
63
80

② Flange type

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

③ Indicator/Pilot port direction

Symbol	Indicator	Pilot port direction
Nil	Without indicator	Flange side
A	With indicator	Flange side
F		Left flange surface
G		Rear flange surface
J		Right flange surface
K	Without indicator	Left flange surface
L		Rear flange surface
M		Right flange surface



④ Temperature specifications/Heater

Symbol		Temperature	Heater
Nil		5 to 60°C	—
High temperature type	**H0**	5 to 150°C	—
	H2		With 100°C heater
	H3		With 120°C heater

Note) Size 16 is not applicable for H2, H3, Size 25 not for H2.

⑤ Auto switch type

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

Auto switches are not applicable for high temperature specifications (Temperature specifications H0, H2, H3). Standard lead wire length is 0.5 m.
Add "L" to the end of the part number when 3 m is desired.
Example) -M9N<u>L</u>

⑥ Switch quantity/Mounting position

Symbol	Qty	Mounting position
Nil	Without auto switch	—
A	2 pcs.	Valve open/closed
B	1 pc.	Valve open
C	1 pc.	Valve closed

⑦ Body surface treatment/Seal material and its changed part

• Body surface treatment

Symbol	Surface treatment
Nil	External: Hard anodized Internal: Raw material
A	External: Hard anodized Internal: Oxalic acid anodized

• Seal material

Symbol	Seal material	Compound No.
Nil	FKM	1349-80*
N1	EPDM	2101-80*
P1	Barrel Perfluoro®	70W
Q1	Kalrez®	4079
R1	Chemraz®	SS592
R2		SS630
R3		SSE38
S1	VMQ	1232-70*
T1	FKM for Plasma	3310-75*
U1	ULTIC ARMOR®	UA4640

* Produced by Mitsubishi Cable Industries, Ltd.

• Seal material changed part and leakage

Symbol	Changed part Note 2)	Leakage (Pa·m³/s or less) Note 1)	
		Internal	External
Nil	None	1.3×10^{-10} (FKM)	1.3×10^{-11} (FKM)
A	②, ③	1.3×10^{-8}	1.3×10^{-9}
B	②	1.3×10^{-8}	1.3×10^{-11} (FKM)
C	③	1.3×10^{-10} (FKM)	1.3×10^{-9}

Note 1) Values at normal temperature, excluding gas permeation.
Note 2) Refer to parts number of "Construction" on page 3 for changed part. Number indicates parts number of "Construction" accordingly.

To order something other than "Nil" (standard), list the symbols starting with "X," followed by each symbol for "body surface treatment," "seal material" and then "changed part".

Example) XLA-16-M9NA-<u>X</u>AN1A

Barrel Perfluoro® is a registered trademark of Matsumura Oil Co., Ltd.
Kalrez® is a registered trademark of DuPont Performance Elastomers.
Chemraz® is a registered trademark of Greene, Tweed & Co.
ULTIC ARMOR® is a registered trademark of Nippon Valqua Industries, Ltd.

Air Operated/with Solenoid Valve

XLAV

How to Order

XLAV − 16 ☐ G − M9N A − 1 G ☐ − ☐

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

● **Air operated/with solenoid valve**

① Flange size

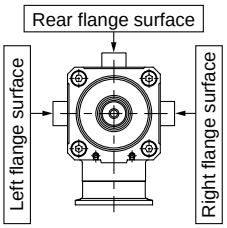
Size
16
25
40
50
63
80

② Flange type

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

③ Indicator/Pilot port direction

Symbol	Indicator	Pilot port direction
F	With indicator	Left flange surface
G		Rear flange surface
J		Right flange surface
K	Without indicator	Left flange surface
L		Rear flange surface
M		Right flange surface



∗ M type plug connector (AC power supply) not attached for J, M of sizes 16 and 25.

④ Auto switch type

Symbol	Auto switch model	Remarks
Nil	—	Without auto switch (without built-in magnet)
M9N(L)	D-M9N(L)	Solid state switch
M9P(L)	D-M9P(L)	
M9B(L)	D-M9B(L)	
A90(L)	D-A90(L)	Reed switch (Not applicable to flange size 16)
A93(L)	D-A93(L)	
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.
Example) -M9NL

⑤ Switch quantity/Mounting position

Symbol	Qty	Mounting position
Nil	Without auto switch	—
A	2 pcs.	Valve open/closed
B	1 pc.	Valve open
C	1 pc.	Valve closed

⑥ Rated voltage

1	100 VAC, 50/60 Hz
2	200 VAC, 50/60 Hz
3	110 VAC, 50/60 Hz
4	220 VAC, 50/60 Hz
5	24 VDC
6	12 VDC

⑦ Electrical entry

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

⑧ 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)

∗ S type: Not available for AC.
∗ U type: DC only.

⑨ Body surface treatment/Seal material and its changed part

• Body surface treatment

Symbol	Surface treatment
Nil	External: Hard anodized Internal: Raw material
A	External: Hard anodized Internal: Oxalic acid anodized

• Seal material

Symbol	Seal material	Compound No.
Nil	FKM	1349-80∗
N1	EPDM	2101-80∗
P1	Barrel Perfluoro®	70W
Q1	Kalrez®	4079
R1	Chemraz®	SS592
R2		SS630
R3		SSE38
S1	VMQ	1232-70∗
T1	FKM for Plasma	3310-75∗
U1	ULTIC ARMOR®	UA4640

∗ Produced by Mitsubishi Cable Industries, Ltd.

• Seal material changed part and leakage

Symbol	Changed part Note 2)	Leakage (Pa·m³/s or less) Note 1)	
		Internal	External
Nil	None	1.3×10^{-10} (FKM)	1.3×10^{-11} (FKM)
A	②, ③	1.3×10^{-8}	1.3×10^{-9}
B	②	1.3×10^{-8}	1.3×10^{-11} (FKM)
C	③	1.3×10^{-10} (FKM)	1.3×10^{-9}

Note 1) Values at normal temperature, excluding gas permeation.
Note 2) Refer to parts number of "Construction" on page 3 for changed part. Number indicates parts number of "Construction" accordingly.

To order something other than "Nil" (standard), list the symbols starting with "X," followed by each symbol for "body surface treatment," "seal material" and then "changed part".

Example) XLAV-16-M9NA-1G-XAN1A

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

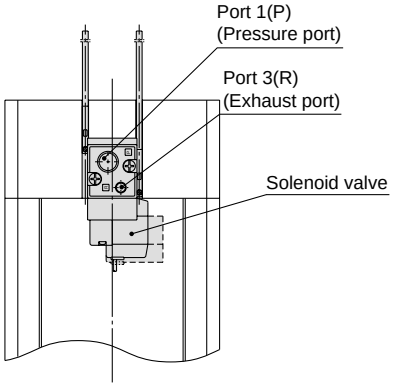
Note 2) Solenoid valves
XLAV-16, 25, 40, 50: SYJ319, XLAV-63, 80: SYJ519
Example) SYJ319-1GS, etc.
For further details on solenoid valves, refer to the SMC solenoid valve catalog "SYJ300/500/700" (ES11-86).

Specifications

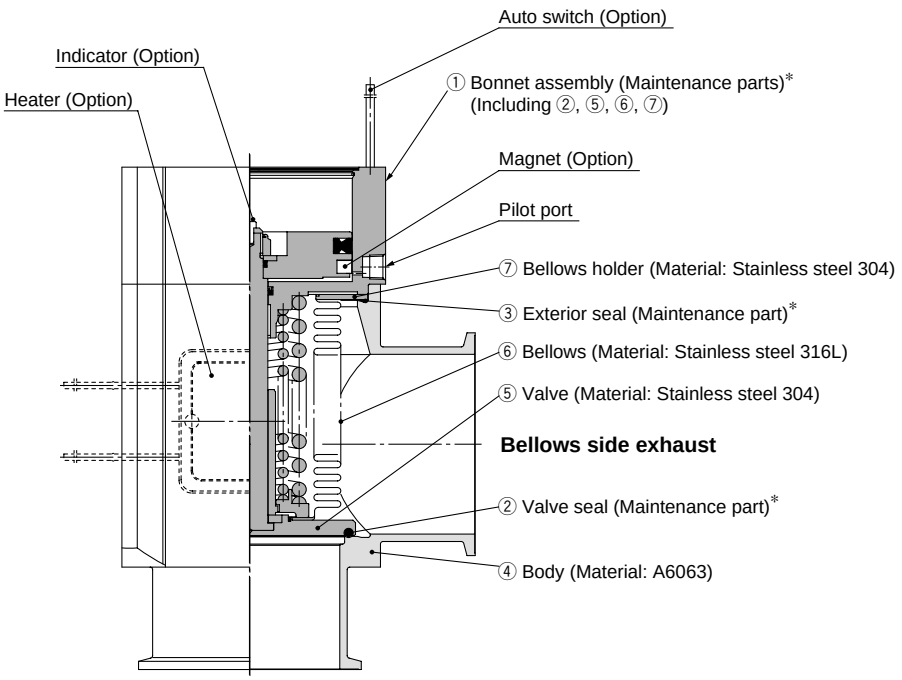
Model		XLA(V)-16	XLA(V)-25	XLA(V)-40	XLA(V)-50	XLA(V)-63	XLA(V)-80
Valve type		Normally closed (Pressurize to open, Spring seal)					
Fluid		Inert gas under vacuum					
Operating temperature (°C)	**XLA**	5 to 60 (High temperature type: 5 to 150)					
	XLAV	5 to 50					
Operating pressure (Pa)		Atmospheric pressure to 1×10^{-6}					
Conductance (ℓ/s) Note 1)		5	14	45	80	160	200
Leakage (Pa•m³/s)	**Internal**	In case of standard material FKM: 1.3×10^{-10} at normal temperature, excluding gas permeation					
	External	In case of standard material FKM: 1.3×10^{-11} at normal temperature, excluding gas permeation					
Flange type		KF (NW)				KF (NW), K (DN)	
Principal materials		Body: Aluminum alloy, Bellows: Stainless steel 316L, Main part: Stainless steel, FKM (Standard seal material)					
Surface treatment		External: Hard anodized Internal: Raw material					
Pilot pressure (MPa)		0.4 to 0.7					
Pilot port size	**XLA**	M5		Rc1/8			
	XLAV	M5: Port 1(P), Port 3(R)				Rc1/8: Port 1(P), M5: Port 3(R)	
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 value for an elbow with the same dimensions.
Note 2) For valve heater specifications, refer to "Common Option [1] Heater" on page 47.

Construction/Operation



With solenoid valve



Valve side exhaust

∗ Refer to the back of page 9 for "Maintenance Parts".

<Working principle>

By applying pressure from the pilot port, the piston-coupled valve overcomes the force of the spring or operating force by pressure, and the valve opens.
In the case of the XLAV, port 1(P) is normally pressurized, and the valve opens when the solenoid valve is turned ON and closes when it is turned OFF.

<Options>

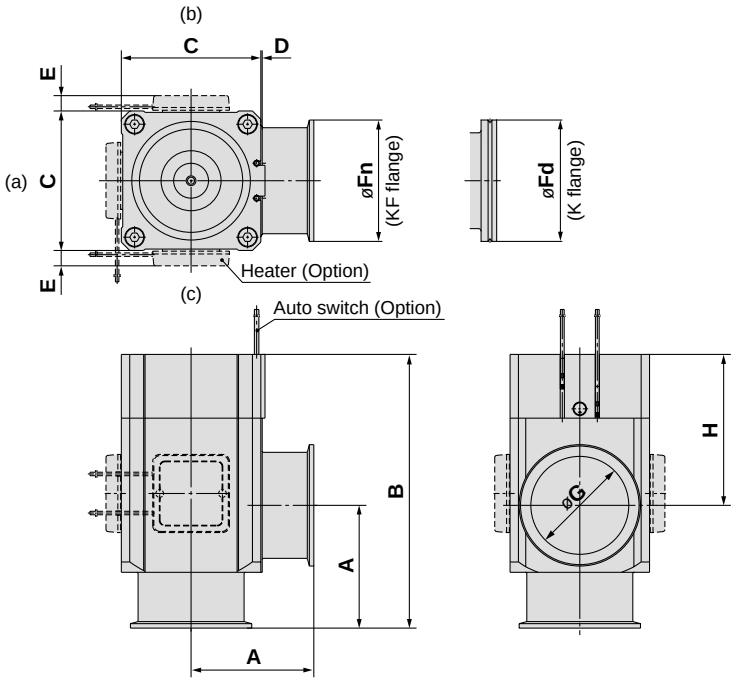
Auto switch: The magnet activates the auto switch. With 2 auto switches, the open and closed positions are detected, and with 1 auto switch, either the open or closed position is detected. Auto switches are applicable at ordinary temperatures only (5 to 60°C).

Heater: Simple heating is performed using thermistors. The valve body can be heated to approximately 100 or 120°C, 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 is a heat resistant structure. This does not apply in cases where a solenoid valve is attached.

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

Dimensions

XLA/Air operated

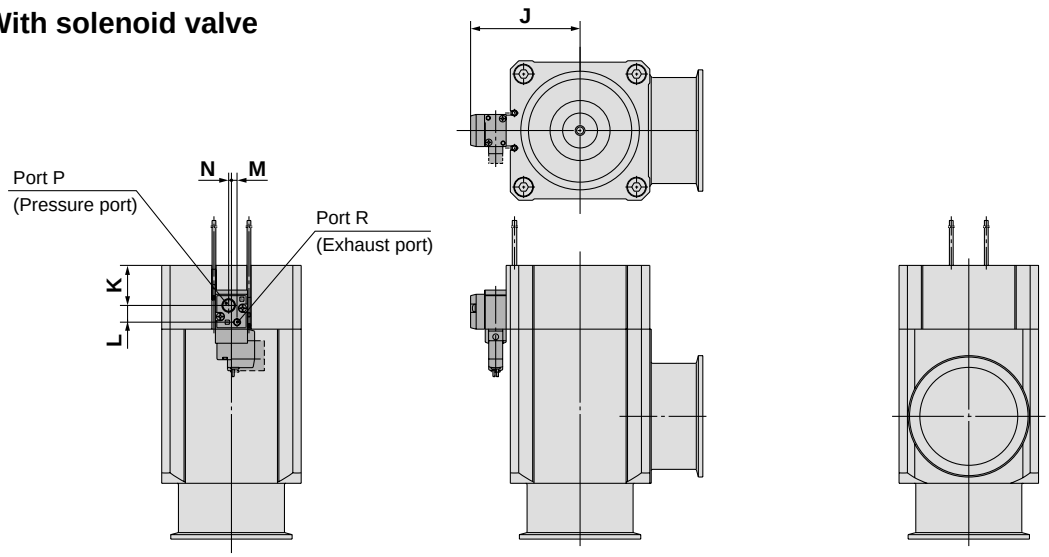


(mm)

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. 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 the back of page 9.

XLAV/With solenoid valve



(mm)

Model	J	K	L	M	N
XLAV-16	35.5	13.4	8.5	2.7	3
XLAV-25	40.5	14.9	8.5	2.7	3
XLAV-40	50.5	22.7	8.5	2.7	3

∗ Other dimensions are the same as the XLA.

(mm)

Model	J	K	L	M	N
XLAV-50	57	25.7	8.5	2.7	3
XLAV-63	78.5	28.7	12	4	2
XLAV-80	87	38.7	12	4	2

∗ Other dimensions are the same as the XLA.

Note) For further details on solenoid valves, refer to the SMC solenoid valve catalog “SYJ300/500/700” (ES11-86).

Aluminum
High Vacuum Angle Valve
Series XLC/XLCV
Double Acting/Bellows Seal

XLC

How to Order

XLC – 16 ① □ ② □ ③ □ ④ – M9N ⑤ A ⑥ – □ ⑦

① Flange size

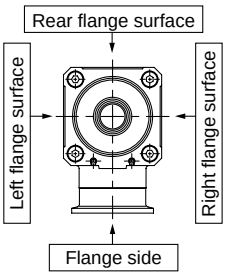
Size
16
25
40
50
63
80

② Flange type

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

③ Pilot port direction

Symbol	Pilot port direction
Nil	Flange side
K	Left flange surface
L	Rear flange surface
M	Right flange surface



④ Temperature specifications/Heater

Symbol		Temperature	Heater
Nil		5 to 60°C	—
High temperature type	**H0**	5 to 150°C	—
	H2		With 100°C heater
	H3		With 120°C heater

Note) Size 16 is not applicable for H2, H3, Size 25 not for H2.

⑤ Auto switch type

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

Auto switches are not applicable for high temperature specifications (Temperature specifications H0, H2, H3). Standard lead wire length is 0.5 m.
Add "L" to the end of the part number when 3 m is desired.
Example) -M9N**L**

⑥ Switch quantity/Mounting position

Symbol	Qty	Mounting position
Nil	Without auto switch	—
A	2 pcs.	Valve open/closed
B	1 pc.	Valve open
C	1 pc.	Valve closed

⑦ Body surface treatment/Seal material and its changed part

• Body surface treatment

Symbol	Surface treatment
Nil	External: Hard anodized Internal: Raw material
A	External: Hard anodized Internal: Oxalic acid anodized

• Seal material

Symbol	Seal material	Compound No.
Nil	FKM	1349-80*
N1	EPDM	2101-80*
P1	Barrel Perfluoro®	70W
Q1	Kalrez®	4079
R1	Chemraz®	SS592
R2		SS630
R3		SSE38
S1	VMQ	1232-70*
T1	FKM for Plasma	3310-75*
U1	ULTIC ARMOR®	UA4640

* Produced by Mitsubishi Cable Industries, Ltd.

• Seal material changed part and leakage

Symbol	Changed part Note 2)	Leakage (Pa·m³/s or less) Note 1)	
		Internal	External
Nil	None	1.3×10^{-10} (FKM)	1.3×10^{-11} (FKM)
A	②, ③	1.3×10^{-8}	1.3×10^{-9}
B	②	1.3×10^{-8}	1.3×10^{-11} (FKM)
C	③	1.3×10^{-10} (FKM)	1.3×10^{-9}

Note 1) Values at normal temperature, excluding gas permeation.
Note 2) Refer to parts number of "Construction" on page 7 for changed part. Number indicates parts number of "Construction" accordingly.

To order something other than "Nil" (standard), list the symbols starting with "X," followed by each symbol for "body surface treatment," "seal material" and then "changed part".

Example) XLC-16-M9NA-XAN1A

Air Operated/with Solenoid Valve

XLCV

How to Order

XLCV – 16 ① ☐ L ② – M9N ③ A ④ – 1 ⑤ ☐ G ⑥ ☐ ⑦ – ☐ ⑧ ⑨ ⑩

● Air operated/with solenoid valve

① Flange size

Size
16
25
40
50
63
80

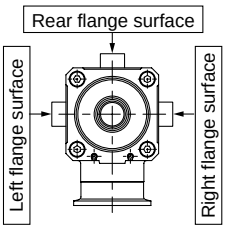
② Flange type

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

③ Solenoid valve direction

Symbol	Solenoid valve direction
K	Left flange surface
L	Rear flange surface
M	Right flange surface

∗ M type plug connector (AC power supply) not attached for J, M of sizes 16 and 25.



④ Auto switch type

Symbol	Auto switch model	Remarks
Nil	—	Without auto switch (without built-in magnet)
M9N(L)	D-M9N(L)	Solid state switch
M9P(L)	D-M9P(L)	
M9B(L)	D-M9B(L)	
A90(L)	D-A90(L)	Reed switch (Not applicable to flange size 16)
A93(L)	D-A93(L)	
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.
Example) -M9NL

⑤ Switch quantity/Mounting position

Symbol	Qty	Mounting position
Nil	Without auto switch	—
A	2 pcs.	Valve open/closed
B	1 pc.	Valve open
C	1 pc.	Valve closed

⑥ Rated voltage

1	100 VAC, 50/60 Hz
2	200 VAC, 50/60 Hz
3	110 VAC, 50/60 Hz
4	220 VAC, 50/60 Hz
5	24 VDC
6	12 VDC

⑦ Type of actuation

Nil	2 position single
W	2 position double

⑧ Electrical entry

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

⑨ 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)

∗ S type: Not available for AC.
∗ U type: DC only.

⑩ Body surface treatment/Seal material and its changed part

• Body surface treatment

Symbol	Surface treatment
Nil	External: Hard anodized Internal: Raw material
A	External: Hard anodized Internal: Oxalic acid anodized

• Seal material

Symbol	Seal material	Compound No.
Nil	FKM	1349-80∗
N1	EPDM	2101-80∗
P1	Barrel Perfluoro®	70W
Q1	Kalrez®	4079
R1	Chemraz®	SS592
R2		SS630
R3		SSE38
S1	VMQ	1232-70∗
T1	FKM for Plasma	3310-75∗
U1	ULTIC ARMOR®	UA4640

∗ Produced by Mitsubishi Cable Industries, Ltd.

• Seal material changed part and leakage

Symbol	Changed part Note 2)	Leakage (Pa·m³/s or less) Note 1)	
		Internal	External
Nil	None	1.3×10^{-10} (FKM)	1.3×10^{-11} (FKM)
A	②, ③	1.3×10^{-8}	1.3×10^{-9}
B	②	1.3×10^{-8}	1.3×10^{-11} (FKM)
C	③	1.3×10^{-10} (FKM)	1.3×10^{-9}

Note 1) Values at normal temperature, excluding gas permeation.
Note 2) Refer to parts number of "Construction" on page 7 for changed part. Number indicates parts number of "Construction" accordingly.

To order something other than "Nil" (standard), list the symbols starting with "X," followed by each symbol for "body surface treatment," "seal material" and then "changed part".

Example) XLCV-16-M9NA-1G-XAN1A

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

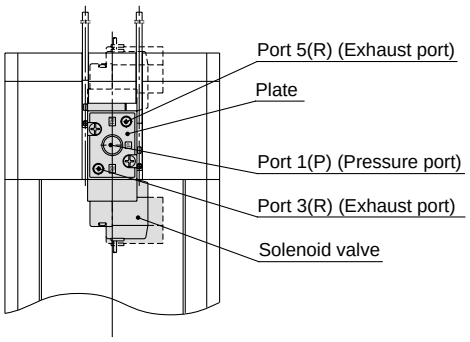
Note 2) Solenoid valves
2 position single: XLCV-16, 25, 40, 50: SYJ3190, XLCV-63, 80: SYJ5190
2 position double: XLCV-16, 25, 40, 50: SYJ3290, XLCV-63, 80: SYJ5290
Example) SYJ3190-1GS, SYJ3290-1GS
For further details on solenoid valves, refer to the SMC solenoid valve catalog "SYJ3000/5000/7000" (ES11-84).

Specifications

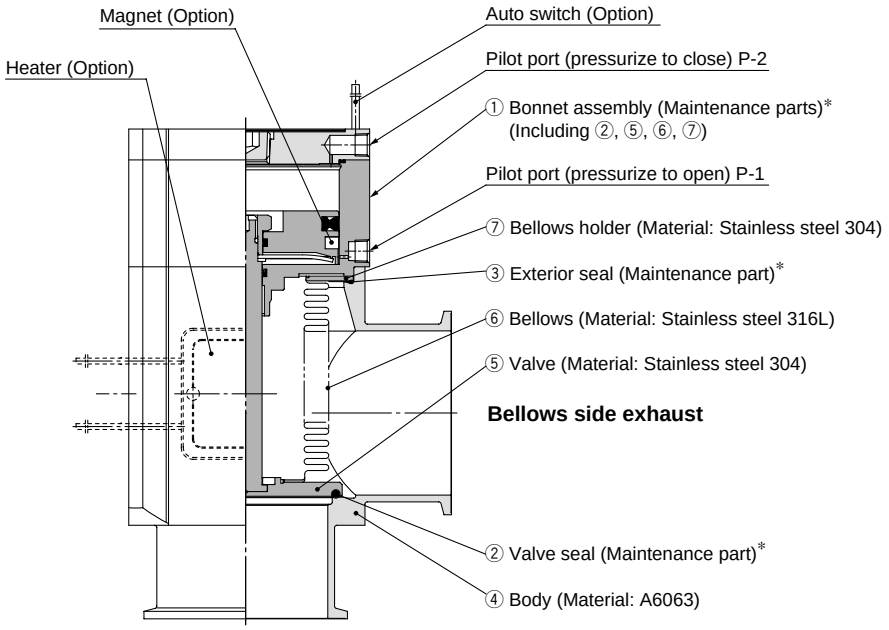
Model		XLC(V)-16	XLC(V)-25	XLC(V)-40	XLC(V)-50	XLC(V)-63	XLC(V)-80
Valve type		Double acting (Dual operation), Pressurize to open/close					
Fluid		Inert gas under vacuum					
Operating temperature (°C)	**XLA**	5 to 60 (High temperature type: 5 to 150)					
	XLAV	5 to 50					
Operating pressure (Pa)		Atmospheric pressure to 1×10^{-6}					
Conductance (ℓ/s) Note 1)		5	14	45	80	160	200
Leakage (Pa•m³/s)	**Internal**	In case of standard material FKM: 1.3×10^{-10} at normal temperature, excluding gas permeation					
	External	In case of standard material FKM: 1.3×10^{-11} at normal temperature, excluding gas permeation					
Flange type		KF (NW)				KF (NW), K (DN)	
Principal materials		Body: Aluminum alloy, Bellows: Stainless steel 316L, Main part: Stainless steel, FKM (Standard seal material)					
Surface treatment		External: Hard anodized Internal: Raw material					
Pilot pressure (MPa)		0.3 to 0.6					
Pilot port size	**XLA**	M5		Rc1/8			
	XLAV	M5: Port 1(P), Port 3(R), Port 5(R)				Rc1/8: Port 1(P), M5: Port 3(R), Port 5(R)	
Weight (kg)	**XLA**	0.28	0.46	1.1	1.7	3.1	5.1
	XLAV	0.32	0.5	1.15	1.74	3.16	5.16

Note 1) Conductance is the value for an elbow with the same dimensions.
Note 2) For valve heater specifications, refer to "Common Option [1] Heater" on page 47.

Construction/Operation



With solenoid valve



Valve side exhaust

∗ Refer to the back of page 9 for "Maintenance Parts".

<Working principle>

By applying pressure from the pilot port P-1, the piston-coupled valve overcomes the operating force by the pressure, and the valve opens. (Pilot port P-2 is open)
Alternatively, by applying pressure to actuation port P-2, the valve closes. (Pilot port P-1 is open)
In the case of the XLCV, port 1(P) is normally pressurized, and the valve opens when the solenoid valve is turned ON and closes when it is turned OFF. In the case of a double solenoid, the valve moves to the opposite side from that in which the solenoid valve is turned ON.

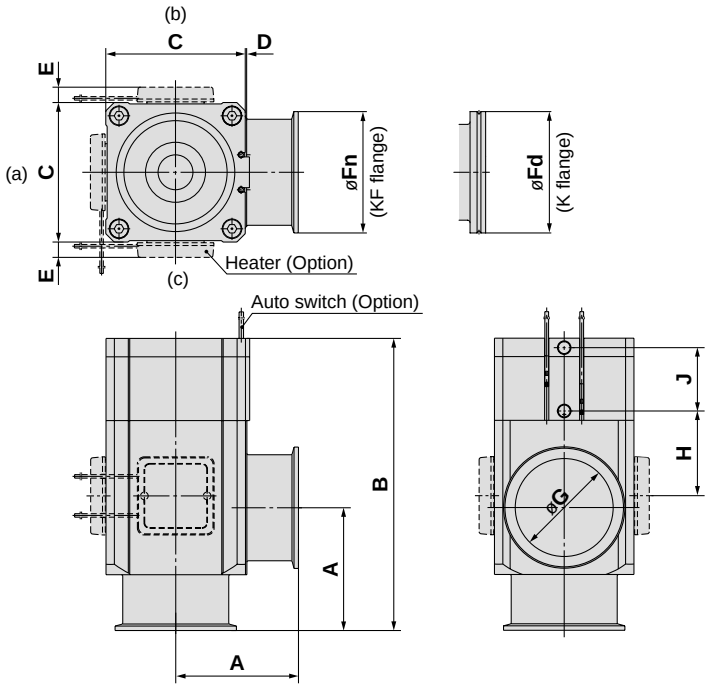
<Options>

Auto switch: The magnet activates the auto switch. 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 60°C).

Heater: Simple heating is performed using thermistors. The valve body can be heated to approximately 100 or 120°C, 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 is a heat resistant structure. This does not apply in cases where a solenoid valve is attached.

Dimensions

XLC/Air operated

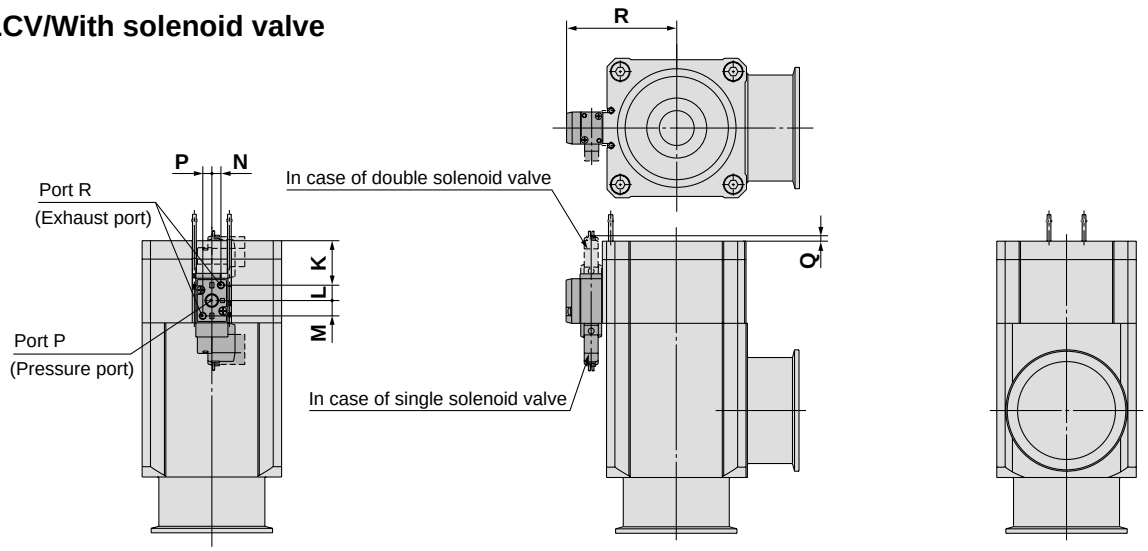


(mm)

Model	A	B	C	D	E Note 1)	Fn	Fd	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
XLC-50	70	183	79	2	11	75	—	52	68	38
XLC-63	88	209	100	3	11	87	95	70	69	45
XLC-80	90	250	117	3	11	114	110	83	96	56

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 the back of page 9.

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.

(mm)

Model	K	L	M	N	P	Q	R
XLCV-50	32.3	9.2	6.4	3.5	2.7	—	57.5
XLCV-63	32	11	11	6.5	6.5	—	79
XLCV-80	43.7	11	11	6.5	6.5	—	87.5

∗ Other dimensions are the same as the XLC.

Note) For further details on solenoid valves, refer to the SMC solenoid valve catalog “SYJ3000/5000/7000” (ES11-84).

