



Operation Manual

PRODUCT NAME

High Vacuum L Type Valve

MODEL/ Series

XLD 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)^{*)}, 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



Precautions 1

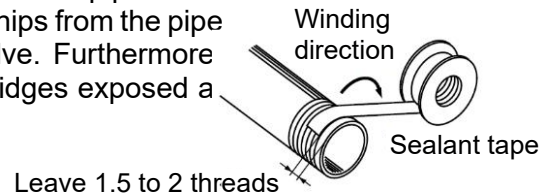
Be sure to read before handling.

Piping



Caution

1. Refer to the Fittings and Tubing Precautions on the SMC website for handling One-touch fittings.
2. Before piping is connected, it should be thoroughly blown out with air (flushing) or washed to remove chips, cutting oil and other debris from inside the pipe.
3. When connecting pipes, fittings, etc., be sure that chips from the pipe threads and sealing material do not enter the valve. Furthermore when sealant tape is used, leave 1.5 to 2 thread ridges exposed at the end of the threads.



Air Supply



Warning

1. Please consult with SMC when using the product in applications other than compressed air.
2. Compressed air containing a large amount of drainage can cause malfunction of pneumatic equipment. An air dryer or water separator should be installed upstream from filters.
3. If condensation in the drain bowl is not emptied on a regular basis, the bowl will overflow and allow the condensation to enter the compressed air lines. It causes malfunction of pneumatic equipment. If the drain bowl is difficult to check and remove, installation of a drain bowl with an auto drain option is recommended.
4. Do not use compressed air that contains chemicals, synthetic oils including organic solvents, salt or corrosive gases, etc., as it can cause damage or malfunction.



Caution

1. When extremely dry air is used as the fluid, degradation of the lubrication properties inside the equipment may occur, resulting in reduced reliability (or reduced service life) of the equipment. Please consult with SMC.
2. Install an air filter at the upstream side of valve. Select an air filter with a filtration degree of 5 μm or finer.
3. Compressed air that contains a large amount of drainage can cause malfunction of pneumatic equipment such as valves. Therefore, take appropriate measures to ensure air quality, such as by providing an aftercooler, air dryer, or water separator.
4. Ensure that the fluid and ambient temperature are within the specified range. If the fluid temperature is 5°C or less, the moisture in the circuit could freeze, causing damage to the seals and equipment malfunction. Therefore, take appropriate measures to prevent freezing.
5. Moisture condensation can occur inside pneumatic systems due to a drop in temperature caused by the piping or operating conditions. This can degrade or wash away grease, resulting in shortened service life or malfunctions. For details, refer to the catalog "Precautionary measures against condensation in a pneumatic system" (CAT.P-E01-11).

For compressed air quality, refer to the SMC catalog "Air preparation system".

2. Product Specific Precautions 2



Precautions 2

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. Refer to Chapter 5, "Construction and Dimensions" (P. 11) for details. Standard seal material in the vacuum section is FKM that can be changed to the other materials. (Refer to Chapter 3, "Product Specific Precautions 3" (P. 7 to 8) for details.) After confirming the type of material used, be sure to use compatible fluids.
2. Select materials for the actuation pressure piping and heat resistant fittings that are suitable for the applicable operating temperatures.

- 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.
2. If using gases that generate a large amount of deposits, it is recommended that the valve body be heated to prevent deposits from sticking to the valve surfaces.

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.
3. Operate within the specified operating pressure range.
4. Operate within the specified operating temperature range.
5. Please note, when selecting a product without an auto switch(es) (excluding those with built-in magnet), it is not possible to mount an auto switch(es) following receipt of the product from an SMC factory.

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 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 / 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 at normal ambient temperature without any drafts or heat insulation.
The temperature 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 the valve 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 designed to protect the flange seal surface.
Be careful when handling the product to prevent any damage to the seal surface .

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 the valve.
2. Replace the bonnet assembly when the valve is approaching the end of its service life.
Refer to Chapter 7, "Period and Scope of Warranty" (P. 15) for details regarding endurance cycles.
3. If potential damages are suspected prior to the end of the service life, perform maintenance earlier than noted. If there are scratches, dents or cracks on the seals (bellows or valve) due to handling or operating conditions, please replace the parts with new ones.
Refer to Chapter 3, "Product Specific Precautions 3" (P. 7 to 8) and Chapter 5, "Construction and Dimensions" (P. 11) for maintenance parts. Parts with the indication of "Maintenance part" can be replaced.
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 Chapter 9, "Parts Replacement Procedure" (P. 16 to 20) for details.)

3. Product Specific Precautions 3



Precautions 3 Be sure to read before handling

Maintenance Parts



Caution

SMC specified parts should be used for maintenance service. Refer to Chapter 5, "Construction and Dimensions" (P. 11) for the part indication numbers.

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

Bonnet assembly/construction part number:1

Temperature specifications	Valve size			
	25	40	50	63
General use	XLD25-30-1	XLD40-30-1	XLD50-30-1	XLD63-30-1
High temperature	XLD25-30-1H	XLD40-30-1H	XLD50-30-1H	XLD63-30-1H

Temperature specifications	Valve size		
	80	100	160
General use	XLD80-30-1	XLD100-30-1	XLD160-30-1
High temperature	XLD80-30-1H	XLD100-30-1H	XLD160-30-1H

Note1) Add the seal material symbol shown on page 8 at the suffix of the model number. This is not necessary for the standard seal material valve seal (**FKM: Compound No. 1349-80**).
e.g.) XLD25-30-1-XN1

Note2) 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. e.g.) XLD25-30-1-M9//

Note3) An auto switch for high temperature is available with a different part number.

