

Valves

Vacuum components

Valves

Ultra-high Vacuum Type-L Polymide Valves

Ultra-high Vacuum Variable Leak Valves

Isolate Valves

Other

Vacuum Switches



Ultra-High Vacuum Type-L Polyimide Valves

Summary

These type-L valves are suitable for use in ultra-high vacuum environments, withstanding pressures as low as 10^{-8} Pa. The valve body is constructed from austenitic stainless steel, and the shaft seals utilize austenitic stainless steel bellows. The vacuum seal is made of polyimide resin, known for its high heat tolerance and low outgassing properties. These valves are ideal for ultra-high vacuum systems that require bake-out temperatures of 150°C or higher.



951-7120

951-7145

Features

1. High heat tolerance

The polyimide seal can withstand repeated bake cycles from room temperature up to 300°C , regardless of whether the valve is open or closed.

2. Seal material with low gas emission

Since polyimide resin has lower outgassing than fluororubber, it enables the system to easily achieve ultra-high vacuum levels around 10^{-8} Pa. (See Figs. 1 and 2)

3. Low tightening torque

Polyimide seals require less tightening torque compared to metal seals.

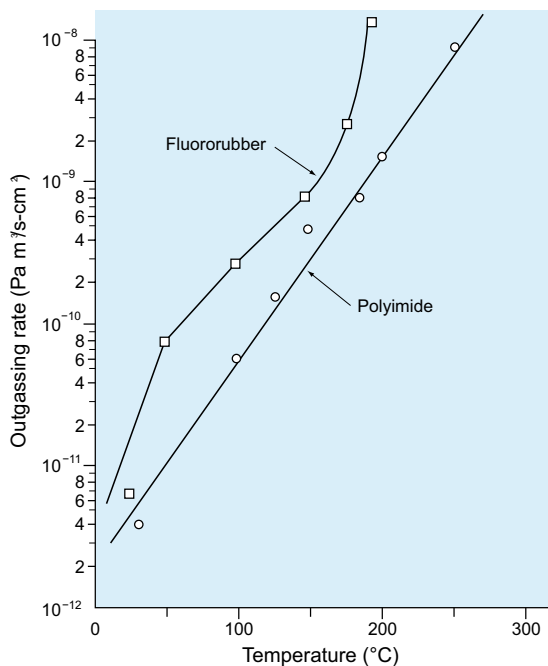


Fig. 1 Gas emissions

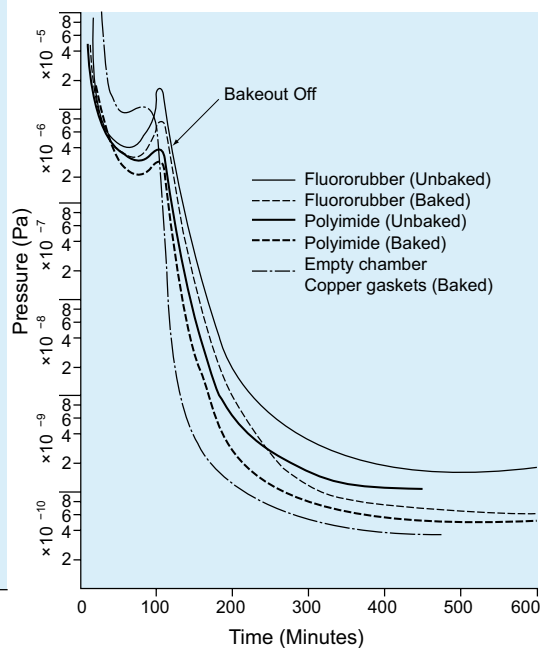


Fig. 2 Seal material comparison (ultimate pressure)