Aluminum
High Vacuum Angle Valve
Series XLF/XLFV
Normally Closed/O-ring Seal

XLF

How to Order

XLF – 16 ① ② ③ ④ – M9N ⑤ A ⑥ – ⑦

① Flange size

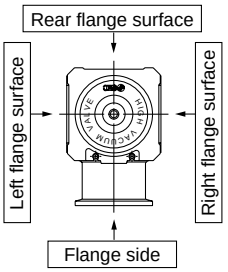
Size
16
25
40
50
63
80
100
160

② Flange type

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

③ Indicator/Pilot port direction

Symbol	Indicator	Pilot port direction
Nil	Without indicator	Flange side
A	With indicator	Flange side
F		Left flange surface
G		Rear flange surface
J		Right flange surface
K	Without indicator	Left flange surface
L		Rear flange surface
M		Right flange surface



④ Temperature specifications/Heater

Symbol		Temperature	Heater
Nil		5 to 60°C	—
High temperature type	**H0**	5 to 150°C	—
	H2		With 100°C heater
	H3		With 120°C heater

Note) Size 16 is not applicable for H2, H3, Size 25 not for H2.

⑤ Auto switch type

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

Auto switches are not applicable for high temperature specifications (Temperature specifications H0, H2, H3). Standard lead wire length is 0.5 m.
Add "L" to the end of the part number when 3 m is desired.
Example) -M9NL

⑥ Switch quantity/Mounting position

Symbol	Qty	Mounting position
Nil	Without auto switch	—
A	2 pcs.	Valve open/closed
B	1 pc.	Valve open
C	1 pc.	Valve closed

⑦ Body surface treatment/Seal material and its changed part

• Body surface treatment

Symbol	Surface treatment
Nil	External: Hard anodized Internal: Raw material
A	External: Hard anodized Internal: Oxalic acid anodized

• Seal material

Symbol	Seal material	Compound No.
Nil	FKM	1349-80*
N1	EPDM	2101-80*
P1	Barrel Perfluoro®	70W
Q1	Kalrez®	4079
R1	Chemraz®	SS592
R2		SS630
R3		SSE38
S1	VMQ	1232-70*
T1	FKM for Plasma	3310-75*
U1	ULTIC ARMOR®	UA4640

***** Produced by Mitsubishi Cable Industries, Ltd.

• Seal material changed part and leakage

Symbol	Changed part Note 2)	Leakage (Pa·m³/s or less) Note 1)	
		Internal	External
Nil	None	1.3×10^{-10} (FKM)	1.3×10^{-10} (FKM)
A	②, ③	1.3×10^{-8}	1.3×10^{-8}
B	②	1.3×10^{-8}	1.3×10^{-10} (FKM)
C	③	1.3×10^{-10} (FKM)	1.3×10^{-8}

Note 1) Values at normal temperature, excluding gas permeation.
Note 2) Refer to parts number of "Construction" on page 11 for changed part. Number indicates parts number of "Construction" accordingly.

To order something other than "Nil" (standard), list the symbols starting with "X," followed by each symbol for "body surface treatment," "seal material" and then "changed part".

Example) XLF-16-M9NA-XAN1A

Air Operated/with Solenoid Valve

XLFV

How to Order

XLFV – 16 ☐ G – M9N A – 1 G ☐ – ☐

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

● **Air operated/with solenoid valve**

① Flange size

Size
16
25
40
50
63
80
100
160

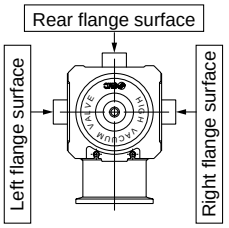
② Flange type

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

③ Indicator/Pilot port direction

Symbol	Indicator	Pilot port direction
F	With indicator	Left flange surface
G		Rear flange surface
J		Right flange surface
K	Without indicator	Left flange surface
L		Rear flange surface
M		Right flange surface

∗ M type plug connector (AC power supply) not attached for J, M of sizes 16 and 25.



④ Auto switch type

Symbol	Auto switch model	Remarks
Nil	—	Without auto switch (without built-in magnet)
M9N(L)	D-M9N(L)	Solid state switch
M9P(L)	D-M9P(L)	
M9B(L)	D-M9B(L)	
A90(L)	D-A90(L)	Reed switch (Not applicable to flange size 16)
A93(L)	D-A93(L)	
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.
Example) -M9NL

⑤ Switch quantity/Mounting position

Symbol	Qty	Mounting position
Nil	Without auto switch	—
A	2 pcs.	Valve open/closed
B	1 pc.	Valve open
C	1 pc.	Valve closed

⑥ Rated voltage

1	100 VAC, 50/60 Hz
2	200 VAC, 50/60 Hz
3	110 VAC, 50/60 Hz
4	220 VAC, 50/60 Hz
5	24 VDC
6	12 VDC

⑦ Electrical entry

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

⑧ 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)

∗ S type: Not available for AC.
∗ U type: DC only.

⑨ Body surface treatment/Seal material and its changed part

• Body surface treatment

Symbol	Surface treatment
Nil	External: Hard anodized Internal: Raw material
A	External: Hard anodized Internal: Oxalic acid anodized

• Seal material

Symbol	Seal material	Compound No.
Nil	FKM	1349-80∗
N1	EPDM	2101-80∗
P1	Barrel Perfluoro®	70W
Q1	Kalrez®	4079
R1	Chemraz®	SS592
R2		SS630
R3		SSE38
S1	VMQ	1232-70∗
T1	FKM for Plasma	3310-75∗
U1	ULTIC ARMOR®	UA4640

∗ Produced by Mitsubishi Cable Industries, Ltd.

• Seal material changed part and leakage

Symbol	Changed part Note 2)	Leakage (Pa·m³/s or less) Note 1)	
		Internal	External
Nil	None	1.3×10^{-10} (FKM)	1.3×10^{-10} (FKM)
A	②, ③	1.3×10^{-8}	1.3×10^{-8}
B	②	1.3×10^{-8}	1.3×10^{-10} (FKM)
C	③	1.3×10^{-10} (FKM)	1.3×10^{-8}

Note 1) Values at normal temperature, excluding gas permeation.
Note 2) Refer to parts number of "Construction" on page 11 for changed part. Number indicates parts number of "Construction" accordingly.

To order something other than "Nil" (standard), list the symbols starting with "X," followed by each symbol for "body surface treatment," "seal material" and then "changed part".

Example) XLFV-16-M9NA-1G-XAN1A

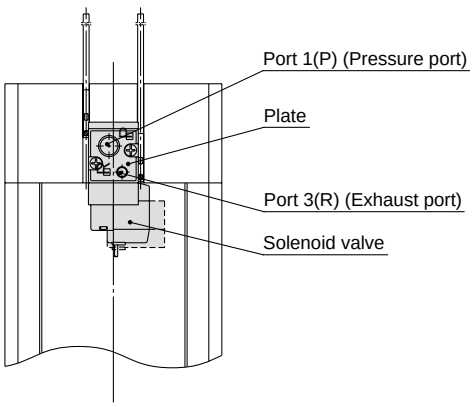
Note 1) Option specifications/Combinations
This model has indicator, auto switch and K(DN) flange options, but high temperature/heater options are not available.
Note 2) Solenoid valves
XLFV-16, 25, 40: SYJ319, XLFV-50, 63, 80, 100, 160: SYJ519
Example) SYJ319-1GS.
For further details on solenoid valves, refer to the SMC solenoid valve catalog "SYJ300/500/700" (ES11-86).

Specifications

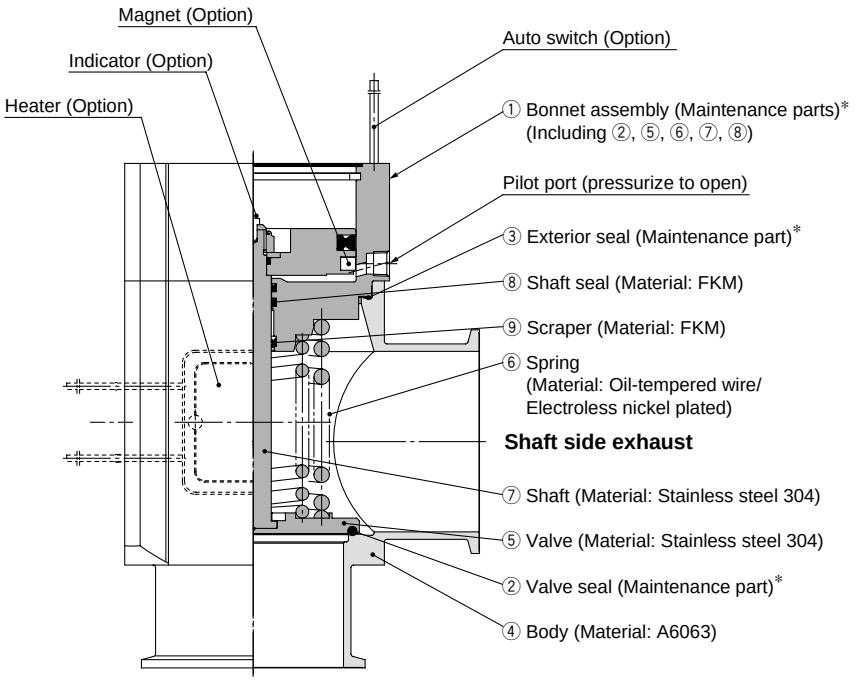
Model		XLF(V)-16	XLF(V)-25	XLF(V)-40	XLF(V)-50	XLF(V)-63	XLF(V)-80	XLF(V)-100	XLF(V)-160
Valve type		Normally closed (Pressurize to open, Spring seal)							
Fluid		Inert gas under vacuum							
Operating temperature (°C)	**XLF**	5 to 60 (High temperature type: 5 to 150)							
	XLFV	5 to 50							
Operating pressure (Pa)		Atmospheric pressure to 1×10^{-5} {760 to 7.5×10^{-8}}							
Conductance (ℓ/s) Note 1)		5	14	45	80	160	200	300	800
Leakage (Pa•m³/s)	**Internal**	In case of standard material FKM: 1.3×10^{-10} at normal temperature, excluding gas permeation							
	External	In case of standard material FKM: 1.3×10^{-10} at normal temperature, excluding gas permeation							
Flange type		KF (NW)				KF (NW), K (DN)			
Principal materials		Body: Aluminum alloy, Main part: Stainless steel, FKM (Standard seal material)							
Surface treatment		External: Hard anodized Internal: Raw material							
Pilot pressure (MPa)		0.4 to 0.7							
Pilot port size	**XLF**	M5		Rc1/8					Rc1/4
	XLFV	M5: Port 1(P), Port 3(R)			Rc1/8: Port 1(P), M5: Port 3(R)				
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 value for an elbow with the same dimensions.
Note 2) For valve heater specifications, refer to "Common Option [1] Heater" on page 47.
Note 3) A coating of vacuum grease [Y-VAC2] is applied to the seal-material sliding portion of the vacuum part.

Construction/Operation



With solenoid valve



Valve side exhaust

∗ Refer to the back of page 9 for "Maintenance Parts".

<Working principle>

By applying pressure from the pilot port, the piston-coupled valve overcomes the force of the spring or operating force by pressure, and the valve opens.
In the case of the XLFV, port 1(P) is normally pressurized, and the valve opens when the solenoid valve is turned ON and closes when it is turned OFF.

<Options>

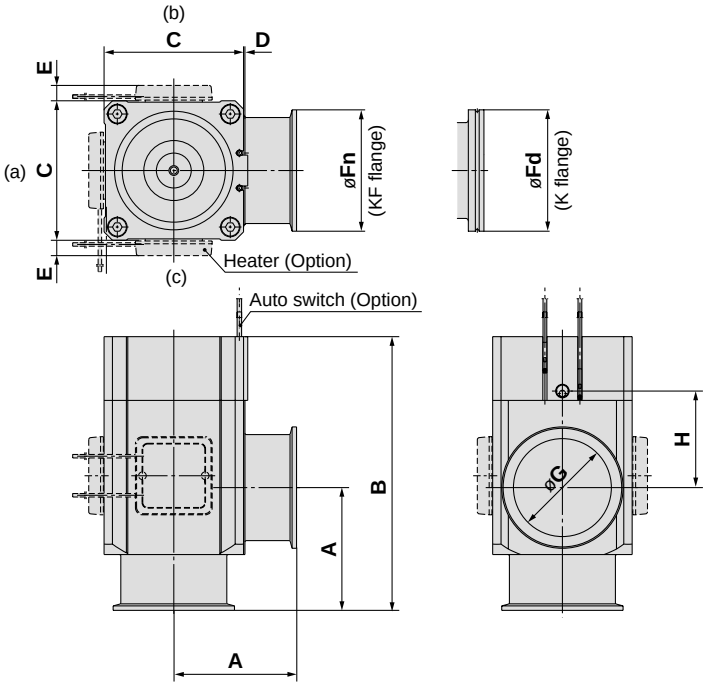
Auto switch: The magnet activates the auto switch. With 2 auto switches, the open and closed positions are detected, and with 1 auto switch, either the open or closed position is detected. Auto switches are applicable at ordinary temperatures only (5 to 60°C).

Heater: Simple heating is performed using thermistors. The valve body can be heated to approximately 100 or 120°C, 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 is a heat resistant structure. This does not apply in cases where a solenoid valve is attached.

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

Dimensions

XLF/Air operated

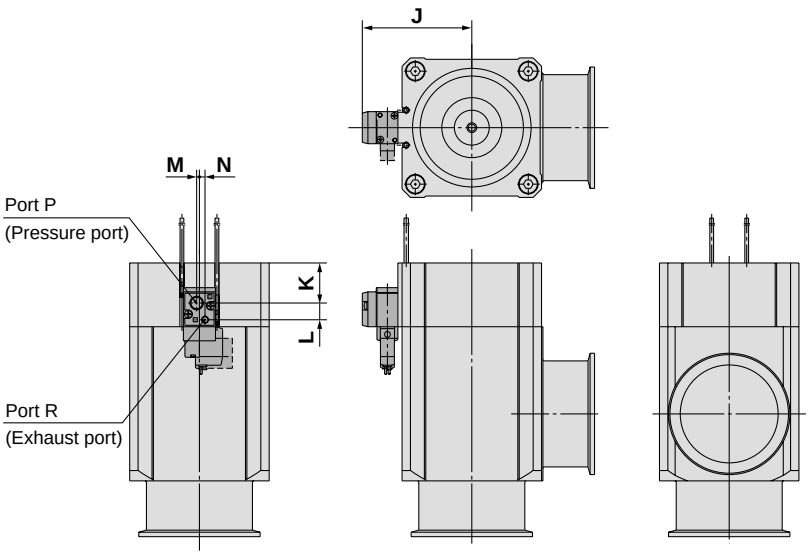


(mm)

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 the back of page 9.

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

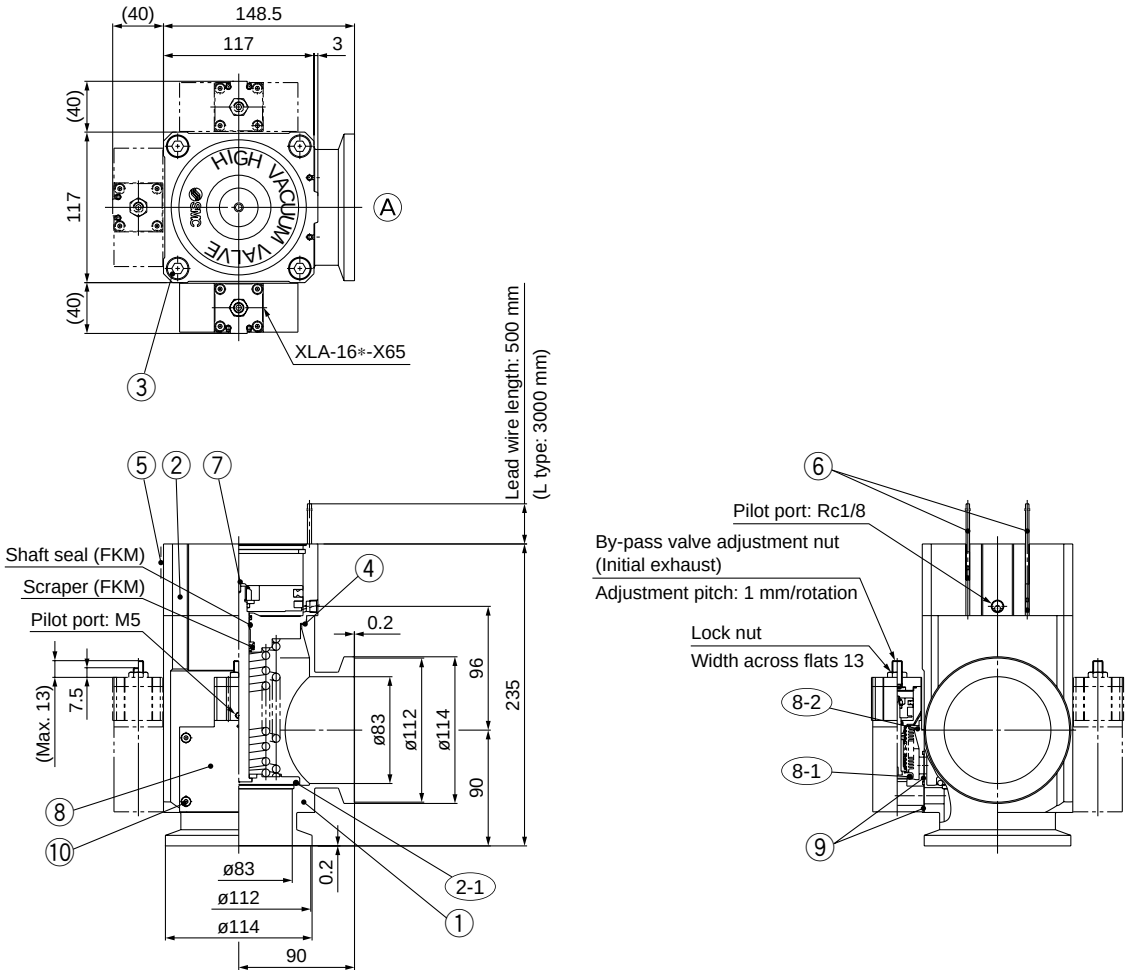
∗ Other dimensions are the same as the XLF.
Note) For further details on solenoid valves, refer to the SMC solenoid valve catalog “SYJ300/500/700” (ES11-86).

Series XLF
Made to Order 1

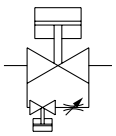
Made to Order

Please contact SMC for detailed dimensions, specifications, and lead times.

With By-pass Valve (Flange size: 80)



Symbol



O-ring Part No.

Seal material symbol	Internal seal ②-1	External seal ④
Nil	B2401-V85V	AS568-045V
N1	B2401-V85-XN1	AS568-045-XN1
P1	B2401-V85-XP1	AS568-045-XP1
Q1	B2401-V85-XQ1	AS568-045-XQ1
R1	B2401-V85-XR1	AS568-045-XR1
R2	B2401-V85-XR2	AS568-045-XR2
R3	B2401-V85-XR3	AS568-045-XR3
S1	B2401-V85-XS1	AS568-045-XS1
T1	B2401-V85-XT1	AS568-045-XT1
U1	B2401-V85-XU1	AS568-045-XU1

Component Parts

No.	Description	Material	Remarks
1	**Body**	A6063-T6	Refer to part no.
2	**Bonnet assembly**		Refer to part no.
2-1	**O-ring**		Refer to part no.
3	**Hexagon socket head cap screw**	SUSXM7	M10, ℓ = 60
4	**O-ring**		Refer to part no.
5	**Computer name plate**		
6	**Auto switch**		Option
7	**Indicator**	A5056	Option
8	**By-pass valve**		Refer to part no.
8-1	**O-ring**		Refer to part no.
8-2	**O-ring**		Refer to part no.
9	**O-ring**		Refer to part no.
10	**Hexagon socket head cap screw**	SUSXM7	M4, ℓ = 40

O-ring Part No.

Seal material symbol	Internal seal ⑧-1	External seal ⑧-2	External seal ⑨
Nil	B2401-V15V	AS568-025V	AS568-017V
N1	B2401-V15-XN1	AS568-025-XN1	AS568-017-XN1
P1	B2401-V15-XP1	AS568-025-XP1	AS568-017-XP1
Q1	B2401-V15-XQ1	AS568-025-XQ1	AS568-017-XQ1
R1	B2401-V15-XR1	AS568-025-XR1	AS568-017-XR1
R2	B2401-V15-XR2	AS568-025-XR2	AS568-017-XR2
R3	B2401-V15-XR3	AS568-025-XR3	AS568-017-XR3
S1	B2401-V15-XS1	AS568-025-XS1	AS568-017-XS1
T1	B2401-V15-XT1	AS568-025-XT1	AS568-017-XT1
U1	B2401-V15-XU1	AS568-025-XU1	AS568-017-XU1

Note) A coating of vacuum grease (fluorinated grease: Y-VAC2) is applied to the shaft seal, scraper and O-ring ⑨.

How to Order Valve

XLFR−80 □ □ − M9N A − 1K − X □ □

Main valve: Indicator/ Pilot port direction

Symbol	Indicator	Pilot port direction
Nil	Without indicator	Flange side
A	With indicator	Flange side
F		Left flange surface
G		Rear flange surface
J		Right flange surface
K	Without indicator	Left flange surface
L		Rear flange surface
M		Right flange surface

∗ Flange: Ⓐ

Temperature specifications

Symbol	Temperature
Nil	5 to 60°C
H0	5 to 150°C

Seal material

Symbol	Seal material	Compound No.
Nil	FKM	1349-80
N1	EPDM	2101-80
P1	Barrel Perfluoro®	70W
Q1	Kalrez®	4079
R1	Chemraz®	SS592
R2		SS630
R3		SSE38
S1	VMQ	1232-70
T1	FKM FOR PLASMA	3310-75
U1	ULTIC ARMOR®	UA4640

Barrel Perfluoro® is a registered trademark of Matsumura Oil Co., Ltd.
Kalrez® is a registered trademark of DuPont Performance Elastomers.
Chemraz® is a registered trademark of Greene, Tweed & Co.
ULTIC ARMOR® is a registered trademark of Nippon Valqua Industries, Ltd.

Auto switch type (Operating temperature 5 to 60°C)

Symbol	Auto switch model	Switch type
Nil	—	Without auto switch (without built-in magnet)
M9N(L)	D-M9N(L)	Solid state switch
M9P(L)	D-M9P(L)	
M9B(L)	D-M9B(L)	
A90(L)	D-A90(L)	Reed switch
A93(L)	D-A93(L)	
M9//	Without auto switch (with built-in magnet)	

Note) Types with auto switches are not available in case of high temperature types.
L type: Lead wire length 3000 mm

By-pass valve mounting position/ Pilot port direction

Symbol	Mounting position	Symbol	Pilot port direction
1	Left flange surface	**Nil**	Flange side
		K	Left flange surface
		L	Rear flange surface
2	Right flange surface	**Nil**	Flange side
		L	Rear flange surface
		M	Right flange surface
3	Rear flange surface	**K**	Left flange surface
		L	Rear flange surface
		M	Right flange surface

Switch quantity/Mounting position

Symbol	Qty	Mounting position
Nil	Without auto switch	—
A	2 pcs.	Valve open/closed
B	1 pc.	Valve open
C	1 pc.	Valve closed

Seal material changed part

Symbol	Changed part	Leakage (Pa·m³/s or less) Note)	
		Internal	External
Nil	None	1.3 x 10^{-9} (FKM)	1.3 x 10^{-9} (FKM)
A	②-1 ⑧-1 ④ ⑧-2 ⑨	1.3 x 10^{-7}	1.3 x 10^{-7}
B	②-1 ⑧-1	1.3 x 10^{-7}	1.3 x 10^{-9} (FKM)
C	④ ⑧-2 ⑨	1.3 x 10^{-9} (FKM)	1.3 x 10^{-7}

Note) Values at normal temperature, excluding gas permeation.

Maintenance Parts

① Body Part No.

XLAR80−1S− 1

By-pass valve mounting position

Symbol	Mounting position
1	Left flange surface
2	Right flange surface
3	Rear flange surface

∗ Flange: Ⓐ

⑧ By-pass Valve Part No.

XLA−16 □ □ − □ □ − X65

Pilot port direction

Symbol	Pilot port direction
Nil	Rear (as seen from body connection point)
K	Left (as seen from body connection point)
M	Right (as seen from body connection point)

Temperature specifications

Symbol	Temperature
Nil	5 to 60°C
H0	5 to 150°C

Seal material changed part

Symbol	Changed part
Nil	None
A	⑧-1 ⑧-2
B	⑧-1
C	⑧-2

Seal material: Same as the seal materials of How to Order Valve.

② Bonnet Assembly Part No.

XLF80A-30-1H − M9NA-XN1

Bonnet assembly

Temperature	Indicator	Part no.
5 to 60°C	Without indicator	XLF80-30-1
	With indiator	XLF80A-30-1
5 to 150°C	Without indicator	XLF80-30-1H
	With indiator	XLF80A-30-1H

Same as How to Order.

Specifications

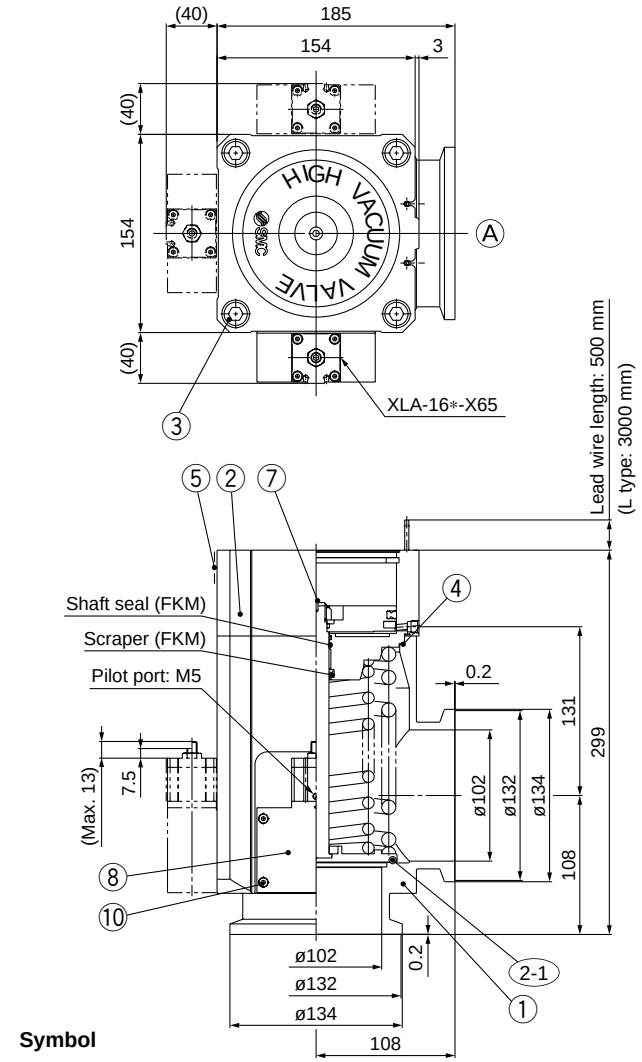
Valve type	Main valve: Normally closed	By-pass valve: Normally closed
Shaft seal type	O-ring seal	Bellows seal
Operating pressure range	Atmospheric pressure to 1 x 10^{-5} Pa	
Fluid	Inert gas under vacuum	
Operating temperature	5 to 60°C (Option: 5 to 150°C)	
Conductance	200 ℓ/s	Max. 25 ℓ/s (Calculated value)
Operating pressure	0.4 to 0.7 MPa	
Flange	KF80	

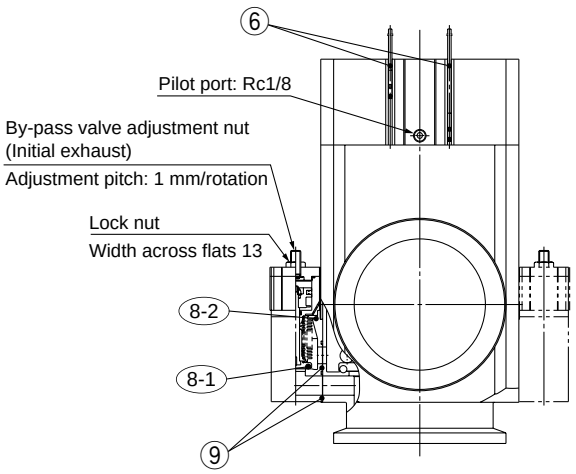
Series XLF
Made to Order 2

Made to Order

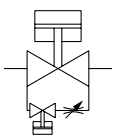
Please contact SMC for detailed dimensions, specifications, and lead times.

With By-pass Valve (Flange size: 100)





Symbol



O-ring Part No.

Seal material symbol	Internal seal ⑵-1	External seal ④
Nil	AS568-349V	AS568-050V
N1	AS568-349-XN1	AS568-050-XN1
P1	AS568-349-XP1	AS568-050-XP1
Q1	AS568-349-XQ1	AS568-050-XQ1
R1	AS568-349-XR1	AS568-050-XR1
R2	AS568-349-XR2	AS568-050-XR2
R3	AS568-349-XR3	AS568-050-XR3
S1	AS568-349-XS1	AS568-050-XS1
T1	AS568-349-XT1	AS568-050-XT1
U1	AS568-349-XU1	AS568-050-XU1

Component Parts

No.	Description	Material	Remarks
1	**Body**	A6063-T6	Refer to part no.
2	**Bonnet assembly**		Refer to part no.
2-1	**O-ring**		Refer to part no.
3	**Hexagon socket head cap screw**	SUSXM7	M12, ℓ = 70
4	**O-ring**		Refer to part no.
5	**Computer name plate**		
6	**Auto switch**		Option
7	**Indicator**	A5056	Option
8	**By-pass valve**		Refer to part no.
8-1	**O-ring**		Refer to part no.
8-2	**O-ring**		Refer to part no.
9	**O-ring**		Refer to part no.
10	**Hexagon socket head cap screw**	SUSXM7	M4, ℓ = 40

O-ring Part No.

Seal material symbol	Internal seal ⑧-1	External seal ⑧-2	External seal ⑨
Nil	B2401-V15V	AS568-025V	AS568-017V
N1	B2401-V15-XN1	AS568-025-XN1	AS568-017-XN1
P1	B2401-V15-XP1	AS568-025-XP1	AS568-017-XP1
Q1	B2401-V15-XQ1	AS568-025-XQ1	AS568-017-XQ1
R1	B2401-V15-XR1	AS568-025-XR1	AS568-017-XR1
R2	B2401-V15-XR2	AS568-025-XR2	AS568-017-XR2
R3	B2401-V15-XR3	AS568-025-XR3	AS568-017-XR3
S1	B2401-V15-XS1	AS568-025-XS1	AS568-017-XS1
T1	B2401-V15-XT1	AS568-025-XT1	AS568-017-XT1
U1	B2401-V15-XU1	AS568-025-XU1	AS568-017-XU1

Note) A coating of vacuum grease (fluorinated grease: Y-VAC2) is applied to the shaft seal, scraper and O-ring ⑨.

