

Direct Operated 2/3 Port Isolated Valve

Low Particle Generation

Oil-free

Metal-free



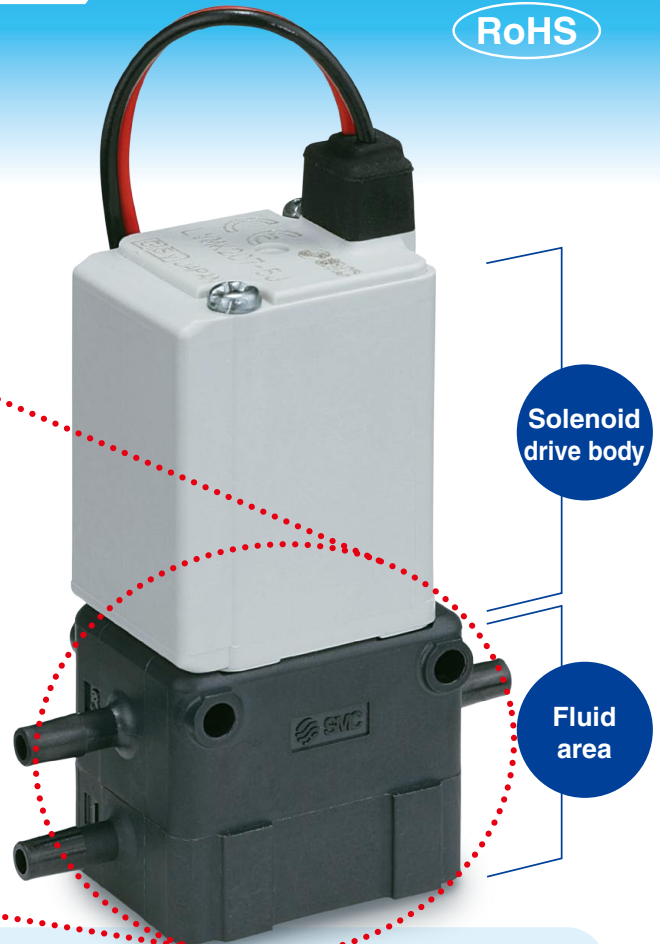
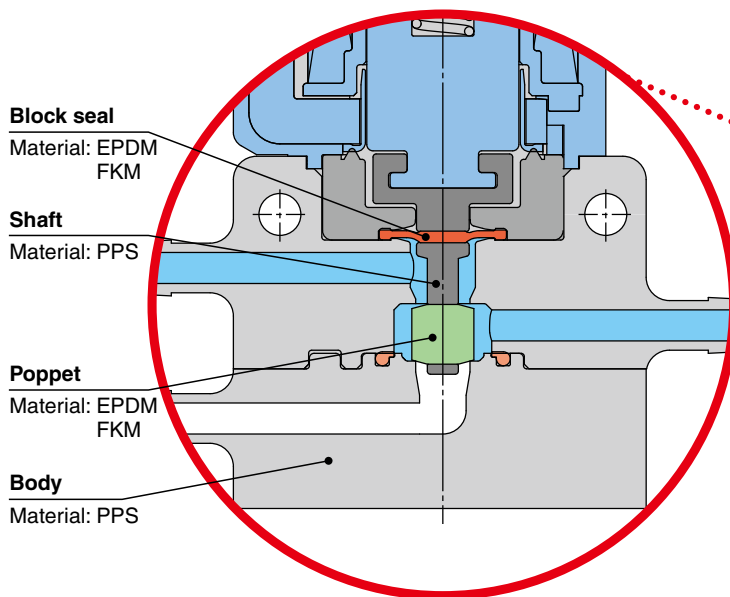
New



RoHS

Isolated Structure

Solenoid drive body is separated from the fluid area by block seal.



Easy piping

Body ported



Bottom ported

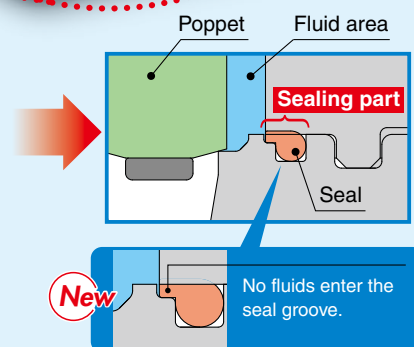
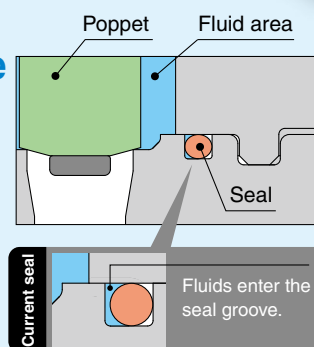
Side ported

Base mounted



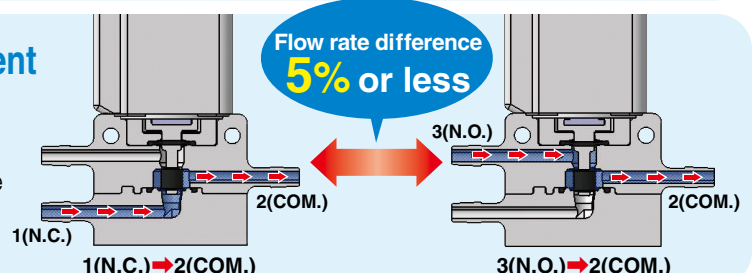
Minimal dead space

No fluids enter the seal groove.



