Safety Precautions

Be sure to read this section before use.

When designing and manufacturing equipment using CKD wet fine system products, the manufacturer is obligated to ensure that the safety of the mechanism, pneumatic control circuit and/or water control circuit and the system that runs the electrical controls are secured.
It is important to select, use, handle and maintain CKD products appropriately to ensure their safe usage.
Observe warnings and precautions to ensure device safety.
Check that device safety is ensured, and manufacture a safe device.

⚠ WARNING

1 This product is designed and manufactured as a general industrial machine part. It must be handled by an operator having sufficient knowledge and experience.

2 Use this product in accordance with specifications.

This product must be used within its stated specifications. In addition, never modify or additionally machine this product.
This product is intended for use in general industrial machinery equipment or parts. It is not intended for use outdoors (except for products with outdoor specifications) or for use under the following conditions or environments. (Note that this product can be used when CKD is consulted prior to its usage and the customer consents to CKD product specifications. The customer should provide safety measures to avoid danger in the event of problems.)

❶ Use for applications requiring safety, including nuclear energy, railways, aircraft, marine vessels, vehicles, medical devices, devices or applications in contact with beverages or foodstuffs, amusement devices, emergency cutoff circuits, press machines, brake circuits, or safety devices or applications.
❷ Use for applications where life or assets could be significantly affected, and special safety measures are required.

3 Observe organization standards and regulations, etc., related to the safety of the device design and control, etc.

ISO4414, JIS B 8370(Pneumatic fluid power - General rules and safety requirements for systems and their components)
JFPS2008 (Principles for pneumatic cylinder selection and use)
Including the High Pressure Gas Safety Act, Industrial Safety and Health Act, other safety rules, organization standards and regulations, etc.

4 Do not handle, pipe, or remove devices before confirming safety.

❶ Inspect and service the machine and devices after confirming safety of all systems related to this product.
❷ Note that there may be hot or charged sections even after operation is stopped.
❸ When inspecting or servicing the device, turn OFF the energy source (air supply or water supply), and turn OFF power to the facility. Discharge any compressed air from the system, and pay attention to possible water leakage and leakage of electricity.
❹ When starting or restarting a machine or device that incorporates pneumatic components, make sure that the system safety, such as pop-out prevention measures, is secured.

5 Observe the warnings and cautions on the following pages to prevent accidents.

■ Precautions are ranked as “DANGER”, “WARNING”, and “CAUTION” in this section.

⚠DANGER: In the case where the product operation is mishandled and/or when the urgency of a dangerous situation is high, it may lead to fatalities or serious injuries.
⚠WARNING: A dangerous situation may occur if handling is mistaken, leading to fatal or serious injuries.
⚠CAUTION: A dangerous situation may occur if handling is mistaken, leading to minor injuries or property damage.

Note that some items indicated with “CAUTION” may lead to serious results depending on the conditions.
All items contain important information and must be observed.

Warranty

1 Warranty period

The product specified herein is warranted for one and a half (1.5) years from the date of delivery to the location specified by the customer.

2 Warranty coverage

If the product specified herein fails for reasons attributable to CKD within the warranty period specified above, CKD will promptly provide a replacement for the faulty product or a part thereof or repair the faulty product at one of CKD's facilities free of charge.
However, following failures are excluded from this warranty:

1) Failure caused by handling or use of the product under conditions and in environments not conforming to those stated in the catalog, the Specifications, or the Instruction Manual.
2) Failure caused by use of the product exceeding its durability (cycles, distance, time, etc.) or caused by consumable parts.
3) Failure not caused by the product.
4) Failure caused by use not intended for the product.
5) Failure caused by modifications/alterations or repairs not carried out by CKD.
6) Failure caused by reasons unforeseen at the level of technology available at the time of delivery.
7) Failure caused by acts of nature and disasters beyond control of CKD.

The warranty stated herein covers only the delivered product itself. Any loss or damage induced by failure of the delivered product is excluded from this warranty.
Note: For details on the durability and consumable parts, contact your nearest CKD sales office.