Specifications

Type	951-7145	951-7120
Operating vacuum range	Atmospheric to approx. 10^{-8} Pa	
Allowable heating temperature ^{*1,2}	300°C	300°C
Seal material (gasket)	Polyimide resin	Polyimide resin ^{**4}
Recommended sealing force (sample tightening torque ^{*5})	1225 ~ 1921 N (2 ~ 3.4 N·m)	3920 ~ 4900 N (4.9 ~ 5.9 N·m)
Maximum sealing force (sample tightening torque ^{*5})	2626 N (5.9 N·m)	7840 N (14.7 N·m)
Operation	Manual	Manual (If baked several times use adjustable pin wrench)
Conductance	1 L/s	30 L/s
Leak ^{*3}	6.7×10^{-11} Pa·m ³ /s or less	6.7×10^{-11} Pa·m ³ /s or less
Dimensions	Fig. 3	Fig. 3
Material used	Main body: SUS304 Bellows: SUS304L Handle: Al alloy (black alumite)	Main body: SUS304 Bellows: SUS304L Handle: Al alloy (black alumite)
Connection flange	φ 34 ICF flange	φ 70 ICF flange
Weight	0.41 kg	1.6 kg
Attachments	-	Adjustable pin wrench, hexagonal wrench

*1. All values are based on a valve with the inside replaced with a vacuum or inert gas such as Ar gas.

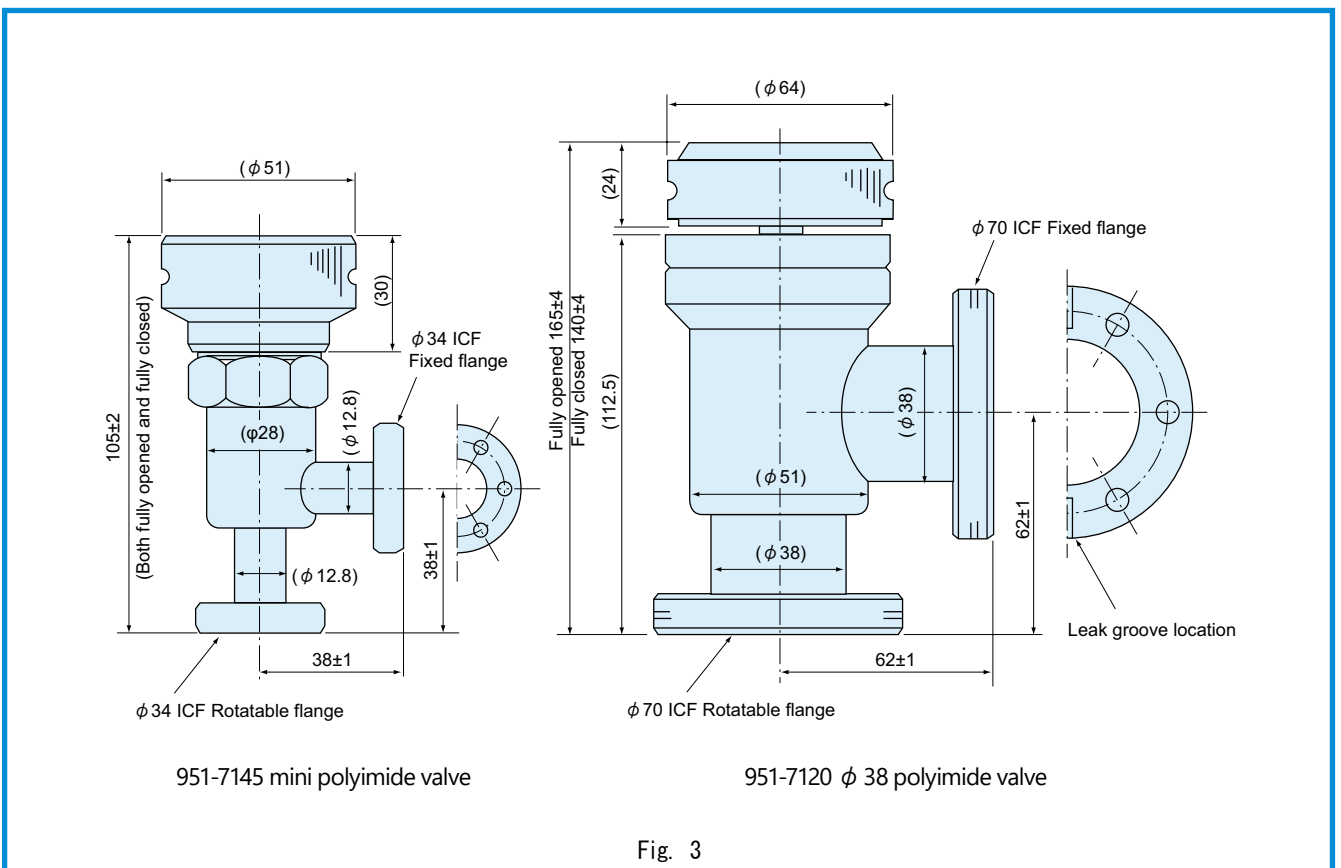
*2. 260°C if heated continuously.

