



Operation Manual

PRODUCT NAME

High Vacuum L Type Valve

MODEL / Series / Product Number

XLH Series

SMC Corporation

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Safety Instructions

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

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



Danger

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



Warning

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



Caution

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



Warning

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

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

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

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

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

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

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

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



Safety Instructions

Caution

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

Use in non-manufacturing industries is not covered.

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

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

Limited warranty and Disclaimer/Compliance Requirements

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

Limited warranty and Disclaimer

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

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

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

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

Compliance Requirements

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

1. Product Specific Precautions 1



Common Precautions 1

Be sure to read before handling.

Design



Warning

- All models
 1. The body material is A6063, the bellows is SUS316L, and other metal seal material is SUS304. The sealing material of the vacuum part is FKM as standard, but this can be changed to other materials (Refer to Chapter 4, "Construction and Outer dimensions" (P.9) for details). Confirm whether the fluid to be used is compatible with the materials before use.
- With heater (thermistor)
 1. When using a model with a heater, a mechanism to prevent overheating should be installed.
 2. If using gases that cause a large amount of deposits, heat the valve body to prevent deposits in the valve.

Selection



Caution

- All models
 1. Operate within the specified operating pressure range.
 2. Operate within the specified operating temperature range.

Mounting



Caution

- All models
 1. In high humidity environments, keep the valve packed until the time of installation.
 2. 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.
 3. Vibration resistance allows for normal operation of up to 30m/s² (45 to 250Hz). Be advised that continuous vibration may cause a decline in durability. Arrange piping to avoid excessive vibration or impacts.
- High temperature type (temperature specification /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. When a valve is to be heated, only the body section should be heated, excluding the handle section.
 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.
 6. The heater temperature will initially decrease several % after the heating starts and then gradually becomes stable. (The heater temperature may decrease approximately 5 to 10% due to individual differences.)

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 handle assembly when the valve is approaching the end of its service life.
*For the endurance cycles, refer to Chapter 6, "Period and Scope of Warranty" (P.11).
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. Refer to Chapter 2, "Product Specific Precautions 2" (P.6) for details.
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 Chapter 7, "Parts Replacement Procedure" (P.12 to P16) for details.

2. Product Specific Precautions 2



Common Precautions 2

Be sure to read before handling

Maintenance Parts



Caution

SMC specified parts should be used for service.

Refer to Chapter 4, "Construction and Dimensions" (P. 9) for the part indication numbers.

Handle assembly/construction part number (1)

Temperature specifications	Valve size			
	16	25	40	50
Standard(5~150 °C)	XLH16-30-1	XLH25-30-1	XLH40-30-1	XLH50-30-1

Note1) List the optional seal material symbol after the model number, except for the standard seal material (FKM: compound No. 1349-80). e.g.) XLH16-30-1-XN1

Exterior seal, valve seal

Description Constructions No.	Material	Valve size			
		16	25	40	50
Exterior seal (3)	Standard	AS568-025V	AS568-030V	AS568-035V	AS568-039V
	Specific	AS568-025**	AS568-030**	AS568-035**	AS568-039**
Valve seal (2)	Standard	B2401-V15V	B2401-V24V	B2401-P42V	AS568-227V
	Specific	B2401-V15**	B2401-V24**	B2401-P42**	AS568-227**

Note1) List the optional seal material symbol after the model number, except for the standard sealant material (FKM: compound no. 1349-80). e.g.) AS568-025-XN1

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

Note3) Due to the different materials used, changing only the seal may prove inadequate.

Additional symbols of the seal materials

Seal material	EPDM	Barrel Perfluoro®	Kalrez®	Chemraz®			VMQ	FKM for PLASMA	ULTIC ARMOR®	FKM
Combination No.	2101-80	70W	4079	SS592	SS630	SSE38	1232-70	3310-75	UA4640	※
Symbol	-XN1	-XP1	-XQ1	-XR1	-XR2	-XR3	-XS1	-XT1	-XU1	-XF1

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 or its affiliates.