3 Compatibility check

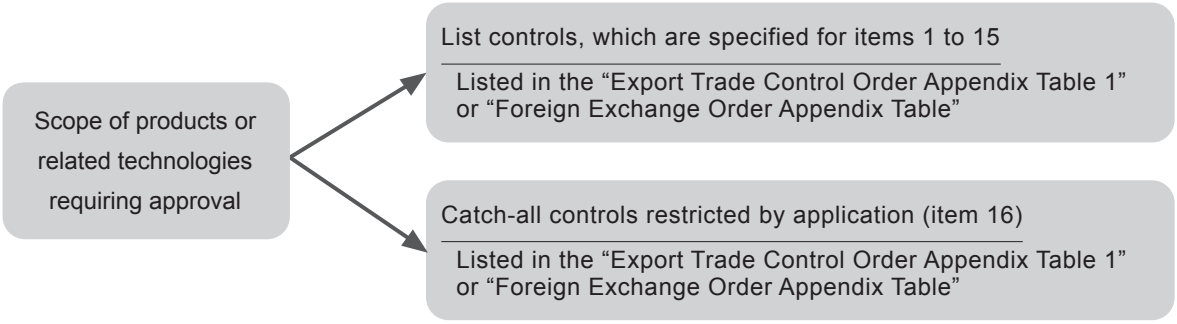
The customer is responsible for confirming the compatibility of CKD products with the customer's systems, machines and equipment.

Precautions for export

1 Security Trade Control

The products in this catalog and their related technologies may require approval before export or provision. For the sake of maintaining world peace and safety, there may be cases in which approval under the Foreign Exchange and Foreign Trade Control Law is required in advance, depending on the country to where the product or related technology is being exported or provided.
The scope of products and related technologies requiring approval is listed in the Export Trade Control Order Appendix Table 1 or Foreign Exchange Order Appendix Table.
The Export Trade Control Order Appendix Table 1 and Foreign Exchange Order Appendix Table contain the following two types of information:

- List controls, which are specified for items 1 to 15
- "Catch-all controls" that do not indicate specifications by item, but restrict by application (Section 16)



An application for approval is received by the Security Export Licensing Division of the Ministry of Economy, Trade and Industry or local bureaus of the Ministry of Economy, Trade and Industry.

2 Products and related technologies in this catalog

The products and related technologies in this catalog are subject to the list controls of the Foreign Exchange and Foreign Trade Control Law.
For information on the products or related technologies subject to the list controls of the Foreign Exchange and Foreign Trade Control Law, refer to the applicable product page.
If exporting or providing products or related technologies that fall under the list controls, be sure to obtain export permission under the Foreign Exchange and Foreign Trade Control Law.
In addition, when exporting or providing the products or related technologies in this catalog, ensure that they are not used for arms or weapons.

3 Contact

Contact your local CKD Sales Office for information on the Security Trade Control of products and related technologies in this catalog.

Fine System Components

Safety Precautions

Be sure to read this section before use.

Design / Selection

1. Checking the specifications

WARNING

■ This product cannot be used as an emergency shut-off valve.
The valves listed in this catalog are not designed as valves to ensure safety such as emergency cutoff valves. When using in such a system, always take separate measures that will ensure safety.

■ Incorrect component 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
Check with a scientific expert regarding the compatibility of the working fluid with the product material in order to determine usability. Stainless steel body cannot be used with acidic fluids.

■ Fluid temperature
Use within the specified working fluid temperature range.

■ Fluid pressure range
Use the products within the fluid pressure given in the specifications listed in this catalog.

■ Ambient environment
①Check the compatibility of product component materials and ambient atmosphere. (Do not use this product in a corrosive or explosive atmosphere.)
②Do not allow fluid to come into contact with the product body.
③Use this product within the ambient temperature range.
④Do not use this product outdoors or in a place where it can be subjected to vibration or impact, or near a heat source.

2. Design

WARNING

■ When using a working fluid that may be hazardous to the 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, as 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.

■ Securing maintenance space
Secure sufficient space for maintenance and inspection.

■ The Rc thread is piped according to "For Rc threads" on the following page (1), but the screw-in part may leak due to thermal cycling. When using the product under these conditions, select the integrated fitting-type.

