Compact Direct Operated
2/3-Port Solenoid Valve for Chemical Liquids

[Option]

RoHS

LVM Series

Low Particle Generation **Oil-free** **Metal-free**

∗ Fluid contact parts

New

A plug connector type has been added to the LVM07. p. 335

Isolated structure
Direct operated rocker type/poppet type

The solenoid drive body is separated from the fluid area by a diaphragm.

Power consumption
(With power saving circuit)

1.0∗1 **W or less**

∗1 Refer to page 329.

(Except LVM31/33)

Change in volume
(Pumping volume)

0.01 μL or less

Variations

A 5 mm orifice diameter has been added for the direct operated poppet type.

		Model	Operating pressure range	Orifice dia. [mm]	Volume of valve chamber [μL]	Valve width [mm]	Weight [g]	Page
Body ported	New 	**LVM31**	–90 kPa to 0.2 MPa	5	500	30	210	370-1
Base mounted	New 	**LVM33**	–90 kPa to 0.2 MPa	5	600	30	200	370-1

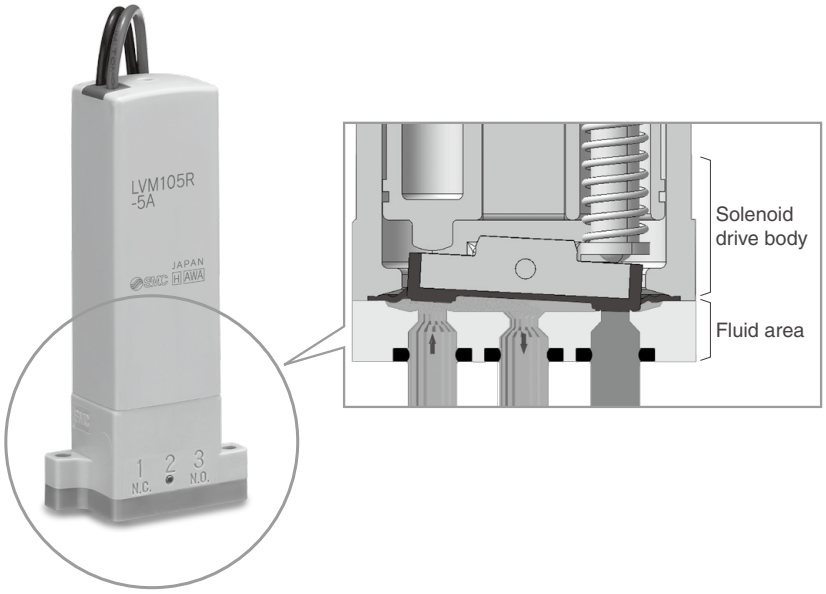
Direct Operated Rocker Type

LVM07, 09/090, 10/100, 15/150, 20/200

p. 335 p. 340 p. 347 p. 354 p. 359

Isolated structure

The solenoid drive body is separated from the fluid area by a diaphragm.



Fluid contact material

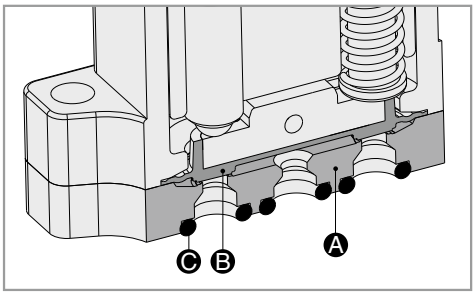
(Metal-free)

Body/Plate

PEEK

Diaphragm

Choice of **EPDM, FKM, or** Kalrez®



A Body/Plate material*1: PEEK

B Diaphragm material: EPDM, FKM, or Kalrez®

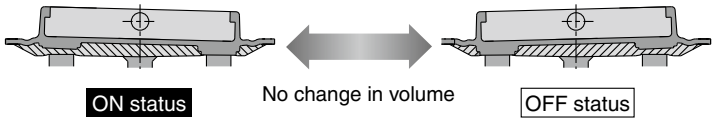
C ● Interface gasket/O-ring material: EPDM, FKM, or Kalrez®

*1 PFA can be selected for the plate material of the LVM10/100 base-mounted type.

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

Change in volume (Pumping volume)

0.01 μL or less



With a normal diaphragm valve, because the valve chamber volume varies depending on the ON or OFF status, the difference in volume is discharged into the outlet side of the valve when the valve is switched from ON to OFF.

However, with a rocker type valve, there is almost no change in volume, and thus **no fluid is discharged into the outlet side of the valve.**

Valve chamber volume

Residual liquid is reduced by suppressing the valve chamber volume.

Model	LVM07	LVM09/090	LVM10/100	LVM15/150	LVM20/200
Valve chamber volume [μL]	8	18 (29)*1	20 (28)*1	50 (60)*1	84
Orifice diameter [mm]	0.8	1 (1.1)*2	1.4	1.6	2

*1 ( ): For R6

*2 ( ): For the base-mounted type

A type with a power saving circuit can be selected.

- Holding power consumption can be reduced substantially.
- Continuous energization for extended periods of time is possible.

Model		LVM07	LVM09/090	LVM10/100	LVM15/150	LVM20/200
Power consumption [W]	Inrush	2.8	3.3	2.5	5.5	4
	Holding	0.8	0.9	1	1	0.6

Refer to 10 in “Design / Selection” on page 371 if the valve is to be energized continuously for extended periods of time or used with a manifold.

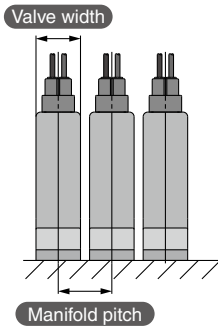
Space saving

LVM07 Series

- **Valve width: 7 mm**
- **Compact & Lightweight**
  - **Volume: 3.9 cm³**
  - **Height: 31 mm**
  - **Weight: 7 g**

Unit: mm

Model	Valve width	Manifold pitch
LVM07	7	8
LVM09/090	9.5	10.5
LVM10/100	13	14
LVM15/150	16	17
LVM20/200	20	21

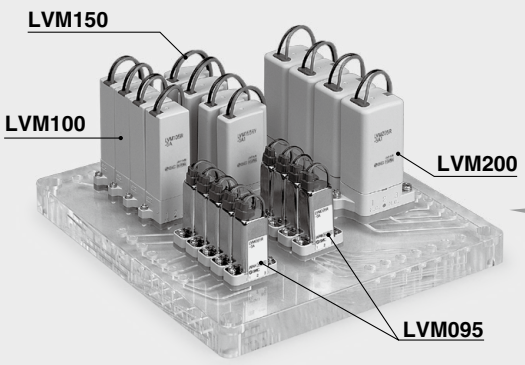


Required space reduced by 50%
Reduction in piping volume, Manifold can be designed to suit the space

Weight reduced by 70%
Weight reduced by using resin material

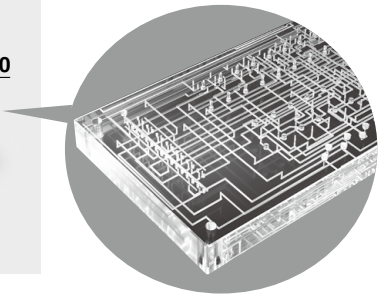
No piping work required
No piping work required between components

Composite Manifold (Made to order)



Flow passage style with high flexibility

Three-dimensional flow passage that cannot be created by machining or injection molding

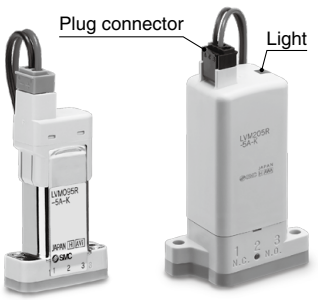


Options

Plug connector, With light/surge voltage suppressor

Applicable models

Model	LVM07	LVM09/090	LVM10/100	LVM15/150	LVM20/200
Plug connector	●	●	●	●	●
With light/surge voltage suppressor	—	●	●	●	●



With reverse mounting prevention pin

Applicable models

LVM07	LVM09/090	LVM10/100	LVM15/150	LVM20/200
●	●	●	●	●

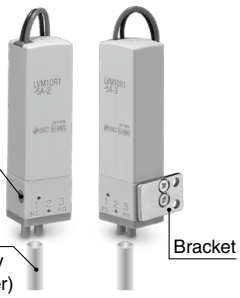
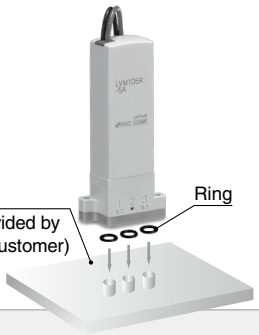
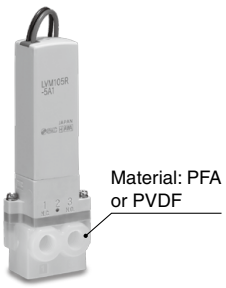
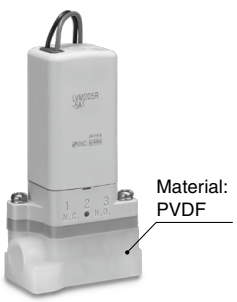
Direct Operated Rocker Type

Series Variations

		Model	Valve type			Operating pressure range	Orifice dia. [mm]	Volume of valve chamber [μL]	Valve width [mm]	Weight [g]	Power consumption [W]	Options			
			N.C. (2-port)	N.O. (2-port)	Universal (3-port)							Reverse mounting prevention pin	Electrical entry: Grommet	Electrical entry: Plug connector	With light/surge voltage suppressor
Base mounted	p. 335  Without sub-plate / With sub-plate	**LVM07R6**	●			–75 kPa to 0.1 MPa	0.8	8	7	7	Holding: 0.8 (With power saving circuit)	●	●	●	—
Body ported	p. 340 	**LVM09R1**	●			–75 kPa to 0.2 MPa	1	18	9.5	22	Standard: 2 Power saving option Holding: 0.9 (With power saving circuit)	—	●	●	●
		LVM09R2		●											
		LVM092R			●										
Base mounted	p. 340  Without sub-plate / With sub-plate	**LVM09R3**	●			–75 kPa to 0.2 MPa	1.1	18	9.5	20	Standard: 2 Power saving option Holding: 0.9 (With power saving circuit)	●	●	●	●
		LVM09R4		●											
		LVM09R6	●					29							
		LVM095R			●			18							
Body ported	p. 347 	**LVM10R1**	●			–75 kPa to 0.25 MPa	1.4	20	13	34	Standard: 1.5 Power saving option Holding: 1 (With power saving circuit)	—	●	●	●
		LVM10R2		●											
		LVM102R			●										
Base mounted	p. 347  Without sub-plate / With sub-plate	**LVM10R3**	●			–75 kPa to 0.25 MPa	1.4	20	13	34	Standard: 1.5 Power saving option Holding: 1 (With power saving circuit)	●	●	●	●
		LVM10R4		●											
		LVM10R6	●					28							
		LVM105R			●			20							
Base mounted	p. 354  Without sub-plate / With sub-plate	**LVM15R3**	●			–75 kPa to 0.25 MPa [Max. 0.6 MPa]	1.6 [1]	50	16	45	Holding: 1 (With power saving circuit)	●	●	●	●
		LVM15R4		●											
		LVM15R6	●					60							
		LVM155R			●			50							
Body ported	p. 359 	**LVM20R1**	●			–75 kPa to 0.25 MPa	2	84	20	80	Standard: 2.5 Power saving option Holding: 0.6 (With power saving circuit)	—	●	●	●
		LVM20R2		●											
		LVM202R			●										
Base mounted	p. 359  Without sub-plate / With sub-plate	**LVM20R3**	●			–75 kPa to 0.3 MPa	2	84	20	80	Standard: 2.5 Power saving option Holding: 0.6 (With power saving circuit)	●	●	●	●
		LVM20R4		●											
		LVM205R			●										

The [ ] indicate the values of the high-pressure type.

Piping/Mounting Variations

Piping/Mounting / Model	Body ported	Base mounted		Page
		Without sub-plate	With sub-plate	
LVM07	—		 Material: PEEK	335
LVM09/090			 Material: PEEK	340
LVM10/100	 Manual override (Option) Tubing (Provided by the customer) Bracket	 Base (Provided by the customer) Ring	 Material: PFA or PVDF	347
LVM15/150	—		 Material: PVDF	354
LVM20/200			 Material: PVDF	359

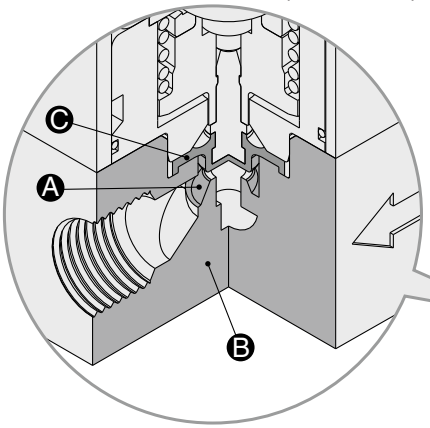
Direct Operated Poppet Type

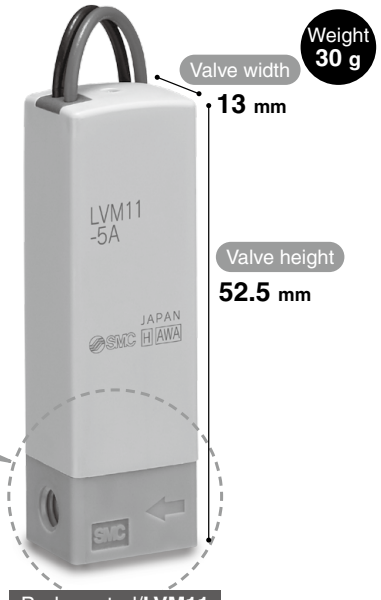
LVM11/13, 31/33

p. 366 p. 370

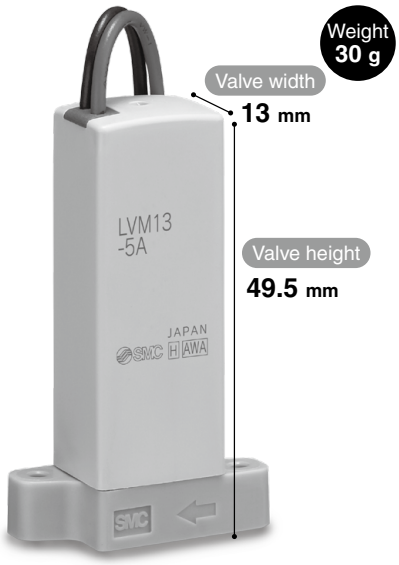
Less clogging due to the poppet construction

- Isolated structure
  The solenoid drive body is separated from the fluid area by a diaphragm.
- Fluid contact material (Metal-free)





Body ported/**LVM11**



Base mounted/**LVM13**

A Volume of valve chamber
B Body material: PEEK
C Diaphragm material: EPDM, FKM, or Kalrez®

* Kalrez® is a registered trademark of E. I. du Pont de Nemours and Company or its affiliates.
* Kalrez® is only available for the LVM11 and LVM13.

- Orifice diameter

Unit: mm

LVM11/13	LVM31/33
1.5	5

- Electrical entry

- Power saving circuit standardized

Holding power consumption can be reduced substantially. Continuous energization for extended periods of time is possible.

Unit: W

Model		LVM11	LVM13	LVM31	LVM33
Power consumption	Inrush	2.5	2.5	7.5	7.5
	Holding	1	1	2	2

Refer to 10 in "Design / Selection" on page 371 if the valve is to be energized continuously for extended periods of time or used with a manifold.

- Volume of valve chamber

Unit: µL

Model	LVM11	LVM13	LVM31	LVM33
Volume of valve chamber	11	13	500	600

- With light/surge voltage suppressor
- With reverse mounting prevention pin (Option)
- Application: Liquid discharge, etc.

Series Variations

		Model	Valve type N.C. (2-port)	Valve type N.O. (2-port)	Operating pressure range	Orifice dia. [mm]	Volume of valve chamber [µL]	Valve width [mm]	Weight [g]	Power consumption [W]	Options: Reverse mounting prevention pin	Options: Electrical entry Grommet	Options: Electrical entry Plug connector	Options: With light/surge voltage suppressor	Body ported	Base mounted: Without sub-plate	Base mounted: With sub-plate	Page
Body ported		**LVM11**	●		0 to 0.25 MPa	1.5	11	13	30	Inrush: 2.5 Holding: 1	—	●	●	●	●	—		366
	New	**LVM31**	●		−90 kPa to 0.2 MPa	5	500	30	210	Inrush: 7.5 Holding: 12	—	●	●	●	●	—		370-1
Base mounted		**LVM13**	●		0 to 0.25 MPa	1.5	13	13	30	Inrush: 2.5 Holding: 1	●	●	●	●	—	●	—	366
	New 	**LVM33**	●		−90 kPa to 0.2 MPa	5	600	30	200	Inrush: 7.5 Holding: 2	●	●	●	●	—	●	—	370-1

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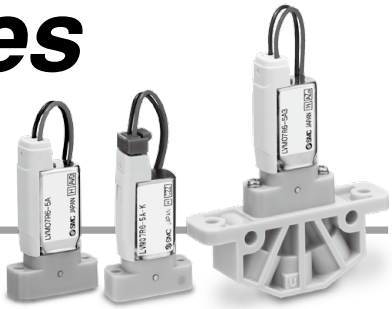
Compact Direct Operated 2/3-Port Solenoid Valve for Chemical Liquids
LVM Series

Direct Operated Rocker Type

Compact Direct Operated 2-Port Solenoid Valve for Chemical Liquids

LVM07 Series



Without sub-plate Base mounted

With sub-plate Base mounted

How to Order

Base mounted **LVM 07R6 ❶ ❷ – 5 ❸ A ❹ ❺ – ❻ – ❼**

❶ Number of ports, Valve type

Symbol	Number of ports	Valve type
07R6	2	N.C.

❷ Power saving circuit

Nil	None (Standard type)
Y1	Yes

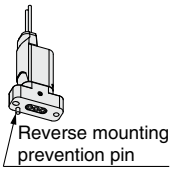
❸ Coil voltage

Symbol	Voltage
5	24 VDC
6	12 VDC

❹ Fluid contact material

Symbol	Body	Diaphragm
A	PEEK	EPDM
B	PEEK	FKM
C	PEEK	Kalrez®

❺ Sub-plate material/port size, Reverse mounting prevention pin

Symbol	Sub-plate		Reverse mounting prevention pin
	Material	Port size	
Nil	None		None
P	None		Yes 
3	PEEK	M6	None
3U		1/4-28UNF	

∗ A sub-plate cannot be mounted for "P" (With reverse mounting prevention pin).

❻ Electrical entry, Lead wire length

Symbol	Electrical entry, Lead wire length
Nil	Grommet, 150 mm
3	Grommet, 300 mm
6	Grommet, 600 mm
K	Plug connector, 300 mm
KO	Plug connector, Without connector

∗ The plug connector is included but does not come assembled.

∗ If a lead wire length of 600 mm or more is required, select "KO□" (Without connector) and then add the connector part number shown below under the valve part number when ordering.

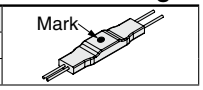
Plug connector part no.

Without power-saving circuit (Standard): S070 – 14A – □

With power-saving circuit (Y1) : LVM070 – 14A – □ – □

Coil voltage

Symbol	Coil voltage	Mark color
5	24 VDC	Blue
6	12 VDC	Yellow



Lead wire length

6	600 mm
10	1000 mm
30	3000 mm

❼ CE/UKCA-compliant

Nil	No
Q	CE/UKCA-compliant

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

For the type without a sub-plate, mounting screws are included. (2 pcs.)
M1.6 x 8.5/With spring washer (Material: Stainless steel)

For other spare parts, refer to page 374.

SMC

Specifications

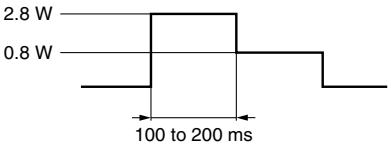
Without sub-plate
Base mounted

Without sub-plate
Base mounted

With sub-plate
Base mounted

Model			Base mounted
			LVM07R6
Valve construction			Direct operated rocker type
Valve type			N.C.
Number of ports			2
Fluid∗1			Air, Water, DI water (Pure water), Diluent, or Cleaning fluid
Operating pressure range			−75 kPa to 0.1 MPa
Orifice diameter			0.8 mm
Response time∗8			10 ms or less (at pneumatic pressure)
Leakage			Zero leakage, both internal or external (at water pressure)
Proof pressure∗2			0.15 MPa
Ambient temperature∗9			0 to 50°C (No condensation)
Fluid temperature∗9			0 to 50°C
Storage temperature∗10			−20 to +60°C (No condensation)
Volume of valve chamber∗3			8 μL
Mounting orientation∗4			Free
Enclosure			IP40 or equivalent
Weight			7 g (Without sub-plate), 11 g (With sub-plate)
Rated voltage			12, 24 VDC
Allowable voltage fluctuation∗5			±10% of rated voltage
Type of coil insulation			Class B
Power consumption (When rated voltage is at 24 V)	**Standard type**		2.8 W (0.12 A)∗6
	With power saving circuit	**Inrush**	2.8 W (0.12 A)
		Holding	0.8 W
Coil switching noise∗7			50 dB

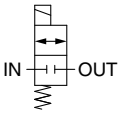
∗1 Select an appropriate fluid contact material according to the fluid to be used. Additionally, check the chemical resistance beforehand.
∗2 Indicates the pressure which does not generate breakage or cracks after a one-minute airtight test
∗3 Indicates the volume of clearance inside the valve chamber after the volume of the diaphragm is subtracted
∗4 When residual liquid needs to be taken into consideration, mounting in a vertical direction with the coil at the top is recommended. When residual liquid need not be taken into consideration, any mounting orientation is available.
∗5 When response time is prioritized, control the voltage so that there is no fluctuation below the rated voltage.
∗6 The LVM07R6 (standard type) requires power saving control. Conduct power saving control according to the figure below.



∗7 The value is based on SMC's measurement conditions. The noise level will vary according to the actual conditions.
∗8 In compliance with JIS B 8419:2010 (Value at ambient and fluid temperatures of 25°C, rated voltage, max. operating pressure (air), and when the N.C. (IN) port is pressurized)
The response time will vary depending on the supply pressure, fluid, piping conditions, and ambient temperature.
∗9 When the diaphragm material is Kalrez®, the valve changeover time will be significantly longer at ambient and fluid temperatures of 15°C or less when compared to the valve changeover time at room temperature (≈ 25°C).
∗10 Store in a location out of direct sunlight and where the cyclic temperature does not exceed normal temperature changes.

Symbol

N.C.
LVM07R6



Flow Rate Characteristics

Water		Air	
Kv	Cv	C	b
0.004	0.005	0.02	0.2

∗ The values of Kv and Cv are based on JIS B 2005:1995; the values of C and b are based on JIS B 8390:2000.

