



Operation Manual

High Vacuum L Type Valve

PRODUCT NAME

XLG Series

MODEL/ Series

Thank you for purchasing this SMC product.

Be sure to read this Operation Manual carefully and understand its contents before operating this product to ensure the safety of the operator and this product.

Please refer to the drawing and other informative documents for the construction and specifications of this product.

Further, ensure your operating environment satisfies the requirements specified for the product.

Keep this Operation Manual available whenever necessary.

SMC Corporation

Contents

Safety Instructions	-----	2
1. Product Specific Precautions 1 (Precautions on Design, Selection, Mounting, Piping, Wiring, Maintenance)	-----	4
2. Product Specific Precautions 2 (Maintenance parts)	-----	6
3. Specifications	-----	8
4. Construction and Outer dimensions	-----	10
5. Period and scope of warranty	-----	12
6. Parts replacement procedure	-----	13



Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of “Caution,” “Warning” or “Danger.”

They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)*1), and other safety regulations.

- *1) ISO 4414: Pneumatic fluid power -- General rules relating to systems
- ISO 4413: Hydraulic fluid power -- General rules relating to systems
- IEC 60204-1: Safety of machinery -- Electrical equipment of machines (Part 1: General requirements)
- ISO 10218-1992: Manipulating industrial robots -- Safety



Caution

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



Warning

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



Danger

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

Warning

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

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results.

The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product.

This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

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

The product specified here may become unsafe if handled incorrectly.

The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

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

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.

2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.

3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.

2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.

3. An application which could have negative effects on people, property, or animals requiring special safety analysis.

4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.



Safety Instructions

Caution

1.The product is provided for use in manufacturing industries.

The product herein described is basically provided for peaceful use in manufacturing industries. If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary. If anything is unclear, contact your nearest sales branch.

Limited warranty and Disclaimer/Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”.

Read and accept them before using the product.

Limited warranty and Disclaimer

1.The warranty period of the product is 1 year in service or 1.5 years after the product is delivered,whichever is first.*2)
Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.

2.For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.
This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.

3.Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

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

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

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

Compliance Requirements

1.The use of SMC products with production equipment for the manufacture of weapons of mass destruction(WMD) or any other weapon is strictly prohibited.

2.The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulation of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

1. Product Specific Precautions 1



Common Precautions 1

Be sure to read before handling.

Design



Warning

- All models

1. The material of the body and bonnet is A6063, and other metal components of the vacuum part are made of SUS304. The sealing material of the vacuum part is FKM as standard, but this can be changed to other materials (refer to “How to Order”). Confirm whether the fluid to be used is compatible with the materials before use.

Grease for vacuum is applied to the sliding part of the vacuum (Fluorine grease: Y-VAC2).

2. Select materials for the pilot pressure piping and fittings whose heat resistance is suitable for the applicable operating temperature.

- Models with auto switch

1. Keep the temperature of the switch below 60 °C

- With heater (thermistor)

1. When using a model with a heater, a mechanism to prevent overheating should be installed.

Selection



Caution

- All models

1. 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.
2. Keep the pilot pressure within the specified range.

The specified range of XLG-16, XLG-25 and XLG-40 is from 0.3MPa to 0.5MPa, and that is for XLG-50, XLG-63, XLG-80, XLG-100 and XLG-160 is from 0.4MPa to 0.5MPa.

3. Keep within the specified range of the pilot pressure.

- High temperature type

1. If using gases that 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 the valve packed until the time of installation.
2. For models with switches, 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. When there is vibration from heavy objects or attachments, etc., fix piping so that vibration will not apply torque directly to the flange section.

4. Vibration resistance allows for normal operation of up to 30 m/s² (45 to 250Hz), but continuous vibration may cause a decline in durability.

Arrange piping to avoid excessive vibration or impacts.

- High temperature type (temperature specification / H0 H4 H5)

1. In models with a heater (thermistor), take care not to damage the insulation components of the lead wires and connector section.
2. The set temperature for models with a heater should be established without any drafts or heat insulation. It will change depending on conditions such as heat insulation 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 current leakage breaker or fuse should be installed.
4. If the valve is to be insulated, only the body should be insulated, excluding the bonnet part.
5. In models with a heater, when the 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 0.2mm in order to protect the flange seal surface, and it should be handled so that the seal surface is not damaged in any way.

Maintenance

Warning

If the fluid or reaction product (deposit) may cause the valve to become unsafe, the valve should be disassembled, cleaned and re-assembled by an operator who has sufficient knowledge and experience (e.g. a specialist).