3. With sensor option

WARNING

■ Application, load current, voltage, temperature, impact, environment, etc., outside the specifications will result in damage or operation faults. Use the device as instructed in the specifications.

■ Never use this product in an explosive gas atmosphere. Option with sensor does not have an explosive-proof structure. Never use in an explosive gas atmosphere as explosions or fires could result.

■ It cannot be used in high steam and dusty environments or in direct contact with water, chemicals, etc., or in atmospheres of corrosive gases.

■ Take care when using this product for an interlock circuit.
When using the option with sensor for an interlock signal requiring high reliability, provide a double interlock by installing a mechanical protective function or other sensor as a guard if problems occur. Regularly inspect and confirm that the interlock activates correctly.

■ Pay attention to the contact capacity.
Do not use a load that exceeds the sensor's max. contact capacity. This may lead to failure.

■ Pay attention to the protection circuit.
● When an inductive load (relay or solenoid valve) is connected, a surge voltage is generated when the sensor is turned OFF. Provide a protection circuit.
● When a capacious load (capacitor) is connected, starting current is generated when the sensor is turned ON. Provide a protection circuit.
● If the wiring length increases, the wiring capacity will be reached and a rush current will occur, damaging the sensor or shortening the service life. Provide a protection circuit.

■ Do not use this product in surge generating areas.
If there are devices and components (solenoid lifters, high frequency induction furnace, motors, etc.) around the sensor that generate a large surge, consider surge protection of the source as it may lead to deterioration or damage of the sensor internal circuit element.

CAUTION

■ Be careful of the internal voltage drop caused by serial connection.
● When serially connecting several sensors, the sensor voltage drop is the total voltage drop of all connected sensors. Check load specifications and determine the number of connections so as not to exceed the maximum load current of the sensor.

Mounting, Installation and Adjustment

1. Mounting

⚠ 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.

⚠ CAUTION

■ After installation, check for leaks from pipes and that the product is installed correctly.

2. Piping

⚠ WARNING

■ Always flush the piping before installing the valve. Debris or foreign matter in the fluid may prevent the valve from functioning correctly. When there is contamination, install a filter on the primary side of the valve according to the circuit used.

■ For products that have an arrow displayed, ensure that the piping is performed so that the flow of the fluid is consistent with the direction of the arrow.

■ When piping, do not apply tension, compression, bending or other forces to the valve body from the piping.

■ 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.

⚠ CAUTION

■ For information on PFA fitting tubes, refer to the latest instruction manuals issued by fitting manufacturers and install accordingly. Since fitting installation requires dedicated installation jigs, contact fitting manufacturers separately. Distance to adjacent fitting is short for AMG, GAMD, and GMMD. Note that installation may be difficult with ordinary tools. Contact CKD as fitting manufacturers' dedicated installation jigs may not be usable.

■ When installing the union fitting, make sure that the O-ring is inserted in the groove of the body and firmly tighten until the O ring collapses. If it is not securely tightened, fluid may leak outside, which could be dangerous.

■ The PFA pipe for welding must be welded by a specialist in PFA pipe welding.

■ 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 mounting plate in addition to using fittings as support when installing a valve.

■ To install the Rc thread section, follow the procedure below.

(1) For Rc threads

①Wind PTFE seal tape three or four times around a fitting conforming to a JIS B 0203 pipe taper thread.
②Tighten at the following tightening torque.

Port size	PFA fitting	PVC fitting
Rc1/8	0.5 to 0.8	—
Rc3/8	1.0 to 1.5	—
Rc1/2	1.5 to 2.0	2.0 to 2.5
Rc3/4	2.0 to 2.5	2.5 to 3.0
Rc1	2.5 to 3.5	3.0 to 4.0

(N·m)

(2) Operating port

As port cracking and screw damage may result, tighten with 0.4 to 0.6 N·m. For AMD3/4/5*2, AMG3/4/502 or GAMD3/4/5*2, when using metal and PPS fittings, select a model with reinforcing ring (refer to applicable model pages). Do not use metal fittings for AMD4/5/61H and AMD3/51M.