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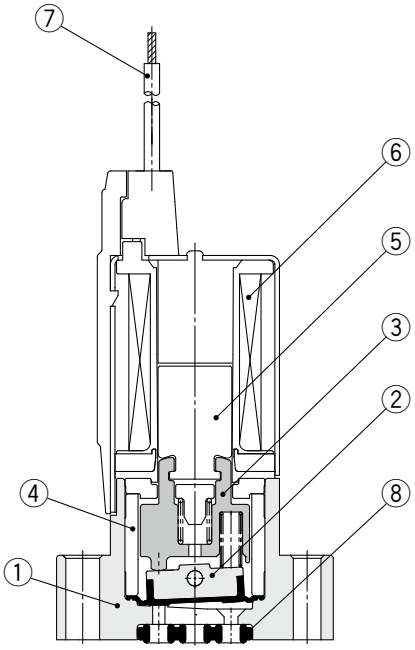
Construction

Base mounted
LVM07R6



Component Parts

No.	Description	Material
1	**Body**	PEEK
2	**Diaphragm assembly**	EPDM/FKM/Kalrez®
3	**Slide bushing assembly**	PPS/Stainless steel
4	**Bushing**	PPS
5	**Armature**	—
6	**Coil assembly**	—
7	**Lead wire**	—
8	**Interface gasket**	EPDM/FKM/Kalrez®

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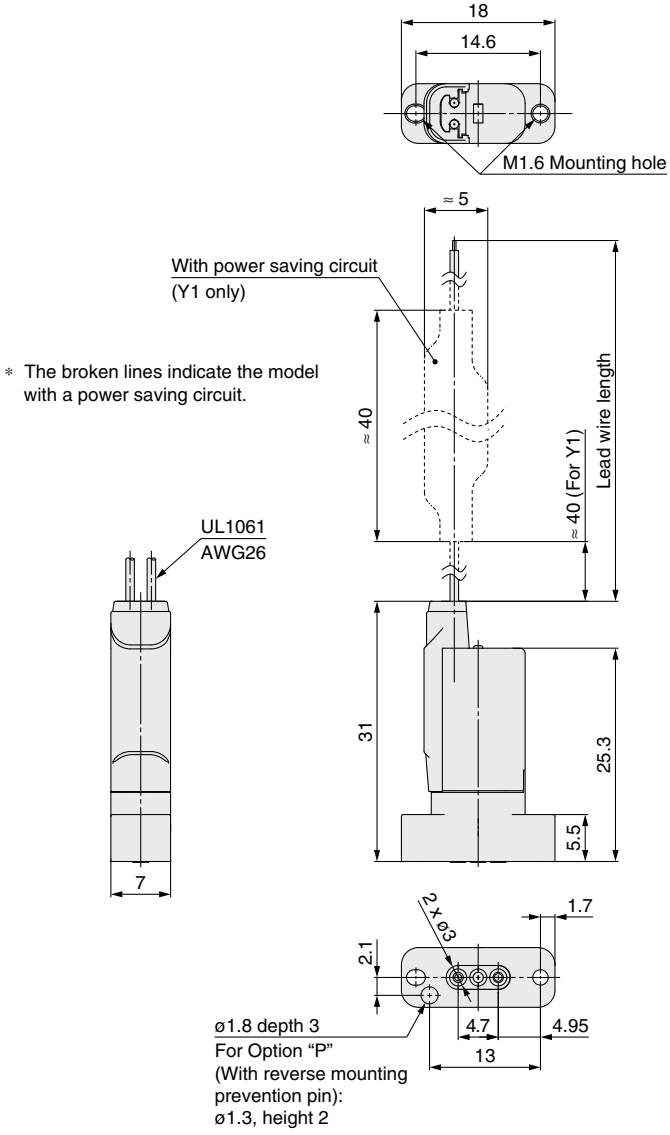
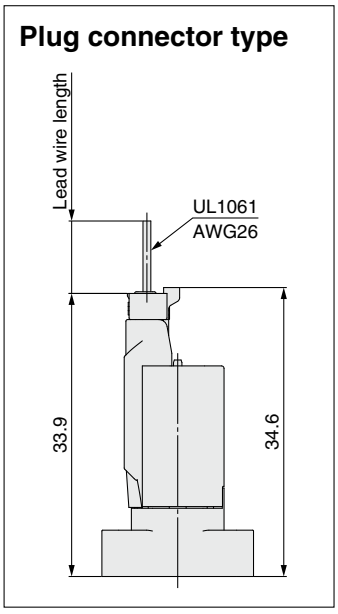
Dimensions

Base mounted
LVM07R6

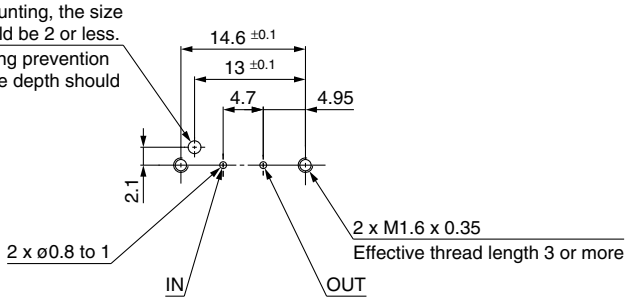


Plug connector type



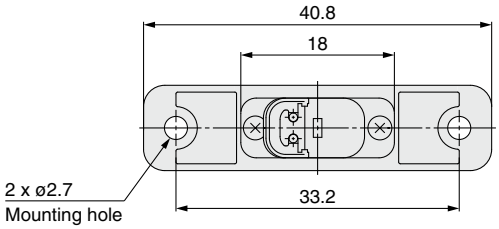
Recommended interface dimensions ∗ Surface roughness = Rz3.2 or less

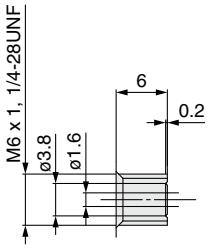
When using a positioning pin for mounting, the size should be ø1.5, and the height should be 2 or less.
For Option "P" (With reverse mounting prevention pin), the size should be ø1.5, and the depth should be 2.3 or more.



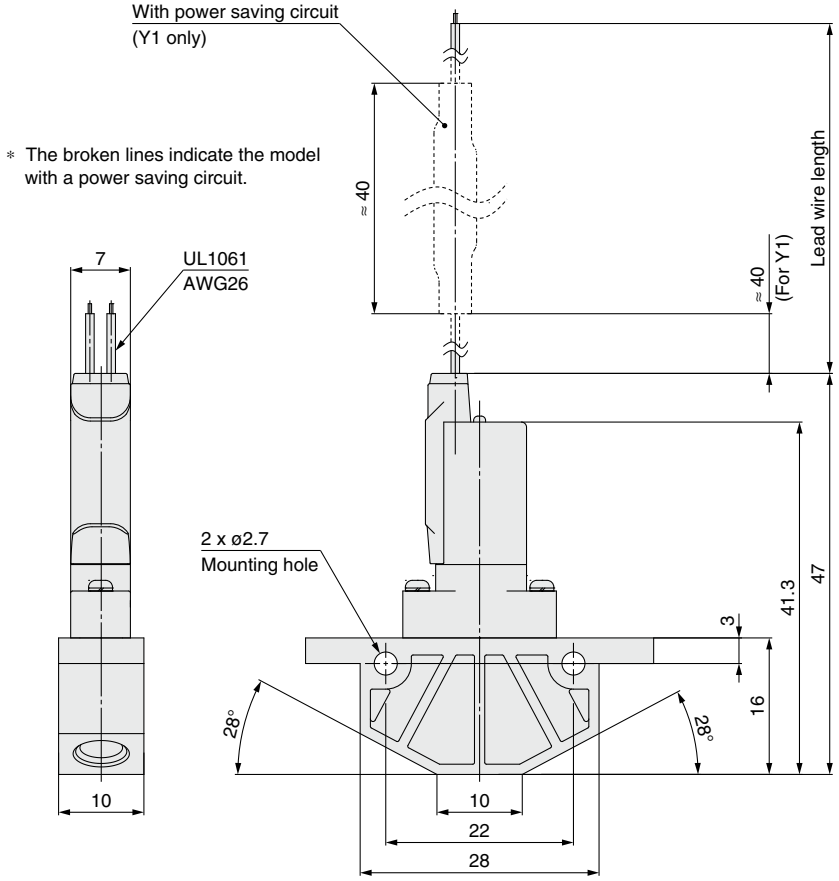
Dimensions

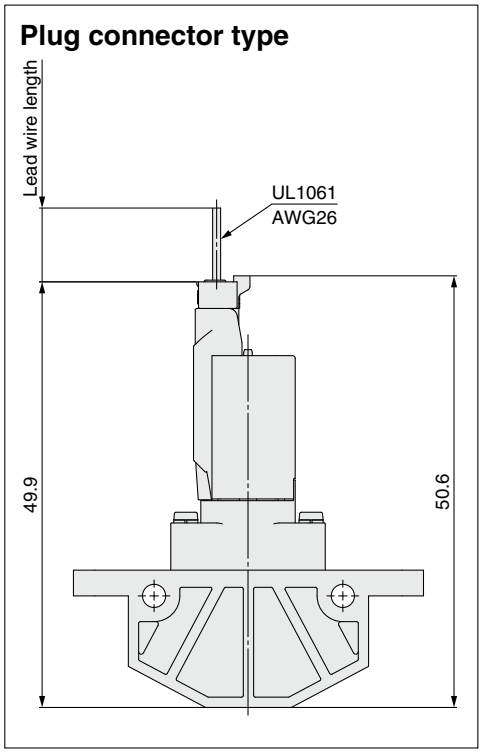
With sub-plate
LVM07R6-□□□-□(N.C.)

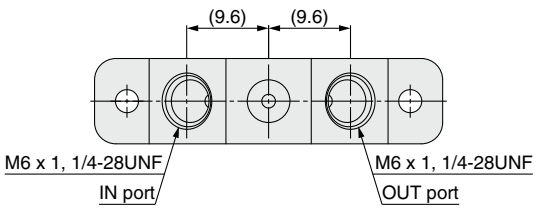




Details of thread







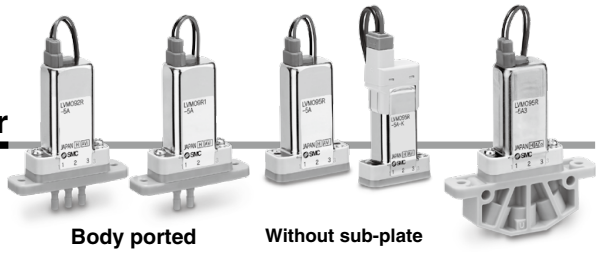
Direct Operated Rocker Type

[Option]

RoHS

Compact Direct Operated 2/3-Port Solenoid Valve for Chemical Liquids

LVM09/090 Series



Body ported

Without sub-plate Base mounted

With sub-plate Base mounted

How to Order

Body ported LVM 09R1 ❶ – 5 A – ❷ – ❸

Base mounted LVM 09R3 ❷ – 5 A ❹ – ❺ – ❻

❶ ❷ ❸ ❹ ❺ ❻ ❼ ❽

❶ Number of ports, Valve type

Symbol	Number of ports	Valve type
09R1	2	N.C.
09R2		N.O.
092R	3	Universal

❷ Number of ports, Valve type

Symbol	Number of ports	Valve type
09R3	2	N.C.
09R4		N.O.
09R6		N.C.
095R	3	Universal

❸ Power saving circuit

Nil	None (Standard type)
Y	Yes (Plug connector)
Y1	Yes (Grommet)

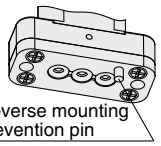
❹ Coil voltage

Symbol	Voltage
5	24 VDC
6	12 VDC

❺ Fluid contact material

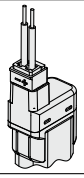
Symbol	Plate	Diaphragm
A	PEEK	EPDM
B	PEEK	FKM
C	PEEK	Kalrez®

❻ Sub-plate material/port size, Reverse mounting prevention pin

Symbol	Sub-plate		Reverse mounting prevention pin
	Material	Port size	
Nil	None		None
P			Yes  Reverse mounting prevention pin
3	PEEK	M6	None
3U		1/4-28UNF	

∗ A sub-plate cannot be mounted for "P" (With reverse mounting prevention pin).

❼ Electrical entry, Lead wire length, Light/surge voltage suppressor

Symbol	Electrical entry, Lead wire length	Light/surge voltage suppressor	
Nil	Grommet, 150 mm	Cannot be selected	
3	Grommet, 300 mm		
6	Grommet, 600 mm		
K	Plug connector, 300 mm	None	
KO	Plug connector, Without connector		
KZ	Plug connector, 300 mm	Yes ∗ Power saving circuit "Y" is equipped with a light/surge voltage suppressor.	
KOZ	Plug connector, Without connector		

∗ "3" or "6" must be selected for power saving circuit "Y1" (grommet). "Nil" cannot be selected.
∗ The plug connector is included but does not come assembled.
∗ If a lead wire length of 600 mm or more is required, select "KO□" (Without connector) and then add the connector part number shown below under the valve part number when ordering.

Plug connector part no.: SY100 − 30 − 4A − □

Lead wire length

6	600 mm
10	1000 mm
30	3000 mm

❽ CE/UKCA-compliant

Nil	No
Q	CE/UKCA-compliant

Mounting screws are included with the base-mounted type (Without sub-plate). (2 pcs.)
M2 x 11/With spring washer (Material: Stainless steel)

For other spare parts, refer to page 374.

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

Specifications

Body ported

Body ported

Without sub-plate
Base mounted

Without sub-plate
Base mounted

With sub-plate
Base mounted

Model			Body ported (Tube connection type)			Base mounted			
			LVM09R1	LVM09R2	LVM092R	LVM09R3	LVM09R4	LVM09R6	LVM095R
Valve construction			Direct operated rocker type						
Valve type			N.C.	N.O.	Universal	N.C.	N.O.	N.C.	Universal
Number of ports			2		3	2			3
Fluid*1			Air, Water, DI water (Pure water), Diluent, or Cleaning fluid						
Operating pressure range			–75 kPa to 0.2 MPa						
Orifice diameter			1 mm			1.1 mm			
Response time*7			10 ms or less (at pneumatic pressure)						
Leakage			Zero leakage, both internal or external (at water pressure)						
Proof pressure*2			0.3 MPa						
Ambient temperature*8			0 to 50°C						
Fluid temperature*8			0 to 50°C (No freezing)						
Storage temperature*9			–20 to +60°C (No condensation)						
Volume of valve chamber*3			18 μL			18 μL		29 μL	18 μL
Mounting orientation*4			Free						
Enclosure			IP40 or equivalent						
Weight			22 g			20 g (Without sub-plate), 24 g (With sub-plate)			
Rated voltage			12, 24 VDC						
Allowable voltage fluctuation*5			±10% of rated voltage						
Type of coil insulation			Class B						
Power consumption (When rated voltage is at 24 V)	Standard type		2 W (0.08 A)						
	With power saving circuit	Inrush	3.3 W (0.14 A)						
		Holding	0.9 W						
Coil switching noise*6			50 dB						

*1 Select an appropriate fluid contact material according to the fluid to be used. Additionally, check the chemical resistance beforehand.
*2 Indicates the pressure which does not generate breakage or cracks after a one-minute airtight test
*3 Indicates the volume of clearance inside the valve chamber after the volume of the diaphragm is subtracted
*4 Since the body (orifice shape) is designed to eliminate residual liquid, mounting in a vertical direction with the coil at the top is recommended. When residual liquid need not be taken into consideration, any mounting orientation is available.
*5 When response time is prioritized, control the voltage so that there is no fluctuation below the rated voltage.
*6 The value is based on SMC's measurement conditions. The noise level will vary according to the actual conditions.
*7 In compliance with JIS B 8419:2010
(Value at ambient and fluid temperatures of 25°C, rated voltage, max. operating pressure (air), and when the N.C. (IN) port is pressurized)
The response time will vary depending on the supply pressure, fluid, piping conditions, and ambient temperature.
*8 When the diaphragm material is Kalrez®, the valve changeover time will be significantly longer at ambient and fluid temperatures of 15°C or less when compared to the valve changeover time at room temperature (≈ 25°C).
*9 Store in a location out of direct sunlight and where the cyclic temperature does not exceed normal temperature changes.
* Refer to 10 in "Design / Selection" on page 371 if the valve is to be energized continuously for extended periods of time.

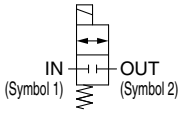
Flow Rate Characteristics

Water		Air	
Kv	Cv	C	b
0.015	0.018	0.06	0.2

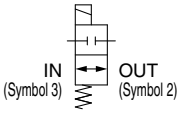
* The values of Kv and Cv are based on JIS B 2005:1995; the values of C and b are based on JIS B 8390:2000.

Symbol

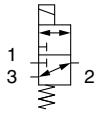
N.C.
LVM09R1/R3



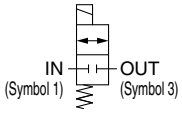
N.O.
LVM09R2/R4



Universal
LVM092R/5R



LVM09R6



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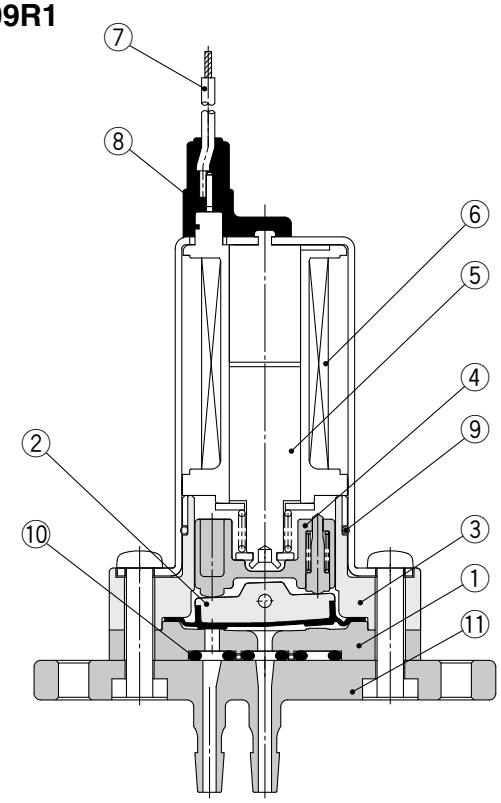
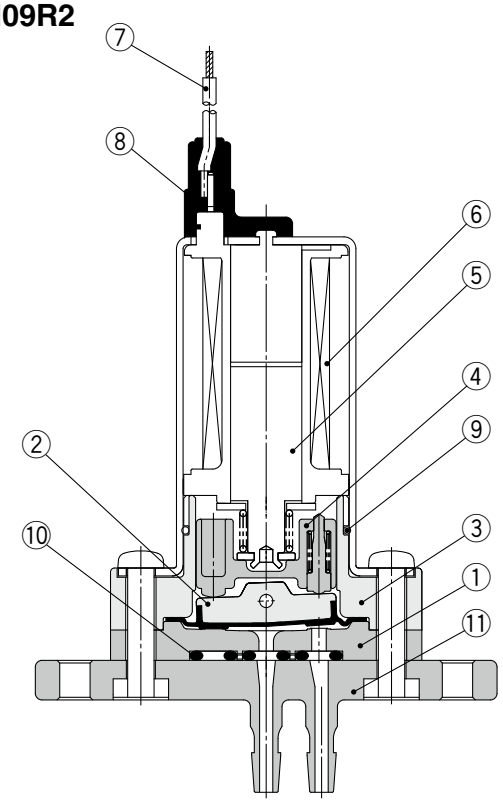
Construction

Body ported

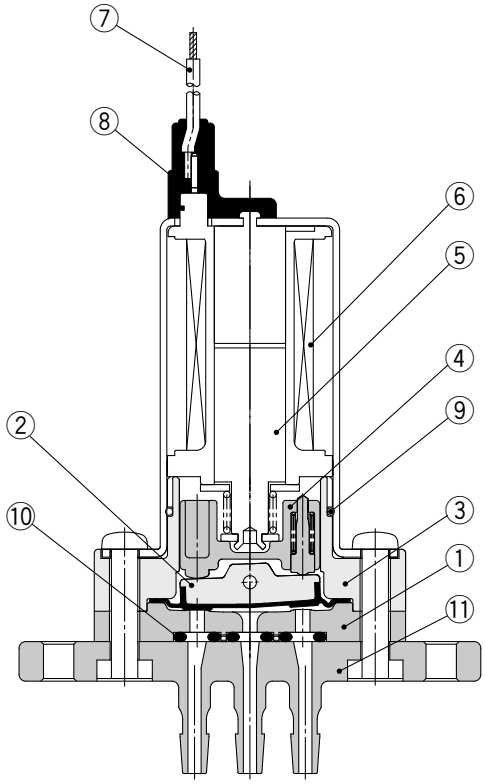
LVM09R1



LVM09R2



LVM092R



Component Parts: LVM09R1, 09R2, 092R

No.	Description	Material
1	**Plate**	PEEK
2	**Diaphragm assembly**	EPDM/FKM/Kalrez®
3	**Body**	PBT
4	**Slide bushing assembly**	PPS/Stainless steel
5	**Armature assembly**	—
6	**Coil assembly**	—
7	**Lead wire**	—
8	**Mold**	PET
9	**O-ring**	NBR
10	**Interface gasket**	EPDM/FKM/Kalrez®
11	**Piping plate**	PEEK

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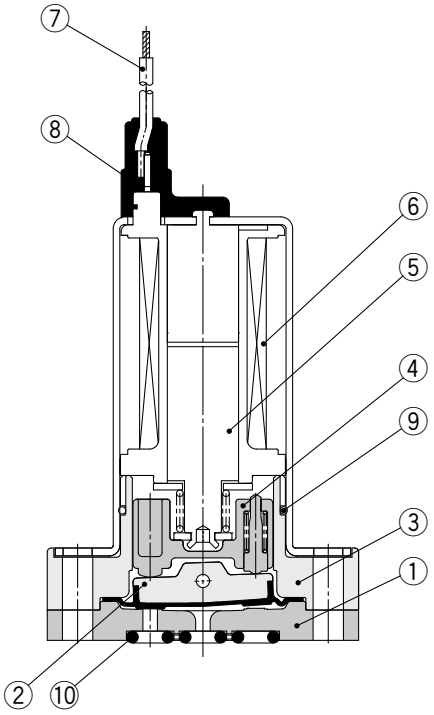
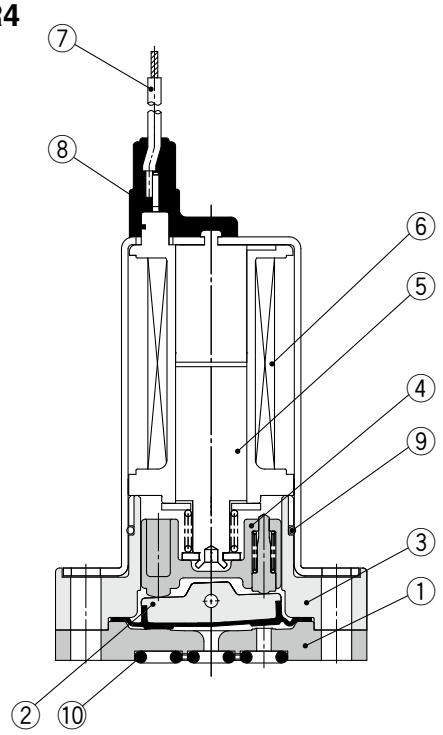
Construction

Base mounted

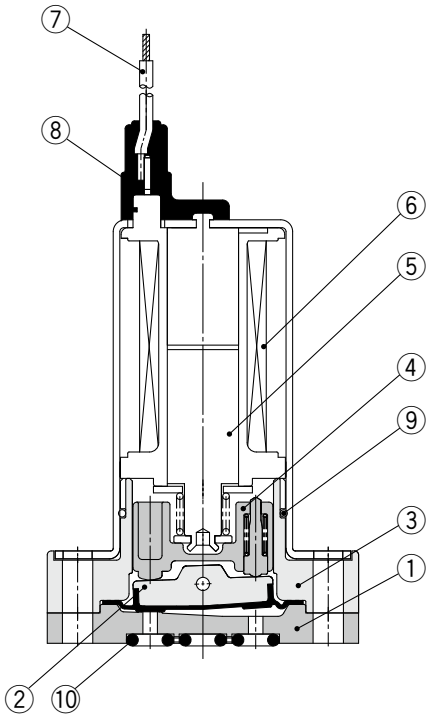
LVM09R3



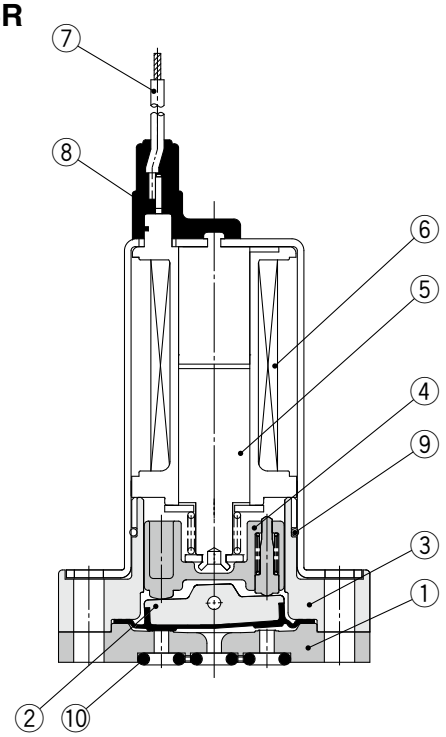
LVM09R4



LVM09R6



LVM095R



Component Parts: LVM09R3, 09R4, 09R6, 095R

No.	Description	Material
1	**Plate**	PEEK
2	**Diaphragm assembly**	EPDM/FKM/Kalrez®
3	**Body**	PBT
4	**Slide bushing assembly**	PPS/Stainless steel
5	**Armature assembly**	—

No.	Description	Material
6	**Coil assembly**	—
7	**Lead wire**	—
8	**Mold**	PET
9	**O-ring**	NBR
10	**Interface gasket**	EPDM/FKM/Kalrez®

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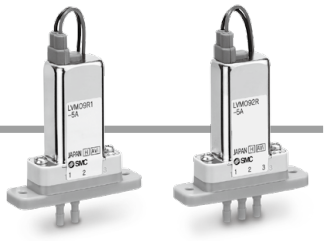
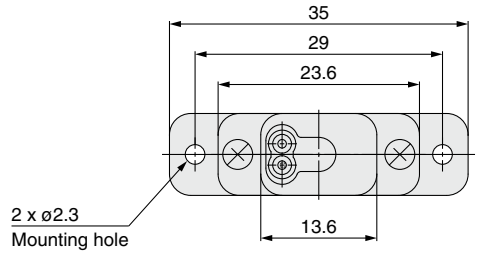
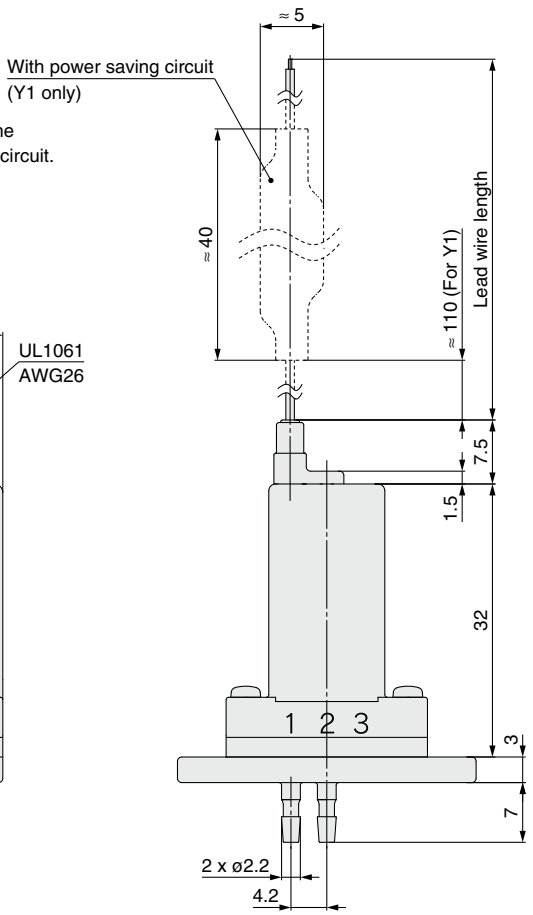


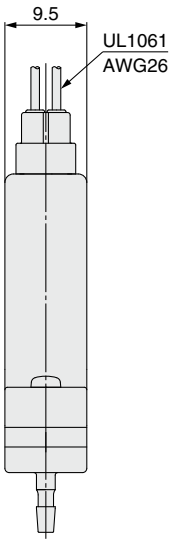
Dimensions

Body ported
LVM09R1
LVM09R2
LVM092R

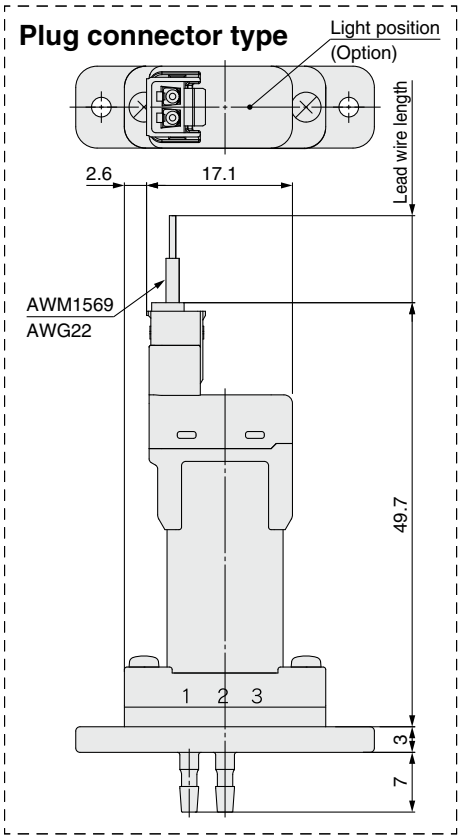


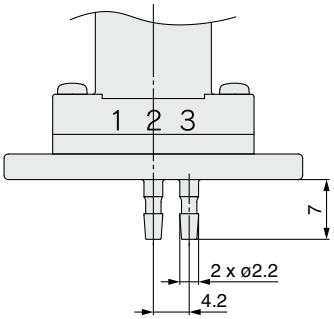


* The broken lines indicate the model with a power saving circuit.