Note4) The bonnet assembly contains the valve seal, S valve seal assembly and the initial pumping valve seal. It does not contain external seal. Order separately if it is required.

Exterior seal, valve seal

Description Constructions No.	Material	Valve size			
		25	40	50	63
Exterior seal (3)	Standard	AS568-030V	AS568-035V	AS568-039V	AS568-043V
	Specific	AS568-030**	AS568-035**	AS568-039**	AS568-043**
Valve seal (2)	Standard	B2401-V24V	B2401-P42V	AS568-227V	AS568-233V
	Specific	B2401-V24**	B2401-P42**	AS568-227**	AS568-233**
S Valve seal Ass'y (4)	Standard		XLD40-2-9-1A	XLD50-2-9-1A	XLD63-2-9-1A
	Specific		XLD40-2-9-1A**	XLD50-2-9-1A**	XLD63-2-9-1A**
Initial pumping valve seal (5).	Standard	AS568-009V	AS568-016V	AS568-016V	
	Specific	AS468-009**	AS568-016**	AS568-016**	

Description Construction No.	Material	Valve size		
		80	100	160
Exterior seal (3)	Standard	AS568-045V	AS568-050V	AS568-167V
	Specific	AS568-045**	AS568-050**	AS568-167**
Valve seal (2)	Standard	B2401-V85V	AS568-349V	B2401-G155V
	Specific	B2401-V85**	AS568-349**	B2401-G155**
S Valve seal Ass'y (4)	Standard	XLD80-2-9-1A	XLD100-2-9-1A	XLD160-2-9-1A
	Specific	XLD80-2-9-1A**	XLD100-2-9-1A**	XLD160-2-9-1A**
Initial pumping valve seal (5).	Standard			AS568-020V
	Specific			AS568-020**

Note1) Add the seal material symbol shown on page 8 at the end of the model number (in place of **). This is not necessary for the standard seal material (**FKM: compound No. 1349-80**).
e.g.) AS568-030-XN1

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

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

Chemraz® is a registered trademark of the Greene, Tweed Technologies,inc.

ULTIC ARMOR® is a registered trademark of the VALQUA,L

※Same specifications as the standard FKM type

Heaters

Temperature specifications	Valve size						
	25	40	50	63	80	100	160
H4 (100 °C)	-	XL1A25-60S-1	XL1A25-60S-1	XL1A25-60S-2	XL1A25-60S-3	XL1A25-60S-2 (2 sets)	XL1A25-60S-2 (3 sets)
H5 (120 °C)	XL1A25-60S-1	XL1A25-60S-2	XL1A25-60S-2	XL1A25-60S-3	XL1A25-60S-2 (2sets)	XL1A25-60S-2 (3 sets)	XL1A25-60S-2 (4 sets)

Example) The heaters included with XLD-80H5 are 2 pieces of XL1A25-60S-2 (a set including 2 heater units).

4. Specifications

4-1. Specifications

Model		XLD-25	XLD-40	XLD-50	XLD-63	XLD-80	XLD-100	XLD-160
Flange (valve) size		25	40	50	63	80	100	160
Actuating type		Normally closed						
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^{-6}						
Conductance l/s Note 1)	Main pumping	14	45	80	160	200	300	800
	Initial pumping	0.5 to 3	2 to 8	2.5 to 11	4 to 18	4 to 18	6.5 to 31.5	6.5 to 31.5
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)			KF (NW) , K (DN)			
Main material		Body: aluminum alloy, Bellows: SUS316L, Main part: SUS304 and FKM (standard sealing material) Note 2)						
Surface treatment for body		Outside: hard anodized Inside: basis material						
Actuation pressure MPa(G)		0.4 to 0.7						
Air consumption cm ³ for 0.5MPa Note 3)	Main pumping	46	200	360	660	1350	3000	5150
	Initial pumping	3.5	12	15.5	30	42	54	54
Port size		M5	Rc 1/8					Rc 1/4
Weight kg		0.5	1.2	1.8	3.4	5.6	11.5	20

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

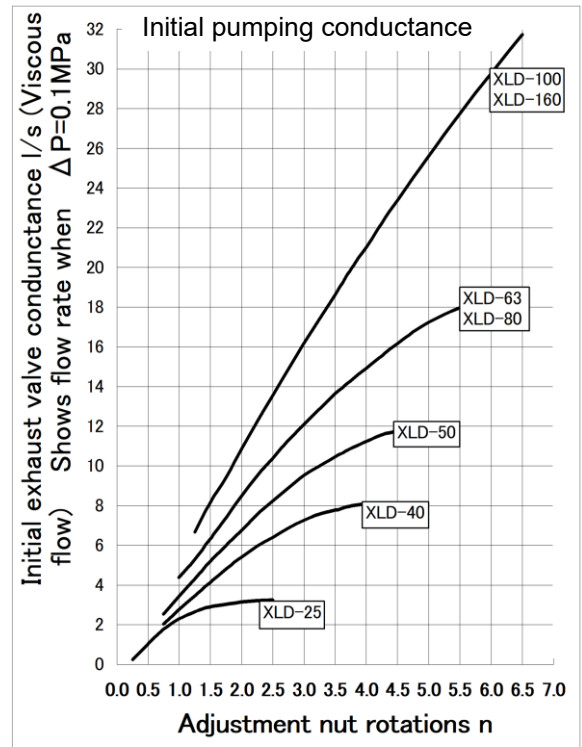
Initial pumping conductance is the value for "viscous flow".

