



No XL\*\*\*\*\*-OMI0013-A

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# Operation Manual

## High Vacuum L Type Valve

Model / Name

## XLS Series

Model / Series

Thank you for purchasing SMC product.  
For appropriate operation of this product, please read this operation manual thoroughly to understand.  
Also, refer to the drawing, product information for structure and specification of this product, Confirm operating environment is within specifications.  
Keep this operation manual with care so that it can be used at any time.

Contents of this operation manual is subject to change without notice.

**SMC CORPORATION**

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# Safety instructions

These safety instructions are intended to prevent a hazardous situation and/or equipment damage. These instructions indicate the level of potential by a label of “**Caution**”, “**Warning**” or “**Danger**”. To ensure safety, be sure to observe ISO 4411, JIS B 8300 and other safety practices.



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



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



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

## 1. Precautions on handling 1



**Common Specific Precautions 1** Be sure to read before handling.

Precautions on Design



**Warning**

□ All models

- a) The body material is A6063, the bellows is SUS316L, and the other metal materials for vacuum environment are SUS304, SUS405 equivalent material, and A2017. The seal material for vacuum environment is FKM. The armature assembly for vacuum uses fluorine type resin (PFA). Use fluids those are compatible with using materials after confirming. A valve for vacuum environment uses vacuum grease (fluorine type grease:Y-VAC3).
- b) If no control power is provided, apply starting voltage only for 0.15 to 0.2s. After that, be sure to apply holding voltage (25% of starting voltage). If this operation is neglected, it will cause coil burning and fire.
- c) When starting voltage is applied, large current runs. Therefore, select a circuit component after checking the current on the specifications.
- d) Be sure to place a fuse or an earth leakage breaker for a power supplying circuit.
- e) Leakage current from a circuit should be 70mA or less. If the voltage between coil terminals becomes DC1V or more, the valve will not be closed.
- f) Fluctuation of each voltage should be +/- 10% or less.

Selection



**Caution**

□ All models

- a) Use within the limits of the operating pressure range.

## Mounting

### **Caution**

□ All models

- a) In high humidity environments, keep valves packed until the time of installation.
- b) Perform piping so that excessive force is not applied to the flange sections. In case there is vibration of heavy objects or attachments, secure them so that torque is not applied directly to the flanges.

## Piping/ Wiring

### **Caution**

- a) Before mounting, clean the surface of the flange seal and the O-ring with ethanol, etc.
- b) 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.
- c) If a control power supply is provided, DC specification has polarity. Follow the indication shown on the end of lead wire.
- d) A wire for wiring should be 0.5 to 1.25mm<sup>2</sup> or more as reference.
- e) Give enough curvature to the lead wire not to have excessive force when it is fixed.
- f) Fluid containing foreign matters and oil will cause malfunction and sealing failure. Remove such things from the fluid.

## Maintenance

### **Warning**

If the fluid or reaction product (deposit) may deteriorate safety, those who have domain knowledge and experience (specialist of the field) shall disassemble, clean and assemble the products.

### **Caution**

- a) Replace the core assembly and the armature assembly when the end of its service life is approaching.
- b) If damage is suspected prior to the end of the service life, perform early maintenance.
- c) SMC specified parts should be used for service. Refer to the Construction / Maintenance parts table.
- d) When removing valve or exterior seals, take care not to damage the sealing surfaces. When installing the valve seal, be sure that the O-ring is not twisted.

## 2. Precautions on handling 2



### Common Specific Precautions 2

Maintenance Parts

Be sure to read before handling



#### Caution

Maintenance can be done without removing a pipe. Remove the four hexagon socket head cap screws on the top of the cover. When the sealant is replaced, be careful not to give a flaw on the sealing face such as a body.

When they are assembled again, the work can be done easily and accurately with the armature assembly absorbed to the core assembly. Check the operation and leakage after assembling.

Service parts See "Construction Drawing" for the construction number.

Construction no.	Description	XLS-16-□□	XLS-16-P□□	XLS-25-□□	XLS-25-P□□
(2)	Coil assembly	XLS16-20-*G,C,D,T	XLS16-20-P*G	XLS25-20-*G,C,D,T	XLS20-20-P*G
(6)	Core assembly	XLS16-30-1		XLS25-30-1	
(4)	Armature assembly	XLS16-30-2		XLS25-30-2	
(3-1)	Core O-ring	AS568-018V		AS568-018V	
(3-2)	Bonnet O-ring	AS568-025V		AS568-030V	

Note Enter voltage no. at \*.

G, C, D, and T after \* mean the symbol showing an electrical entry.