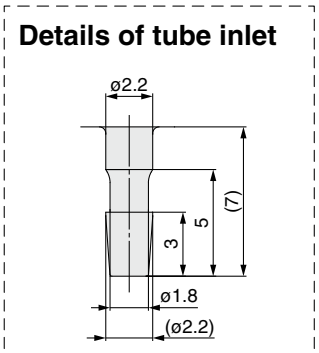


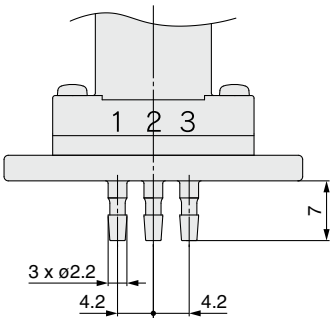
LVM09R1





LVM09R2

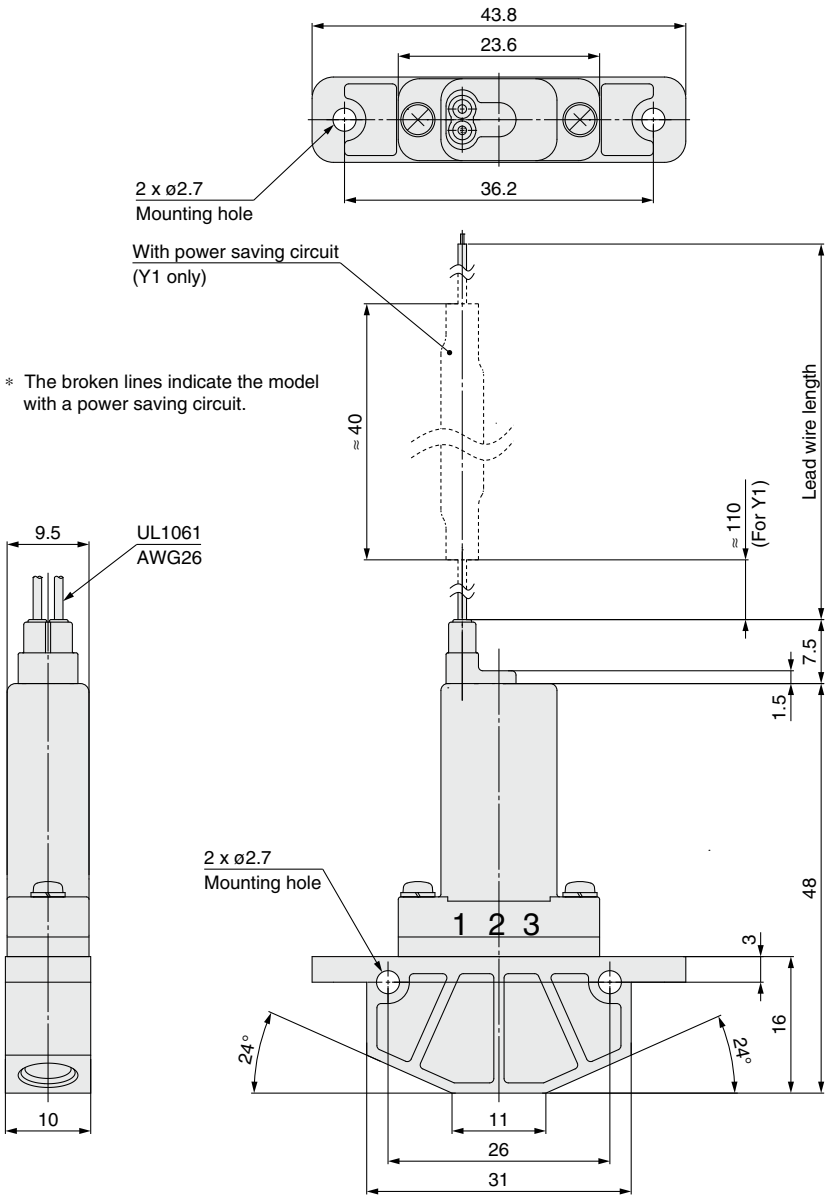


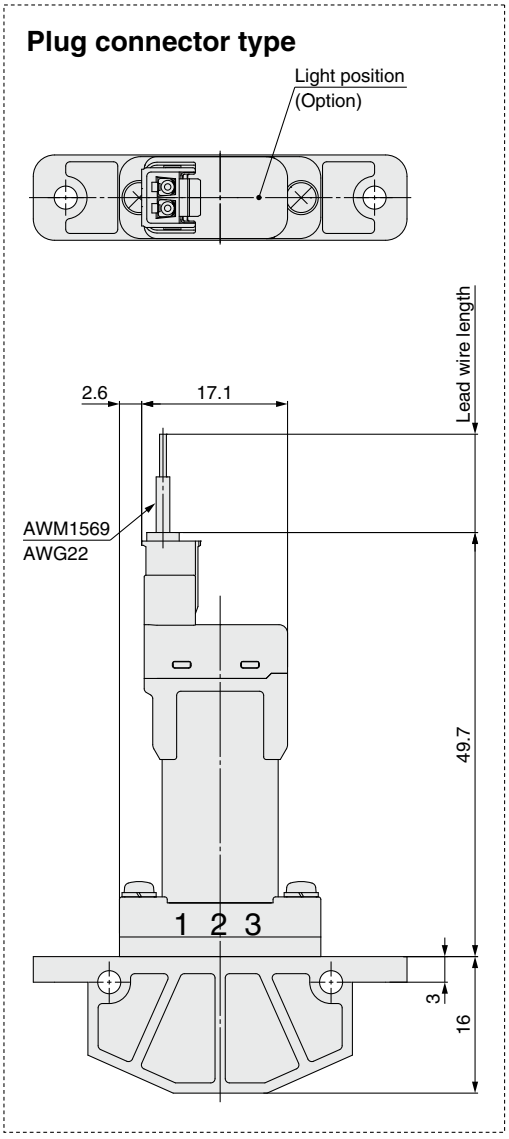


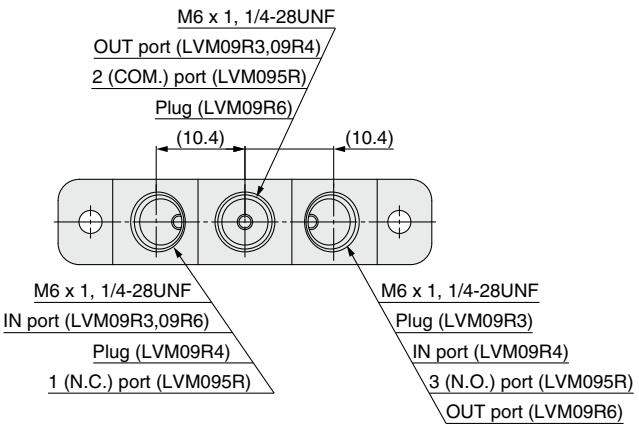
LVM092R

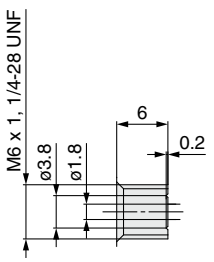
Dimensions

With sub-plate
LVM09R3-□□□-□(N.C.)
LVM09R4-□□□-□(N.O.)
LVM09R6-□□□-□(N.C.)
LVM095R-□□□-□(Universal)

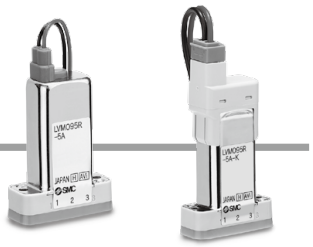






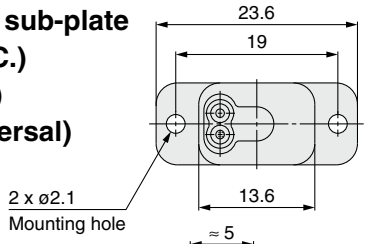


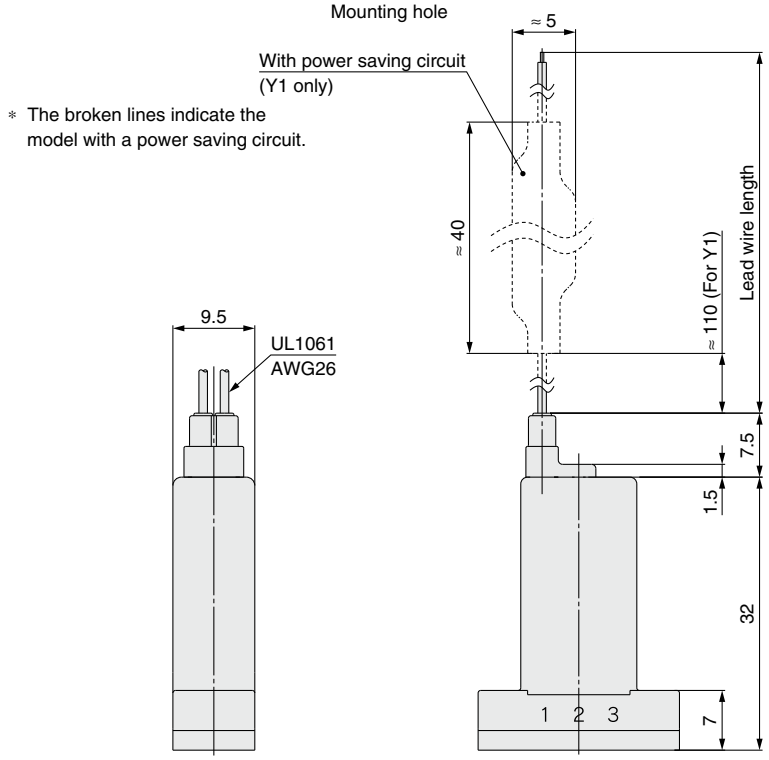
Details of thread



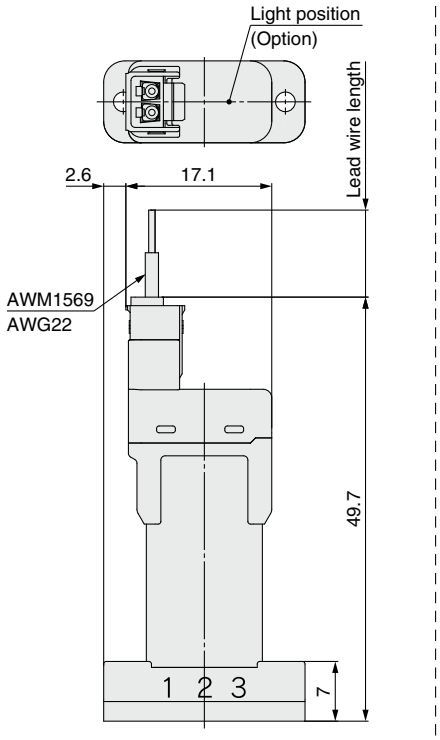
Dimensions

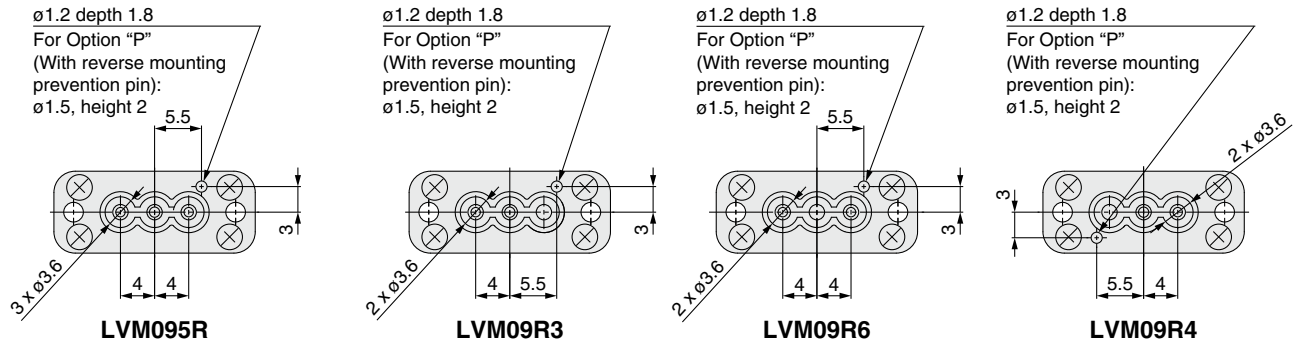
Base mounted, Without sub-plate
LVM09R3/6-□□-□ (N.C.)
LVM09R4-□□-□ (N.O.)
LVM095R-□□-□ (Universal)





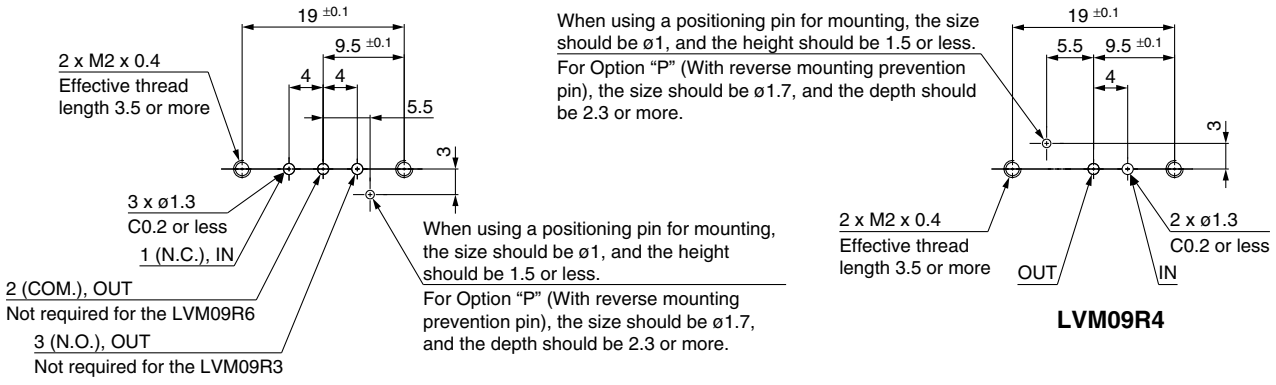
Plug connector type





Recommended interface dimensions

∗ Surface roughness = Rz3.2 or less



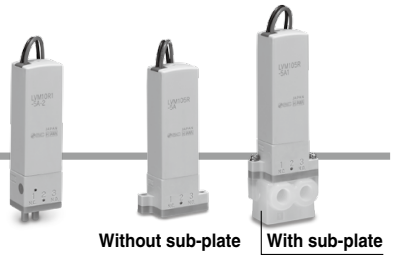
Direct Operated Rocker Type

[Option]

RoHS

Compact Direct Operated 2/3-Port Solenoid Valve for Chemical Liquids

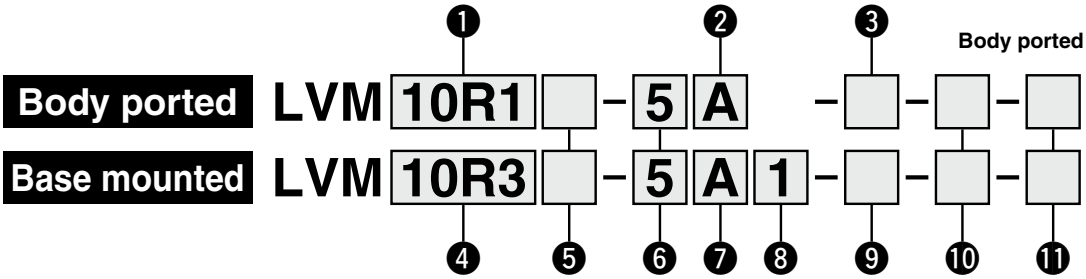
LVM10/100 Series



How to Order

Body ported

Base mounted



1 Number of ports, Valve type

Symbol	Number of ports	Valve type
10R1	2	N.C.
10R2		N.O.
102R	3	Universal

2 Fluid contact material

Symbol	Plate	Diaphragm
A	PEEK	EPDM
B	PEEK	FKM
C	PEEK	Kalrez®

3 Option

Nil	None
1	Bracket
2	Manual override
3	Bracket, Manual override

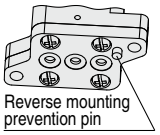
4 Number of ports, Valve type

Symbol	Number of ports	Valve type
10R3	2	N.C.
10R4		N.O.
10R6		N.C.
105R	3	Universal

5 Power saving circuit

Nil	None (Standard type)
Y	Yes

8 Sub-plate material/port size, Reverse mounting prevention pin

Symbol	Sub-plate		Reverse mounting prevention pin
	Material	Port size	
Nil	None		None
P			Yes  Reverse mounting prevention pin
1	PVDF	M6	None
1U		1/4-28UNF	
2	PFA	M6	
2U		1/4-28UNF	

∗ "P," "1," and "1U" cannot be selected if the wetted parts material is "E," "F," or "G."
∗ A sub-plate cannot be mounted for "P" (With reverse mounting prevention pin).

6 Coil voltage

Symbol	Voltage
5	24 VDC
6	12 VDC

7 Fluid contact material

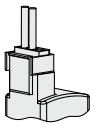
Symbol	Plate	Diaphragm
A	PEEK	EPDM
B	PEEK	FKM
C	PEEK	Kalrez®
E	PFA	EPDM
F	PFA	FKM
G	PFA	Kalrez®

9 Option

Nil	None
1	Bracket
2	Manual override
3	Bracket, Manual override

∗ Without a sub-plate, a bracket cannot be attached.

10 Electrical entry, Lead wire length, Light/surge voltage suppressor

Symbol	Electrical entry, Lead wire length	Light/surge voltage suppressor	
Nil	Grommet, 300 mm	Cannot be selected	
6	Grommet, 600 mm		
10	Grommet, 1000 mm		
K	Plug connector, 300 mm	None	
KO	Plug connector, Without connector		
KZ	Plug connector, 300 mm	Yes ∗ Power saving circuit "Y" is equipped with a light/surge voltage suppressor.	
KOZ	Plug connector, Without connector		

∗ The plug connector is included but does not come assembled.
∗ If a lead wire length of 600 mm or more is required, select "KO□" (Without connector) and then add the connector part number shown below under the valve part number when ordering.

11 CE/UKCA-compliant

Nil	No
Q	CE/UKCA-compliant

Plug connector part no.: AXT661 – 14A – □

Lead wire length

6	600 mm
10	1000 mm
20	2000 mm
30	3000 mm

Mounting screws are included with the base-mounted type (without sub-plate). (2 pcs.)
M2 x 11/With spring washer
(Material: Stainless steel)

For other spare parts, refer to page 374.

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

Specifications

Body ported

Without sub-plate
Base mounted

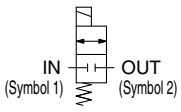
With sub-plate
Base mounted

Model			Body ported (Tube connection type)			Base mounted			
			LVM10R1	LVM10R2	LVM102R	LVM10R3	LVM10R4	LVM10R6	LVM105R
Valve construction			Direct operated rocker type						
Valve type			N.C.	N.O.	Universal	N.C.	N.O.	N.C.	Universal
Number of ports			2		3	2			3
Fluid*1			Air, Water, DI water (Pure water), Diluent, or Cleaning fluid						
Operating pressure range			–75 kPa to 0.25 MPa						
Orifice diameter			1.4 mm						
Response time*7			10 ms or less (35 ms or less for the type with a power-saving circuit only when OFF*9) (at pneumatic pressure)						
Leakage			Zero leakage, both internal or external (at water pressure)						
Proof pressure*2			0.38 MPa						
Ambient temperature*8			0 to 50°C						
Fluid temperature*8			0 to 50°C (No freezing)						
Storage temperature*10			–20 to +60°C (No condensation)						
Volume of valve chamber*3			20 μL					28 μL	20 μL
Mounting orientation*4			Free						
Enclosure			IP40 or equivalent						
Weight			34 g			34 g (Without sub-plate) 42 g (With sub-plate)			
Rated voltage			12, 24 VDC						
Allowable voltage fluctuation*5			±10% of rated voltage						
Type of coil insulation			Class B						
Power consumption (When rated voltage is at 24 V)	Standard type		1.5 W (0.06 A)						
	With power saving circuit	Inrush	2.5 W (0.1 A)						
		Holding	1 W						
Coil switching noise*6			50 dB						

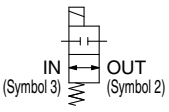
*1 Select an appropriate fluid contact material according to the fluid to be used. Additionally, check the chemical resistance beforehand.
*2 Indicates the pressure which does not generate breakage or cracks after a one-minute airtight test
*3 Indicates the volume of clearance inside the valve chamber after the volume of the diaphragm is subtracted
*4 Since the body (orifice shape) is designed to eliminate residual liquid, mounting in a vertical direction with the coil at the top is recommended. When residual liquid need not be taken into consideration, any mounting orientation is available.
*5 When response time is prioritized, control the voltage so that there is no fluctuation below the rated voltage.
*6 The value is based on SMC's measurement conditions. The noise level will vary according to the actual conditions.
*7 In compliance with JIS B 8419:2010
(Value at ambient and fluid temperatures of 25°C, rated voltage, max. operating pressure (air), and when the N.C. (IN) port is pressurized)
The response time will vary depending on the supply pressure, fluid, piping conditions, and ambient temperature.
*8 When the diaphragm material is Kalrez®, the valve changeover time will be significantly longer at ambient and fluid temperatures of 15°C or less when compared to the valve changeover time at room temperature (≈ 25°C).
*9 Refer to 2. in the "Selection" section of the "Design and Selection Precautions" on page 371.
*10 Store in a location out of direct sunlight and where the cyclic temperature does not exceed normal temperature changes.
* Refer to 10 in "Design / Selection" on page 371 if the valve is to be energized continuously for extended periods of time.

Symbol

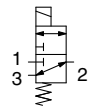
N.C.
LVM10R1/R3



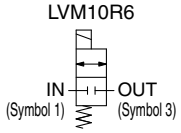
N.O.
LVM10R2/R4



Universal
LVM102R/5R



LVM10R6



Flow Rate Characteristics

Water		Air	
Kv	Cv	C	b
0.025	0.03	0.1	0.2

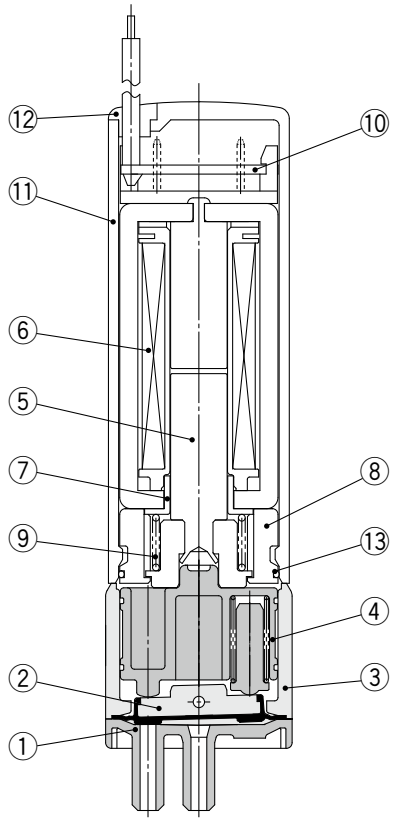
* The values of Kv and Cv are based on JIS B 2005:1995; the values of C and b are based on JIS B 8390:2000.