Chemraz® is a registered trademark of Greene, Tweed Technologies, Inc. ULTIC ARMOR® is a registered trademark of VALQUA, LTD.

※ Same specifications as the standard FKM type

Heaters

Temperature specifications	Valve size		
	25	40	50
H4 (100°C)	-	XL1A25-60S-1	XL1A25-60S-1
H5 (120°C)	XL1A25-60S-1	XL1A25-60S-2	XL1A25-60S-2

3. Specifications

3-1. Valve specifications

Model		XLH-16	XLH-25	XLH-40	XLH-50
Flange (valve) size		16	25	40	50
Valve type		Manual type			
Fluid		Vacuum of inert gas			
Operating temperature °C		5 to 150			
Operating pressure Pa		Atmospheric pressure to 1×10^{-6}			
Conductance l/s ^{Note 1)}		5	14	45	80
Leakage Pa·m ³ /s	Internal	1.3 x 10 ⁻¹⁰ for the standard material (FKM) at ambient temperatures , excluding gas permeation			
	External	1.3 x 10 ⁻¹¹ for the standard material (FKM) at ambient temperatures , excluding gas permeation			
Flange type		KF (NW)			
Main material		Body: aluminum alloy, Bellows: SUS316L, Main part: SUS304 and FKM (standard sealing material)			
Surface treatment for body		Outside: hard anodized Inside: basis material			
Pilot 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

Note1) The conductance is "molecular flow" measured with an elbow pipe which has the same dimension with each flange.

3-2. Heater specifications

Item		XLH-25	XLH-40	XLH-50		
Rated voltage of the heater		90 to 240 ACV				
Symbo l	H4	Heater assembly number	-	XL1A25-60S-1	XL1A25-60S-1	
		No. of heater assemblies	-	1 pc.	1 pc.	
		Initial power / Power consumption (W)	100 VAC	-	200/40	200/50
			200 VAC	-	800/45	800/55
	H5	Heater assembly number	XL1A25-60S-1	XL1A25-60S-2	XL1A25-60S-2	
		No. of heater assemblies	1 pc.	1 pc.	1 pc.	
		Initial power / Power consumption (W)	100 VAC	200/40	400/70	400/80
			200 VAC	800/45	1600/90	1600/90

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

Note 2) Heaters are not available for size 16.

Note 3) For mounting, refer to Chapter 1, "Product Specific Precautions 1" (P4) and Chapter 7 "Parts Replacement Procedure" (P16).

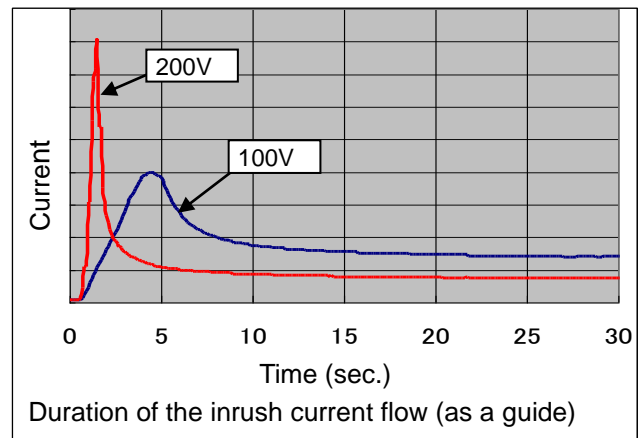
Note 4) As the stable temperature of the heated product may vary by approx. ± 10 to 15% due to instrumental error, be aware that the temperature specifications are to be used as a guide only (H4: 100°C and H5: 120°C).

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.

