



Safety Precautions

Be sure to read this section before use.

When designing and manufacturing a device using CKD products, the manufacturer is obligated to check that device safety mechanism, pneumatic control circuit, or water control circuit and the system operated by electrical control that controls the devices is secured.

It is important to select, use, handle and maintain the product appropriately to ensure that the CKD product is used safely.

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.)
 - 1** 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.
 - 2** 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 device design and control, etc. ISO4414, JIS B 8370 (Pneumatics 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.
 - 1** Inspect and service the machine and devices after confirming safety of all systems related to this product.
 - 2** Note that there may be hot or charged sections even after operation is stopped.
 - 3** 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.
 - 4** 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 warnings and cautions in the following pages to prevent accidents.
- The precautions are ranked as "DANGER", "WARNING" and "CAUTION" in this section.



Danger: When a dangerous situation may occur if handling is mistaken leading to fatal or serious injuries, and when there is a high degree of emergency to a warning.



Warning: If handled incorrectly, a dangerous situation may occur, resulting in death or serious injury.



Caution: When a dangerous situation may occur if handling is mistaken leading to minor injuries or physical damage.

Note that some items described as "CAUTION" may lead to serious results depending on the situation. Every item provides important information and must be observed.

Warranty

1 Warranty period

The product specified herein is warranted for one (1) year 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.



Pneumatic components (Electro pneumatic regulator)

Safety Precautions

Be sure to read this section before use.

Product-specific cautions: Electro pneumatic regulator

Design/selection

CAUTION

- Response is affected by working pressure and load volume. Also fluctuation of the working pressure affects the secondary side control pressure. If reproducibility with stable responsiveness is required, install a regulator in the preceding stage.
- Take the following countermeasures to prevent malfunction caused by noise.
 - Install a line filter in the AC power supply line.
 - Use a surge suppressor such as a CR or diode on the inductive load (solenoid valve, relay, etc.) and remove noise from the source.
 - Keep wiring to each device separate from strong magnetic fields.
 - Connect wiring to proportional pressure controls with a shielded wire.
 - Ground the shielded wire on the power supply side. Note that the shielding wire for the serial transmission communication cable must be treated based on communication system specifications.
- When releasing the secondary control pressure, such as air blowing, into the atmosphere, the pressure could fluctuate depending on the piping and flow conditions. Test under actual working conditions, or contact CKD before using this method.

- When selecting the dryer, air filter, oil mist filter or regulator, select a device with a flow rate higher than that used by proportional pressure controls.
- This product has moving parts due to its operation and structure, the accuracy, etc., of which can change over time. Before use, evaluate the part in the system. Depending on the operating frequency, use this product as a periodic maintenance part, etc.
- Working conditions for CE compliance
This product is CE-marked, indicating conformity with the EMC Directives. The standard for the immunity for industrial environments applied to this product is EN61000-6-2; the following requirements must be satisfied in order to conform to this standard:
Conditions
 - The evaluation of this product is performed by using a cable that has a power supply line and a signal line paired to assess the product's performance.
 - This product is not equipped with surge protection. Implement surge protection measures on the system side.

Mounting, installation and adjustment

CAUTION

- Do not use the product where the product is exposed to direct sunlight or may come in contact with water, oil, etc.
- Sufficiently flush the piping with air before connecting to proportional pressure controls. Also, make sure that sealing tape does not enter during piping.
- Mount the product as indicated in the product-specific cautions.
- When connecting pipes, wrap sealing tape in the opposite direction from the threading, from the inside position to within 2 mm from the pipe end.



- If sealing tape protrudes from the pipe threads, it could be cut when screwing the bolts in. This could cause the tape to enter the pneumatic pressure component, causing failures.
- Correct pressure control is not possible if the exhaust port is plugged. Release this port to the atmosphere.
- Use appropriate torque to tighten the pipes when connecting them.
 - The purpose is to prevent air leakage and damage to bolts.
 - First tighten the bolts by hand to ensure that the threads are not damaged, then use a tool.

[Recommended tightening torque]

Port thread	Tightening torque N·m
Rc1/4	6 to 8
Rc3/8	13 to 15



- Tighten with an appropriate torque when using CKD cable option M12 connector. Recommended tightening torque: 0.4 to 0.49 N·m

Use/maintenance

CAUTION

- Do not disassemble the product. Doing so may cause product failure. Operation after disassembly cannot be guaranteed.