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

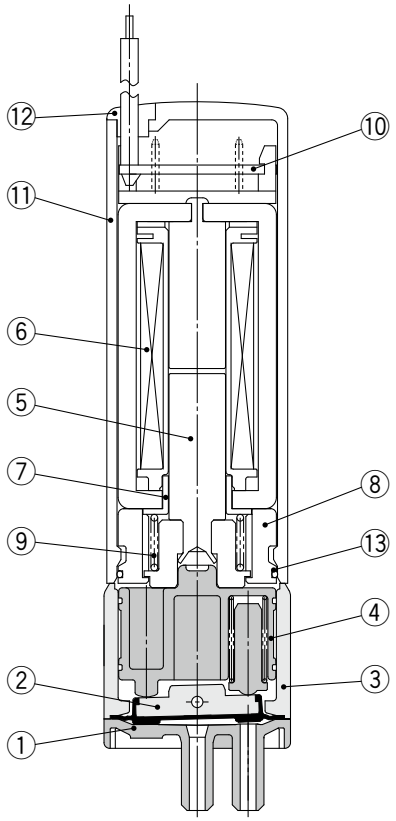
Construction

Body ported

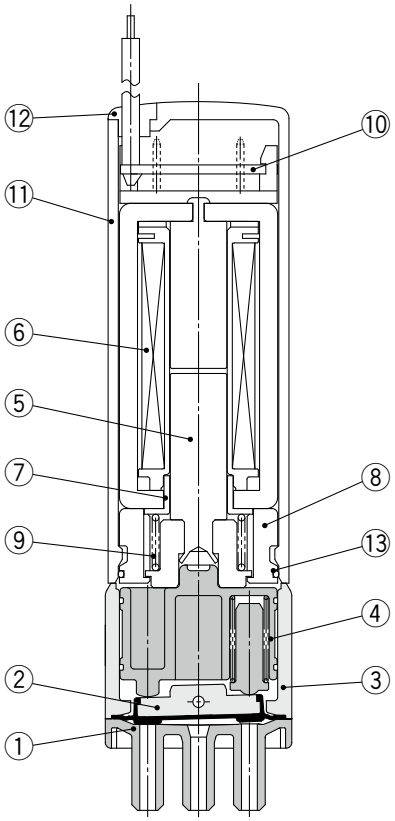
LVM10R1



LVM10R2



LVM102R



Component Parts: LVM10R1, 10R2, 102R

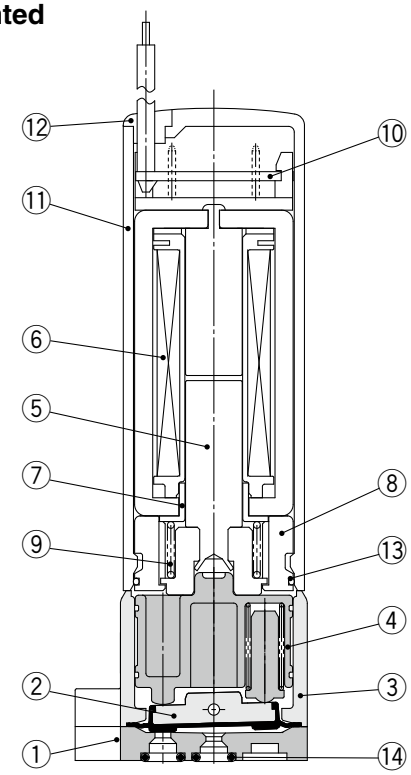
No.	Description	Material
1	**Plate**	PEEK
2	**Diaphragm assembly**	EPDM/FKM/Kalrez®
3	**Body**	PBT
4	**Slide bushing assembly**	PPS/Stainless steel
5	**Armature assembly**	Stainless steel/PBT
6	**Coil assembly**	—
7	**Sleeve**	SUY (Iron)
8	**Spacer**	PBT
9	**Return spring**	Stainless steel
10	**Board assembly**	—
11	**Casing**	PBT
12	**Plug**	NBR
13	**O-ring**	NBR

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

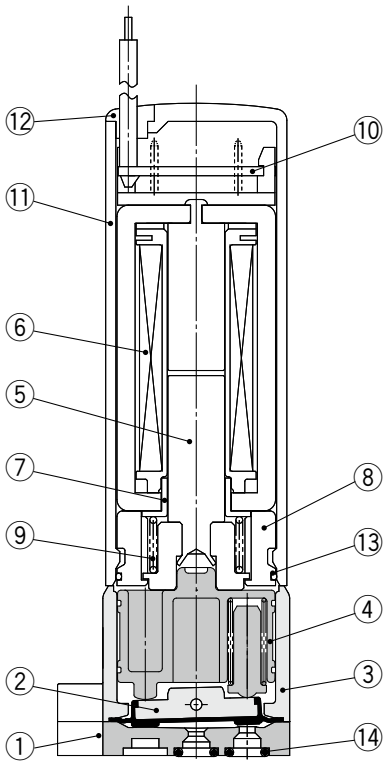
Construction

Base mounted

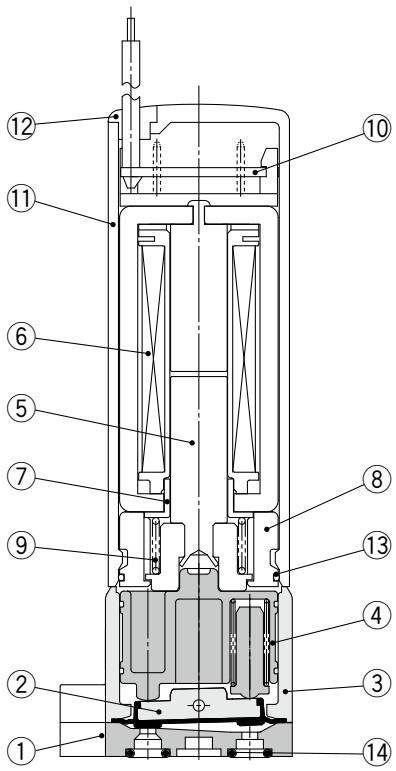
LVM10R3



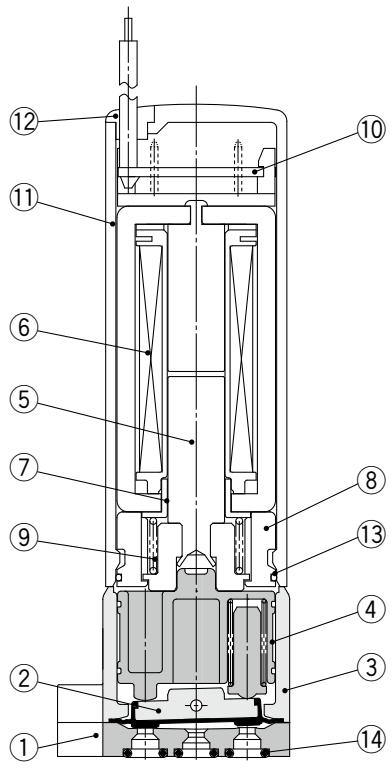
LVM10R4



LVM10R6



LVM105R



Component Parts: LVM10R3, 10R4, 10R6, 105R

No.	Description	Material
1	**Plate**	PEEK/PFA
2	**Diaphragm assembly**	EPDM/FKM/Kalrez®
3	**Body**	PBT
4	**Slide bushing assembly**	PPS/Stainless steel
5	**Armature assembly**	Stainless steel/PBT
6	**Coil assembly**	—
7	**Sleeve**	SUY (Iron)

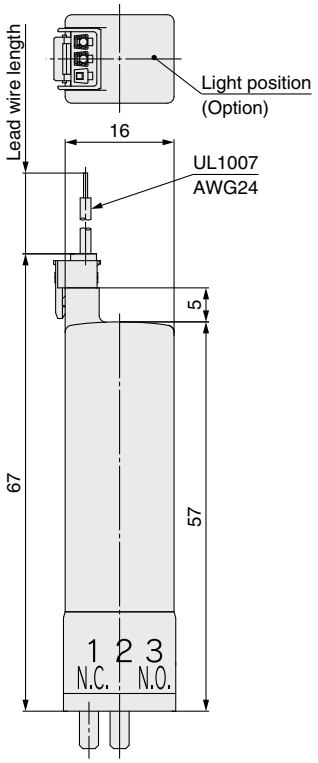
No.	Description	Material
8	**Spacer**	PBT
9	**Return spring**	Stainless steel
10	**Board assembly**	—
11	**Casing**	PBT
12	**Plug**	NBR
13	**O-ring**	NBR
14	**O-ring**	EPDM/FKM/Kalrez®

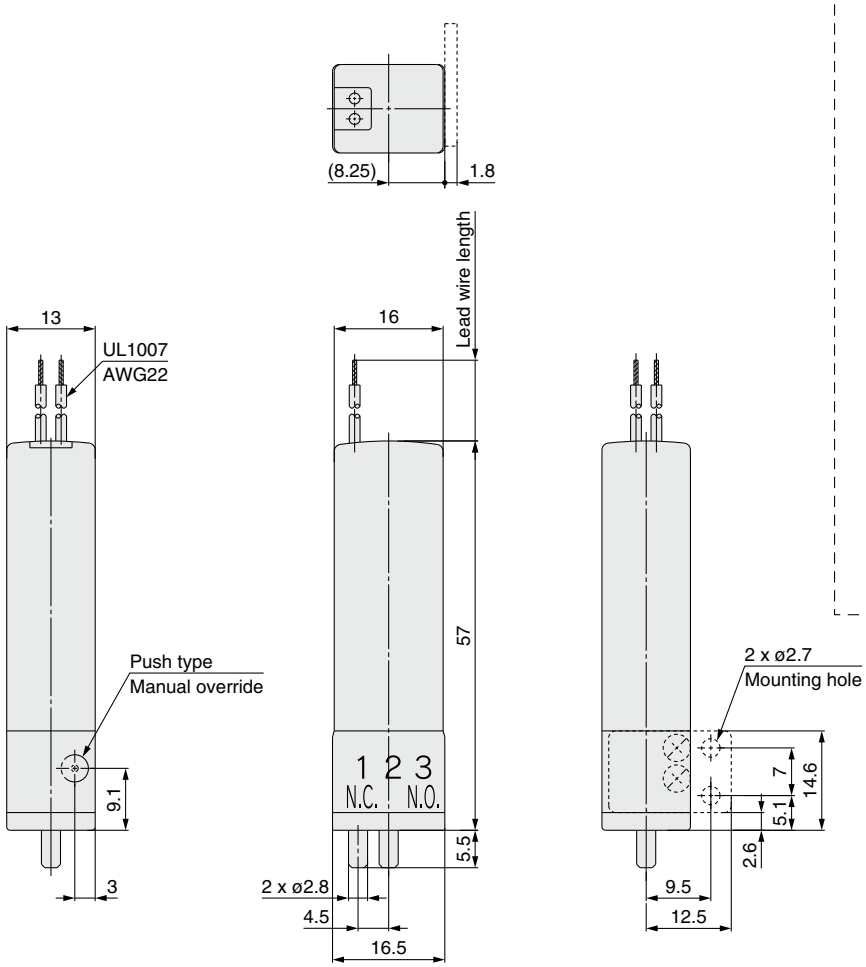
* Kalrez® is a registered trademark of E. I. du Pont de Nemours and Company or its affiliates.

Dimensions

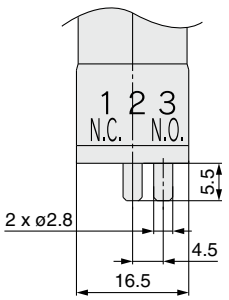
Body ported
LVM10R1-□□-□ (N.C.)
LVM10R2-□□-□ (N.O.)
LVM102R-□□-□ (Universal)

Plug connector type



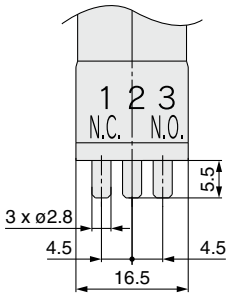


LVM10R1



LVM10R2

∗ The broken lines indicate the model with a bracket.

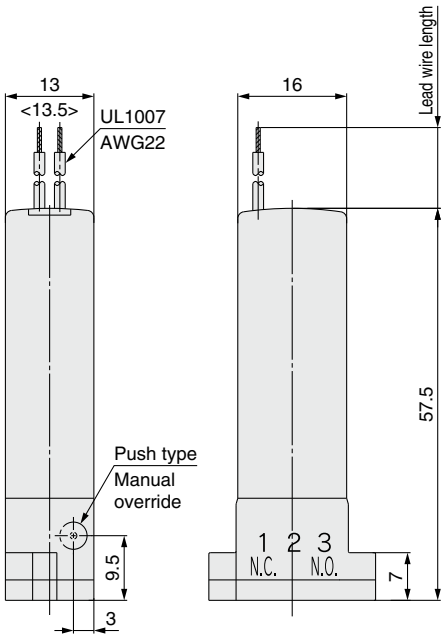


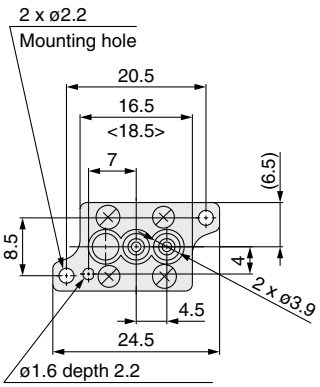
LVM102R

Dimensions

Base mounted, Without sub-plate

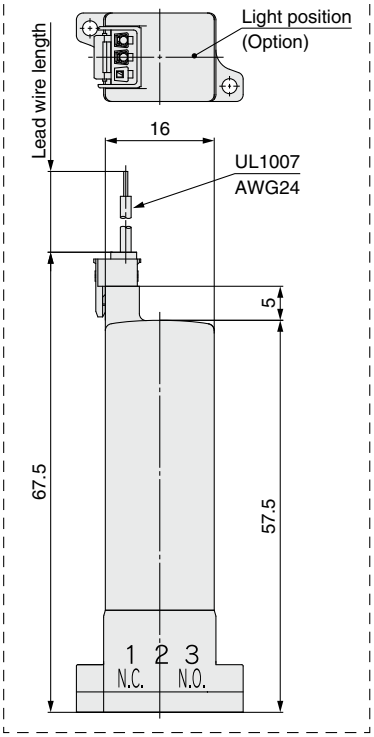
LVM10R3-□□-□ (N.C.)
LVM10R4-□□-□ (N.O.)
LVM10R6-□□-□ (N.C.)
LVM105R-□□-□ (Universal)

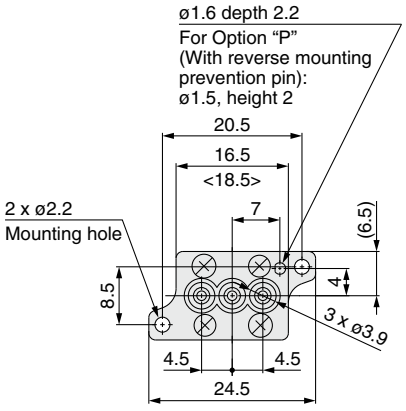




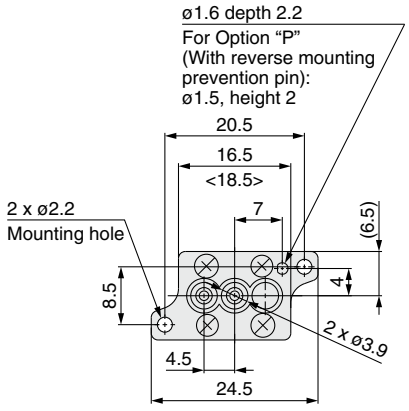
LVM10R4

Plug connector type

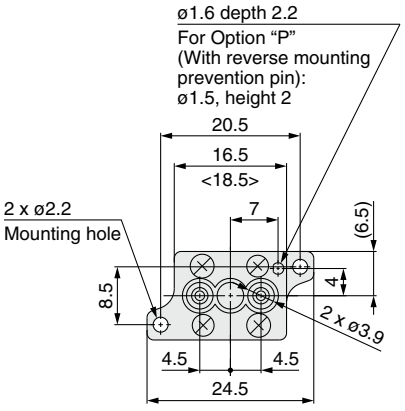




LVM105R



LVM10R3

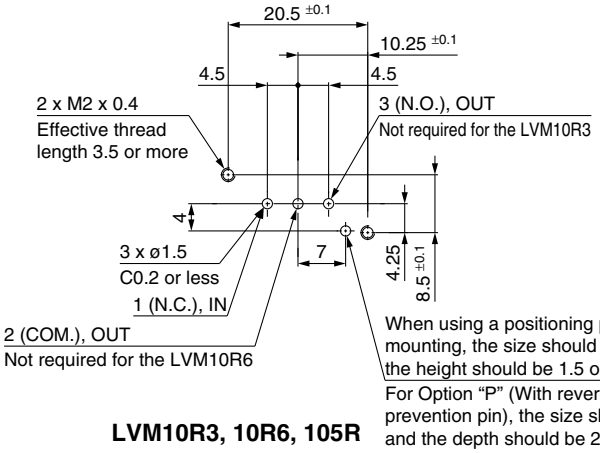


LVM10R6

∗ The figures in brackets < > indicate the values when PFA is selected as the plate material (wetted parts material "E," "F," or "G"). When PFA is selected as the plate material (wetted parts material "E," "F," or "G"), there is no ø1.6 positioning hole or ø1.5 reverse mounting prevention pin.

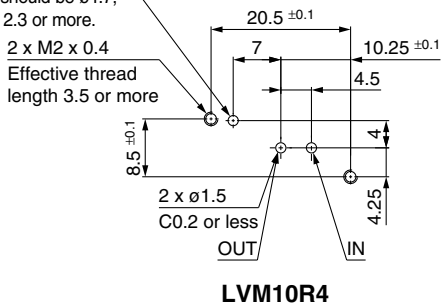
Recommended interface dimensions

∗ Surface roughness = Rz3.2 or less



LVM10R3, 10R6, 105R

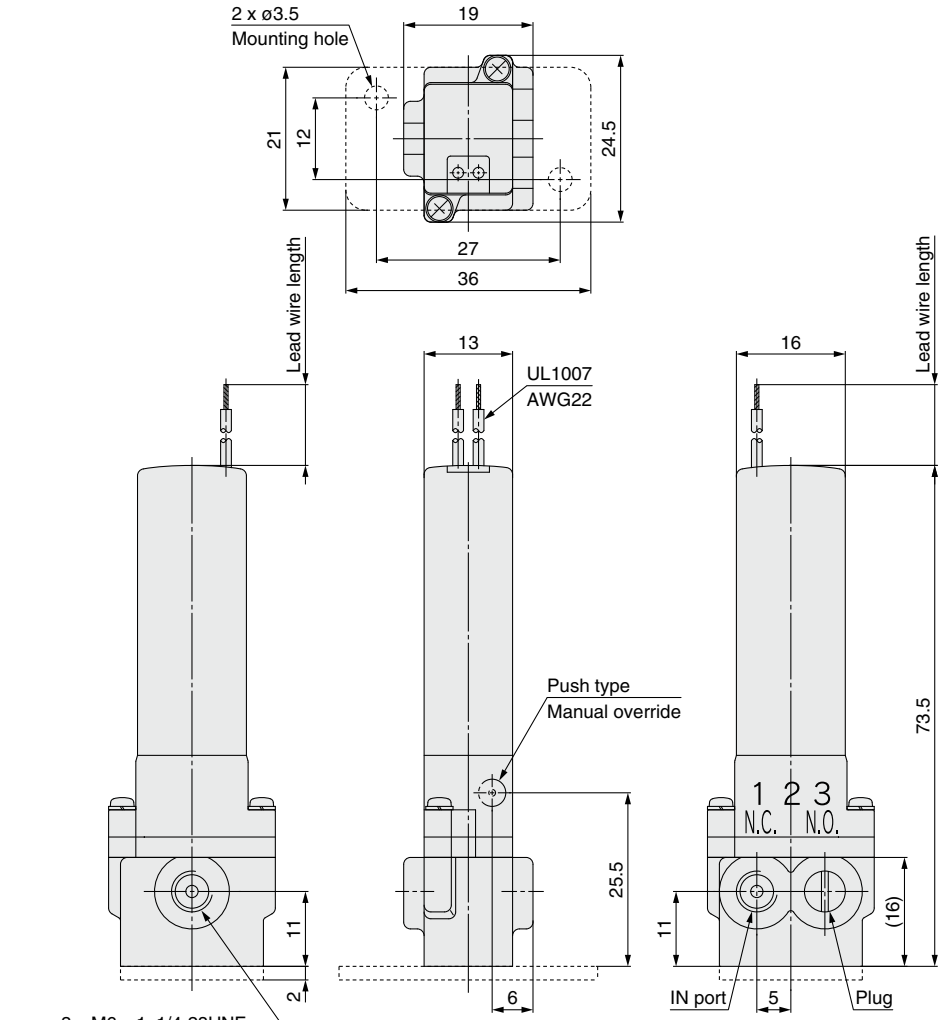
When using a positioning pin for mounting, the size should be ø1, and the height should be 1.5 or less.
For Option "P" (With reverse mounting prevention pin), the size should be ø1.7, and the depth should be 2.3 or more.



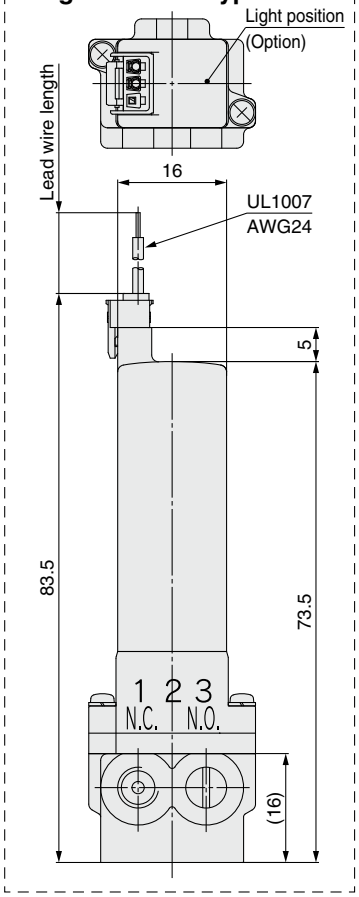
LVM10R4

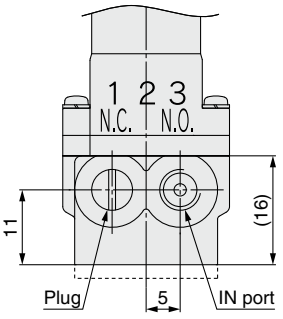
Dimensions

Base mounted, With sub-plate
LVM10R3-□□□-□ (N.C.)
LVM10R4-□□□-□ (N.O.)
LVM10R6-□□□-□ (N.C.)
LVM105R-□□□-□ (Universal)

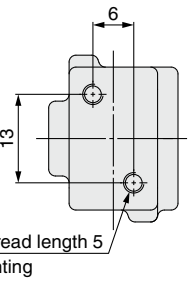


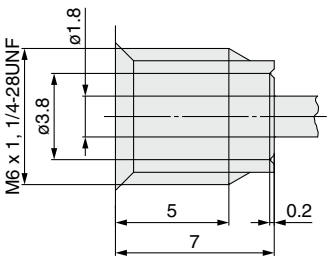
LVM10R3



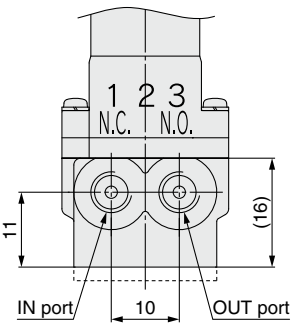


LVM10R4

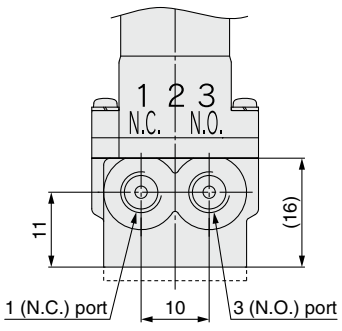




Details of thread



LVM10R6



LVM105R

∗ The broken lines indicate the model with a bracket.