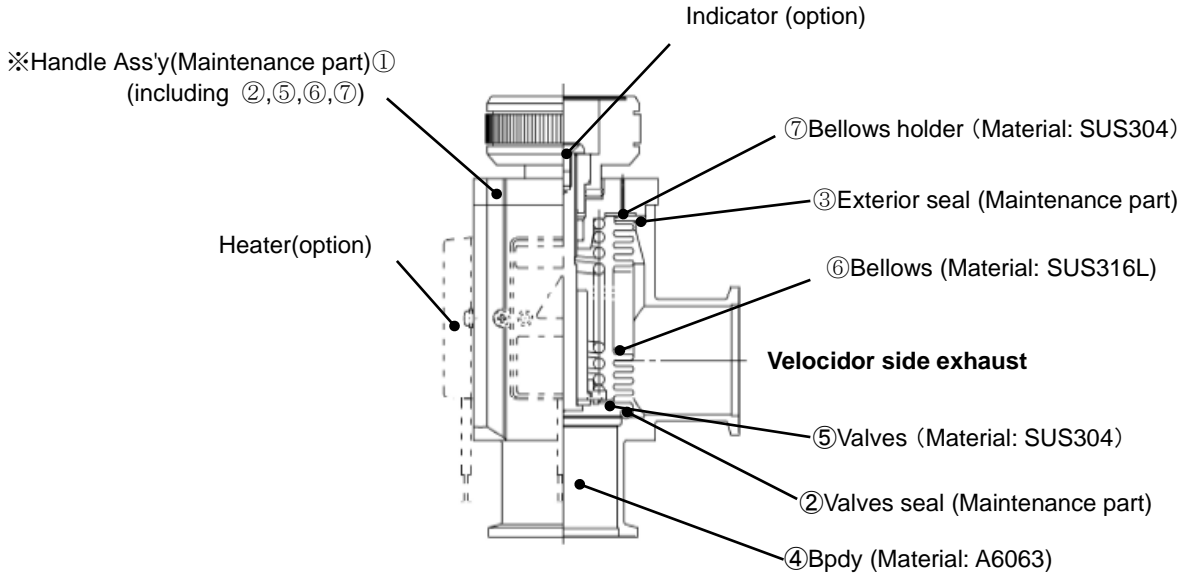
If the temperature of the PTC heaters fitted exceeds 200°C, then it may fail. The maximum operating temperature for the valve is 150°C. If the heater temperature is over 200°C or valve temperature is over 150°C, please use thermostat to control the heaters to prevent overheating.

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.