Note2) A seal sliding part for vacuum use vacuum grease (Y-VAC2).

Note3) For one cycle of cylinder.

See the figure on the right for the relation between the numbers of revolution of adjustment nut (pitch 1mm) and conductance of the initial exhausting valve.

(The conductance is just a reference.)



4-2. 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	-	XL1A25-60S-1	XL1A25-60S-1	XL1A25-60S-2
		No. of heater assemblies	-	1 pc.	1 pc.	1 pc.
		Initial power / Power consumption (W)	100 VAC	-	200/40	200/50
	200 VAC		-	800/45	800/55	800/110
	H 5	Heater assembly number	XL1A25-60S-1	XL1A25-60S-2	XL1A25-60S-2	XL1A25-60S-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	800/45	1600/90	1600/90	2400/145	

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	XL1A25-60S-3	XL1A25-60S-2	XL1A25-60S-2
		No. of heater assemblies	1 pc.	2 pcs.	3 pcs.
		Initial power/ Power consumption (W)	100 VAC	600/150	800/220
	200 VAC		2400/160	3200/240	4800/385
	H 5	Heater assembly number	XL1A25-60S-2	XL1A25-60S-2	XL1A25-60S-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	3200/200	4800/330	6400/440	

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

Note 2) For mounting, refer to Chapter 2, "Product Specific Precautions 2" (P6) and Chapter 9, "Parts Replacement Procedure" (P20).

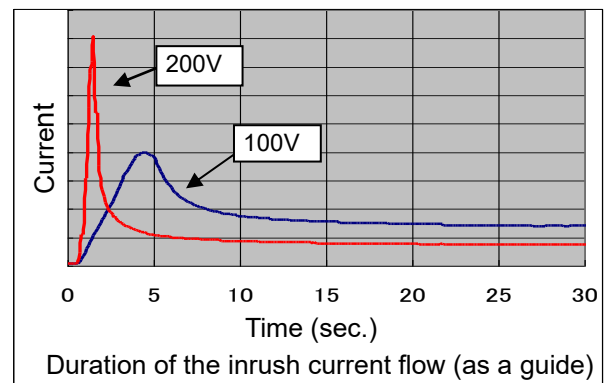
Note 3) As the stable temperature of the heated product may vary by approx. ± 10 to 15% due to instrumental error, be aware that the temperature specifications are to be used as a guide only (H4: 100°C and H5: 120°C).

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

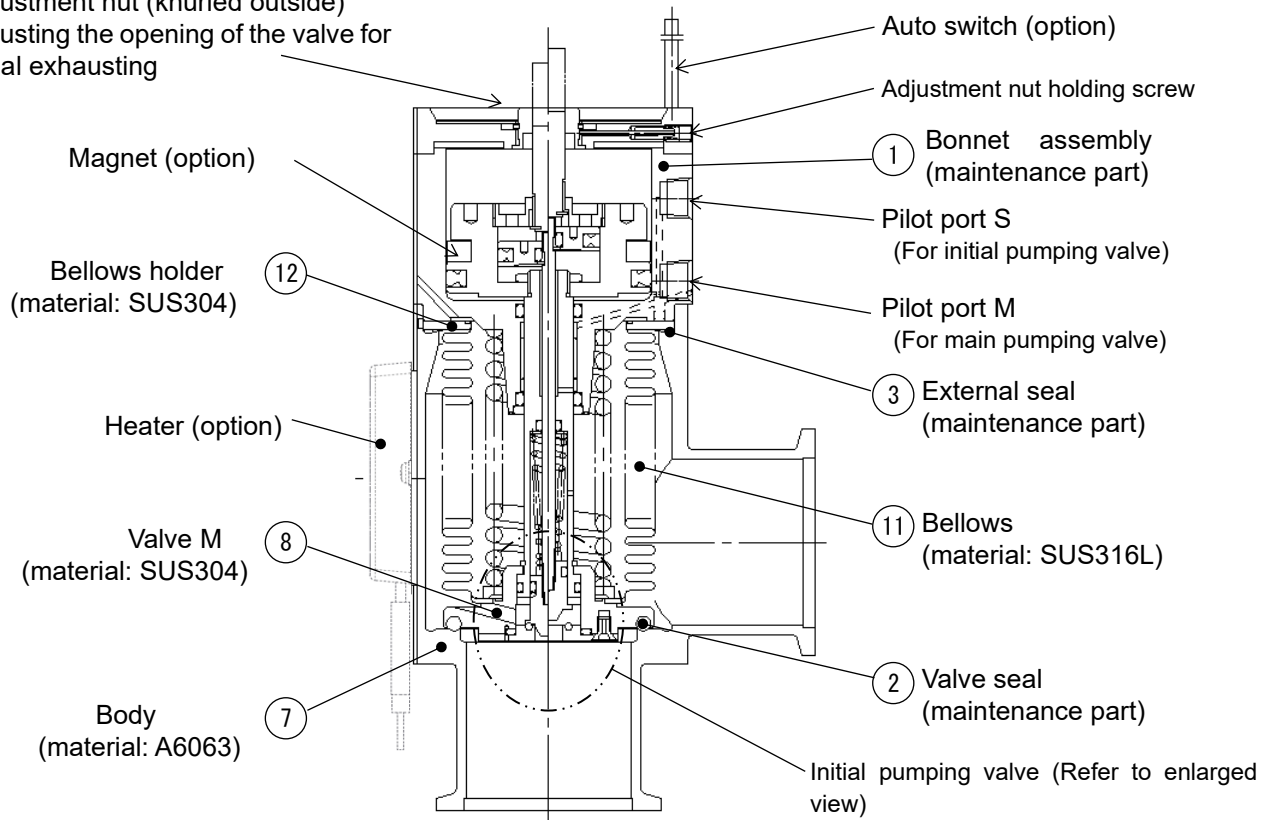
heaters to prevent overheating. With PTC type heaters, there is an initial surge of current (inrush current) after the power is supplied. These inrush current will reduce overtime. If multiple heater assemblies are used, the inrush current to the heaters will be magnified and care should be taken. When 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.