Safety Precautions

Be sure to read this section before use.

Mounting, Installation and Adjustment

3. With sensor option

⚠ CAUTION

■ Do not drop or apply impact.
Do not drop, bump or apply excessive impact when handling. Even if the body is not damaged, sensor components could break or malfunction.

■ Do not carry the valve body by the sensor's lead wire.
Never do this: it not only causes disconnection of lead wires, but since stress is applied to the internal sensor, it may also damage the sensor internal element.

■ Do not wire together with power lines or high voltage lines.
Avoid the use of parallel wiring or wiring in the same conduit as that of power lines or high voltage lines. The control circuit containing the sensor could malfunction due to noise.

■ Do not short-circuit the load.
If turned ON in a state of load short-circuit, excess current will flow and the sensor will be damaged.

■ Pay attention to the lead wire connection.
Turn OFF power to the device in the electric circuit to be connected before starting wiring. If operated while the power is turned ON, it may cause accidents due to electric shock or unpredicted operation.

■ Check the power supply fluctuations so that the power supply input does not exceed the rating.

■ When using a commercially available switching regulator on the power supply, be sure to ground the power supply frame ground (F.G.) terminal.

■ When using a component (switching regulator, inverter motor, etc.) that could generate noise around the component, be sure to ground the sensor frame ground (F.G.) terminal.

4. Electric needle valve MNV series

⚠ WARNING

■ Note that the product surface will be hot when used under high temperature conditions. Touching it directly may result in burns.

■ When the valve operates, a tiny amount of permeated gas from the chemical liquid will be released though the vent hole on the side of the cover. Do not put your face or hands near the vent hole. When touching the valve, use corrosion-resistant gloves and do not touch with bare hands.

■ Be sure to observe the setting range (0 to 600 step).

■ Do not use the product so as to continue step-out of the motor. Doing so may result in malfunctions or breakdowns. When using as feedback control, durability may be affected depending on the conditions. Check the operation with the actual device before use.

Use / Maintenance

1. Before use

⚠ WARNING

■ Use this product below the max. working pressure and max. working pressure range.

⚠ CAUTION

■ Do not disassemble.

■ Do not apply strong impact to the product by dropping it, etc. This may cause malfunction or damage to the product.

■ Check with a chemical expert regarding the compatibility of the working fluid with the product material in order to determine usability.

- Fluids that contain particles, such as slurry and UV curing agent, or could solidify or jell may affect performance.
- If the fluid is highly absorbable, such as liquid containing a surfactant or stripping solution, 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 N_2 gas and air, valve seat leakage up to 1 cm^3/min (at pneumatic pressure) may occur.

■ Rapid changes in fluid temperature may cause the valve seat to warp unevenly, leading to valve seat leakage.

■ As for operating air, use air or inert gas passed through a filter with a filtration rating of 5 µm or more.

■ Since it is precision cleaned, clean packed and delivered assuming installation in a clean room, handle with care.

■ Do not over-tighten the flow rate/bypass adjustment knob.

■ Do not use valves as a footing or place any heavy objects on top of the valves.

■ If the product has been out of use for a long period, perform a test run before starting the actual operation.

■ The valve operating time may change due to the piping conditions, pressure conditions, operation intervals and the like of the operating air. Be sure to confirm that there are no problems before using the valve after it is installed on the actual machine.

■ 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.

■ Static electricity

Fluororesin is easily charged and becomes further charged by flowing gas or liquids. As static electricity may cause external leakage or ignition, be sure to take measures to remove static electricity to the extent possible.

2. With sensor option

⚠ WARNING

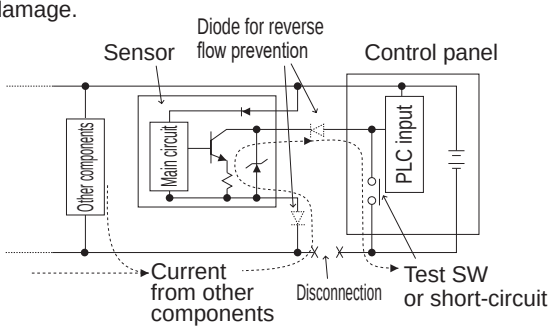
■ Do not apply overcurrent.