Flow adjustment not required

As the flow rate difference is 5% or less, no flow rate adjustment is required at inlet and outlet side.



LVMK20/200 Series









CAT.ES70-55A

Application Examples Oil-free, clean, low particle generation applications



Variations

	Model	Valve type	Piping direction	Voltage	Fluid contact material
Body Ported	 LVMK21	N.C.	Bottom ported	24 VDC 12 VDC	Body: PPS Seal: EPDM, FKM
	 LVMK27		Side ported		
	 LVMK202	Universal	Bottom ported		
	 LVMK207		Side ported		
Base Mounted	 LVMK23	N.C.	—		
	 LVMK205	Universal	—		

Direct Operated 2/3 Port Isolated Valve

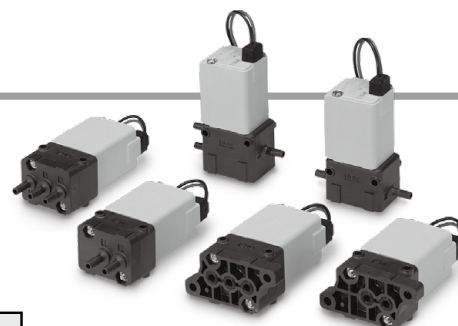
LVMK20/200 Series



How to Order

Number of ports/Valve type/Piping direction

Symbol	Number of ports	Valve type	Piping direction	Recommended tubing diameter
21	2	N.C.	Bottom ported	I.D. 2 to 3.2 mm, O.D. after mounting 8 mm or less
27			Side ported	
202	3	Universal	Bottom ported	
207			Side ported	



Body ported

LVMK 202 - 5 J - □

Base mounted

LVMK 205 - 5 J - □

Number of ports/Valve type

Symbol	Number of ports	Valve type
23	2	N.C.
205	3	Universal

Coil voltage

Symbol	Voltage
5	24 VDC
6	12 VDC

Fluid contact material

Symbol	Body	Poppet/Seal
J	PPS	EPDM
K	PPS	FKM

Lead wire length

Symbol	Length
Nil	300 mm
6	600 mm
10	1000 mm

Specifications

Model	Body ported (Tubing type)				Base mounted	
	LVMK21	LVMK27	LVMK202	LVMK207	LVMK23	LVMK205
Valve construction	Direct operated poppet					
Valve type	N.C.		Universal		N.C.	Universal
Number of ports	2		3		2	3
Fluid*1	Air, Water, Deionized water, Diluent, Cleaning fluid					
Operating pressure range	-90 kPa to 0.2 MPa					
Orifice diameter	2 mm equivalent					
Response time*2	16 ms or less (at pneumatic pressure)					
Leakage	Zero leakage, either external or internal (at water pressure)					
Proof pressure*3	0.3 MPa					
Ambient temperature	5 to 50°C (No condensation)					
Fluid temperature	5 to 50°C					
Mounting orientation*4	Free					
Enclosure	IP40 equivalent					
Weight*7	76 g	77 g	78 g	78 g	76 g	79 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)	3 W (0.125 A)					
Coil switching noise*6	70 dB (A)					

*1: Be sure to confirm the fluid compatibility in advance.

*2: Based on JIS B 8419-2010 (at ambient and fluid temperature of 25°C, supply pressure of 0.2 MPa, rated voltage, and when N.C. (IN) port is pressurized)
When poppet/seal material is FKM, if ambient temperature and fluid temperature is 10°C or less (guide), the response time will be longer.

*3: Indicates the pressure which does not generate breakage, cracks or external leakage after a one-minute airtight test.

*4: When residual liquid is considered, mounting in a vertical direction with the coil at the top is recommended. When residual liquid is not considered, any mounting orientation is available.

*5: When response ability is prioritized, the voltage should be rated voltage +10%.

*6: The value is based on SMC's measurement conditions. The noise level will vary with conditions.

*7: When lead wire length is 300 mm. For 600 mm, add 3 g, and for 1000 mm, add 7 g.

*: Refer to 10 in "Design / Selection" on page 9, if the valve is to be energized continuously for extended periods of time.