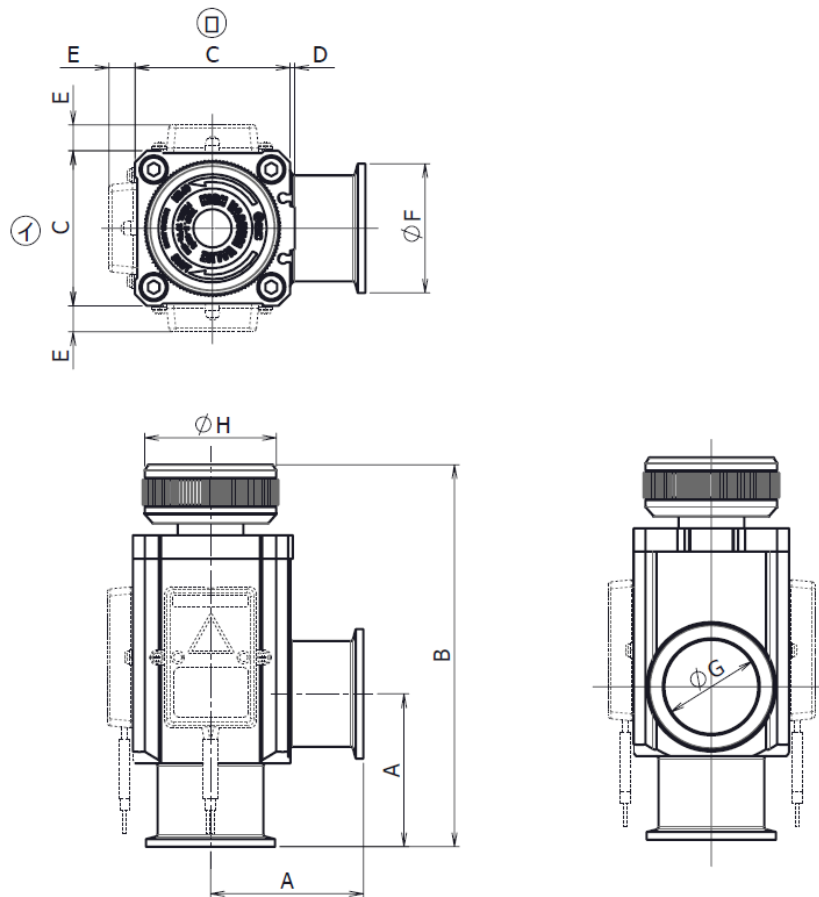


4. Construction and Dimensions

4-1. Construction



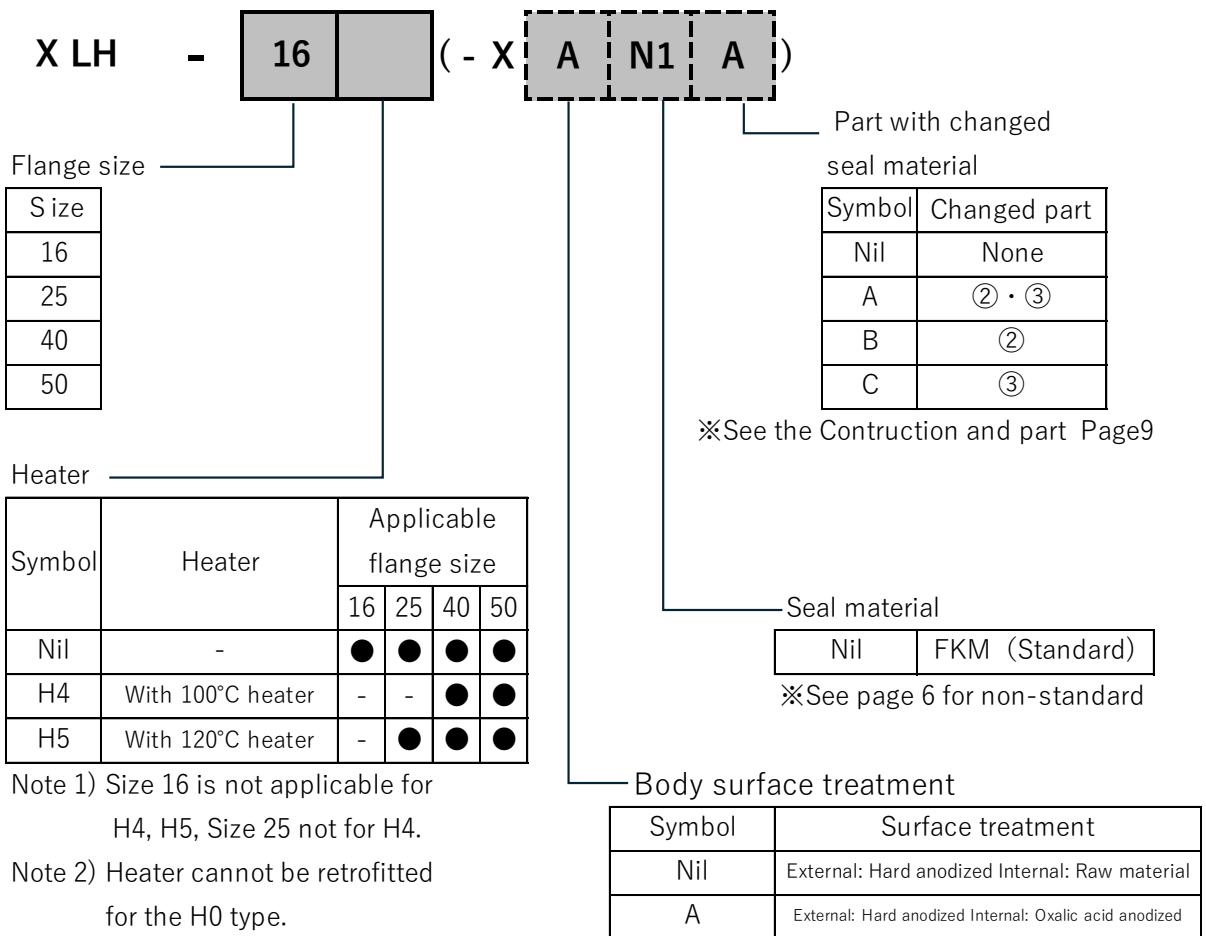
4-2. Dimensions



Unit: mm

Model	A	B	C	D	E	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

5. How to order



6. Period and Scope of Warranty

The warranty period is 1,000,000 cycles (under SMC's endurance test conditions), 1 year in service or within 1.5 years after delivery, whichever comes first.

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, Seal material etc. by the user, the warranty cannot be applied.

Notes) The endurance will depend on the operating conditions (such as if the flow rate is large).

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

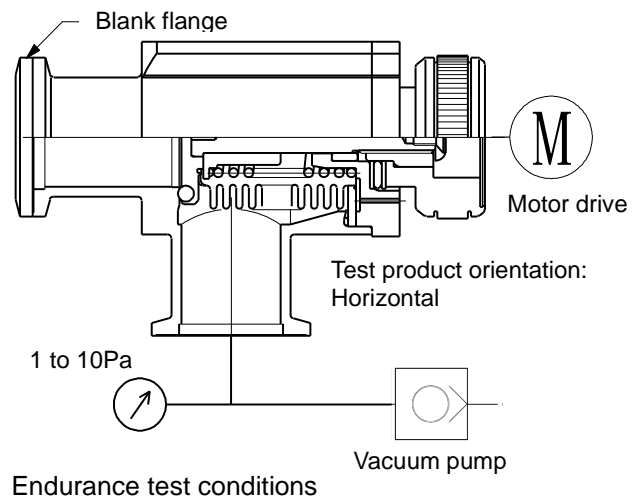
Result of endurance test

(Using the circuit shown on the right)

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