Direct Operated Rocker Type

CE UKCA [Option] RoHS

Compact Direct Operated 2/3-Port Solenoid Valve for Chemical Liquids

LVM15/150 Series

Without sub-plate With sub-plate

How to Order

Base mounted **LVM 15R3 Y – 5 A 1 – □ – □**

❶ ❷ ❸ ❹ ❺ ❻ ❼

❶ Number of ports, Valve type

Symbol	Number of ports	Valve type
15R3	2	N.C.
15R4		N.O.
15R6		N.C.
155R	3	Universal

❷ Max. operating pressure, Power saving circuit

Symbol	Max. operating pressure	Power saving circuit
Y	0.25 MPa (Standard type)	Yes
HY	0.6 MPa (High-pressure type)	Yes

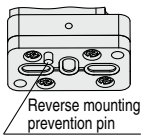
❸ Coil voltage

Symbol	Voltage
5	24 VDC
6	12 VDC

❹ Fluid contact material

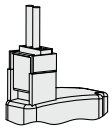
Symbol	Plate	Diaphragm
A	PEEK	EPDM
B	PEEK	FKM
C	PEEK	Kalrez®

❺ Sub-plate material/port size, Reverse mounting prevention pin

Symbol	Sub-plate		Reverse mounting prevention pin
	Material	Port size	
Nil	None		None
P			Yes  Reverse mounting prevention pin
1	PVDF	M6	None
1U		1/4-28UNF	

∗ A sub-plate cannot be mounted for “P” (With reverse mounting prevention pin).

❻ Electrical entry, Lead wire length, Light/surge voltage suppressor

Symbol	Electrical entry, Lead wire length	Light/surge voltage suppressor	
Nil	Grommet, 300 mm	Cannot be selected	
6	Grommet, 600 mm		
10	Grommet, 1000 mm		
KZ	Plug connector, 300 mm	Yes	
KOZ	Plug connector, Without connector		

∗ The plug connector is included but does not come assembled.
∗ If a lead wire length of 600 mm or more is required, select “KOZ” (Without connector) and then add the connector part number shown below under the valve part number when ordering.

Plug connector part no.: AXT661 – 14A – □

Lead wire length

6	600 mm
10	1000 mm
20	2000 mm
30	3000 mm

❼ CE/UKCA-compliant

Nil	No
Q	CE/UKCA-compliant

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

Mounting screws are included for models without sub-plate. (2 pcs.)
M2.5 x 14/With spring washer (Material: Stainless steel)

For other spare parts, refer to page 374.

Specifications

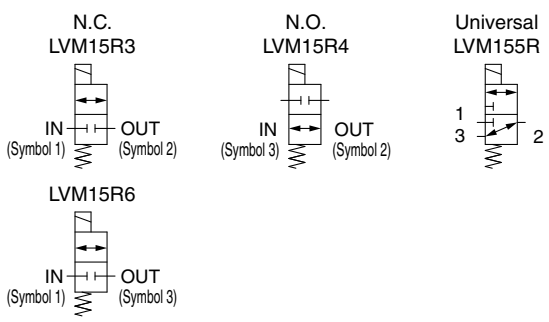
Without sub-plate

With sub-plate

Model		Base mounted			
		LVM15R3	LVM15R4	LVM15R6	LVM155R
Valve construction		Direct operated rocker type			
Valve type		N.C.	N.O.	N.C.	Universal
Number of ports		2			3
Fluid*1		Air, Water, DI water (Pure water), Diluent, or Cleaning fluid			
Operating pressure range	Standard type	–75 kPa to 0.25 MPa			
	High-pressure type	Max. 0.6 MPa*7			
Orifice diameter	Standard type	1.6 mm			
	High-pressure type	1 mm			
Response time*8		15 ms or less (at pneumatic pressure)			
Leakage		Zero leakage, both internal or external (at water pressure)			
Proof pressure*2	Standard type	0.38 MPa			
	High-pressure type	0.9 MPa			
Ambient temperature*9		0 to 50°C			
Fluid temperature*9		0 to 50°C (No freezing)			
Storage temperature*10		–20 to +60°C (No condensation)			
Volume of valve chamber*3		50 μL		60 μL	50 μL
Mounting orientation*4		Free			
Enclosure		IP40 or equivalent			
Weight		45 g (Without sub-plate), 56 g (With sub-plate)			
Rated voltage		12, 24 VDC			
Allowable voltage fluctuation*5		±10% of rated voltage			
Type of coil insulation		Class B			
Power consumption (When rated voltage is at 24 V)	Inrush	5.5 W (0.23 A)			
	Holding	1 W			
Coil switching noise*6		60 dB			

*1 Select an appropriate fluid contact material according to the fluid to be used. Additionally, check the chemical resistance beforehand.
*2 Indicates the pressure which does not generate breakage or cracks after a one-minute airtight test
*3 Indicates the volume of clearance inside the valve chamber after the volume of the diaphragm is subtracted
*4 Since the body (orifice shape) is designed to eliminate residual liquid, mounting in a vertical direction with the coil at the top is recommended. When residual liquid need not be taken into consideration, any mounting orientation is available.
*5 When response time is prioritized, control the voltage so that there is no fluctuation below the rated voltage.
*6 The value is based on SMC's measurement conditions. The noise level will vary according to the actual conditions.
*7 The high-pressure type can also be used at a pressure level of up to –75 kPa. However, set the maximum operating pressure so that a difference in operating pressure becomes 0.6 MPa or less.
Example) When the valve is used at –50 kPa, the maximum operating pressure is up to 0.55 MPa.
*8 In compliance with JIS B 8419:2010
(Value at ambient and fluid temperatures of 25°C, rated voltage, max. operating pressure (air), and when the N.C. (IN) port is pressurized)
The response time will vary depending on the supply pressure, fluid, piping conditions, and ambient temperature.
*9 When the diaphragm material is Kalrez®, the valve changeover time will be significantly longer at ambient and fluid temperatures of 15°C or less when compared to the valve changeover time at room temperature (≈ 25°C).
*10 Store in a location out of direct sunlight and where the cyclic temperature does not exceed normal temperature changes.
* Refer to 10 in "Design / Selection" on page 371 if the valve is to be energized continuously for extended periods of time.

Symbol



Flow Rate Characteristics

Water		Air	
Kv	Cv	C	b
0.034 [0.012]	0.04 [0.015]	0.13 [0.05]	0.22 [0.2]

The [ ] indicate the values of the high-pressure type.

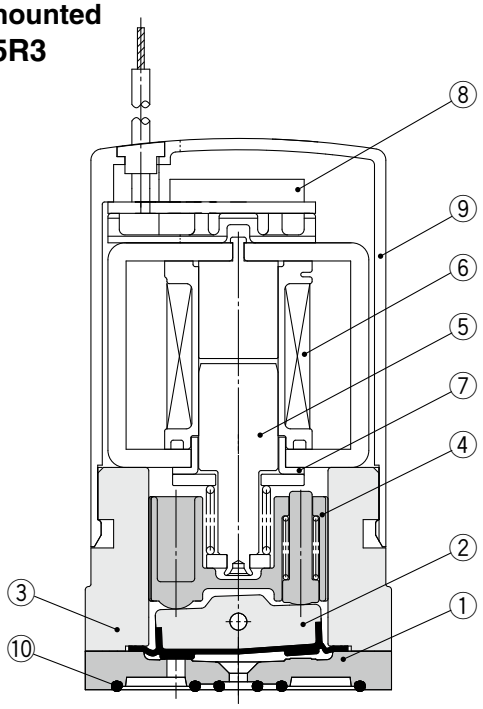
* The values of Kv and Cv are based on JIS B 2005:1995; the values of C and b are based on JIS B 8390:2000.

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

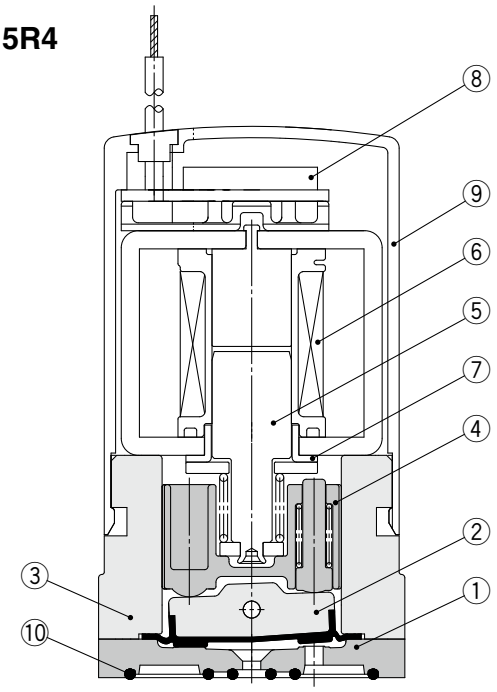
Construction

Base mounted

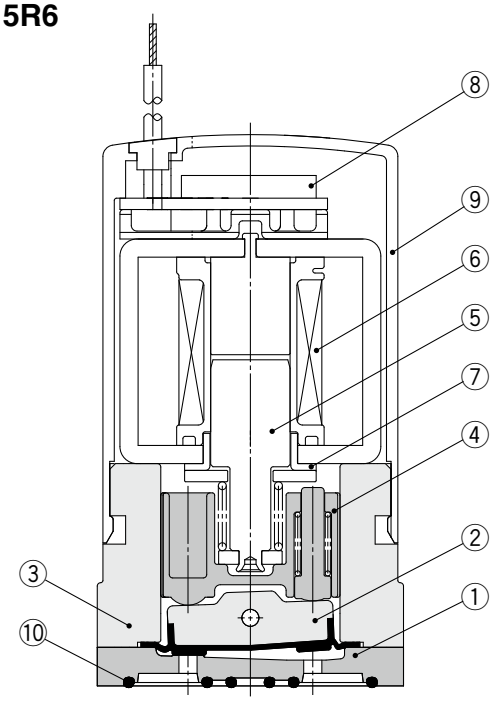
LVM15R3



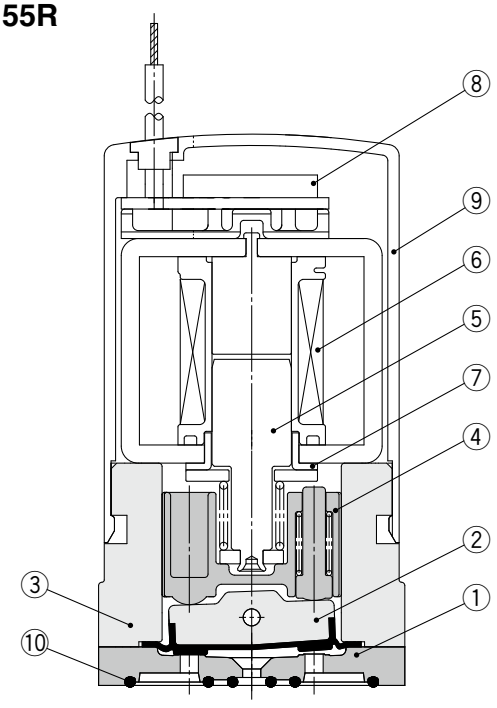
LVM15R4



LVM15R6



LVM155R



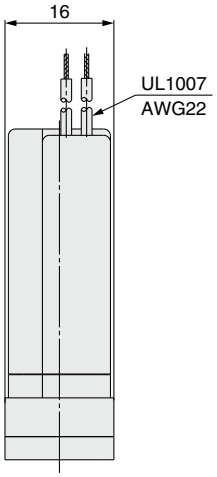
Component Parts: LVM15R3, 15R4, 15R6, 155R

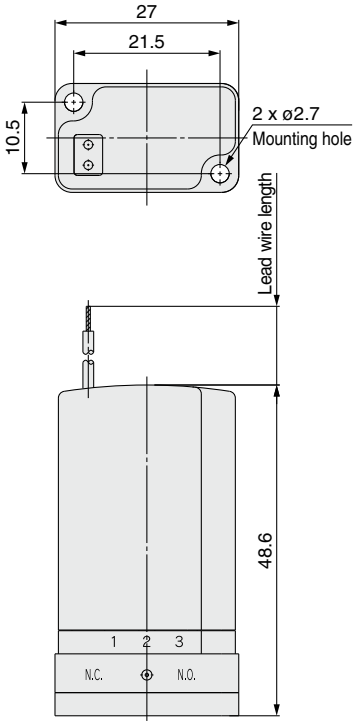
No.	Description	Material
1	**Plate**	PEEK
2	**Diaphragm assembly**	EPDM/FKM/Kalrez®
3	**Body**	PBT
4	**Slide bushing assembly**	PPS/Stainless steel
5	**Armature assembly**	—
6	**Coil assembly**	—
7	**Sleeve**	SUY (Iron)
8	**Board assembly**	—
9	**Casing**	PBT
10	**Interface gasket**	EPDM/FKM/Kalrez®

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

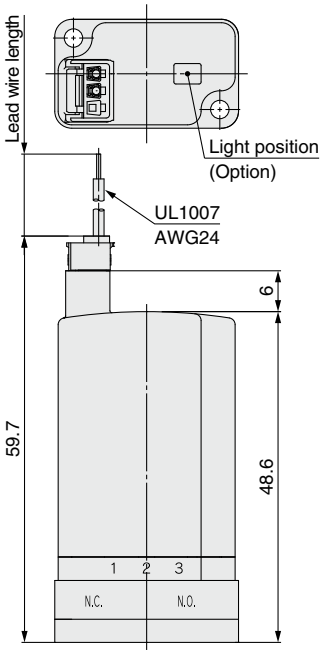
Dimensions

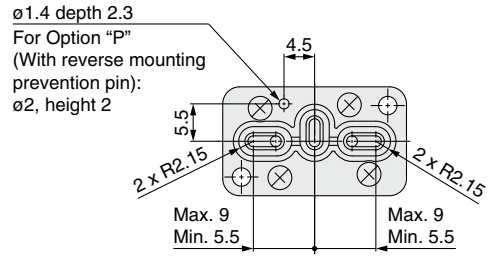
Base mounted, Without sub-plate
LVM15R3-□□-□ (N.C.)
LVM15R4-□□-□ (N.O.)
LVM15R6-□□-□ (N.C.)
LVM155R-□□-□ (Universal)



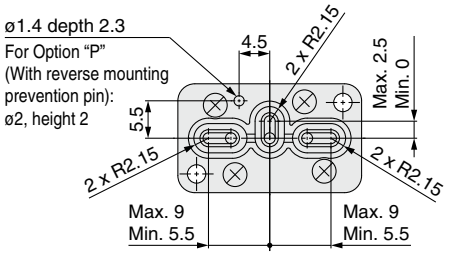


Plug connector type

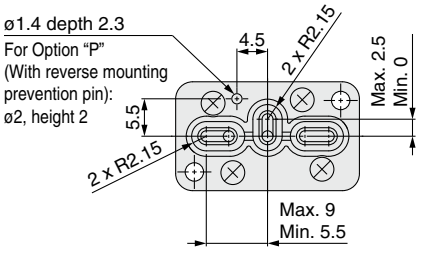




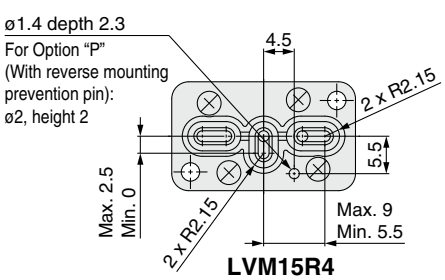
LVM15R6



LVM155R



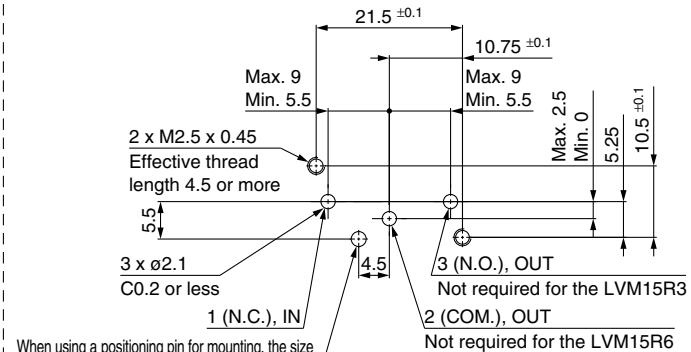
LVM15R3



LVM15R4

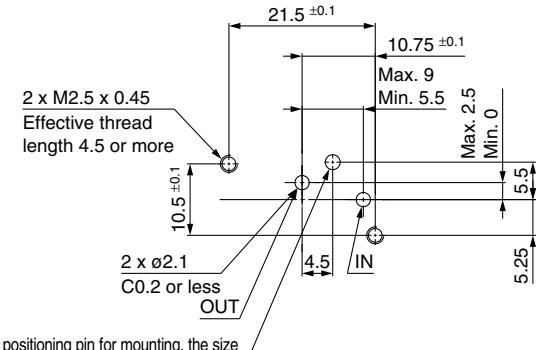
Recommended interface dimensions

* Surface roughness = Rz3.2 or less



When using a positioning pin for mounting, the size should be ø1.2, and the height should be 2 or less.
For Option "P" (With reverse mounting prevention pin), the size should be ø2.2, and the depth should be 2.3 or more.

LVM15R3, 15R6, 155R



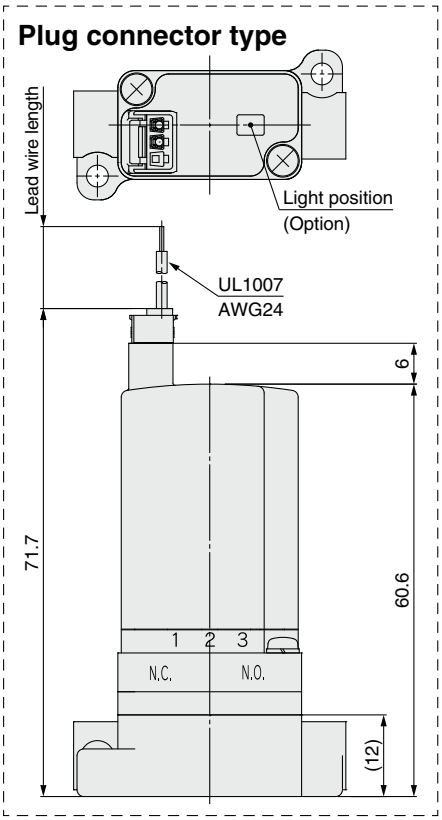
When using a positioning pin for mounting, the size should be ø1.2, and the height should be 2 or less.
For Option "P" (With reverse mounting prevention pin), the size should be ø2.2, and the depth should be 2.3 or more.

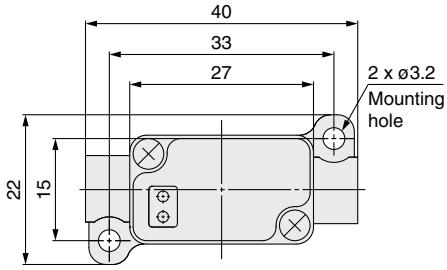
LVM15R4

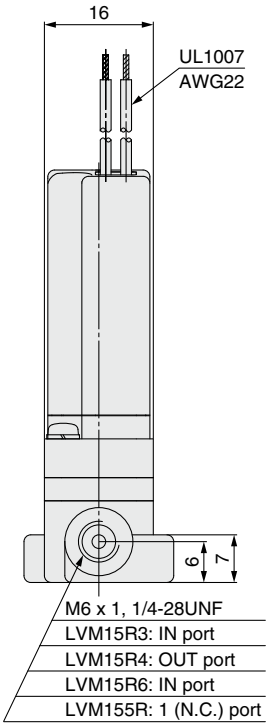
Dimensions

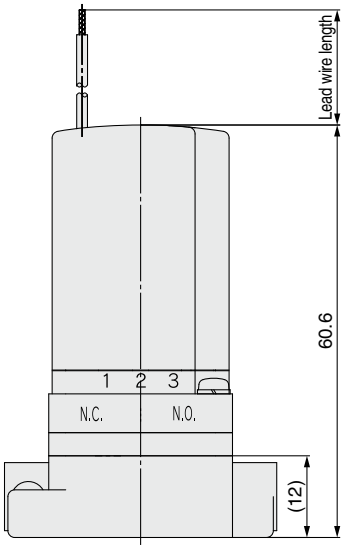
Base mounted, With sub-plate
LVM15R3-□□□-□ (N.C.)
LVM15R4-□□□-□ (N.O.)
LVM15R6-□□□-□ (N.C.)
LVM155R-□□□-□ (Universal)

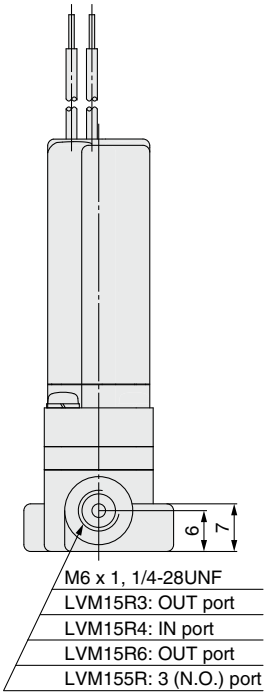
Plug connector type

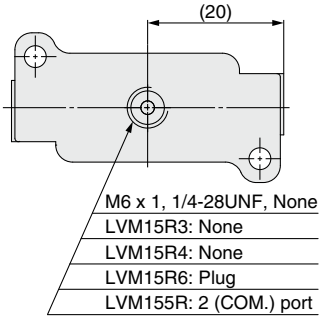


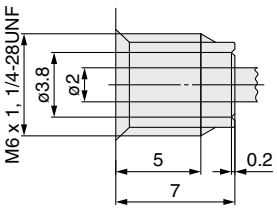












Details of thread

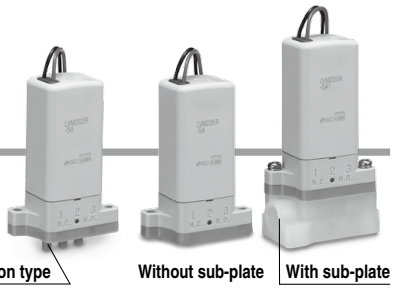
Direct Operated Rocker Type

[Option]

RoHS

Compact Direct Operated 2/3-Port Solenoid Valve for Chemical Liquids

LVM20/200 Series



How to Order

Body ported LVM 20R1 □ – 5 A – □ – □

Base mounted LVM 20R3 □ – 5 A 1 – □ – □

❶ ❷ ❸ ❹ ❺ ❻ ❼ ❽

❶ Number of ports, Valve type

Symbol	Number of ports	Valve type
20R1	2	N.C.
20R2		N.O.
202R	3	Universal

❷ Number of ports, Valve type

Symbol	Number of ports	Valve type
20R3	2	N.C.
20R4		N.O.
205R	3	Universal

❸ Power saving circuit

Nil	None (Standard type)
Y	Yes

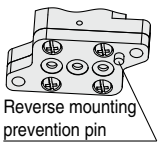
❹ Coil voltage

Symbol	Voltage
5	24 VDC
6	12 VDC

❺ Fluid contact material

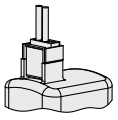
Symbol	Plate	Diaphragm
A	PEEK	EPDM
B	PEEK	FKM
C	PEEK	Kalrez®

❻ Sub-plate material/port size, Reverse mounting prevention pin

Symbol	Sub-plate		Reverse mounting prevention pin
	Material	Port size	
Nil	None		None
P	None		Yes  Reverse mounting prevention pin
1	PVDF	Rc1/8	None
1F		G1/8	
1N		NPT1/8	

∗ A sub-plate cannot be mounted for "P" (With reverse mounting prevention pin).

❼ Electrical entry, Lead wire length, Light/surge voltage suppressor

Symbol	Electrical entry, Lead wire length	Light/surge voltage suppressor	
Nil	Grommet, 300 mm	Cannot be selected	
6	Grommet, 600 mm		
10	Grommet, 1000 mm		
K	Plug connector, 300 mm	None	
KO	Plug connector, Without connector		
KZ	Plug connector, 300 mm	Yes ∗ Power saving circuit "Y" is equipped with a light/surge voltage suppressor.	
KOZ	Plug connector, Without connector		

∗ The plug connector is included but does not come assembled.
∗ If a lead wire length of 600 mm or more is required, select "KO□" (Without connector) and then add the connector part number shown below under the valve part number when ordering.

Plug connector part no.: AXT661 − 14A − □

Lead wire length

6	600 mm
10	1000 mm
20	2000 mm
30	3000 mm

❽ CE/UKCA-compliant

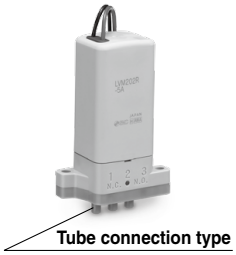
Nil	No
Q	CE/UKCA-compliant

Mounting screws are included with the base-mounted type (without sub-plate). (2 pcs.)
M3 x 14/With spring washer (Material: Stainless steel)

For other spare parts, refer to page 374.