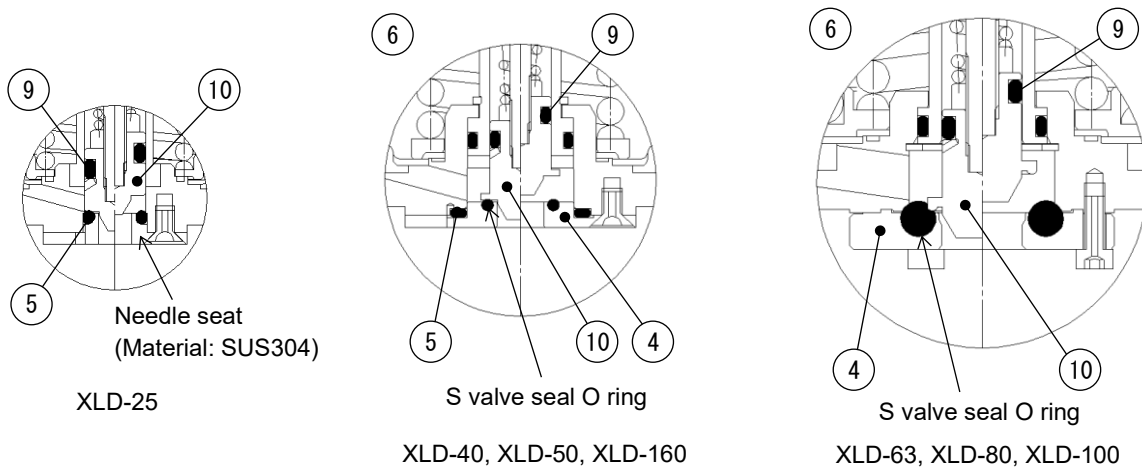
5. Construction and Dimensions

5-1. Construction

Adjustment nut (knurled outside)
Adjusting the opening of the valve for
initial exhausting



Initial pumping valve (Enlarged view)

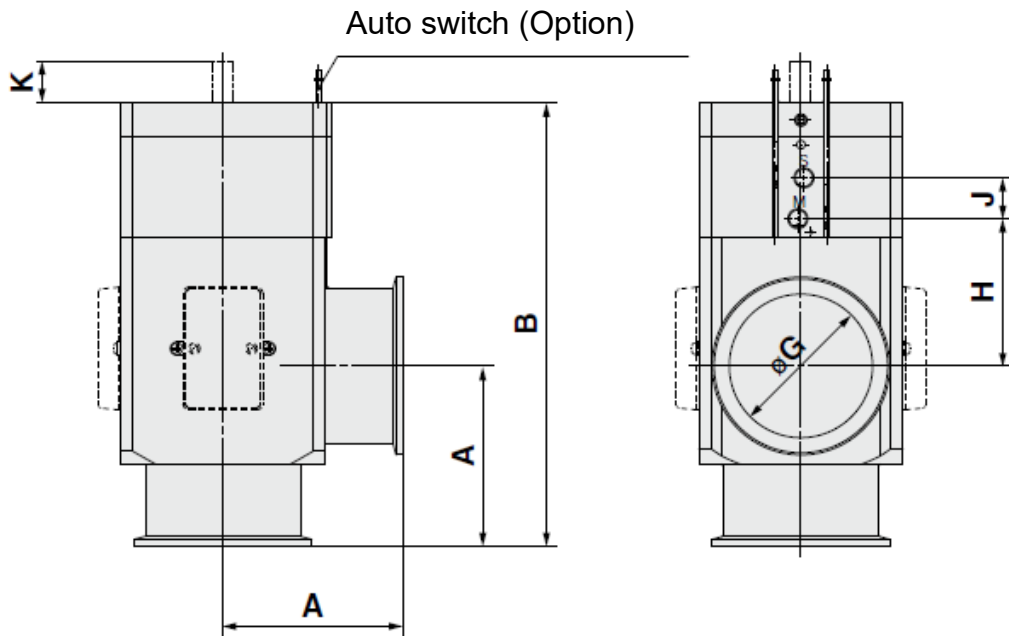
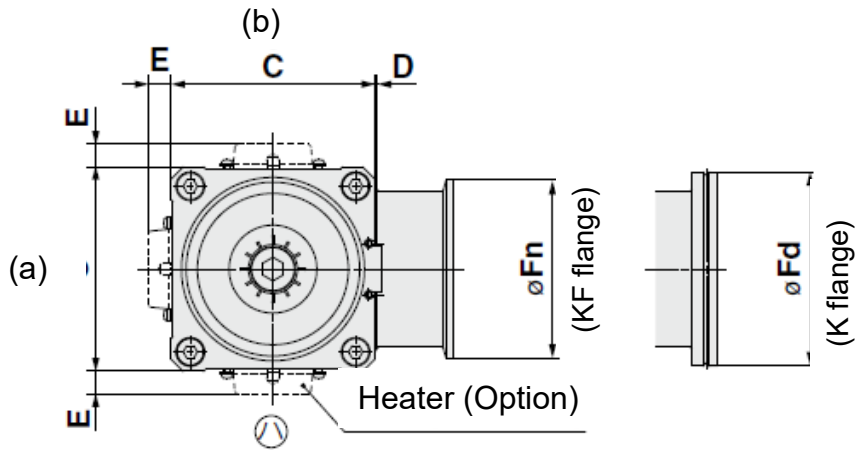


- 4 S valve assembly (Maintenance part) Note 1 (Material: SUS304 + Seal material)
- 5 Initial pumping valve seal (Maintenance part)
- 6 Fixing ring
- 9 O-ring for sliding of S valve Note 2 (material: FKM)
- 10 S valve (material: SUS304)

Note1) The O ring of the S valve seal assembly cannot be replaced. It is necessary to replace the whole assembly.

