2/3 Port Solenoid Valve for Chemical Liquids

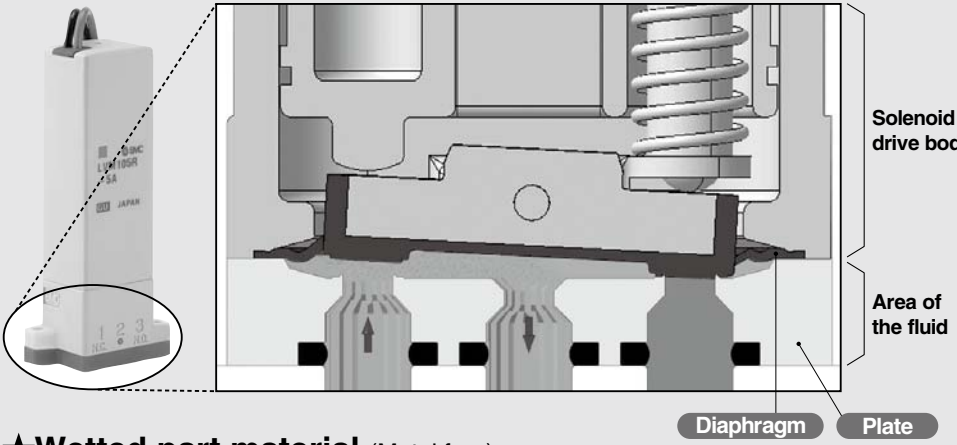
Series LVM

Compact Direct Operated

★Isolated structure

Diaphragm isolates the solenoid drive body from the fluid.

[Option]



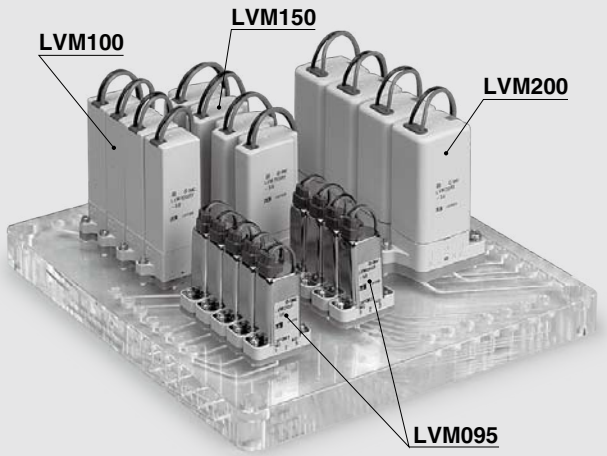
★Wetted part material (Metal free)

Body/Plate **PEEK**

Choice of

Diaphragm **EPDM, FKM,** Kalrez® Note)

Highly integrated resin manifold (Made to Order)



Note) Kalrez® is a registered trademark of DuPont Performance Elastomers.

Meeting the most advanced needs of process control

Compact Direct Operated 2/3 Port

○ Valve chamber volume

Unit: μL

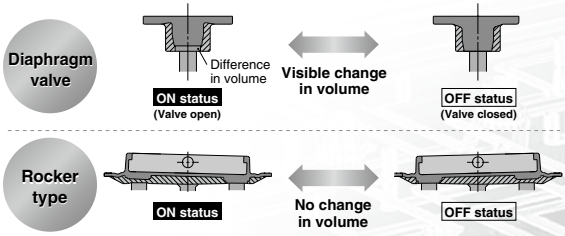
Series	LVM09/090	LVM10 (For LVM11)	LVM10/100	LVM15/150	LVM20/200
Valve chamber volume	18	11	20	50	84

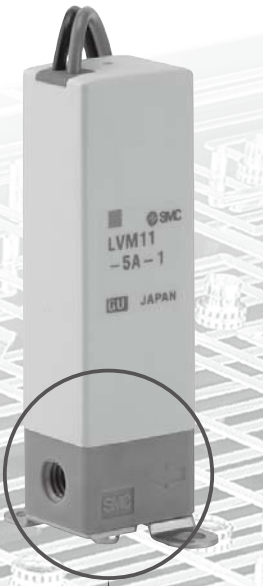
○ Change in volume depending on open/closed status of valve (pumping volume)

0.01 μL or less (Rocker type)

"Pumping volume" refers to the volume of water that is expelled from the valve chamber, in which it is sealed, by the opening and closing action of the valve (once with no applied pressure).

With a normal diaphragm valve, because the valve chamber volume varies depending on ON or OFF status, a 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.





○ Type with power-saving circuit can be selected.

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

Unit: W

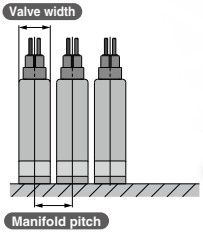
Series		LVM09/090	LVM10/100	LVM15/150	LVM20/200
Power consumption	Inrush	3.3	2.5	5.5	4
	Holding	0.9	1	1	0.6

Refer to 10 in "Design and Selection" on the page 463, if the valve is to be energized continuously for extended periods of time, or used with a manifold.

○ Space-saving

Unit: mm

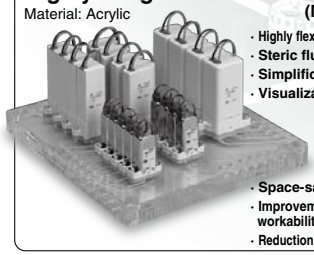
Series	LVM090	LVM10/100	LVM150	LVM200
Valve width	9.5	13	16	20
Manifold pitch	10.5	14	17	21



Highly integrated resin manifold

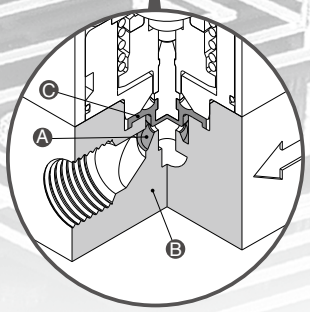
(Made to Order)

Material: Acrylic



- Highly flexible fluid path design
- Steric fluid path structure
- Simplification of piping
- Visualization of the fluid

- Space-saving
- Improvement of maintenance workability
- Reduction of piping work steps



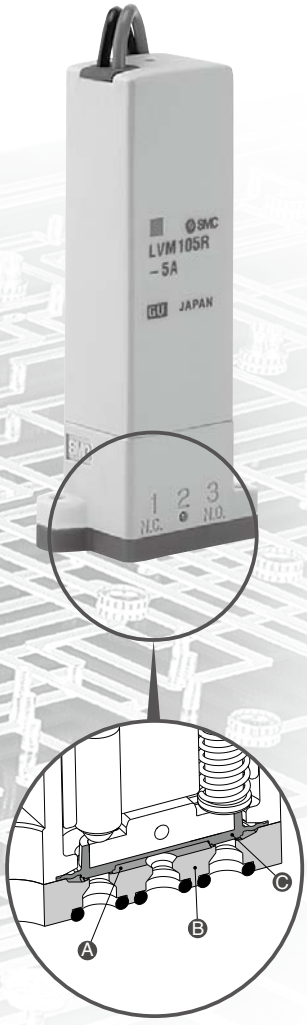
LVM11

○ Applications: Various analytical and inspection equipment

Analytical instruments for blood, urine, immune system, etc.

Solenoid Valve for Chemical Liquids

CE [Option]



LVM□□□
(Rocker type)

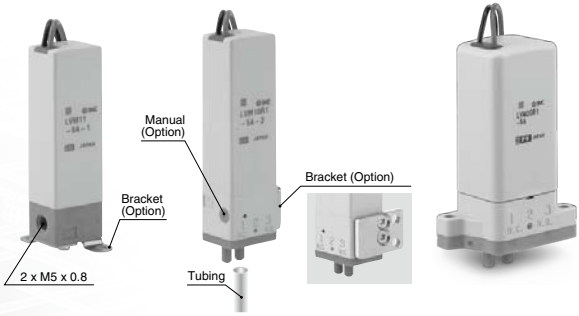
- A Valve chamber volume
- B Body/Plate material*: PEEK
- C Diaphragm material: EPDM or FKM or Kalrez®

* Plate material PFA can be selected for the LVM10/100 base mounted type.