Flow Rate Characteristics

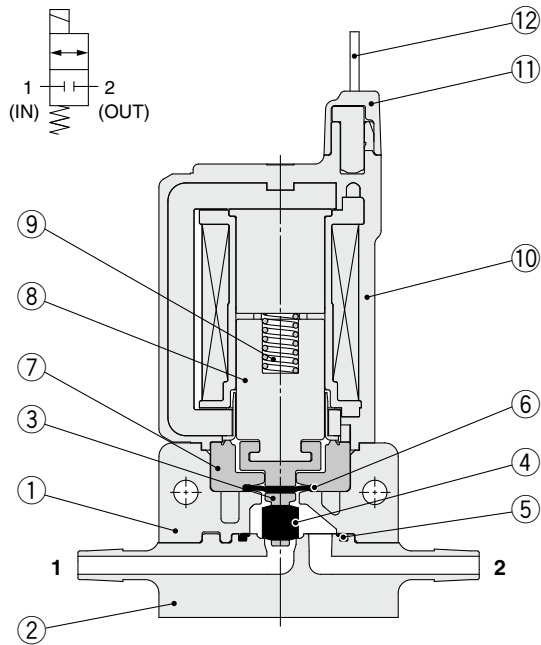
Water		Air	
Kv	Cv	C	b
0.055	0.065	0.23	0.27

