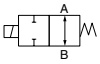
Delay vacuum solenoid valve

# HVL12/42 Series

● OFF delay function solenoid valve

## JIS symbol




## Specifications

| Item | | | HVL12 | HVL42 |
|---|---|---|---|---|
| Working fluid | | | Air, nitrogen (Note 1) | |
| Working pressure range | Pa (abs) | | $1.3 \times 10^{-6}$ to $2.0 \times 10^{5}$ | |
| Max. working differential pressure | MPa | | 0.2 | |
| Valve seat leakage | Pa·m³/s (He) | | $1.3 \times 10^{-9}$ or less | |
| External leakage | Pa·m³/s (He) | | $1.3 \times 10^{-9}$ or less | |
| Withstanding pressure | MPa | | 0.5 | |
| Fluid temperature | ˚C | | 5 to 50 | |
| Ambient temperature | ˚C | | 0 to 50 | |
| Orifice | mm | | 1.2 | 3.0 |
| Mounting attitude | | | Free | |
| Weight | kg | AC | 0.5 | 1.5 |
| (Note 2) | | DC | 0.2 | 0.9 |
| Frequency | | | 0.5 cycle/min. or less | |
| Port size | | | Rc1/8, 1/4" double barbed joint, NW10.16 vacuum clamp joint | |
| Cv flow factor | | | 0.05 | 0.3 |
| Delay time | | | AC: 0 to 8 sec, DC: 0 to 10 sec | AC/DC: 0 to 10 sec |
| Rated voltage | | | 24 VDC, 100 VAC, 200 VAC (HVL42: common for 100/200 VAC power, use according to connection method) | |
| Allowable voltage fluctuation | | | Rated voltage ±10% | |
| Power consumption | W | | 4 | 11 |

Note 1: The durability may drop considerably depending on the degree of dryness.
Note 2: The weights listed are for port connection size Rc1/8.
Note 3: Do not handle by holding just the lead wires.
Note 4: Always use the M4 screws on the bottom of the case when mounting HVL12.
Note 5: Do not fix only at the port piping of the valve.
Use in a place which is not affected by vibration.

## How to order

HVL 1 2 - 4S 6 - 5 - AC100V

Model no. | Ⓐ Size variation | Ⓑ Port A connection Note 1 | Ⓒ Port B connection Note 1 | Ⓓ Voltage

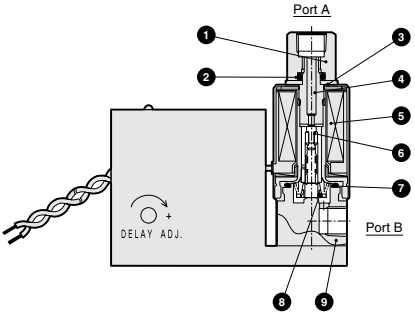
| Symbol | Descriptions | Model no. HVL12 | Model no. HVL42 |
|---|---|---|---|
| **Ⓐ Size variation** | | | |
| 1 | Orifice 1.2 | ● | |
| 4 | Orifice 3.0 | | ● |
| **Ⓑ Port A connection Note 1** | | | |
| 6 | Rc1/8 | ● | ● |
| 4S | 1/4" double barbed joint | ● | ● |
| 10K | NW10 vacuum clamp joint | ● | ● |
| 16K | NW16 vacuum clamp joint | ● | ● |
| **Ⓒ Port B connection Note 1** | | | |
| 6 | Rc1/8 | ● | ● |
| 4S | 1/4" double barbed joint | | ● |
| 10K | NW10 vacuum clamp joint | | ● |
| 16K | NW16 vacuum clamp joint | | ● |
| **Ⓓ Voltage** | | | |
| DC24V | 24 VDC | ● | ● |
| AC100V | 100 VAC | ● | |
| AC200V | 200 VAC | ● | |
| AC100V /VC200V | 100 VAC/200 VAC For both powers Note 2 | | ● |

### ⚠Note on model no. selection

Note 1: If the symbols selected for port A and port B are the same, indicate only one.
Example: When both port A and port B are Rc1/8
HVL12-6-5-voltage (correct)
HVL12-66-5-voltage (wrong)
Note 2: These can be used according to the connection method.