- Do not use with the cover and housing removed.
 - An electronic circuit board is assembled inside. Using the product with the cover or housing removed could result in unexpected accidents or trouble.

Product-specific cautions: EVD Series

Design/selection

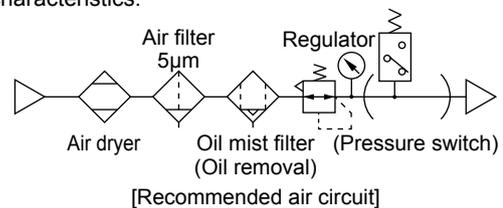
⚠ WARNING

- Understand the characteristics of compressed air before designing a pneumatic circuit.
 - The same functions as mechanical, hydraulic and electrical methods cannot be anticipated.
 - The product cannot be used for immediate stopping and holding in case of emergency stop.
 - Pop-out, air discharge, or leakage due to air compression and expansion may occur.
 - Design the circuit so that compressed air in the system is exhausted.
- Confirm before use that the product will withstand the working environment.
 - This product cannot be used in an atmosphere containing corrosive gas, chemical liquids, solvents, water or steam. If water, oil, or metal chips (spatter or cutting chips, etc.) could come in contact with the product, provide appropriate protection.
 - A gauge pressure sensor is built in. To protect the sensor, do not seal the product, and make sure that air can be introduced.
 - This product cannot be used in an explosive gas atmosphere.
- Pay attention to the electric circuit during emergency stop and to the cylinder operation during power outages.
- Install a "pressure switch" and "residual pressure exhaust valve" on the device's compressed air supply side.
 - The pressure switch will disable operation until the set pressure is reached. The residual pressure exhaust valve releases compressed air into the pneumatic pressure circuit to prevent accidents caused by operation of pneumatic components under residual pressure.
- If the regulator is left with the power OFF and the primary pressure applied, the secondary pressure could rise to the primary pressure level. Due to the structure, a small amount of air is consumed from the EXH port when the secondary pressure is generated. Set the primary regulator to 0 or use a valve on the primary side to shut off the supply source when not using the regulator.

⚠ CAUTION

- Indicate the maintenance conditions in the device's instruction manual.
 - The product's performance may drop too low to maintain an appropriate safety level depending on usage conditions, working environment and maintenance status. With correct maintenance, the product functions can be used to the fullest.
 1. Control of supplied compressed air pressure
 2. Control of pneumatic filter
 3. Control of compressed air leakage at piping connections
 4. Operational status control
 5. Control of current consumption
- Use a constant voltage power supply.

- Response is affected by working pressure and load volume. If reproducibility with stable response time is required, install a regulator in the proceeding stage.
- Take the following countermeasures to prevent malfunction caused by noise.
 - Install a line filter in the AC power supply line.
 - Use a surge suppressor such as a CR or diode on the inductive load (solenoid valve, relay, etc.) and remove noise from the source.
 - Keep wiring to devices separate from strong magnetic fields.
 - Connect wiring to proportional pressure controls with a shielded wire.
 - Keep the power supply cable as short as possible.
 - Do not share power with an inverter or components causing motor noise, etc.
 - Do not lay the power wire, signal wire, and other power cables in parallel.
- Poor air quality will cause poor characteristics and adversely affect the durability.
- Use clean dry air of JIS B 8392-1:2012 (ISO 8573-1: 2010) [1:3:2] or equivalent.
 - For the pneumatic source, always supply clean air, from which solids, moisture and oils have been sufficiently removed with dryer, air filter and oil mist filter. Do not use lubricated air as it will adversely affect the characteristics.



- When the secondary pressure is lowered with an input signal, etc., the secondary air passes through the product and is discharged from the EXH port. Contamination on the secondary piping and on the inside of the load will have an adverse effect on the characteristics, etc., Thus, keep the inside of the piping as clean as possible.
- If power is turned OFF under pressure, secondary pressure is held.
 - To discharge pressure, lower set pressure with an input signal and then turn OFF, or use a residual pressure exhaust valve, etc. This holding state is not guaranteed for extended periods of time.
- Matters related to UL

Note the following when using this product in compliance with UL/ULc standards.