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

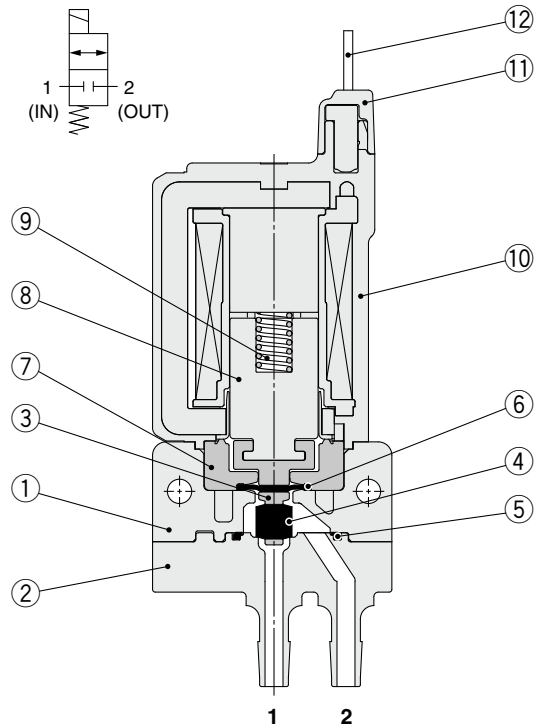
LVMK20/200 Series

Construction: Body Ported

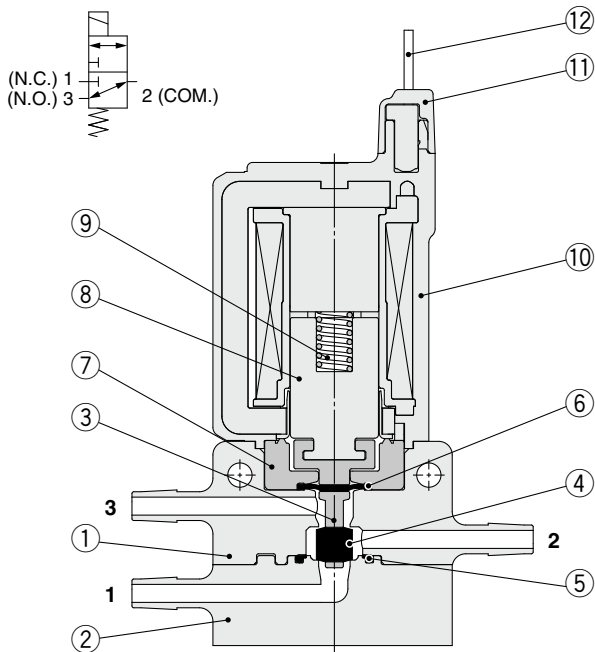
LVMK27



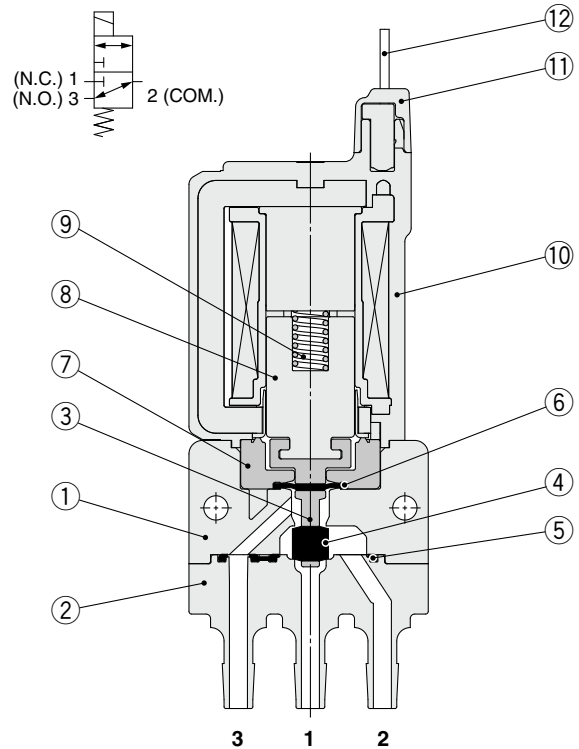
LVMK21



LVMK207



LVMK202



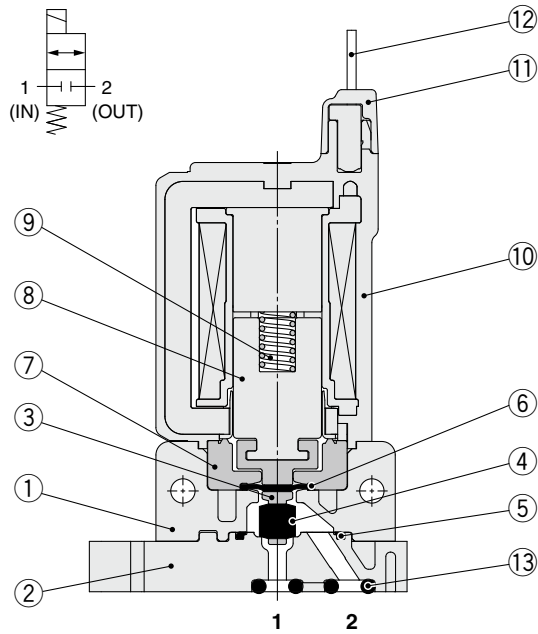
Component Parts

No.	Description	Material
1	Body A	PPS
2	Body B	PPS
3	Shaft	PPS
4	Poppet	EPDM, FKM
5	Seal	EPDM, FKM
6	Block seal	EPDM, FKM

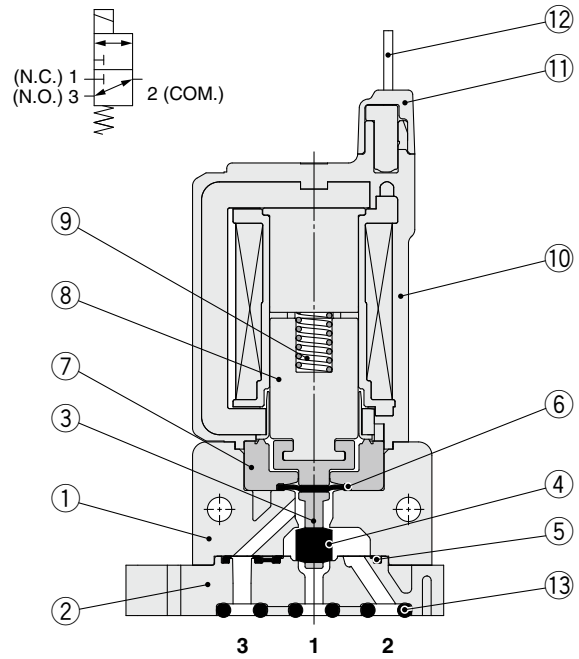
No.	Description	Material
7	Spacer	PBT
8	Armature	—
9	Return spring	Stainless steel
10	Mold coil	Molded material: PBT
11	Cover	NBR
12	Lead wire	—

Construction: Base Mounted

LVMK23



LVMK205



Component Parts

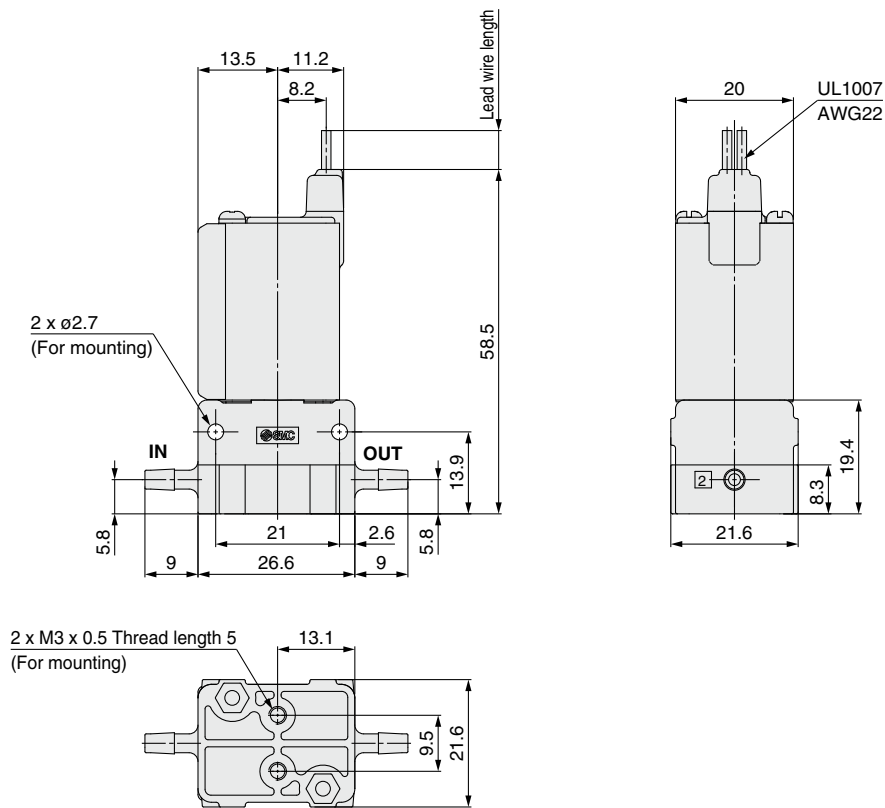
No.	Description	Material
1	Body A	PPS
2	Body B	PPS
3	Shaft	PPS
4	Poppet	EPDM, FKM
5	Seal	EPDM, FKM
6	Block seal	EPDM, FKM
7	Spacer	PBT