Caution

1. When removing deposits from the valve, take care not to damage any part of it.
2. Replace the bonnet assembly when the valve is approaching the end of its service life.
* For details regarding endurance cycles, please reference Section 5 of this Operation manual titled Period and scope of warranty . (pages 12)
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 the Construction / Maintenance parts table.
5. When removing the valve seal and external seal, take care not to damage the sealing surfaces. When installing the valve seal and external seal, be sure that the O-ring is not twisted. (Refer to Section 6 Parts Replacement Procedure (pages 13 to 15) for details.)

2. Product Specific Precautions 2



Common Precautions 2 Be sure to read before handling

Maintenance Parts



SMC specified parts should be used for service. Refer to the construction drawing.

1. Replace the bonnet assembly when changing the sealant material. Due to the different materials used, changing only the seal may prove inadequate.

Bonnet assembly (Construction part no.) 1

Temperature Specifications	Valve size			
	16	25	40	50
For general environments	XLG16-30-1	XLG25-30-1	XLG40-30-1	XLG50-30-1-1
For high temperature	XLG16-30-1H	XLG25-30-1H	XLG40-30-1H	XLG50-30-1H-1

Temperature Specifications	Valve size			
	63	80	100	160
For general environments	XLG63-30-1-1	XLG80-30-1-1	XLG100-30-1-1	XLG160-30-1-1
For high temperature	XLG63-30-1H-1	XLG80-30-1H-1	XLG100-30-1H-1	XLG160-30-1H-1

Note1) The magnet for auto switch is not provided. When the magnet for auto switch is necessary, add "-M9//" at the suffix of the part number.

Note2) List the optional sealant material symbol after the model number, except for the standard sealant material (FKM: compound No. 1349-80).

Note3) The bonnet assembly includes valve seals.

External seal / Valve seal

Description Construction No.	Material	Valve size			
		16	25	40	50
External seal (3)	Standard	XLF16-6	XLF25-6	AS568-035V	AS568-039V
	Special	-	-	AS568-035 **	AS568-039 **
Valve seal (2)	Standard	B2401-V15V	B2401-V24V	B2401-P42V	AS568-227V
	Special	B2401-V15 **	B2401-V24 **	B2401-P42 **	AS568-227 **

Description Construction No.	Material	Valve size			
		63	80	100	160
External seal (3)	Standard	AS568-043V	AS568-045V	AS568-050V	AS568-167V
	Special	AS568-043 **	AS568-045 **	AS568-050 **	AS568-167 **
Valve seal (2)	Standard	AS568-233V	B2401-V85V	AS568-349V	B2401-G155V
	Special	AS568-233 **	B2401-V85 **	AS568-349 **	B2401-G155 **

Note1) List the optional sealant material symbol after the model number, except for the standard sealant material (FKM: compound no. 1349-80).

Note2) Refer to the Construction of each series for the construction numbers.

Note3) We do not guarantee the quality if the seal material is changed by customer.

Additional symbols of the seal materials

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

Note1) Due to the different materials used, changing only the seal may prove inadequate.

Barrel Perfluoro® is a registered trademark of MATSUMURA OIL Co.,Ltd.

Kalrez® is a registered trademark of E. I. du Pont de Nemours and Company.

Chemraz® is a registered trademark of Greene, Tweed & Co.,

ULTIC ARMOR® is a registered trademark of NIPPON VALQUA INDUSTRIES, LTD.

3. Specifications

3-1. Vale specifications

Model		XLG-16	XLG-25	XLG-40	XLG-50-1	XLG-63-1	XLG-80-1	XLG-100-1	XLG-160-1
Flange (valve) size		16	25	40	50	63	80	100	160
Actuating type		Double acting / pressurized to open/close							
Fluid		Vacuum of inert gas							
Operating temperature °C		5 to 60 (5 to 150 for high temperature type)							
Operating pressure Pa(abs)		Atmospheric pressure to 1×10^{-5}							
Conductance l/s Note 1		5	14	45	80	160	200	300	800
Leakage Pam ³ /s	Internal	1.3 x 10 ⁻¹⁰ for the standard material (FKM) at ambient temperature, excluding gas permeation							
	External	1.3 x 10 ⁻¹⁰ for the standard material (FKM) at ambient temperature, excluding gas permeation							
Flange type		KF(NW)				KF(NW),K(DN)			
Main material		Body : Aluminum alloy, critical part : SUS304, FKM (standard seal material) Note 2							
Surface treatment for body		Outside: hard anodized Inside: basis material							
Pilot pressure MPa(G)		0.3 to 0.6				0.4 to 0.6			
Air consumption cm ³ Note 3	0.5MPa	38	91	430	280	500	1000	2300	3700
Port size		M5			Rc 1/8				
Weight kg		0.28	0.46	1.1	1.4	2.3	4.1	7.6	14.9

Note1) Conductance is "molecular flow" measured with an elbow pipe which has the same dimension as each applicable flange.

