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 devices separate from strong magnetic fields.
- Connect wiring to proportional pressure controls with a shield wire.
- Ground the shield 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 operation frequency, use this product as a periodic maintenance part, etc.

■ Working conditions for CE compliance
CKD electro pneumatic regulators (EVD, EVR, EV, EVS2 and MEVT Series) conform to the EMC Directive and CE standard. 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

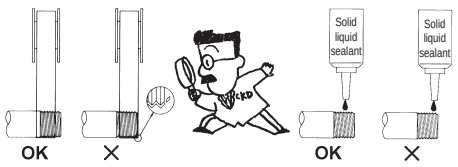
⚠ CAUTION

■ 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. Prevent pipe from catching on parts of the sealing tape when piping.

■ Mount the product as indicated in the product-specific cautions.

■ When connecting pipes, wrap sealing tape in the opposite direction to 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 components, 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
M5	1 to 1.5
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.

■ Check for leakage current to avoid malfunction caused by leakage current from other fluid control components.
- When using a programmable controller, etc., leakage current may affect the electro pneumatic regulator and cause malfunction.

24 VDC	1.8 mA or less

■ Response is affected by working pressure and load volume. If reproducibility with stable response time is required, install a regulator in the proceeding stage.

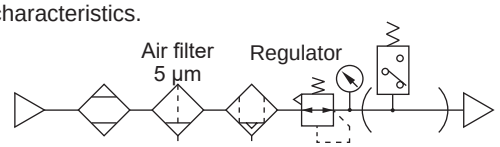
■ Take the following countermeasures to prevent malfunction caused by noise.
- Install a line filter in the AC power supply line.
- Use a surge suppressor such as a CR or diode on the inductive load (solenoid valve, relay, etc.) and remove noise from the source.
- Keep wiring to device separate from strong magnetic fields.
- Connect wiring to device with a shield wire.
- Ground the shield wire on the power supply side.
- 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.

■ When the current input is wired, the power ground and signal common are shared.
- When driving several electro pneumatic regulators with one PLC and D/A unit, depending on the D/A unit circuit, wiring could prevent the correct signal from being input. Contact the PLC manufacturer.

■ The current input can be used with an input signal of 1 to 5 V. However, because input impedance is small (250 Ω) when compared to other voltage input, use an appropriate voltage generator.

■ 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 a dryer, air filter and oil mist filter.
  Do not use lubricated air as it will adversely affect the characteristics.



[Recommended air circuit]

- 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.

Design/selection

⚠CAUTION

■Primary pressure:
- For 100 kPa pressure specifications, make sure that the pressure is not less than “set pressure + 50 kPa”.
- For 500/900 kPa pressure specifications, make sure that the pressure is not less than the “set pressure + 100 kPa”.
- Product life is shortened if primary pressure is not supplied for a long period while power is ON. Do not use this way.

■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 kPa. If an offset signal is not applied, unnecessary operation of the solenoid valve will occur, resulting in shorter service life. ■ Even when pressure is set to 0 kPa at 1% F.S. or less of max. control pressure, secondary pressure is not completely released. If precise 0 kPa is required, bleed the secondary side or install a 3-way valve on the secondary side to switch the secondary side to atmospheric pressure.

■EVD-1000The processing performance of flow rate 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 these applications, use EVD-3000 Series with higher supply and exhaust port performance.

■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

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-insulated 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 controls and machine devices 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 this product at levels exceeding the power supply voltage. Apply voltage exceeding specifications or AC power supply (100 VAC) may result in rupture or burning.

■Do not short-circuit the load. Failure to observe this could result in rupture or burning.

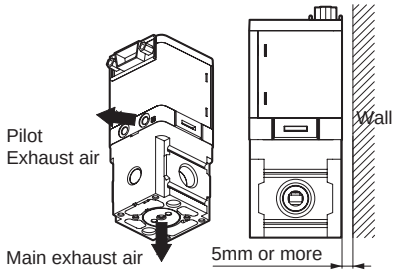
Mounting, installation and adjustment

⚠CAUTION
Installation

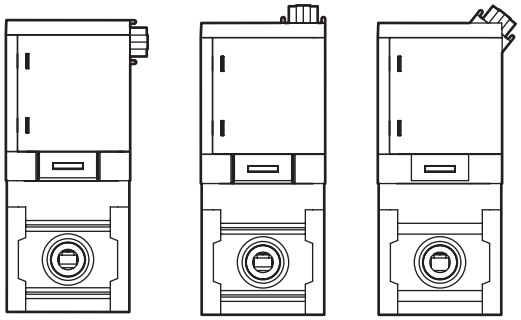
■ Mounting orientation
There are no restrictions to the mounting direction or mounting attitude, but provide sufficient space around the product for operation, mounting, removal, wiring and piping work.