Note2) The material of the O ring for sliding of S valve is FKM. This cannot be changed.

5-2. Dimensions



Unit: mm

Model	A	B	C	D	E	F _n	F _d	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
XLD-100	108	321	154	3	11	134	130	102	133	20	38
XLD-160	138	335	200	3	11	190	180	153	114	30	40

5. Operation

6-1. Adjusting the opening of the valve for initial pumping

Adjust the initial pumping amount with no air pressure to the pilot port S before using. Initial flow is reduced by turning the adjustment nut clockwise. It is increased by turning it counterclockwise. The location where the nut gently stops during rotation clockwise and counterclockwise indicates the initial flow zero and the maximum flow. If the nut is rotated too much, it may damage the nut.

The adjustment nut shall be operated by hand. Do not use any tool. If the rotation of the adjustment nut feels heavy, please refer to the following items.

The adjustment nut is fully closed when the completed product is shipped. The nut is fully open when the bonnet assembly (maintenance part) is shipped. Use caution.

6-2. Fixing adjustment nuts

The adjustment nut does not rotate during the operation of the valve. It can be fixed to prevent incorrect operation, if required. If the adjustment nut is fixed after adjusting the initial flow, tighten the adjustment nut set screw to the tightening torque shown in the table below. When loosening the set screw, loosen until it stops gently. Do not remove the adjustment nut set screw.

The adjustment nut is not fixed when the product is shipped. If the rotation of the adjustment nut feels heavy, loosen the adjustment nut set screw.

Adjustment nut tightening torque

Model	XLD-25	XLD-63
	XLD-40	XLD-80
	XLD-50	XLD-100
		XLD-160
Tightening torque	0.08 N · m or less	0.3 N · m or less

6-3. Opening the valve (s valve) for initial pumping

When the air pressure is applied to the pilot port S, the S valve will release from the S valve seal assembly and open to the adjusted opening.

6-4. Opening the valve (valve M) for main pumping

When the air pressure is applied to the pilot port M, the valve will release from the body seat and fully open. It operates even when air pressure is not applied to the pilot port S.

6-5. Closing the valve for initial pumping and main pumping

When the air pressure is released from the pilot port S and M, S and M valve will return and start sealing.

7. How to order

X LD - 25 - M9N A (- X A N1 A)

Flange size

Size
25
40
50
63
80
100
160

Flange type

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

Indicator Pilot port direction

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

Temperature specifications/Heater

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

*1 Size 25 is not applicable to H4.

*2 Heater cannot be retrofitted for the H0 type.

Part with changed seal material

Symbol	Changed part
Nil	None
A	② · ③ · ④ · ⑤
B	② · ④ · ⑤
C	③

*See the Construction and part Page 11

Seal material

Nil	FKM (Standard)
-----	----------------

*See page 8 for non-standard

Body surface treatment

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

Number of auto switches/Mounting position

Symbol	Quantity	Mounting position
Nil	Without auto switch	-
A	2	Valve open/closed
B	1	Valve open
C	1	Valve closed

Auto switch type

Symbol	Model	Remarks
Nil	-	Without auto switch (without magnet)
M9N(M)(L)(Z)	D-M9N(M)(L)(Z)	Solid state auto switch
M9P(M)(L)(Z)	D-M9P(M)(L)(Z)	
M9B(M)(L)(Z)	D-M9B(M)(L)(Z)	
A90(L)	D-A90(L)	Reed auto switch
A93(M)(L)(Z)	D-A93(M)(L)(Z)	
M9//	-	Without auto switch (with magnet)

*No auto switch for high temperature type

8. Period and Scope of Warranty

The warranty period is 2 million cycles for sizes 25, 40, 50, 63 and 80, 1 million cycles for sizes 100 and 160 (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, seals, or etc. by the user, the warranty will not be applied. (Note) The endurance of the product will depend on the operating conditions (such as if the flow rate is large).

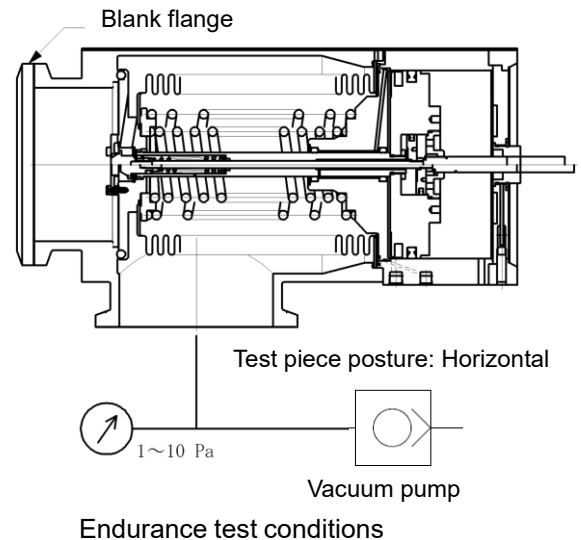
For any failure reported within the warranty period which is clearly our responsibility, the whole valve will be replaced. This guarantee does not apply to any damage incurred due to the failure of the valve.