### 3. Specifications

Table 1 Specifications

Model		XLS-16	XLS-25	XLS-16-P*G	XLS-25-P*G
Flange (valve) size		16	25	16	25
Actuating type		Normal close (N.C.)			
Fluid		Inert gas			
Operating temperature °C		5 to 40			
Exhausting direction		Free			
Operating pressure Pa		0.2M (absolute pressure) to $1 \times 10^{-6}$			
Conductance l/s Note 1		5	8	5	8
Leakage Pa · m <sup>3</sup> /s	Internal	$1.3 \times 10^{-8}$ at ambient temperatures, excluding gas permeation			
	External	$1.3 \times 10^{-11}$ at ambient temperatures, excluding gas permeation			
Main material		Body: aluminum alloy, Bellows: SUS316L, Main part: SUS304, SUS405 equivalent, FKM and resin (PFA) Note 2			
Surface treatment for body		Outside: hard anodized		Inside: basis material	
Control power supply		Not provided		Provided	
Operating power voltage (starting/ holding) V		DC24/6, DC48/12, DC100/24		DC24, AC100, AC200	
Allowable voltage fluctuation %		+/- 10			
Electrical entry		Type G, C, D, and T		Type G	
Type of coil isolation		Type B			
Max. operating frequency		10 cycle times/ min.			
Weight kg		0.4	0.7	0.7	1.0

Note 1 The conductance is "molecular flow" measured with an elbow pipe which has the same dimension with each flange.

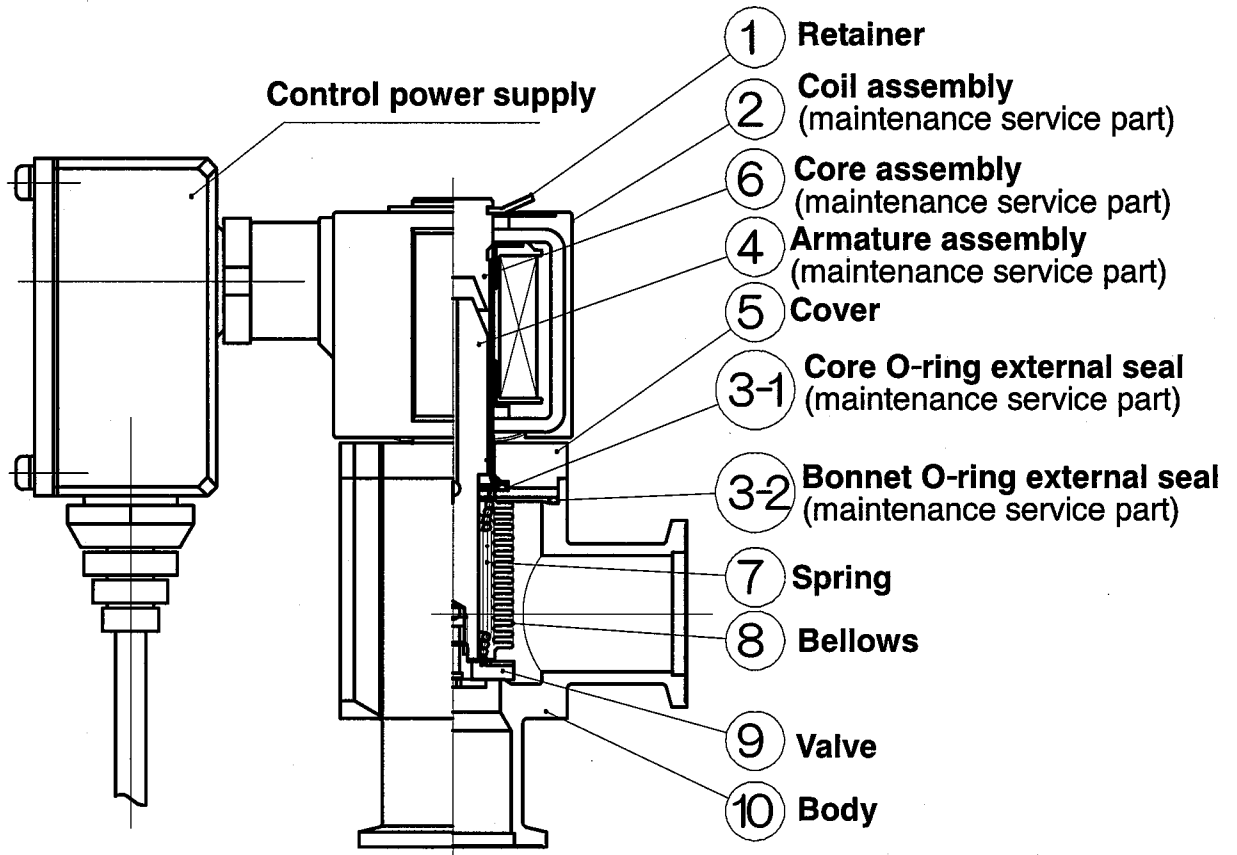
Note 2 The valve for vacuum has vacuum grease (fluorine type: Y-VAC3).