■ Install a pneumatic filter just before the pneumatic components 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 D sub-connector's rotating mechanism is not designed for use in moving applications. Keep it facing upward or sideways (not obliquely) when using. If the cable may move, fix the cable or connector.

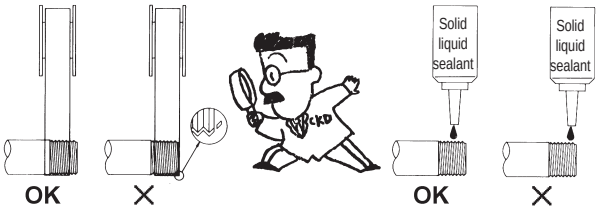


■ Depending on the piping and load conditions, the control pressure may not be stable and the product could repeatedly rise and fall in pressure. If that condition continues, the product life will be shortened, so be sure to review piping conditions, etc.

⚠CAUTION
Piping

■ Sufficiently 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 to 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 sealant tape to enter the pneumatic components, causing breakdowns.

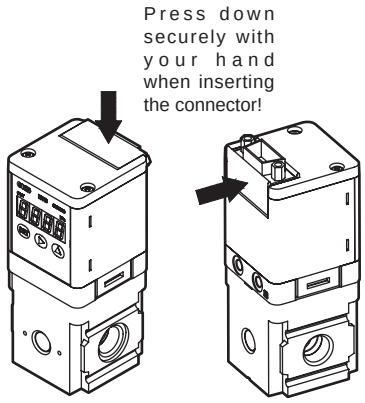


Wiring

■ The optional shield cable connector is a shielded wire.
● Insulate wires not being used so that they do not contact other wires, including shielded wires. Unintended connection to the ground, etc., could cause malfunction or damage to the product.

■ Insert and fit the D sub-connector securely on the back.

■ The D sub-connector has a 90˚ rotating mechanism. When fitting the D sub-connector, press it in by hand so that it faces the top or side.



■ Correct pressure control is not possible if the exhaust port is plugged. Release this port to the atmosphere.

■ Tighten pipes with the appropriate torque.
● 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.

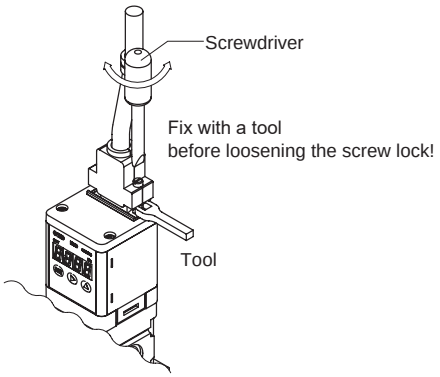
■ The wiring part is mounted to the body with two hooks on the side of the housing. Be careful not to apply excessive force to the housing since doing so may cause the hooks to disengage and be damaged.

[Recommended tightening torque]

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

Mounting, installation and adjustment

- 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.
- Lock the D sub-connector so that it will not be dislocated. Before loosening the lock, fix the fixing block with a tool, etc.



Use/maintenance

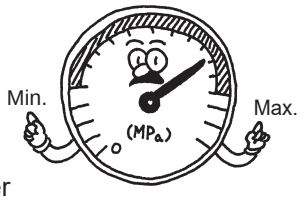
⚠ WARNING

- 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 pneumatics 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 is earlier, so use this as an inspection guideline.
  * The conditions for the 3,000,000 operations listed in the term of warranty 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 cm^3.
- The case is made of resin. Do not use solvent, alcohol or detergent in cleaning, or 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.