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

Specifications



Body ported

Without sub-plate
Base mounted

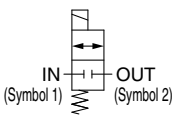
Base mounted

Model			Body ported (Tube connection type)			Base mounted		
			LVM20R1	LVM20R2	LVM202R	LVM20R3	LVM20R4	LVM205R
Valve construction			Direct operated rocker type					
Valve type			N.C.	N.O.	Universal	N.C.	N.O.	Universal
Number of ports			2		3	2		3
Fluid*1			Air, Water, DI water (Pure water), Diluent, or Cleaning fluid					
Operating pressure range			–75 kPa to 0.25 MPa			–75 kPa to 0.3 MPa		
Orifice diameter			2 mm					
Response time*7			20 ms or less (40 ms or less for the type with a power-saving circuit only when OFF*9) (at pneumatic pressure)					
Leakage			Zero leakage, both internal or external (at water pressure)					
Proof pressure*2			0.38 MPa			0.45 MPa		
Ambient temperature*8			0 to 50°C					
Fluid temperature*8			0 to 50°C (No freezing)					
Storage temperature*10			–20 to +60°C (No condensation)					
Volume of valve chamber*3			84 μL					
Mounting orientation*4			Free					
Enclosure			IP40 or equivalent					
Weight			80 g			80 g (Without sub-plate), 94 g (With sub-plate)		
Rated voltage			12, 24 VDC					
Allowable voltage fluctuation*5			±10% of rated voltage					
Type of coil insulation			Class B					
Power consumption (When rated voltage is at 24 V)	Standard type		2.5 W (0.1 A)					
	With power saving circuit	Inrush	4 W (0.17 A)					
		Holding	0.6 W					
Coil switching noise*6			60 dB					

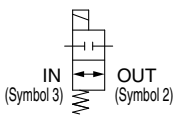
*1 Select an appropriate fluid contact material according to the fluid to be used. Additionally, check the chemical resistance beforehand.
*2 Indicates the pressure which does not generate breakage or cracks after a one-minute airtight test
*3 Indicates the volume of clearance inside the valve chamber after the volume of the diaphragm is subtracted
*4 Since the body (orifice shape) is designed to eliminate residual liquid, mounting in a vertical direction with the coil at the top is recommended. When residual liquid need not be taken into consideration, any mounting orientation is available.
*5 When response time is prioritized, control the voltage so that there is no fluctuation below the rated voltage.
*6 The value is based on SMC's measurement conditions. The noise level will vary according to the actual conditions.
*7 In compliance with JIS B 8419:2010
(Value at ambient and fluid temperatures of 25°C, rated voltage, max. operating pressure (air), and when the N.C. (IN) port is pressurized)
The response time will vary depending on the supply pressure, fluid, piping conditions, and ambient temperature.
*8 When the diaphragm material is Kalrez®, the valve changeover time will be significantly longer at ambient and fluid temperatures of 15°C or less when compared to the valve changeover time at room temperature (≈ 25°C).
*9 Refer to 2. in the "Selection" section of the "Design and Selection Precautions" on page 371.
*10 Store in a location out of direct sunlight and where the cyclic temperature does not exceed normal temperature changes.
* Refer to 10 in "Design / Selection" on page 41 if the valve is to be energized continuously for extended periods of time.

Symbol

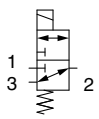
N.C.
LVM20R1/R3



N.O.
LVM20R2/R4



Universal
LVM202R/5R



Flow Rate Characteristics

Water		Air	
Kv	Cv	C	b
0.055	0.065	0.23	0.27

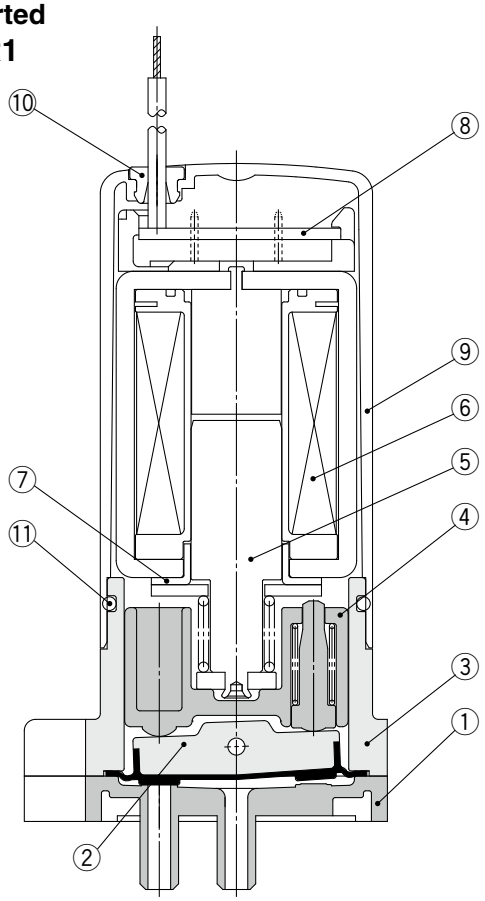
* The values of Kv and Cv are based on JIS B 2005:1995; the values of C and b are based on JIS B 8390:2000.

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

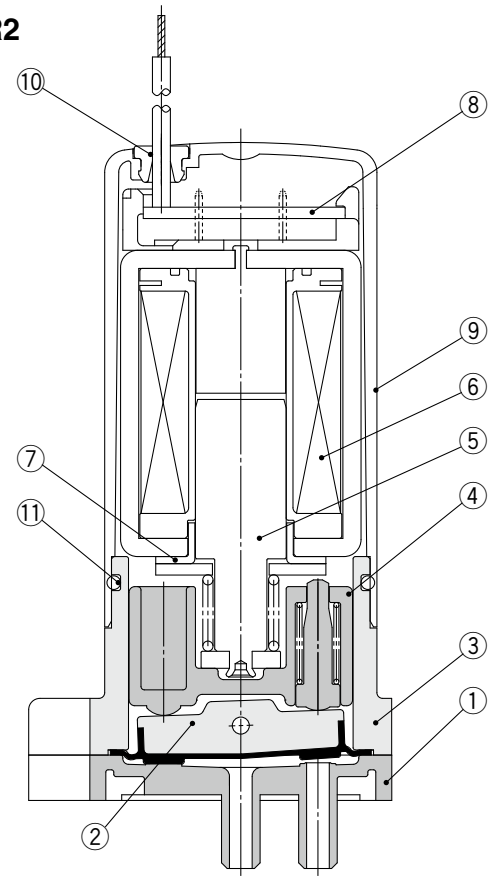
Construction

Body ported

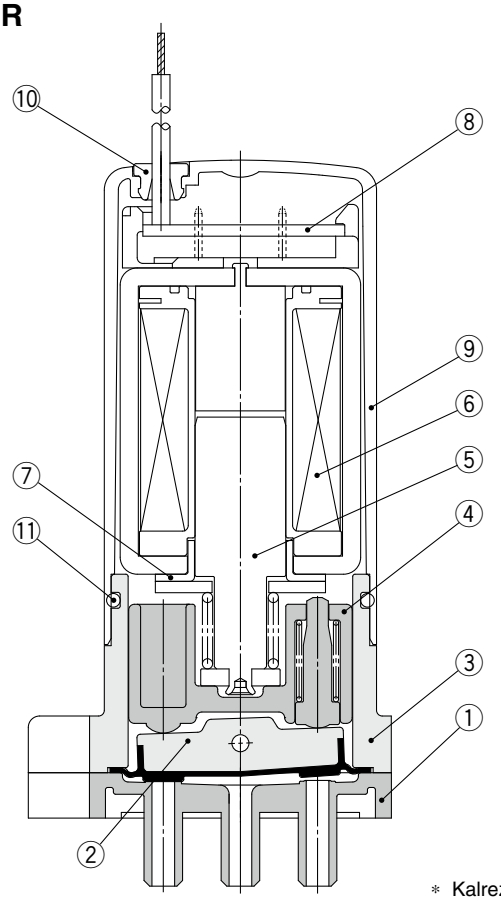
LVM20R1



LVM20R2



LVM202R



Component Parts: LVM20R1, 20R2, 202R

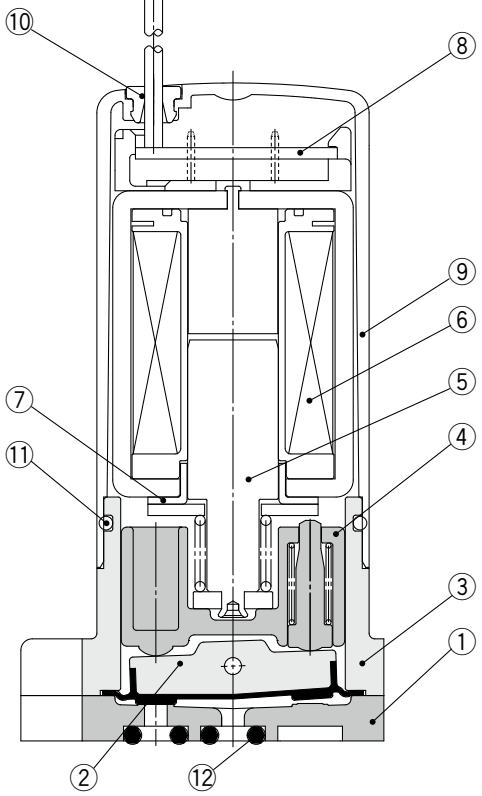
No.	Description	Material
1	**Plate**	PEEK
2	**Diaphragm assembly**	EPDM/FKM/Kalrez®
3	**Body**	PBT
4	**Slide bushing assembly**	PPS/Stainless steel
5	**Armature assembly**	—
6	**Coil assembly**	—
7	**Sleeve**	SUY (Iron)
8	**Board assembly**	—
9	**Casing**	PBT
10	**Plug**	NBR
11	**O-ring**	NBR

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

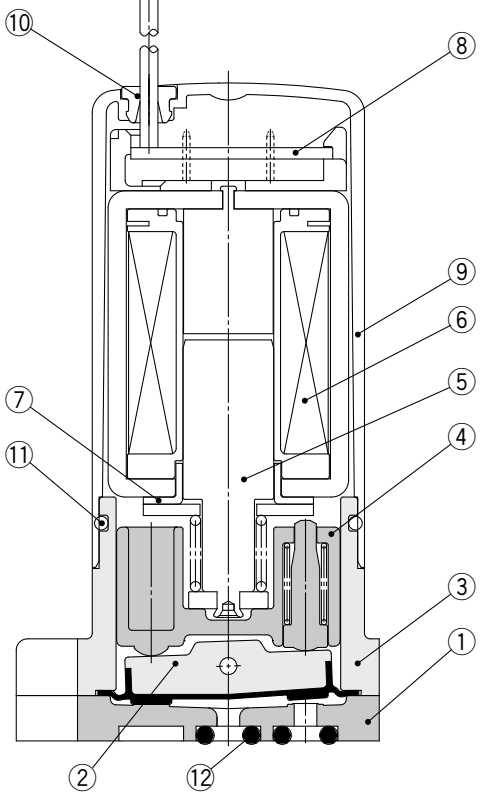
Construction

Base mounted

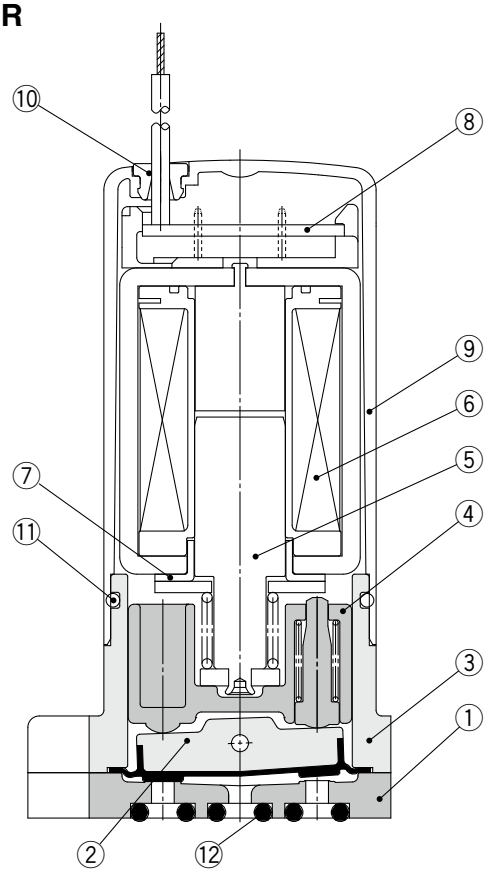
LVM20R3



LVM20R4



LVM205R



Component Parts: LVM20R3, 20R4, 205R

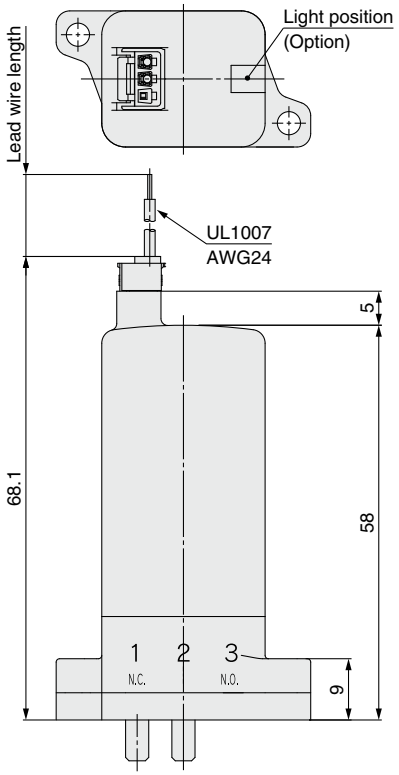
No.	Description	Material
1	**Plate**	PEEK
2	**Diaphragm assembly**	EPDM/FKM/Kalrez®
3	**Body**	PBT
4	**Slide bushing assembly**	PPS/Stainless steel
5	**Armature assembly**	—
6	**Coil assembly**	—
7	**Sleeve**	SUY (Iron)
8	**Board assembly**	—
9	**Casing**	PBT
10	**Plug**	NBR
11	**O-ring**	NBR
12	**O-ring**	EPDM/FKM/Kalrez®

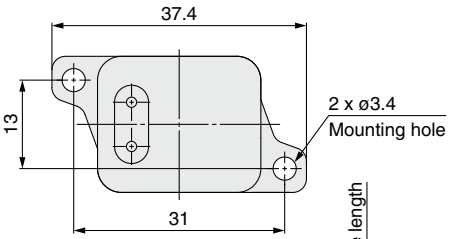
∗ Kalrez® is a registered trademark of E. I. du Pont de Nemours and Company or its affiliates.

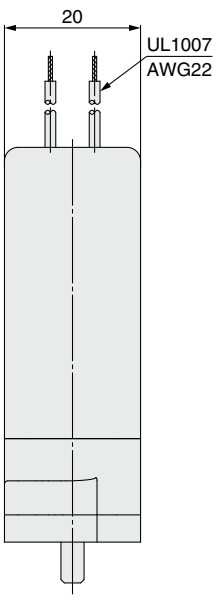
Dimensions

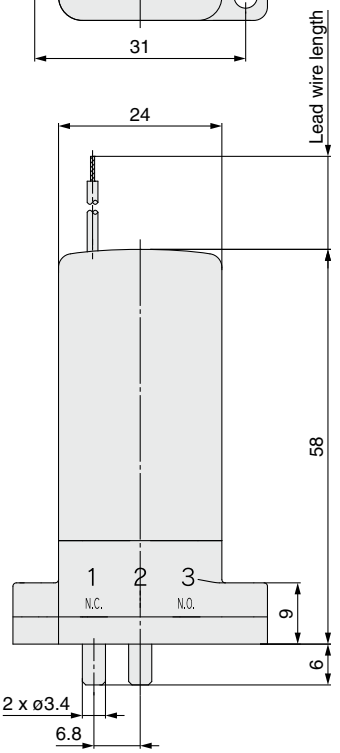
Body ported
LVM20R1-□□-□ (N.C.)
LVM20R2-□□-□ (N.O.)
LVM202R-□□-□ (Universal)

Plug connector type

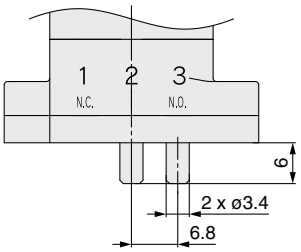




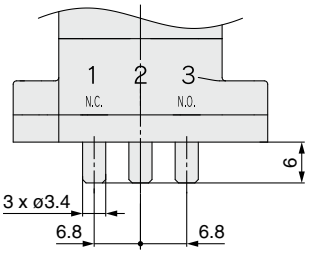




LVM20R1



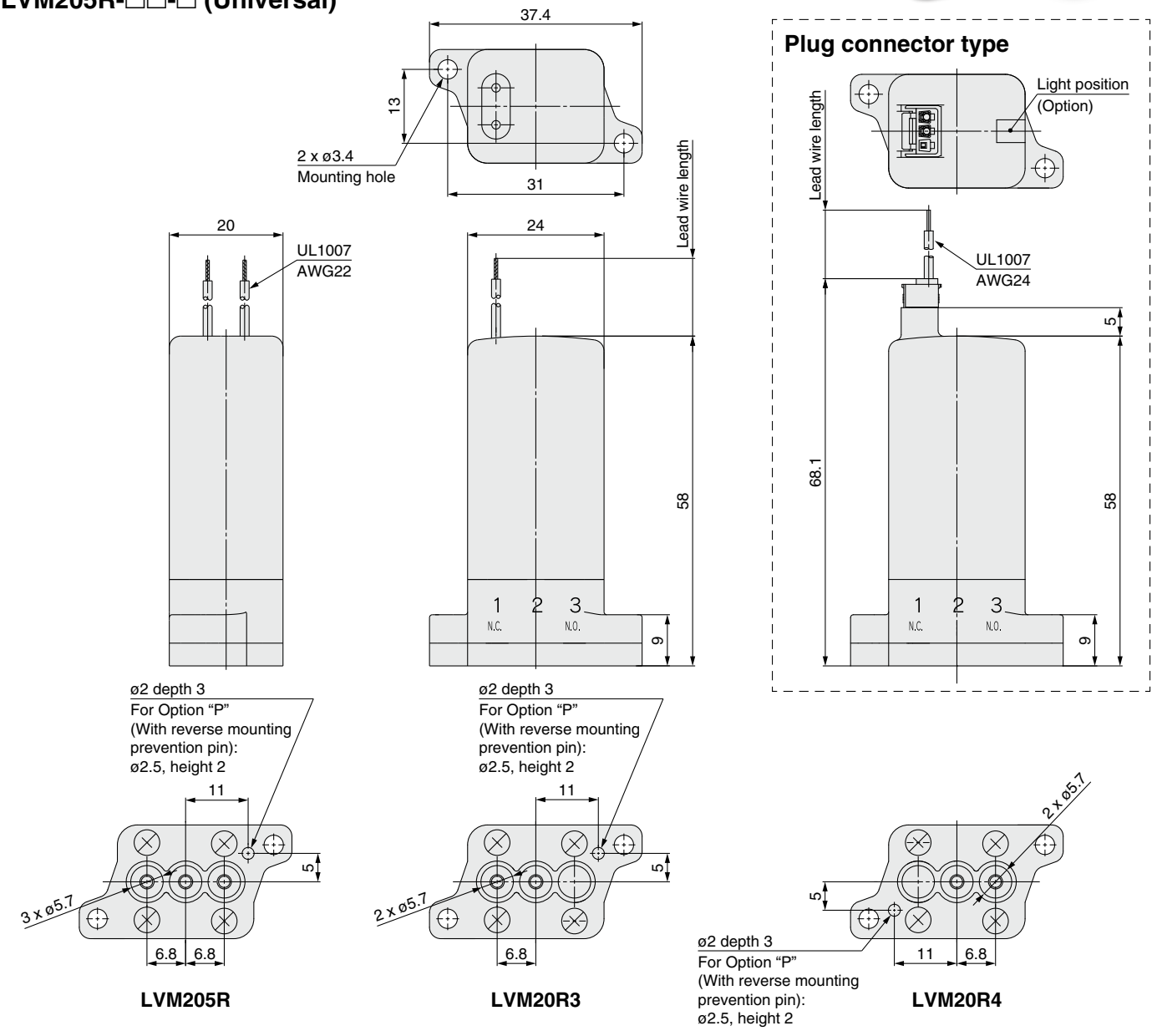
LVM20R2



LVM202R

Dimensions

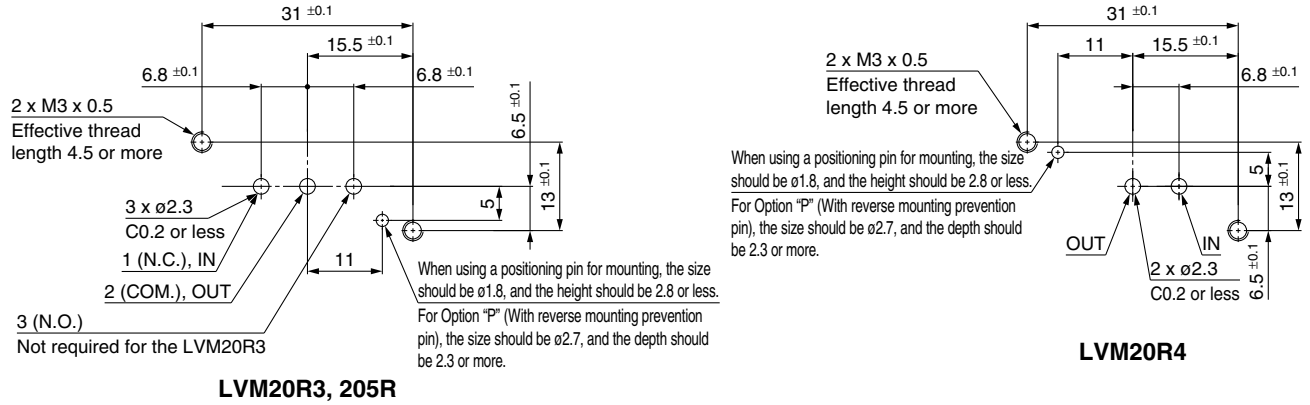
Base mounted, Without sub-plate
LVM20R3-□□-□ (N.C.)
LVM20R4-□□-□ (N.O.)
LVM205R-□□-□ (Universal)



LVM205R **LVM20R3** **LVM20R4**

Recommended interface dimensions

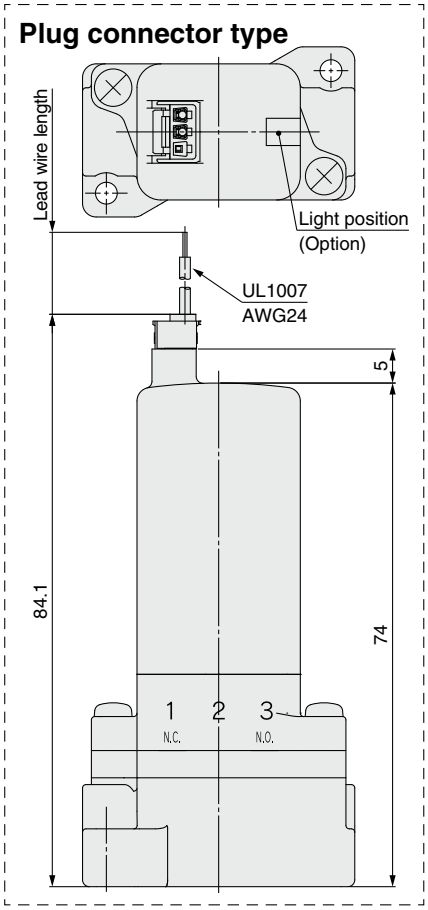
* Surface roughness = Rz3.2 or less

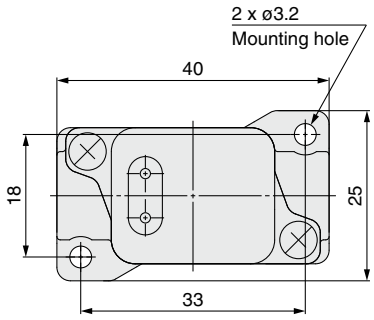


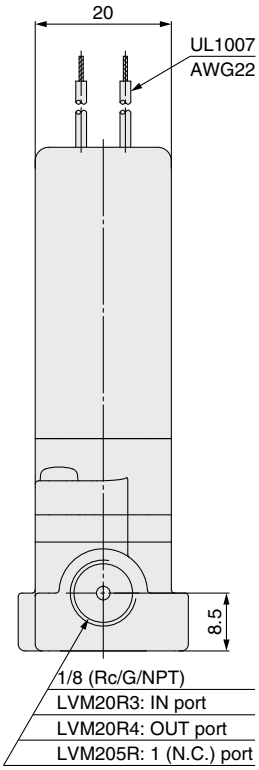
LVM20R3, 205R **LVM20R4**

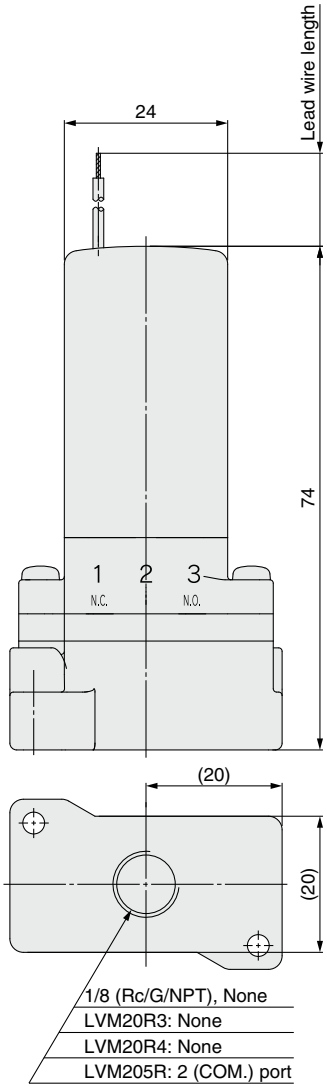
Dimensions

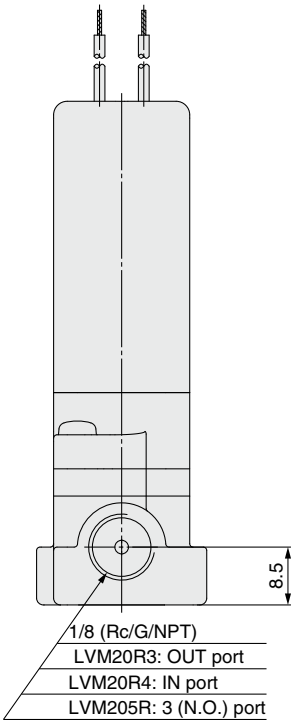
Base mounted, With sub-plate
LVM20R3-□□□-□ (N.C.)
LVM20R4-□□□-□ (N.O.)
LVM205R-□□□-□ (Universal)











Direct Operated Poppet Type

[Option]

RoHS

Compact Direct Operated 2-Port Solenoid Valve for Chemical Liquids with Power Saving Circuit

LVM11/13 Series

Body ported Base mounted

How to Order

Body ported LVM 11 – 5 A – □ – □ – □

Base mounted LVM 13 – 5 A P – □ – □

❶ ❷ ❸ ❹ ❺ ❻ ❼ ❽

❶ Number of ports, Valve type

Symbol	Number of ports	Valve type
11	2	N.C.