How to Order Valve

XLFR−100 □□ − M9N A − 1K − X □□

Main valve: Indicator/ Pilot port direction

Symbol	Indicator	Pilot port direction
Nil	Without indicator	Flange side
A	With indicator	Flange side
F		Left flange surface
G		Rear flange surface
J		Right flange surface
K	Without indicator	Left flange surface
L		Rear flange surface
M		Right flange surface

∗ Flange: Ⓐ

Temperature specifications

Symbol	Temperature
Nil	5 to 60°C
H0	5 to 150°C

Switch quantity/Mounting position

Symbol	Qty	Mounting position
Nil	Without auto switch	—
A	2 pcs.	Valve open/closed
B	1 pc.	Valve open
C	1 pc.	Valve closed

Seal material

Symbol	Seal material	Compound No.
Nil	FKM	1349-80
N1	EPDM	2101-80
P1	Barrel Perfluoro®	70W
Q1	Kalrez®	4079
R1	Chemraz®	SS592
R2		SS630
R3		SSE38
S1	VMQ	1232-70
T1	FKM FOR PLASMA	3310-75
U1	ULTIC ARMOR®	UA4640

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Kalrez® is a registered trademark of DuPont Performance Elastomers.
Chemraz® is a registered trademark of Greene, Tweed & Co.
ULTIC ARMOR® is a registered trademark of Nippon Valqua Industries, Ltd.

Auto switch type

Symbol	Auto switch model	Switch type
Nil	—	Without auto switch (without built-in magnet)
M9N(L)	D-M9N(L)	Solid state switch
M9P(L)	D-M9P(L)	
M9B(L)	D-M9B(L)	
A90(L)	D-A90(L)	Reed switch
A93(L)	D-A93(L)	
M9//	Without auto switch (with built-in magnet)	

Note 1) L type: Lead wire length 3000 mm
Note 2) Types with auto switches are not available in case of high temperature types.

By-pass valve mounting position/Pilot port direction

Symbol	Mounting position	Symbol	Pilot port direction
1	Left flange surface	**Nil**	Flange side
		K	Left flange surface
		L	Rear flange surface
2	Right flange surface	**Nil**	Flange side
		L	Rear flange surface
		M	Right flange surface
3	Rear flange surface	**K**	Left flange surface
		L	Rear flange surface
		M	Right flange surface

∗ Flange: Ⓐ

Seal material changed part

Symbol	Changed part	Leakage (Pa·m³/s or less) Note)	
		Internal	External
Nil	None	1.3×10^{-9} (FKM)	1.3×10^{-9} (FKM)
A	②-① ⑧-① ④ ⑧-② ⑨	1.3×10^{-7}	1.3×10^{-7}
B	②-① ⑧-①	1.3×10^{-7}	1.3×10^{-9} (FKM)
C	④ ⑧-② ⑨	1.3×10^{-9} (FKM)	1.3×10^{-7}

Note) Values at normal temperature, excluding gas permeation.

Maintenance Parts

① Body Part No.

XLAR100−1S− 1

By-pass valve mounting position

Symbol	Mounting position
1	Left flange surface
2	Right flange surface
3	Rear flange surface

② Bonnet Assembly Part No.

XLF100A-30-1 − M9NA-XN1

Bonnet assembly

Temperature	Indicator	Part no.
5 to 60°C	Without indicator	XLF100-30-1
	With indiator	XLF100A-30-1
5 to 150°C	Without indicator	XLF100-30-1H
	With indiator	XLF100A-30-1H

Same as How to Order.

Specifications

Valve type	Main valve: Normally closed	By-pass valve: Normally closed
Shaft seal type	O-ring seal	Bellows seal
Operating pressure range	Atmospheric pressure to 1×10^{-5} Pa	
Fluid	Inert gas under vacuum	
Operating temperature	5 to 60°C (Option: 5 to 150°C)	
Conductance	300 ℓ/s	Max. 31.5 ℓ/s (Calculated value)
Operating pressure	0.4 to 0.7 MPa	
Flange	KF100	

⑧ By-pass Valve Part No.

XLA−16 □□ − □□ − X65

Pilot port direction

Symbol	Pilot port direction
Nil	Rear (as seen from body connection point)
K	Left (as seen from body connection point)
M	Right (as seen from body connection point)

Temperature specifications

Symbol	Temperature
Nil	5 to 60°C
H0	5 to 150°C

Seal material changed part

Symbol	Changed part
Nil	None
A	⑧-① ⑧-②
B	⑧-①
C	⑧-②

Seal material: Same as the seal materials of How to Order Valve.

Specifications

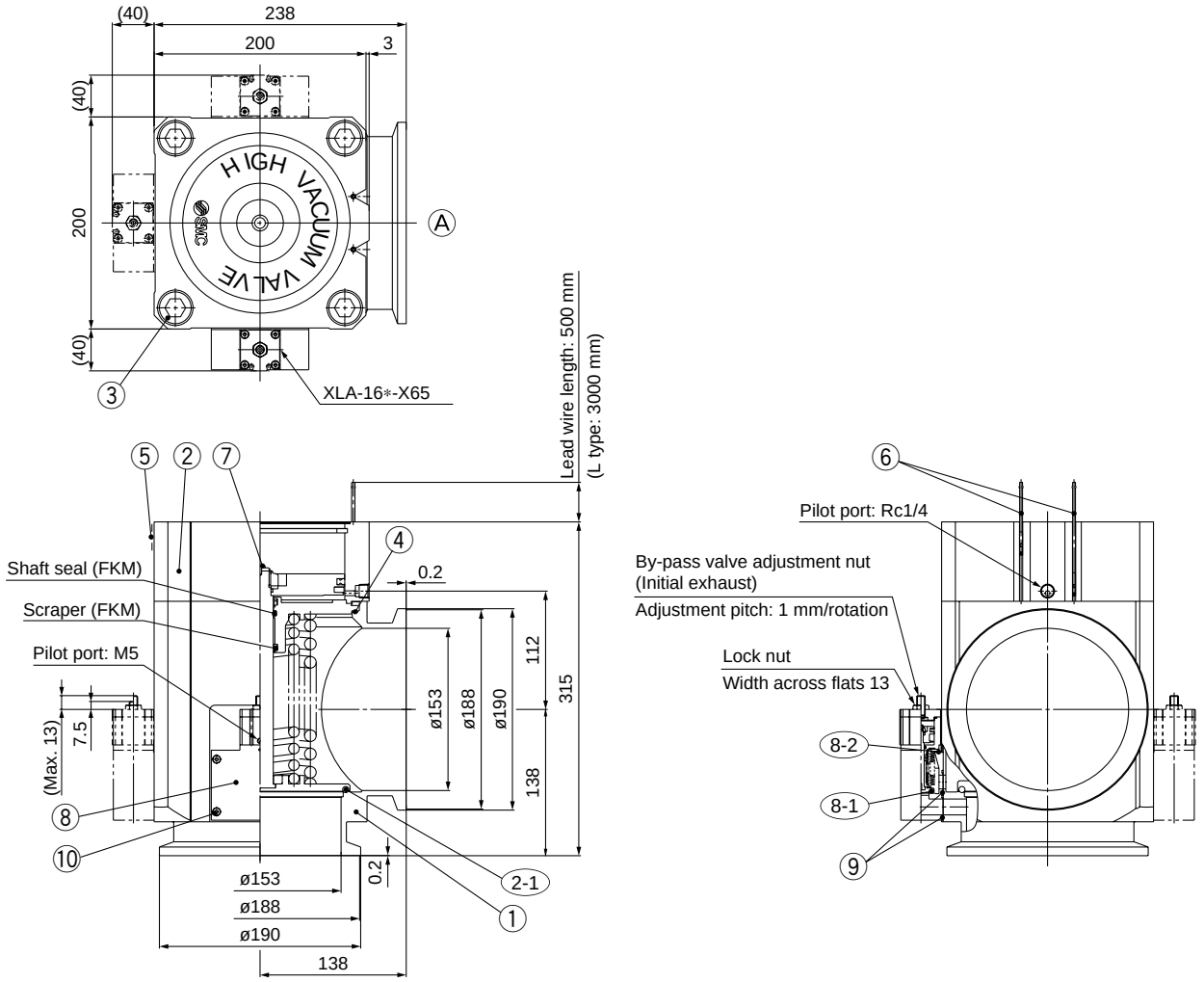
Valve type	Main valve: Normally closed	By-pass valve: Normally closed
Shaft seal type	O-ring seal	Bellows seal
Operating pressure range	Atmospheric pressure to 1×10^{-5} Pa	
Fluid	Inert gas under vacuum	
Operating temperature	5 to 60°C (Option: 5 to 150°C)	
Conductance	200 ℓ/s	Max. 25 ℓ/s (Calculated value)
Operating pressure	0.4 to 0.7 MPa	
Flange	KF80	

Series XLF
Made to Order 3

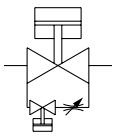
Made to Order

Please contact SMC for detailed dimensions, specifications, and lead times.

With By-pass Valve (Flange size: 160)



Symbol



O-ring Part No.

Seal material symbol	Internal seal (2-1)	External seal (4)
Nil	B2401-G155V	AS568-167V
N1	B2401-G155-XN1	AS568-167-XN1
P1	B2401-G155-XP1	AS568-167-XP1
Q1	B2401-G155-XQ1	AS568-167-XQ1
R1	B2401-G155-XR1	AS568-167-XR1
R2	B2401-G155-XR2	AS568-167-XR2
R3	B2401-G155-XR3	AS568-167-XR3
S1	B2401-G155-XS1	AS568-167-XS1
T1	B2401-G155-XT1	AS568-167-XT1
U1	B2401-G155-XU1	AS568-167-XU1

Component Parts

No.	Description	Material	Remarks
1	**Body**	A6063-T6	Refer to part no.
2	**Bonnet assembly**		Refer to part no.
2-1	**O-ring**		Refer to part no.
3	**Hexagon socket head cap screw**	SUSXM7	M20, ℓ = 70
4	**O-ring**		Refer to part no.
5	**Computer name plate**		
6	**Auto switch**		Option
7	**Indicator**	A5056	Option
8	**By-pass valve**		Refer to part no.
8-1	**O-ring**		Refer to part no.
8-2	**O-ring**		Refer to part no.
9	**O-ring**		Refer to part no.
10	**Hexagon socket head cap screw**	SUSXM7	M4, ℓ = 40

O-ring Part No.

Seal material symbol	Internal seal (8-1)	External seal (8-2)	External seal (9)
Nil	B2401-V15V	AS568-025V	AS568-017V
N1	B2401-V15-XN1	AS568-025-XN1	AS568-017-XN1
P1	B2401-V15-XP1	AS568-025-XP1	AS568-017-XP1
Q1	B2401-V15-XQ1	AS568-025-XQ1	AS568-017-XQ1
R1	B2401-V15-XR1	AS568-025-XR1	AS568-017-XR1
R2	B2401-V15-XR2	AS568-025-XR2	AS568-017-XR2
R3	B2401-V15-XR3	AS568-025-XR3	AS568-017-XR3
S1	B2401-V15-XS1	AS568-025-XS1	AS568-017-XS1
T1	B2401-V15-XT1	AS568-025-XT1	AS568-017-XT1
U1	B2401-V15-XU1	AS568-025-XU1	AS568-017-XU1

Note) A coating of vacuum grease (fluorinated grease: Y-VAC2) is applied to the shaft seal, scraper and O-ring (9).

How to Order Valve

XLFR−160 □ □ − M9N A − 1K − X □ □

Main valve: Indicator/ Pilot port direction

Symbol	Indicator	Pilot port direction
Nil	Without indicator	Flange side
A	With indicator	Flange side
F		Left flange surface
G		Rear flange surface
J		Right flange surface
K	Without indicator	Left flange surface
L		Rear flange surface
M		Right flange surface

∗ Flange: Ⓐ

Temperature specifications

Symbol	Temperature
Nil	5 to 60°C
H0	5 to 150°C

Switch quantity/Mounting position

Symbol	Qty	Mounting position
Nil	Without auto switch	—
A	2 pcs.	Valve open/closed
B	1 pc.	Valve open
C	1 pc.	Valve closed

Seal material

Symbol	Seal material	Compound No.
Nil	FKM	1349-80
N1	EPDM	2101-80
P1	Barrel Perfluoro®	70W
Q1	Kalrez®	4079
R1	Chemraz®	SS592
R2		SS630
R3		SSE38
S1	VMQ	1232-70
T1	FKM FOR PLASMA	3310-75
U1	ULTIC ARMOR®	UA4640

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Kalrez® is a registered trademark of DuPont Performance Elastomers.
Chemraz® is a registered trademark of Greene, Tweed & Co.
ULTIC ARMOR® is a registered trademark of Nippon Valqua Industries, Ltd.

Auto switch type

Symbol	Auto switch model	Switch type
Nil	—	Without auto switch (without built-in magnet)
M9N(L)	D-M9N(L)	Solid state switch
M9P(L)	D-M9P(L)	
M9B(L)	D-M9B(L)	
A90(L)	D-A90(L)	Reed switch
A93(L)	D-A93(L)	
M9//	Without auto switch (with built-in magnet)	

Note 1) L type: Lead wire length 3000 mm
Note 2) Types with auto switches are not available in case of high temperature types.

By-pass valve mounting position/Pilot port direction

Symbol	Mounting position	Symbol	Pilot port direction
1	Left flange surface	**Nil**	Flange side
		K	Left flange surface
		L	Rear flange surface
2	Right flange surface	**Nil**	Flange side
		L	Rear flange surface
		M	Right flange surface
3	Rear flange surface	**K**	Left flange surface
		L	Rear flange surface
		M	Right flange surface

∗ Flange: Ⓐ

Seal material changed part

Symbol	Changed part	Leakage (Pa·m³/s or less) Note)	
		Internal	External
Nil	None	1.3×10^{-9} (FKM)	1.3×10^{-9} (FKM)
A	②-1 ⑧-1 ④ ⑧-2 ⑨	1.3×10^{-7}	1.3×10^{-7}
B	②-1 ⑧-1	1.3×10^{-7}	1.3×10^{-9} (FKM)
C	④ ⑧-2 ⑨	1.3×10^{-9} (FKM)	1.3×10^{-7}

Note) Values at normal temperature, excluding gas permeation.

Maintenance Parts

① Body Part No.

XLAR160−1S− 1

By-pass valve mounting position

Symbol	Mounting position
1	Left flange surface
2	Right flange surface
3	Rear flange surface

⑧ By-pass Valve Part No.

XLA−16 □ □ − □ □ − X65

Pilot port direction

Symbol	Pilot port direction
Nil	Rear (as seen from body connection point)
K	Left (as seen from body connection point)
M	Right (as seen from body connection point)

Seal material changed part

Symbol	Changed part
Nil	None
A	⑧-1 ⑧-2
B	⑧-1
C	⑧-2

Temperature specifications

Symbol	Temperature
Nil	5 to 60°C
H0	5 to 150°C

Seal material: Same as the seal materials of How to Order Valve.

② Bonnet Assembly Part No.

XLF160A-30-1 − M9NA-XN1

Bonnet assembly

Temperature	Indicator	Part no.
5 to 60°C	Without indicator	XLF160-30-1
	With indiator	XLF160A-30-1
5 to 150°C	Without indicator	XLF160-30-1H
	With indiator	XLF160A-30-1H

Same as How to Order.

Specifications

Valve type	Main valve: Normally closed	By-pass valve: Normally closed
Shaft seal type	O-ring seal	Bellows seal
Operating pressure range	Atmospheric pressure to 1×10^{-5} Pa	
Fluid	Inert gas under vacuum	
Operating temperature	5 to 60°C (Option: 5 to 150°C)	
Conductance	800 ℓ/s	Max. 31.5 ℓ/s (Calculated value)
Operating pressure	0.4 to 0.7 MPa	
Flange	KF160	

Specifications

Valve type	Main valve: Normally closed	By-pass valve: Normally closed
Shaft seal type	O-ring seal	Bellows seal
Operating pressure range	Atmospheric pressure to 1×10^{-5} Pa	
Fluid	Inert gas under vacuum	
Operating temperature	5 to 60°C (Option: 5 to 150°C)	
Conductance	200 ℓ/s	Max. 25 ℓ/s (Calculated value)
Operating pressure	0.4 to 0.7 MPa	
Flange	KF80	

Aluminum
High Vacuum Angle Valve
Series XLG/XLGV
Double Acting/O-ring Seal

XLG

How to Order

XLG – 16 ① ② ③ ④ – M9N ⑤ A ⑥ – ⑦

① Flange size

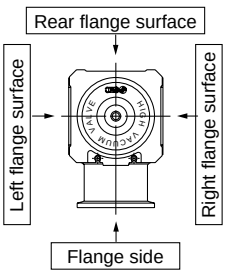
Size
16
25
40
50
63
80

② Flange type

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

③ Pilot port direction

Symbol	Pilot port direction
Nil	Flange side
K	Left flange surface
L	Rear flange surface
M	Right flange surface



④ Temperature specifications/Heater

Symbol		Temperature	Heater
Nil		5 to 60°C	—
High temperature type	**H0**	5 to 150°C	—
	H2		With 100°C heater
	H3		With 120°C heater

Note) Size 16 is not applicable for H2, H3, Size 25 not for H2.

⑤ Auto switch type

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

Auto switches are not applicable for high temperature specifications (Temperature specifications H0, H2, H3). Standard lead wire length is 0.5 m.
Add "L" to the end of the part number when 3 m is desired.
Example) -M9N<u>L</u>

⑥ Switch quantity/Mounting position

Symbol	Qty	Mounting position
Nil	Without auto switch	—
A	2 pcs.	Valve open/closed
B	1 pc.	Valve open
C	1 pc.	Valve closed

⑦ Body surface treatment/Seal material and its changed part

• Body surface treatment

Symbol	Surface treatment
Nil	External: Hard anodized Internal: Raw material
A	External: Hard anodized Internal: Oxalic acid anodized

• Seal material

Symbol	Seal material	Compound No.
Nil	FKM	1349-80*
N1	EPDM	2101-80*
P1	Barrel Perfluoro®	70W
Q1	Kalrez®	4079
R1	Chemraz®	SS592
R2		SS630
R3		SSE38
S1	VMQ	1232-70*
T1	FKM for Plasma	3310-75*
U1	ULTIC ARMOR®	UA4640

* Produced by Mitsubishi Cable Industries, Ltd.

• Seal material changed part and leakage

Symbol	Changed part Note 2)	Leakage (Pa·m³/s or less) Note 1)	
		Internal	External
Nil	None	1.3×10^{-10} (FKM)	1.3×10^{-10} (FKM)
A	②, ③	1.3×10^{-8}	1.3×10^{-8}
B	②	1.3×10^{-8}	1.3×10^{-10} (FKM)
C	③	1.3×10^{-10} (FKM)	1.3×10^{-8}

Note 1) Values at normal temperature, excluding gas permeation.
Note 2) Refer to parts number of "Construction" on page 21 for changed part. Number indicates parts number of "Construction" accordingly.

To order something other than "Nil" (standard), list the symbols starting with "X," followed by each symbol for "body surface treatment," "seal material" and then "changed part".

Example) XLG-16-M9NA-<u>X</u>AN1A

Air Operated/with Solenoid Valve

XLGV

How to Order

XLGV – 16 [ ] L – M9N A – 1 [ ] G [ ] – [ ]

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

• **Air operated/with solenoid valve**

① Flange size

Size
16
25
40
50
63
80

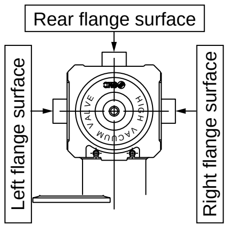
② Flange type

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

③ Solenoid valve direction

Symbol	Solenoid valve direction
K	Left flange surface
L	Rear flange surface
M	Right flange surface

∗ M type plug connector (AC power supply) not attached for M of sizes 16 and 25.



④ Auto switch type

Symbol	Auto switch model	Remarks
Nil	—	Without auto switch (without built-in magnet)
M9N(L)	D-M9N(L)	Solid state switch
M9P(L)	D-M9P(L)	
M9B(L)	D-M9B(L)	
A90(L)	D-A90(L)	Reed switch (Not applicable to flange size 16)
A93(L)	D-A93(L)	
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.
Example) -M9NL

⑤ Switch quantity/Mounting position

Symbol	Qty	Mounting position
Nil	Without auto switch	—
A	2 pcs.	Valve open/closed
B	1 pc.	Valve open
C	1 pc.	Valve closed

⑥ Rated voltage

1	100 VAC, 50/60 Hz
2	200 VAC, 50/60 Hz
3	110 VAC, 50/60 Hz
4	220 VAC, 50/60 Hz
5	24 VDC
6	12 VDC

⑦ Type of actuation

Nil	2 position single
W	2 position double

⑧ Electrical entry

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

⑨ 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)

∗ S type: Not available for AC.
∗ U type: DC only.

⑩ Body surface treatment/Seal material and its changed part

• Body surface treatment

Symbol	Surface treatment
Nil	External: Hard anodized Internal: Raw material
A	External: Hard anodized Internal: Oxalic acid anodized

• Seal material

Symbol	Seal material	Compound No.
Nil	FKM	1349-80*
N1	EPDM	2101-80*
P1	Barrel Perfluoro®	70W
Q1	Kalrez®	4079
R1	Chemraz®	SS592
R2		SS630
R3		SSE38
S1	VMQ	1232-70*
T1	FKM for Plasma	3310-75*
U1	ULTIC ARMOR®	UA4640

∗ Produced by Mitsubishi Cable Industries, Ltd.

• Seal material changed part and leakage

Symbol	Changed part Note 2)	Leakage (Pa·m³/s or less) Note 1)	
		Internal	External
Nil	None	1.3×10^{-10} (FKM)	1.3×10^{-10} (FKM)
A	②, ③	1.3×10^{-8}	1.3×10^{-8}
B	②	1.3×10^{-8}	1.3×10^{-10} (FKM)
C	③	1.3×10^{-10} (FKM)	1.3×10^{-8}

Note 1) Values at normal temperature, excluding gas permeation.
Note 2) Refer to parts number of “Construction” on page 21 for changed part. Number indicates parts number of “Construction” accordingly.

To order something other than “Nil” (standard), list the symbols starting with “X,” followed by each symbol for “body surface treatment,” “seal material” and then “changed part”.

Example) XLGV-16-M9NA-1G-XAN1A

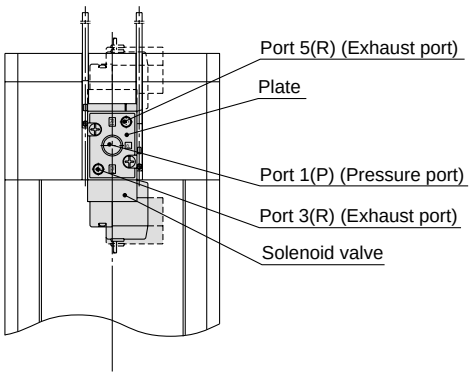
Note 1) Option specifications/Combinations
This model has auto switch and K(DN) flange options, but high temperature/heater options are not available.
Note 2) Solenoid valves
2 position single: XLGV-16, 25, 40: SYJ3190, XLGV-50, 63, 80: SYJ5190
2 position double: XLGV-16, 25, 40: SYJ3290, XLGV-50, 63, 80: SYJ5290
Example) SYJ3190-1GS, SYJ3290-1GS
For further details on solenoid valves, refer to the SMC solenoid valve catalog “SYJ3000/5000/7000” (ES11-84).

Specifications

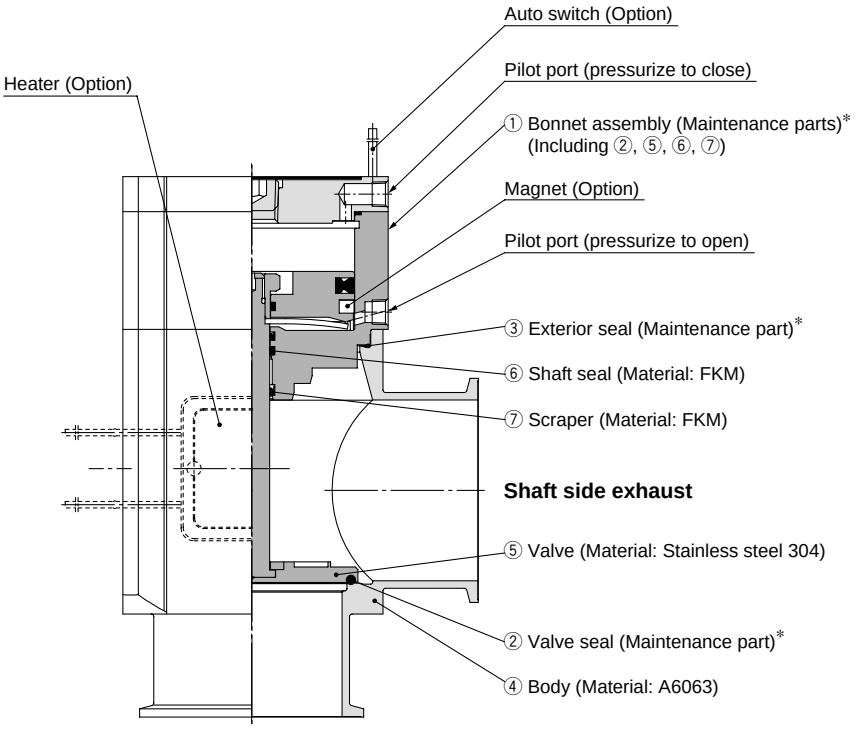
Model		XLG(V)-16	XLG(V)-25	XLG(V)-40	XLG(V)-50	XLG(V)-63	XLG(V)-80
Valve type		Double acting (Dual operation), Pressurize to open/close					
Fluid		Inert gas under vacuum					
Operating temperature (°C)	**XLG**	5 to 60 (High temperature type: 5 to 150)					
	XLGV	5 to 50					
Operating pressure (Pa)		Atmospheric pressure to 1 x 10^{-5}					
Conductance (ℓ/s) Note 1)		5	14	45	80	160	200
Leakage (Pa•m³/s)	**Internal**	In case of standard material FKM: 1.3 x 10^{-10} at normal temperature, excluding gas permeation					
	External	In case of standard material FKM: 1.3 x 10^{-10} at normal temperature, excluding gas permeation					
Flange type		KF (NW)				KF (NW), K (DN)	
Principal materials		Body: Aluminum alloy, Main part: Stainless steel, FKM (Standard seal material)					
Surface treatment		External: Hard anodized Internal: Raw material					
Pilot pressure (MPa)		0.3 to 0.6					
Pilot port size	**XLG**	M5		Rc1/8			
	XLGV	M5: Port 1(P), Port 3(R), Port 5(R)			Rc1/8: Port 1(P), M5: Port 3(R), Port 5(R)		
Weight (kg)	**XLG**	0.28	0.46	1.1	1.7	3.1	5.1
	XLGV	0.32	0.5	1.14	1.76	3.16	5.16

Note 1) Conductance is the value for an elbow with the same dimensions.
Note 2) For valve heater specifications, refer to "Common Option [1] Heater" on page 47.
Note 3) A coating of vacuum grease [Y-VAC2] is applied to the seal-material sliding portion of the vacuum part.

Construction/Operation



With solenoid valve



Valve side exhaust

∗ Refer to the back of page 9 for "Maintenance Parts".

<Working principle>

By applying pressure from the pilot port P-1, the piston-coupled valve overcomes the operating force by the pressure, and the valve opens. (Pilot port P-2 is open)
Alternatively, by applying pressure to pilot port P-2, the valve closes. (Pilot port P-1 is open)
In the case of the XLGV, port 1(P) is normally pressurized, and the valve opens when the solenoid valve is turned ON and closes when it is turned OFF. In the case of a double solenoid, the valve moves to the opposite side from that in which the solenoid valve is turned ON.

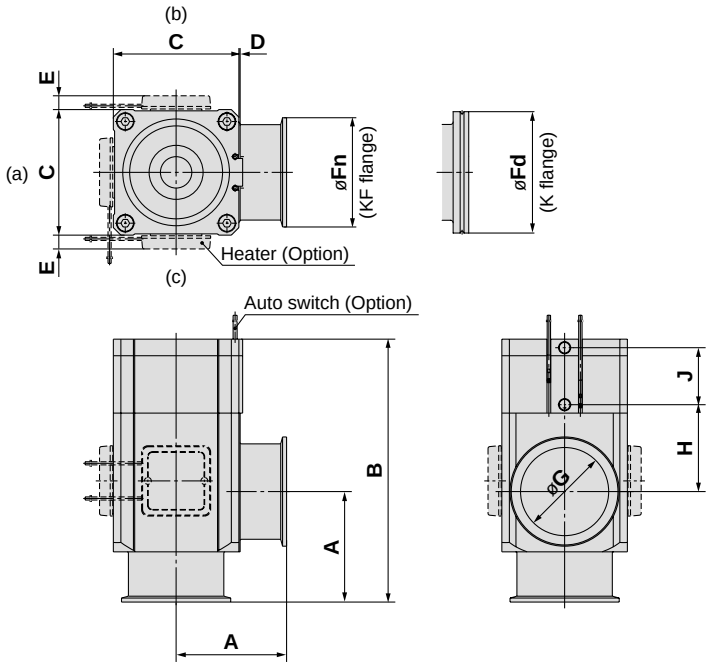
<Options>

Auto switch: The magnet activates the auto switch. 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 60°C).

Heater: Simple heating is performed using thermistors. The valve body can be heated to approximately 100 or 120°C, 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 is a heat resistant structure. This does not apply in cases where a solenoid valve is attached.

Dimensions

XLG/Air operated

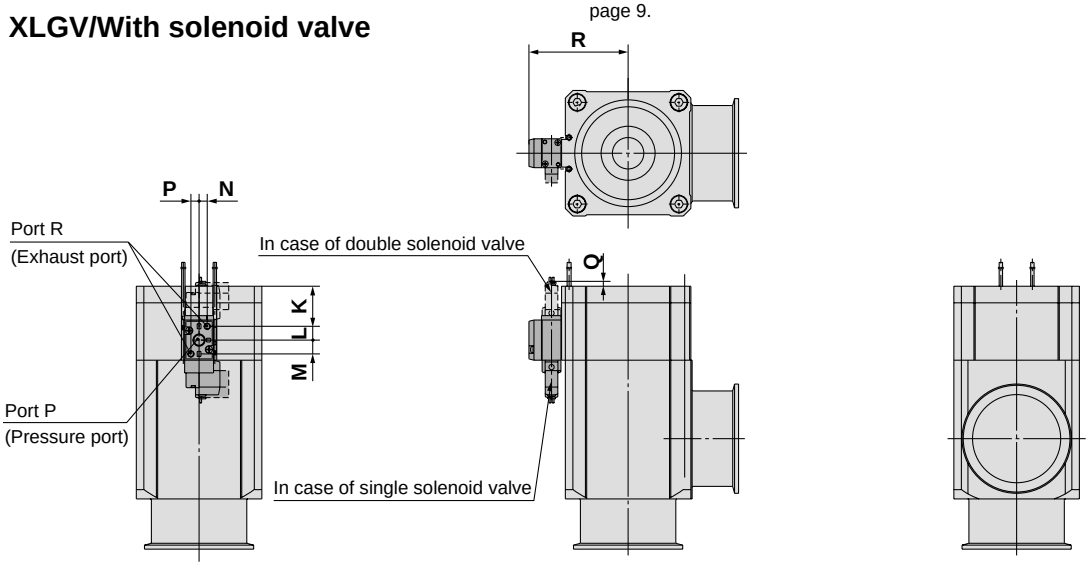


(mm)

Model	A	B	C	D	E Note 1)	Fn	Fd	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
XLG-50	70	183	79	2	11	75	—	52	68	38
XLG-63	88	209	100	3	11	87	95	70	69	45
XLG-80	90	250	117	3	11	114	110	83	96	56

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 the back of page 9.