Piping/Mounting Variations

Body ported

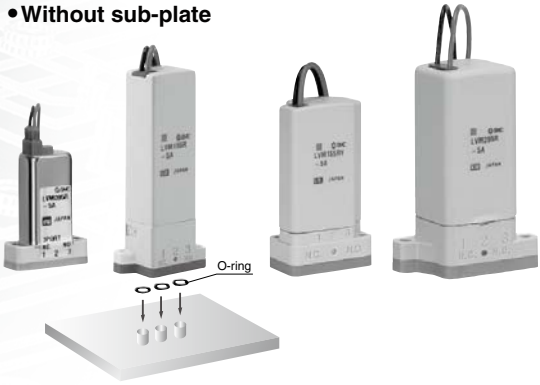
• M5 thread • Tubing type



LVM11 LVM10/100 LVM20/200

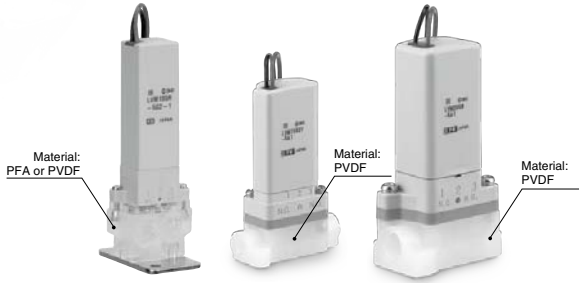
Base mounted

• Without sub-plate



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

• With sub-plate



LVM10/100 LVM15/150 LVM20/200

Series Variations

	Model	Valve construction	Valve type	Number of ports	Operating pressure range	Orifice diameter (mm)	Valve width (mm)	
	**LVM09R3**	Diaphragm type direct operated poppet (Rocker type)	N.C.	2	–75 kPa to 0.2 MPa	1.1	9.5	
	LVM09R4		N.O.					
	LVM095R		Universal	3				
	**LVM11**	Diaphragm type direct operated poppet	N.C.	2	0 to 0.25 MPa	1.5	13	
	**LVM10R1**	Diaphragm type direct operated poppet (Rocker type)	N.C.	2	–75 kPa to 0.25 MPa	1.4	13	
	LVM10R2		N.O.					
	LVM102R		Universal	3				
	**LVM10R3**		N.C.	2	–75 kPa to 0.25 MPa	1.4	13	
	LVM10R4		N.O.					
	LVM10R6		N.C.					
	LVM105R		Universal	3				
	**LVM15R3**		N.C.	2	–75 kPa to 0.25 MPa (Max. 0.6 MPa)	1.6 (1)	16	
	LVM15R4		N.O.					
	LVM155R		Universal	3				
	**LVM20R1**		N.C.	2	–75 kPa to 0.25 MPa	2	20	
	LVM20R2		N.O.					
	LVM202R		Universal	3				
	**LVM20R3**		N.C.	2	–75 kPa to 0.3 MPa	2	20	
	LVM20R4		N.O.					
	LVM205R		Universal	3				

Flow characteristics				Fluid temperature (°C)	Volume of valve chamber (μL)	Weight (g)	Power consumption (W)	Page
Water		Air						
Av[m²]	Cv	C[dm³/(S·bar)]	b					
0.43 x 10⁻⁶	0.018	0.06	0.2	0 to 50 (No condensation)	18	20	2	P.442 to 444
0.96 x 10⁻⁶	0.04	0.13	0.22		11	30	2.5 at inrush 1 at holding	P.445 to 449
0.72 x 10⁻⁶	0.03	0.1	0.2		20	34	1.5	P.445 to 451
0.72 x 10⁻⁶	0.03	0.1	0.2		20	34	1.5	
0.96 x 10⁻⁶ (0.36 x 10⁻⁶)	0.04 (0.015)	0.13 (0.05)	0.22 (0.2)		50	45	5.5 at inrush 1 at holding	P.452 to 455 High-pressure type is indicated in brackets.
1.56 x 10⁻⁶	0.065	0.23	0.27		84	80	2.5	P.456 to 460
1.56 x 10⁻⁶	0.065	0.23	0.27		84	80	2.5	P.456 to 462

∗ The values of Av and Cv are based on JIS B 2005:1995, C and b are based on JIB B 8390:2000.

Compact Direct Operated
2/3 Port Solenoid Valve for Chemical Liquids
Series LVM09/090

How to Order

Base mounted **LVM** [09R3] [ ] – [5] [A] – [ ] – [ ]

Series

Symbol	Number of ports	Valve type	
09R3	2	N.C.	IN (Symbol 1) OUT (Symbol 2)
09R4	2	N.O.	IN (Symbol 3) OUT (Symbol 2)
095R	3	Universal	1 3 2

Function

Nil	Standard
Y1	With power-saving circuit

Coil voltage

Symbol	Voltage
5	24 VDC
6	12 VDC

Wetted part material

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

Lead wire length

Nil	150 mm
3	300 mm
6	600 mm

∗ Nil cannot be selected in the case of function Y1.

CE-compliant

Nil	None
Q	CE-compliant

Specifications

Model			Base mounted		
			LVM09R3	LVM09R4	LVM095R
Valve construction			Diaphragm type direct operated poppet (Rocker type)		
Valve type			N.C.	N.O.	Universal
Number of ports			2		3
Fluid Note 1)			Air, Water, DI water (Pure water), Diluent, Cleaning fluid		
Operating pressure range			−75 kPa to 0.2 MPa		
Orifice diameter			1.1 mm		
Response time Note 8)			10 ms or less (at pneumatic pressure)		
Leakage			Zero leakage, either external or internal (at water pressure)		
Proof pressure Note 2)			0.3 MPa		
Ambient temperature Note 9)			0 to 50°C		
Fluid temperature Note 9)			0 to 50°C (No condensation)		
Volume of valve chamber Note 3)			18 µL		
Mounting orientation Note 4)			Free		
Enclosure			IP40 or equivalent		
Weight			20 g		
Rated voltage			12, 24 VDC		
Allowable voltage fluctuation Note 5)			±10% of rated voltage		
Type of coil insulation			Class B		
Power consumption (When rated voltage is at 24 V)	**Standard**		2 W (0.08 A)		
	With power-saving circuit	**Inrush**	3.3 W (0.14 A)		
		Holding	0.9 W		
Coil switching noise Note 6)			50 dB		

Flow Characteristics

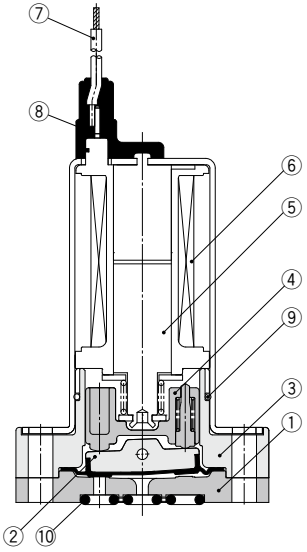
Water		Air	
Av	Cv	C	b
0.43×10^{-6}	0.018	0.06	0.2

∗ The values of Av and Cv are based on JIS B 2005:1995, C and b are based on JIB B 8390:2000.

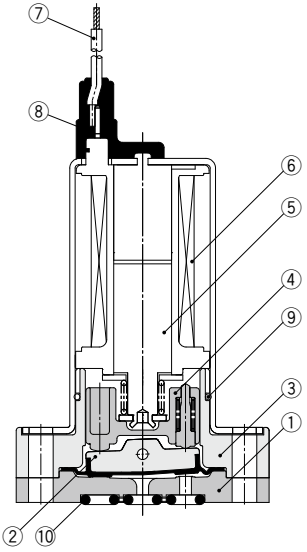
Note 1) Select an appropriate material for the wetted part when fluid such as a cleaning solvent is used. Also, be sure to confirm the fluid compatibility in advance.
Note 2) Indicates the pressure which does not generate breakage, cracks or external leakage after a one-minute airtight test.
Note 3) Indicates the volume of clearance inside the valve chamber after the volume of the diaphragm is subtracted.
Note 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 is not considered, any mounting orientation is available.
Note 5) When the response speed is regarded as important, prevent negative fluctuation of the voltage by adequate regulation.
Note 6) The value is based on SMC's measurement conditions. The noise level will vary with conditions.
Note 7) Refer to 10 in "Design and Selection" on the back of page 463, if the valve is to be energized continuously for extended periods of time.
Note 8) In conformity with JIS B 8373/8374 (at ambient and fluid temperature of 25°C and rated voltage)
Note 9) When the diaphragm material is Kalrez®, take great care since the valve changeover time becomes significantly long at ambient and fluid temperature of 15°C or less when compared to that at room temperature (≒25°C).

