



Safety Precautions

Be sure to read this section before use.

Product-specific cautions: Diaphragm cylinder valve LAD Series

Design/selection

1. Checking the specifications

WARNING

■ Incorrect equipment selection and handling can cause problems not only in this product, but also to your system. For equipment selection and handling, it is the customer's responsibility to check the specifications of this product and the compatibility with your system before use.

■ Working fluids

For information on the compatibility of product materials, working fluids, and ambient atmospheres, refer to the compatibility checklist on page 572 as a basic reference. For fluids not listed in the checklist or new fluids (including different concentration levels), contact and inquire with CKD beforehand.

■ Back pressure

Always use the product within the specified back pressure range in the specifications. Make sure that the back pressure does not exceed the allowable range due to water head pressure caused by raised piping or led in from another line.

■ Ambient environment

- (1) Do not allow fluid to come into contact with the product body.
- (2) Do not use this product outdoors or in a place where it can be subjected to vibration or impact, or near a heat source.
- (3) Avoid using this product in a place where it can be exposed to direct sunlight or UV light.

2. Design

WARNING

■ When using a working fluid that may be hazardous to the human body, isolate the valve so that no one can approach it.

■ Liquid ring

When the valve opens and closes, the diaphragm moves up and down, which accordingly causes the flow path capacity to change inside the valve. For this reason, if the fluid is an incompressible fluid (liquid), extreme pressures will be created in the valve when operating under conditions that seal the fluid in the valve (liquid ring). In this case, install a release valve on the primary or secondary side of the valve, preventing a liquid ring circuit from forming.

■ With the Rc screw, the screw-in part may leak due to thermal cycling. When using the product under these conditions, select the fitting integrated from the "AMD" Series of air operated valves for chemical liquids.

CAUTION

■ Because the connection is by screws, particles are generated during installation. Operation may generate particles during use, especially with the EPDM diaphragm. Check the compatibility for the application.

Mounting, installation and adjustment

1. Installation

WARNING

■ Incorrect mounting or 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, fluid characteristics, compatibility between the fluid and related products, and other safety-related information.

2. Piping

WARNING

■ Use resin fittings or piping material that conforms to JIS B 0203 pipe taper screw for ports A and B on the body. (when the body material is PPS)

- An arrow is marked on the side of the body. Ensure that the piping is performed so that the flow of the fluid is consistent with the direction of the arrow.
- For NC and NO, ports that are not pressurized with operating pressure should be open to the atmosphere. If direct intake and exhaust from the valve should be avoided due to reasons such as ambient atmospheric conditions or airborne dirt, remove the set screw and install piping in order to allow intake and exhaust elsewhere as preferable.
- Use the driving solenoid valve connected to the drive unit according to the specifications or applications.
- When installing piping, avoid any application of stress on the valve body, such as bending, tension, or compression. Also, make sure that the pipes' support position and method do not produce piping load on the valve.
- Fix the equipment to the body or mounting plate in addition to using fittings as support when installing a valve.

Piping

The piping tightening torque for ports A and B of the body should be as shown in the table below. Make sure to fix the body before installing the piping so that no load, including bending, tension, or compression, is applied to the actuator assembly. Excessive tightening can result in damage to the product.

Port size	Recommended tightening torque (N·m)	
	Body material is resin	Body material is metal
10A	1.0 to 1.5	22 to 24
15A	2.0 to 2.5	28 to 30
20A	2.5 to 3.0	31 to 33
25A	3.0 to 4.0	36 to 38

- When piping the LAD Series, check the supply port on the pilot operation side.

Model No.	Pilot operation side supply port
LAD1	Y
LAD2	X
LAD3	X and Y

Mounting

Refer to the following table for the tightening torque to use when using the set screws on the bottom of the resin body for installation.

Excessive tightening can result in damage to the product.

Port size	Thread size	Recommended tightening torque (N·m)
10A	M5	0.8 to 1.0
15A	M6	1.3 to 1.5
20A	M6	1.3 to 1.5
25A	M6	1.3 to 1.5

Use/maintenance

1. Before use

CAUTION

- For information on the compatibility of product materials, working fluids, and ambient atmospheres, refer to the compatibility checklist on page 572 as a basic reference. For fluids not listed in the checklist or new fluids (including different concentration levels), contact and inquire with CKD beforehand.
 - If the fluid is highly absorbable, such as liquid containing a surfactant, the fluid may permeate through the parts. Conduct periodic inspections, and if there is any abnormality, take necessary measures such as replacing the parts.
- When using gases such as N₂ gas or air, valve seat leakage up to 1 cm³/min (at pneumatic pressure) may occur. (When the diaphragm material is PTFE)
- Rapid changes in fluid temperature may cause the valve seat to warp unevenly, leading to valve seat leakage. (When the body material is PPS)
- Do not overly tighten the flow rate adjustment knob.
- If the diaphragm material is EPDM and the operation category is NO, using such a valve in closed condition over an extensive period of time may cause a delay in return or return failure due to the rubber getting stuck. In this case, remove the Y port set screw, and apply operating pressure to return the valve.