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
XLGV-50	25	11	11	6.5	6.5	7.7	67.5
XLGV-63	32.3	11	11	6.5	6.5	0.3	79
XLGV-80	43.7	11	11	6.5	6.5	—	87.5

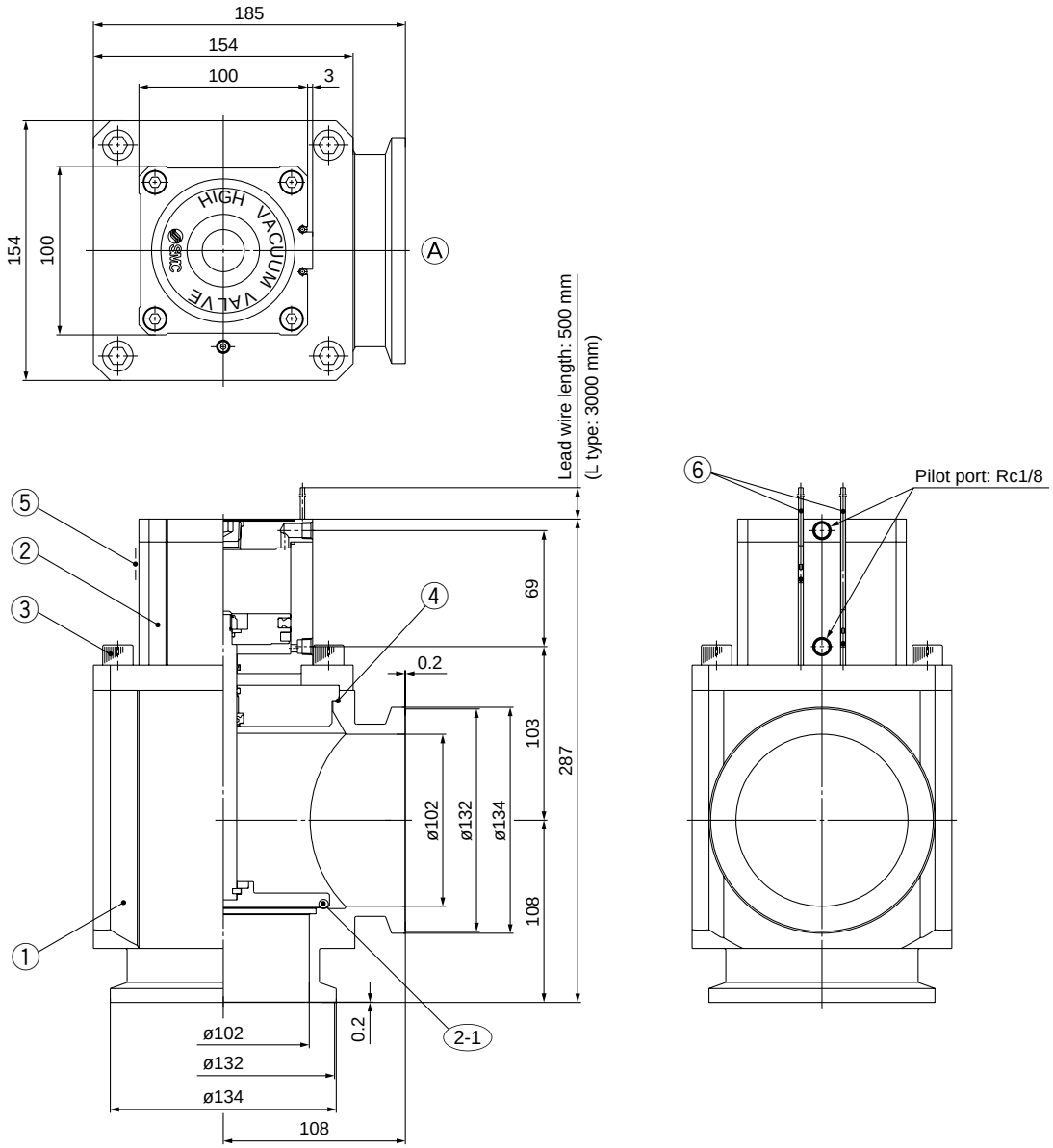
∗ Other dimensions are the same as the XLG.
Note) For further details on solenoid valves, refer to the SMC solenoid valve catalog “SYJ3000/5000/7000” (ES11-84).

Series XLG

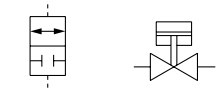
Made to Order 1

Please contact SMC for detailed dimensions, specifications, and lead times.

Flange size: 100



Symbol



JISB0125 JISZ8207

Component Parts

No.	Description	Material	Remarks
1	**Body**	A6063-T6	XLA100-1S-X898
2	**Bonnet assembly**		Refer to part no.
2-1	**O-ring**	FKM	AS568-349V
3	**Hexagon socket head cap screw**	SUSXM7	M12, ℓ = 30
4	**O-ring**	FKM	AS568-050V
5	**Computer name plate**		
6	**Auto switch**		Refer to part no.

How to Order Valve

XLG−100 □ □ − M9N A −X30

Pilot port direction

Symbol	Pilot port direction
Nil	Flange side
K	Left flange surface
L	Rear flange surface
M	Right flange surface

∗ Flange: Ⓐ

Temperature specifications

Symbol	Temperature
Nil	5 to 60°C
H0	5 to 150°C

Switch quantity/Mounting position

Symbol	Qty	Mounting position
Nil	Without auto switch	—
A	2 pcs.	Valve open/closed
B	1 pc.	Valve open
C	1 pc.	Valve closed

Auto switch type (Operating temperature 5 to 60°C)

Symbol	Auto switch model	Switch type
Nil	—	Without auto switch (without built-in magnet)
M9N(L)	D-M9N(L)	Solid state switch
M9P(L)	D-M9P(L)	
M9B(L)	D-M9B(L)	
A90(L)	D-A90(L)	Reed switch
A93(L)	D-A93(L)	
M9//	Without auto switch (with built-in magnet)	

Note) Types with auto switches are not available in case of high temperature types.
L type: Lead wire length 3000 mm

Maintenance Parts

② Bonnet Assembly Part No.

XLG100-30-1H − M9NA −X30

Bonnet assembly

Temperature	Part no.
5 to 60°C	XLG100-30-1
5 to 150°C	XLG100-30-1H

Same as How to Order.

Specifications

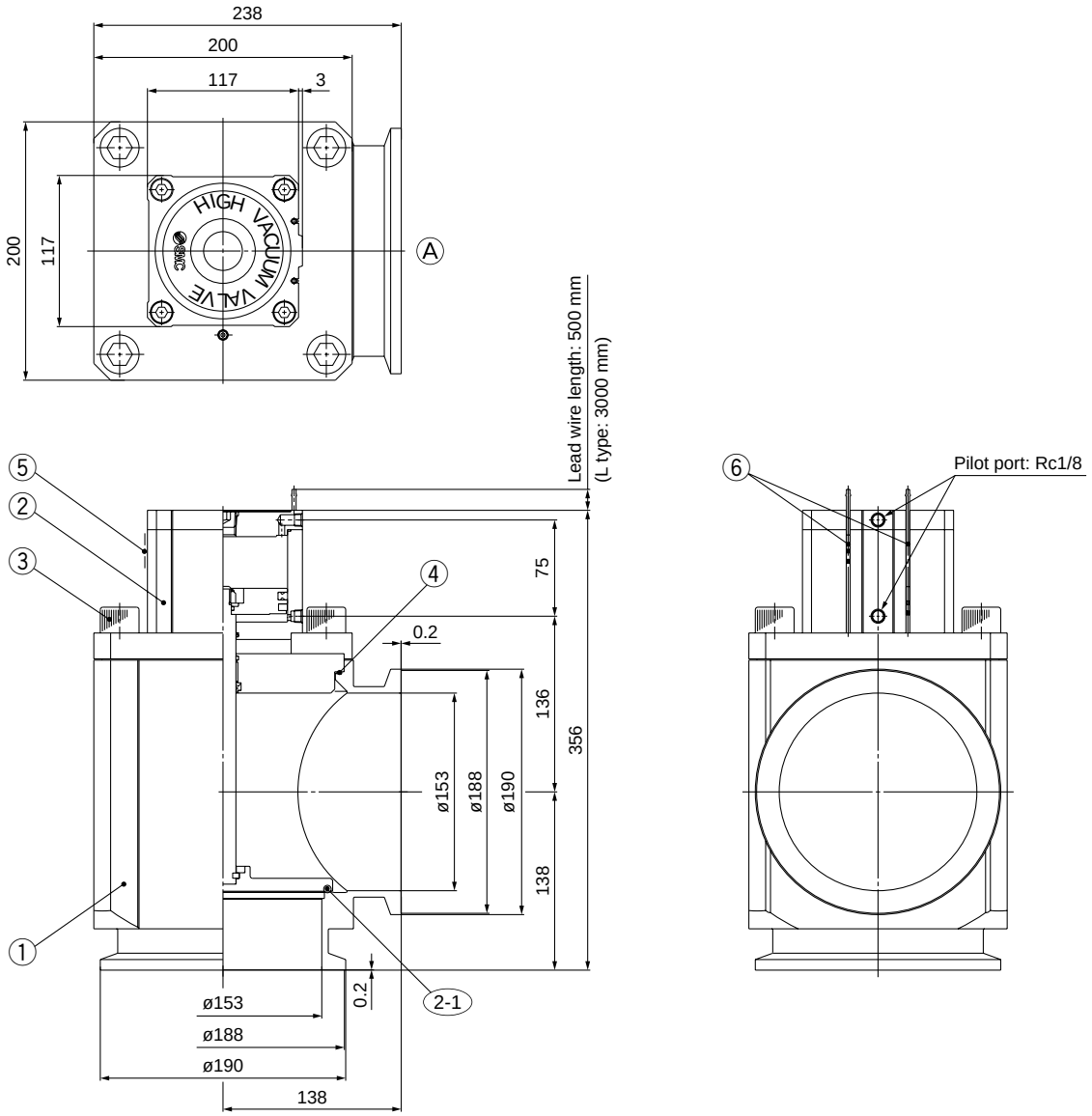
Valve type	Double acting
Shaft seal type	O-ring seal
Operating pressure range	Atmospheric pressure to 1 x 10^{-5} Pa
Fluid	Inert gas under vacuum
Internal leakage	1.3 x 10^{-9} Pa·m^3/s or less∗
External leakage	1.3 x 10^{-9} Pa·m^3/s or less∗
Operating temperature	5 to 60°C (Option: 5 to 150°C)
Conductance	300 ℓ/s
Operating pressure	0.4 to 0.6 MPa
Flange	KF100

∗ Values at normal temperature, excluding gas permeation.

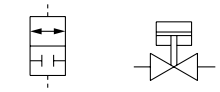
Series XLG
Made to Order 2

Please contact SMC for detailed dimensions, specifications, and lead times.

Flange size: 160



Symbol



JISB0125 JISZ8207

Component Parts

No.	Description	Material	Remarks
1	**Body**	A6063-T6	XLA160-1S
2	**Bonnet assembly**		Refer to part no.
2-1	**O-ring**	FKM	B2401-G155V
3	**Hexagon socket head cap screw**	SUSXM7	M20, ℓ = 40
4	**O-ring**	FKM	AS568-167V
5	**Computer name plate**		
6	**Auto switch**		Refer to part no.

How to Order Valve

XLG−160 □ □ − M9N A −X30

Pilot port direction

Symbol	Pilot port direction
Nil	Flange side
K	Left flange surface
L	Rear flange surface
M	Right flange surface

∗ Flange: Ⓐ

Temperature specifications

Symbol	Temperature
Nil	5 to 60°C
H0	5 to 150°C

Switch quantity/Mounting position

Symbol	Qty	Mounting position
Nil	Without auto switch	—
A	2 pcs.	Valve open/closed
B	1 pc.	Valve open
C	1 pc.	Valve closed

Auto switch type (Operating temperature 5 to 60°C)

Symbol	Auto switch model	Switch type
Nil	—	Without auto switch (without built-in magnet)
M9N(L)	D-M9N(L)	Solid state switch
M9P(L)	D-M9P(L)	
M9B(L)	D-M9B(L)	
A90(L)	D-A90(L)	Reed switch
A93(L)	D-A93(L)	
M9//	Without auto switch (with built-in magnet)	

Note) Types with auto switches are not available in case of high temperature types.
L type: Lead wire length 3000 mm

Maintenance Parts

② Bonnet Assembly Part No.

XLG160-30-1H − M9NA −X30

Bonnet assembly

Temperature	Part no.
5 to 60°C	XLG160-30-1
5 to 150°C	XLG160-30-1H

Same as How to Order.

Specifications

Valve type	Double acting
Shaft seal type	O-ring seal
Operating pressure range	Atmospheric pressure to 1 x 10^{-5} Pa
Fluid	Inert gas under vacuum
Internal leakage	1.3 x 10^{-9} Pa·m^3/s or less∗
External leakage	1.3 x 10^{-9} Pa·m^3/s or less∗
Operating temperature	5 to 60°C (Option: 5 to 150°C)
Conductance	800 ℓ/s
Operating pressure	0.4 to 0.6 MPa
Flange	KF160

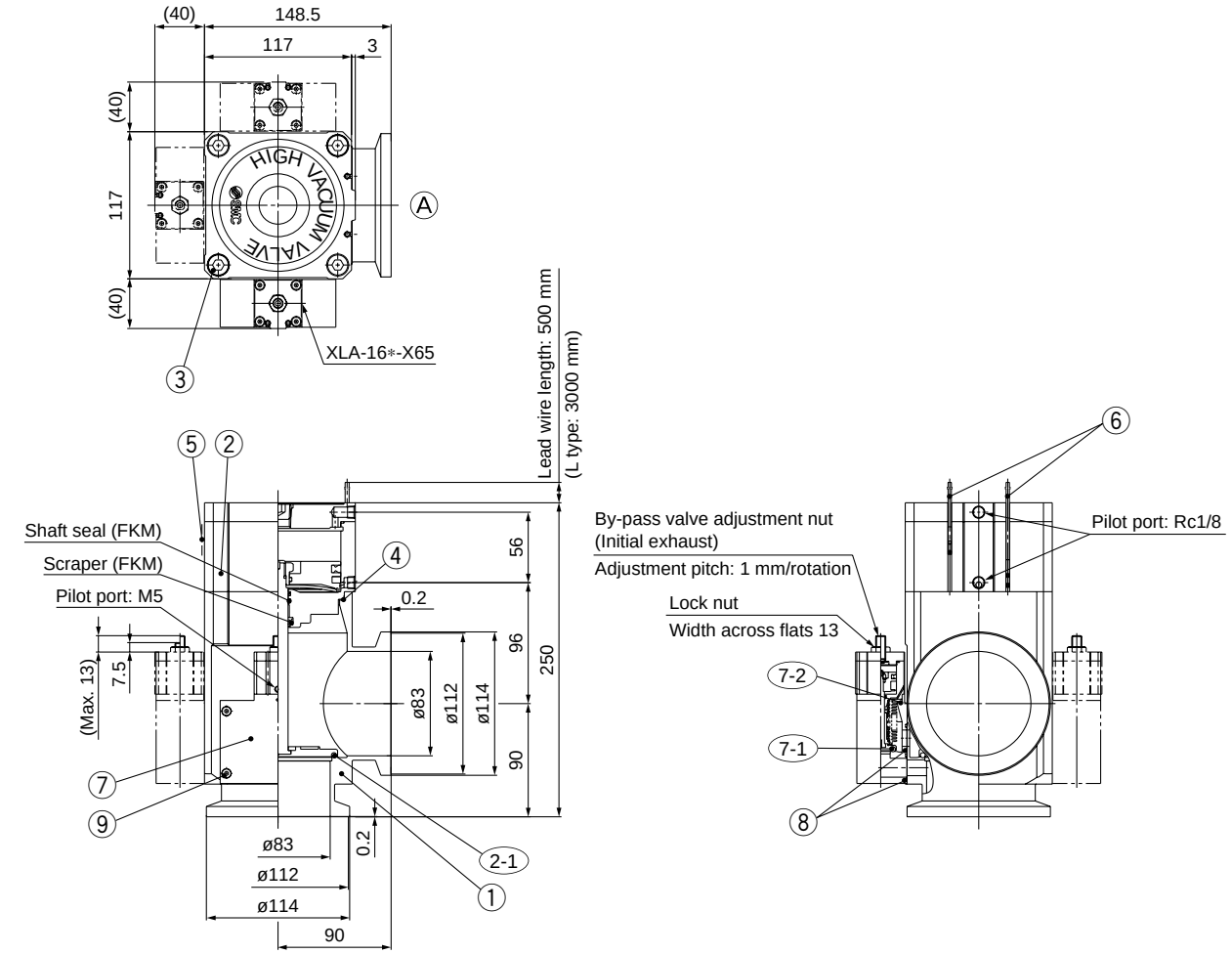
Note) Values at normal temperature, excluding gas permeation.

Series XLG
Made to Order 3

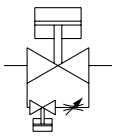
Made to Order

Please contact SMC for detailed dimensions, specifications, and lead times.

With By-pass Valve (Flange size: 80)



Symbol



O-ring Part No.

Seal material symbol	Internal seal (2-1)	External seal (4)
Nil	B2401-V85V	AS568-045V
N1	B2401-V85-XN1	AS568-045-XN1
P1	B2401-V85-XP1	AS568-045-XP1
Q1	B2401-V85-XQ1	AS568-045-XQ1
R1	B2401-V85-XR1	AS568-045-XR1
R2	B2401-V85-XR2	AS568-045-XR2
R3	B2401-V85-XR3	AS568-045-XR3
S1	B2401-V85-XS1	AS568-045-XS1
T1	B2401-V85-XT1	AS568-045-XT1
U1	B2401-V85-XU1	AS568-045-XU1

Component Parts

No.	Description	Material	Remarks
1	**Body**	A6063-T6	Refer to part no.
2	**Bonnet assembly**		Refer to part no.
2-1	**O-ring**		Refer to part no.
3	**Hexagon socket head cap screw**	SUSXM7	M10, ℓ = 75
4	**O-ring**		Refer to part no.
5	**Computer name plate**		
6	**Auto switch**		Option
7	**High vacuum angle valve (By-pass valve)**		Refer to part no.
7-1	**O-ring**		Refer to part no.
7-2	**O-ring**		Refer to part no.
8	**O-ring**		Refer to part no.
9	**Hexagon socket head cap screw**	SUSXM7	M4, ℓ = 40

O-ring Part No.

Seal material symbol	Internal seal (7-1)	External seal (7-2)	External seal (8)
Nil	B2401-V15V	AS568-025V	AS568-017V
N1	B2401-V15-XN1	AS568-025-XN1	AS568-017-XN1
P1	B2401-V15-XP1	AS568-025-XP1	AS568-017-XP1
Q1	B2401-V15-XQ1	AS568-025-XQ1	AS568-017-XQ1
R1	B2401-V15-XR1	AS568-025-XR1	AS568-017-XR1
R2	B2401-V15-XR2	AS568-025-XR2	AS568-017-XR2
R3	B2401-V15-XR3	AS568-025-XR3	AS568-017-XR3
S1	B2401-V15-XS1	AS568-025-XS1	AS568-017-XS1
T1	B2401-V15-XT1	AS568-025-XT1	AS568-017-XT1
U1	B2401-V15-XU1	AS568-025-XU1	AS568-017-XU1

Note) A coating of vacuum grease (fluorinated grease: Y-VAC2) is applied to the shaft seal, scraper and O-ring (8).

How to Order Valve

XLGR−80□□−□□−1K−X□□

Main valve: Pilot port direction

Symbol	Pilot port direction
Nil	Flange side
K	Left flange surface
L	Rear flange surface
M	Right flange surface

∗ Flange: Ⓐ

Temperature specifications

Symbol	Temperature	Heater
Nil	5 to 60°C	—
H0	5 to 150°C	—

Auto switch type (Operating temperature 5 to 60°C)

Symbol	Auto switch model	Switch type
Nil	—	Without auto switch (without built-in magnet)
M9N(L)	D-M9N(L)	Solid state switch
M9P(L)	D-M9P(L)	
M9B(L)	D-M9B(L)	
A90(L)	D-A90(L)	Reed switch
A93(L)	D-A93(L)	
M9//	Without auto switch (with built-in magnet)	

Note) Types with auto switches are not available in case of high temperature types.
L type: Lead wire length 3000 mm

Switch quantity/Mounting position

Symbol	Qty	Mounting position
Nil	—	Without auto switch
A	2 pcs.	Valve open/closed
B	1 pc.	Valve open
C	1 pc.	Valve closed

By-pass valve mounting position/ Pilot port direction

Symbol	Mounting position	Symbol	Pilot port direction
1	Left flange surface	**Nil**	Flange side
		K	Left flange surface
		L	Rear flange surface
2	Right flange surface	**Nil**	Flange side
		L	Rear flange surface
		M	Right flange surface
3	Rear flange surface	**K**	Left flange surface
		L	Rear flange surface
		M	Right flange surface

∗ Flange: Ⓐ

Seal material

Symbol	Seal material	Compound No.
Nil	FKM	1349-80
N1	EPDM	2101-80
P1	Barrel Perfluoro®	70W
Q1	Kalrez®	4079
R1	Chemraz®	SS592
R2		SS630
R3		SSE38
S1	VMQ	1232-70
T1	FKM FOR PLASMA	3310-75
U1	ULTIC ARMOR®	UA4640

Barrel Perfluoro® is a registered trademark of Matsumura Oil Co., Ltd.
Kalrez® is a registered trademark of DuPont Performance Elastomers.
Chemraz® is a registered trademark of Greene, Tweed & Co.
ULTIC ARMOR® is a registered trademark of Nippon Valqua Industries, Ltd.

Seal material changed part

Symbol	Changed part	Leakage ($Pa \cdot m^3/s$ or less) Note)	
		Internal	External
Nil	None	1.3×10^{-9} (FKM)	1.3×10^{-9} (FKM)
A	②-1 ⑦-1 ④ ⑦-2 ⑧	1.3×10^{-7}	1.3×10^{-7}
B	②-1 ⑦-1	1.3×10^{-7}	1.3×10^{-9} (FKM)
C	④ ⑦-2 ⑧	1.3×10^{-9} (FKM)	1.3×10^{-7}

Note) Values at normal temperature, excluding gas permeation.

Maintenance Parts

① Body Part No.

XLAR80−1S−1

By-pass valve mounting position

Symbol	Mounting position
1	Left flange surface
2	Right flange surface
3	Rear flange surface

∗ Flange: Ⓐ

② Bonnet Assembly Part No.

XLG80-30-1H − M9NA-XN1

Bonnet assembly

Temperature	Part no.
5 to 60°C	XLG80-30-1
5 to 150°C	XLG80-30-1H

Same as How to Order.

⑧ By-pass Valve Part No.

XLA−16□□−□□−X65

Pilot port direction

Symbol	Pilot port direction
Nil	Rear (as seen from body connection point)
K	Left (as seen from body connection point)
M	Right (as seen from body connection point)

Temperature specifications

Symbol	Temperature
Nil	5 to 60°C
H0	5 to 150°C

Seal material changed part

Symbol	Changed part
Nil	None
A	⑦-1 ⑦-2
B	⑦-1
C	⑦-2

Seal material: Same as the seal materials of How to Order Valve.

Specifications

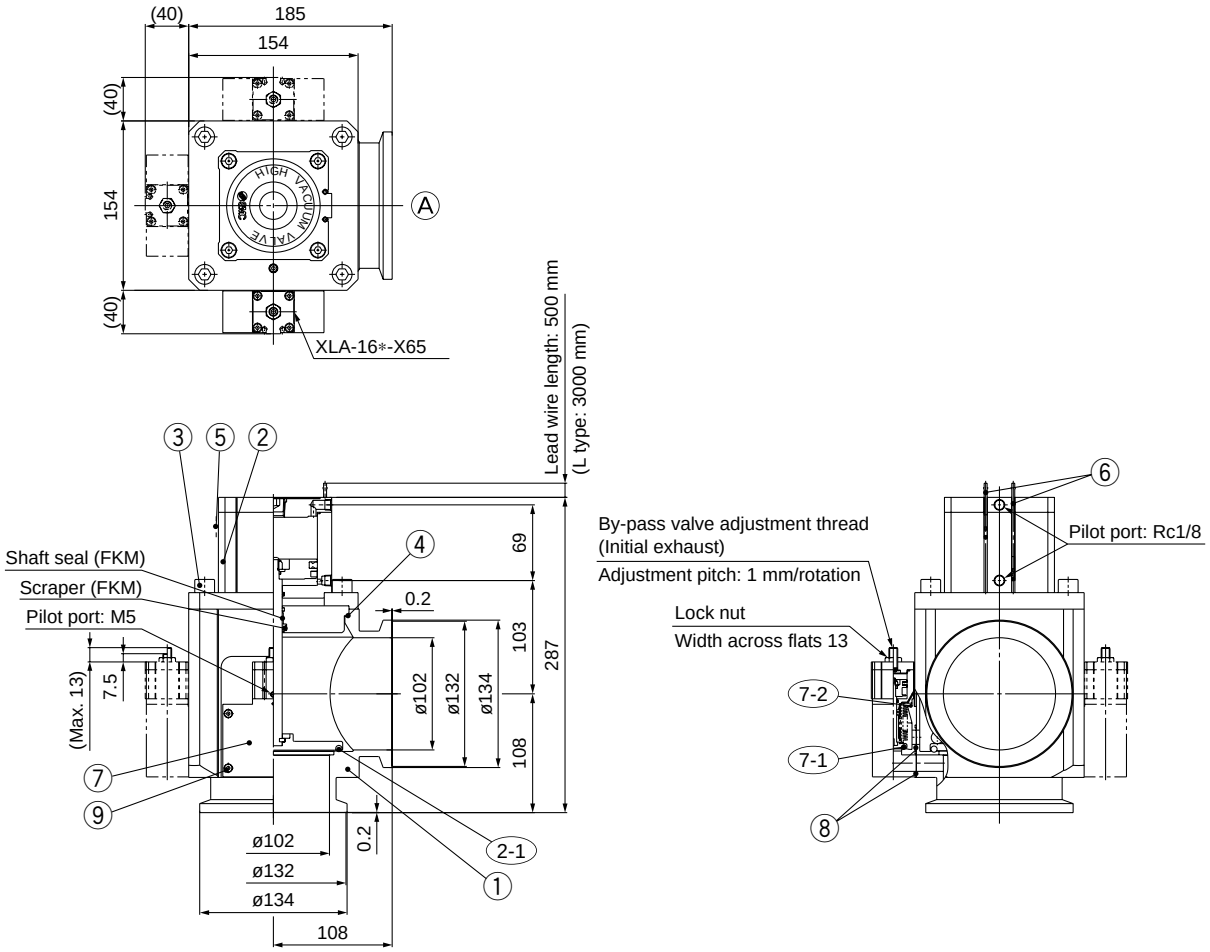
Valve type	Main valve: Double acting	By-pass valve: Normally closed
Shaft seal type	O-ring seal	Bellows seal
Operating pressure range	Atmospheric pressure to 1×10^{-5} Pa	
Fluid	Inert gas under vacuum	
Operating temperature	5 to 60°C (Option: 5 to 150°C)	
Conductance	200 ℓ/s	Max. 25 ℓ/s (Calculated value)
Operating pressure	0.3 to 0.6 MPa	
Flange	KF80	

Series XLG
Made to Order 4

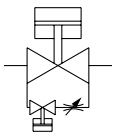
Made to Order

Please contact SMC for detailed dimensions, specifications, and lead times.

With By-pass Valve (Flange size: 100)



Symbol



O-ring Part No.

Seal material symbol	Internal seal (2-1)	External seal (4)
Nil	AS568-349V	AS568-050V
N1	AS568-349-XN1	AS568-050-XN1
P1	AS568-349-XP1	AS568-050-XP1
Q1	AS568-349-XQ1	AS568-050-XQ1
R1	AS568-349-XR1	AS568-050-XR1
R2	AS568-349-XR2	AS568-050-XR2
R3	AS568-349-XR3	AS568-050-XR3
S1	AS568-349-XS1	AS568-050-XS1
T1	AS568-349-XT1	AS568-050-XT1
U1	AS568-349-XU1	AS568-050-XU1

Component Parts

No.	Description	Material	Remarks
1	**Body**	A6063-T6	Refer to part no.
2	**Bonnet assembly**		Refer to part no.
2-1	**O-ring**		Refer to part no.
3	**Hexagon socket head cap screw**	SUSXM7	M12, ℓ = 30
4	**O-ring**		Refer to part no.
5	**Computer name plate**		
6	**Auto switch**		Option
7	**High vacuum angle valve (By-pass valve)**		Refer to part no.
7-1	**O-ring**		Refer to part no.
7-2	**O-ring**		Refer to part no.
8	**O-ring**		Refer to part no.
9	**Hexagon socket head cap screw**	SUSXM7	M4, ℓ = 40

O-ring Part No.

Seal material symbol	Internal seal (7-1)	External seal (7-2)	External seal (8)
Nil	B2401-V15V	AS568-025V	AS568-017V
N1	B2401-V15-XN1	AS568-025-XN1	AS568-017-XN1
P1	B2401-V15-XP1	AS568-025-XP1	AS568-017-XP1
Q1	B2401-V15-XQ1	AS568-025-XQ1	AS568-017-XQ1
R1	B2401-V15-XR1	AS568-025-XR1	AS568-017-XR1
R2	B2401-V15-XR2	AS568-025-XR2	AS568-017-XR2
R3	B2401-V15-XR3	AS568-025-XR3	AS568-017-XR3
S1	B2401-V15-XS1	AS568-025-XS1	AS568-017-XS1
T1	B2401-V15-XT1	AS568-025-XT1	AS568-017-XT1
U1	B2401-V15-XU1	AS568-025-XU1	AS568-017-XU1

Note) A coating of vacuum grease (fluorinated grease: Y-VAC2) is applied to the shaft seal, scraper and O-ring (8).