No.	Description	Material
8	Armature	—
9	Return spring	Stainless steel
10	Mold coil	Molded material: PBT
11	Cover	NBR
12	Lead wire	—
13	O-ring	EPDM, FKM

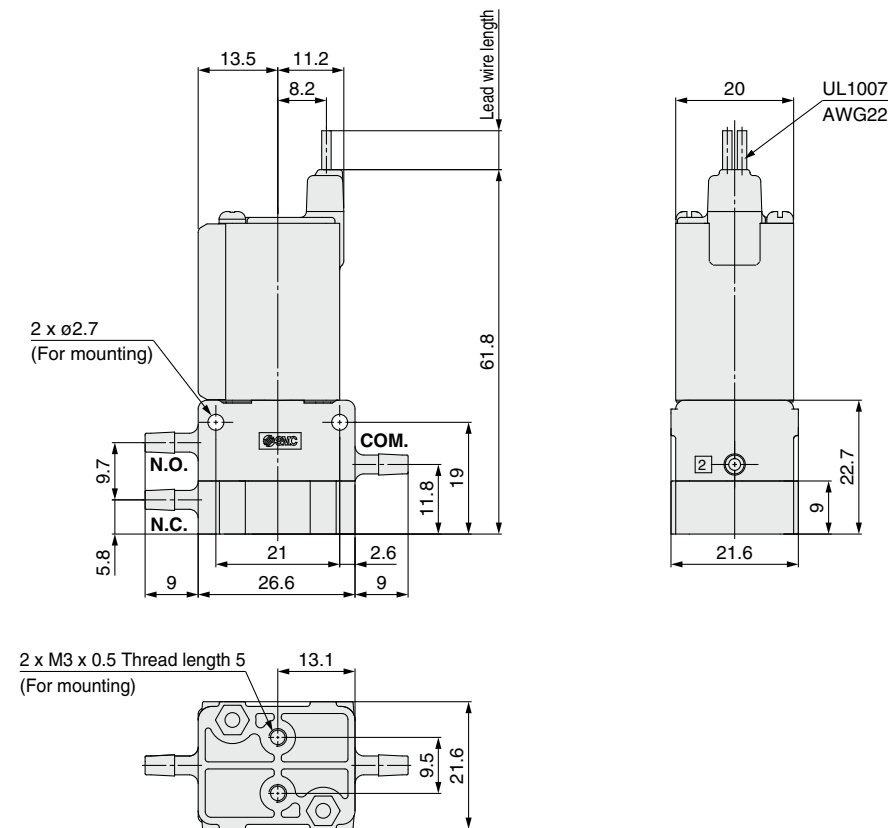
LVMK20/200 Series

Dimensions: Body Ported (Side Ported)