We confirmed that the product satisfies the product specifications of 0.1 million cycles.

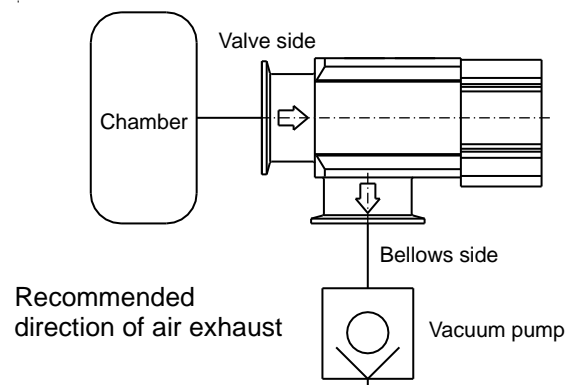
The test was performed with FKM, the standard sealant material.



<Reference>

The pumping direction is not limited, but if the pumping creates a flow stream, the durability of the product could be impaired.

Therefore, the pumping direction shown on the right figure (bellows side pumping) is recommended. Also, the operating conditions should be checked prior to use, as this affects the life of the product.



7. Parts Replacement Procedure

7-1. Precautions

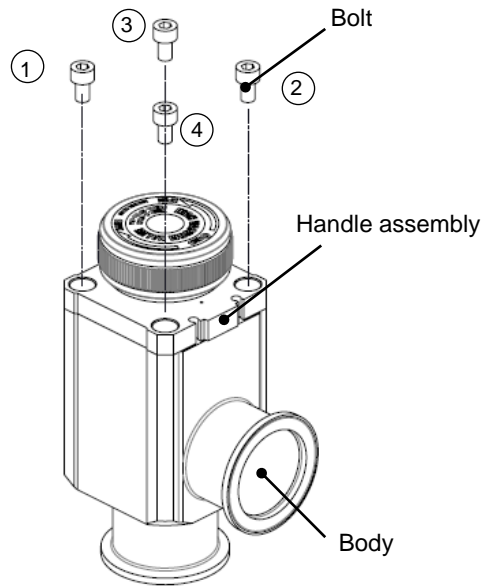
Be sure to adhere to instructions given in “1. Precautions 1”, when disassembling the product for maintenance. Along with the precautions listed in Chapter 1, the user should comply with those listed below.