Note2) The seal sliding part for vacuum uses vacuum grease (Y-VAC2).

Note3) For one cycle of cylinder.

3-2. Heater specifications

Item		XL□-25	XL□-40	XL□-50	XL□-63	
Rated voltage of the heater		90 to 240 ACV				
S y m b o l	H 4	Heater assembly number	-	XLA25-60S-1	XLA25-60S-1	XLA25-60S-2
		No. of heater assemblies	-	1 pc.	1 pc.	1 pc.
		Initial power / Power consumption (W)	100 VAC	-	200/40	200/50
	200 VAC		-	800/40	800/50	800/100
	H 5	Heater assembly number	XLA25-60S-1	XLA25-60S-2	XLA25-60S-2	XLA25-60S-3
		No. of heater assemblies	1 pc.	1 pc.	1 pc.	1 pc.
Initial power / Power consumption (W)		100 VAC	200/40	400/70	400/80	600/130
	200 VAC	800/40	1600/80	1600/80	2400/130	

Item		XL□-80	XL□-100	XL□-160	
Rated voltage of the heater		90 to 240 ACV			
S y m b o l	H 4	Heater assembly number	XLA25-60S-3	XLA25-60S-2	XLA25-60S-2
		No. of heater assemblies	1 pc.	2 pcs.	3 pcs.
		Initial power/ Power consumption (W)	100 VAC	600/150	800/220
	200 VAC		2400/150	3200/220	4800/350
	H 5	Heater assembly number	XLA25-60S-2	XLA25-60S-2	XLA25-60S-2
		No. of heater assemblies	2 pcs.	3 pcs.	4 pcs.
Initial power/ Power consumption (W)		100 VAC	800/180	1200/300	1600/400
	200 VAC	3200/180	4800/300	6400/400	

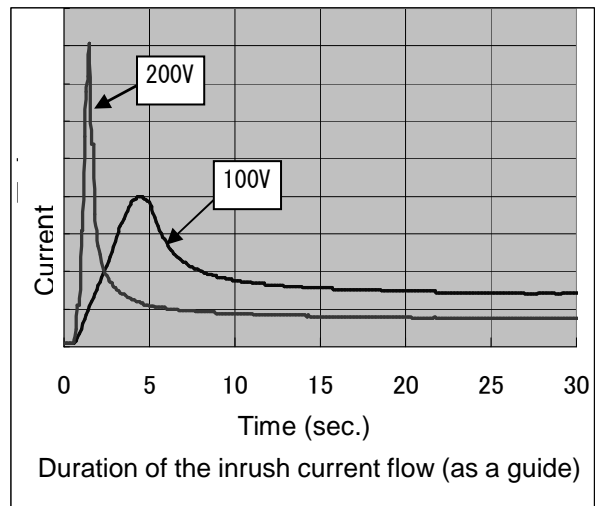
Note 1) Initial power and power consumption are nominal values.

Note 2) Heaters are not available for the size 16 models.

The heaters are PTC thermistor type design. These thermistors self regulate their temperature by switching the resistance at certain critical temperatures, so a separate temperature controller is unnecessary.