LVMK27-□□-□

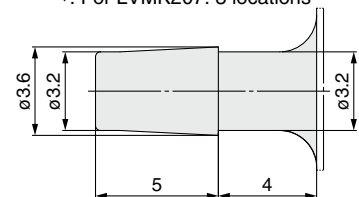


LVMK207-□□-□



Tubing insertion dimension

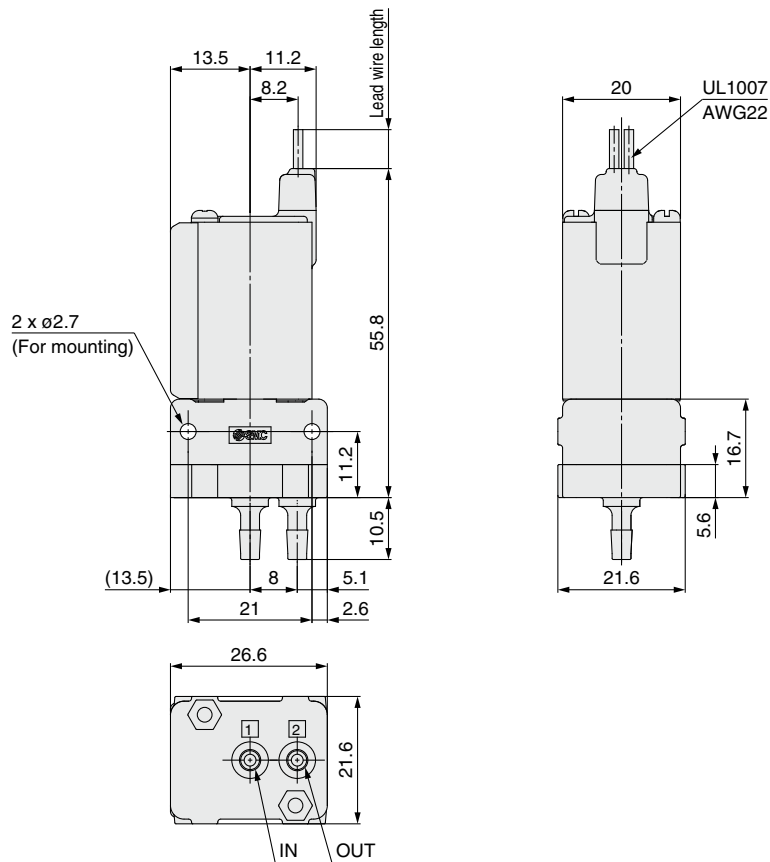
- *: For LVMK27: 2 locations
- *: For LVMK207: 3 locations



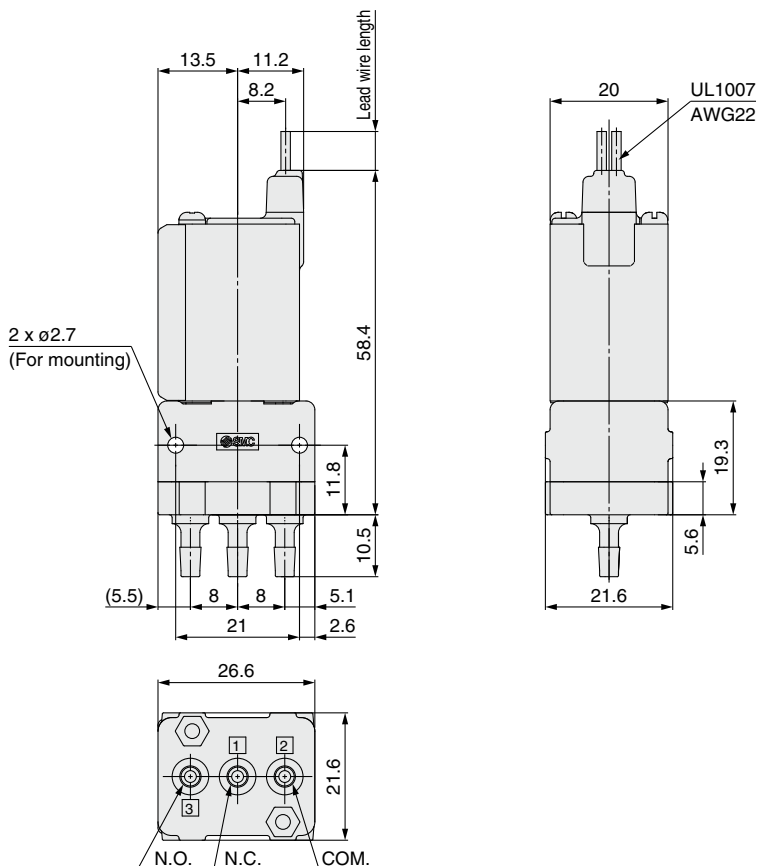
(Recommended tubing diameter:
 I.D. $\phi 2$ to $\phi 3.2$, O.D. after mounting
 $\phi 8$ or less
 *: Mounting force (holding force) varies depending on the tube material or dimensions, so please check that there is no problem with the leakage and mounting performance before use.)

Dimensions: Body Ported (Bottom Ported)