Table 2 Power/ Current

With rated voltage applied

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

#### 4. Construction / Operation



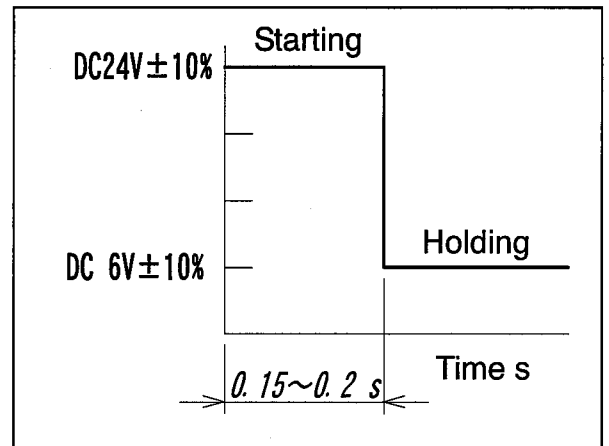
Armature assembly includes (7), (8), and (9).

#### <Operation Description>

4-1 XLS-\*\*-\*\* (without control power supply)

Valve (9) opens when the coil assembly is carrying starting voltage for approx. 0.15 to 0.2s.

The valve keeps opening with voltage by 25% of the starting voltage (see right). Do not apply the starting voltage for 0.3s or more. It will cause coil burning. When energizing to the coil assembly is stopped, valve (9) closes.



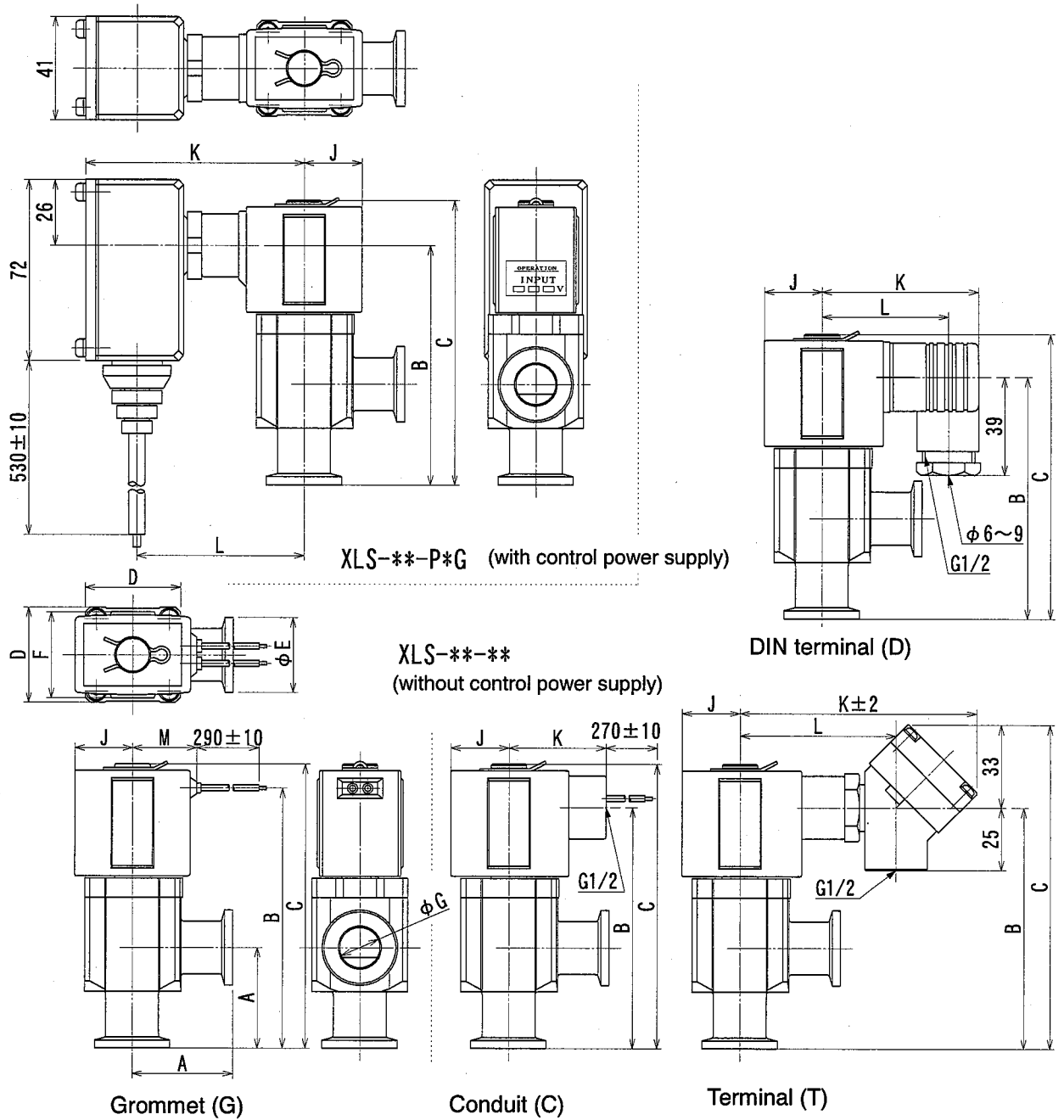
Ex.) For DC24. DC6 V specification,  
 The time to apply starting voltage is same for all voltage.