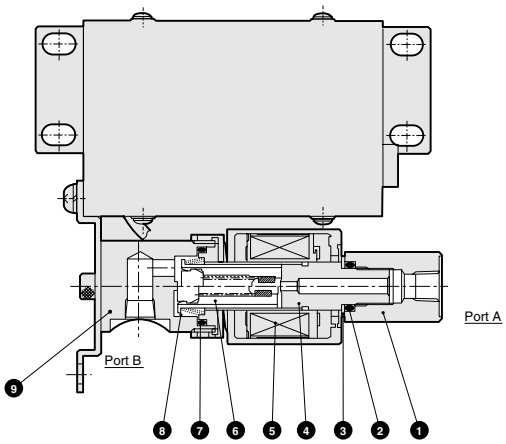
## Internal structure and parts list

● HVL12-6-5




| No. | Parts name | Material |
|---|---|---|
| 1 | Socket | SUS303 |
| 2 | O ring | FKM |
| 3 | Washer | SUS304 |
| 4 | Core assembly | SUS316L, SUS405 |
| 5 | Coil assembly | PBT |
| 6 | Plunger assembly | SUS405, FKM, PTFE |
| 7 | O ring | FKM |
| 8 | Spring | SUS304 |
| 9 | Body | SUS303 |

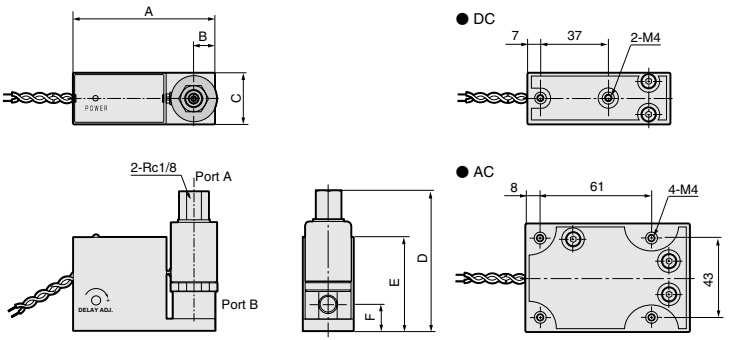
● HVL42-6-5




| No. | Parts name | Material |
|---|---|---|
| 1 | Socket | SUS303 |
| 2 | O ring | FKM |
| 3 | Washer | SUS301-CSP |
| 4 | Core assembly | SUS403, SUS316L, SUS405 |
| 5 | Coil assembly | Class B nylon mold |
| 6 | Plunger assembly | SUS405, FKM, PTFE |
| 7 | O ring | FKM |
| 8 | Spring | SUS304 |
| 9 | Body | SUS303 |

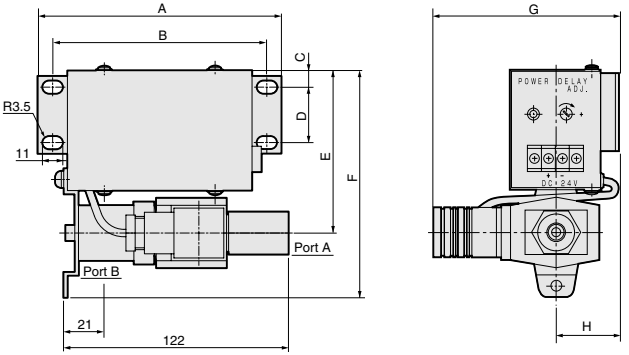
## Dimensions

● HVL12-6-5




| Model no. \ Symbol | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| HVL12-DC24V | 78 | 11.5 | 28 | 76 | 51 | 14.5 |
| HVL12-AC100, 200V | 90 | 11.5 | 59 | 76 | 62 | 14.5 |

● HVL42-6-5

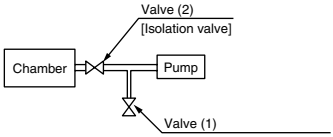



| Model no. \ Symbol | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| HVL42-DC24V | 132 | 116 | 8 | 30 | 88 | 123 | 102 | 35 |
| HVL42-AC100, 200V | 152 | 136 | 20 | 30 | 103 | 138 | 105 | 37 |

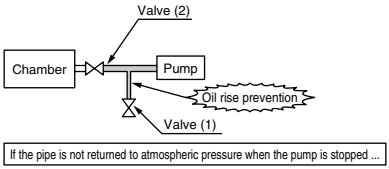
## Main applications

Purpose of using a delay vacuum solenoid valve (HVL Series)

### Preventing oil rising during power failure




<Fig. 1>

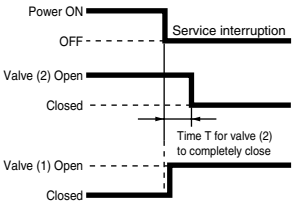



<Fig. 2>

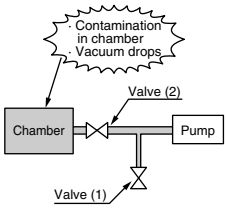
Normally after the machine has stopped, the pipe between the chamber and pump is released to atmospheric pressure with valve (1) to prevent the oil from rising (from entering the pipes). However, to protect the chamber (to maintain vacuum and prevent contamination), it is necessary to release the pipe to atmospheric pressure after valve (2) has completely closed.

If valve (1) is opened before valve (2) has completely closed ...

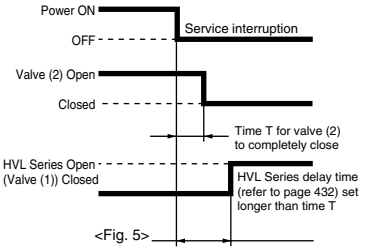
Prevent oil rising and protect the chamber by using HVL Series!!