- Turbulent flow occurs on the secondary side of the valve.

When installing a device that requires laminar flow, e.g. a flow rate meter, on the secondary side of the valve, make sure to keep enough distance between the valve and the device so that the device is not affected by turbulent flow.

- Never attempt to disassemble the product. It is very dangerous, as some products include high-load springs.
- Do not allow fluid to come into contact with the product body.
- When using a model with flow rate adjustment, make sure to turn the adjusting dial at least the specified number of times from the closed state to ensure appropriate setting. If used below this level, vibration or flow rate fluctuation may occur depending on the working conditions. Changes in fluid temperature may also affect flow rate depending on the working conditions.
- Water hammer and vibration may occur in certain fluid pressure conditions. In most cases, this can be resolved by adjusting the open-close speed using a speed controller, etc. If a problem persists, review and revise the fluid pressure and piping conditions.

EXA
FWD
HNB/G
USB/G
FAB/G
FGB/G
FVB
FWB/G
FHB
FLB
AB
AG
AP/AD
APK/ADK
DryAir
EX-XPLNprf
XPLNprf
HVB/HVL
S [◇] B/NAB
LAD/NAD
Water-Rela
NP/NAP/NVP
SNP
CHB/G
MXB/G
Other valves
SWD/MWD
DustColl
CVE/CVSE
CCH/CPE/D
LifeSci
Gas-Combust
Auto-Water
Outdoor
SpecFld
Custom
Ending

2. Maintenance and inspection

DANGER

- When replacing the valve, thoroughly replace the remaining fluid with pure water or air so that it does not affect the surrounding devices and humans. While the upper side of the diaphragm (cylinder side) does not come into contact with the fluid, it may be exposed to fluid atmosphere due to gas permeation from the thin film part. For your safety, follow the precautions below:
 - (1) A small amount of permeating gas is released from the breathing hole located on the side of the cylinder by valve operation.
 - (2) When touching the valve, read the material safety data sheet (SDS) for the working fluid and wear the necessary protective gear.
- Valves used with chemical liquids may have chemical atmosphere remaining between the actuator and the diaphragm. Never attempt to disassemble the product. If disassembly is necessary, contact CKD or a dealership.

- Perform the following periodic inspection once or twice a year to ensure that the valve is achieving optimal functionality.
 - (1) Inspection for leakage to the valve exterior
 - (2) Inspection for leakage from port thread part
 - (3) Inspection for loosening in operating air piping and fallen tubes

WARNING

- Always drain the operating air and fluid before performing maintenance.
- Before starting maintenance or inspection, read the material safety data sheet (SDS) for the chemical liquid and wear the necessary protective gear.

CAUTION

- When replacing a product, always replace it with a product with the same model No. Specifications may differ even when the appearance is the same.
- Store unused products in a location where they are not exposed to direct sunlight or high temperatures. When handling the product, do not apply impact or damage it by throwing, dropping, or allowing it to catch on something.

Product and working fluid compatibility checklist

This checklist is created based on previous evaluations and experience, and does not guarantee performance.

When using chemical liquids, check with a chemical expert regarding the compatibility between the working fluid and the product material based on the table below in order to determine usability. Note that permeating gas can also affect product materials other than the wetted parts. This may cause leakage from the product or malfunctions.

Material combination code		P	C	R	F
Material	Body	PPS	PPS	SCS13	SCS13
	Diaphragm	EPDM	PTFE	EPDM	PTFE
Pure water		○	○	○	○
Sulfuric acid		×	×	×	×
Hydrochloric acid (5% or less)		○	○	×	×
Nitric acid		×	×	×	×
Hydrogen peroxide solution		×	×	×	×
Ozone water		×	×	×	×
Sodium hydroxide (30% or less)		○	○	○	○
Aqueous ammonia		△ *3	△ *3	△ *3	△ *3
Acetone		○	△ *3	○	△ *3
Isopropyl alcohol		○	○	○	○
Paint thinner		×	△ *3	×	△ *3
Air/N ₂ gas		○	○	○	○

○: Usable △: Usable with conditions ×: Not usable

For fluids not listed above, contact CKD.

*1: Part of the compatibility data is created based on materials provided by the respective material manufacturers. These are merely reference values, and do not guarantee actual usability with the product.

*2: Highly absorbable fluids may cause very slight leakage along the thread parts or cavities of a stainless steel (SCS13) casting.

*3: Contact CKD separately.