4-2 XLS-\*\*-P\*G (with control power supply)

Valve (9) opens when the coil assembly is applied the rated voltage.  
 Valve (9) closes when the coil assembly is stopped being energized.

As this product has pressure balanced construction, the exhausting direction is free.

## 5. Dimensions



Model	mm										
	A	B	C	D	E	F	G	J	K	L	M
XLS-16-*G	40	104	113	38	30	35	17	23	-	-	25.5
XLS-16-*C		96							41	-	-
XLS-16-*D			60							48	-
XLS-16-*T			95						62	-	
XLS-25-*G	50	128.5	138.5	48	40	40	26	25.5	-	-	28
XLS-25-*C		120.5							43	-	-
XLS-25-*D			63							51	-
XLS-25-*T			97						66	-	
XLS-16-P*G	40	96	113	38	30	35	17	23	87	66.5	-
XLS-25-P*G	50	121.5	138.5	48	40	40	26	25.5	89.5	69	-



## 6. Guaranteed term and guaranteed range

The guaranteed period covers the period which finishes the earliest among 0.5 million operating cycles [with our durability test conditions], 18 months after shipping from the factory, and 12 months after stating the use of this product at your place or your customer's place.

Note: The product durability is varied depending on the operating conditions (such as a use with large flow rate).

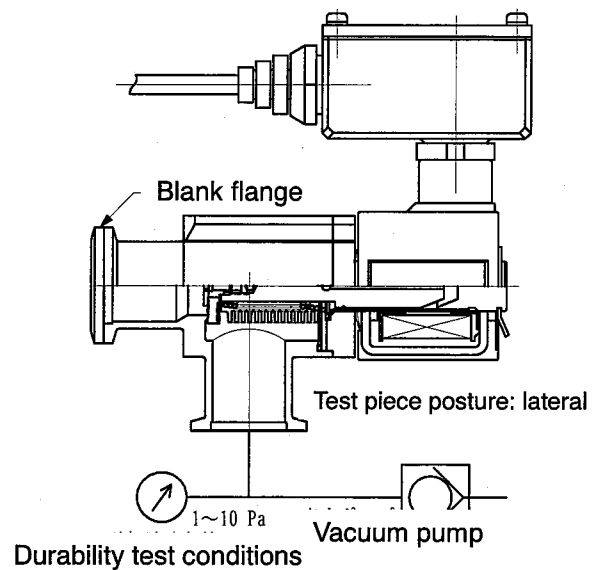
If the specification is not kept, or any non-conformance derived from mounting or replace of a device, an assembly, or an O-ring at your place occurs, the guarantee cannot be applied.

If any failure occurs due to our fault during the guaranteed period, we will guarantee the non-conformance by delivering a substitute in the worst case. However, responsibility of any damage which is led by the product failure is not taken by us.