Construction: Base Mounted

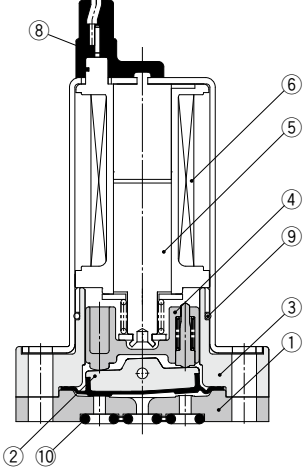
LVM09R3



LVM09R4



LVM095R

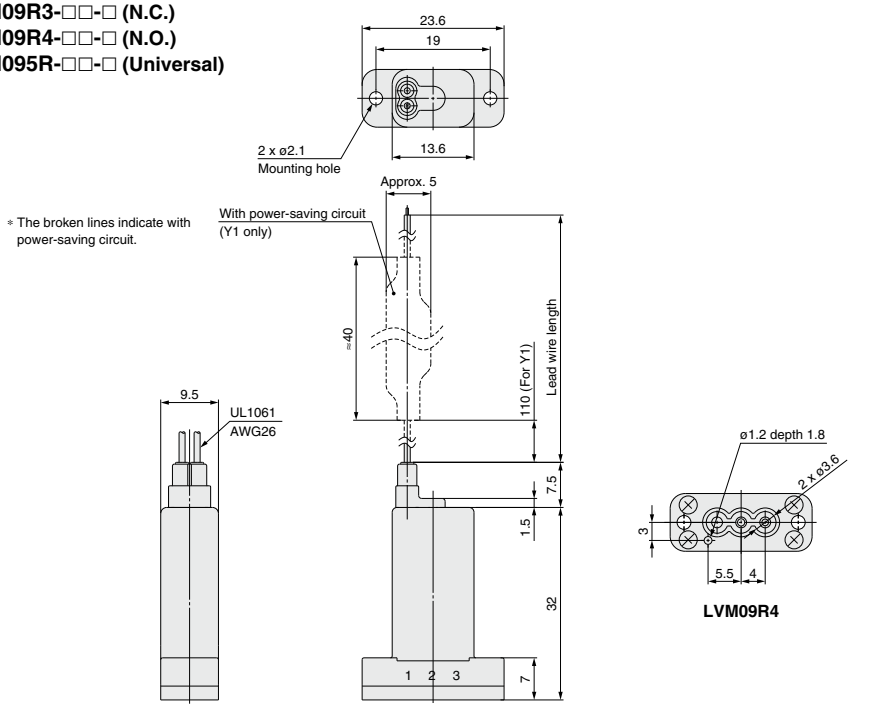


Component Parts: LVM09R3, 09R4, 095R

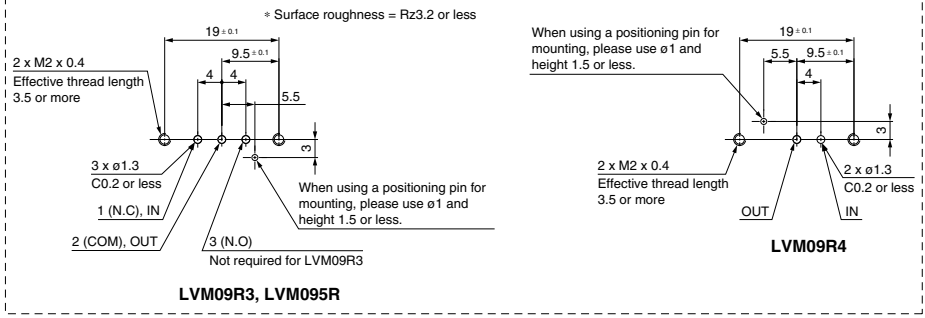
No.	Description	Material
1	**Plate**	PEEK
2	**Diaphragm assembly**	EPDM/FKM/Kalrez®
3	**Body**	PBT
4	**Slide bushing assembly**	PPS/Stainless steel
5	**Armature assembly**	—
6	**Coil assembly**	—
7	**Lead wire**	—
8	**Mold**	PET
9	**O-ring**	NBR
10	**Interface gasket**	EPDM/FKM/Kalrez®

Dimensions: Base Mounted

LVM09R3-□□-□ (N.C.)
LVM09R4-□□-□ (N.O.)
LVM095R-□□-□ (Universal)



Recommended interface dimensions

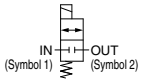
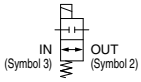


Compact Direct Operated
2/3 Port Solenoid Valve for Chemical Liquids
Series LVM10/100

CE [Option]

How to Order

Series

Symbol	Number of ports	Valve type		Connection
11	2	N.C.		M5 thread
10R1		N.C.		Tubing type
10R2		N.O.		
102R	3	Universal		

Wetted part material

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

Option

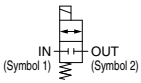
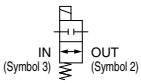
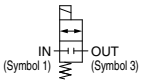
Nil	None
1	Bracket
2	Manual override
3	Bracket, Manual override

∗ Only Option 1 can be selected for the LVM11

Body ported LVM **11** □ – **5** **A** — □ – □ – □

Base mounted LVM **10R3** □ – **5** **A** **1** – □ – □ – □

Series

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

Function

Nil	Standard
Y	With power-saving circuit

∗ For the LVM11, the type with power-saving circuit is standard.

Coil voltage

Symbol	Voltage
5	24 VDC
6	12 VDC

Wetted part material

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

Option

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

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

Sub-plate material/Port size

Nil	Without sub-plate	
1∗	PVDF	M6
1U∗	PVDF	1/4-28UNF
2	PFA	M6
2U	PFA	1/4-28UNF

∗ Combinations with wetted part materials E, F, G. are not available.

CE-compliant

Nil	None
Q	CE-compliant

Lead wire length

Nil	300 mm
6	600 mm
10	1000 mm

Body ported

Body ported
(Tubing type)

Base mounted
(Without sub-plate)

Base mounted
(With sub-plate)

Specifications

Model			Body ported	Body ported (Tubing type)			Base mounted			
			LVM11	LVM10R1	LVM10R2	LVM102R	LVM10R3	LVM10R4	LVM10R6	LVM105R
Valve construction			Diaphragm type direct operated poppet	Diaphragm type direct operated poppet (Rocker type)						
Valve type			N.C.	N.C.	N.O.	Universal	N.C.	N.O.	N.C.	Universal
Number of ports			2	2		3	2			3
Fluid Note 1)			Air, Water, DI water (Pure water), Diluent, Cleaning fluid							
Operating pressure range			0 to 0.25 MPa	–75 kPa to 0.25 MPa						
Orifice diameter			1.5 mm	1.4 mm						
Response time Note 8)			10 ms or less (at pneumatic pressure)							
Leakage			Zero leakage, either external or internal (at water pressure)							
Proof pressure Note 2)			0.38 MPa							
Ambient temperature Note 9)			0 to 50°C							
Fluid temperature Note 9)			0 to 50°C (No condensation)							
Volume of valve chamber Note 3)			11 μL	20 μL						
Mounting orientation Note 4)			Free							
Enclosure			IP40 or equivalent							
Weight			30 g	34 g (without sub-plate), 42 g (with sub-plate)						
Rated voltage			12, 24 VDC							
Allowable voltage fluctuation Note 5)			±10% of rated voltage							
Type of coil insulation			Class B							
Power consumption (When rated voltage is at 24 V)	Standard		—	1.5 W (0.06 A)						
	With power-saving circuit	In-rush	2.5 W (0.1 A)							
		Holding	1 W							
Coil switching noise Note 6)			50 dB							

Note 1) Select an appropriate material for the wetted part when fluid such as a cleaning solvent is used. Also, be sure to confirm the fluid compatibility in advance.
Note 2) Indicates the pressure which does not generate breakage, cracks or external leakage after a one-minute airtight test.
Note 3) Indicates the volume of clearance inside the valve chamber after the volume of the diaphragm is subtracted.
Note 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 is not considered, any mounting orientation is available.
Note 5) When the response speed is regarded as important, prevent negative fluctuation of the voltage by adequate regulation.
Note 6) The value is based on SMC's measurement conditions. The noise level will vary with conditions.
Note 7) Refer to 10 in "Design and Selection" on the back of page 463, if the valve is to be energized continuously for extended periods of time.
Note 8) In conformity with JIS B 8373/8374 (at ambient and fluid temperature of 25°C and rated voltage)
Note 9) When the diaphragm material is Kalrez®, take great care since the valve changeover time becomes significantly long at ambient and fluid temperature of 15°C or less when compared to that at room temperature (≈25°C).