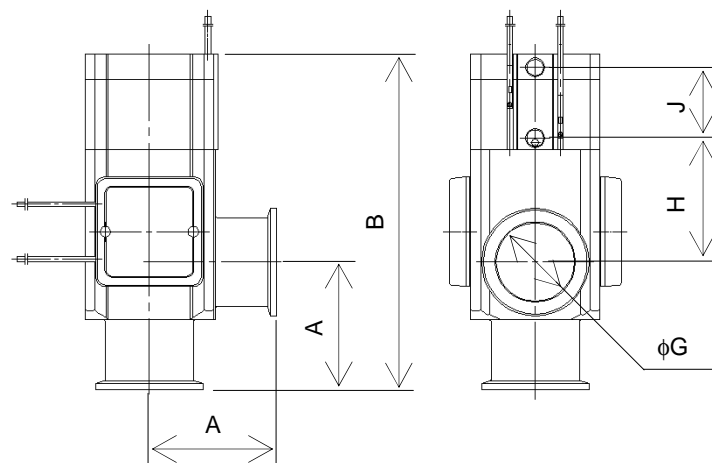
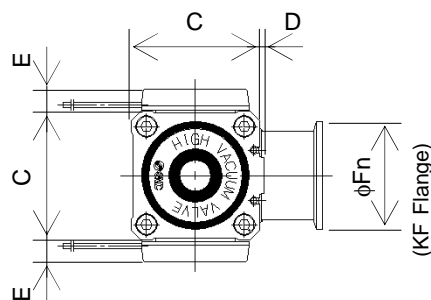
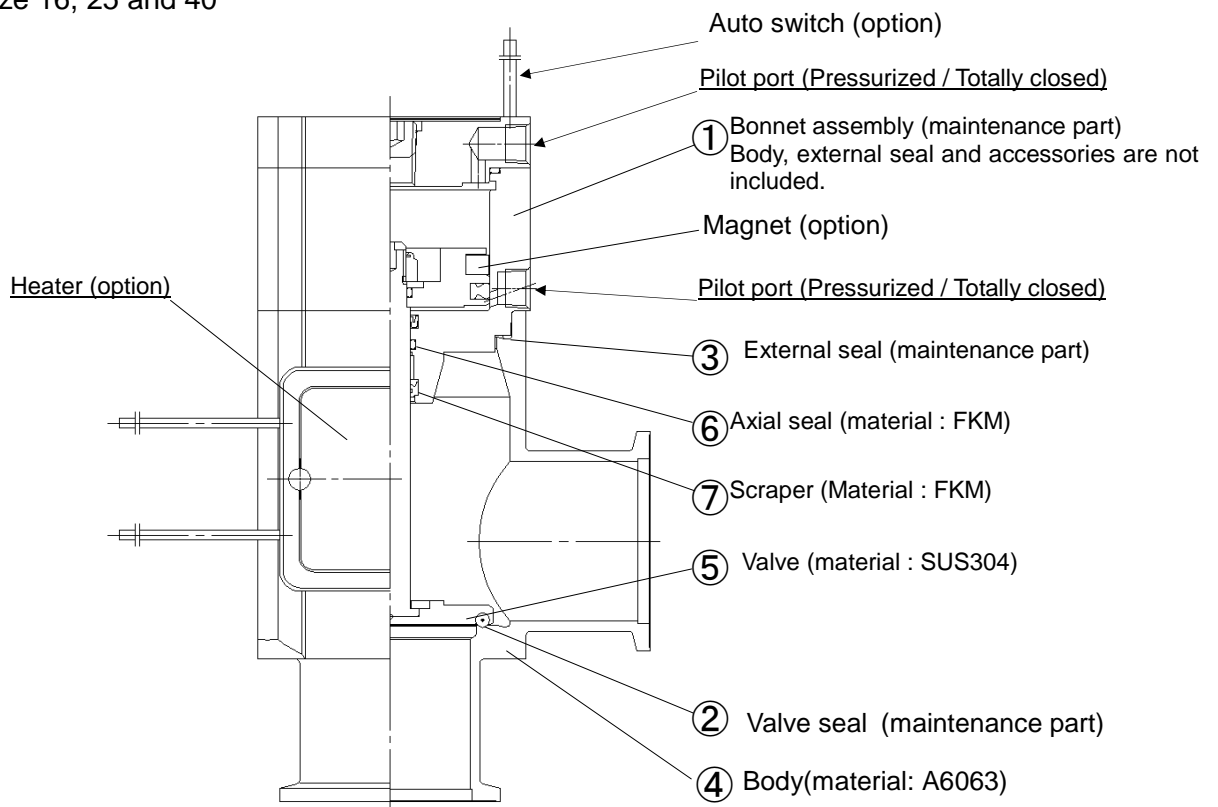
If the temperature of the PTC heaters fitted exceeds 200°C, then it may fail. The maximum operating temperature for the valve is 150°C. If the heater temperature is over 200°C or valve temperature is over 150°C, please use thermostat to control the heaters to prevent overheating.

With PTC type heaters, there is an initial surge of current (inrush current) after the power is supplied. These inrush current will reduce overtime. If multiple heater assemblies are used, the inrush current to the heaters will be magnified and care should be taken. When multiple heater assemblies or valves are used, do not apply power to the heater assemblies simultaneously. Keep approximately 30 seconds between applications of power to each heater assembly. This will allow for incremental spacing to prevent harmful large initial surge.