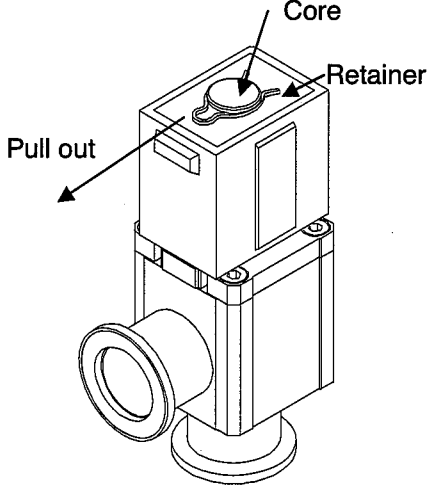
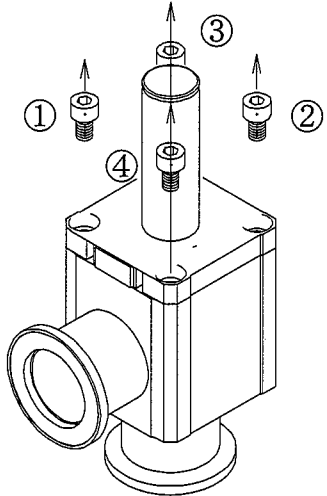
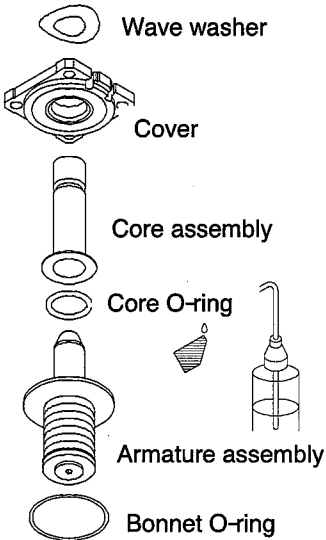
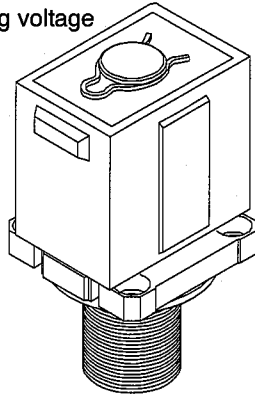
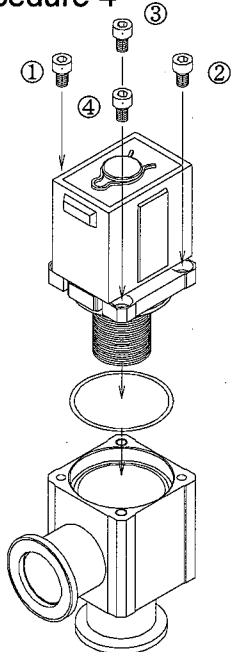
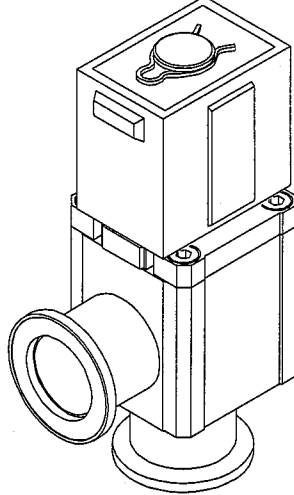
Result of durability test (with the circuit shown on the right)

Internal/ external leakage and operation were checked by opening and closing a valve in internally evacuated condition at ordinary temperature (room temperature).

It was confirmed that this product satisfied the specification up to 0.5 million cycles.



## 6. 部品交換要領

Replacement procedure			
Dept.	1	Model	High Vacuum Angle Valve
1: Replacement of coil assembly	2: Replacement of other parts		
 <p>Pull out the retainer to the side with the coil assembly pressed downward. Pull out the coil assembly from the body. When it is assembled again, mount the retainer on the groove of the core securely.</p>	<p><b>Procedure 1</b></p>  <p>Loosen the bolts gradually in numerical order. If the core assembly is not replaced, the coil assembly does not need to be removed in advance.</p>		<p><b>Procedure 2</b></p>  <p>Parts excepting the wave washer and the cover are the service parts. Replace a part which needs to be maintained. Wipe out dust on the surface of each part with a clean cloth (such as BENCOT) soaked into ethanol.</p>
<p><b>Procedure 3</b></p> <p>Apply holding voltage</p>  <p>If the coil assembly is applied holding voltage with the above condition (Mount the core assembly on the cover, and fix the coil assembly with the retainer. After that, press the armature assembly until the absorbing position.) when it is assembled again, the armature assembly is fixed at the absorbed position. The procedure 4 can be done easily and accurately.</p>	<p><b>Procedure 4</b></p>  <p>Tighten the bolts in numerical order without a flaw and dust on each part.</p>		<p><b>Procedure 5</b></p>  <p>Check the operation and internal and external leakage.</p>