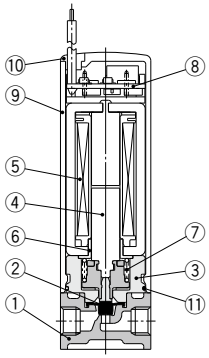
Flow Characteristics

Valve construction	Water		Air	
	Av	Cv	C	b
Direct operated poppet	0.96×10^{-6}	0.04	0.13	0.22
Rocker type	0.72×10^{-6}	0.03	0.1	0.2

∗ The values of Av and Cv are based on JIS B 2005:1995, C and b are based on JIB B 8390:2000.

Construction: Body Ported

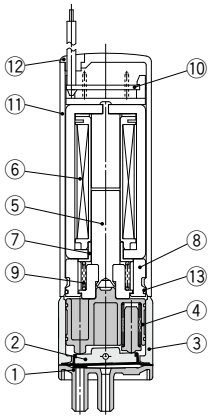
LVM11



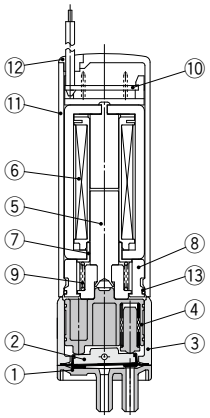
Component Parts: LVM11

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
7	**Return spring**	Stainless steel
8	**Board assembly**	—
9	**Casing**	PBT
10	**Plug**	NBR
11	**O-ring**	NBR

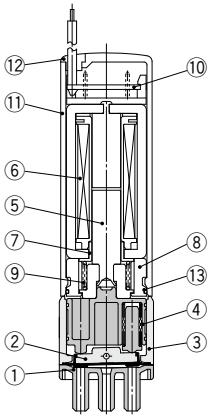
LVM10R1



LVM10R2



LVM102R

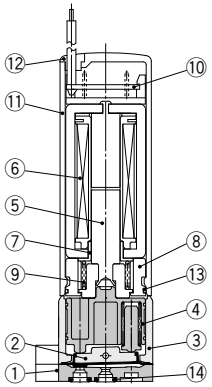


Component Parts: LVM10R1, 10R2, 102R

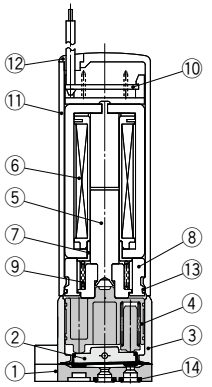
No.	Description	Material
1	**Plate**	PEEK
2	**Diaphragm assembly**	EPDM/FKM/Kalrez®
3	**Body**	PBT
4	**Slide bushing assembly**	PPS/Stainless steel
5	**Armature assembly**	Stainless steel/PBT
6	**Coil assembly**	—
7	**Sleeve**	SUY
8	**Spacer**	PBT
9	**Return spring**	Stainless steel
10	**Board assembly**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

Construction: Base Mounted

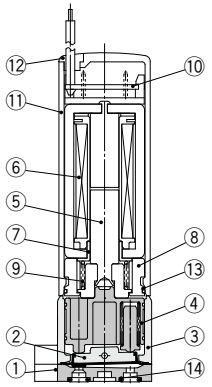
LVM10R3



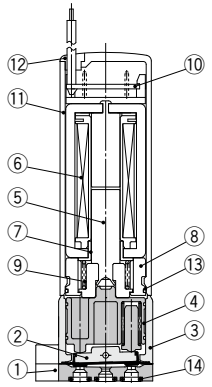
LVM10R4



LVM10R6



LVM105R

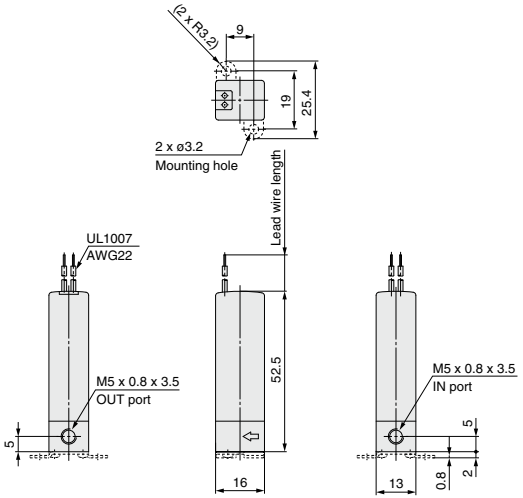


Component Parts: LVM10R3, 10R4, 10R6, 105R

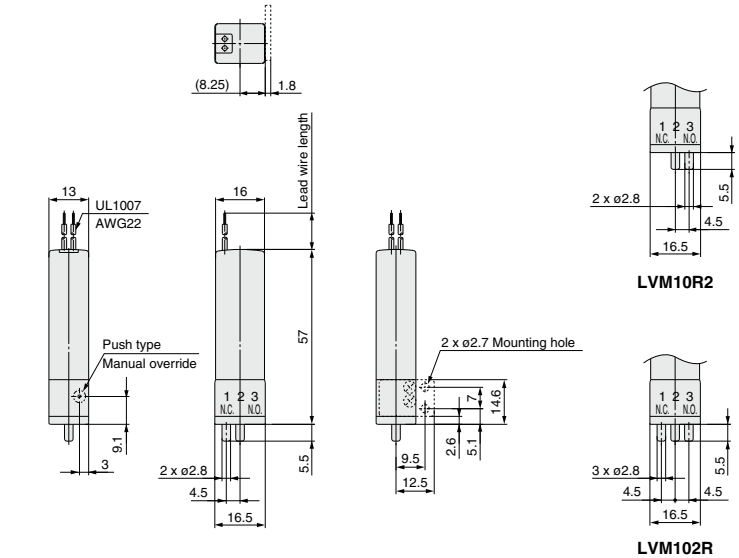
No.	Description	Material
1	**Plate**	PEEK/PFA
2	**Diaphragm assembly**	EPDM/FKM/Kalrez®
3	**Body**	PBT
4	**Slide bushing assembly**	PPS/Stainless steel
5	**Armature assembly**	Stainless steel/PBT
6	**Coil assembly**	—
7	**Sleeve**	SUY
8	**Spacer**	PBT
9	**Return spring**	Stainless steel
10	**Board assembly**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

Dimensions: Body Ported

LVM11-□□-□ (N.C.)



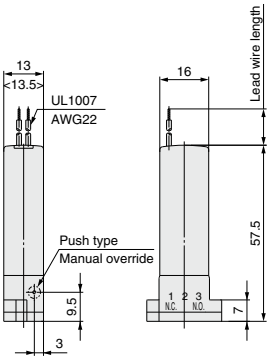
LVM10R1-□□-□ (N.C.)
LVM10R2-□□-□ (N.O.)
LVM102R-□□-□ (Universal)

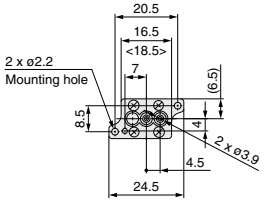


∗ The broken lines indicate with bracket.

Dimensions: Base Mounted

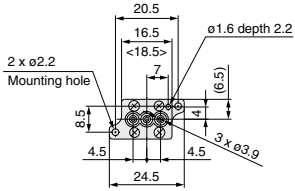
LVM10R3-□□-□ (N.C.)
LVM10R4-□□-□ (N.O.)
LVM10R6-□□-□ (N.C.)
LVM105R-□□-□ (Universal)



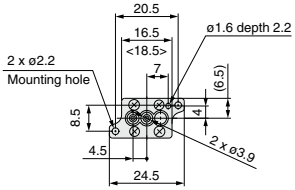


LVM10R4

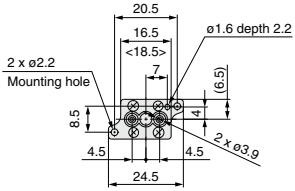
∗ The figures in brackets < > indicate the values for PFA plate material (wetted part material "E, F, G"). In the case of PFA plate material (wetted part material "E, F, G"), there is no ø1.6 positioning hole.