Product-specific cautions: EVR Series

Design/selection

⚠ WARNING

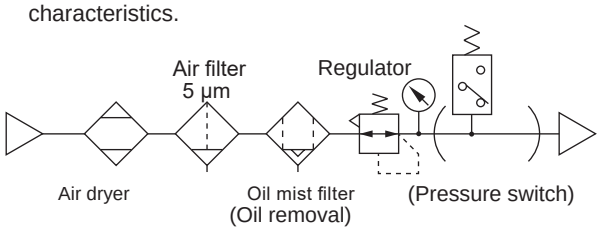
■ If the regulator is left with the power OFF and the primary pressure applied, the secondary pressure could rise to the primary pressure level. If this poses a safety hazard, take system safety measures using a valve on the primary side or secondary side, etc.

⚠ CAUTION

■ Poor air quality will worsen the characteristics and adversely affect the durability.

■ Use clean dry air of ISO 8573-1 Class 1.3.2 or JIS B 8392-1 Class 1.3.2 or equivalent.

● For the pneumatic source, always supply clean air, from which solids, moisture and oil have been sufficiently removed with a dryer, air filter and oil mist filter. Do not use lubricated air as it will adversely affect the characteristics.



[Recommended air circuit]

● When secondary pressure is lowered with an input signal, etc., secondary air passes through the EV and is discharged from the exhaust port (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. The holding state guarantees long-term holdingIt is not something.

■ Primary pressure must be over “Setting secondary pressure + 0.05 MPa”.

● In particular, with the secondary side pressure set within a range up to 12%F.S., if the primary pressure is not supplied for long periods, the product service life will be shortened and its characteristics will deteriorateand avoid this type of usage.

■ Leaving the product non-pressurized with power and input signals applied could have adverse effects on the life and propertiesbe avoided.

■ The product cannot control 1% F.S. or less input signal.

● The exhaust port (EXH port) should be open to the atmosphere to discharge air.

■ Applying an input signal outside the specifications shown in the table below will cause unnecessary operation of the solenoid valve, resulting in a shorter service life and deteriorated performance. Keep the signal within the specifications.

0 - 10V type	0 to 5 V type	4 to 20mA type
Less than 0 V More than 10 V	Less than 0 V More than 5 V	Less than 4 mA Over 20 mA

■ Apply a signal to offset the residual pressure (5 kPa or equivalent) in the standby status where the input signal is set to 0 kPa. If an offset signal is not applied, unnecessary operation of the solenoid valve will occur, resulting in shorter service life.

■ When the current input type is wired, the power ground and signal common are shared.

● When operating several EV units with one PLC and D/A, depending on the D/A unit circuit, wiring could prevent the correct signal from being input. Contact the PLC manufacturer.

■ The current input type can be used with an input signal of 1-5VDC. However, because input impedance is small (250 Ω) when compared to other voltage input types, use an appropriate voltage generator.

■ Due to the structure of EVR, a small amount of air is consumed from the EXH port when the secondary pressure is generated.

■ EVR-2509 Series has IN1 and IN2 supply ports on the body right and left respectively. If the port is not used, be sure to plug it.

■ Drip-proof environment

Refer to the specifications of each product to check the degree of protection before use. You cannot use the product if it does not satisfy the requirements of your use environment.

Mounting, installation and adjustment

■ Mounting orientation
There are no restrictions to the mounting direction or orientation, but provide sufficient space for exhausting from the exhaust port.

Use/maintenance

⚠ CAUTION

■ 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 term of warranty are as follows.
When the input signal which causes the set pressure to rise from zero to 50% of the max. control pressure is repeatedly applied in steps, the secondary side load capacity condition is 300 cm^3.

Product-specific cautions: EV210□V Series for vacuum control

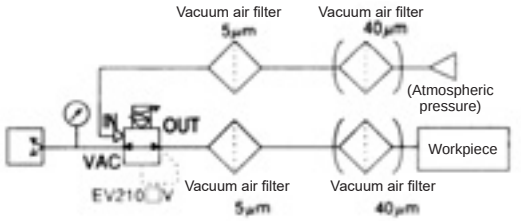
Design/selection

⚠ WARNING

- If the product is left with working pressure (vacuum source pressure) applied when power is OFF, the degree of the secondary pressure of the vacuum could rise to the working pressure. If this poses a safety hazard, take system safety measures using a valve on the secondary side, etc.