*3. Gas permeation of polyimide resin is not within specifications.

*4. Please consult with us about upgrading the bonnet seal to a metal seal (SUS321 silver plated O-ring).

*5. The tightening torque is a reference value only because baking increases the friction coefficient of the driving screws and changes the balance between the tightening torque and tightening seal force.

Dimensions diagram



Maintenance and consumable parts

	951-7145 mini polyimide valve	951-7120 ϕ 38 polyimide valve
Main seal (valve seat)	951-7145 gasket	951-7120 gasket
Bonnet seal	951-7145 bellows gasket	951-7120 bellows gasket

Usage notes

1. Avoid damaging the seal surface with foreign particles such as metal dust because polyimide resin is used for the valve vacuum seal.
2. Solid lubricant is applied to the valve open/close screws to prevent "galling" at high temperature.

Ordering information

Parts Number	Model	Description	Remarks	Code
8B1-0020-075	951-7145	Mini Polyimide Valve	With ϕ 34 ICF	30200
8B1-0020-074	951-7120	ϕ 38 Polyimide Valve	With ϕ 70 ICF	30210
8A1-0341-783	951-7145	Bellows Gasket (Polyimide)	For 951-7145 bonnet seal	30806
8A1-0341-786	951-7145	Gasket (Polyimide)	For 951-7145 valve seat seal	30807
8A1-0341-746	951-7120	Gasket (Polyimide)	For 951-7120 valve seat seal	30809
8A1-0341-745	951-7120	Bellows Gasket (Polyimide)	For 951-7120 bonnet seal	30810

Memorandum

Ultra-High Vacuum Variable Leak Valves



951-7172

Summary

This variable leak valve is designed for vacuum systems that require precise control of gas introduction.

By adjusting the gap between the piston equipped with a precision-polished WC (tungsten carbide) seal and the fixed copper alloy gasket, gas can be introduced at extremely low flow rates. Fine adjustments allow for a minimum leak rate of $6.7 \times 10^{-9} \text{ Pa} \cdot \text{m}^3/\text{s}$ or less from a fully sealed state.

Additionally, the valve is constructed entirely from metal and can withstand bake-out temperatures up to 450°C , making it ideal for ultra-high vacuum applications.

Features

1. Seal with high resistance to heat and external shock

The sealing mechanism uses WC-type cemented carbide in combination with a copper alloy. Unlike seals made with sapphire and copper alloy, this configuration prevents cracking caused by thermal or mechanical vibrations.

2. Stable control of minute gas flow

Extremely small amounts of gas can be introduced with high precision. The minimum controllable leak rate is less than $6.7 \times 10^{-9} \text{ Pa} \cdot \text{m}^3/\text{s}$ when introducing helium gas, with a primary-side gauge pressure of 0.2 MPa.

3. High heat tolerance

Constructed entirely from metal, the valve can withstand bake-out temperatures of up to 450°C .

4. Wide gas flow control range.

The gas flow can be precisely controlled across a wide range.