LVM105R



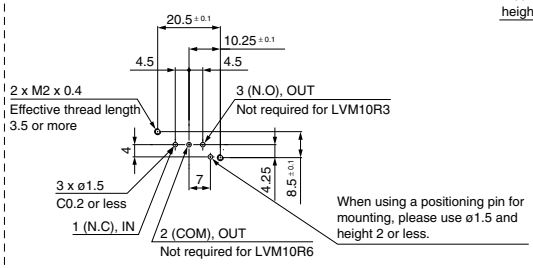
LVM10R3



LVM10R6

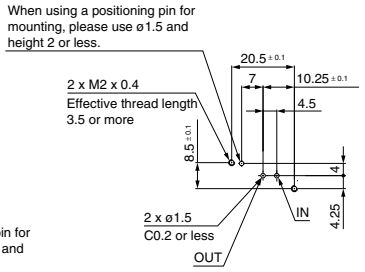
Recommended interface dimensions

∗ Surface roughness = Rz3.2 or less



LVM10R3, LVM10R6, LVM105R

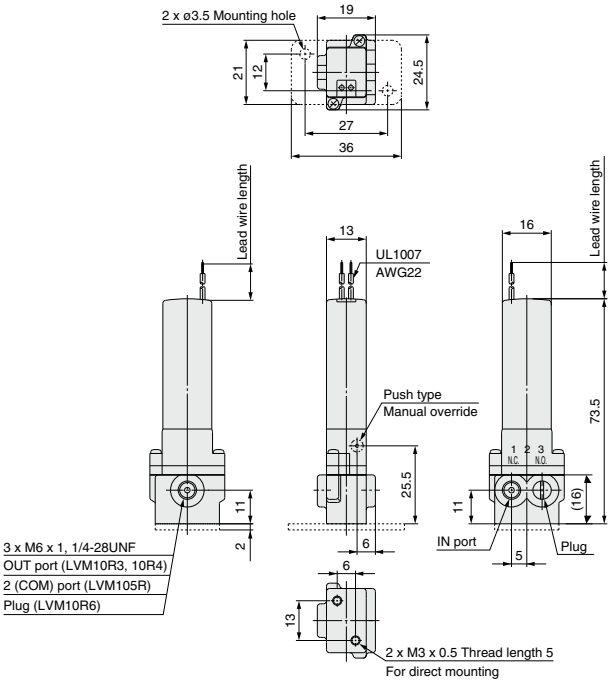
∗ Surface roughness = Rz3.2 or less

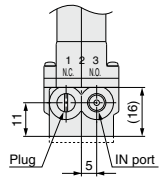


LVM10R4

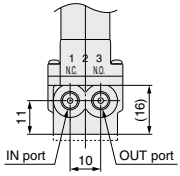
Dimensions: Base Mounted

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

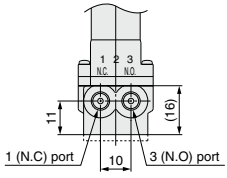




LVM10R4

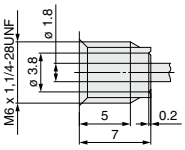


LVM10R6



LVM105R

∗ The broken lines indicate with bracket.



Details of thread

Compact Direct Operated
2/3 Port Solenoid Valve for Chemical Liquids
Series LVM15/150

CE [Option]

Base mounted (Without sub-plate)

Base mounted (With sub-plate)

How to Order

Base mounted **LVM** [15R3] [Y] – [5] [A] [1] – [ ] – [ ]

Series

Symbol	Number of ports	Valve type	
15R3	2	N.C.	IN (Symbol 1) OUT (Symbol 2)
15R4	2	N.O.	IN (Symbol 3) OUT (Symbol 2)
155R	3	Universal	1 3 2

Sub-plate material/port size

Nil	Without sub-plate	
1	M6	PVDF
1U	1/4-28UNF	PVDF

Lead wire length

Nil	300 mm
6	600 mm
10	1000 mm

Coil voltage

Symbol	Voltage
5	24 VDC
6	12 VDC

Wetted part material

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

Function

Symbol	Specifications
Y	Standard (With power-saving circuit)
HY	High-pressure type (With power-saving circuit)

CE-compliant

Nil	None
Q	CE-compliant

Specifications

Model		Base mounted		
		LVM15R3	LVM15R4	LVM155R
Valve construction		Diaphragm type direct operated poppet (Rocker type)		
Valve type		N.C.	N.O.	Universal
Number of ports		2		3
Fluid Note 1)		Air, Water, DI water (Pure water), Diluent, Cleaning fluid		
Operating pressure range		–75 kPa to 0.25 MPa [Max. 0 to 0.6 MPa] Note 8)		
Orifice diameter		1.6 mm [1 mm]		
Response time Note 9)		15 ms or less (at pneumatic pressure)		
Leakage		Zero leakage, either external or internal (at water pressure)		
Proof pressure Note 2)		0.38 MPa [0.9 MPa]		
Ambient temperature Note 10)		0 to 50°C		
Fluid temperature Note 10)		0 to 50°C (No condensation)		
Volume of valve chamber Note 3)		50 µL		
Mounting orientation Note 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 Note 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 Note 6)		60 dB		

[ ] indicates high-pressure type.

Flow Characteristics

Water		Air	
Av	Cv	C	b
0.96 x 10^{-6} [0.36 x 10^{-6}]	0.04 [0.015]	0.13 [0.05]	0.22 [0.2]

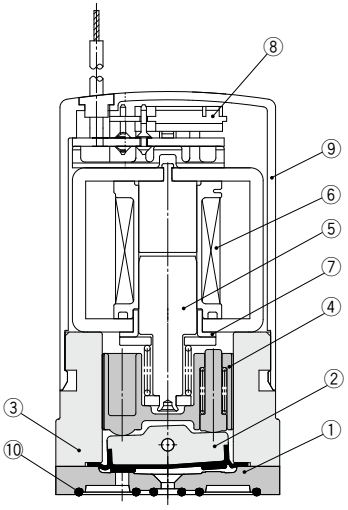
[ ] indicates high-pressure type.

∗ The values of Av and Cv are based on JIS B 2005:1995, C and b are based on JIB B 8390:2000.

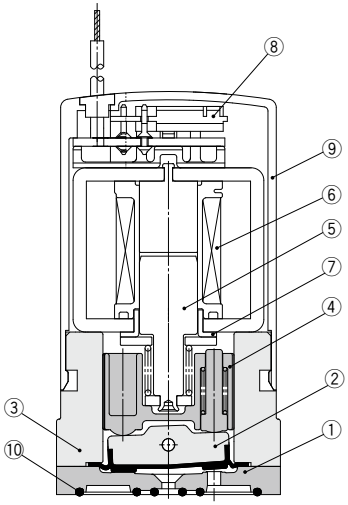
Note 1) Select an appropriate material for the wetted part when fluid such as a cleaning solvent is used. Also, be sure to confirm the fluid compatibility in advance.
Note 2) Indicates the pressure which does not generate breakage, cracks or external leakage after a one-minute airtight test.
Note 3) Indicates the volume of clearance inside the valve chamber after the volume of the diaphragm is subtracted.
Note 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 is not considered, any mounting orientation is available.
Note 5) When the response speed is regarded as important, prevent negative fluctuation of the voltage by adequate regulation.
Note 6) The value is based on SMC's measurement conditions. The noise level will vary with conditions.
Note 7) Refer to 10 in "Design and Selection" on the back of page 463, if the valve is to be energized continuously for extended periods of time.
Note 8) 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.
Note 9) In conformity with JIS B 8373/8374 (at ambient and fluid temperature of 25°C and rated voltage)
Note 10) When the diaphragm material is Kalrez®, take great care since the valve changeover time becomes significantly long at ambient and fluid temperature of 15°C or less when compared to that at room temperature (≒25°C).