- Temperature rating: Max. 50°C
- Use Class2 power supply.

UL File No.	UL Standard	Description
E339318	UL 508	Industrial Control Equipment

Design/selection

CAUTION

■ Primary pressure:

- For 100 kPa pressure specifications, make sure that the pressure is not less than the "set secondary pressure + 50 kPa".
- For 500/900 kPa pressure specifications, make sure that the pressure is not less than the "set secondary pressure + 100 kPa".
- Product life is shortened if primary pressure is not supplied for a long period while power is ON. Avoid this type of usage.

■ When releasing the secondary control pressure, such as air blowing, into the atmosphere, the pressure could fluctuate depending on the piping and flow conditions. Test under actual working conditions, or contact CKD before using this method.

■ When selecting the dryer, air filter, oil mist filter or regulator, select a device with a flow rate higher than that used by proportional pressure controls.

■ Working environment

Do not use the product where the product is exposed to direct sunlight or may come in contact with water, oil, etc. The product cannot be used with large temperature variations or high temperature/humidity since condensation may occur inside the body. Consult with CKD on specifications for use outside the designated specifications or for special applications.

■ Drip-proof environment

The degree of protection of this product is equivalent to IP40. Do not install this product where water, salt, dust, or swarf is present or in a pressurized or depressurized environment. The product cannot be used with large temperature variations or high temperature/humidity since condensation may occur inside the body.

■ Apply a signal to offset the residual pressure (1% F.S. or equivalent) in the waiting status where the input signal is set to 0 MPa. If an offset signal is not applied, unnecessary operation of the solenoid valve will occur, resulting in a shorter service life.

■ Even when pressure is set to 0 MPa at 1% F.S. or less of max. control pressure, secondary pressure is not completely released. If precise 0 MPa is required, bleed the secondary side or install a 3-way valve on the secondary side to switch the secondary side to atmospheric pressure.

■ The processing performance of EVD-1000 Series is intended for small control targets. If pressure rises and falls frequently with large secondary side load capacity or with long piping to the control target, reducing the pressure will take a long time and the service life may become shorter since load is applied to the diaphragm and other exhaust side components. In such applications, use EVD-3000 Series with higher supply and exhaust port performance.

Mounting, installation and adjustment

DANGER

Installation

- Use power supply voltage and output within the specified voltage. Using voltage that exceeds the specified voltage could cause malfunctions, controller damage, electrical shock, or fire. Do not use any load that exceeds the rated output. Otherwise, output damage or fire may result.

WARNING

Wiring

- Check the connector pin and cable core wire color when wiring. Incorrect connections could cause damage, failures, or malfunctions. Check the wire color against instructions and precautions before wiring.
- Ensure that wires are properly insulated. Check that wires do not come into contact with other circuits, that no ground faults occur, and that the insulator between terminals is not defective. Overcurrent could damage the product.

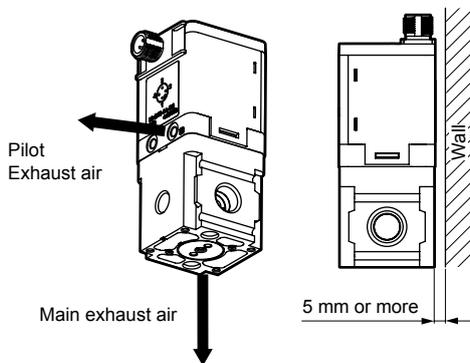
- Use a stabilized DC power supply within the specified rating that has been insulated from the AC power supply. A non-isolated power supply could result in electrical shock. If power is not stabilized, the peak value could exceed the rating and damage the product or reduce precision.
- Stop the control device and equipment and turn power OFF before wiring. Starting operation suddenly could cause unpredictable and dangerous operation. Conduct an energized test with control devices and equipment stopped. Be sure to discharge any accumulated electrostatic charge among personnel, tools, or equipment before and during work. Connect and wire bending resistant material, such as robot wire material for movable sections.
- Do not use at levels exceeding the power supply voltage range. The product could rupture or burn if voltage exceeding the working range is applied or if an AC power supply (100 VAC) is applied.
- Do not short-circuit the load. Failure to observe this could result in rupture or burning.