5. Connectable to ultra-high pressure

Each component material has been carefully selected to ensure compatibility with ultra-high vacuum systems.

Applications

- Vacuum systems requiring precise control of gas flow
- Gas analysis equipment
- Research instrumentation

Specifications

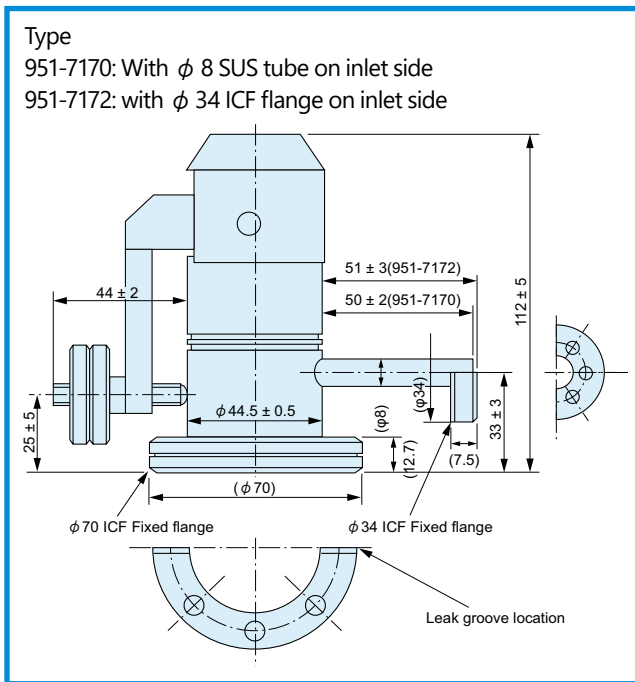
Operating vacuum range		Atmospheric to approx. 10^{-8} Pa
Minimum adjustment for gas introduction *1		$6.7 \times 10^{-9} \text{ Pa} \cdot \text{m}^3/\text{s}$ or less
Leak when valve is closed		$6.7 \times 10^{-11} \text{ Pa} \cdot \text{m}^3/\text{s}$ or less
Allowable heating temperature*2		450°C (open or closed)
Gasket life*3		Approx. 300 seals (at room temperature) Approx. 30 seals (with baking) (Gasket replaceable)
Component material		Main body: SUS304 Seal: WC type cemented carbide Gasket: Cu alloy
Connection flange	Gas outlet side	$\phi 70$ ICF fixed flange
	Gas inlet side	$\phi 8 \times \phi 6$ SUS304 tube (951-7170) $\phi 34$ ICF with fixed flange (951-7172)
Weight		1.3 kg

* 1. Value measured by a He leak detector at the $\phi 70$ ICF side with He gas at a pressure of 0.2 MPa connected to the gas inlet side.

* 2. Gas inlet side and $\phi 70$ ICF side replaced with a vacuum or inert gas such as Ar gas.

* 3. The life of the gasket varies depending on the usage, so it is reference only but non-guaranteed value.

■ Dimensions diagram



■ Usage notes

1. Precautions for Baking the Variable Leak Valve

- Depending on the baking temperature and duration, it may be necessary to reapply lubricant to the moving parts on the atmosphere side of the valve.

If lubricant is not reapplied as needed, its effectiveness may deteriorate, potentially resulting in galling or damage due to metal-to-metal contact. Please note that lubricants are not included and must be ordered separately.

- Do not perform baking with atmosphere or reactive gases present inside the valve, including the gas inlet side. Doing so may cause oxidation of the seal, resulting in irreversible damage.

Ensure that the gas inlet side and the ϕ 70 ICF flange are purged and filled with vacuum or an inert gas such as argon (Ar) before baking.

■ Maintenance and consumable parts

Replace the following maintenance/consumable parts at the end of their product life.