Construction: Base Mounted

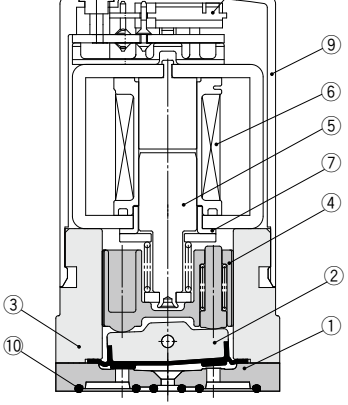
LVM15R3



LVM15R4



LVM155R

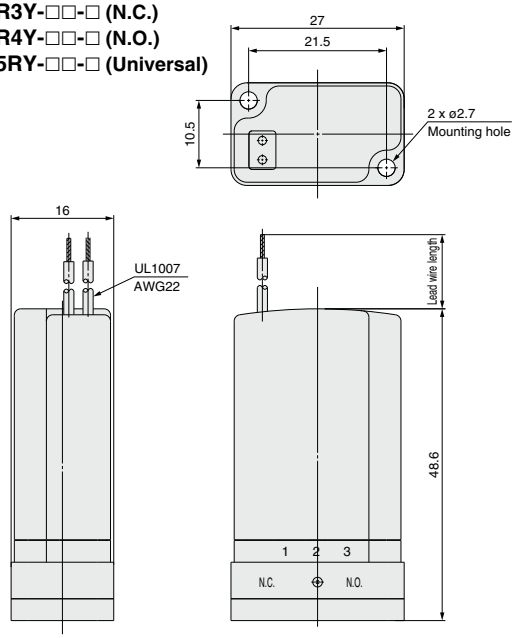


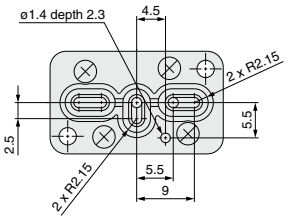
Component Parts: LVM15R3, 15R4, 155R

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
8	**Board assembly**	—
9	**Casing**	PBT
10	**Interface gasket**	EPDM/FKM/Kalrez®

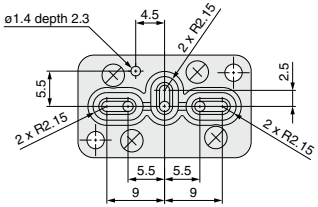
Dimensions: Base Mounted

LVM15R3Y-□□-□ (N.C.)
LVM15R4Y-□□-□ (N.O.)
LVM155RY-□□-□ (Universal)

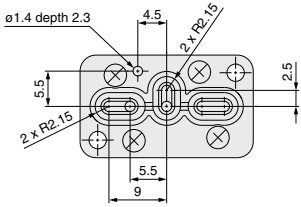




LVM15R4

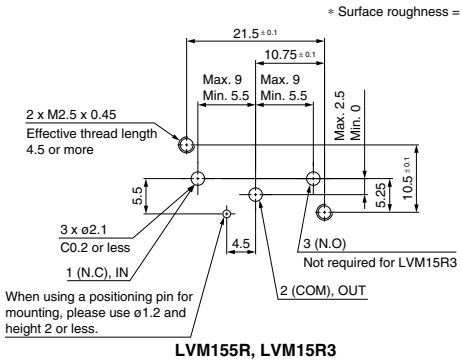


LVM155R

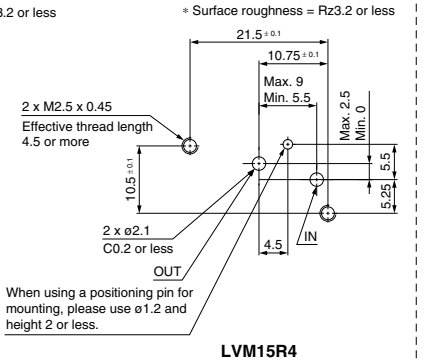


LVM15R3

Recommended interface dimensions



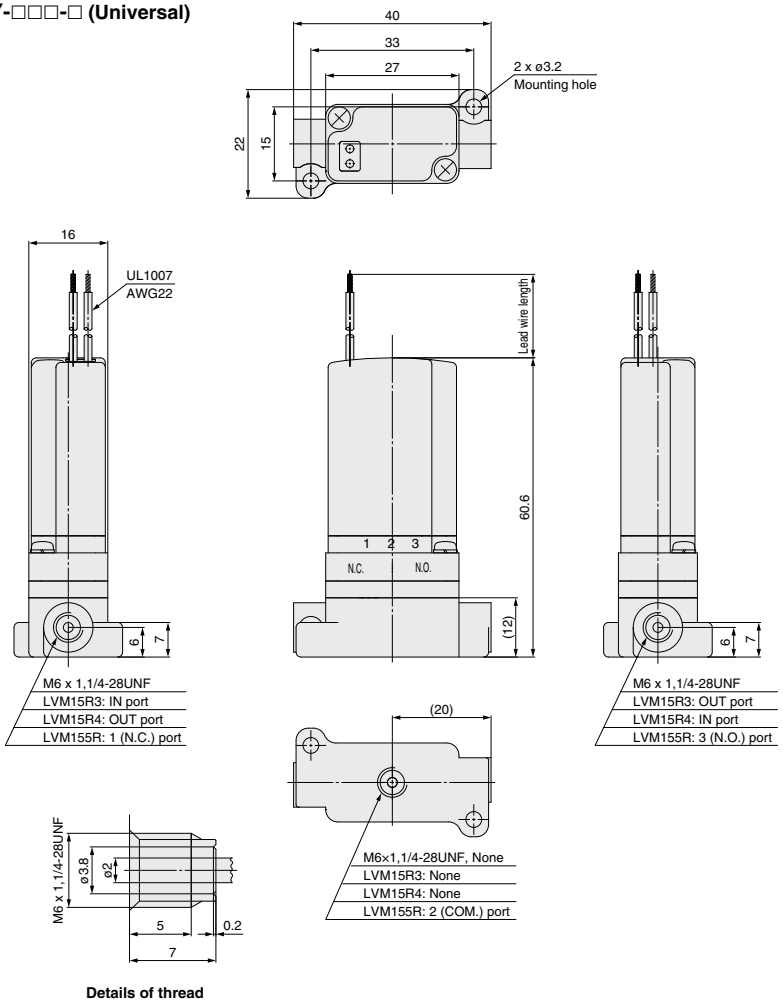
LVM155R, LVM15R3



LVM15R4

Dimensions: Base Mounted

LVM15R3Y-□□□-□ (N.C.)
LVM15R4Y-□□□-□ (N.O.)
LVM155RY-□□□-□ (Universal)



Details of thread

Compact Direct Operated
2/3 Port Solenoid Valve for Chemical Liquids
Series LVM20/200

How to Order

[Option]

Series

Symbol	Number of ports	Valve type	
20R1	2	N.C.	IN (Symbol 1) — OUT (Symbol 2)
20R2		N.O.	IN (Symbol 3) — OUT (Symbol 2)
202R	3	Universal	1 / 3 — 2

Body ported LVM **20R1** □ – **5** **A** —— □ – □

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

Series

Symbol	Number of ports	Valve type	
20R3	2	N.C.	IN (Symbol 1) — OUT (Symbol 2)
20R4		N.O.	IN (Symbol 3) — OUT (Symbol 2)
205R	3	Universal	1 / 3 — 2

Function

Nil	Standard
Y	With power-saving circuit

Coil voltage

Symbol	Voltage
5	24 VDC
6	12 VDC

Wetted part material

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

Sub-plate material/ Port size

Nil	Without sub-plate	
1	Rc1/8	PVDF
1F	G1/8	PVDF
1N	NPT1/8	PVDF

CE-compliant

Nil	None
Q	CE-compliant

Lead wire length

Nil	300 mm
6	600 mm
10	1000 mm

Specifications

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

Note 1) Select an appropriate material for the wetted part when fluid such as a cleaning solvent is used. Also, be sure to confirm the fluid compatibility in advance.
Note 2) Indicates the pressure which does not generate breakage, cracks or external leakage after a one-minute airtight test.
Note 3) Indicates the volume of clearance inside the valve chamber after the volume of the diaphragm is subtracted.
Note 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 is not considered, any mounting orientation is available.
Note 5) When the response speed is regarded as important, prevent negative fluctuation of the voltage by adequate regulation.
Note 6) The value is based on SMC's measurement conditions. The noise level will vary with conditions.
Note 7) Refer to 10 in "Design and Selection" on the back of page 463, if the valve is to be energized continuously for extended periods of time.
Note 8) In conformity with JIS B 8373/8374 (at ambient and fluid temperature of 25°C and rated voltage)
Note 9) When the diaphragm material is Kalrez®, take great care since the valve changeover time becomes significantly long at ambient and fluid temperature of 15°C or less when compared to that at room temperature (≈25°C).