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 2 million cycles (for size 25, 40, 50, 63, 80) or 1 million cycles (for size 100, 160).

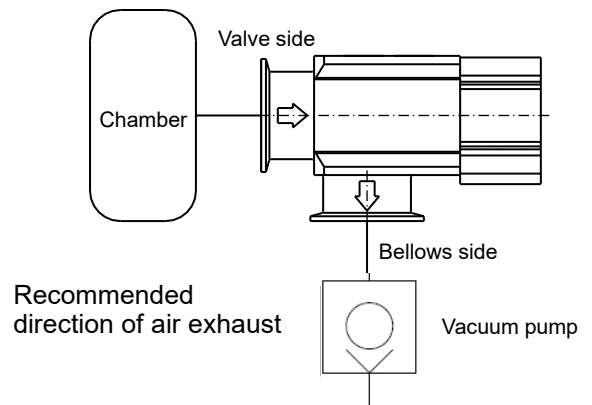
The test was performed with FKM, the standard sealant material.



<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.



9. Parts Replacement Procedure

9-1. Precautions

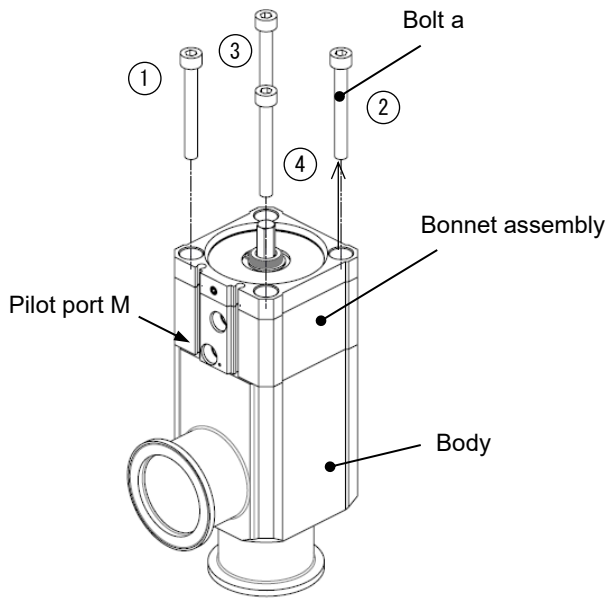
Be sure to adhere to the instructions given in “2. Precautions 2“, when disassembling the product for maintenance. Along with the precautions listed in Chapter 2, the user should comply with those listed below.

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 cylinder portion of this product cannot be disassembled. When the cylinder portion or the bonnet assembly is damaged or is expected to have been damaged, replace the whole product or the bonnet 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.

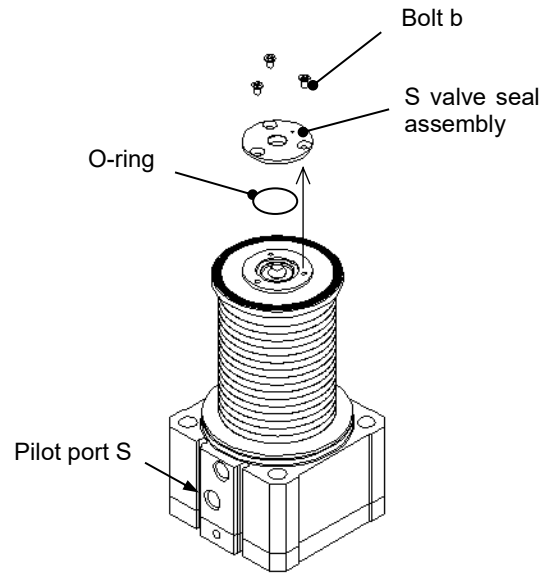
9-2. Disassembly procedure

Step 1 Removal of bonnet assembly



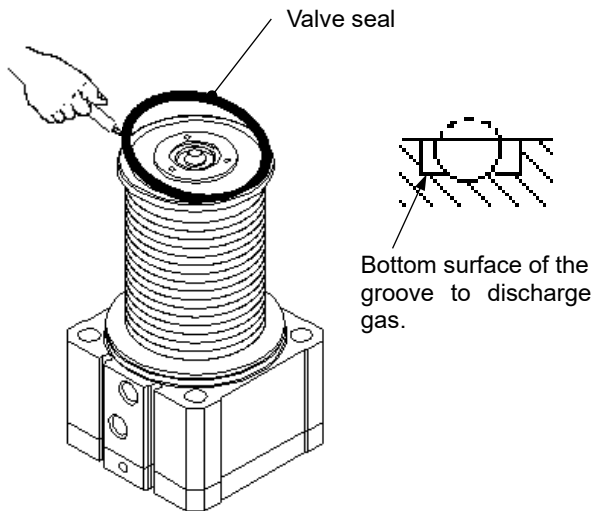
Supply air pressure of 0.2MPa (G) to the pilot port M. Loosen the bolt a in numerical order to disassemble the body and the bonnet assembly.