Type	Name	Quantity per unit
951-9160	Gasket	1
951-9160	Ring	1
951-9160	Spring washer	5

- Ensure that no foreign particles, such as metal dust, are present inside the valve.
 If there is a risk of contamination from the gas introduced from the primary side, a filter should be installed in the piping to prevent particle ingress.
- Be aware of the thermal effects on the valve.
 These effects become more pronounced when introducing a small gas flow, as the flow rate can fluctuate with temperature changes.
 To ensure precise control of the gas flow, maintain the valve at a constant temperature.
- This variable leak valve is not suitable for use with corrosive gases.

■ Ordering information

Parts Number	Model	Description	Remarks	Code
8B1-0020-076	951-7170	Variable Leak Valve	With ϕ 70ICF, inlet side ϕ 8 SUS tube	31000
8B1-0020-077	951-7172	Variable Leak Valve	With ϕ 70ICF, inlet side ϕ 34 ICF tube	31001

Functions as both a shut-off valve and a vent valve.!

Isolate Valves

V-025SV



Summary

The V-025SV isolate valve is primarily used by connecting it to the intake port of an oil rotary vacuum pump. This automatic valve integrates both shut-off and venting functions, and helps prevent backflow of pump oil in the event of a power outage or operational error.

Features

1. Prevent backflow of pump oil.

When the oil-sealed rotary vacuum pump is stopped, the valve automatically isolates the pump from the anti-suckback system by vacuum-sealing it, and then vents the pump to the atmosphere. This prevents oil from flowing back from the pump into the anti-suckback system.

2. No compressed air or air piping required

The valve uses the vacuum generated by the oil-sealed rotary vacuum pump as its driving source. Unlike conventional automatic valves, it does not require compressed air or any associated air piping. (Note: The valve will not open if the pump is not operating.)

3. No special control circuit required

The valve operates by interlocking the power supply of the solenoid valve with the motor of the oil-sealed rotary vacuum pump. Therefore, no dedicated control circuit is necessary.

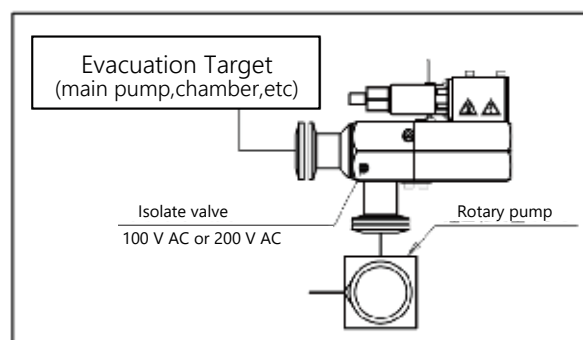
- Please install a fuse or other protective device in the electrical circuit to ensure safety.
- Operate the valve within the specified voltage range ($\pm 10\%$ of the rated voltage).
- Use a connector that is compatible with the rated voltage for wiring the valve.

Pumping system configuration example

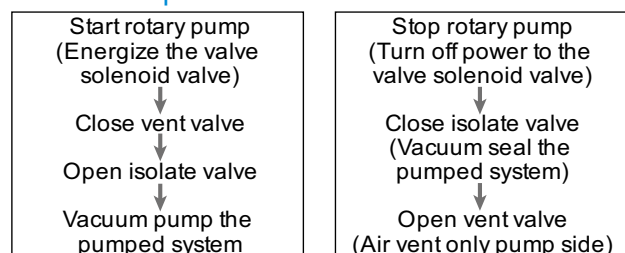
Since the valve has a fixed flow direction, please ensure that the oil rotary vacuum pump and the exhaust system are connected correctly, referring to the exhaust system configuration diagram below.

If the valve is installed in the wrong orientation, it will not function.

Additionally, if the valve is not properly evacuated, it will not open even when the solenoid valve is energized.



Flow of operation



Note 1: The isolate valve incorporates both a shut-off valve and a vent valve.