How to Order Valve

XLGR−100□□−□□−1K−X□□

Main valve: Pilot port direction

Symbol	Pilot port direction
Nil	Flange side
K	Left flange surface
L	Rear flange surface
M	Right flange surface

∗ Flange: Ⓐ

Temperature specifications

Symbol	Temperature	Heater
Nil	5 to 60°C	—
H0	5 to 150°C	—

Auto switch type
(Operating temperature 5 to 60°C)

Symbol	Auto switch model	Switch type
Nil	—	Without auto switch (without built-in magnet)
M9N(L)	D-M9N(L)	Solid state switch
M9P(L)	D-M9P(L)	
M9B(L)	D-M9B(L)	
A90(L)	D-A90(L)	Reed switch
A93(L)	D-A93(L)	
M9//	Without auto switch (with built-in magnet)	

Note) Types with auto switches are not available in case of high temperature types.
L type: Lead wire length 3000 mm

Switch quantity/Mounting position

Symbol	Qty	Mounting position
Nil	—	Without auto switch
A	2 pcs.	Valve open/closed
B	1 pc.	Valve open
C	1 pc.	Valve closed

By-pass valve mounting position/ Pilot port direction

Symbol	Mounting position	Symbol	Pilot port direction
1	Left flange surface	**Nil**	Flange side
		K	Left flange surface
		L	Rear flange surface
2	Right flange surface	**Nil**	Flange side
		L	Rear flange surface
		M	Right flange surface
3	Rear flange surface	**K**	Left flange surface
		L	Rear flange surface
		M	Right flange surface

∗ Flange: Ⓐ

Seal material

Symbol	Seal material	Compound No.
Nil	FKM	1349-80
N1	EPDM	2101-80
P1	Barrel Perfluoro®	70W
Q1	Kalrez®	4079
R1	Chemraz®	SS592
R2		SS630
R3		SSE38
S1	VMQ	1232-70
T1	FKM FOR PLASMA	3310-75
U1	ULTIC ARMOR®	UA4640

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Kalrez® is a registered trademark of DuPont Performance Elastomers.
Chemraz® is a registered trademark of Greene, Tweed & Co.
ULTIC ARMOR® is a registered trademark of Nippon Valqua Industries, Ltd.

Seal material changed part

Symbol	Changed part	Leakage (Pa·m³/s or less) Note)	
		Internal	External
Nil	None	1.3 x 10^{-9} (FKM)	1.3 x 10^{-9} (FKM)
A	2-1 7-1 4 7-2 8	1.3 x 10^{-7}	1.3 x 10^{-7}
B	2-1 7-1	1.3 x 10^{-7}	1.3 x 10^{-9} (FKM)
C	4 7-2 8	1.3 x 10^{-9} (FKM)	1.3 x 10^{-7}

Note) Values at normal temperature, excluding gas permeation.

Maintenance Parts

① Body Part No.

XLGR100−1S−1

By-pass valve mounting position

Symbol	Mounting position
1	Left flange surface
2	Right flange surface
3	Rear flange surface

∗ Flange: Ⓐ

② Bonnet Assembly Part No.

XLGR100-30-1H − M9NA-XN1

Bonnet assembly

Temperature	Part no.
5 to 60°C	XLGR100-30-1
5 to 150°C	XLGR100-30-1H

Same as How to Order.

⑧ By-pass Valve Part No.

XLA−16□□−□□−X65

Pilot port direction

Symbol	Pilot port direction
Nil	Rear (as seen from body connection point)
K	Left (as seen from body connection point)
M	Right (as seen from body connection point)

Temperature specifications

Symbol	Temperature
Nil	5 to 60°C
H0	5 to 150°C

Seal material changed part

Symbol	Changed part
Nil	None
A	7-1 7-2
B	7-1
C	7-2

Seal material: Same as the seal materials of How to Order Valve.

Specifications

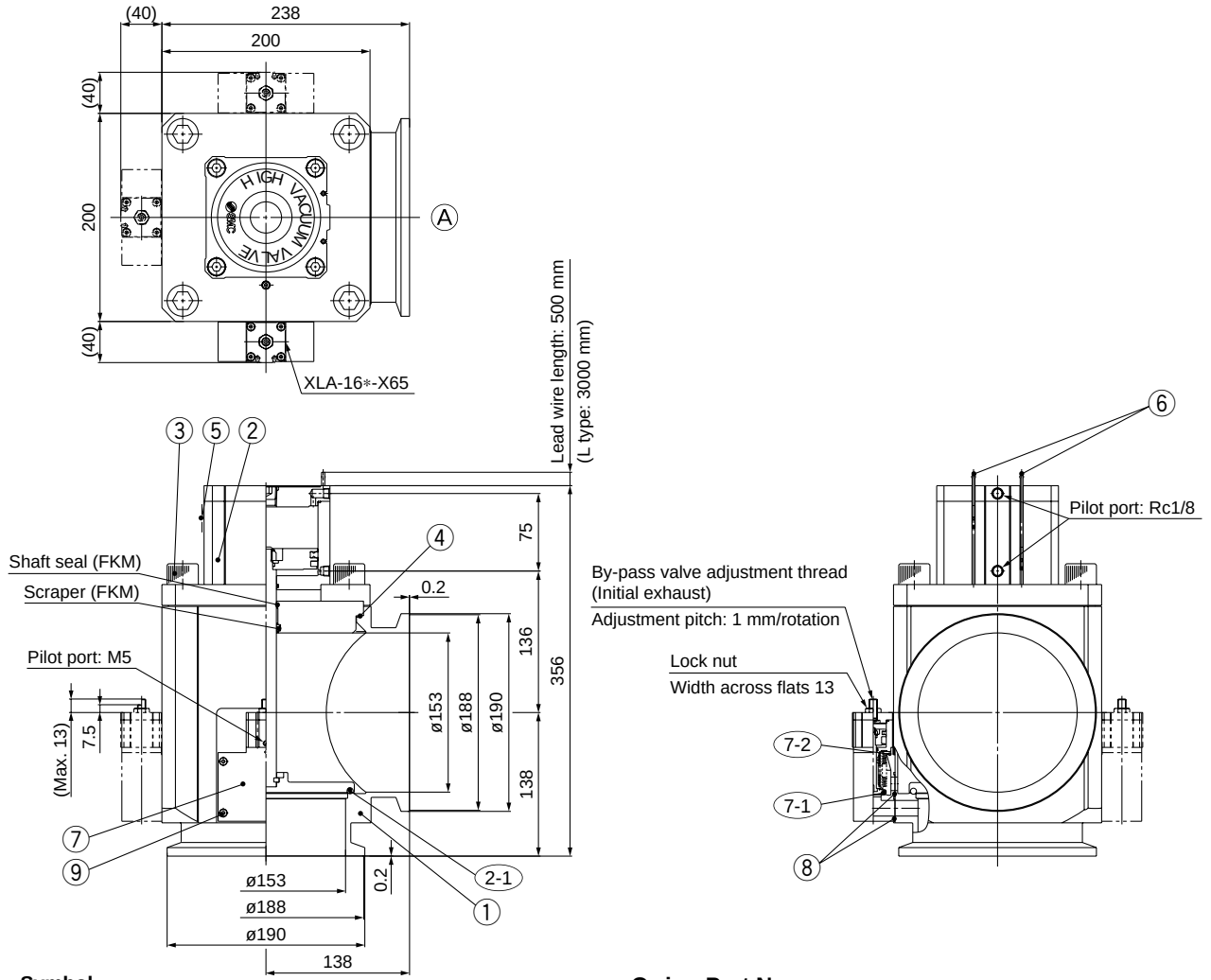
Valve type	Main valve: Double acting	By-pass valve: Normally closed
Shaft seal type	O-ring seal	Bellows seal
Operating pressure range	Atmospheric pressure to 1 x 10^{-5} Pa	
Fluid	Inert gas under vacuum	
Operating temperature	5 to 60°C (Option: 5 to 150°C)	
Conductance	300 ℓ/s	Max. 31.5 ℓ/s (Calculated value)
Operating pressure	0.3 to 0.6 MPa	
Flange	KF100	

Series XLG
Made to Order 5

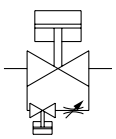
Made to Order

Please contact SMC for detailed dimensions, specifications, and lead times.

With By-pass Valve (Flange size: 160)



Symbol



Component Parts

No.	Description	Material	Remarks
1	**Body**	A6063-T6	Refer to part no.
2	**Bonnet assembly**		Refer to part no.
2-1	**O-ring**		Refer to part no.
3	**Hexagon socket head cap screw**	SUSXM7	M20, ℓ = 40
4	**O-ring**		Refer to part no.
5	**Computer name plate**		
6	**Auto switch**		Option
7	**High vacuum angle valve (By-pass valve)**		Refer to part no.
7-1	**O-ring**		Refer to part no.
7-2	**O-ring**		Refer to part no.
8	**O-ring**		Refer to part no.
9	**Hexagon socket head cap screw**	SUSXM7	M4, ℓ = 40

O-ring Part No.

Seal material symbol	Internal seal (2-1)	External seal (4)
Nil	B2401-G155V	AS568-167V
N1	B2401-G155-XN1	AS568-167-XN1
P1	B2401-G155-XP1	AS568-167-XP1
Q1	B2401-G155-XQ1	AS568-167-XQ1
R1	B2401-G155-XR1	AS568-167-XR1
R2	B2401-G155-XR2	AS568-167-XR2
R3	B2401-G155-XR3	AS568-167-XR3
S1	B2401-G155-XS1	AS568-167-XS1
T1	B2401-G155-XT1	AS568-167-XT1
U1	B2401-G155-XU1	AS568-167-XU1

O-ring Part No.

Seal material symbol	Internal seal (7-1)	External seal (7-2)	External seal (8)
Nil	B2401-V15V	AS568-025V	AS568-017V
N1	B2401-V15-XN1	AS568-025-XN1	AS568-017-XN1
P1	B2401-V15-XP1	AS568-025-XP1	AS568-017-XP1
Q1	B2401-V15-XQ1	AS568-025-XQ1	AS568-017-XQ1
R1	B2401-V15-XR1	AS568-025-XR1	AS568-017-XR1
R2	B2401-V15-XR2	AS568-025-XR2	AS568-017-XR2
R3	B2401-V15-XR3	AS568-025-XR3	AS568-017-XR3
S1	B2401-V15-XS1	AS568-025-XS1	AS568-017-XS1
T1	B2401-V15-XT1	AS568-025-XT1	AS568-017-XT1
U1	B2401-V15-XU1	AS568-025-XU1	AS568-017-XU1

Note) A coating of vacuum grease (fluorinated grease: Y-VAC2) is applied to the shaft seal, scraper and O-ring (8).

How to Order Valve

XLGR−160 □□−□□−1K−X□□

Main valve: Pilot port direction

Symbol	Pilot port direction
Nil	Flange side
K	Left flange surface
L	Rear flange surface
M	Right flange surface

∗ Flange: Ⓐ

Temperature specifications

Symbol	Temperature	Heater
Nil	5 to 60°C	—
H0	5 to 150°C	—

Auto switch type
(Operating temperature 5 to 60°C)

Symbol	Auto switch model	Switch type
Nil	—	Without auto switch (without built-in magnet)
M9N(L)	D-M9N(L)	Solid state switch
M9P(L)	D-M9P(L)	
M9B(L)	D-M9B(L)	
A90(L)	D-A90(L)	Reed switch
A93(L)	D-A93(L)	
M9//	Without auto switch (with built-in magnet)	

Note) Types with auto switches are not available in case of high temperature types.
L type: Lead wire length 3000 mm

Switch quantity/Mounting position

Symbol	Qty	Mounting position
Nil	—	Without auto switch
A	2 pcs.	Valve open/closed
B	1 pc.	Valve open
C	1 pc.	Valve closed

By-pass valve mounting position/ Pilot port direction

Symbol	Mounting position	Symbol	Pilot port direction
1	Left flange surface	**Nil**	Flange side
		K	Left flange surface
		L	Rear flange surface
2	Right flange surface	**Nil**	Flange side
		L	Rear flange surface
		M	Right flange surface
3	Rear flange surface	**K**	Left flange surface
		L	Rear flange surface
		M	Right flange surface

∗ Flange: Ⓐ

Seal material

Symbol	Seal material	Compound No.
Nil	FKM	1349-80
N1	EPDM	2101-80
P1	Barrel Perfluoro®	70W
Q1	Kalrez®	4079
R1	Chemraz®	SS592
R2		SS630
R3		SSE38
S1	VMQ	1232-70
T1	FKM FOR PLASMA	3310-75
U1	ULTIC ARMOR®	UA4640

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Kalrez® is a registered trademark of DuPont Performance Elastomers.
Chemraz® is a registered trademark of Greene, Tweed & Co.
ULTIC ARMOR® is a registered trademark of Nippon Valqua Industries, Ltd.

Seal material changed part

Symbol	Changed part	Leakage ($Pa \cdot m^3/s$ or less) Note)	
		Internal	External
Nil	None	1.3×10^{-9} (FKM)	1.3×10^{-9} (FKM)
A	2-1 7-1 4 7-2 8	1.3×10^{-7}	1.3×10^{-7}
B	2-1 7-1	1.3×10^{-7}	1.3×10^{-9} (FKM)
C	4 7-2 8	1.3×10^{-9} (FKM)	1.3×10^{-7}

Note) Values at normal temperature, excluding gas permeation.

Maintenance Parts

① Body Part No.

XLAR160−1S−1

By-pass valve mounting position

Symbol	Mounting position
1	Left flange surface
2	Right flange surface
3	Rear flange surface

∗ Flange: Ⓐ

⑧ By-pass Valve Part No.

XLA−16□□−□□−X65

Pilot port direction

Symbol	Pilot port direction
Nil	Rear (as seen from body connection point)
K	Left (as seen from body connection point)
M	Right (as seen from body connection point)

Temperature specifications

Symbol	Temperature
Nil	5 to 60°C
H0	5 to 150°C

Seal material changed part

Symbol	Changed part
Nil	None
A	7-1 7-2
B	7-1
C	7-2

Seal material: Same as the seal materials of How to Order Valve.

② Bonnet Assembly Part No.

XLGR160-30-1H − M9NA-XN1

Bonnet assembly

Temperature	Part no.
5 to 60°C	XLGR160-30-1
5 to 150°C	XLGR160-30-1H

Same as How to Order.

Specifications

Valve type	Main valve: Double acting	By-pass valve: Normally closed
Shaft seal type	O-ring seal	Bellows seal
Operating pressure range	Atmospheric pressure to 1×10^{-5} Pa	
Fluid	Inert gas under vacuum	
Operating temperature	5 to 60°C (Option: 5 to 150°C)	
Conductance	800 ℓ/s	Max. 31.5 ℓ/s (Calculated value)
Operating pressure	0.3 to 0.6 MPa	
Flange	KF160	

Aluminum
High Vacuum Angle Valve
Series XLD/XLDV
2-Step Control, Single Acting/Bellows Seal, O-ring Seal

PAT.

XLD

How to Order

XLD − 25 ① □ ② □ ③ □ ④ − M9N ⑤ A ⑥ − □ ⑦

① Flange size

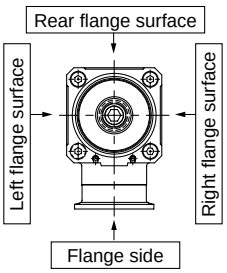
Size
25
40
50
63
80

② Flange type

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

③ Pilot port direction

Symbol	Pilot port direction
Nil	Flange side
K	Left flange surface
L	Rear flange surface
M	Right flange surface



④ Temperature specifications/Heater

Symbol		Temperature	Heater
Nil		5 to 60°C	—
High temperature type	**H0**	5 to 150°C	—
	H2		With 100°C heater
	H3		With 120°C heater

Note) Size 25 is not applicable for H2.

⑤ Auto switch type

Symbol	Auto switch model	Remarks
Nil	—	Without auto switch (without built-in magnet)
M9N(L)	D-M9N(L)	Solid state switch
M9P(L)	D-M9P(L)	
M9B(L)	D-M9B(L)	
A90(L)	D-A90(L)	Reed switch
A93(L)	D-A93(L)	
M9//	—	Without auto switch (with built-in magnet)

Auto switches are not applicable for high temperature specifications (Temperature specifications H0, H2, H3). Standard lead wire length is 0.5 m.
Add "L" to the end of the part number when 3 m is desired.
Example) -M9N<u>L</u>

⑥ Switch quantity/Mounting position

Symbol	Qty	Mounting position
Nil	Without auto switch	—
A	2 pcs.	Valve open/closed
B	1 pc.	Valve open
C	1 pc.	Valve closed

⑦ Body surface treatment/Seal material and its changed part

• Body surface treatment

Symbol	Surface treatment
Nil	External: Hard anodized Internal: Raw material
A	External: Hard anodized Internal: Oxalic acid anodized

• Seal material

Symbol	Seal material	Compound No.
Nil	FKM	1349-80*
N1	EPDM	2101-80*
P1	Barrel Perfluoro®	70W
Q1	Kalrez®	4079
R1	Chemraz®	SS592
R2		SS630
R3		SSE38
S1	VMQ	1232-70*
T1	FKM for Plasma	3310-75*
U1	ULTIC ARMOR®	UA4640

* Produced by Mitsubishi Cable Industries, Ltd.

• Seal material changed part and leakage

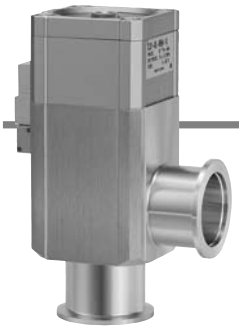
Symbol	Changed part Note 2), 3)	Leakage (Pa·m³/s or less) Note 1)	
		Internal	External
Nil	None	1.3×10^{-10} (FKM)	1.3×10^{-11} (FKM)
A	②, ③, ④, ⑤	1.3×10^{-8}	1.3×10^{-9}
B	②, ④, ⑤	1.3×10^{-8}	1.3×10^{-11} (FKM)
C	③	1.3×10^{-10} (FKM)	1.3×10^{-9}

Note 1) Values at normal temperature, excluding gas permeation.
Note 2) Refer to parts number of "Construction" on page 36 for changed part. Number indicates parts number of "Construction" accordingly.
Note 3) Changes to seal material for part no. ④ S valve seal assembly are only applicable for sizes 25, 40 and 50.

To order something other than "Nil" (standard), list the symbols starting with "X," followed by each symbol for "body surface treatment," "seal material" and then "changed part".

Example) XLD-25-M9NA-<u>X</u>AN1A

Air Operated/with Solenoid Valve



XLDV

How to Order

XLDV – 25 ☐ L – M9N A – 1 G ☐ – ☐

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

● **Air operated/with solenoid valve**

① Flange size

Size
25
40
50
63
80

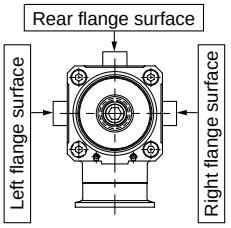
② Flange type

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

③ Solenoid valve direction

Symbol	Solenoid valve direction
K	Left flange surface
L	Rear flange surface
M	Right flange surface

∗ M type is not available for size 25.



④ Auto switch type

Symbol	Auto switch model	Remarks
Nil	—	Without auto switch (without built-in magnet)
M9N(L)	D-M9N(L)	Solid state switch
M9P(L)	D-M9P(L)	
M9B(L)	D-M9B(L)	
A90(L)	D-A90(L)	Reed switch
A93(L)	D-A93(L)	
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.
Example) -M9N<u>L</u>

⑤ Switch quantity/Mounting position

Symbol	Qty	Mounting position
Nil	Without auto switch	—
A	2 pcs.	Valve open/closed
B	1 pc.	Valve open
C	1 pc.	Valve closed

⑥ Rated voltage

1	100 VAC, 50/60 Hz
2	200 VAC, 50/60 Hz
3	110 VAC, 50/60 Hz
4	220 VAC, 50/60 Hz
5	24 VDC
6	12 VDC

⑦ Electrical entry

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

⑧ 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)

∗ S type: Not available for AC.
∗ U type: DC only.

⑨ Body surface treatment/Seal material and its changed part

• Body surface treatment

Symbol	Surface treatment
Nil	External: Hard anodized Internal: Raw material
A	External: Hard anodized Internal: Oxalic acid anodized

• Seal material

Symbol	Seal material	Compound No.
Nil	FKM	1349-80∗
N1	EPDM	2101-80∗
P1	Barrel Perfluoro®	70W
Q1	Kalrez®	4079
R1	Chemraz®	SS592
R2		SS630
R3		SSE38
S1	VMQ	1232-70∗
T1	FKM for Plasma	3310-75∗
U1	ULTIC ARMOR®	UA4640

∗ Produced by Mitsubishi Cable Industries, Ltd.

• Seal material changed part and leakage

Symbol	Changed part Note 2), 3)	Leakage (Pa·m³/s or less) Note 1)	
		Internal	External
Nil	None	1.3×10^{-10} (FKM)	1.3×10^{-11} (FKM)
A	②, ③, ④, ⑤	1.3×10^{-8}	1.3×10^{-9}
B	②, ④, ⑤	1.3×10^{-8}	1.3×10^{-11} (FKM)
C	③	1.3×10^{-10} (FKM)	1.3×10^{-9}

Note 1) Values at normal temperature, excluding gas permeation.
Note 2) Refer to parts number of "Construction" on page 36 for changed part. Number indicates parts number of "Construction" accordingly.
Note 3) Changes to seal material for part no. ④ S valve seal assembly are only applicable for sizes 25, 40 and 50.

To order something other than "Nil" (standard), list the symbols starting with "X," followed by each symbol for "body surface treatment," "seal material" and then "changed part".

Example) XLDV-25-M9NA-1G-<u>X</u>AN1A

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

Model	Initial exhaust valve	Main exhaust valve	Example
XLDV-25	SY114 will be changed to V114 after the stock of SY114 runs out.		SY114-1GS
XLDV-40/50/63/80		SYJ314	SYJ314-1GS

For further details on solenoid valves, refer to the SMC solenoid valve catalog "SY100" (Best Pneumatics 2004 Vol. 4) and "SYJ300/500/700" (ES11-86).

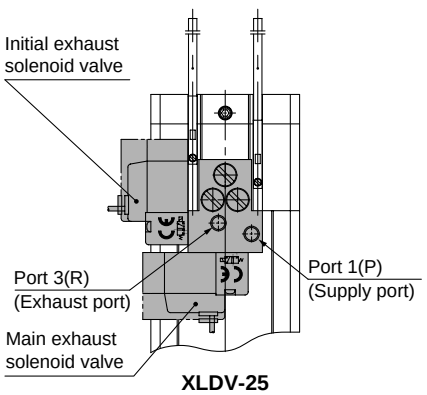
Specifications

Model			XLD(V)-25	XLD(V)-40	XLD(V)-50	XLD(V)-63	XLD(V)-80
Valve type			Normally closed (Spring Return and seal) [Both main & initial exhaust valves]				
Fluid			Inert gas under vacuum				
Operating temperature (°C)		**XLD**	5 to 60 (High temperature type: 5 to 150)				
		XLDV	5 to 50				
Operating pressure (Pa)			Atmospheric pressure to 1×10^{-6}				
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•m³/s)		**Internal**	In case of standard material FKM: 1.3×10^{-10} at normal temperature, excluding gas permeation				
		External	In case of standard material FKM: 1.3×10^{-11} at normal temperature, excluding gas permeation				
Flange type			KF (NW)			KF (NW), K (DN)	
Principal materials Note 3)			Body: Aluminum alloy, Bellows: Stainless steel 316L, Main part: Stainless steel, FKM (Standard seal material)				
Surface treatment			External: Hard anodized Internal: Raw material				
Pilot pressure (MPa)			0.4 to 0.7 [Both main & initial exhaust valves]				
Pilot port size		**XLD**	M5	Rc1/8			
		XLDV	M5: Port 1(P), Port 3(R)				
Weight (kg)		**XLD**	0.5	1.2	1.8	3.4	5.6
		XLDV	0.57	1.3	1.9	3.5	5.7

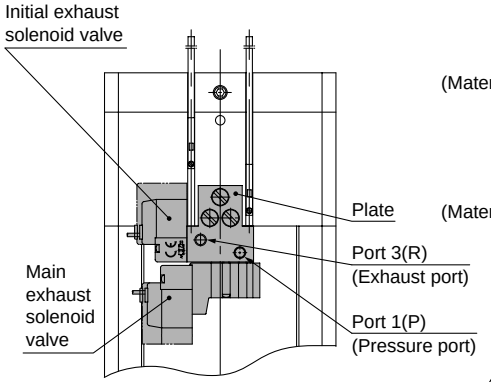
Note 1) The main exhaust valve conductance is the valve for the “molecular flow” of an elbow with the same dimensions. The initial exhaust valve conductance is the value for the “viscous flow”.
Note 2) For valve heater specifications, refer to “Common Option [1] Heater” on page 47.
Note 3) A coating of vacuum grease [Y-VAC2] is applied to the seal-material sliding portion (initial exhaust valves sliding parts) of the vacuum part.

Construction/Operation

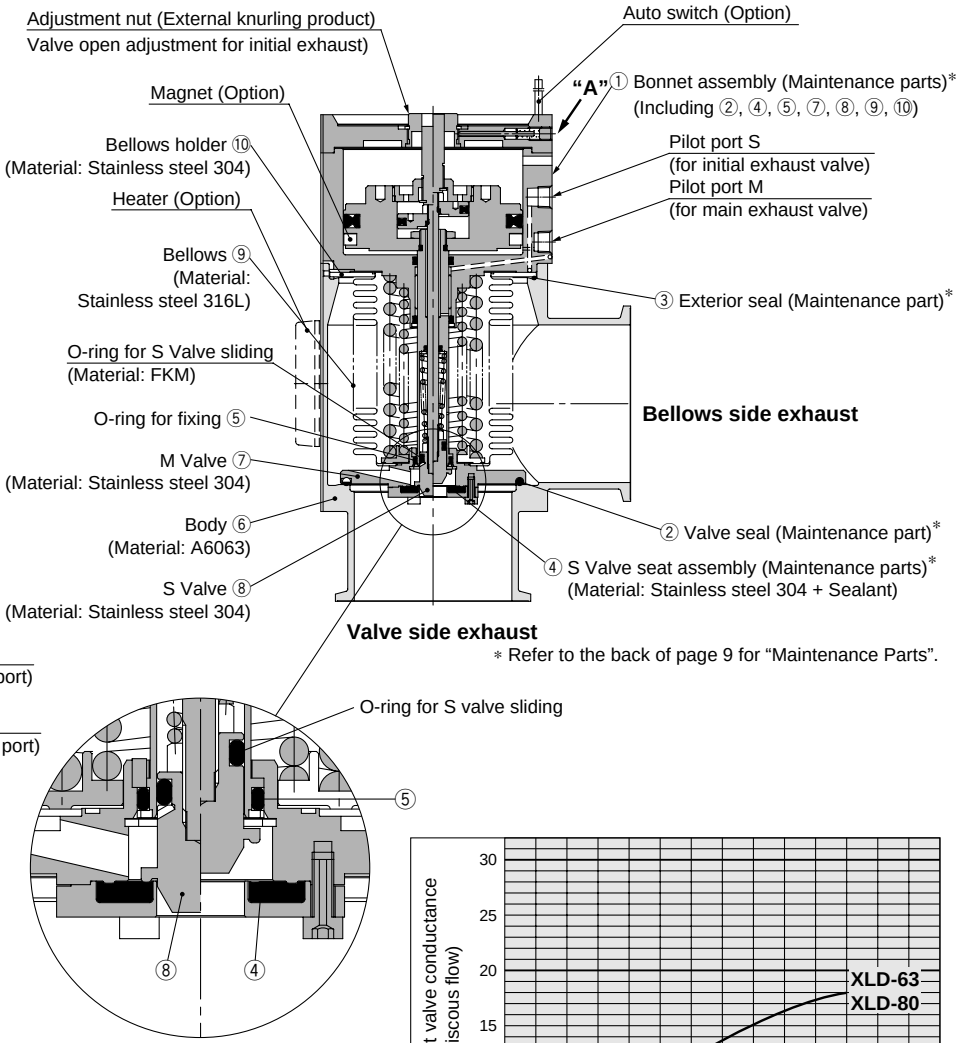
With solenoid valve



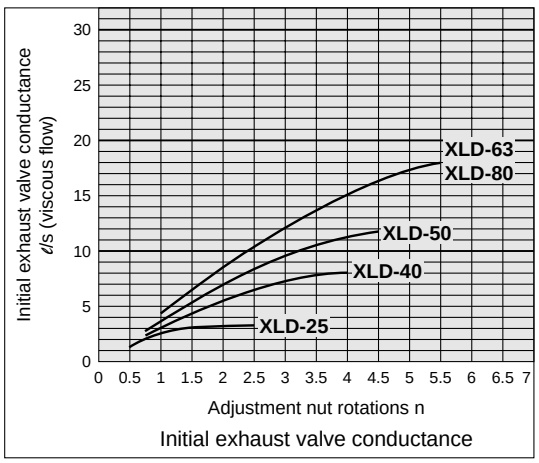
XLDV-25



XLDV-40 to 80



∗ Refer to the back of page 9 for "Maintenance Parts".



Initial exhaust valve conductance

<Working principle>

1 **Initial exhaust valve opening adjustment**
The initial exhaust rate should be adjusted before operation, with the pilot port S in an unpressurized state. The initial exhaust rate is set to zero by gently turning the adjustment nut to the right until it stops. (Do not use any tools.) The initial exhaust rate is adjusted by turning the nut to the left.

2 **Opening of the initial exhaust valve (valve S)**
When pressure is applied to the pilot port S, the valve S is removed from the valve S seal assembly, and the valve opens the adjusted amount. When the initial exhaust solenoid valve is turned ON and pressure is constantly applied to port 1(P) on model XLDV, the valve opens the adjusted amount.

3 **Opening of the main exhaust valve (valve M)**
When pressure is applied to the pilot port M, the valve M is removed from the body sheet portion, and the valve fully opens. When the initial exhaust solenoid valve is turned ON and pressure is constantly applied to port 1(P) on model XLDV, the valve fully opens.

4 **Closing of the initial exhaust / main exhaust valves**
By removing pressure from pilot port S and pilot port M, both S and M valves revert to their previous positions and are sealed. By turning OFF the initial exhaust valve and main exhaust valve on model XLDV, both valves revert to their previous position and are sealed.

<Options>

Auto switch: (for main exhaust valve) The magnet actuates the auto switch. 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).

Heater: Simple heating is performed using thermistors. The valve body can be heated to approximately 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 is a heat resistant structure. This is not available with solenoid valve.

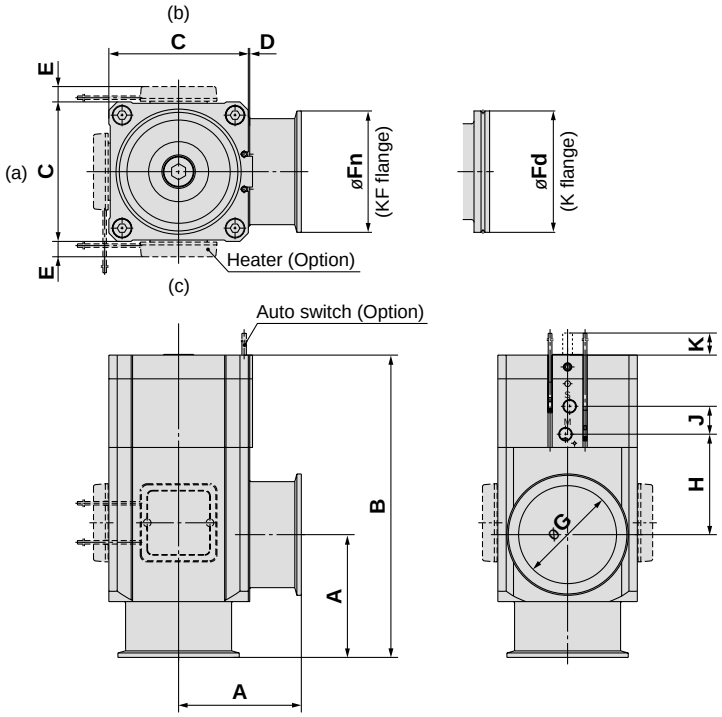
Note) After the opening adjustment of the initial exhaust valve, it will be lightly locked in place and will not rotate. To fix it in place, please tighten with the tightening torque shown in the below table. (Tightening with excessive torque can result in damaged components or the generation of abnormal noise.)