4. Construction and Outer dimensions

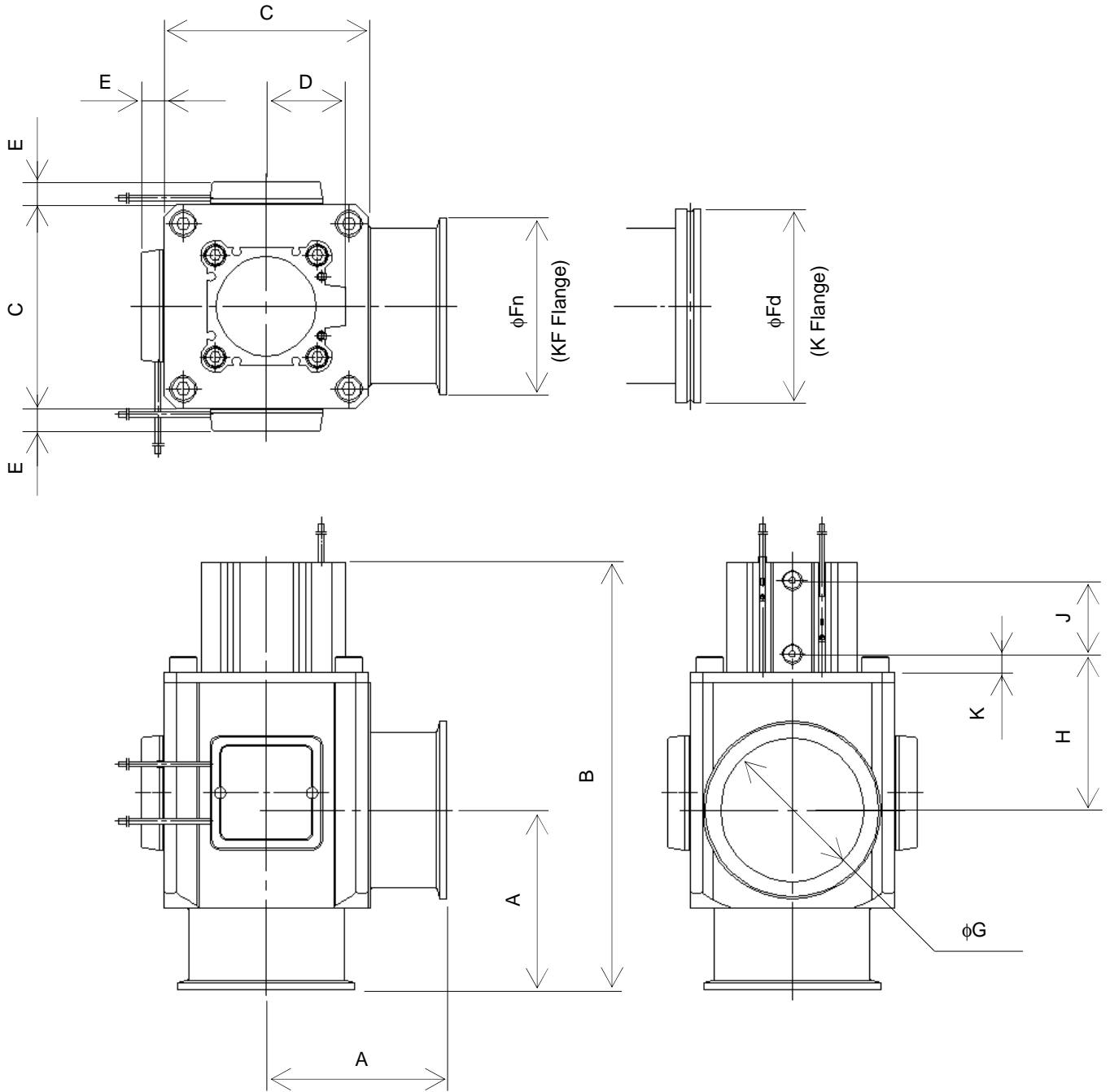
4-1. Size 16, 25 and 40



Unit: mm

Model	A	B	C	D	E	Fn	G	H	J
XLG-16	40	110	38	1	-	30	17	40	26
XLG-25	50	120	48	1	12	40	26	39	27.5
XLG-40	65	171	66	2	11	55	41	63	36

4-2. Size 50,63,80,100,160



Unit: mm

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

5. Period and scope of warranty

The warranty period is 3 million cycles (for size 16, 25 and 40), 2 million cycles (for size 50, 63 and 80) or 1 million cycles (for size 100 and 160) (under SMC endurance test conditions), 18 months after delivery or 12 months in service, whichever comes first.

Note) The endurance will depend on the operating conditions (such as if the flow rate is large). If the valve has been used outside of the specifications, or if a failure occurs as a result of mounting onto a machine or replacement of an assembly, O-ring etc. by the user, the guarantee cannot be applied.

For any failure reported within the warranty period which is clearly our responsibility, the whole valve will be replaced. This guarantee does not apply to any damage incurred due to the failure of the valve.

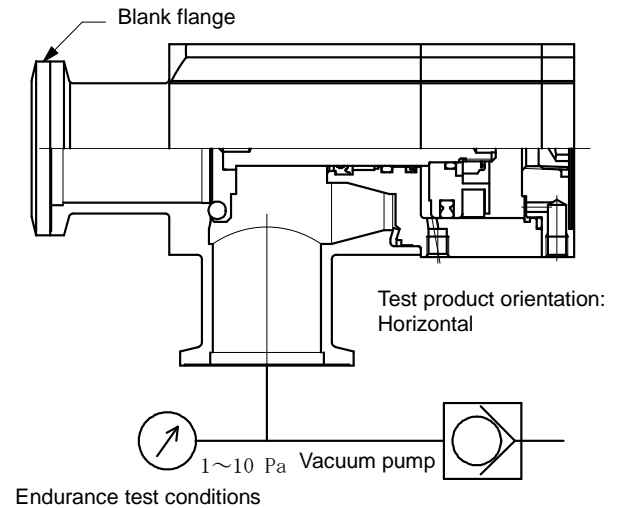
Result of endurance test

(with the circuit shown on the right)

The valve was opened and closed in an internal vacuum state at an ordinary (room) temperature and checked for internal and external leakage and operation.