⚠ CAUTION

- If poor quality air is supplied to the primary side (atmosphere side), characteristics could deteriorate and durability be adversely affected.
  - When using this product in a dusty environment, etc., remove dust with a filter.
  - As with the secondary side load, if piping or the inside of the load is contaminated, characteristics and durability could be adversely affected. Blow air piping with compressed air to remove foreign matter before connecting.
  - Install an air filter as shown in the recommended air circuit below if necessary.



[Recommended air circuit]

- The secondary side pressure is maintained if power is turned OFF with the working pressure side in a vacuum state.
  - When releasing the secondary side to the atmosphere, lower the input signal and then turn the power OFF, or alternatively discharge the pressure with a residual pressure exhaust valve. This holding state is not guaranteed for extended periods of time.
- The working pressure is applied to supply the specified pressure for the control pressure. Ensure that the working pressure stays within the specified range.
  - If working pressure is not supplied for a long time when secondary pressure is set within more than 0 kPa to 12% F.S., or if the product is left for a long period with the working pressure at “control pressure + (- 10 kPa)” or less, the product life will be shortened. Avoid this type of usage.
- Set the input signal within the specifications.
  - Applying a signal exceeding the range could have adverse effects on the life and properties. Avoid this type of usage.
- The current input can be used with an input signal of 1 to 5 V. However, because input impedance is small (250 Ω) when compared to other voltage input, use an appropriate voltage generator.
- When the current input is wired, the power ground and signal common are shared.
  - When driving several EV units with one PLC and D/A unit, depending on the D/A unit circuit, wiring could prevent the correct signal from being input. Contact the PLC manufacturer.
- Apply a signal to offset the residual pressure (-5 kPa or equivalent) in the standby status where the input signal is set to 0 kPa. If an offset signal is not applied, unnecessary operation of the solenoid valve will occur, resulting in shorter service life.
- Even if pressure is set to 0 kPa, secondary pressure is not released and remains as is within 0 to -5 kPa range.
  - If 0 kPa is required, install a 3-way valve on the secondary side to switch to atmosphere, etc.

Use/maintenance

⚠ CAUTION

- Correct pressure control is not possible if the IN port is plugged. Release this port to the atmosphere. ■ When connecting a fitting to the piping port (VAC, OUT, IN), use seal material (sealing tape, gel sealant) to prevent leakage. Check that seal material or piping screw swarf does not enter the port. When tightening the VAC port fitting, hook a wrench on the intake block (□27).
- When using the manifold and connecting several units with a module connection, atmosphere release ports (IN1 and IN2) are shared.
- The optional shielded cable connector is a 4-conductor shield wire.
- When not using the green special application wire (analog output, etc.), insulate so that there is no contact with other wires (including shielded wires). Unintended connection to the ground, etc., could cause malfunction or damage the product. Also, the wiring must be kept away from noise sources such as intense electric fields. Otherwise an external induction noise added to the analog output will cause product damage.
- When using a hydraulic rotary vacuum pump, be sure to prevent oil from entering by breaking the vacuum with a residual pressure exhaust valve, etc., after the vacuum pump power is turned OFF.
- 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 1,000,000 repeated operations, whichever comes first, so use this as an inspection guideline.
  - * The conditions for the 1,000,000 operations listed in the term of warranty are as follows.
    When repeatedly applying a stepped input signal which causes the control pressure to rise from zero to 90% of 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 cm^3.

Product-specific cautions: Thin electro pneumatic regulator MEVT Series

Design/selection

Circuit design

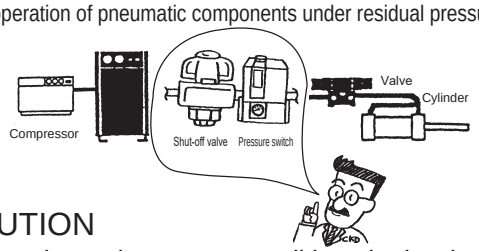
⚠ WARNING

■ Understand the characteristics of compressed air before designing a pneumatic circuit.
- The same functions as the mechanical, hydraulic, and electrical methods cannot be anticipated if instantaneous stopping and holding are required during an emergency stop.
- Pop-out, air discharge, or leakage due to air compression and expansion may occur.