"A" Section Thread Tightening Torque

Model	XLD(V)-25	XLD(V)-40	XLD(V)-50	XLD(V)-63	XLD(V)-80
Tightening torque	0.08 N·m (0.8 kgf·cm) or less			0.3 N·m (3 kgf·cm) or less	

Dimensions

XLD/Air operated



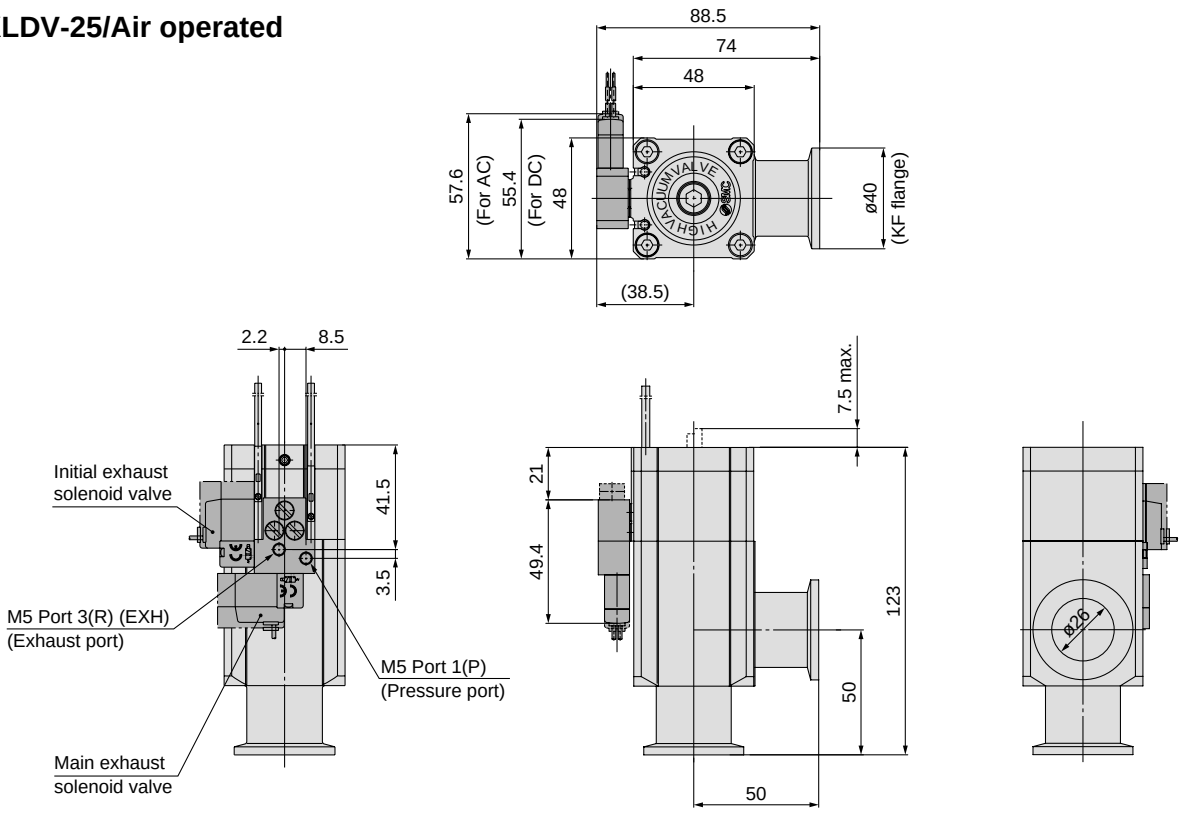
(mm)

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

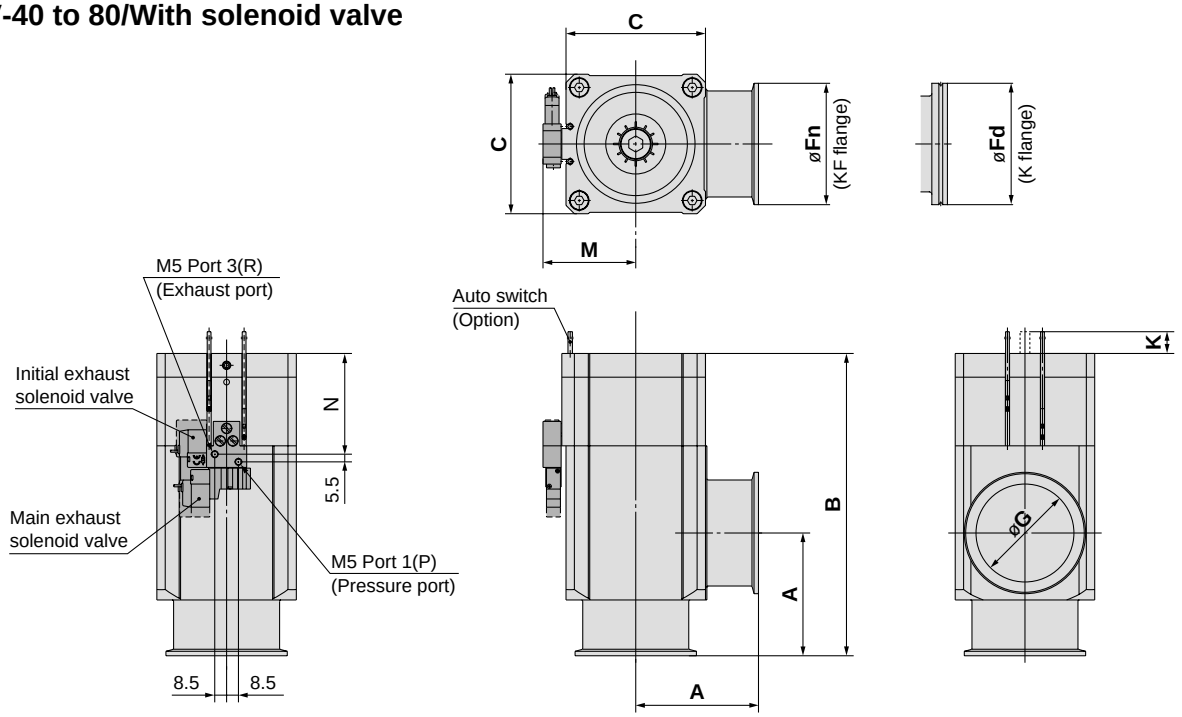
Note 1) Dimension E applies when heater option is included. (Lead wire length: approx. 1 m)
Note 2) (a), (b) and (c) in the above drawing indicate heater mounting positions.
Moreover, heater mounting positions will differ depending on the type of heater.
For further details, refer to mounting positions under “Replacement Heaters” on the back of page 9.

Dimensions

XLDV-25/Air operated



XLDV-40 to 80/With solenoid valve



(mm)

Model	A	B	C	Fn	Fd	G	M	N	K
XLDV-40	65	170	66	55	—	41	48.5	53.5	15
XLDV-50	70	183	79	75	—	52	55	57.5	17.5
XLDV-63	88	217	100	87	95	70	66.5	72.2	20
XLDV-80	90	256	117	114	110	83	75	82.6	26.5

Note) For further details on solenoid valves, refer to the SMC solenoid valve catalog “SY100” (Best Pneumatics 2004 Vol. 4) and “SYJ300/500/700” (ES11-86).

Aluminum
High Vacuum Angle Valve
Series XLH
Manual/Bellows Seal

XLH

How to Order

XLH – 16 ① ② – ③

High vacuum manual angle valve
(Bellows seal)

① Flange size

Size
16
25
40
50

④ Temperature specifications/Heater

Symbol		Temperature	Heater	Applicable flange size			
				16	**25**	**40**	**50**
Nil		5 to 60°C	—	●	●	●	●
High temperature type	**H2**	5 to 150°C	With 100°C heater	—	—	●	●
	H3		With 120°C heater	—	●	●	●

③Body surface treatment/Seal material and its changed part

• Body surface treatment

Symbol	Surface treatment
Nil	External: Hard anodized Internal: Raw material
A	External: Hard anodized Internal: Oxalic acid anodized

• Seal material

Symbol	Seal material	Compound No.
Nil	FKM	1349-80*
N1	EPDM	2101-80*
P1	Barrel Perfluoro®	70W
Q1	Kalrez®	4079
R1	Chemraz®	SS592
R2		SS630
R3		SSE38
S1	VMQ	1232-70*
T1	FKM for Plasma	3310-75*
U1	ULTIC ARMOR®	UA4640

* Produced by Mitsubishi Cable Industries, Ltd.

• Seal material changed part and leakage

Symbol	Changed part Note 2)	Leakage (Pa·m³/s or less) Note 1)	
		Internal	External
Nil	None	1.3×10^{-10} (FKM)	1.3×10^{-11} (FKM)
A	②, ③	1.3×10^{-8}	1.3×10^{-9}
B	②	1.3×10^{-8}	1.3×10^{-11} (FKM)
C	③	1.3×10^{-10} (FKM)	1.3×10^{-9}

Note 1) Values at normal temperature, excluding gas permeation.
Note 2) Refer to parts number of "Construction" on page 40 for changed part. Number indicates parts number of "Construction" accordingly.

To order something other than "Nil" (standard), list the symbols starting with "X", followed by each symbol for "seal material" and then "changed part".

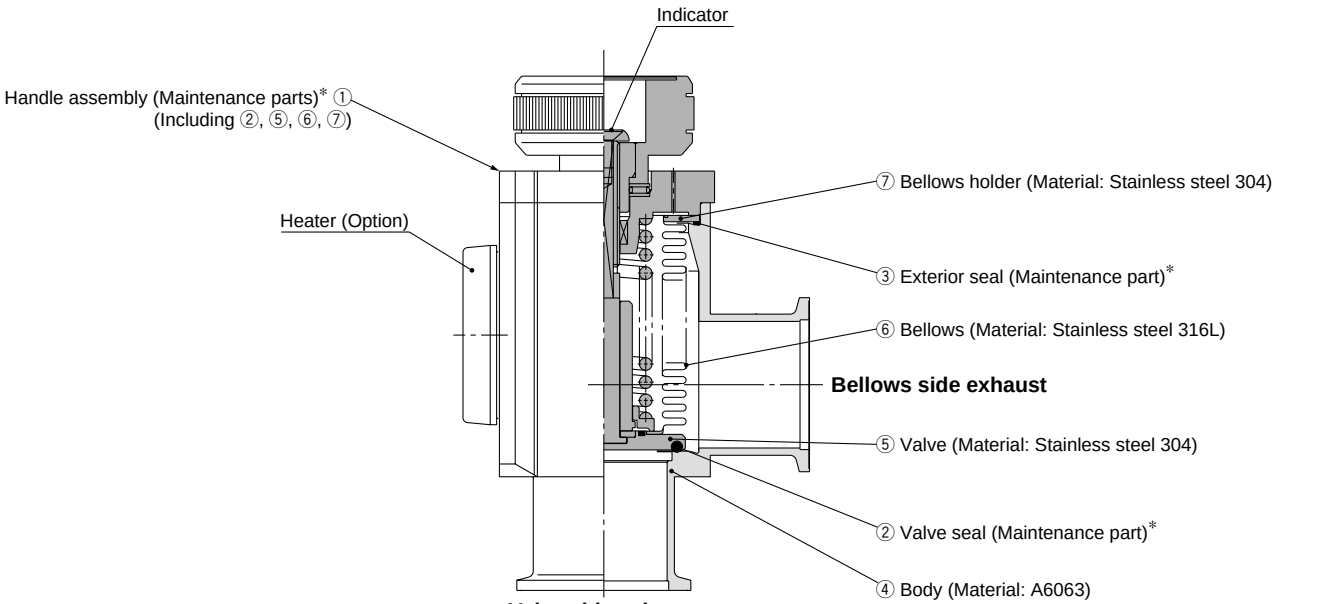
Example) XLH-16-XAN1A

Specifications

Model		XLH-16	XLH-25	XLH-40	XLH-50
Valve type		Inert gas under vacuum			
Fluid (°C)		5 to 150			
Operating pressure (Pa)		Atmospheric pressure to 10^{-6}			
Conductance (ℓ/s) Note 1)		5	14	45	80
Leakage (Pa•m³/s)	**Internal**	In case of standard material FKM: 1.3×10^{-10} at normal temperature, excluding gas permeation			
	External	In case of standard material FKM: 1.3×10^{-11} at normal temperature, excluding gas permeation			
Flange type		KF (NW)			
Principal materials		Body: Aluminum alloy, Bellows: Stainless steel 316L, Main part: Stainless steel, FKM (Standard seal material)			
Surface treatment		External: Hard anodized Internal: Raw material			
Actuation torque (N·m)		0.1≤	0.15≤	0.35≤	0.5≤
Handle revolutions		5	7	10	13
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 [1] Heater" on page 47.

Construction/Operation



∗ Refer to the back of page 9 for “Maintenance Parts”.

<Working principle>

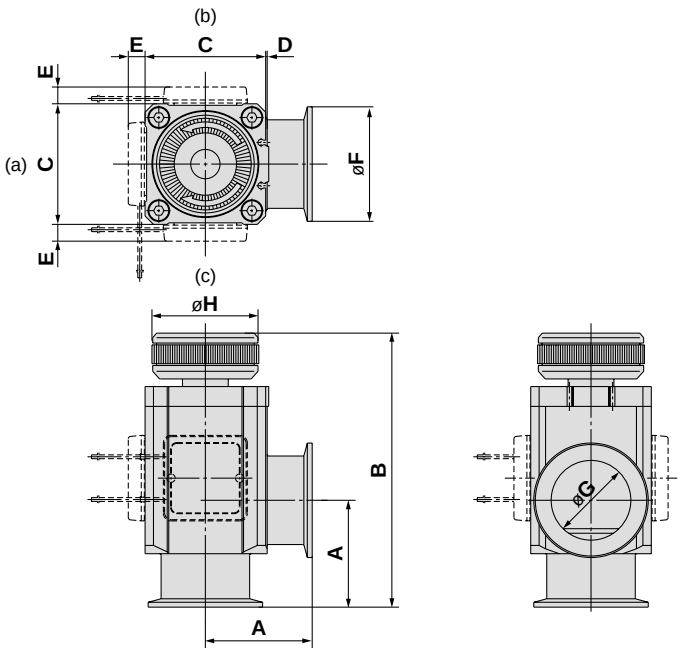
By turning the handle to the left, the valve opens. The handle does not move up and down, but the indicator shows the open or closed position of the valve. As the handle is turned to the right, the valve closes, and when the turning force of the handle suddenly ceases to be felt, the valve is sealed.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

<Options>

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

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

Dimensions



(mm)

Model	A	B	C	D	E Note 1)	F	G	H
XLH-16	40	100.5	38	1	—	30	17	35
XLH-25	50	114	48	1	12	40	26	41
XLH-40	65	162.5	66	2	11	55	41	57
XLH-50	70	179.5	79	2	11	75	52	70

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 the back of page 9.

Aluminum
High Vacuum Angle Valve
Series XLS
Electromagnetic/Bellows Pressure Balance

How to Order

Starting voltage

5	24 VDC
9	Others (48. 100 VDC)

Note) Holding voltage is 25% of starting voltage.

Electrical entry

G	Grommet
C	Conduit
T	Terminal
D	DIN terminal

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

With control power supply **XLS — 25 — P 1 G**

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

Valve size

16	KF16
25	KF25

Control power supply

P	With control power supply

Voltage

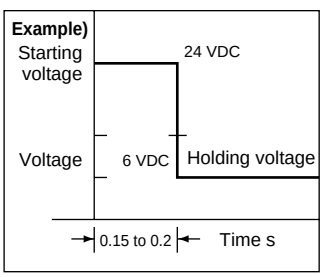
1	100 VAC
2	200 VAC
5	24 VDC

Electrical entry

G	Grommet

⚠ Warning

(1) In case there is no control power supply (XLS-25-□□: 24/48/100 VDC), starting voltage should be applied for only 0.15 to 0.2 s, 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).



SMC

Specifications

Model		XLS-16	XLS-25	XLS-16-P□G	XLS-25-P□G
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	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	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		Yes	
Operating power supply voltage		24/6, 48/12, 100/24 VDC		24 VDC, 100/200 VAC	
Allowable voltage fluctuation (%)		±10			
Electrical entry		G, C, D, T type		G type only	
Coil insulation		Class B			
Maximum operating frequency (Hz)		0.17			
Weight (kg)		0.4	0.7	0.7	1.0

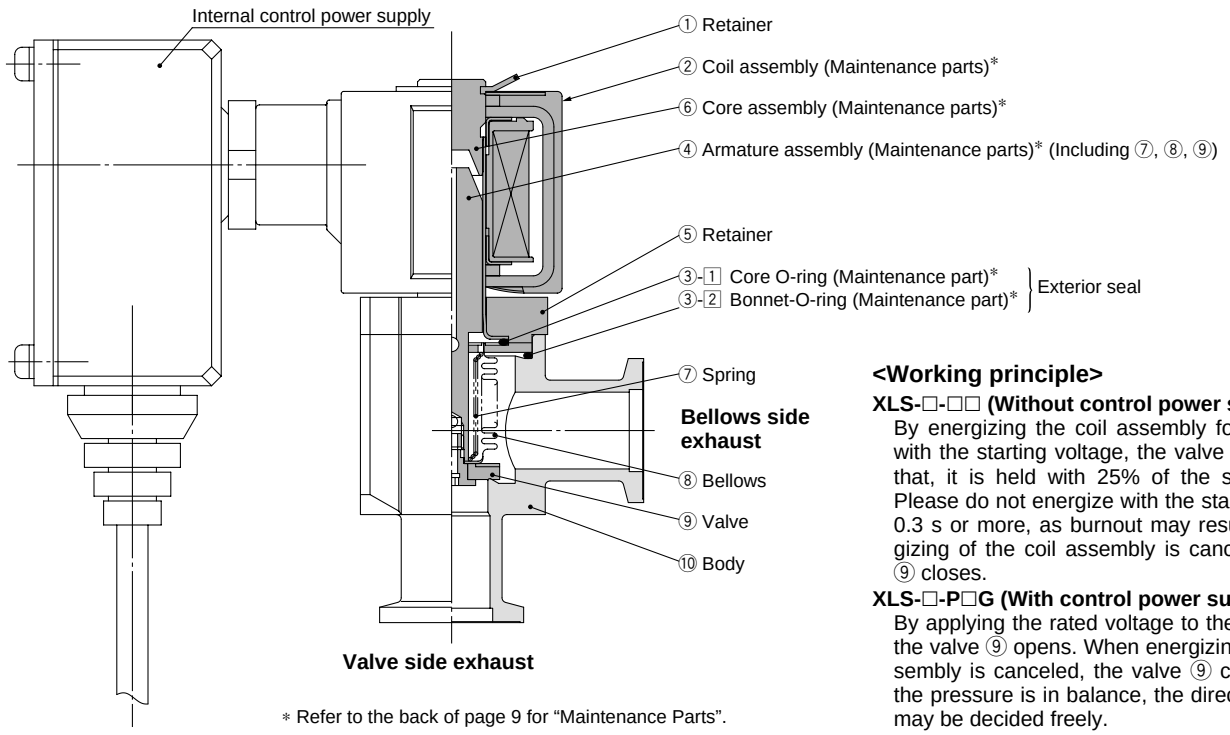
Note 1) Conductance is the value for an elbow with the same dimensions.
Note 2) A coating of vacuum grease [Y-VAC3] is applied to the valve seat of the vacuum part.

Power/Voltage

At the Rated Voltage

Model			Starting		Holding	
			Power (W)	Current (A)	Power (W)	Current (A)
XLS-16-	**□G/C/D/T, P5G**		36	1.5	4.8	0.38
	P1G	50 Hz	30.5	0.47	14.8	0.35
		60 Hz			10	0.27
	P2G	50 Hz	30	0.24	4.9	0.11
		60 Hz			2.3	0.10
XLS-25-	**□G/C/D/T, P5G**		47	2.0	5.3	0.5
	P1G	50 Hz	42	0.62	20	0.46
		60 Hz			13.5	0.36
	P2G	50 Hz	45	0.35	6.7	0.15
		60 Hz			3.0	0.12

Construction/Operation



∗ Refer to the back of page 9 for "Maintenance Parts".

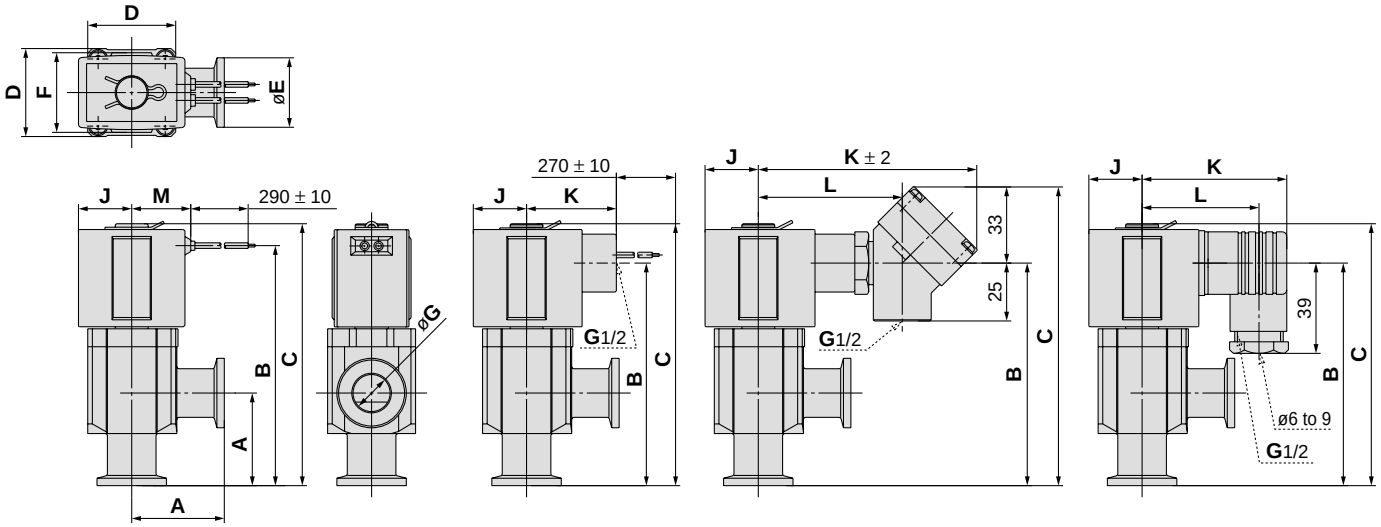
<Working principle>

XLS-□-□□ (Without control power supply)
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.

XLS-□-P□G (With control power supply)
By applying the rated voltage to the coil assembly, the valve ⑨ opens. When energizing of the coil assembly is canceled, the valve ⑨ closes. Because the pressure is in balance, the direction of exhaust may be decided freely.

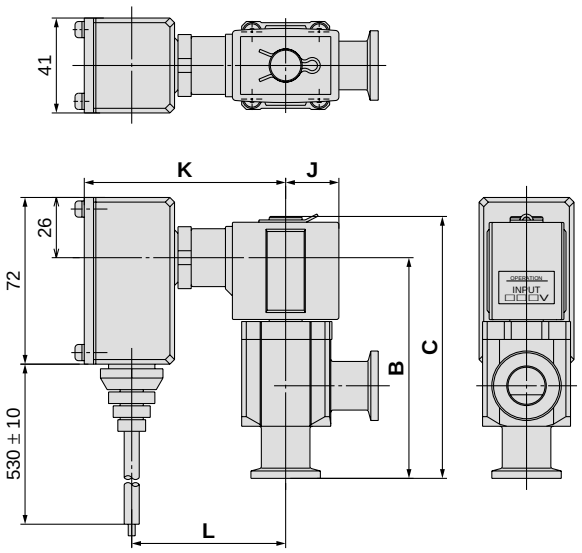
Dimensions

XLS/Without control power supply



Grommet (G) **Conduit (C)** **Terminal (T)** **DIN terminal (D)**

XLS/With control power supply



Grommet (G)

(mm)

Model	A	B	C	D	E	F	G	J	K	L	M
XLS-16-□G	40	104	113	38	30	35	17	23	—	—	25.5
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	40	26	25.5	—	—	28
XLS-25-□C		121.5							43	—	—
XLS-25-□D		120.5							63	51	—
XLS-25-□T		121.5	154.5						97	66	—
XLS-16-P□G	40	96	113	38	30	35	17	23	87	66.5	—
XLS-25-P□G	50	121.5	138.5	48	40	40	26	25.5	89.5	69	—

Series XVD
Smooth Vent Valve (Supply Line)

How to Order

XVD 2 — 02 V

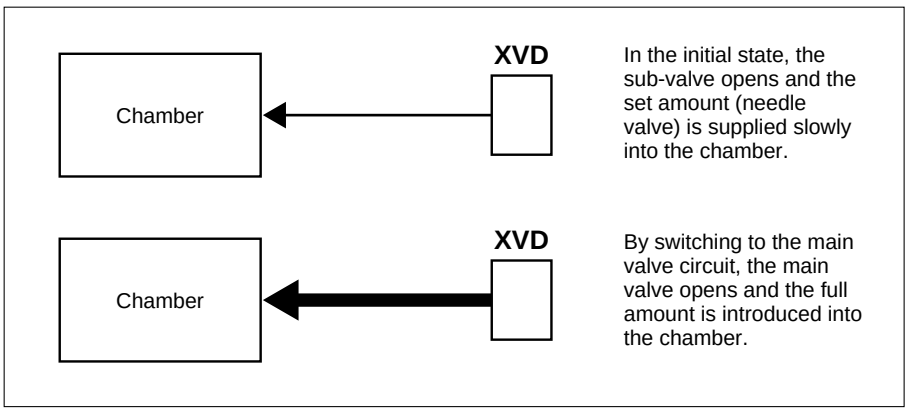
- XVD: Smooth vent valve
- 2: Orifice size (ø3)
- 02: Fitting size (1/4)
- V: Fitting type

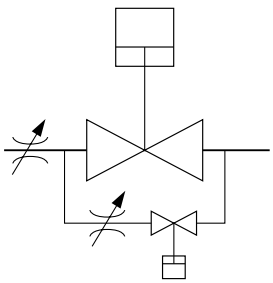
V	For VCR®
S	For Swagelok®

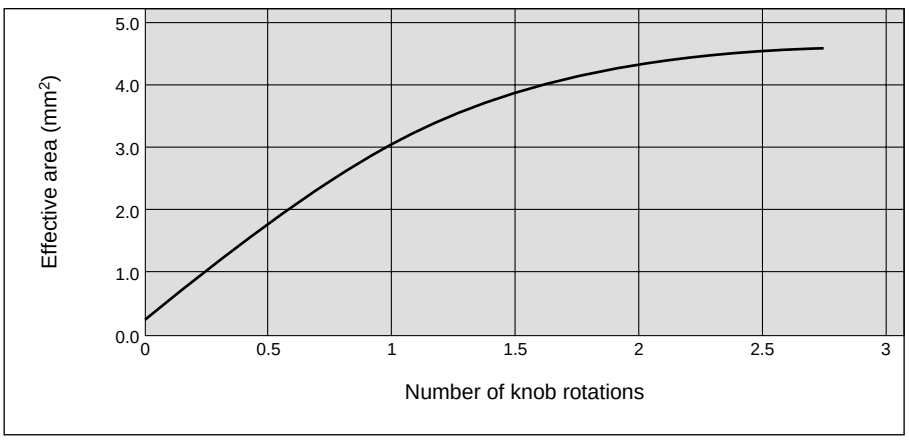
- **Space-saving**
  Valve / needle valve integrated construction – requires only 1/4 the piping space of previous models.
- **Particulates significantly reduced through the use of a metal diaphragm in the sheet portion**
- **Flow of both initial air supply and main air supply can be adjusted.**

Application

Introducing the full amount of supply pressure (Clean air / N_2) all at once when returning the vacuum chamber to the atmosphere will cause particulates to get into the chamber. To prevent this, after slowly introducing the initial air supply and setting the pressure, switch to the main valve circuit to supply the full amount.