Mounting, installation and adjustment

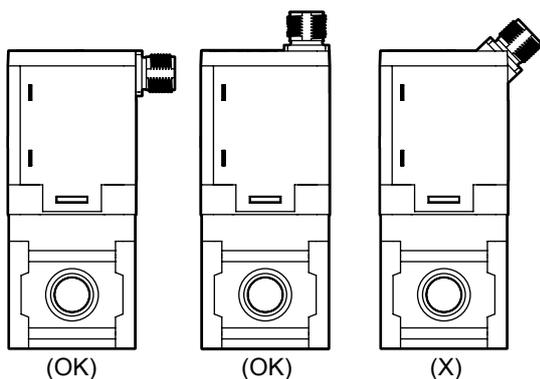
⚠ CAUTION

Installation

- **Mounting orientation**
There are no restrictions to the mounting direction or mounting attitude, but provide sufficient space around the product for operation, mounting, removal, wiring and piping work.
- **Install a pneumatic filter just before the pneumatic component in the circuit.**
- **Install so that the exhaust port is not blocked and provide sufficient space for exhaust.**
When mounting this product, do not use a mounting method that relies on support from the piping.



- **The rotary mechanism of the M12 connector is not intended for use with the cable enabled. Keep the M12 connector facing upward or sideways (not obliquely). If the cable may move, fix the cable.**

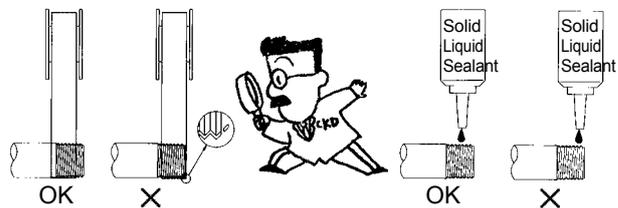


- **Depending on the piping and load conditions, the control pressure of this product may not be stable and the product could repeatedly rise and fall in pressure. If that condition continues, the product life will be shortened, so be sure to review piping conditions, etc.**

⚠ CAUTION

Piping

- **Sufficiently flush the piping with air before connecting.**
Also, make sure that sealing tape does not enter during piping.
- **When connecting pipes, wrap sealing tape in the opposite direction from the threading, from the inside position to within 2 mm from the pipe end.**
 - If sealing tape protrudes from the pipe threads, it could be cut when screwing the bolts in. This could cause the tape to enter the pneumatic pressure component, causing failures.



- **Correct pressure control is not possible if the exhaust port is plugged. Release this port to the atmosphere.**
- **Use appropriate torque to tighten the pipes when connecting them.**
 - The purpose is to prevent air leakage and damage to bolts.
 - First tighten the bolts by hand to ensure that the threads are not damaged, then use a tool.
- **The wiring part is mounted to the body with two hooks on the side of the housing. Be careful not to apply excessive force to the housing since doing so may cause the hooks to disengage and be damaged.**

[Recommended tightening torque]

Port thread	Tightening torque N·m
Rc1/4	6 to 8
Rc3/8	13 to 15

- **When supplying compressed air after connecting pipes, do not suddenly apply high pressure.**
- **Before supplying compressed air after connecting pipes, check that there are no air leaks at any pipe connections.**
 - Apply a leakage detection agent on pipe connections with a brush and check for air leaks.