❷ Option

Nil	None
1	Bracket

❸ Number of ports, Valve type

Symbol	Number of ports	Valve type
13	2	N.C.

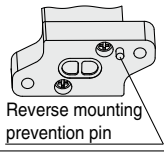
❹ Coil voltage

Symbol	Voltage
5	24 VDC
6	12 VDC

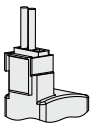
❺ Fluid contact material

Symbol	Body	Diaphragm
A	PEEK	EPDM
B	PEEK	FKM
C	PEEK	Kalrez®

❻ Reverse mounting prevention pin

Nil	None
P	Yes  Reverse mounting prevention pin

❼ Electrical entry, Lead wire length, Light/surge voltage suppressor

Symbol	Electrical entry, Lead wire length	Light/surge voltage suppressor	
Nil	Grommet, 300 mm	Cannot be selected	
6	Grommet, 600 mm		
10	Grommet, 1000 mm		
KZ	Plug connector, 300 mm	Yes	
KOZ	Plug connector, Without connector		

∗ The plug connector is included but does not come assembled.
∗ If a lead wire length of 600 mm or more is required, select "KOZ" (Without connector) and then add the connector part number shown below under the valve part number when ordering.

Plug connector part no.: AXT661 – 14A – □

Lead wire length

6	600 mm
10	1000 mm
20	2000 mm
30	3000 mm

❽ CE/UKCA-compliant

Nil	No
Q	CE/UKCA-compliant

Mounting screws are included with the base-mounted type. (2 pcs.)
M2 x 11/With spring washer (Material: Stainless steel)

For other spare parts, refer to page 374.

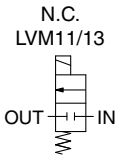
∗ Kalrez® is a registered trademark of E. I. du Pont de Nemours and Company or its affiliates.

Specifications

Body ported

Base mounted

Symbol



Model			Body ported	Base mounted
			LVM11	**LVM13**
Valve construction			Direct operated poppet type	
Valve type			N.C.	
Number of ports			2	
Fluid∗1			Air, Water, DI water (Pure water), Diluent, or Cleaning fluid	
Operating pressure range			0 to 0.25 MPa	
Orifice diameter			1.5 mm	
Response time∗7			10 ms or less (at pneumatic pressure)	
Leakage			Zero leakage, both internal or external (at water pressure)	
Proof pressure∗2			0.38 MPa	
Ambient temperature∗8			0 to 50°C	
Fluid temperature∗8			0 to 50°C (No freezing)	
Storage temperature∗9			−20 to +60°C (No condensation)	
Volume of valve chamber∗3			11 μL	13 μL
Mounting orientation∗4			Free	
Enclosure			IP40 or equivalent	
Weight			30 g	
Rated voltage			12, 24 VDC	
Allowable voltage fluctuation∗5			±10% of rated voltage	
Type of coil insulation			Class B	
Power consumption (When rated voltage is at 24 V)	**With power saving circuit**	**Inrush**	2.5 W (0.1 A)	
		Holding	1 W	
Coil switching noise∗6			50 dB	

∗1 Select an appropriate fluid contact material according to the fluid to be used. Additionally, check the chemical resistance beforehand.
∗2 Indicates the pressure which does not generate breakage or cracks after a one-minute airtight test
∗3 Indicates the volume of clearance inside the valve chamber after the volume of the diaphragm is subtracted
∗4 Since the body (orifice shape) is designed to eliminate residual liquid, mounting in a vertical direction with the coil at the top is recommended. When residual liquid need not be taken into consideration, any mounting orientation is available.
∗5 When response time is prioritized, control the voltage so that there is no fluctuation below the rated voltage.
∗6 The value is based on SMC's measurement conditions. The noise level will vary according to the actual conditions.
∗7 In compliance with JIS B 8419:2010
(Value at ambient and fluid temperatures of 25°C, rated voltage, max. operating pressure (air), and when the N.C. (IN) port is pressurized)
The response time will vary depending on the supply pressure, fluid, piping conditions, and ambient temperature.
∗8 When the diaphragm material is Kalrez®, the valve changeover time will be significantly longer at ambient and fluid temperatures of 15°C or less when compared to the valve changeover time at room temperature (≈ 25°C).
∗9 Store in a location out of direct sunlight and where the cyclic temperature does not exceed normal temperature changes.
∗ Refer to 10 in "Design / Selection" on page 371 if the valve is to be energized continuously for extended periods of time.

Flow Rate Characteristics

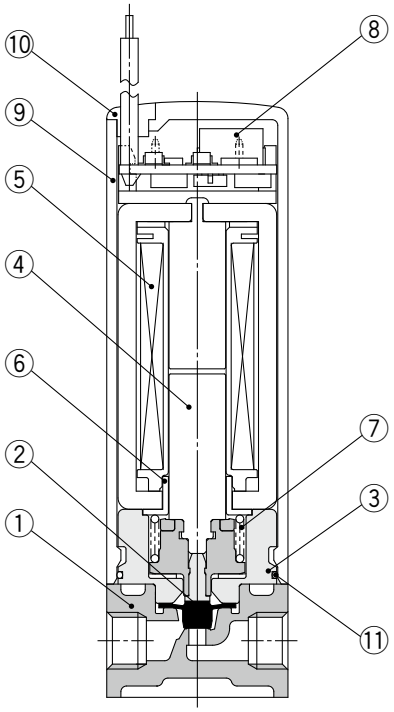
Water		Air	
Kv	Cv	C	b
0.034	0.04	0.13	0.22

∗ The values of Kv and Cv are based on JIS B 2005:1995; the values of C and b are based on JIS B 8390:2000.

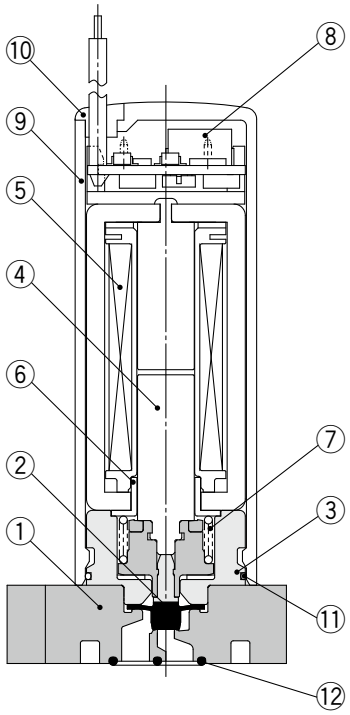
∗ Kalrez® is a registered trademark of E. I. du Pont de Nemours and Company or its affiliates.

Construction

Body ported
LVM11



Base mounted
LVM13



Component Parts: LVM11

No.	Description	Material
1	**Body**	PEEK
2	**Diaphragm assembly**	EPDM/FKM/Kalrez®
3	**Spacer**	PBT
4	**Armature assembly**	Stainless steel/POM
5	**Coil assembly**	—
6	**Sleeve**	SUY (Iron)
7	**Return spring**	Stainless steel
8	**Board assembly**	—
9	**Casing**	PBT
10	**Plug**	NBR
11	**O-ring**	NBR

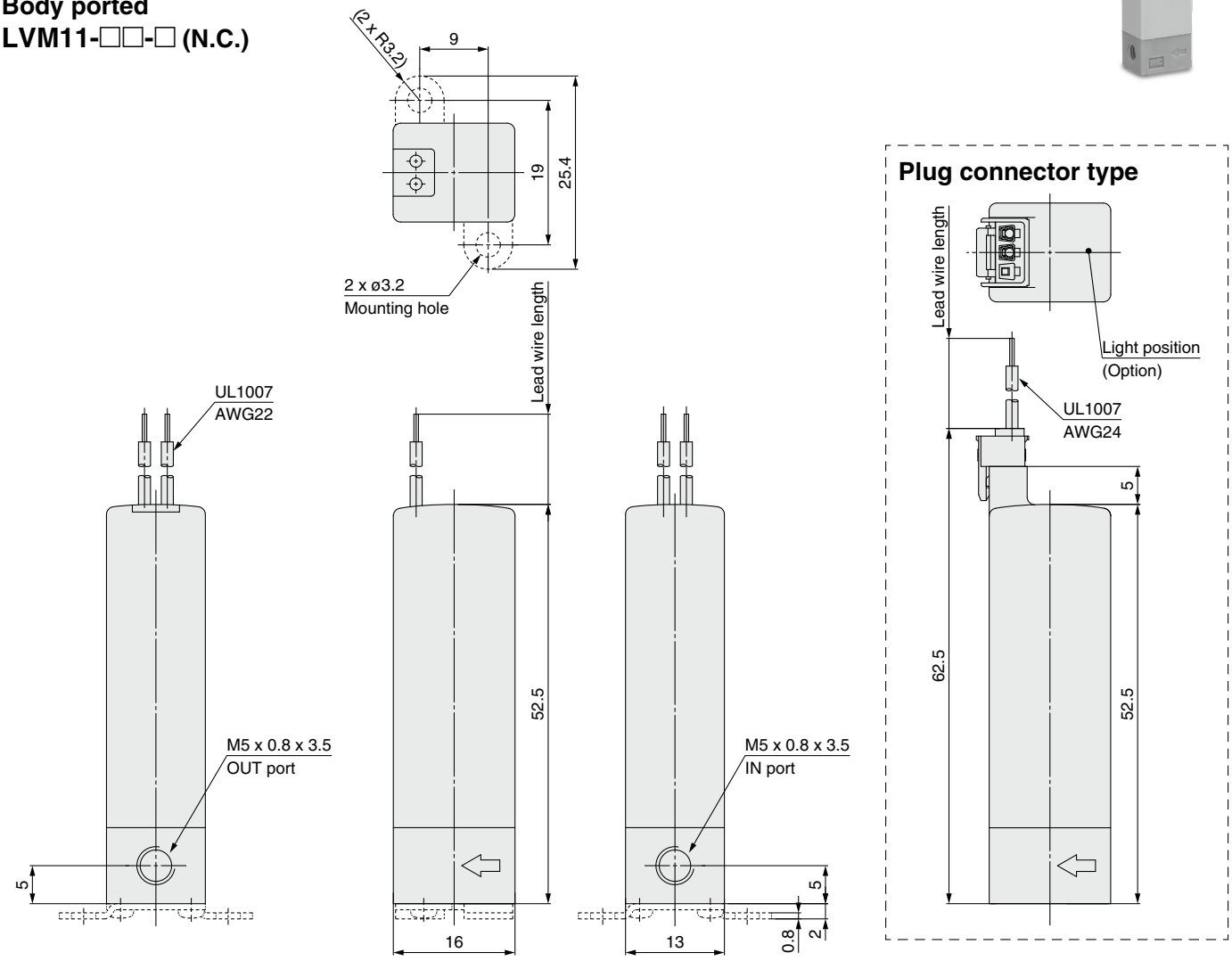
Component Parts: LVM13

No.	Description	Material
1	**Body**	PEEK
2	**Diaphragm assembly**	EPDM/FKM/Kalrez®
3	**Spacer**	PBT
4	**Armature assembly**	Stainless steel/POM
5	**Coil assembly**	—
6	**Sleeve**	SUY (Iron)
7	**Return spring**	Stainless steel
8	**Board assembly**	—
9	**Casing**	PBT
10	**Plug**	NBR
11	**O-ring**	NBR
12	**Gasket**	EPDM/FKM/Kalrez®

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

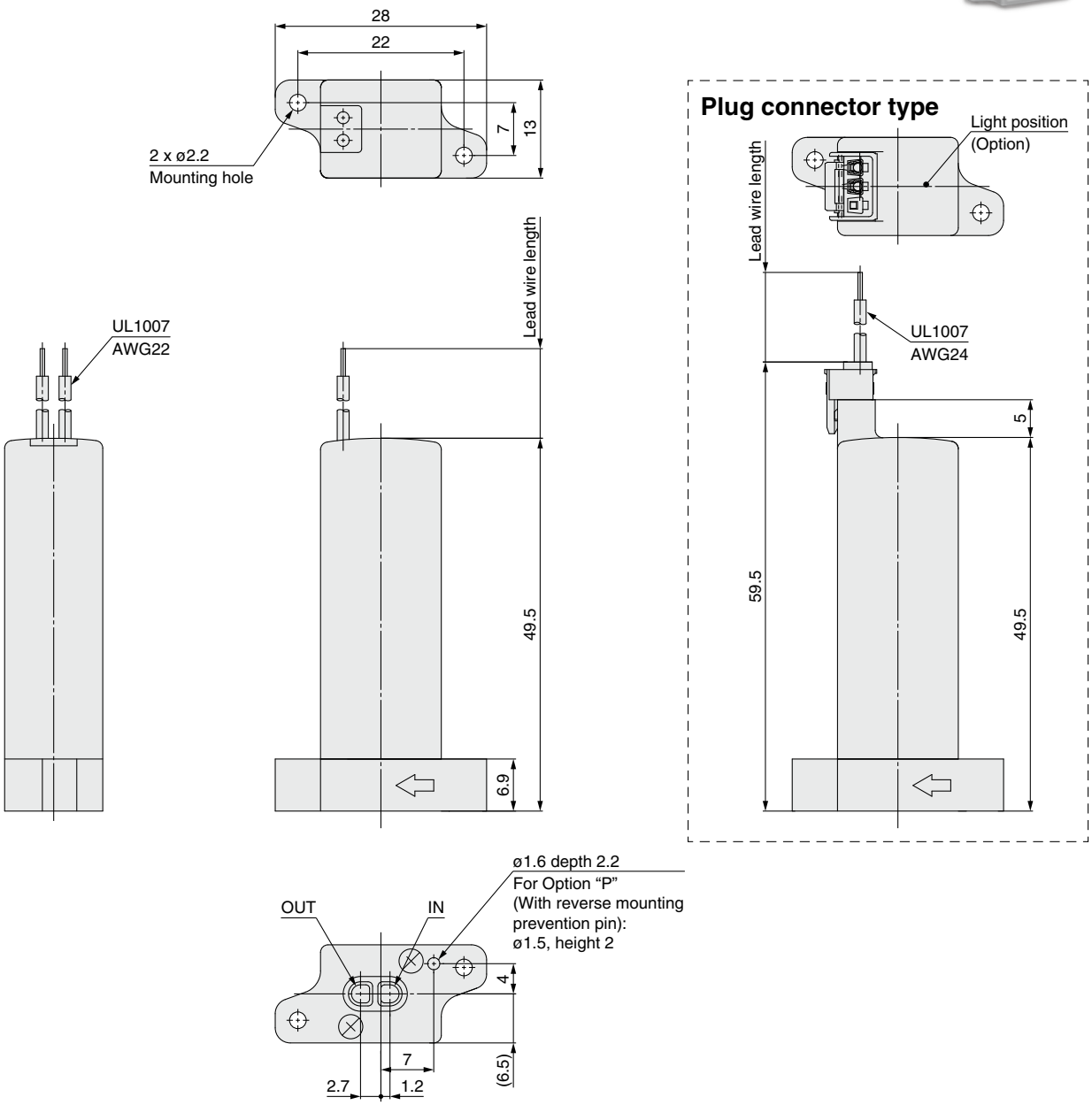
Dimensions

Body ported
LVM11-□□-□ (N.C.)



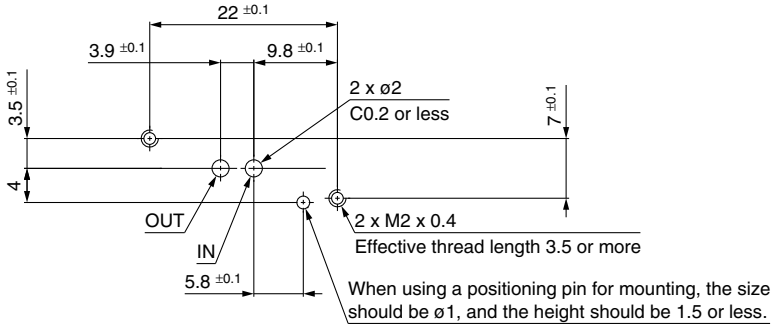
Dimensions

Base mounted
LVM13-□□-□ (N.C.)



Recommended interface dimensions

* Surface roughness = Rz3.2 or less

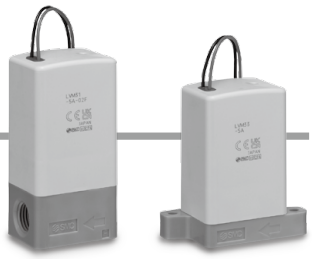


When using a positioning pin for mounting, the size should be ø1, and the height should be 1.5 or less.
For Option "P" (With reverse mounting prevention pin), the size should be ø1.7, and the depth should be 2.3 or more.

Direct Operated Poppet Type

Compact Direct Operated 2-Port Solenoid Valve for Chemical Liquids with Power Saving Circuit

LVM31/33 Series



Body ported Base mounted

How to Order

Body ported LVM ❶31 – 5 A – ☐ – ❷01F

Base mounted LVM ❸33 – 5 A P – ☐ (❹ ❺ ❻ ❼)

❶ Number of ports, Valve type

Symbol	Number of ports	Valve type
31	2	N.C.

❷ Port size

Symbol	Port size
01F	G1/8
02F	G1/4
01N	NPT1/8
02N	NPT1/4

❸ Number of ports, Valve type

Symbol	Number of ports	Valve type
33	2	N.C.

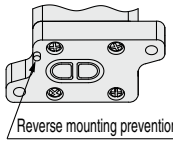
❹ Coil voltage

Symbol	Voltage
5	24 VDC
6	12 VDC

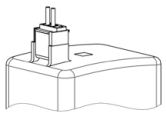
❺ Fluid contact material

Symbol	Body	Diaphragm
A	PEEK	EPDM
B	PEEK	FKM

❻ Reverse mounting prevention pin

Nil	None
P	Yes 

❼ Electrical entry, Lead wire length, Light/surge voltage suppressor

Symbol	Electrical entry, Lead wire length	Light/surge voltage suppressor	
Nil	Grommet, 300 mm	Cannot be selected	
6	Grommet, 600 mm		
10	Grommet, 1000 mm		
KZ	Plug connector, 300 mm	Yes	
KOZ	Plug connector, Without connector		

∗ The plug connector is included but does not come assembled.
∗ If a lead wire length of 600 mm or more is required, select “KOZ” (Without connector) and then add the connector part number shown below under the valve part number when ordering.

Plug connector part no.: AXT661 – 14A – ☐

Lead wire length

6	600 mm
10	1000 mm
20	2000 mm
30	3000 mm

Mounting screws are included with the base-mounted type. (2 pcs.)
M4 x 16/With spring washer (Material: Stainless steel)

For other spare parts, refer to page 374.

SMC

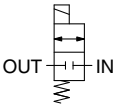
Specifications

Body ported

Base mounted

Symbol

N.C.
LVM31/33



Model			Body ported	Base mounted
			LVM31	**LVM33**
Valve construction			Direct operated poppet type	
Valve type			N.C.	
Number of ports			2	
Fluid∗1			Air, Water, DI water (Pure water), Diluent, or Cleaning fluid	
Operating pressure range∗8			IN → OUT: –90 kPa to 0.2 MPa OUT → IN: 0 to 0.1 MPa	
Orifice diameter			5 mm	
Response time∗7			30 ms or less (at pneumatic pressure)	
Leakage			Zero leakage, both internal or external (at water pressure)	
Proof pressure∗2			0.3 MPa	
Ambient temperature			0 to 50°C	
Fluid temperature			0 to 50°C (No freezing)	
Storage temperature∗9			–20 to +60°C (No condensation)	
Volume of valve chamber∗3			500 μL	600 μL
Mounting orientation∗4			Free	
Enclosure			IP40 or equivalent	
Weight			210 g	200 g
Rated voltage			12, 24 VDC	
Allowable voltage fluctuation∗5			±10% of rated voltage	
Type of coil insulation			Class B	
Power consumption (When rated voltage is at 24 V)	**With power saving circuit**	**Inrush**	7.5 W (0.31 A)	
		Holding	2 W	
Coil switching noise∗6			80 dB	

∗1 Select an appropriate fluid contact material according to the fluid to be used. Additionally, check the chemical resistance beforehand.
∗2 Indicates the pressure which does not generate breakage or cracks after a one-minute airtight test
∗3 Indicates the volume of clearance inside the valve chamber after the volume of the diaphragm is subtracted
∗4 Since the body (orifice shape) is designed to eliminate residual liquid, mounting in a vertical direction with the coil at the top is recommended. When residual liquid need not be taken into consideration, any mounting orientation is available.
∗5 When response time is prioritized, control the voltage so that there is no fluctuation below the rated voltage.
∗6 The value is based on SMC's measurement conditions. The noise level will vary according to the actual conditions.
∗7 In compliance with JIS B 8419:2010
(Value at ambient and fluid temperatures of 25°C, rated voltage, max. operating pressure (air), and when the N.C. (IN) port is pressurized)
The response time will vary depending on the supply pressure, fluid, piping conditions, and ambient temperature.
∗8 When using IN → OUT, set the OUT side pressure (back pressure) to 0.1 MPa or less.
∗9 Store in a location out of direct sunlight and where the cyclic temperature does not exceed normal temperature changes.
∗ Refer to 10 in "Design / Selection" on page 41 if the valve is to be energized continuously for extended periods of time.

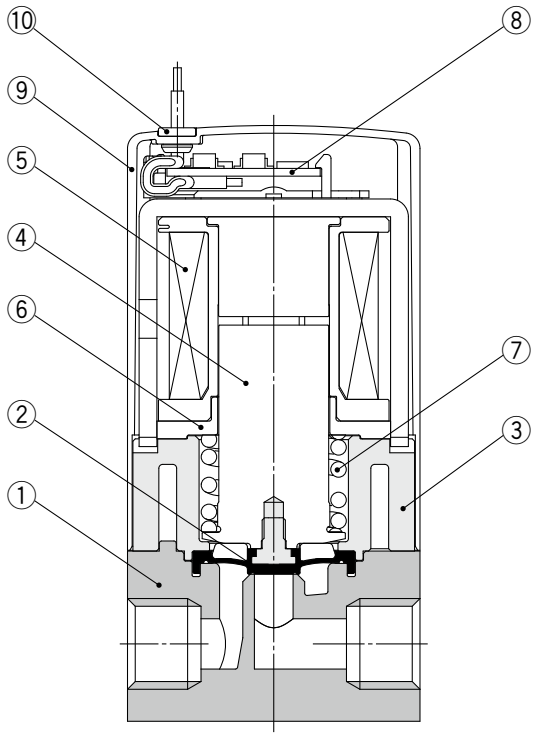
Flow Rate Characteristics

Water		Air	
Kv	Cv	C	b
0.36	0.42	1.64	0.23

∗ The values of Kv and Cv are based on JIS B 2005:1995; the values of C and b are based on JIS B 8390:2000.