LVMK21-□□-□

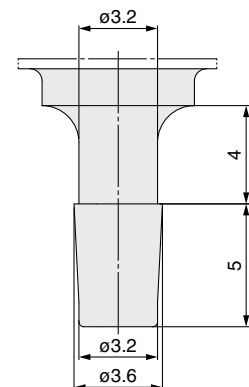


LVMK202-□□-□



Tubeing insertion dimension

- *: For LVMK21: 2 locations
- *: For LVMK202: 3 locations

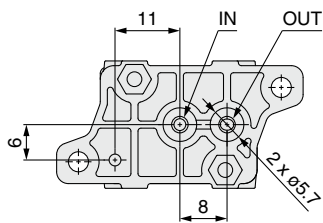
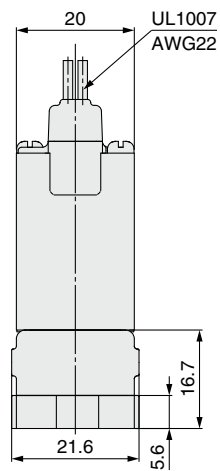
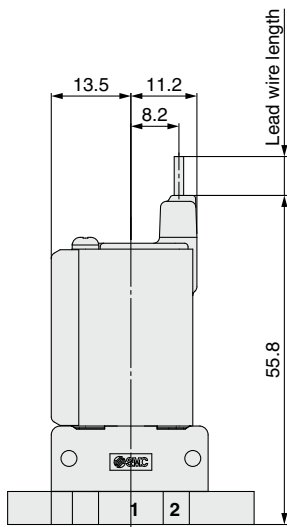
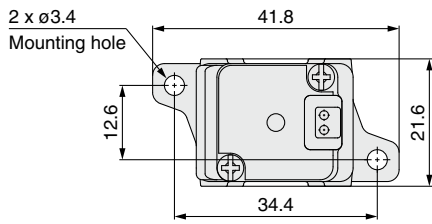


(Recommended tubing diameter:
 I.D. $\phi 2$ to $\phi 3.2$, O.D. after mounting
 $\phi 8$ or less
 *: Mounting force (holding force) varies depending on the tube material or dimensions, so please check that there is no problem with the leakage and mounting performance before use.)

LVMK20/200 Series

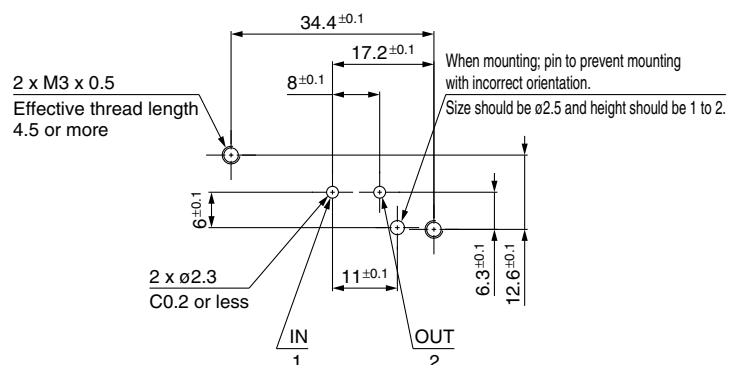
Dimensions: Base Mounted

LVMK23-□□-□



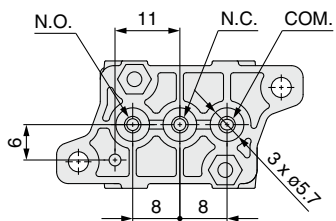
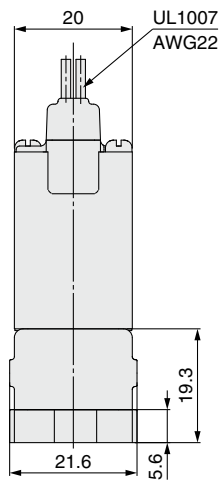
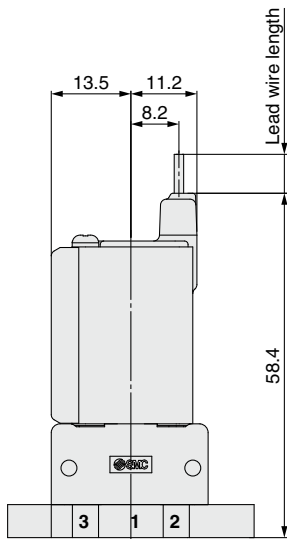
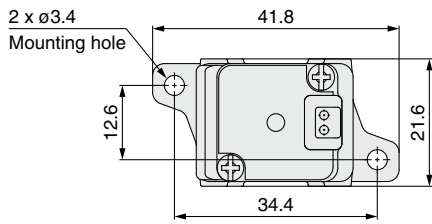
Recommended interface dimension

※: Surface roughness = Rz3.2 or less



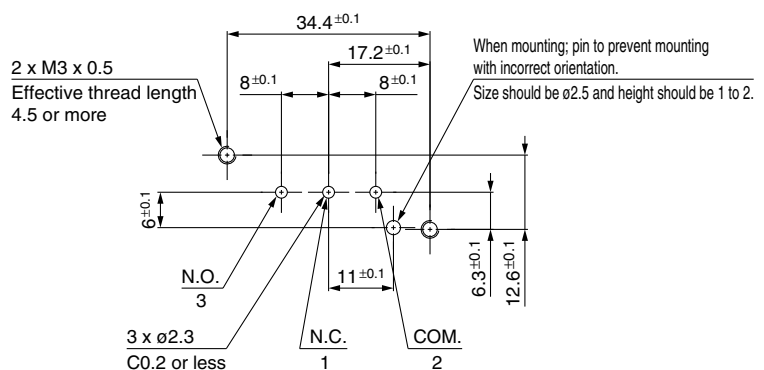
Dimensions: Base Mounted

LVMK205-□□-□



Recommended interface dimension

*: Surface roughness = Rz3.2 or less





LVMK 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 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 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 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

When a solenoid valve 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.