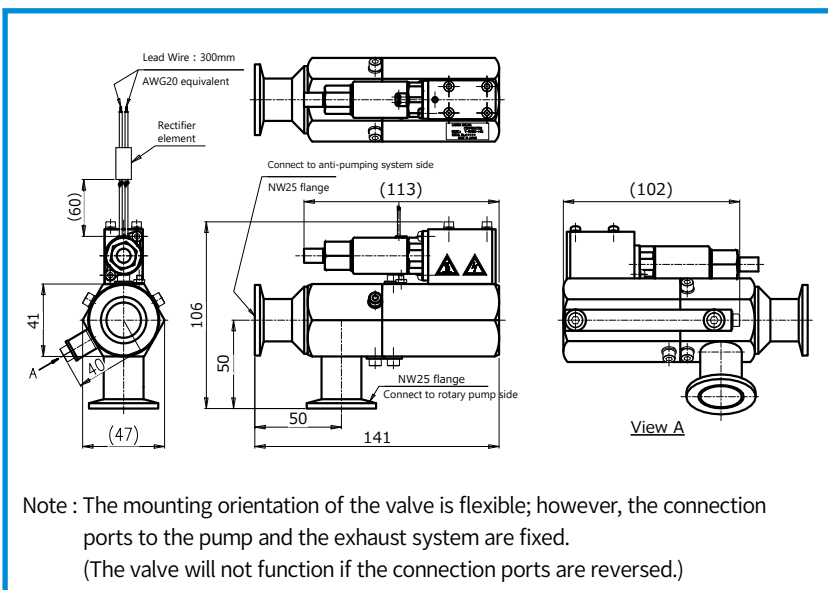
Note 2: The isolate valve operates using the vacuum generated by an oil-sealed rotary vacuum pump.

Applying power to the solenoid valve alone will not open the valve.

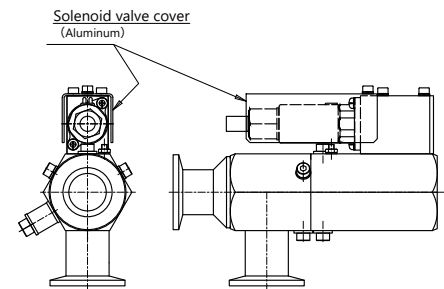
Specifications

Type	V-025SV-1AC	V-025SV-2AC	
Pressure range	Atmospheric to approx. 10^{-2} Pa		
Leak	$< 5 \times 10^{-7}$ Pa·m ³ /s		
Conductance	420 L/min		
Maintenance interval	30,000 cycles or 1 year		
Main component material	Fluororubber O-ring: Nitril rubber: SUS304: Al alloy: Shaft seal lubricant:	Main seal, bonnet seal, shaft seal Piston and screw seal Valve body, spring Base,Piston,air pipe Silicon grease	
Connection flange	NW25 flange		
Fluid used	Atmosphere or gas (excluding corrosive gas)		
Usage environment	Ambient temperature 10°C to 40°C		
Solenoid	Rated voltage (V)	AC100 V \pm 10% (50/60 Hz)	AC200 V \pm 10% (50/60 Hz)
	Starting current (A)	0.03 A	0.015 A
	Holding current (A)	0.03 A	0.015 A
	Power consumption	3 W	
Coil insulation	Type B		
Dimensions	See ■ Dimensions diagram.		
Weight	1 kg		

Dimensions diagram



Option



The solenoid valve may become hot due to continuous energization.
If the ambient temperature exceeds 30 °C, or if deemed necessary, install a protective cover (optional accessory).

Ordering information

Parts Number	Model	Description	Remark	Code
8B1-0020-607	V-025SV-1AC	V-025SV-1AC Isolate Valve	With NW25 flange, 100V AC	31095
8B1-0020-608	V-025SV-2AC	V-025SV-2AC Isolate Valve	With NW25 flange, 200V AC	31096
8B1-0022-410		Isolate valve solenoid valve cover	Option (Separate arrangement required)	31098

Vacuum Switches

Summary

These vacuum switches, equipped with a single-pole double-throw (SPDT) contact, allow simultaneous output of ON and OFF control signals at either the maximum or minimum operating pressure, while maintaining minimal variation in switching pressure. In addition, the entire vacuum-side structure is made of SUS304 stainless steel, and the welded air-tight seal enables connection to high vacuum environments. These features make the switches suitable for use as protective devices in automated vacuum systems and as components in safety circuits.