Construction

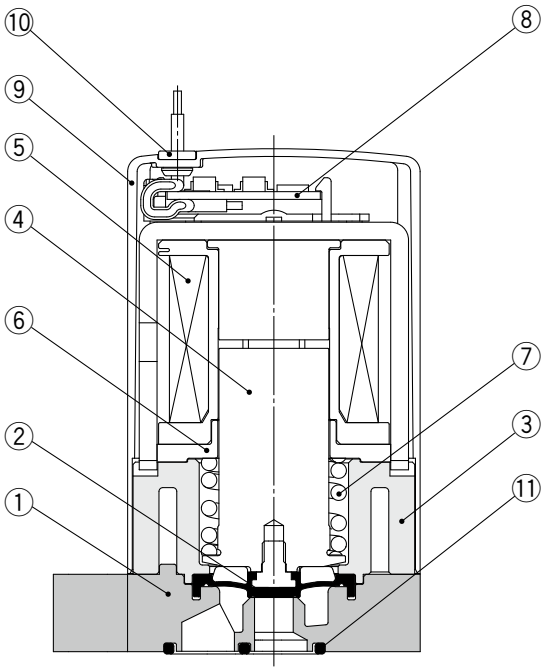
Body ported
LVM31



Component Parts: LVM31

No.	Description	Material
1	**Body**	PEEK
2	**Diaphragm assembly**	EPDM/FKM
3	**Spacer**	PBT
4	**Armature**	Stainless steel
5	**Coil assembly**	—
6	**Sleeve**	SPCE
7	**Return spring**	Stainless steel
8	**Board assembly**	—
9	**Casing**	PBT
10	**Plug**	NBR

Base mounted
LVM33

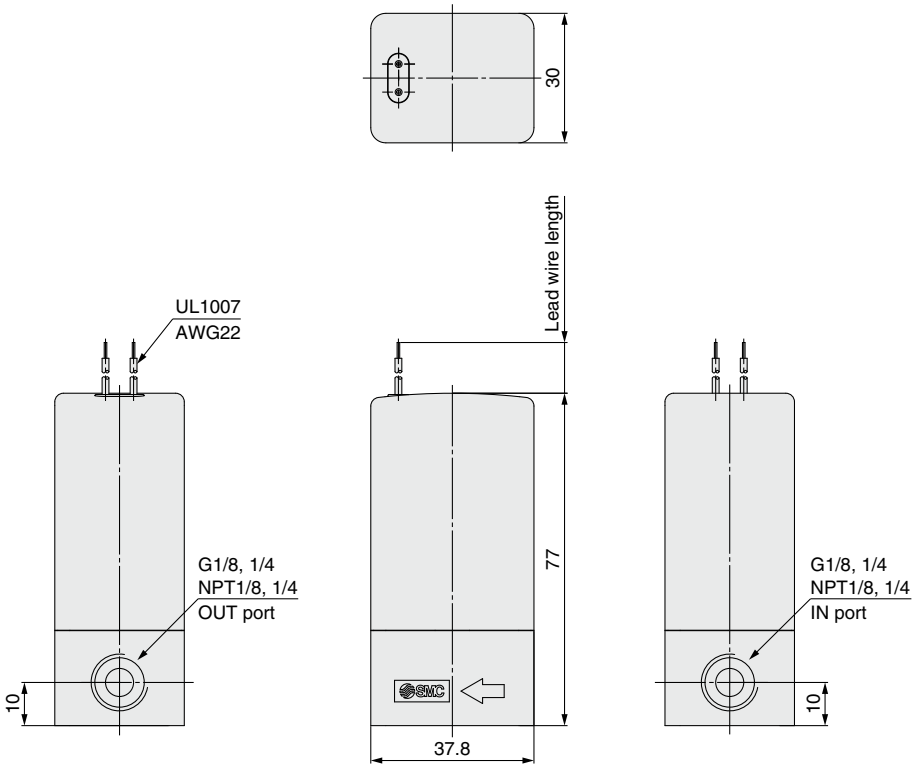


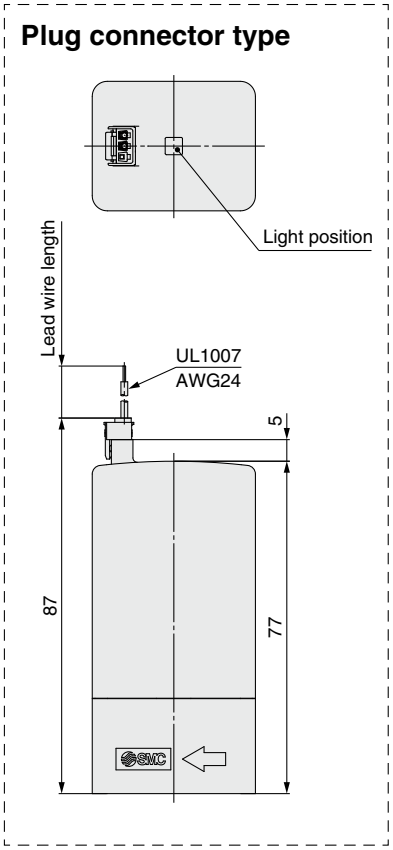
Component Parts: LVM33

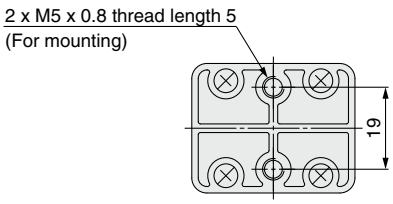
No.	Description	Material
1	**Body**	PEEK
2	**Diaphragm assembly**	EPDM/FKM
3	**Spacer**	PBT
4	**Armature**	Stainless steel
5	**Coil assembly**	—
6	**Sleeve**	SPCE
7	**Return spring**	Stainless steel
8	**Board assembly**	—
9	**Casing**	PBT
10	**Plug**	NBR
11	**Gasket**	EPDM/FKM

Dimensions

Body ported
LVM31-□□-□-□ (N.C.)

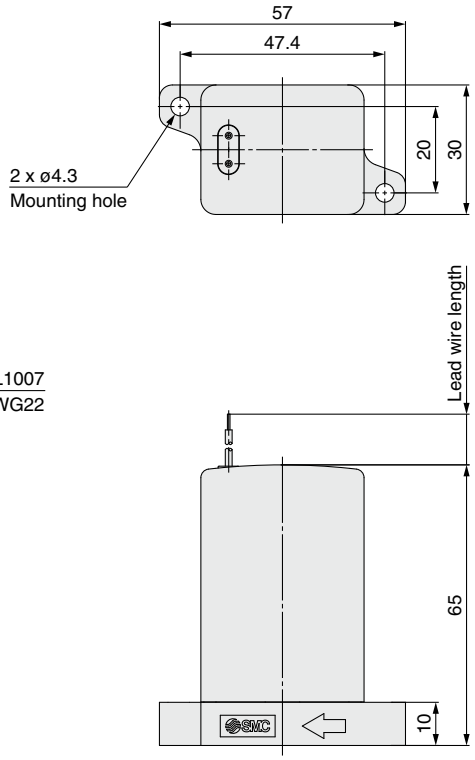




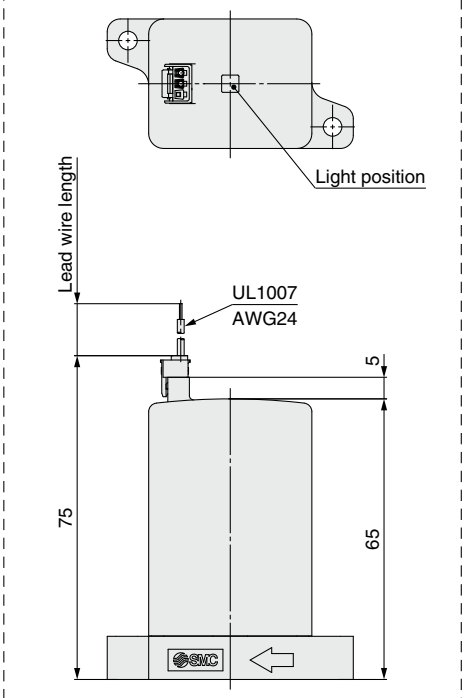


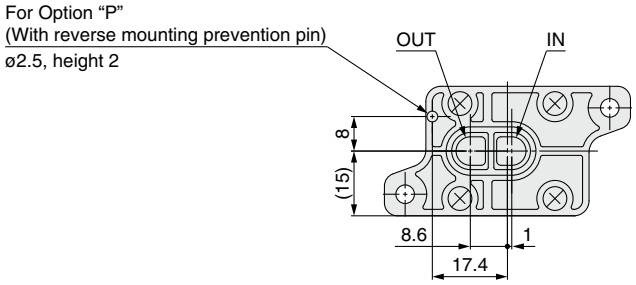
Dimensions

Base mounted
LVM33-□□□-□ (N.C.)

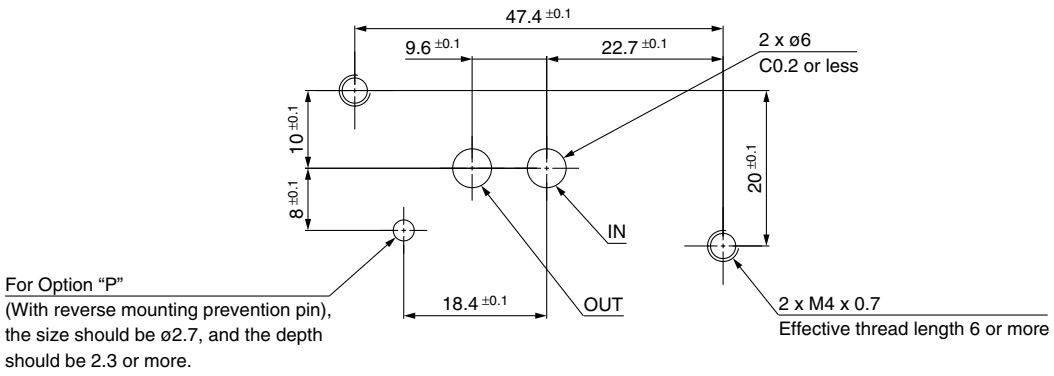


Plug connector type





Recommended interface dimensions * Surface roughness = Rz3.2 or less



LVM Series
Specific Product Precautions 1

Be sure to read this before handling the products. Please contact SMC when it is used in conditions other than the specifications.

Design / Selection

⚠ Warning

1. Do not use this product in applications which may adversely affect human life (e.g. medical equipment connected to the human body for drip infusion).

2. Confirm the specifications.

Give careful consideration to the operating conditions, such as the application, fluid, and environment, and use within the specified operating ranges indicated in the catalog.

3. Fluid

Be sure to confirm the compatibility between the component material and the fluid.

4. Ensure sufficient space for maintenance activities.

When installing the products, allow access for maintenance and inspection.

5. Fluid pressure range

Fluid pressure should be within the allowable pressure range.

6. Ambient environment

Use within the allowable ambient temperature range. Be sure that the liquid or corrosive gas does not touch the external surface of the product.

7. Countermeasures against static electricity

Take measures to prevent static electricity since some fluids can cause static electricity.

8. Pressure (including vacuum) holding

It is not usable for an application such as holding the pressure (including vacuum) inside of a pressure vessel because air leakage is entailed in a valve.

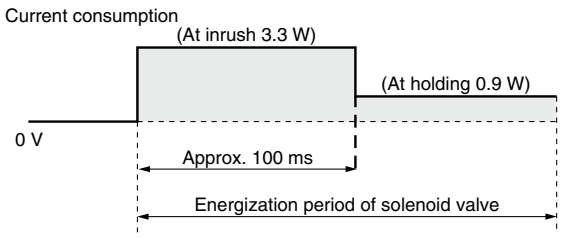
9. Cannot be used as an emergency shut-off valve, etc.

The valves presented in this catalog are not designed for safety applications such as an emergency shut-off valve. If the valves are used in this type of system, other reliable safety assurance measures should also be adopted.

10. Extended periods of continuous energization

If solenoid valves are to be continuously energized for extended periods of time, use valves with power saving circuits to minimize the amount of heat released by the coil.

Power saving circuit waveform (example)



∗ Power consumption for the waveform shown above is that of the LVM09/090.
∗ For the LVM15/150, LVM11/13, LVM31/33 the type with power saving circuit is standard.
∗ For the LVM10/100, the inrush is 50 ms.

When a solenoid valve without a power saving circuit is continuously energized for long periods of time, temperature increase from coil heat release can result in worsening performance and shortened service life of the solenoid valve, as well as adverse effects on peripheral equipment in the vicinity. For this reason, when valves are to be continuously energized for extended periods, use a fan or take other measures to disperse heat and keep valve surface temperatures at 70°C or less.

The table below shows reference values for continuously energized valves (single unit) when surface temperature is 70°C or less.

Model	LVM09/090	LVM10/100	LVM20/200
Period of continuous energization	5 min. or less	30 min. or less	30 min. or less
Duty ratio	50% or less		
Ambient temperature	25°C or less		
Power saving circuit	None		

∗ Duty ratio: ON time/(ON time + OFF time)
∗ For the LVM15/150, the type with power saving circuit is standard.

Please use a fan or take other measures to disperse heat and keep temperatures within the specified range when mounting the solenoid valves inside control panels, etc. Be especially careful when using three or more adjacent valves with manifolds and keeping them continuously energized for extended period, as this may result in dramatic increases in temperature.

11. Low temperature environments

Be aware that the valve changeover time becomes extremely long when the ambient and fluid temperature becomes 15°C or less as a reference when compared to the valve changeover time at room temperature (approx. 25°C). Diaphragm material: Kalrez®

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

Selection

⚠ Caution

1. Leakage voltage

The leakage voltage should be 2% or less of the rated voltage. If the leakage voltage exceeds this value, solenoid valve may not turn OFF.

2. Valves with a power saving circuit (PWM circuit built-in type)

The power-saving circuit (PWM control) contained in this product reduces the power consumption through the switching operation at high speeds in the PWM control circuit after the rated voltage is applied for approx. 100 ms since energizing the circuit. Please note that the effect of this PWM control can cause the following problems depending on the type of switch and drive circuit used.

1. When a mechanical type relay is used in the drive circuit, the circuit cannot turn on normally if chattering occurs in the relay just when the rated voltage is applied for approx. 100 ms after energizing the valve.
2. When a filter or another device is installed between the power supply and the product to achieve noise reduction, the current may be reduced due to filtering, which may prevent the product from turning ON normally.
3. When an SSR (solid state relay) with a built-in photo coupler is used in the drive circuit, the photo coupler may not turn OFF, preventing the product from switching OFF (it will remain ON).

(Response time when OFF)

The PWM circuit has a built-in protection circuit that uses diodes, etc., to protect the electronic parts from the coil surges (back electromotive force) that are generated when the power is turned OFF. Due to this protection circuit, the response time of this product when OFF is slower than that of the standard type.
(As the coil surge varies by model, the OFF response time delay also varies.)

LVM Series
Specific Product Precautions 2

Be sure to read this before handling the products. Please contact SMC when it is used in conditions other than the specifications.

Mounting

⚠ Caution

1. Always tighten threads with the proper tightening torque.

When mounting the solenoid valve, tighten it with the proper tightening torque shown below.

Tightening Torque for Base Mounting

Location	Model	Thread size	Proper tightening torque [N·m]
Base mounted, Body mounting	**LVM07R6**	M1.6	0.06 to 0.1
	LVM09R3, 09R4, 09R6, 095R	M2	0.1 to 0.14
	LVM13	M2	0.15 to 0.2
	LVM10R3, 10R4, 10R6, 105R	M2	0.15 to 0.2
	LVM15R3, 15R4, 15R6, 155R	M2.5	0.25 to 0.35
	LVM20R3, 20R4, 205R	M3	0.4 to 0.6
	LVM33	M4	0.7 to 0.9
Body ported Body bottom surface (Refer to Fig. 1 below.)	**LVM31**	M5	0.5 to 0.7

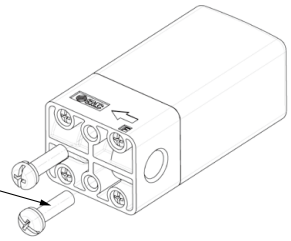


Figure 1. Thread size: M5
Proper tightening torque: 0.5 to 0.7 N·m
(Model: LVM31)

2. Mount the solenoid valve on the horizontal surface.

Applicable model: All models

3. Remove dust from the solenoid valve mounting surface completely. The surface roughness of the mounting surface should be Rz3.2 or less.

Applicable model: Base mounted

4. When mounting the solenoid valves next to each other, the valve pitch should be the value or more shown in the table below.

Model	LVM07	LVM09/090	LVM13	LVM10/100	LVM15/150	LVM20/200	LVM33
Valve pitch	8	10.5	14	14	17	21	31

Applicable model: All models

⚠ Warning

5. If air leakage increases or equipment does not operate properly, stop operation.

After mounting, perform suitable function and leak tests to confirm that the mounting is correct.

6. Since the body (orifice shape) is designed to eliminate residual liquid, mounting in a vertical direction with the coil at the top is recommended.

When residual liquid need not be taken into consideration, any mounting orientation is available.

Piping

⚠ Caution

1. Preparation before piping

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.

Piping

⚠ Caution

2. When tubing is connected to the body-ported solenoid valve, insert the tubing straight to the end of the tube inlet for a complete fit.

Select appropriate tubing while referring to the table below.

Model	Tube inside diameter (I.D.)	Tubing outside diameter (O.D.) (after mounting)
LVM09R1, 09R2, 092R	ø1.9 or less	ø4.2 or less
LVM10R1, 10R2, 102R	ø2.5 or less	ø4.5 or less
LVM20R1, 20R2, 202R	ø3.1 or less	ø6.8 or less

The holding force varies by the tubing material. Be sure to confirm the holding force of each material before operation.
After connecting the tubing, care should be taken not to put excessive force (tensile force, compression, bending, etc.) on the tubing. If an external force of 20 N or more is applied to the tube inlet, the inlet may become damaged, and leakage or breakage could occur.

3. When the tubing is long or according to the operating conditions, tubing may thrash about, causing damage to the tube inlet of the solenoid valve, or the tubing to come off or deteriorate.

In this case, secure the tubing to prevent its uncontrolled movement.

4. When piping the fitting to the solenoid valve, the installation method and tightening torque value may vary depending on the seal structure (shape) or material of the fitting to be used. Check the methods and precautions recommended by the fitting manufacturer to be used, and be sure to check for leakage.

The table below shows the tightening method using the KQ2 series.

Model	Location	Thread size	Tightening method	Tightening torque [N·m] (Reference)
LVM11	Body	M5	After tightening by hand, tighten 1/6 to 1/4 turn with a tightening tool.	Material PEEK: 0.5 to 0.7
LVM07R6, LVM09R3, 09R4, 09R6, 095R	Base mounted (With sub-plate)	M6 or 1/4-28UNF	After tightening by hand, tighten 1/6 to 1/4 turn with a tightening tool.	Material PEEK: 0.5 to 0.6
LVM10R3, 10R4, 10R6, 105R		M6 or 1/4-28UNF	After tightening by hand, tighten 1/6 to 1/4 turn with a tightening tool.	Material PVDF: 0.6 to 0.8 Material PFA: 0.2 to 0.25
LVM15R3, 15R4, 15R6, 155R		M6 or 1/4-28UNF	After tightening by hand, tighten 1/6 to 1/4 turn with a tightening tool.	Material PVDF: 0.6 to 0.8
LVM20R3, 20R4, 205R		Rc1/8 or NPT1/8	Tighten approximately 4 turns.	Material PVDF: 0.5 to 0.6
		G1/8	After tightening by hand, tighten 1/3 to 1/2 turn with a tightening tool.	Material PVDF: 0.4 to 0.6
LVM31	Body	G1/8	After tightening by hand, tighten 1/4 to 5/12 turn with a tightening tool.	Material PEEK: 2.5 to 3.5
		G1/4	After tightening by hand, tighten 1/4 to 5/12 turn with a tightening tool.	Material PEEK: 6 to 8
		NPT1/8	After tightening by hand, tighten 2 to 3 turn with a tightening tool.	Material PEEK: 1 to 3
		NPT1/4	After tightening by hand, tighten 2 to 3 turn with a tightening tool.	Material PEEK: 1.5 to 3.5

LVM Series
Specific Product Precautions 3

Be sure to read this before handling the products. Please contact SMC when it is used in conditions other than the specifications.

Wiring

⚠ Caution

1. Use electrical circuits which do not generate chattering in their contacts.

2. Use voltage which is within ±10% of the rated voltage.

However, when response time is prioritized, control the voltage so that there is no fluctuation below the rated voltage.

3. Apply the correct voltage.

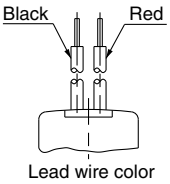
Applying incorrect voltage may cause a malfunction or a burned coil.

4. Connect the wires so that an external force of 10 N or more is not applied to the lead wire.

Otherwise, the coil will burn.

5. Units with power saving circuits use polarized electrical connections.

Red (+), Black (–)



6. The lead wire bending radius should be the same as or greater than the value in the table below.

Lead wire size	Min. bending radius (Guide)
UL1061/AWG26	8 mm
UL1007/AWG24	12 mm
AWM1569/AWG22 UL1007/AWG22	14 mm

Fluid Properties

⚠ Warning

Liquid (chemicals)

Component crystallizes or clots depending on its nature. Leakage will occur when a crystallized or clotted component is caught between the sealing parts.
Take measures to clean such component if necessary.

Water

Install a filter strainer of about 100 mesh on the inlet side of the piping.

Air

Compressed air filtered with a filter with filtration rating of 5 μm or less, which is mounted on the inlet side of the piping, should be used.

Operating Environment

⚠ Warning

1. Do not use the product in a place where there is contact with corrosive gases, chemicals or liquids.

2. Do not use in explosive atmospheres.

3. Do not use in locations subject to excessive vibration or impact.

Impact resistance of this solenoid valve is 150 m/s^2. Vibration resistance of this solenoid valve is 30 m/s^2.

4. Do not use in locations where radiated heat will be received from nearby heat sources.

Maintenance

⚠ Warning

1. Removing the product

Shut off the fluid supply and release the fluid pressure in the system. Shut off the power supply. Remove the product.

2. Before operating, remove residual chemicals and completely replace it with pure water, air, etc.

3. Do not disassemble the product.

Products which have been disassembled cannot be guaranteed. If disassembly is necessary, please contact SMC.

How to Use Plug Connector

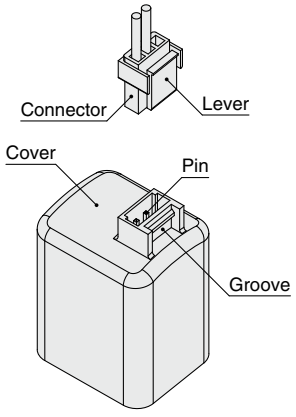
⚠ Caution

Attaching connectors

Hold the lever and connector unit between your fingers and insert straight onto the pins of the solenoid valve so that the lever's pawl is pushed into the groove and locks.

Detaching connectors

Remove the pawl from the groove by pushing the lever downward with your thumb, and pull the connector straight out.



LVM Series
Spare Parts

■ Mounting Screw (Base mounted, For Body mounting)

Applicable model	Part number	Qty.
LVM07R6	LVM070-SC	20
LVM09R3, 09R4, 09R6, 095R	LVM090-SC	20
LVM13	LVM100-SC	20
LVM10R3, 10R4, 10R6, 105R		
LVM15R3, 15R4, 15R6, 155R	LVM150-SC	20
LVM20R3, 20R4, 205R	LVM200-SC	20
LVM33	LVM30-SC	20

■ Sub-plate (Base mounted, Option)

Applicable model	Part number		Qty.
LVM07R6 (Material: PEEK)	LVM070-S2-3-☐	☐: Port size M6: M6 x 1 28: 1/4-28UNF	1
LVM09R3, 09R4, 09R6 (Material: PEEK)	LVM090-S2-3-☐		1
LVM095R (Material: PEEK)	LVM090-S1-3-☐		1
LVM10R3, 10R4, 10R6 (Material: PVDF)	LVM100-S2-1-☐		1
LVM10R3, 10R4, 10R6 (Material: PFA)	LVM100-S2-2-☐		1
LVM105R (Material: PVDF)	LVM100-S1-1-☐		1
LVM105R (Material: PFA)	LVM100-S1-2-☐		1
LVM15R3, 15R4	LVM150-S2-1-☐	☐: Port size M6: M6 x 1 28: 1/4-28UNF	1
LVM15R6	LVM150-S6-1-☐		1
LVM155R	LVM150-S1-1-☐		1
LVM20R3, 20R4	LVM200-S2-1-☐	☐: Port size 01: Rc1/8 F1: G1/8 N1: NPT1/8	1
LVM205R	LVM200-S1-1-☐		1

■ Gasket, O-ring (Base mounted, For Interface mounting)

Applicable model	Part number		Qty.
LVM07R6	LVM070-GS-☐	☐: Material A: EPDM B: FKM C: Kalrez®	10
LVM09R3, 09R4, 09R6, 095R	LVM090-GS-☐		10
LVM13	LVM13-GS-☐		10
LVM10R3, 10R4, 10R6, 105R	LVM100-OR-☐		30
LVM15R3, 15R4, 15R6, 155R	LVM150-GS-☐		10
LVM20R3, 20R4, 205R	LVM200-OR-☐		30
LVM33	LVM33-GS-☐	A: EPDM B: FKM	10

■ Bracket (Option)

Applicable model	Part number	Qty.	Note
LVM11	LVM10-14A-1	1	With mounting screws
LVM10R1, 10R2, 102R	LVM100-10A-1	1	
LVM10R3, 10R4, 10R6, 105R	LVM100-18A-1	1	

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

■ Plug Connector

Applicable model	Part number			Qty.
LVM07	Standard S070-14A-□	□: Lead wire length 3: 300 mm 6: 600 mm 10: 1000 mm 30: 3000 mm		1
	With power-saving circuit LVM070-14A-(5,6)-□	(5, 6): Coil voltage 5: For 24 VDC 6: For 12 VDC	□: Lead wire length Nil: 300 mm 6: 600 mm 10: 1000 mm 30: 3000 mm	1
LVM09/090	SY100-30-4A-□	□: Lead wire length Nil: 300 mm 6: 600 mm 10: 1000 mm 30: 3000 mm		1
LVM11/13/10/100/15/150/20/200/31/33	AXT661-14A-□	□: Lead wire length Nil: 300 mm 6: 600 mm 10: 1000 mm 20: 2000 mm 30: 3000 mm		1