If overcurrent flows to the sensor due to a load short-circuit, etc., the sensor will be damaged with a risk of ignition. Provide an overcurrent protection circuit, such as a fuse, for the output wire and power cable as needed.

⚠ CAUTION

■ Pay attention to reverse currents caused by disconnected wires and wiring resistance.

- If other components, including a sensor, are connected to the same power supply as the sensor, and the output wire and power cable negative (-) side are short-circuited to check the operation of the control panel input unit, or if the power cable negative (-) side is disconnected, reverse current could flow to the sensor's output circuit and cause damage.



- Take the following measures to prevent damage caused by reverse current:

①Avoid centralizing current at the power cable, especially the minus side power cable, and use as thick a cable as possible.

②Limit the number of components connected to the same power source as the sensor.

③Insert a diode parallel to the sensor's output line to prevent reverse current.

④Insert a diode parallel to the sensor power wire's negative (-) side to prevent reverse current.

Fine System Components

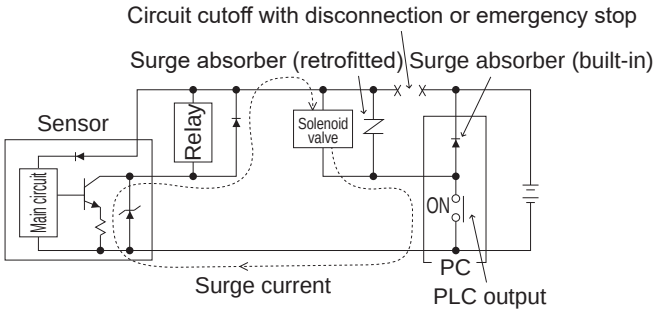
Safety Precautions

Be sure to read this section before use.

Use / Maintenance

■ Pay attention to surge current flow-around.

●When sensor power is shared with an inductive load that generates surges such as a solenoid valve or relay, if the circuit is cut off while the inductive load is functioning, surge current could enter the output circuit and cause damage depending on where the surge absorber is installed.



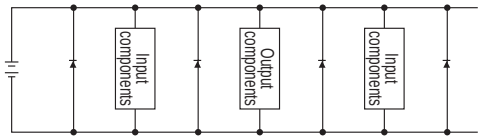
●Take the measures below to prevent damage from sneak surge current.

①Separate power supplies for output systems that are inductive loads, such as solenoid valves and relays, from input systems, such as sensors.

②If a separate power supply cannot be used, directly install a surge absorption element for all inductive loads. Consider that the surge absorber connected to the PLC, etc., protects only the individual device.

③Insert a diode parallel to the sensor's output line to prevent reverse current.

④Connect a surge absorber to places on the power wiring shown in the figure below, as a measure against disconnections in unspecified areas.



When devices are joined to a connector, the output circuit could be damaged by the above if the connector is disconnected while power is ON. Turn power OFF before connecting or disconnecting the connector.

3. Air operated manual valve for chemical liquids AMD/MMD Series

⚠ CAUTION

■ When adjusting the flow rate of the AMD Series or MMD Series, vibration or flow rate fluctuation may occur depending on the working conditions such as fluid temperature, differential pressure, opening degree, etc. Confirm that the product is acceptable under actual working conditions before use.

Use the MMD**2 Series in the fully closed or fully open position. It cannot be used in the intermediate position. Tighten the MMD**2 Series knob within the torque range shown in the table below. If it is not tightened properly, the knob may rotate due to vibration of the pump.

Model No.	MMD302	MMD402	MMD502
Knob tightening torque	0.8 to 1.5	1.0 to 1.8	1.5 to 2.5

(N·m)

4. Air operated valve for chemical liquids AMD/GAMD Series

⚠ CAUTION

■ In the AMD/GAMD Series, 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.