Features

1. Dual signal output with SPDT contact

Equipped with a single-pole double-throw (SPDT) contact, the switch can simultaneously output ON and OFF control signals at either the maximum or minimum operating pressure.

2. High vacuum compatibility

The entire vacuum-side structure is made of US304 stainless steel, and the welded air-tight seal enables reliable connection to high vacuum environments.

3. Long service life with stable performance

Designed for durability, the switch offers a long service life of over 10,000 cycles, while maintaining minimal variation in switching pressure.

4. Easy installation

The V-070VS-T vacuum switch is designed to be inserted into a $\phi 15$ gauge adapter, allowing for easy installation and removal.

Applications

Suitable for protecting automated vacuum equipment and for use as a switch in safety circuits. Enables retrieval of control signals in various vacuum systems.

Specifications

Type	V-070VS-I	V-015VS-T
Operating pressure (At black - yellow lead wire)	OFF: Atmospheric pressure \sim Atmospheric pressure -5.4 kPa (Atmospheric pressure -2.7 kPa \pm 2.7 kPa) ON: Atmospheric pressure -7.0 kPa \sim Atmospheric pressure -18.7 kPa	
Operating degree of vacuum	Approx. 10^{-7} Pa	
Leak	1.33×10^{-11} Pa \cdot m ³ /s or less	
Fluid	Air, Gas (excluding corrosive gases affecting SUS304)	
Allowable heating temperature	40°C	
Operating environment temperature	-10°C \sim +40°C	
Material	Vacuum side all SUS304	
Life	10,000 times or more	
Connection flange	$\phi 70$ ICF flange	$\phi 15$ gauge port
Electrical rating	Rated voltage — Resistive load AC250 V — 15 A DC125 V — 0.6 A DC250 V — 0.3 A	<ul style="list-style-type: none"> Ambient temperature : $20 \pm 2^\circ\text{C}$ Ambient humidity : $65 \pm 5\%$ RH Operation frequency : 30 times/min
Weight	500 g	260 g

Note: This vacuum switch is designed specifically for use in vacuum systems. If it is subjected to internal pressurization, it may malfunction, such as deviating from its specified operating pressure.

In particular, for the V-015VS-T vacuum switch, internal pressurization is extremely hazardous, as it may cause the unit to be ejected from the $\phi 15$ adapter. Therefore, please implement appropriate safety measures, such as installing a protective cover, to prevent potential ejection and ensure safe operation.