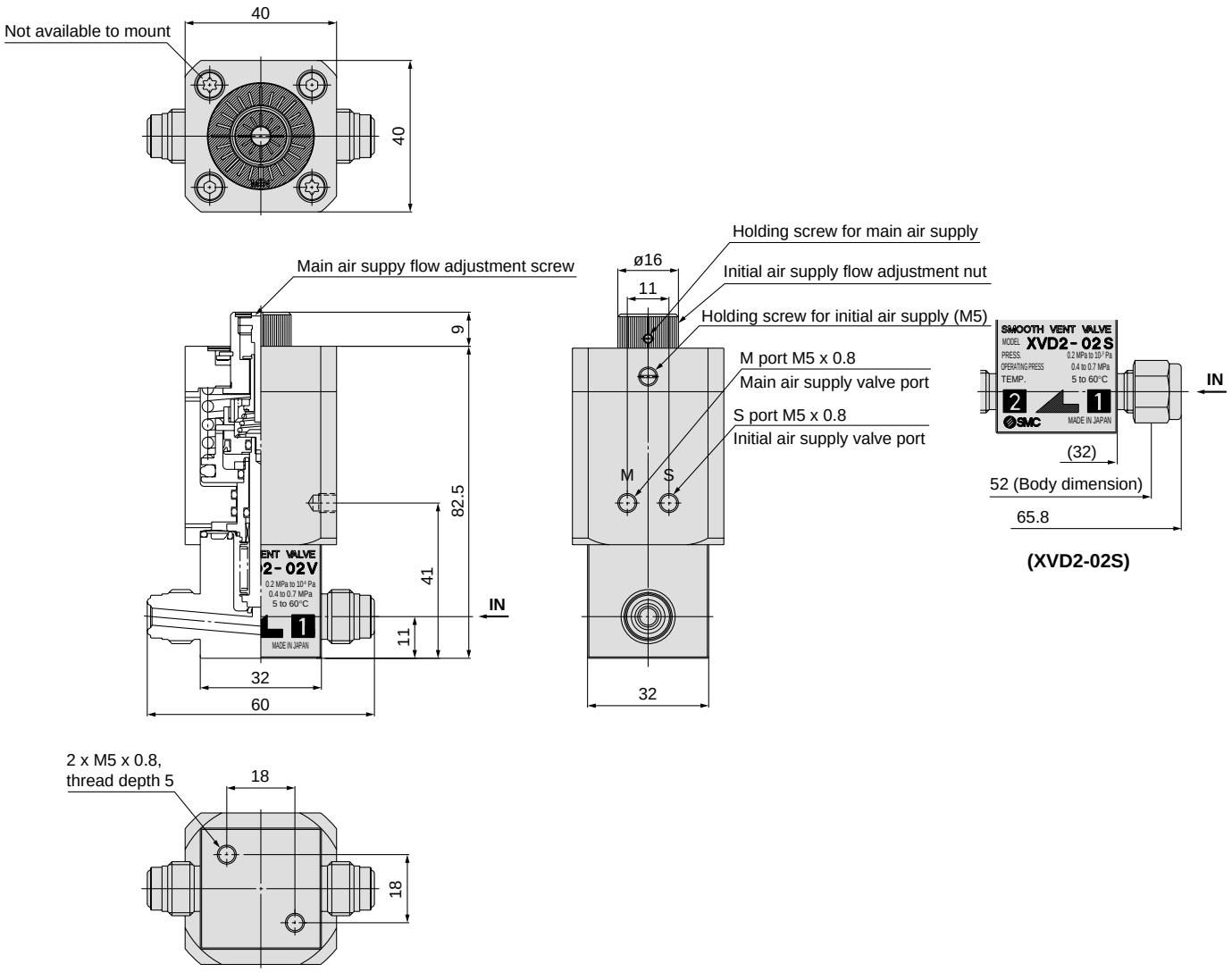




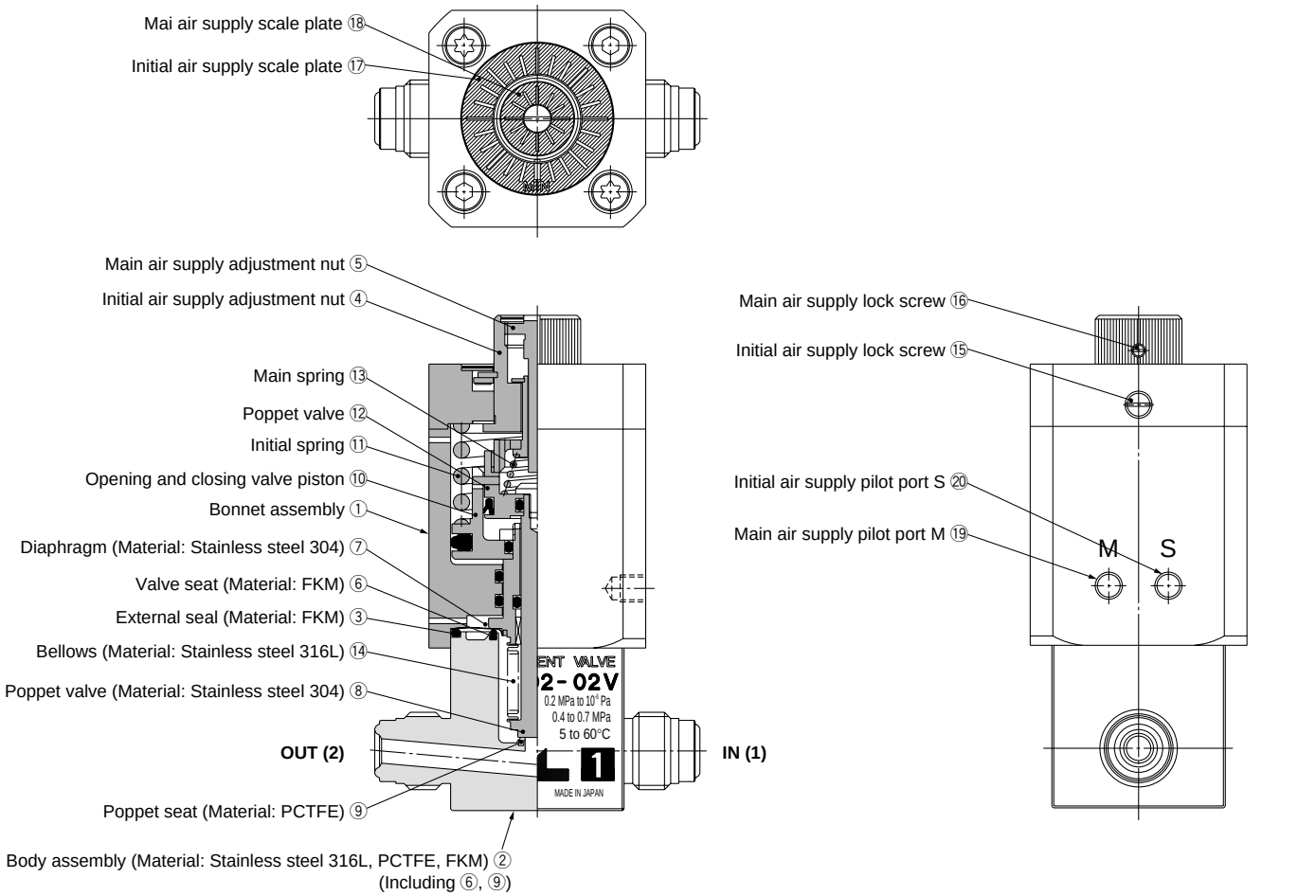
Specifications

Model		XVD2-02V	XVD2-02S
Valve type		Normally closed (Pressurize to open, Spring seal)	
Fluid		Nitrogen, Air, Inert gas, etc.	
Operating temperature (°C)		5 to 60°C (Baking temperature 150°C or less)	
Operating pressure (Pa)		0.2 MPa (G) to 1 x 10^{-6} (abs)	
Orifice diameter (mm)		ø3	
Effective area (mm^2)	**Main air supply**	4.6	
	Initial air supply	0.2 to 4.6	
Leakage (Pa·m^3/s)	**Internal**	5 x 10^{-9}	At normal temperature, excluding gas permeation
	External	1.3 x 10^{-11}	At normal temperature, excluding gas permeation
	Fitting	1.3 x 10^{-11}	1.3 x 10^{-10}
Piping connection type		For VCR®	For Swagelok®
Connection size		1/4	
Principal materials		Body: Stainless steel 316L, Main part: Stainless steel 316L, Stainless steel 304, FKM (Seal material)	
Internal surface treatment		Body EP treatment	
Operating pressure (MPa)		0.4 to 0.7 (Both main & initial supply valves)	
Pilot port size		M5 x 0.8	
Weight (kg)		0.5	

Dimensions



Construction/Operation



<Initial air supply flow adjustment> XVD series

Use a flat head screwdriver to gently turn the initial air supply lock screw ⑮ to the left, loosening it until it stops. Keep rotating the initial air supply adjustment nut ④ to the right, and the minimum possible initial air supply flow is the point at which the name plate and adjustment nut mark align closest to where torque is felt. (Be careful not to tighten the initial air supply adjustment nut ④ further than this point, as it may result in component damage.)
After confirming the position of the initial air supply adjustment nut ④ and the angle alignment scale of the initial air supply scale plate ⑰, adjust the initial air supply amount by rotating the nut to the left. According to the "Number of rotations and flow characteristics" as shown, set the initial air supply flow. After setting, lock by tightening the initial air supply lock screw ⑮ with a torque of 0.5 N·cm.

Main air supply flow adjustment
Use a flat head screwdriver to gently loosen the main air supply lock screw ⑯, and also to confirm that the main air supply adjustment nut ⑤ is rotating freely. Keep rotating the main air supply adjustment nut ⑤ to the right, and the point at which it stops is the "initial air supply adjustment amount." After confirming the position of the main air supply adjustment nut ⑤ and the angle alignment scale of the main air supply scale plate ⑱, set the main air supply amount by rotating the nut to the left. After setting, lock by tightening the main air supply lock screw ⑯ with a torque of 0.3 N·cm.

Initial air supply feed
Gas filling in from the IN (1) port side pushes the initial spring ⑪ down the opening and closing valve piston ⑩, and seals the diaphragm ⑦ and valve seat ⑥ to stop the gas. Air pressure is applied on pilot port S ⑳. The air pressure is loaded into the lower part of the opening and closing piston ⑩, and the opening and closing valve piston ⑩ stops after moving the assigned amount. The movement of the opening and closing valve piston ⑩ causes the diaphragm ⑦ to remove from the valve seat ⑥, and gas to flow. When the gas begins to flow, it passes through the opening between the poppet valve ⑧ and poppet seat ⑨ (initial air supply set amount) and flows from the OUT (2) port.

Main air supply feed
With the initial air supply pilot port S ⑳ in a pressurized state, pressure is applied to pilot port M ⑲. The air pressure fills into the lower part of the poppet valve piston ⑫, and the poppet valve piston ⑫ moves upward, stopping when it strikes the main air supply adjustment nut ⑤. The movement of the poppet valve piston ⑫ causes the attached poppet valve ⑧ to move further from the initial air supply adjustment position, and a greater volume of gas flows from the OUT (2) port.

Stoppage of the initial and main air supply
It is possible for the initial and main air supply to stop at the same time. The force of the main spring ⑬ activated by the exhaust from the pilot port S ⑳ causes the opening and closing valve piston ⑩ to move downward, and the diaphragm ⑦ and valve seat ⑥ to close, stopping the gas feed. The force of the initial spring ⑪ activated by the exhaust from the pilot port M ⑲ causes the poppet valve piston ⑫ to move downward, and the initial air supply to revert to its previous adjusted position.

Remarks 1: The feeding of the main air supply is carried out with the initial air supply pilot port S ⑲ in a pressurized state.
2: Increasing the initial air supply amount in the mechanism will cause a decrease in the range of the main air supply amount.

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 125 VAC						
Heater power W (Nominal value) In-rush/Power consumption (Option symbol)	**H2** 100°C	—	200/40	200/60	400/100	600/150	800/220	1200/350
	H3 120°C	200/30	400/70	400/80	600/130	800/180	1200/300	1600/400

Note) In-rush current will flow to the heater for a few dozen seconds and will then subside.
Refer to “Maintenance Parts” on the back of page 9 for further details regarding quantity and type.

Auto Switch Specifications

Auto Switch Common Specifications

Type	Reed switch	Solid state switch
Leakage current	None	3-wire: 100 μA or less 2-wire: 0.8 mA or less
Operating time	1.2 ms	1 ms or less
Impact resistance	300 m/s^2	1000 m/s^2
Insulation resistance	50 MΩ or more at 500 VDC Mega (between lead wire and case)	
Withstand voltage	1500 VAC for 1 minute (between lead wire and case)	1000 VAC for 1 minute (between lead wire and case)
Ambient temperature	–10 to 60°C	
Enclosure	IEC529 standard IP67, JIS C 0920 waterproof construction	
Standard	Conforming to CE Standards	

Lead Wire Length

Lead wire length indication

(Example) **D-M9P[L]**

Lead wire length

Nil	0.5 m
L	3 m

Note) Lead wire length tolerance

Lead wire length	Tolerance
0.5 m	±15 mm
3 m	±90 mm

Contact Protection Boxes: CD-P11, CD-P12

<Applicable switch model>

D-A9□ type

The auto switches below do not have a built-in contact protection circuit. Therefore, please use a contact protection box with the switch for any of the following cases:

① **Where the operation load is an inductive load.**
② **Where the wiring length to load is greater than 5 m.**
③ **Where the load voltage is 100/200 VAC.**

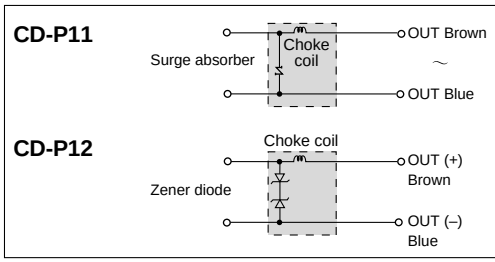
The contact life may be shortened (due to permanent energizing conditions). Since the solid state auto switch is a semiconductor switch which has no contacts, no contact protection box is needed.

Specifications

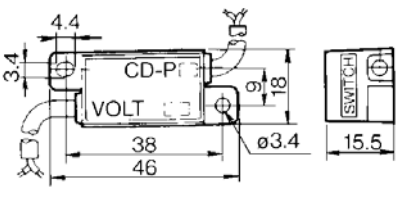
Part no.	CD-P11		CD-P12
Load voltage	100 VAC	200 VAC	24 VDC
Max. load current	25 mA	12.5 mA	50 mA

∗ Lead wire length —— Switch connection side 0.5 m
Load connection side 0.5 m

Internal Circuit



Dimensions



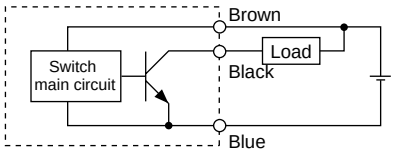
Connection

To connect a switch unit to a contact protection box, connect the lead wire from the side of the contact protection box marked SWITCH to the lead wire coming out of the switch unit. Keep the switch as close as possible to the contact protection box, with a lead wire length of no more than 1 meter.

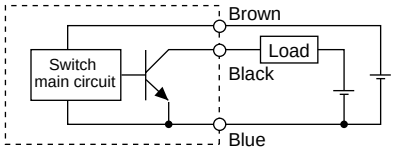
Auto Switch Connections and Examples

Basic Wiring

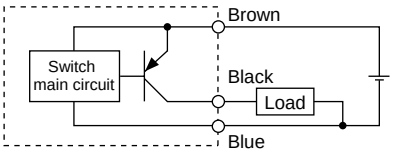
Solid state 3-wire, NPN



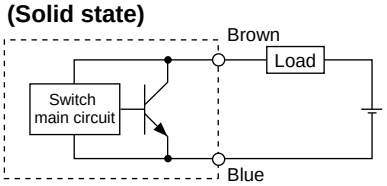
(Power supplies for switch and load are separate.)

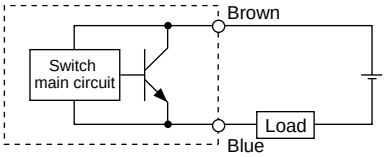


Solid state 3-wire, PNP



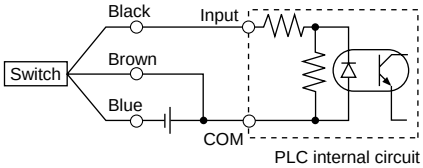
2-wire (Solid state)



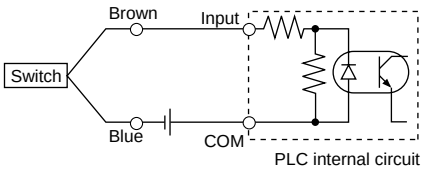


Example of Connection to PLC (Programmable Logic Controller)

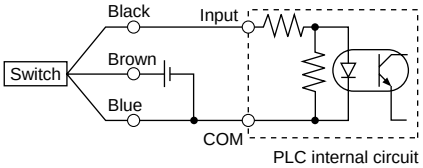
• Sink input specification
3-wire, NPN



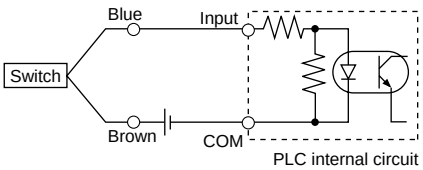
2-wire



• Source input specification
3-wire, PNP



2-wire

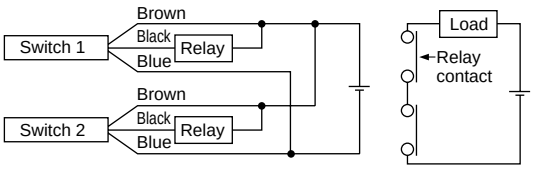


Connect according to the applicable PLC input specifications, since the connection method will vary depending on the PLC input specifications.

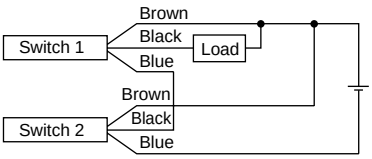
Example of AND (Serial) and OR (Parallel) Connection

• 3-wire

AND connection for NPN output (using relays)

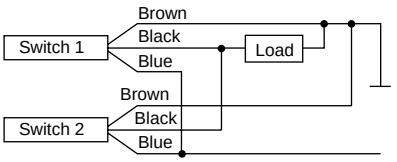


AND connection for NPN output (performed with switches only)

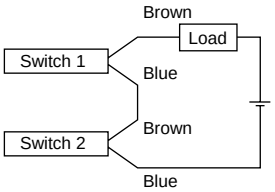


The indicator lights will illuminate when both switches are turned ON.

OR connection for NPN output



2-wire with 2-switch AND connection

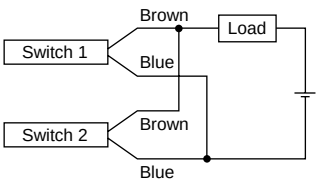


When two switches are connected in series, a load may malfunction because the load voltage will decrease when in the ON state.
The indicator lights will illuminate if both of the switches are in the ON state.

Load voltage at ON = $\frac{\text{Power supply voltage}}{} - \frac{\text{Residual voltage}}{}$ x 2 pcs.
= 24 V - 4 V x 2 pcs.
= 16 V

Example: Power supply is 24 VDC.
Internal voltage drop in switch is 4 V.

2-wire with 2-switch OR connection



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

Load voltage at OFF = Leakage current x 2 pcs.
x Load impedance
= 1 mA x 2 pcs. x 3 kΩ
= 6 V

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

(Reed)
Because there is no current leakage, the load voltage will not increase when turned OFF. However, depending on the number of switches in the ON state, the indicator lights may sometimes dim or not light because of the dispersion and reduction of the current flowing to the switches.

Solid State Switch: Direct Mounting Style
D-M9N/D-M9P/D-M9B

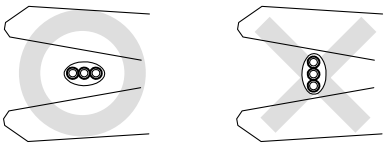
Grommet

- **2-wire load current is reduced (2.5 to 40 mA).**
- **Lead free**
- **UL certified (style 2844) lead cable is used.**
- **Flexibility is 1.5 times greater than the conventional model (SMC comparison).**
- **Using flexible cable as standard spec.**

⚠Caution

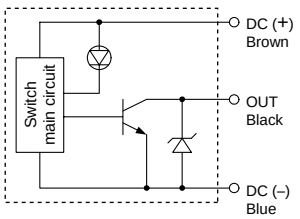
Precautions

When the cable sheath is stripped, confirm the stripping direction.
The insulator may be split or damaged depending on the direction.

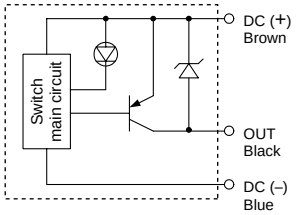


Auto Switch Internal Circuit

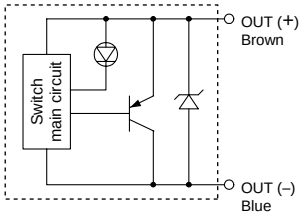
D-M9N



D-M9P



D-M9B



Auto Switch Specifications

PLC: Programmable Logic Controller

D-M9□ (With indicator light)			
Auto switch part no.	**D-M9N**	**D-M9P**	**D-M9B**
Wiring type	3-wire		2-wire
Output type	NPN	PNP	—
Applicable load	IC circuit, Relay, PLC		24 VDC relay, PLC
Power supply voltage	5, 12, 24 VDC (4.5 to 28 V)		—
Current consumption	10 mA or less		—
Load voltage	28 VDC or less	—	24 VDC (10 to 28 VDC)
Load current	40 mA or less		2.5 to 40 mA
Internal voltage drop	0.8 V or less		4 V or less
Leakage current	100 μA or less at 24 VDC		0.8 mA or less
Indicator light	Red LED illuminates when turned ON.		
Standard	Conforming to CE Standards		

- Lead wires — Oilproof, flexible heavy-duty vinyl cable: ø2.7 x 3.2 ellipse
  D-M9B 0.15 mm² x 2 cores
  D-M9N, D-M9P 0.15 mm² x 3 cores

Note 1) Refer to page 48 for solid state switch common specifications.
Note 2) Refer to page 48 for lead wire lengths.

Weight

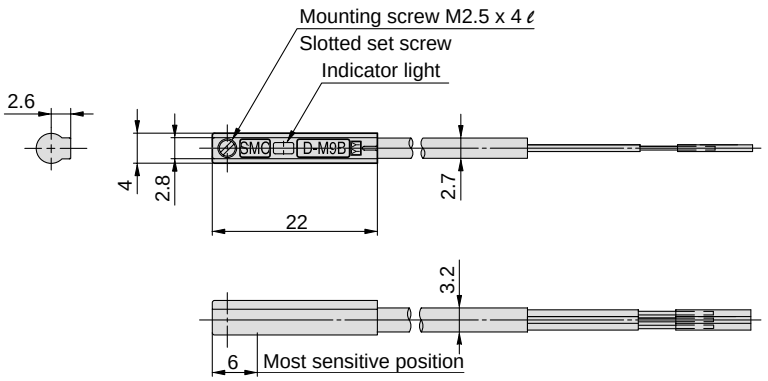
Unit: g

Auto switch part no.		D-M9N	D-M9P	D-M9B
Lead wire length (m)	0.5	8	8	7
	3	41	41	38

Dimensions

Unit: mm

D-M9□



Reed Switch: Direct Mounting Style
D-A90/D-A93

CE

Grommet

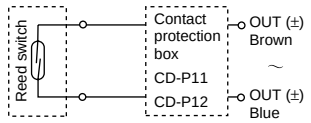
⚠Caution

Precautions

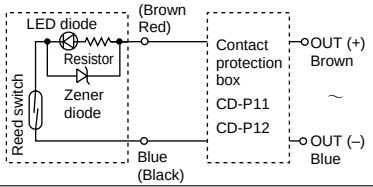
Fix the switch with the existing screw installed on the switch body. The switch may be damaged if a screw other than the one supplied is used.

Auto Switch Internal Circuit

D-A90



D-A93



Note) ① In a case where the operation load is an inductive load.
② In a case where the wiring load is greater than 5 m.
③ In a case where the load voltage is 100 VAC.

Use the auto switch with a contact protection box in any of the above mentioned cases. (For details about the contact protection box, refer to page 48.)

Auto Switch Specifications

PLC: Programmable Logic Controller

D-A90 (Without indicator light)			
Auto switch part no.	**D-A90**		
Applicable load	IC circuit, Relay, PLC		
Load voltage	24 VAC/DC or less	48 VAC/DC or less	100 VAC/DC or less
Maximum load current	50 mA	40 mA	20 mA
Contact protection circuit	None		
Internal resistance	1 Ω or less (including lead wire length of 3 m)		
D-A93 (With indicator light)			
Auto switch part no.	**D-A93**		
Applicable load	Relay, PLC		
Load voltage	24 VDC	100 VAC	
Load current range and max. load current	5 to 40 mA	5 to 20 mA	
Contact protection circuit	None		
Internal voltage drop	D-A93 — 2.4 V or less (to 20 mA)/3 V or less (to 40 mA)		
Indicator light	Red LED illuminates when turned ON.		
Standard	Conforming to CE Standards		

● Lead wires
D-A90/D-A93 — Oilproof heavy-duty vinyl cable: ø2.7, 0.18 mm² x 2 cores (Brown, Blue), 0.5 m
Note 1) Refer to page 48 for reed switch common specifications.
Note 2) Refer to page 48 for lead wire lengths.

Weight

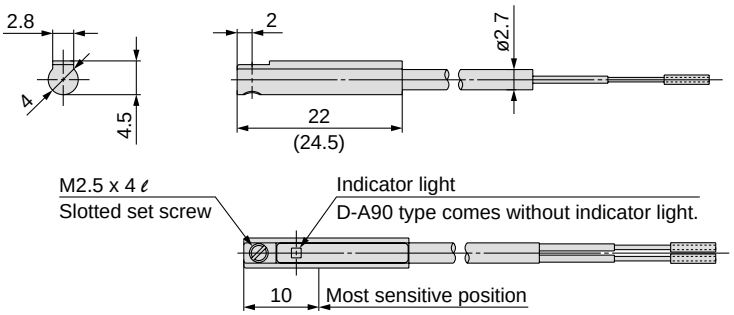
Unit: g

Auto switch part no.		**D-A90**	**D-A93**
Lead wire length (m)	0.5	6	6
	3	30	30

Dimensions

Unit: mm

D-A90/D-A93



( ): dimensions for D-A93

SMC

Glossary

1 Seal Materials

Please note that the following are general features and subject to change depending on processing conditions. For details, please contact sealing component manufacturerers.

FKM (Fluoro rubber)
With low outgassing, low permanent-setting and low gas permeation rates, this is the most popular seal material for high vacuums. Standard material used by SMC's high vacuum angle valve is Mitsubishi Cable Industries, Ltd. (Compound No. 1349-80).
It is advisable to choose a model depending on its application, because an improved material compound (3310-75) which reduces the weight reduction ratio with O_2 plasma is also available.

Kalrez® ∗ Kalrez® is a registered trademark of DuPont Performance Elastomers.
This material, perfluoroelastomer (FFKM), has excellent heat and chemical resistance, but its permanent-setting is large, and special caution is required. Variations are available with improved plasma (O_2, CF_4) and particulate resistance; therefore it is advisable to select types based upon the application.
Compound No. 4079: Standard Kalrez®, excellent in gas and heat resistance.

Chemraz® ∗ Chemraz® is a registered trademark of Greene, Tweed & Co.
This material, perfluoroelastomer (FFKM), has excellent chemical and plasma resistance and has slightly higher heat resistance than FKM. Several variations of Chemraz® are available and it is advisable to choose based upon the particular plasma being used and other conditions, etc.
Compound No. SS592: Excellent physical properties and especially effective for moving parts.
Compound No. SS630: Applicable to both fixed and moving parts and compatible with a wide variety of applications.
Compound No. SSE38: The cleanest material among Chemraz®, developed for high-density plasma instruments.

Barrel Perfluoro® ∗ Barrel Perfluoro® is a registered trademark of Matsumura Oil Co.,Ltd.
Compound No. 70W: Perfluoroelastomer (FFKM) which does not contain a metal filler. Resistant against NF_3, NH_3. Low particle generation under dry process conditions.

ULTIC ARMOR® ∗ ULTIC ARMOR® is a registered trademark of Nippon Valqua Industries, Ltd.
Fluoro-based rubber which does not contain a metal filler. Seal material which is plasma-resistant and has low gas emittance and heat resistance.

Silicone (Silicone rubber, VMQ)
This material is relatively inexpensive, has good plasma resistance, but its gas permeation rate is high.
Optional seal material used by SMC's high vacuum angle valve is Mitsubishi Cable Industries, Ltd. (Compound No. 1232-70, White)
It has a low weight-reduction ratio and low particle generation within O_2 plasma and NH_3 gas environments.

EPDM (Ethylenepropylene rubber)
Relatively lower priced and excellent in weatherability, chemical and heat resistance, but with no resistance at all to general mineral oil.
Optional seal material used by SMC's high vacuum angle valve is Mitsubishi Cable Industries, Ltd. (Compound No. 2101-80)
Resistant to NH_3 gas, etc.

2 Shaft Sealing Method

Bellows
Bellows offer cleaner sealing with reduced particle generation and less outgassing. The two major bellow types are: Formed-bellows and Welded-bellows. Formed-bellows produce less dusts and offer higher dust resistance. Welded-bellows allow longer strokes, but generate more dust particles and offer less dust resistance. Please note, the endurance depends on length and speed of the strokes.

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. In general, fluorinated grease is affixed to the shaft seal portion.

3 Response Time/Operation Time

Valve opening
The time from the application of voltage to the actuation solenoid valve (XL□) until 90% of the valve 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.

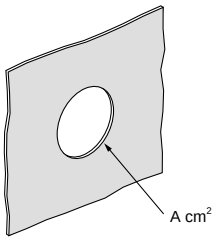
Valve closing
The time from the cut off of power to the actuation solenoid valve (XL□) until 90% of the valve return stroke has been completed is the valve closing response time. Valve closing operation time indicates the time from valve opening until 90% of return movement has been completed. Both of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

Glossary

4 Molecular Flow Conductance

Orifice conductance

In the case of a øA (cm^2) hole in an ultra-thin plate, 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=11.6A ℓ/sec, at an air tempearture of 20°C.

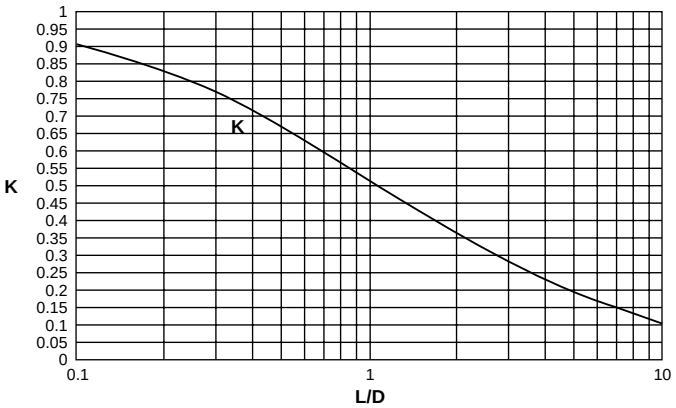


Cylinder conductance

With length "L" (cm) and diameter "D" (cm) where L>>D, from the formula $C=(2\pi RT/M)^{0.5}D^3/6L$, 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 hole conductance "C" in Graph 1. (Clausing's factor drawing), the short pipe conductance C_K is easily found as $C_K=KC$.



Graph 1. Clausing's factor

Conductances combined

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

5 He Leakage

Surface leakage

This leakage occurs between surfaces of the sealing and the seal material. In the case of elastic body seal (elastomer), leakage values are confirmed within minutes of operation. Leakage rate is measured at room temperature (20 to 30°C).

Gas permeation

This is leakage caused by diffusion through the elastic body seal material. As 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 (distance between the atmosphere and the vacuum side). In the case of metal gaskets, only hydrogen diffusion should be considered.

6 Outgassing

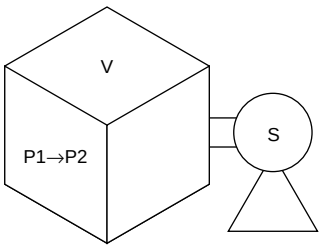
This is a phenomenon where gases adhered or adsorbed to the metallic surface or its inside parts are released from the surface and drawn into the vacuum according to the pressure decrease. The smoothness of the surface and closeness of the oxidized layer can effect (increase/decrease) this.

7 Ultimate Pressure

Ultimate pressure P (Pa) is P=Q/S, where the sum of mass flow rates for outgassing (Qg) and leakage (Qℓ) is Q(Pa•m^3/s), and the exhaust speed is S(m^3/s). The ultimate pressure is measured with Qg, QℓS shown as above, and the ultimate pressure of the pump itself. In the case of very low pressure, the exhaust characteristics of the actual pump can be the limiting factor. In particular, a deterioration of exhaust characteristics due to an unclean pump and invasion of the atmospheric moisture can be the major factor.

8 Exhaust Time (Low/Medium Vacuum)

The time (△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 vacuum, 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 (T: absolute temperature) is raised to shorten residence time. This time is characterized as $\tau=\tau 0\ \exp(E/RT)$ where R is the ideal gas constant and τ0=(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 about 200 times shorter. The objective of baking is to exhaust water with long adsorption residence time more quickly.