It was confirmed that XLG-16, XLG-25, XLG-40 satisfied the valve specification up to 3 million cycles, XLG-50, XLG-63, XLG-80 satisfied it up to 2 million cycles, XLG-100 and XLG-160 satisfied it up to 1 million cycles.

The test was performed with FKM, the standard sealant material.



6. Parts Replacement Procedure

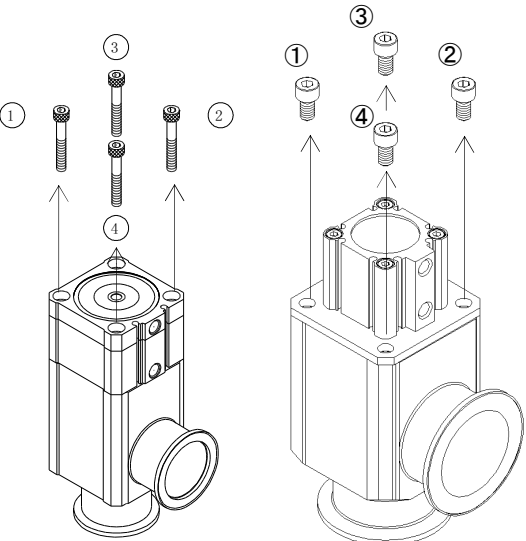
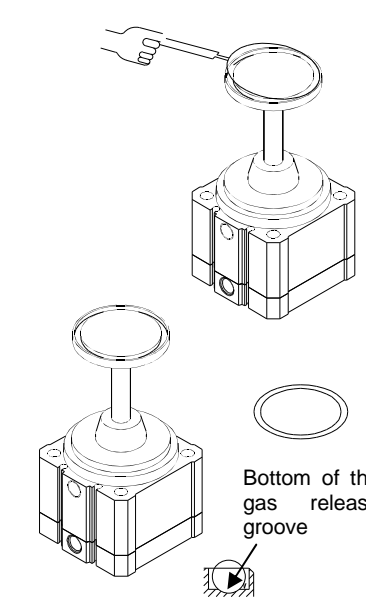
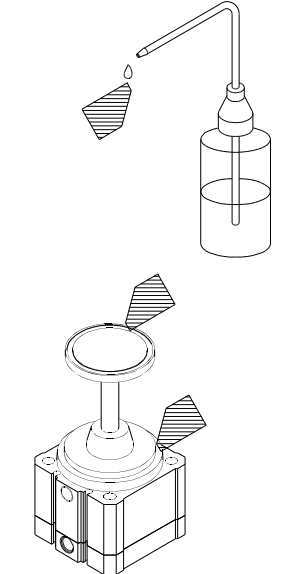
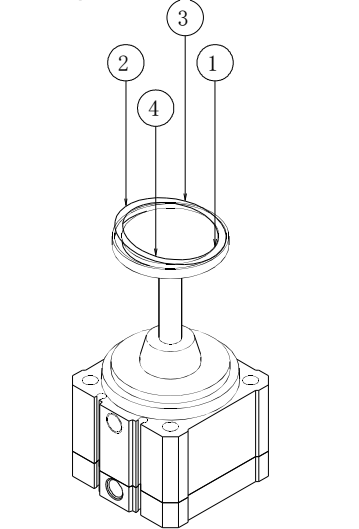
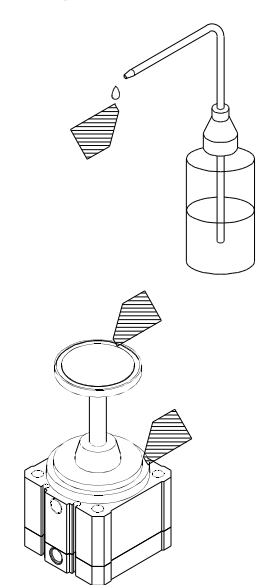
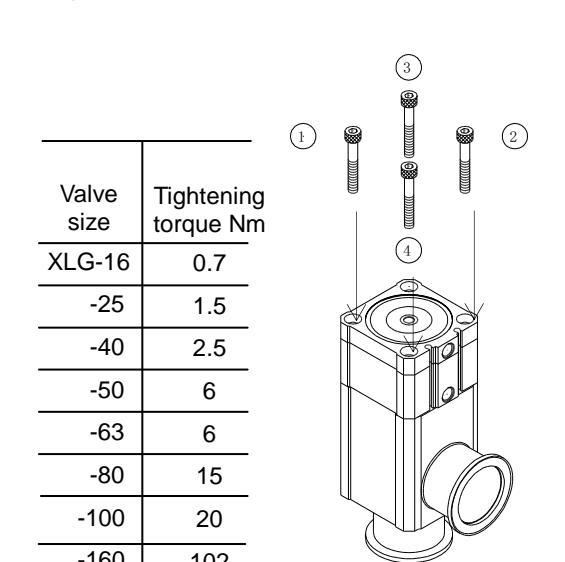
6-1. Precautions