Warning

- If it is expected that product materials may get stuck to the product, ensure safety is confirmed before handling. It is recommended that the user wear gloves and a mask.
- Pay attention to the handling of components in accordance with the procedures outlined, hereafter. Do not apply excessive force or impact. This may damage the product, as well as, decrease its performance and life expectancy.
- The handle assembly of this product cannot be disassembled. When the components or the handle assembly is damaged or is expected to have been damaged, replace the whole product or the handle assembly.
- Do not disassemble the parts that are not explained in this operation manual. This may decrease the performance and life expectancy of these parts. In addition, disassembly may cause danger.
- **Torque values specified in this manual must be followed.** Not adhering to these specifications, can result in damage to the product.

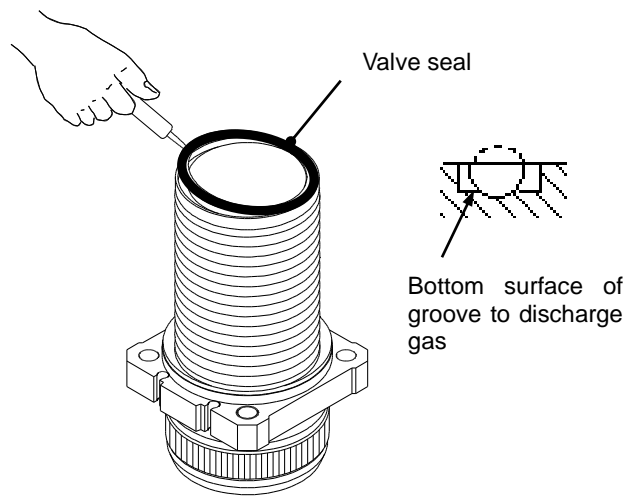
7-2. Disassembly procedure

Step 1 Removal of handle assembly



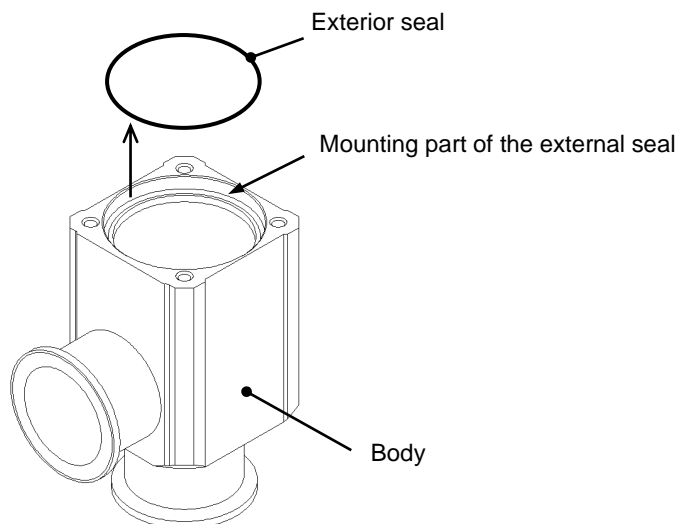
Loosen the bolt gradually in numerical order with the valve opened a little to disassemble the body and the handle assembly. When it is difficult to remove the handle assembly due to adhesion of the external seal, pull the handle assembly straight up slowly without twisting the handle.

Step 2 Removal of valve seal



Remove the valve seal from the seal mounting groove. Use a tool (e.g. which has a finger that is not longer than the depth from the bottom to the top of the groove). Use caution not to scratch the mounting groove surface of the seal.

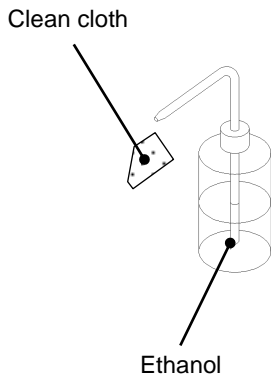
Step 3 Removal of external seal



Remove the external seal from the body.
(Take care not to damage the surface of the seal mounting groove.)