Period of continuous energization	30 minutes or less
Duty ratio	50% or less
Ambient temperature	25°C or less

*: Duty ratio: ON time/(ON time + OFF time)

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.

Coil generates heat when it is energized in general, so do not touch it by hand.

11. Low temperature environments

When poppet/seal material is FKM, if ambient temperature and fluid temperature is 10°C or less (guide), the response time of the solenoid valve will be longer.

Selection

Caution

Leakage voltage

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

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.

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 Mounting the Solenoid Valve

Location	Model	Thread size	Proper tightening torque [N·m]
Body ported, Side of the body (See Fig. 1 below.)	LVMK21, 27, 202, 207	M2.5	0.25 to 0.35
Body ported, Bottom of the body (See Fig. 2 below.)	LVMK27, 207	M3	0.4 to 0.6
Base mounted, Body mounting (See Fig. 3 below.)	LVMK23, 205	M3	0.4 to 0.6

Fig. 1 Thread size: M2.5

Proper tightening torque: 0.25 to 0.35 N·m
(Applicable model: LVMK21, 27, 202, 207)

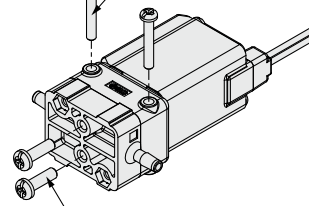


Fig. 2 Thread size: M3

Proper tightening torque: 0.4 to 0.6 N·m
(Applicable model: LVMK27, 207)

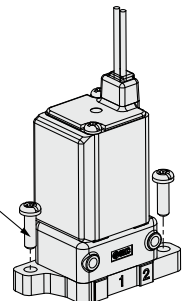


Fig. 3 Thread size: M3

Proper tightening torque: 0.4 to 0.6 N·m
(Applicable model: LVMK23, 205)



LVMK 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

2. Mount the solenoid valve on the horizontal surface.

Applicable model: LVMK21, 27, 202, 207 (Body ported)

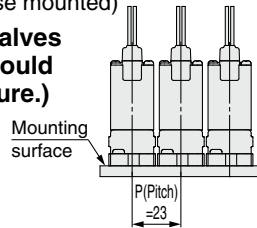
3. Remove dust from the solenoid valve mounting surface completely.

The surface roughness of the mounting surface should be Rz3.2 or less.

Applicable model: LVMK23, 205 (Base mounted)

4. When mounting the solenoid valves next to each other, P (pitch) should be 23 mm or more. (See the figure.)

Applicable model: LVMK23, 205 (Base mounted)



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 barb for a complete fit.

The tube I.D. should be 2 to 3.2 mm and O.D. after mounting should be 8 mm or less, but mounting force (holding force) varies depending on the tube material or dimensions, so please check that there is no problem with the leakage and mounting performance before use.

After connecting the tubing, care should be taken not to put excessive force (tensile force, compression, bending, etc.) on the tubing.

If 20 N or more of external force is applied to the barb, it may break the barb.

Wiring

⚠ Caution

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

2. Use voltage which is within $\pm 10\%$ of the rated voltage.

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

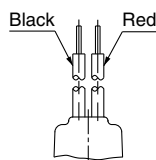
3. Apply the correct voltage.

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

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

Otherwise the coil will burn.

5. This solenoid valve has no polarity.



Lead wire color

Fluid Quality

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

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

4. Do not expose the solenoid valve to direct sunlight. (Including storage environment.)

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, please contact SMC.

Safety Instructions

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

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

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

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

*1) ISO 4414: Pneumatic fluid power – General rules relating to systems.
ISO 4413: Hydraulic fluid power – General rules relating to systems.
IEC 60204-1: Safety of machinery – Electrical equipment of machines.
(Part 1: General requirements)
ISO 10218-1: Manipulating industrial robots – Safety.
etc.

Warning

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

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

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

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

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

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

4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.
3. An application which could have negative effects on people, property, or animals requiring special safety analysis.
4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

Caution

1. The product is provided for use in manufacturing industries.

The product herein described is basically provided for peaceful use in manufacturing industries.
If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.
If anything is unclear, contact your nearest sales branch.

Limited warranty and Disclaimer/ Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”.

Read and accept them before using the product.

Limited warranty and Disclaimer

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

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

A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.
Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

Compliance Requirements

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

Caution

SMC products are not intended for use as instruments for legal metrology.

Measurement instruments that SMC manufactures or sells have not been qualified by type approval tests relevant to the metrology (measurement) laws of each country. Therefore, SMC products cannot be used for business or certification ordained by the metrology (measurement) laws of each country.

Safety Instructions

Be sure to read the “Handling Precautions for SMC Products” (M-E03-3) and “Operation Manual” before use.