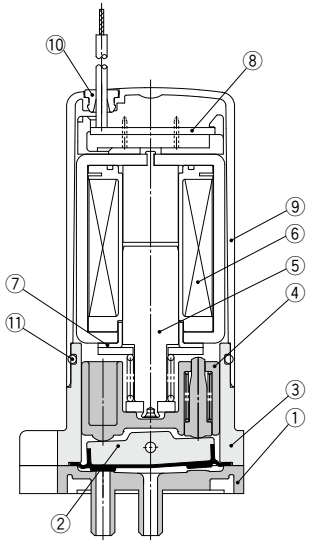
Flow Characteristics

Water		Air	
Av	Cv	C	b
1.56×10^{-6}	0.065	0.23	0.27

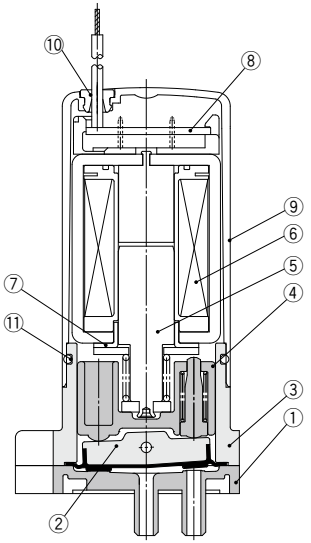
∗ The values of Av and Cv are based on JIS B 2005:1995, C and b are based on JIB B 8390:2000.

Construction: Body Ported

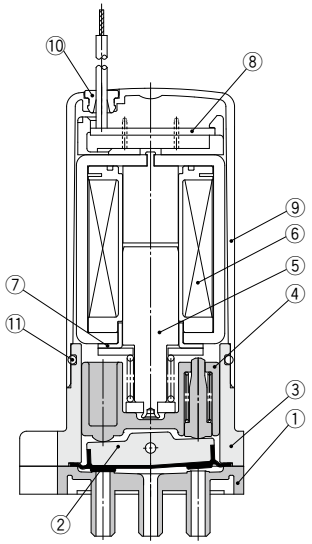
LVM20R1



LVM20R2



LVM202R

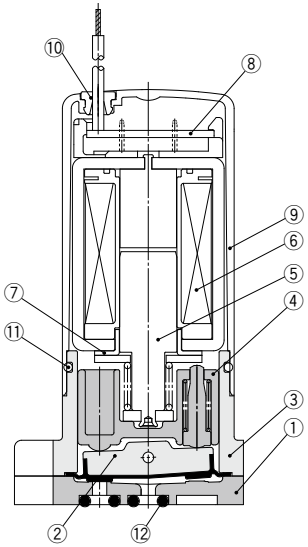


Component Parts: LVM20R1, 20R2, 202R

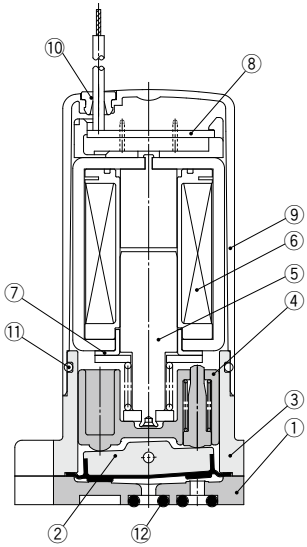
No.	Description	Material
1	**Plate**	PEEK
2	**Diaphragm assembly**	EPDM/FKM/Kalrez®
3	**Body**	PBT
4	**Slide bushing assembly**	PPS/Stainless steel
5	**Armature assembly**	—
6	**Coil assembly**	—
7	**Sleeve**	SUY
8	**Board assembly**	—
9	**Casing**	PBT
10	**Plug**	NBR
11	**O-ring**	NBR

Construction: Base Mounted

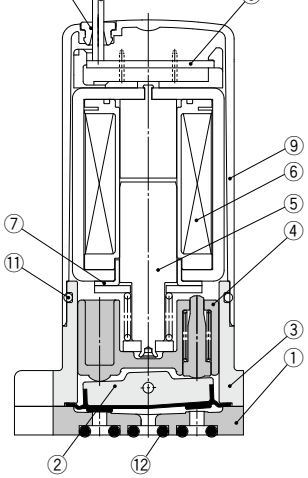
LVM20R3



LVM20R4



LVM205R

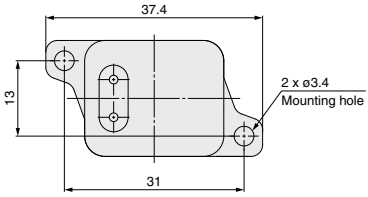


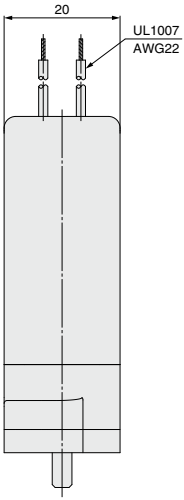
Component Parts: LVM20R3, 20R4, 205R

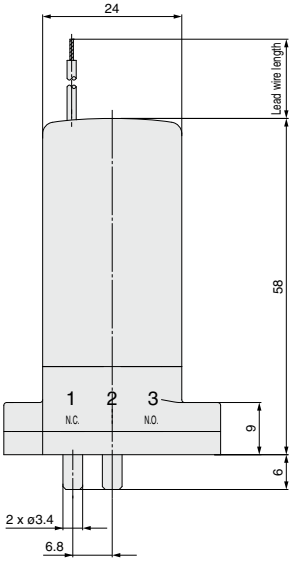
No.	Description	Material
1	**Plate**	PEEK
2	**Diaphragm assembly**	EPDM/FKM/Kalrez®
3	**Body**	PBT
4	**Slide bushing assembly**	PPS/Stainless steel
5	**Armature assembly**	—
6	**Coil assembly**	—
7	**Sleeve**	SUY
8	**Board assembly**	—
9	**Casing**	PBT
10	**Plug**	NBR
11	**O-ring**	NBR
12	**O-ring**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

Dimensions: Body Ported

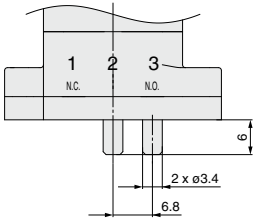
LVM20R1-□□-□ (N.C.)
LVM20R2-□□-□ (N.O.)
LVM202R-□□-□ (Universal)



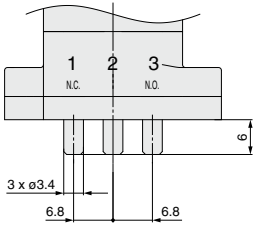




LVM20R1



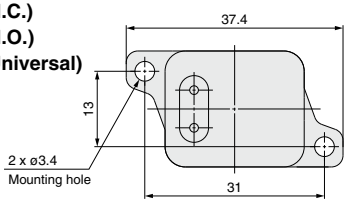
LVM20R2

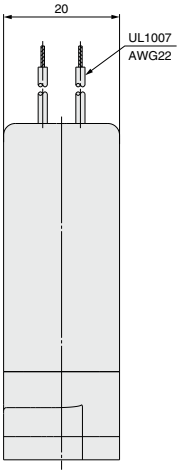


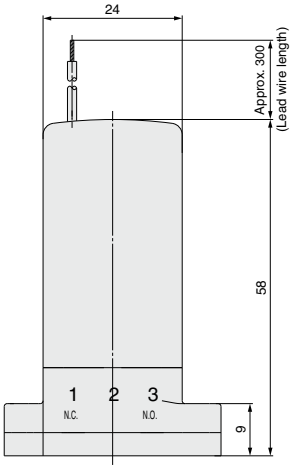
LVM202R

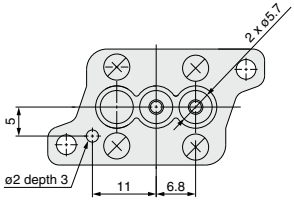
Dimensions: Base Mounted

LVM20R3-□□-□ (N.C.)
LVM20R4-□□-□ (N.O.)
LVM205R-□□-□ (Universal)