5. Air operated manual valve for high pressure chemical liquids AMD*1H/MMD*0H Series
Air operated manual valve for chemical liquids AMD*1M/MMD*0M Series

⚠ CAUTION

■ When collecting permeated gas from the diaphragm or detecting leakage, remove the set screw from the detection port and use it as the piping port. If the piping is made of fluororesin, tighten it by 0.4 N·m or less. Use the MMD*0H or MMD50M Series either fully closed or fully opened. The intermediate position cannot be used.

6. Manual valve for chemical liquids MMD Part 3RN/GMMD Part 3RN Series

⚠ CAUTION

■ When operating the valve, turn the knob until it spins loosely (there should hear a click). If you hold the lock ring while turning the knob, it will not spin; valve seat deterioration or product damage may be caused by over tightening.

■ If the knob spins loosely but the valve fails to close or open, insert a screwdriver or similar tool into the hole on the knob side and turn the knob. If the green indicator inside the hole is visible, forced operation is possible. If the green indicator is not visible from the hole, turn the knob to adjust the position.

Use / Maintenance

■ The structure uses knob rotation for sealing, so that if the valve is left closed for long periods, valve seat leakage may occur. When temperature changes take place, retighten the knob.

■ Vibration or flow rate fluctuation may occur depending on the working conditions such as fluid temperature, differential pressure, or opening. Confirm that the product is acceptable under actual working conditions before use. For precise flow rate adjustment, select the FMD Series or Fine flow rate adjusting valve (LYX).

■ When transporting valves with misoperation prevention covers attached, hold the entire valve rather than the misoperation cover alone.

■ Attach the misoperation prevention cover with the lock ring lowered. This can prevent misoperation and erroneous knob operation.

■ When mounting the misoperation prevention cover to prevent knob operation, use a padlock or similar to keep it locked.

■ Note that the misoperation prevention cover cannot be used with the GMMD Series.

7. Fine regulator PMM/PYM/PMP Series

⚠ CAUTION

■ In the PMM, PYM or PMP Series, vibration may occur due to fluctuations in fluid pressure, flow rate, or supply pressure or to piping conditions, which may affect the product life. If this occurs, review and revise the fluid pressure and flow rate conditions.

■ Since the regulator operates with a small opening, allowing a fluid mixed with foreign matter to flow may damage the valve seat and cause the performance to deteriorate. We recommend installing a filter on the primary side of the regulator when there is a possibility of foreign matter contamination.

■ When the set output pressure of regulator is exceeded, if damage and malfunction of devices at the secondary side could be caused, always provide a safety device.

■ In the PMP Series, bubbles may be generated in the liquid by the pilot air passing through the diaphragm membrane. We recommend not to keep pressurizing the pilot air when not in use.

■ When adjusting the flow rate, install a needle valve or a needle valve, etc., on the secondary side of the regulator.

8. Maintenance and Inspection

⚠ DANGER

■ When replacing the valve, thoroughly flush the remaining chemical liquid with pure water or air so that it does not affect the surrounding components and humans. While the upper side of the diaphragm (cylinder side) does not come into contact with the fluid, it may be exposed to chemical atmosphere due to gas permeation from the thin film part. For your safety, follow the precautions below:

①Since a small amount of transmitted gas is released from the breathing hole on the cylinder side by the operation of the valve, do not let anyone near the breathing hole during valve operation.

②In addition, crystals may adhere to the breathing hole and its vicinity.

③When touching the valve, use corrosion-resistant gloves and do not touch with bare hands.

■ 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 distributor.

■ Perform the following periodic inspection once or twice a year to ensure that the valve is achieving optimal functionality.

①Inspection for leakage to the valve exterior

②Inspection for leakage from fitting

③Check for abnormalities such as discoloration, deformation, corrosion of the components

⚠ WARNING

■ Read the instruction manual thoroughly and make sure you understand the content before performing maintenance.

■ 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.

■ When using chemical liquids such as high permeability hydrochloric acid, hydrofluoric acid, or nitric acid for long periods, it can lead to deterioration of parts other than the wetted parts and accidents such as external leakage due to transmission gas. Check for abnormalities such as discoloration, deformation, or corrosion of the components once or twice a year as periodic inspection for safety.

⚠ 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.