■ Confirm before use that the product will withstand the working environment.
- This product cannot be used in an atmosphere containing corrosive gases, chemical liquids, solvents, water, vapor or ozone. If water, oil, or metal chips (spatter or cutting chips, etc.) could come in contact with the product, provide appropriate protection.
- 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.



⚠ CAUTION

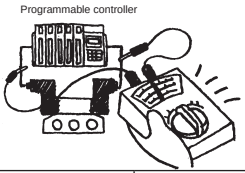
■ Indicate the maintenance conditions in the device’s instruction manual.
- The product’s performance may drop too low to maintain an appropriate safety level depending on usage conditions, working environment and maintenance status. With correct maintenance, the product functions can be used to the fullest.

■ Use a constant voltage power supply.

■ Set the input signal within the specifications.
- Applying a signal exceeding the range could have adverse effects on the life and properties. Avoid this type of usage.

■ Apply a signal to offset the residual pressure (EVT100: 2 kPa, EVT500: 10 kPa 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 shorter service life.

■ Check for leakage current to avoid malfunction caused by leakage current from other fluid control components.
When using a programmable controller, etc., leakage current could cause the EVT to malfunction.



24 VDC	1.8 mA or less

■ Take the following countermeasures to prevent malfunction caused by noise.
- Insert 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.), to remove noise from the source.
- Separate the wiring to the MEVT from electrical lines with strong current.
- Use the designated wire material for the serial transmission line.
- If operation may be affected by noise, wire the power supply independently for each manifold when possible.
- 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.

■ Precautions for wiring
- When wiring the common terminal block and D sub-connector, the power supply gland and signal common are shared. When driving several EVT units with one PLC and D/A unit, depending on the D/A unit circuit, wiring could prevent the correct signal from being input. Contact the PLC manufacturer. When using a shielded wire, connect to the gland on the power supply side.

■ This regulator cannot be used with a cylinder having a large leakage rate, such as an air bearing cylinder.
- When using for blowing applications or when back pressure is applied on the secondary side, it is not possible to maintain the set pressure. A loud thrumming sound will be generated and service life will be shortened. Avoid this type of usage.

■ Residual pressure of 2 kPa or less (EVT100) or 10 kPa or less (EVT500) is generated even when the input signal is set to 0%. If 0 MPa is required, install a three-way valve on the secondary side or release into to the atmosphere, etc.

⚠ CAUTION

■ Install valves on the primary side and secondary side as necessary.
- If the regulator is left with the power OFF and the primary pressure applied, the secondary pressure could rise to the primary pressure level. If this poses a safety hazard, take system safety measures using a valve on the primary side or secondary side, etc.

■ Working environment
Do not use the product where the product is exposed to direct sunlight or may come in contact with water, oil, etc. Consult with CKD on specifications for use outside the designated specifications or for special applications.
- Ambient temperature
  · If used in an environment with a temperature higher than 50˚C or lower than 5˚C
- Vibration/impact
  · Do not use this product in an environment exposed to vibrations of 50 m/s^2 and over or impacts of 300 m/s^2 and over.

■ Pressure accuracy is affected by temperature characteristics and heat generated when energized. The more manifold stations there are, the greater the effect. Provide sufficient standby time (30 minutes or more after energizing) if you need to obtain a more stable pressure.

■ Drip-proof environments

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.

■ Working conditions for CE compliance

MEVT conforms to the EMC Directive and CE standard. 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

● Use a power cable shorter than 3 m.

Mounting, installation and adjustment

Installation

⚠WARNING

■ Do not install the MEVT by supporting it with pipes.
● Mount and fix the MEVT body.

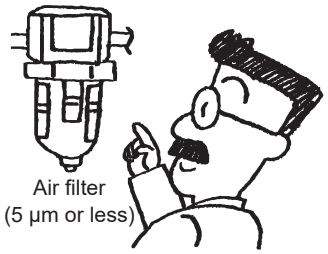
■ Do not wash the MEVT with water or solvent, or paint the body.
● Otherwise some resin parts may be damaged.
Paint could plug the exhaust port and result in malfunctions.

⚠CAUTION

■ Secure sufficient space around the MEVT for installation, removal, wiring, and piping work.