Series XL/XVD
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 labels of **"Caution", "Warning"** or **"Danger"**. To ensure safety, be sure to observe ISO 4414 Note 1), JIS B 8370 Note 2) and other safety practices.

⚠ 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.

Note 1) ISO 4414: Pneumatic fluid power--General rules relating to systems.
Note 2) JIS B 8370: General Rules for Pneumatic Equipment

⚠ Warning

1. **The compatibility of the pneumatic equipment is the responsibility of the person who designs the pneumatic system or decides its specifications.**
   Since the products specified here are used in various operating conditions, their compatibility for the specific pneumatic system must be based on specifications or post analysis and/or tests to meet the specific requirements. The expected performance and safety assurance are the responsibility of the person who has determined the compatibility of the system. This person should continuously review the suitability of all items specified, referring to the latest catalog information with a view to giving due consideration to any possibility of equipment failure when configuring a system.
2. **Only trained personnel should operate pneumatically operated machinery and equipment.**
   Compressed air can be dangerous if handled incorrectly. Assembly, handling or repair of pneumatic systems should be performed by trained and experienced operators.
3. **Do not service machinery/equipment or attempt to remove components until safety is confirmed.**
   1. Inspection and maintenance of machinery/equipment should only be performed once measures to prevent falling or runaway of the driven objects have been confirmed.
   2. When equipment is removed, confirm that safety process as mentioned above. Turn off the supply pressure for this equipment and exhaust all residual compressed air in the system.
   3. Before machinery/equipment is restarted, take measures to prevent quick extension of a cylinder piston rod, etc.
4. **If the equipment will be used in the following conditions or environment, please contact SMC first and be sure to take all necessary safety precautions.**
   1. Conditions and environments beyond the given specifications, or if product is used outdoors.
   2. Installation on equipment in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverages, recreation equipment, emergency stop circuits, clutch and brake circuits in press applications, or safety equipment.
   3. An application which has the possibility of having negative effects on people, property, or animals, requiring special safety analysis.

■ Exemption from Liability

1. **SMC, its officers and employees shall be exempted from liability for any loss or damage arising out of earthquakes or fire, action by a third person, accidents, customer error with or without intention, product misuse, and any other damages caused by abnormal operating conditions.**
2. **SMC, its officers and employees shall be exempted from liability for any direct or indirect loss or damage, including consequential loss or damage, loss of profits, or loss of chance, claims, demands, proceedings, costs, expenses, awards, judgments and any other liability whatsoever including legal costs and expenses, which may be suffered or incurred, whether in tort (including negligence), contract, breach of statutory duty, equity or otherwise.**
3. **SMC is exempted from liability for any damages caused by operations not contained in the catalogs and/or instruction manuals, and operations outside of the specification range.**
4. **SMC is exempted from liability for any loss or damage whatsoever caused by malfunctions of its products when combined with other devices or software.**

Series XL
Auto Switches Precautions 1

Be sure to read this before handling.

Design and Selection

⚠Warning

1. Confirm the specifications.

Read the specifications carefully and use this product appropriately. The product may be damaged or malfunction if it is used outside the range of specifications of current load, voltage, temperature or impact. We do not guarantee any damage in any case the product is used outside of the specification range.

2. Pay attention to the length of time that a switch is on at an intermediate stroke position.

When an auto switch is placed at an intermediate position of the stroke and a load is driven at the time the piston passes, the auto switch will operate. However if the speed is too great, the operating time will be shortened and the load may not operate properly. The maximum detectable piston speed is:

$$V\ (mm/s) = \frac{\text{Auto switch operating range (mm)}}{\text{Load operating time (ms)}}$$

3. Keep wiring as short as possible.

<Reed switch>

As the length of the wiring to a load gets longer, the rush current at switching ON becomes greater, and this may shorten the product's life. (The switch will stay ON all the time.)
Use a contact protection box when the wire length is 5 m or longer.

<Solid state switch>

Although wire length should not affect switch function, use a wire 100 m or shorter.
If the wiring is longer it will likely increase noise although the length is less than 100 m.
When the wire length is long, we recommend attaching the ferrite core to the both ends of the cable to prevent excess noise.

4. Do not use a load that generates surge voltage. If a surge voltage is generated, the discharge occurs at the contact, possibly resulting in the shortening of product life.

<Reed switch>

If driving a load such as a relay that generates a surge voltage, use a contact protection box.

<Solid state switch>

Although a zener diode for surge protection is connected at the output side of a solid state auto switch, damage may still occur if the surge is applied repeatedly. When a load, such as a relay or solenoid, which generates surge is directly driven, use a type of switch with a built-in surge absorbing element.

5. Cautions for use in an interlock circuit

When an auto switch is used for an interlock signal requiring high reliability, devise a double interlock system to avoid trouble by providing a mechanical protection function, or by also using another switch (sensor) together with the auto switch. Also perform periodic maintenance and confirm proper operation.

6. Do not make any modifications to the product.

Do not take the product apart. It may cause human injuries and accidents.

⚠Caution

1. Take precautions when multiple actuators are used close together.

When two or more actuators are lined up in close proximity to each other, magnetic field interference may cause the switches to malfunction. Maintain a minimum cylinder separation of 40 mm.
(When the allowable interval is specified for each cylinder series, use the indicated value.) The auto switches may malfunction due to the interference from the magnetic fields.

2. Take note of the internal voltage drop of the switch.

<Reed switch>

1) Switches with an indicator light (D-A93)
   - If auto switches are connected in series as shown below, take note that there will be a large voltage drop because of internal resistance in the light emitting diodes. (Refer to internal voltage drop in the auto switch specifications.)
     [The voltage drop will be "n" times larger when "n" auto switches are connected.]
     Even though an auto switch operates normally, the load may not operate.

   - In the same way, when operating under a specified voltage, although an auto switch may operate normally, the load may not operate. Therefore, the formula below should be satisfied after confirming the minimum operating voltage of the load.

$$\text{Supply voltage} - \text{Internal voltage drop of switch} > \text{Minimum operating voltage of load}$$

2) If the internal resistance of a light emitting diode causes a problem, select a switch without an indicator light (Model D-A90).

<Solid state switch>

3) Generally, the internal voltage drop will be greater with a 2-wire solid state auto switch than with a reed switch. Take the same precautions as in 1).
   Also, note that a 12 VDC relay is not applicable.

Series XL
Auto Switches Precautions 2

Be sure to read this before handling.

Design and Selection

⚠Caution

3. Pay attention to leakage current.

<Solid state switch>

With a 2-wire solid state auto switch, current (leakage current) flows to the load to operate the internal circuit even when in the OFF state.

Operating current of load (OFF condition) > Leakage current

If the criteria given in the above formula are not met, it will not reset correctly (stays ON). Use a 3-wire switch if this specification will not be satisfied.

Moreover, leakage current flow to the load will be "n" times larger when "n" auto switches are connected in parallel. Refer to page 49.

4. Ensure sufficient clearance for maintenance activities.

When designing an application, be sure to allow sufficient clearance for maintenance and inspections.

5. Minimum stroke for auto switch mounting

The minimum stroke value for mounting one or two auto switches is obtained when the switch can detect at the product.

However, even if the switch is mounted at the proper position within the minimum stroke range, it may not be able to detect when the piston stops in the middle of the stroke due to a stopper, etc. It may also turn on in the middle of a stroke.

6. When multiple auto switches are required

"n" indicates the number of switch which can be physically mounted. Detection intervals depends on the switch mounting structure and set position, therefore some required interval and set positions may not be available.

Mounting and Adjustment

⚠Warning

1. Instruction manual

Install the products and operate them only after reading the instruction manual carefully and understanding its contents. Also keep the manual where it can be referred to as necessary.

2. Do not drop or bump.

Do not drop, bump or apply excessive impacts (300 m/s^2 or more for reed switches and 1000 m/s^2 or more for solid state switches) while handling. Although the body of the switch may not be damaged, the inside of the switch could be damaged and cause a malfunction.

3. Mount switches using the proper fastening torque.

When a switch is tightened beyond the range of fastening torque, the mounting screws, mounting bracket or switch may be damaged. On the other hand, tightening below the range of fastening torque may allow the switch to slip out of position. (For mounting and moving auto switches, tightening torque, etc., refer to each series.)

4. Mount a switch at the center of the operating range.

Adjust the mounting position of an auto switch so that the piston stops at the center of the operating range (the range in which a switch is ON). (The mounting position shown in a catalog indicates the optimum position at stroke end.) If mounted at the end of the operating range (around the borderline of ON and OFF), operation will be unstable or the service life will be shortened.

<D-M9□>

When the D-M9□ auto switch is used to replace old series auto switch, it may not activate depending on operating condition because of its shorter operating range.

Such as

- **Applications where the stop position of actuator may vary and exceed the operating range of the auto switch, for example, pushing, pressing, clamping operation, etc.**
- **Applications where the auto switch is used for detecting an intermediate stop position of the actuator. (In this case the detecting time will be reduced.)**

In these applications, set the auto switch to the center of the required detecting range.

⚠Caution

1. Do not carry an actuator by the auto switch lead wires.

Never carry a cylinder (actuator) by its lead wires. This may not only cause broken lead wires, but it may cause internal elements of the switch to be damaged by the stress.

2. Fix the switch with appropriate screw installed on the switch body. If using other screws, switch may be damaged.

Series XL
Auto Switches Precautions 3

Be sure to read this before handling.

Wiring

⚠Warning

1. Confirm proper insulation of wiring.

Be certain that there is no faulty wiring insulation (contact with other circuits, ground fault, improper insulation between terminals, etc.). Damage may occur due to excess current flow into a switch.

2. Do not wire with power lines or high voltage lines.

Wire separately from power lines or high voltage lines, avoiding parallel wiring or wiring in the same conduit with these lines. Control circuits, including auto switches, may malfunction due to noise from these other lines.

⚠Caution

1. Avoid repeatedly bending or stretching lead wires.

Repeated bending or tensile force applied to the lead wire may cause the sheath to fall off or disconnection of the wire.
If bending or tensile force are not avoidable, fix the lead wire close to the switch and allow a bend radius of R40 to 80 mm or larger. Please consult SMC for details. Stress and tensile force applied to the connection between the cable and switch increases the possibility of disconnection.
Fix the cable in the middle so that it is not movable in the area where it connects with the switch.

2. Be sure to connect the load before power is applied.

<2-wire type>

If the power is turned ON when an auto switch is not connected to a load, the switch will be instantly damaged because of excess current.
It is the same as when the 2-wire brown cord (+, output) is directly connected to the (+) power supply terminal.

3. Do not allow short circuit of loads.

<Reed switch>

If the power is turned ON with a load in a short circuited condition, the switch will be instantly damaged because of excess current flow into the switch.

<Solid state switch>

Model D-M9□ switches do not have built-in short circuit prevention circuits. If loads are short circuited, the switches will be instantly damaged, as in the case of reed switches.
Take special care to avoid reverse wiring with the power supply line (brown) and the output line (black) on 3-wire type switches.

⚠Caution

4. Avoid incorrect wiring.

<Reed switch>

A 24 VDC switch with indicator light has polarity. The brown lead wire is (+) and the blue lead wire is (–).

1) If connections are reversed, a switch will operate, however, the light emitting diode will not light up.
Also note that a current greater than that specified will damage a light emitting diode and it will no longer operate.
Applicable model:
D-A93

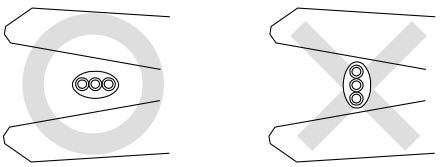
<Solid state switch>

1) If connections are reversed on a 2-wire type switch, the switch will not be damaged if protected by a protection circuit, but the switch will always stay in an ON state. However, it is still necessary to avoid reversed connections, since the switch could be damaged by a load short circuit in this condition.
2) If connections are reversed (power supply line + and power supply line –) on a 3-wire type switch, the switch will be protected by a protection circuit. However, if the power supply line (+) is connected to the blue wire and the power supply line (–) is connected to the black wire, the switch will be damaged.

<D-M9□>

D-M9□ does not have built-in short circuit protection circuit. Be aware that if the power supply connection is reversed (e.g. (+) power supply wire and (–) power supply wire connection is reversed), the switch will be damaged.

5. When the cable sheath is stripped, confirm the stripping direction. The insulator may be split or damaged depending on the direction. (D-M9□ only)



Recommended Tool

Model name	Model no.
Wire stripper	D-M9N-SWY

∗ Stripper for a round cable (ø2.0) can be used for a 2-wire type cable.

Series XL
Auto Switches Precautions 4

Be sure to read this before handling.

Operating Environment

⚠Warning

1. Never use in an atmosphere of explosive gases.

The construction of auto switches is not intended to prevent explosion. Never use in an atmosphere with an explosive gas since this may cause a serious explosion.

2. Do not use in an area where a magnetic field is generated.

Auto switches will malfunction or magnets inside products will become demagnetized.

3. Do not use in an environment where the auto switch will be in water or continually exposed to water.

Although switches satisfy IEC standard IP67 construction (JIS C 0920: waterproof construction), do not use switches in applications where continually exposed to water splash or spray. Poor insulation or swelling of the potting resin inside switches may cause malfunction.

4. Do not use in an environment with oil or chemicals.

Please consult SMC if auto switches will be used in an environment with coolant, cleaning solvent, various oils or chemicals. If auto switches are used under these conditions for even a short time, they may be adversely affected by improper insulation, malfunction due to swelling of the potting resin, or hardening of the lead wires.

5. Do not use in an environment with temperature cycles.

Please consult SMC if switches are used where there are temperature cycles other than normal temperature changes, as they may be adversely affected internally.

6. Do not use in an environment where there is excessive impact shock.

<Reed switch>

When excessive impact (300 m/s^2 or more) is applied to a reed switch during operation, the contact point will malfunction and generate or cut off a signal momentarily (1 ms or less). Please consult SMC regarding the need to use a solid state switch depending upon the environment.

7. Do not use in an area where surges are generated.

<Solid state switch>

When there are units (solenoid type lifter, high frequency induction furnace, motor, radio equipment etc.) which generate large surges or electromagnetic waves in the area around products with solid state auto switches, this may cause deterioration or damage to the switches. Avoid sources of surge generation and crossed lines.

⚠Caution

1. Avoid accumulation of iron debris or close contact with magnetic substances.

When a large amount of ferrous debris such as machining chips or spatter is accumulated, or a magnetic substance (something attracted by a magnet) is brought into close proximity with products with auto switches, it may cause the auto switch to malfunction due to a loss of the magnetic force inside the product.

2. Please consult SMC concerning water resistance, elasticity of lead wires, usage at welding sites, etc.

3. Do not use in direct sunlight.

4. Do not mount the product in locations where it is exposed to radiant heat.

Maintenance

⚠Warning

1. Perform the following maintenance periodically in order to prevent possible danger due to unexpected auto switch malfunction.

1) Securely tighten switch mounting screws.
If screws become loose or the mounting position is dislocated, retighten them after readjusting the mounting position.

2) Confirm that there is no damage to lead wires.
To prevent faulty insulation, replace switches or repair lead wires, etc., if damage is discovered.

3) Confirm the lighting of the green light on the 2-color indicator type switch.
Confirm that the green LED is turned on when stopped at the established position. If the red LED is turned on, the mounting position is not appropriate. Readjust the mounting position until the green LED lights up.

2. Maintenance procedures are outlined in the operation manual.

Not following proper procedures could cause the product to malfunction and could lead to damage to the equipment or machine.

3. Removal of equipment, and supply/exhaust of compressed air

Before any machinery or equipment is removed, first ensure that the appropriate measures are in place to prevent the fall or erratic movement of driven objects and equipment, then cut off the electric power and reduce the pressure in the system to zero. Only then should you proceed with the removal of any machinery and equipment.

When machinery is restarted, proceed with caution after confirming that appropriate measures are in place to prevent actuators from sudden movement.

Series XL
Specific Product Precautions 1

Be sure to read this before handling.

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

Design

⚠Warning

- **All models**

1. The body material is A6063, the bellows are stainless steel 316L, and other metal seal material is stainless steel 304. Standard seal material in the vacuum section is FKM that can be changed to the other materials (please refer to "How to Order"). Use fluids which are compatible with materials after confirming.
2. Select materials for the actuation pressure piping, and heat resistance for fittings that are suitable for the applicable operating temperatures.

- **Model 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.

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

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

- **Model 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. For high vacuum valves used in the main exhaust lines of flat panel display manufacturing equipment and other large manufacturing equipment, the XLF(V) or XLG(V) series, employing O-ring seal type for improved durability, is recommended.
2. When controlling valve responsiveness, take note of the size and length of piping, as well as the flow rate characteristics of the actuating solenoid valve.
3. Actuating pressure should be kept within the specified range. 0.4 to 0.5 MPa is recommended.
4. Use within the limits of the operating pressure range.
5. The actuating piston chamber and the bellows chamber [except for XLF(V)/XLG(V)] are directly connected to atmosphere.
   Please use in an environment in which dust emissions will not cause problems. (Please consult SMC if the release of dust must be avoided.)

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

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

Mounting

⚠Caution

- **All models**

1. In high humidity environments, keep valves packaged until the time of installation.
2. In case with switches and 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.

Mounting

⚠Caution

4. Vibration resistance allows for normal operation up to 30 m/s^2 (45 to 250 Hz), but continuous vibration may cause a decline in durability. Arrange piping to avoid excessive vibrations or shocks.

- **High temperature type (Model/XLA, XLC, XLD, XLF, XLG; Temperature specifications/H0, H2, H3)**

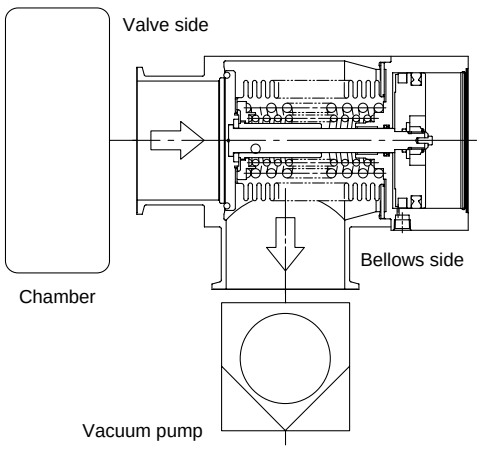
1. In models with heater (thermistor), take care not to damage the insulation components of the lead wires and connector section.
2. The setting temperature for models with heater should be established without a draft or heat insulation. It will change depending on conditions such as heat retaining measures 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. A short circuit breaker or fuse should be installed.
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. There is an indentation of 0.1 to 0.2 mm in order to protect the flange seal surface, and it should be handled so that the seal surface is not damaged in any way.
3. Exhaust direction
   During operation, the direction of the exhaust may be determined freely, but in cases where a flow is generated by the exhaust, a decline in durability may result.
   The exhaust direction shown in the figure below (bellows side exhaust) is recommended.
   Please take all available precautions, as the life of the equipment is affected by conditions of usage.

Recommended exhaust direction
[Vacuum pump connected on bellows side]



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Series XL
Specific Product Precautions 2

Be sure to read this before handling.

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

Maintenance

⚠Caution

4. SMC specified parts should be used for service. Refer to “Construction”, “Replacement Parts,” or “Maintenance Parts.”
5. 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.

Manual Angle Valve/Series XLH

Design

⚠Caution

1. The body material is A6063, the bellows are stainless steel 316L, other vacuum parts are stainless steel 304.
   FKM is the standard seal material for the vacuum part, but other materials may be selected (please refer to How to Order). Please check the material used, and use only fluids that will not interfere with the material.
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.
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 (excluding handle part) 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. There is an indentation of 0.1 to 0.2 mm 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. 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. SMC specified parts should be used for service. Refer to “Construction”, “Replacement Parts,” or “Maintenance Parts.”
5. 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.

Series XL/XVD
Specific Product Precautions 3

Be sure to read this before handling.

Angle Solenoid Valve/Series XLS

Design

⚠Warning

1. The body material is A6063, the bellows are stainless steel 316L, the other metal materials used in the vacuum part are 13Cr stainless steel, stainless steel 304, and A2017, and the seal material is FKM. In addition, a fluorinated resin (PFA) is used in the armature assembly of the vacuum part. The valve of the vacuum part has a fluorinated grease coating. Please check the material used, and in the course of maintenance, use only liquids that will not interfere with the material.
2. In cases without an operating power supply, the starting voltage is applied for only 0.15 to 0.2 s, 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.

Mounting

⚠Caution

1. In high humidity environments, keep valves packaged until the time of installation.

Mounting

⚠Caution

2. Please secure in such a way that the lead wire has sufficient curvature, and that no excessive force is applied to it.

Piping

⚠Caution

1. Before mounting, clean the surface of the flange seal and the O-ring with ethanol, etc.
2. There is an indentation of 0.1 to 0.2 mm 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 back of page 9 for further details.

Smooth Vent Valve/Series XVD

Design

⚠Warning

1. The body material and bellows are stainless steel 316L, the other materials that may be exposed to fluids are stainless steel 304 and PCTFE, and the seal material is FKM. Please check the material used, and only fluids that will not interfere with the material.

Selection

⚠Caution

1. Please use within the operating pressure range.
2. Leaks may result when the supplied pressure exceeds 0.2 MPa(G). When adjusting the pressure on the supply side with a regulator, etc., please take precautions against rising pressure to prevent leakage from the regulator.
3. Do not tighten the initial air supply flow any further than the “minimum supply flow” position, as this may result in component damage, or in increased time needed to attain a vacuum in the vacuum chamber due to a decline in the displacement capabilities of the gas accumulation part (bellows chamber).

Mounting

⚠Caution

1. In high humidity environments, keep valves packaged until the time of installation.

Piping

⚠Caution

1. Before mounting, clean the sealing surface with ethanol, etc.
2. Fasten the VCR® and Swagelok® properly, in accordance with the specified torque and methods prescribed by Swagelok.
   Reference) For VCR®: 1/8 turn after tightening by hand
   For Swagelok®: 1 1/4 turns after tightening by hand
3. Attach the valve using body bottom mounting screws (2-M5).

Maintenance

⚠Caution

1. Replace the bonnet assembly part and body assembly part 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.

Back page 8

Series XL
Specific Product Precautions 4

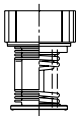
Be sure to read this before handling.

Maintenance Parts

Air operated angle valve/Manual valve

⚠ Caution

1. When replacing seal materials, please replace bonnet assembly or handle assembly. This may not be applicable in cases where the seal material differs from that used in the products.



Bonnet assembly

Handle assembly

Bonnet Assembly, Handle Assembly Component Parts No.: (1)

Model	Temperature specifications	Indicator	Valve size							
			16	25	40	50	63	80	100	160
XLA	General use	None	XLA16-30-1	XLA25-30-1	XLA40-30-1	XLA50-30-1	XLA63-30-1	XLA80-30-1	—	—
		Yes	XLA16A-30-1	XLA25A-30-1	XLA40A-30-1	XLA50A-30-1	XLA63A-30-1	XLA80A-30-1	—	—
	High temperature	None	XLA16-30-1H	XLA25-30-1H	XLA40-30-1H	XLA50-30-1H	XLA63-30-1H	XLA80-30-1H	—	—
		Yes	XLA16A-30-1H	XLA25A-30-1H	XLA40A-30-1H	XLA50A-30-1H	XLA63A-30-1H	XLA80A-30-1H	—	—
XLAV	General use	None	XLAV16-30-1	XLAV25-30-1	XLAV40-30-1	XLAV50-30-1	XLAV63-30-1	XLAV80-30-1	—	—
		Yes	XLAV16A-30-1	XLAV25A-30-1	XLAV40A-30-1	XLAV50A-30-1	XLAV63A-30-1	XLAV80A-30-1	—	—
XLC	General use	None	XLC16-30-1	XLC25-30-1	XLC40-30-1	XLC50-30-1	XLC63-30-1	XLC80-30-1	—	—
	High temperature	None	XLC16-30-1H	XLC25-30-1H	XLC40-30-1H	XLC50-30-1H	XLC63-30-1H	XLC80-30-1H	—	—
XLCV	General use	None	XLCV16-30-1	XLCV25-30-1	XLCV40-30-1	XLCV50-30-1	XLCV63-30-1	XLCV80-30-1	—	—
XLF	General use	None	XLF16-30-1	XLF25-30-1	XLF40-30-1	XLF50-30-1	XLF63-30-1	XLF80-30-1	XLF100-30-1	XLF160-30-1
		Yes	XLF16A-30-1	XLF25A-30-1	XLF40A-30-1	XLF50A-30-1	XLF63A-30-1	XLF80A-30-1	XLF100A-30-1	XLF160A-30-1
	High temperature	None	XLF16-30-1H	XLF25-30-1H	XLF40-30-1H	XLF50-30-1H	XLF63-30-1H	XLF80-30-1H	XLF100-30-1H	XLF160-30-1H
		Yes	XLF16A-30-1H	XLF25A-30-1H	XLF40A-30-1H	XLF50A-30-1H	XLF63A-30-1H	XLF80A-30-1H	XLF100A-30-1H	XLF160A-30-1H
XLFV	General use	None	XLFV16-30-1	XLFV25-30-1	XLFV40-30-1	XLFV50-30-1	XLFV63-30-1	XLFV80-30-1	XLFV100-30-1	XLFV160-30-1
		Yes	XLFV16A-30-1	XLFV25A-30-1	XLFV40A-30-1	XLFV50A-30-1	XLFV63A-30-1	XLFV80A-30-1	XLFV100A-30-1	XLFV160A-30-1
XLD	General use	Standard	—	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	—	—
XLG	General use	None	XLG16-30-1	XLG25-30-1	XLG40-30-1	XLG50-30-1	XLG63-30-1	XLG80-30-1	—	—
	High temperature	None	XLG16-30-1H	XLG25-30-1H	XLG40-30-1H	XLG50-30-1H	XLG63-30-1H	XLG80-30-1H	—	—
XLGV	General use	None	XLGV16-30-1	XLGV25-30-1	XLGV40-30-1	XLGV50-30-1	XLGV63-30-1	XLGV80-30-1	—	—
XLH	Standard	Standard	XLH16-30-1	XLH25-30-1	XLH40-30-1	XLH50-30-1	—	—	—	—

Note 1) In cases where the valve seal material is other than the standard (FKM: includes Compound no. 1349-80: made by Mitsubishi Cable Industries, Inc.), please add suffix symbol for seal material (shown in the below table) at the end of the part number.
Note 2) An auto switch magnet is not attached. In cases where an auto switch magnet is attached, please add "-M9//" at the end of the part number. (Not available for high temperature models)
Note 3) Auto switch and solenoid valve are not attached. When a set including auto switch and solenoid valve is required, please add the symbols after the auto switch in "How to Order" at the end of the part number.

Exterior Seal, (M) Valve Seal, S Valve Seal Assembly

Model	Description Construction No.	Material	Valve size							
			16	25	40	50	63	80	100	160
XLA(V) XLC(V) XLD(V) XLH	Exterior seal ③	Standard	AS568-025V	AS568-030V	AS568-035V	AS568-039V	AS568-043V	AS568-045V	—	—
		Special	AS568-025□	AS568-030□	AS568-035□	AS568-039□	AS568-043□	AS568-045□	—	—
XLF(V) XLG(V)	Exterior seal ③	Standard	XLF16-6	XLF25-6	AS568-035V	AS568-039V	AS568-043V	AS568-045V	AS568-050V	AS568-167V
		Special	—	—	AS568-035□	AS568-039□	AS568-043□	AS568-045□	AS568-050□	AS568-167□
Common	Valve seal ③	Standard	B2401-V15V	B2401-V24V	B2401-P42V	AS568-227V	AS568-233V	B2401-V85V	AS568-349V	B2401-G155V
		Special	B2401-V15□	B2401-V24□	B2401-P42□	AS568-227□	AS568-233□	B2401-V85□	AS568-349□	B2401-G155□
XLD(V)	S valve seal assembly ④	Standard	—	AS568-009V	XLD40-2-9-1A	XLD50-2-9-1A	XLD80-2-9-3A	XLD80-2-9-3A	—	—
		Special	—	AS568-009□	XLD40-2-9-1A□	XLD50-2-9-1A□	—	—	—	—

Note 3) In cases where the seal material is other than the standard (FKM: includes Compound no. 1349-80: made by Mitsubishi Cable Industries, Inc.), please add suffix symbol for seal material (shown in the below table) at the end of the part number (the place of □).
Note 4) Refer to "Construction" of each series for component parts numbers.

Table 1: Seal Material Symbol

Symbol	-XN1	-XP1	-XQ1	-XR1	-XR2	-XR3	-XS1	-XT1	-XU1
Seal material	EPDM	Barrel Perfluoro®	Kalrez®	Chemraz®			VMQ	FKM for PLASMA	ULTIC ARMOR®
Compound no.	2101-80*	70W	4079	SS592	SS630	SSE38	1232-70*	3310-75*	UA4640

Note 5) This may not be applicable in cases where the seal material differs from that used in the products, although the seal material is changed.

* Produced by Mitsubishi Cable Industries, Ltd.

Replacement Heaters

Temperature specification	Valve size						
	25	40	50	63	80	100	160
H2 (100°C heater)	—	XLA25-60M-1	XLA25-60M-1	XLA25-60M-2	XLA25-60M-3	XLA25-60M-2 (2 sets)	XLA25-60M-2 (3 sets)
H3 (120°C heater)	XLA25-60M-1	XLA25-60M-2	XLA25-60M-2	XLA25-60M-3	XLA25-60M-2 (2 sets)	XLA25-60M-2 (3 sets)	XLA25-60M-2 (4 sets)

Example) In the case of a replacement heater for XL□-80-H3, two sets of XLA25-80M-2 (including two M type heaters) are required.

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	XLS16-20-P⊠G
⑥	**Core assembly**	XLS16-30-1		XLS25-30-1	
④	**Armature assembly**	XLS16-30-2		XLS25-30-2	
③-1	**O-ring**	AS568-018V		AS568-018V	
③-2	**O-ring**	AS568-025V		AS568-030V	

Note 1) In case of coil assembly, please enter voltage symbol in ⊠. "G" after ⊠ is grommet, "C" for conduit, "T" for terminal, and "D" for DIN.
Note 2) Refer to "Construction" for component parts numbers.

Series XVD
Specific Product Precautions 5
Be sure to read this before handling.

Smooth Vent Valve/Series XVD

Maintenance Parts

XVD Smooth Vent Valve

Construction No.	Description	Part no.
①	**Bonnet assembly**	XVD2-02A-30-1
②	**Body assembly**	XVD2-02V-30-2 (For VCR®)
		XVD2-02S-30-2 (For Swagelok®)
③	**Exterior seal**	AS568-024V

Record of changes	
B edition	∗ Addition of ø100 and ø160 of High Vacuum Angle Valve Series XLF(V). ∗ Addition of Made to Order Series VLF and Series VLG. ∗ Addition of Smooth Vent Valve Series XVD. ∗ Change of appearance of shape. ∗ Change of auto switch F9□ → M9□. ∗ Deletion of Straight Solenoid Valve (with Metallic Seal Fitting), Series XSA. ∗ Number of pages from 48 to 68. LT

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