Step 2 Removal of S valve seal assembly



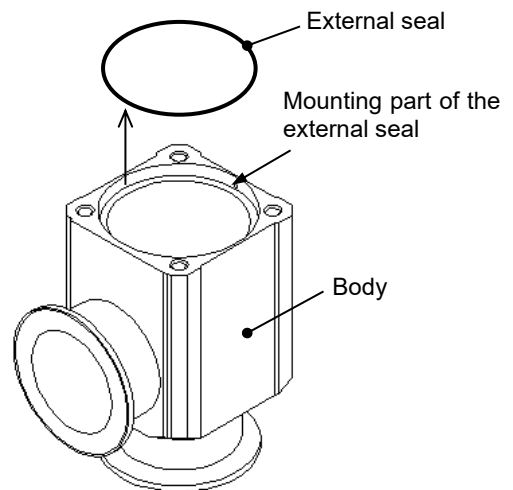
Supply air pressure of 0.3MPa (G) to the pilot port S. Loosen the bolt b to remove S valve seal assembly. Initial pumping valve seal O ring is removed from size 25, 40, 50, and 160 too.

Step 3 Removal of valve seal



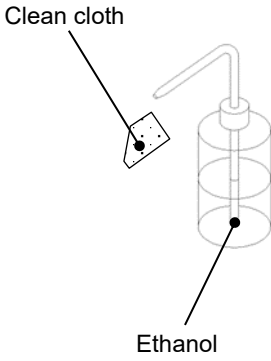
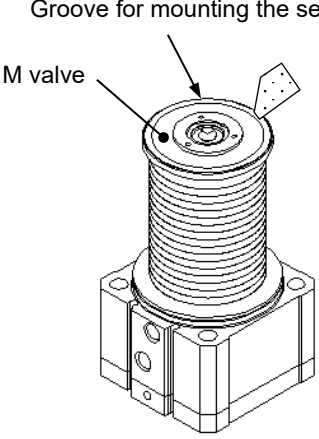
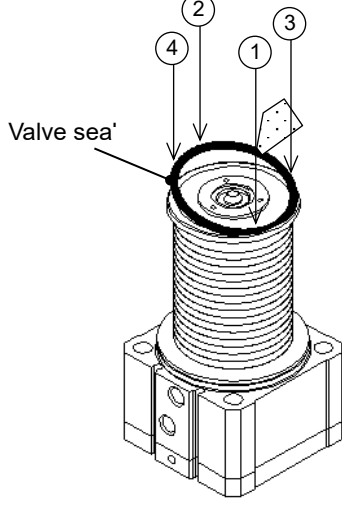
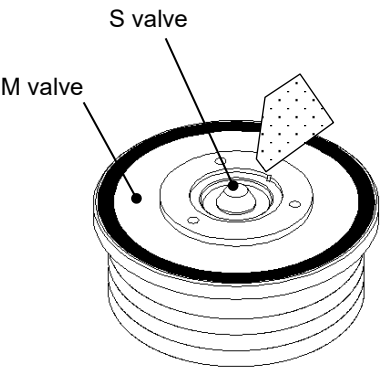
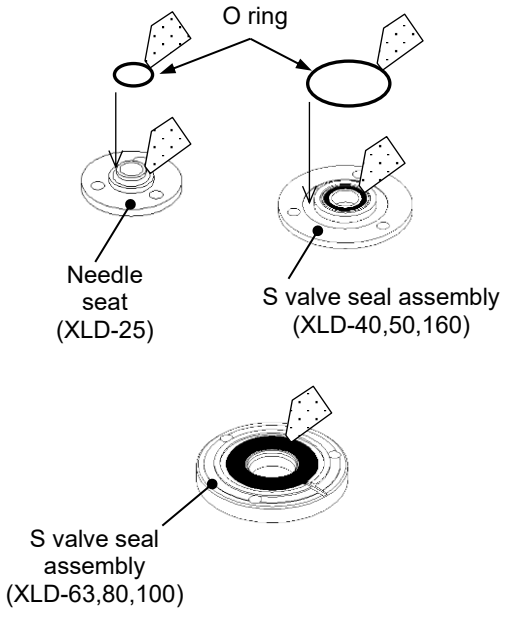
Remove the valve seal from the seal mounting groove. Use a tool (e.g. which has a finger that is not longer than the depth from the bottom to the top of the groove). Use caution not to scratch the mounting groove surface of the seal.

Step 4 Removal of external seal



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

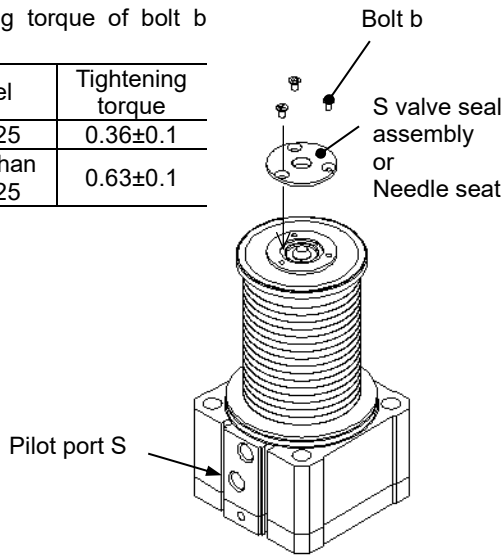
9-3. Assembly Procedure

<p>Step 1 Preparation</p>  <p>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.)</p>	<p>Step 2 Reassembly of valve seal (No.1)</p>  <p>Eliminate any dust within groove for mounting the seal of the valve M.</p>	<p>Step 3 Reassembly of valve seal (No.2)</p>  <p>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.</p>
<p>Step 4 Reassembly of S valve seal assembly (No.1)</p>  <p>Wipe off any dust of the S valve and around it.</p>	<p>Step 5 Reassembly of S valve seal assembly (No.2)</p>  <p>Wipe off any dust from the needle seat or S valve seal assembly. For size 25, 40, 50, and 160, wipe off any dust from the initial pumping valve seal O ring. Mount the needle seat or S valve seal assembly.</p>	