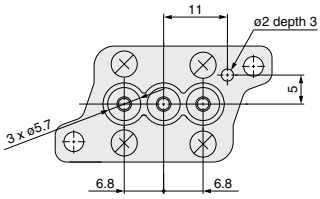




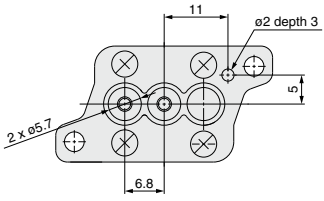




LVM20R4

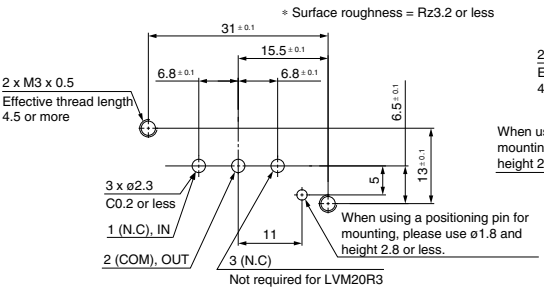


LVM205R

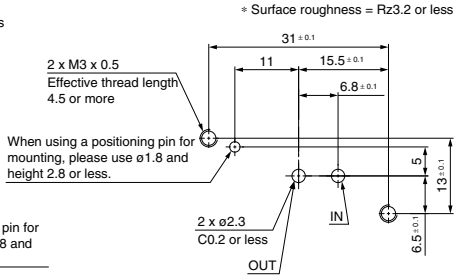


LVM20R3

Recommended interface dimensions



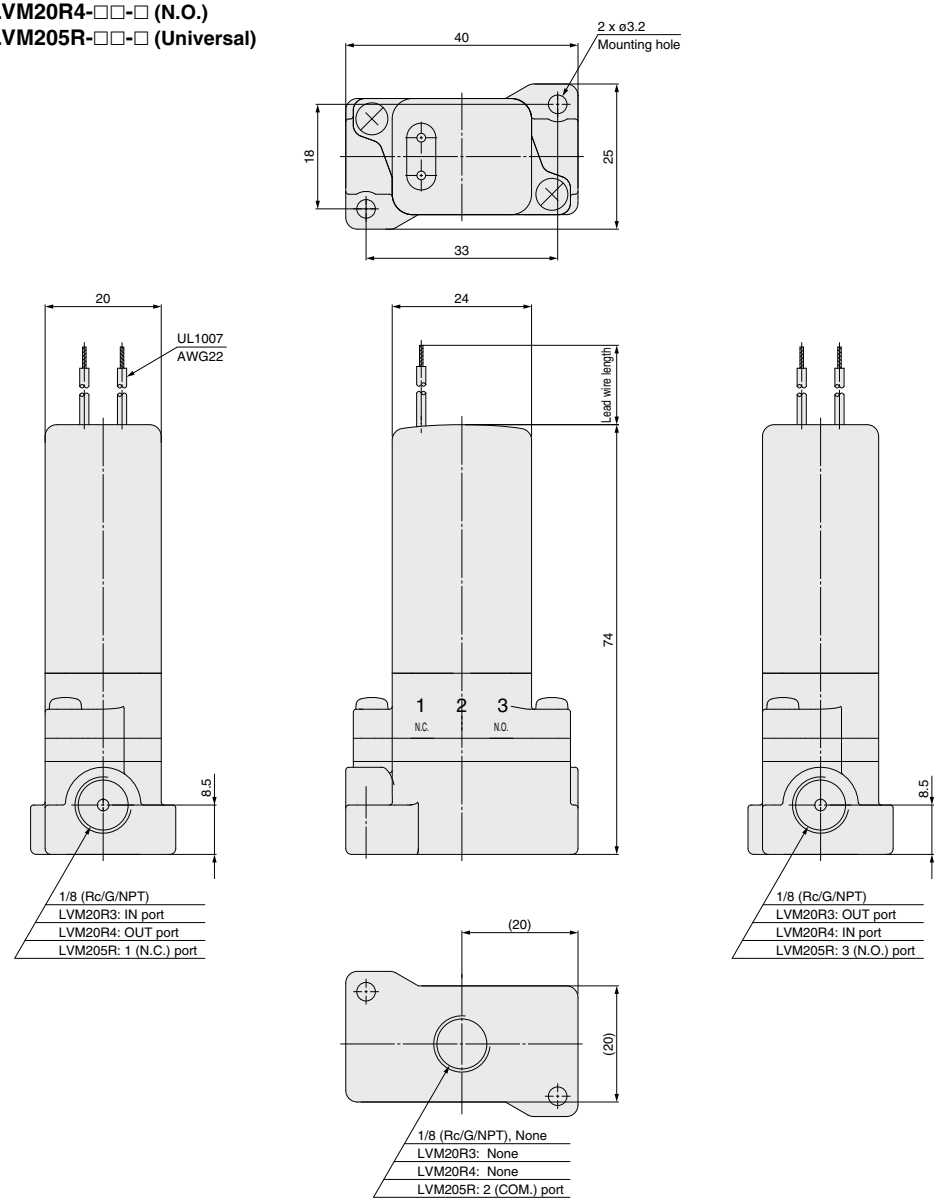
LVM20R3, LVM205R



LVM20R4

Dimensions: Base Mounted

LVM20R3-□□-□ (N.C.)
LVM20R4-□□-□ (N.O.)
LVM205R-□□-□ (Universal)



Series LVM
Specific Product Precautions 1

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

Design and 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 operating ranges specified in this catalog.

3. Fluid

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

4. Maintenance space

The installation should allow sufficient space for maintenance activities.

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 fluid used 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.

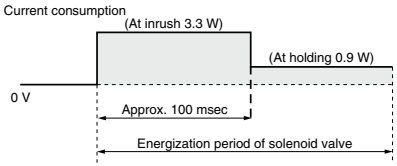
9. Cannot be used as an emergency shutoff valve, etc.

The valves presented in this catalog are not designed for safety applications such as an emergency shutoff 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, the type with power-saving circuit is standard.
∗ For the LVM10/100, the inrush is 50 msec.

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.

Series	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. Please use valve pitches equal to or above those shown in the table below when using multiple valves together.

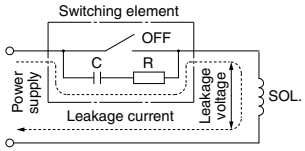
Series	LVM09/090	LVM10/100	LVM15/150	LVM20/200
Valve pitch	10.5	14	17	21

Selection

⚠Caution

Leakage voltage

Particularly when using a resistor in parallel with a switching element and using a C-R element (surge voltage suppressor) to protect the switching element, take note that leakage current will flow through the resistor, C-R element, etc., creating a possible danger that the valve may not turn off.



AC/Class B built-in full wave rectifier coil: 10% or less of rated voltage
DC coil: 2% or less of rated voltage

Mounting

⚠Warning

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

After mounting is completed, confirm that it has been done correctly by performing a suitable function test.

2. 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 is not considered, any mounting position is possible.

Series LVM
Specific Product Precautions 2

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

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.

2. When tubing is directly connected to the solenoid valve, insert the tubing straight into the nipple for a complete fit.

Select appropriate tubing while referring to the table below.

Model		Tube inside diameter (I.D.)	Tubing outside diameter (O.D.)
Body ported	**LVM10R1, 10R2, 102R**	ø2.5 or less	ø4.5 or less
Body ported	**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. Applying an external force of greater than 20 N to the nipple may cause leakage.

3. Always tighten threads with the proper tightening torque.

When mounting the solenoid valve on the base or screwing in the fittings, tighten it with the proper tightening torque shown below.

Tightening Torque for Base Mounting

Model		Thread size	Proper tightening torque N·m
Base mounted	**LVM09R3, 09R4, 095R**	M2	0.1 to 0.14
Base mounted	**LVM10R3, 10R4, 10R6, 105R**	M2	0.15 to 0.2
Base mounted	**LVM15R3Y, 15R4Y, 155RY**	M2.5	0.25 to 0.35
Base mounted	**LVM20R3, 20R4, 205R**	M3	0.4 to 0.6

Tightening Torque for Piping

Model		Thread size	Proper tightening torque N·m*
Body ported	**LVM11**	M5	1.5 to 2
Base mounted (With sub-plate)	**LVM10R3, 10R4, 10R6, 105R**	M6 or 1/4-28UNF	1.5 to 2
Base mounted (With sub-plate)	**LVM15R3Y, 15R4Y, 155RY**	M6 or 1/4-28UNF	1.5 to 2
Base mounted (With sub-plate)	**LVM20R3, 20R4, 205R**	Rc1/8 or NPT1/8	0.5 to 0.6
		G1/8	0.5 to 0.6

* Reference
M5, M6, 1/4-28UNF
After tightening by hand, tighten approximately 1/6 turn with a tightening tool.
Rc1/8, NPT1/8
After tightening 1 turn by hand, retighten approximately 3 turns with a tightening tool.
G1/8
After tightening by hand, tighten approximately 1/6 turn with a tightening tool.

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 the response time is important, control the voltage to avoid variation on the minus side.

3. Apply the correct voltage.

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

Wiring

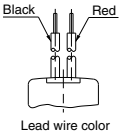
⚠Caution

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

Otherwise the coil will burn.

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

Red (+), Black (–)



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 in explosive atmospheres.

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

Impact resistance of this solenoid valve is 150 m/s². Vibration resistance of this solenoid valve is 30 m/s².

3. 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 deionized water, air, etc.

3. Do not disassemble the product.

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