Be sure to follow [1. Precautions 1] when disassembling the product for maintenance. Along with the precautions above, comply with the following precautions too.

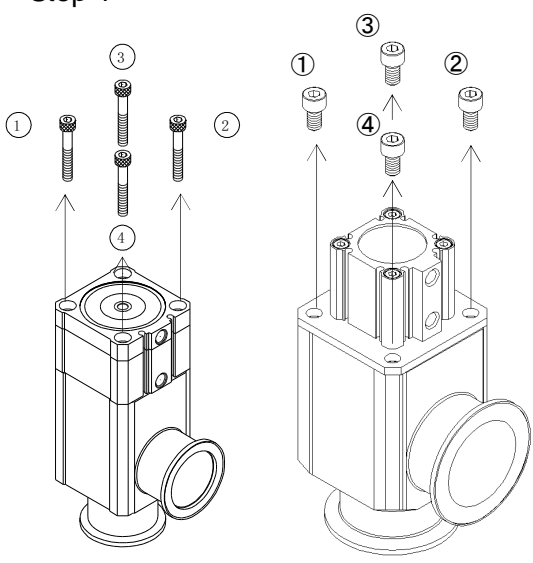
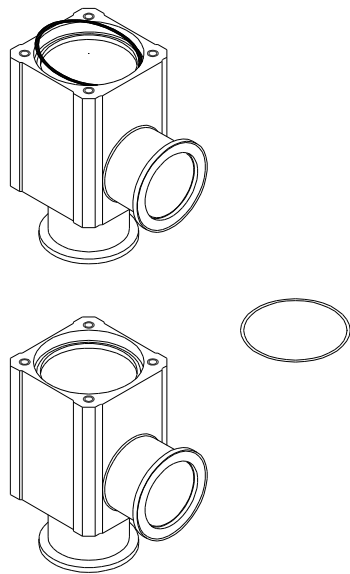
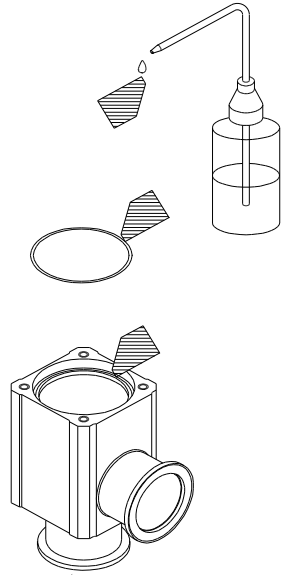
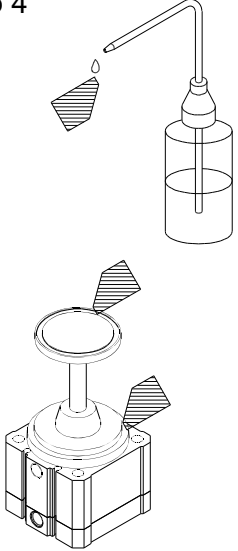
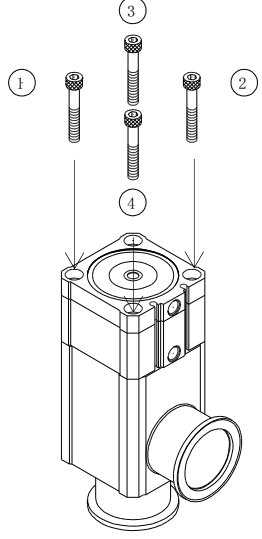
Warning

- If it is expected that product materials may get stuck to the product, ensure safety is assured before handling. It is recommended to wear gloves and a mask.
- Pay attention to the handling of components according to the procedure in the next item onwards. Do not apply excessive force or impact. This will not only damage the product but also decrease its performance and life expectancy.
- It is not possible to disassemble the bonnet assembly of this product. If the components and assembly are damaged, or damage is expected, exchange the bonnet assembly itself.
- Do not disassemble the parts that are not explained in this operation manual. The performance and life may decrease. Also, it may cause danger.