Step 6 Reassembly of S valve seal assembly (No.3)

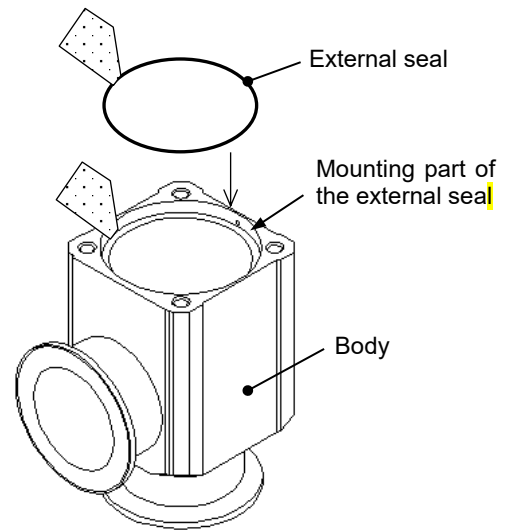
Tightening torque of bolt b
N · m

Model	Tightening torque
XLD-25	0.36±0.1
Other than XLD-25	0.63±0.1



Supply air pressure of 0.3MPa (G) to the pilot port S. Place the needle seat or S valve seal assembly, and tighten the bolt b to fix them. When tightening bolt b, first tighten manually until the O-ring is compressed, then perform extra tightening.

Step 7 Remount of external seal

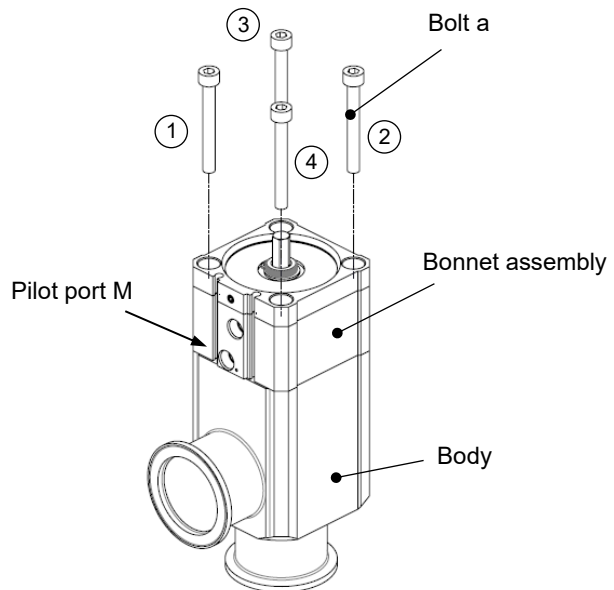


Wipe off any dust from the surface of the external seal and the mounting surface of the external seal on the body, then place the external seal in the mounting position on the body.

Step 8 Reassembly of bonnet assembly

Tightening torque of bolt a
N · m

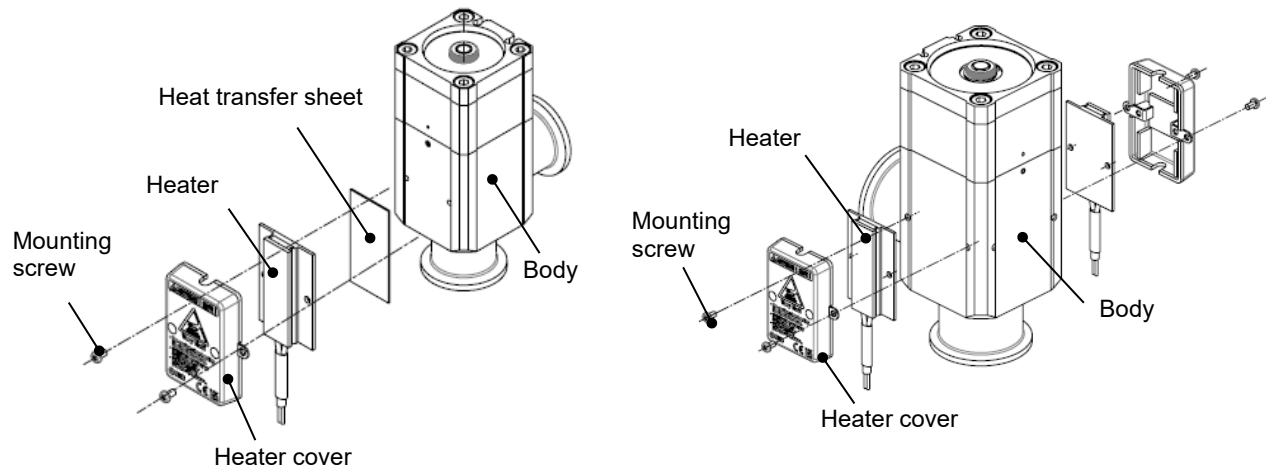
Valve Size	Tightening Torque
XLD-25	1.5
-40	2.5
-50	6
-63	6
-80	15
-100	20
-160	102



Supply air pressure of 0.2MPa (G) to the pilot port M (for main pumping). Tighten the bolt a in numerical order to re-assemble the body with the bonnet assembly. Manually tighten screws until the external seal is compressed. Perform final torquing of the bolts in the same numerical order (diagonally).

9-4. Heater Replacement Procedure

Step 1 Assembly of heater



Size 25

Size 40 or larger

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.

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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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