<Fig. 3>




<Fig. 4>




<Fig. 5>

# HVB/HVL

## Solenoid valve for high vacuum

■ For vacuum, inert gas, air, nitrogen

### Overview

Advanced technology, such as stability in the leak amount (vacuum holding force) and increased seal life, is required when the degree of vacuum increases.

The HVB Series introduces special technology throughout for the valve seat shape, seal material and surface processing, etc. A stable performance is realized even at a high vacuum. Use this for various vacuum devices, including electronic beams, molecular accelerators and vacuum deposition.

The HVL Series is the conventional high vacuum solenoid valve to which a device is added to provide a several-second delay when opening the valve. This prevents various troubles in vacuum devices during power failures.

Use this to prevent release to atmospheric pressure at a power failure, or to prevent oil from entering the piping if the manual valve is not properly opened after the power stops.

### Features

**Special packing seal adopted**
FKM with outstanding seal life.

**High corrosion proof**
Stainless steel is adopted for body.

**High vacuum holding force**
The low leakage provides a stable vacuum holding force.

**Back pressure usable (reverse vacuum)**
* Excluding some models

**Easy maintenance**
Simple structure facilitates maintenance.

### CONTENTS



⚠ Always read the precautions in the Introduction and page 414 before starting use.

# Safety precautions
**Always read this section before starting use.**

## Solenoid valve for high vacuum (HVB/HVL)

### Design & Selection

## ⚠ CAUTION

**1** Working fluid

· The high vacuum device is designed for controlling fluids (inert gas, air, vacuum). If other fluids (active gas, fluids, solids, etc.) are passed, the product will not operate correctly, or its performance could drop markedly.

### Installation & Adjustment

## ⚠ WARNING

**1** Installation

· Incorrect mounting and piping will result in product trouble, may cause trouble in the user's system, and may result in death or serious injury. The user is responsible for making sure that the operator has read the instruction manual and fully comprehends the system.

After mounting, carry out an appropriate function test to confirm that the product is correctly mounted.

## ⚠ CAUTION

**1** Direction when connecting pipes (some models)

· The vacuum valve is basically designed so that all connection ports can be connected to the vacuum pump. However, with some models (see below), the connection port to the vacuum pump is limited.

<Table 1> Vacuum pumps with limited connection ports

| Model | Vacuum pump connection port |
|---|---|
| HVB612-12F-12B | Port A |
| HVB712-15F-15B | Port A |

When using the models shown above and using a port other than the designated port when connecting to the vacuum pump, trouble such as a seal fault or operation fault could result.

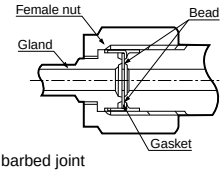
**2** Tightening the joint

· Make sure that there is no dirt, scratches or burrs on the seal section before tightening the joint with the following procedures.

(1) Joint tightening method

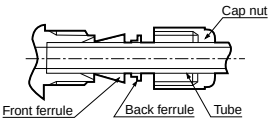
● JXR joint (when gasket material is nickel/SUS316)

Using fingers, tighten the nut until the gasket contacts the bead surface, and then tighten another 1/8 turn with a tool. (Consult with CKD for all other materials.)




● Double barbed joint

Confirm that the front ferrule, back ferrule and nut are properly attached, and then insert the tube until it contacts the back of the body. Tighten the nut as far as possible with fingers, and then tighten 1 1/4 turn with a tool.




(2) After tightening the joint, always carry out a leak test, and confirm that there are no leaks.

**3** High temperature caution during solenoid valve coil energizing

· The coil section of the solenoid valve (HVB/HVL) will heat up when energized. Especially, the class H specification coil (some of the HVB coils) will become very hot when energized. There is a risk of burns if these coils are touched directly.

**4** Cautions for wiring solenoid valve

(1) As a guide, use a wire with a nominal cross section of 0.5 $mm^2$ or more. Make sure that excessive force is not applied on the lead wire.

(2) Always use within the allowable voltage range. Use exceeding the allowable voltage range could result in operation faults or coil damage.

(3) Provide a breaker, such as a fuse, on the control circuit side to protect the electric equipment.

(4) Use of a switching circuit which does not generate contact chattering will increase the solenoid valve's durability.

(5) If the electric circuit system is susceptible to solenoid surging, provide measures such as inserting a surge absorber in parallel to the solenoid.

## When Using

### ⚠ CAUTION

**1** Electric shock risk: Solenoid valve electrical wiring connections (bare live parts)

· There is a risk of electric shock by touching the electrical wiring connections (bare live parts) of the solenoid valve (HVB/HVL).

Always disconnect the power supply before disassembly and inspection.

Never touch the live parts with wet hands.