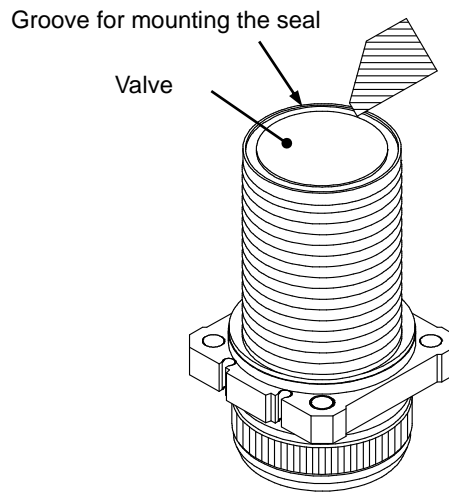
7-3.Assembly Procedure

Step 1 Preparation



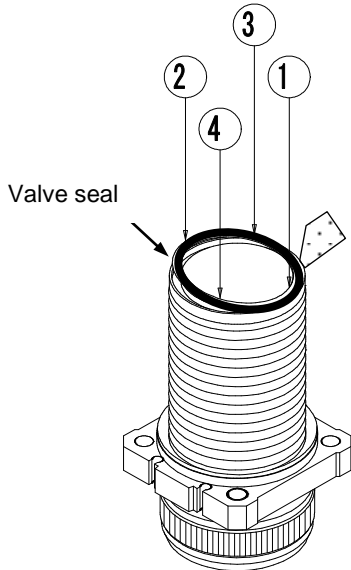
Assemble parts eliminating any dust or debris. Wipe off dust with a clean cloth soaked with ethanol. Blow parts with clean air if necessary. (Ensure there are no fibers or dust.)

Step 2 Reassembly of valve seal (No.1)



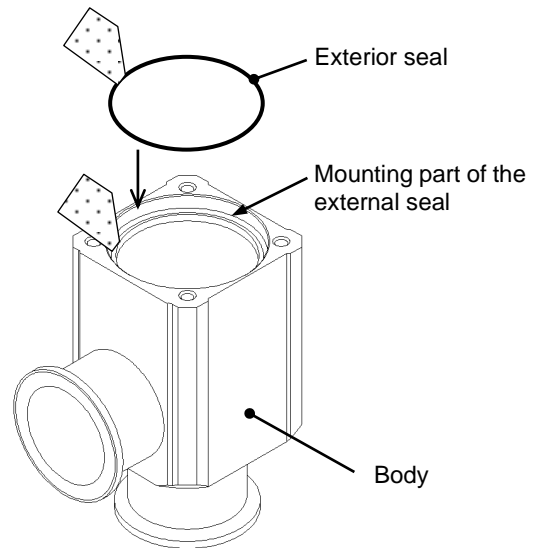
Eliminate any dust within groove for mounting the seal of the valve .

Step 3 Reassembly of valve seal (No.2)



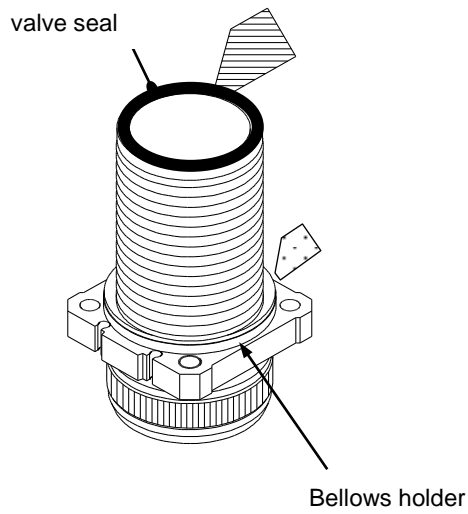
Wipe off any dust on the surface of the valve seal, then place the valve seal in the seal mounting groove. Press the seal into the groove in numerical order (press diagonally) to fit the valve seal into the groove. Do not twist the valve seal. Use dust-free gloves.