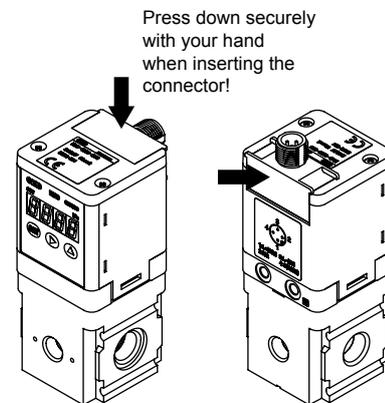
Mounting, installation and adjustment

⚠ CAUTION

Wiring

- Insulate wires not being used so that they do not contact other wires.
 - Unintended connection of unused wires to the ground, etc., could cause malfunction or damage to the product.
- If extending the cable, use a wiring length of 20 m or less between the master and device (this product).
 - Unintended connection of unused wires to the ground, etc., could cause malfunction or damage to the product.
- When using a cable other than the optional cable, make sure that the cable meets the IO-Link communication specifications.
- The wiring colors and pin layouts are determined by the IO-Link communication specifications.
 - Depending on the cable, the correlation between the wiring color and pin layouts may not match, resulting in incorrect wiring.
- Do not rotate the M12 connector.
 - L type cable connectors do not rotate. Never attempt to rotate them.
- Be sure to disconnect the power supply before inserting/removing M12 connectors.
- Always hold the connector part when inserting/removing M12 connectors.
 - Do not hold by the cable to pull out.
- When fitting the M12 connector, align the protrusions on the main unit connector terminal with the recesses on the cable connector terminal and insert them securely.
 - After inserting them securely, hold the knurled part and tighten it clockwise to avoid damaging the threads.
- Be careful not to over-screw the connector.
 - Take care as tightening with excessive force may lead to damage of the body connector.
Recommended torque: 0.4 to 0.49 N·m

- When fitting the M12 connector, press it in by hand so that it faces the top or side.
 - The connector housing rotates by 90°.



Use/maintenance

⚠ WARNING

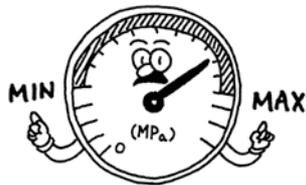
- Do not supply anything other than compressed air.
- Use clean compressed air that does not contain corrosive gases.
- Use oil-free clean dry air of JIS B 8392-1:2012 (ISO 8573-1: 2010) [1:3:2] or equivalent.
- Before conducting maintenance, turn the power OFF, stop the supply of compressed air and make sure that there is no residual pressure.
 - Observe the conditions to ensure safety.

⚠ CAUTION

- Conduct daily inspections and regular inspections to ensure that maintenance control is done correctly.
 - If maintenance is not correctly managed, the product's functions could deteriorate markedly and lead to a shortened service life, faults and accidents

1. Control of supplied compressed air pressure

- Is the set pressure supplied? Does the pressure gauge indicate the set pressure while the equipment is operating?



2. Control of pneumatic filter

- Is the drain correctly discharged?
Is the bowl or element clean enough to use?

3. Control of compressed air leaks from piping connections

- Is the state of the connection, especially at movable sections, normal?
Leakage in piping could cause incorrect operation.

4. Operational status control

- Are operations delayed? Is exhaust normal?

5. Control of pneumatic actuator operation

- Is operation smooth? Is the end stop state normal?
Is coupling with the load normal?

- If abnormal operation occurs, turn power and pneumatic source OFF immediately and stop use.

- Use this product within the working pressure.

- Immediately after power is turned ON, this product does not start pressure control for approximately 2 seconds to complete self-diagnosis. Provide a control circuit/program that ignores signals for at least two seconds after power is turned ON.

- When changing the output set value, turn OFF the equipment first in order to prevent unexpected operation in the control system equipment.

- Regularly inspect the product at least once a year to check that it operates correctly.

- This product uses a small solenoid valve as an actuator. The service life may change depending on the frequency of operation triggered by pressure switching, the working conditions, etc.

- The term of warranty is set as one year or 3,000,000 repeated operations, whichever comes first, so use this as an inspection guideline.

- * The conditions for the 3,000,000 operations listed in the warranty period are as follows.

When repeatedly applying a stepped input signal which causes the control pressure to rise from zero to the maximum control pressure. The working air quality in this case shall be clean compressed air from the recommended air circuit. The secondary side load capacity shall be 300 cm³.

- The case is made of resin. Do not use solvent, alcohol or detergent in cleaning, since the resin could absorb it. There is a risk of affecting the resin. Wipe off dirt with a rag soaked in a diluted neutral detergent solution and wrung out well.

⚠ CAUTION

When using the product

- Clear each Process Data OUT to "0" before powering this product.

- It may cause the pressure to be output unintentionally.

- The settings of this product can be changed in two ways: IO-Link communication from the master and key input on the device (the product itself).

- There is no hierarchical relationship or priority given to either side, instead the most recently applied setting is reflected as the setting of this product. When settings are made on the device side, the master side is also synchronized. However, note that some masters may not reflect the new settings in the display unless the display is updated or settings are uploaded.

- Process Data OUT values can only be operated by the master.

- Even if a setting is changed via key operation on a device, these changes will not be reflected on Process Data OUT values. Check the Process Data IN / Parameter settings to check the product setting status on the master side.