■ Dimensions diagram

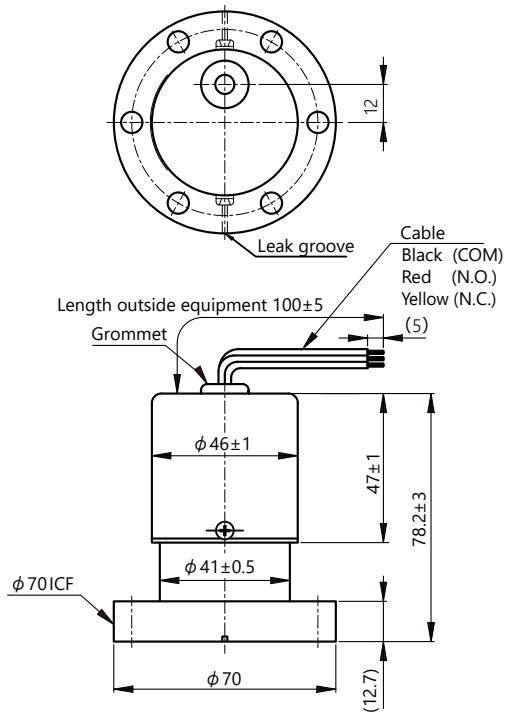


Fig. 1 V-070VS-I dimensions

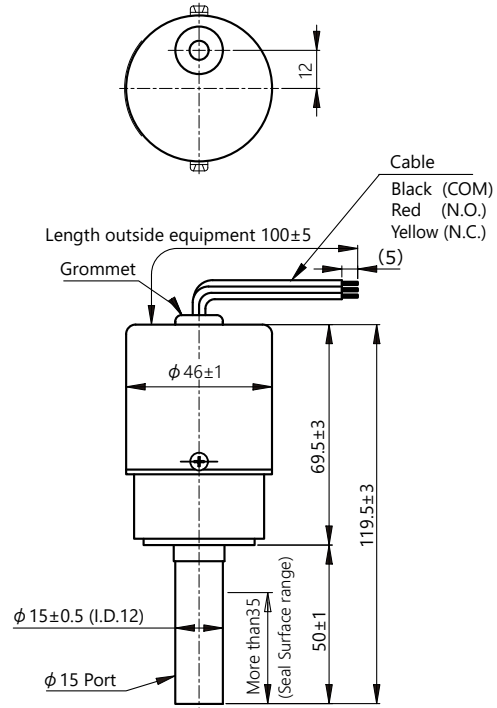
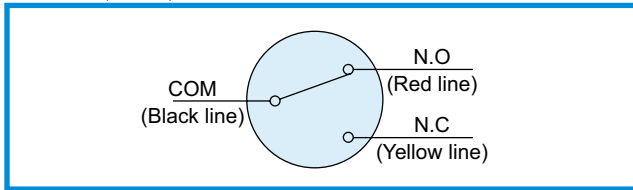


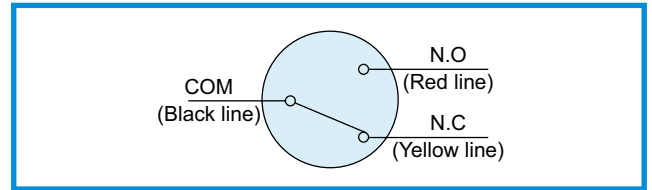
Fig. 2 V-070VS-T dimensions

● Contact structure

Atmospheric pressure minus 5.4 kPa or more
(Atmospheric pressure state)

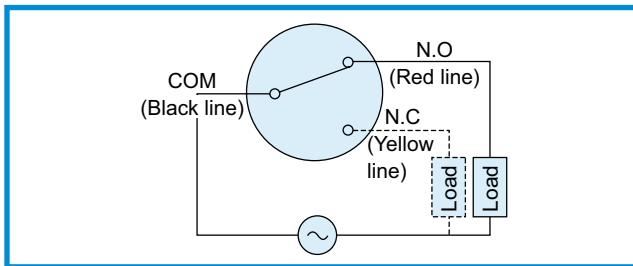


Atmospheric pressure minus 7.0 kPa or less (Vacuum state)

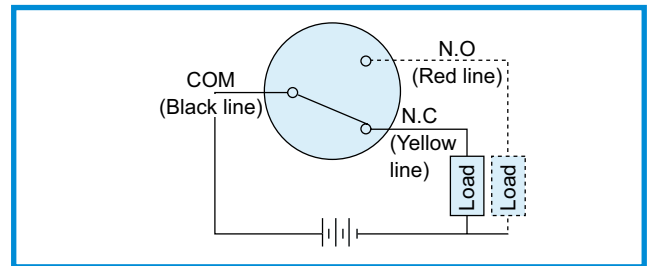


● Wiring method

If AC



If DC



● Usage notes

Be sure to read the included "Usage notes" before using.

■ Ordering information

Parts Number	Model	Description	Remarks	Code
8B1-0018-241	V-070VS-I	Vacuum Switch	With ϕ 70ICF	29210
8B1-0018-242	V-070VS-T	Vacuum Switch	For ϕ 15 gauge port	29211

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