Step 4 Remount of external seal



Wipe off any dust from the surface of the external seal and the mounting surface of the external seal on the body, then place the external seal in the mounting position on the body.

Step 5 Reassembly of S valve seal assembly

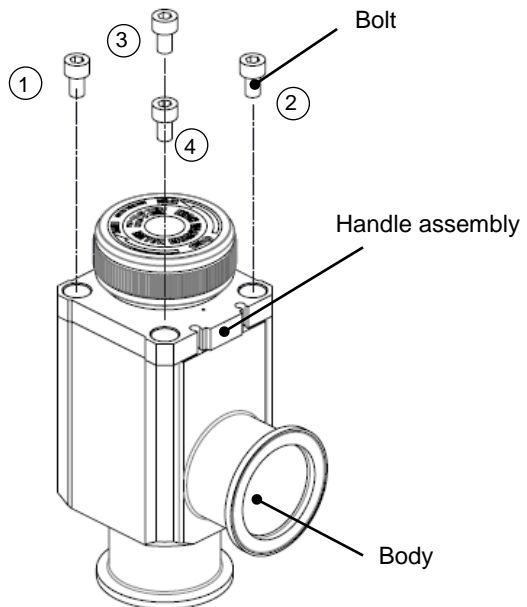


Wipe off any dust from the valve seal valve seal and the Bellows holder surface.

Step 6 Reassembly of bonnet assembly

Tightening torque of bolt
N·m

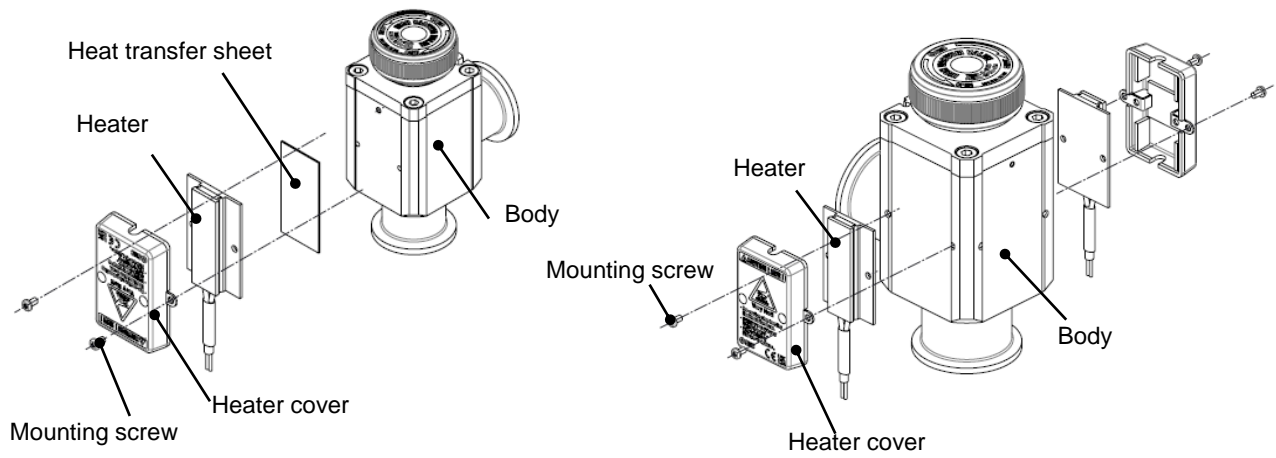
Valve size	Tightening torque
XLH-16	0.7
-25	1.5
-40	2.5
-50	6



Tighten Bolt in numerical order to assemble the Body and the Handle assembly with the valve opened a little in numerical order.

7-4. Heater Replacement Procedure

Step 1 Assembly of heater



Put heat transfer sheet(Note1), heater, heater cover to backside of body.

Tighten the mounting screws to install heater assembly.

Tighten torque:0.3N·m

For detachment, remove the mounting screws.

Note 1) Heat transfer sheet to seat only size 25.

Note 2) Heaters are not available for size 16.

Revision		
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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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