6-2. Replacement Procedure of the valve seal (O-ring)

Step 1	Step 2	Step 3																		
 <p>Size 16, 25 and 40 Size 50, 63, 80, 100 and 160</p> <p>Loosen the hexagon socket head cap screws gradually in numerical order. (Note) For valve sizes larger than 50, pay attention to the position of the hexagon socket head cap screws which should be removed. (Those mounted outermost should be removed.)</p>	 <p>Bottom of the gas release groove</p> <p>Remove the O-ring from the gas release part of the O-ring groove with a tool whose height is as the same as the depth of the gas release part. (Be careful not to damage the O-ring groove.)</p>	 <p>Wipe any dust off the O-ring groove with a clean cloth (Bemcot™) dipped into ethanol. (Confirm that there is no waste thread or dust.)</p>																		
 <p>Wipe any dust off the O-ring surface with a clean cloth (Bemcot™) dipped into ethanol, and insert the O-ring into the O-ring groove. Push the O-ring in numerical order (diagonally) to insert it into the O-ring groove. (Use dust-free gloves.)</p>	 <p>Wipe any dust off the O-ring surface with a clean cloth (Bemcot™) dipped into ethanol.</p>	 <table border="1" data-bbox="933 1288 1173 1736"> <thead> <tr> <th>Valve size</th> <th>Tightening torque Nm</th> </tr> </thead> <tbody> <tr> <td>XLG-16</td> <td>0.7</td> </tr> <tr> <td>-25</td> <td>1.5</td> </tr> <tr> <td>-40</td> <td>2.5</td> </tr> <tr> <td>-50</td> <td>6</td> </tr> <tr> <td>-63</td> <td>6</td> </tr> <tr> <td>-80</td> <td>15</td> </tr> <tr> <td>-100</td> <td>20</td> </tr> <tr> <td>-160</td> <td>102</td> </tr> </tbody> </table> <p>Loosen the hexagon socket head cap screws gradually in numerical order. First tighten evenly by hand until the O-ring is compressed, and then apply extra tightening fully.</p>	Valve size	Tightening torque Nm	XLG-16	0.7	-25	1.5	-40	2.5	-50	6	-63	6	-80	15	-100	20	-160	102
Valve size	Tightening torque Nm																			
XLG-16	0.7																			
-25	1.5																			
-40	2.5																			
-50	6																			
-63	6																			
-80	15																			
-100	20																			
-160	102																			

6-3. Replacement Procedure of the External Seal (O-ring)

<p>Step 1</p>  <p>Size 16, 25, 40 Size 50, 63, 80, 100, 160</p> <p>Loosen the hexagon socket head cap screws gradually in numerical order. Note) For valve sizes larger than 50, pay attention to the position of the hexagon socket head cap screws which should be removed. Those mounted outermost should be removed.</p>	<p>Step 2</p>  <p>Remove the O-ring from the body. (Take care not to damage the mounting surface of the body.)</p>																		
<p>Step 3</p>  <p>Wipe any dust off the O-ring surface and mounting surface of the body with a clean cloth (Bemcot™) dipped into ethanol. After wiping off, mount the O-ring.</p>	<p>Step 4</p>  <p>Wipe any dust off the O-ring surface and O-ring seat with a clean cloth (Bemcot™) dipped into ethanol.</p>																		
<p>Step 5</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="padding: 5px;">Valve size</th> <th style="padding: 5px;">Tightening torque Nm</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">XLG-16</td> <td style="padding: 5px;">0.7</td> </tr> <tr> <td style="padding: 5px;">-25</td> <td style="padding: 5px;">1.5</td> </tr> <tr> <td style="padding: 5px;">-40</td> <td style="padding: 5px;">2.5</td> </tr> <tr> <td style="padding: 5px;">-50</td> <td style="padding: 5px;">6</td> </tr> <tr> <td style="padding: 5px;">-63</td> <td style="padding: 5px;">6</td> </tr> <tr> <td style="padding: 5px;">-80</td> <td style="padding: 5px;">15</td> </tr> <tr> <td style="padding: 5px;">-100</td> <td style="padding: 5px;">20</td> </tr> <tr> <td style="padding: 5px;">-160</td> <td style="padding: 5px;">102</td> </tr> </tbody> </table>  <p>Tighten the socket head cap screws in numerical order. First tighten them evenly by hand until the O-ring is compressed, and then apply extra tightening overall to complete.</p>	Valve size	Tightening torque Nm	XLG-16	0.7	-25	1.5	-40	2.5	-50	6	-63	6	-80	15	-100	20	-160	102	
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Revision history

C	Construction	oo
D	Safety Instructions	PQ
E	Limited warranty and Disclaimer	SR

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Note: Specifications are subject to change without prior notice and any obligation on the part of the manufacturer.
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