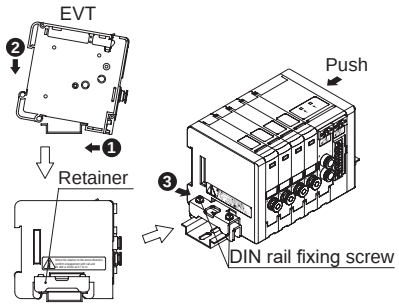
■ Install a pneumatic filter just before the pneumatic component in the circuit.

■ Response is affected by working pressure and load volume. If reproducibility with stable response time is required, install a regulator in the preceding stage.



■ Mounting orientation
● The MEVT is mounted on a DIN rail. If the manifold's total weight exceeds 1 kg, or when using the MEVT in an environment with vibration or impact, fix the DIN rails on the mounting surface with a pitch of 50 to 100 mm. Check that there are no problems with installation.
● Although there is no restriction in mounting direction and orientation, attention should be paid to loose mounting screws caused by resonance due to vibration that may cause the manifold to fall off during operation.
● Mounting and removal method of MEVT
Removal:
Loosen the four DIN rail set screws (two each on the left and right).
Installation:
1. Engage the fingers with the DIN rail in order from (1) to (2).
2. Press the retainer in the direction of (3).
3. Hold down the blocks so that there is no gap between them and fix the DIN rail with the set screws. (recommended tightening torque 0.6 to 0.8 N·m).

Note: If the retainer fingers are not securely engaged, air could leak or the product could fall. Check that these fingers are secure.



Piping

⚠CAUTION

■ Do not remove the MEVT packaging until just before piping.
● If the package is removed before connecting pipes, foreign matter could enter the EVT from the piping port and result in fault or malfunction.

■ Always flush just before piping pneumatic components.
● Any foreign matter that has entered during piping must not enter the EVT.

■ Connect piping so that connections are not dislocated by equipment movement, vibration, or tension.

■ The exhaust port (port R) should be open to the atmosphere to discharge air appropriately.

■ Do not narrow the EVT exhaust port (R) to a smaller one than the connected pipe port size.
Air may be taken in at the EVT exhaust port (R) due to valving element operation, causing foreign matter around the exhaust port (R) to enter the inside. Foreign matter may also enter when the exhaust port (R) is pointed upwards. Install a silencer and/or make the exhaust port (R) open downward.
● The actuator will not operate correctly if the exhaust air is not discharged smoothly. In the case of a manifold, exhaust air may prevent other EVTs' normal operation. ■ When supplying compressed air after connecting pipes, do not suddenly apply high pressure.
● The pipe connection could dislocate, causing the pipe tube to fly out, leading to accidents.
● CAUTION: If compressed air is supplied too slowly, sealing pressure may not be generated depending on the internal sealing mechanism of the EVT and may cause air leakage.

■ 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.

■ Observe the following precautions when using nylon tubes or urethane tubes for piping material.
- Use flame-resistant tubes they could come in contact with spatter.

■ Piping connections
- Compatible tube

Use a CKD specified tube.
Soft nylon (F-1500 Series)
Urethane (U-9500 Series)
When using a commercially available tube, check external dimension accuracy, thickness, and hardness. Use an urethane tube with a hardness of 93˚ or more (rubber hardness scale). If a tube that does not satisfy the diameter accuracy or hardness is used, the chucking force may decrease or the tube may come off or be difficult to insert.

Tube dimensions

O.D. mm	I.D. mm	
	Nylon	Urethane
ø4	ø2.5	ø2
ø6	ø4	ø4

Tolerance of outer diameter

Soft/hard nylon	±0.1 mm
Urethane ø4, ø6	+0.1 mm -0.15 mm

- Bending radius of tube

The tube's bending radius must be larger than the min. bending radius. (Otherwise, dislocation or leakage could result)

Bore size	Min. bending radius mm	
	Nylon	Urethane
ø4	10	10
ø6	20	20

- Min. tube length

As a guideline, the output port (A) tube length should have a capacity of 1 cc and over.
(Otherwise, vibration may result.)

Bore size	Min. length mm	
	Nylon	Urethane
ø4	200	320
ø6	80	80

- Cutting the tube

Use a tube knife (AZ-1200), and cut at a right angle to the axis. Air could leak if a tube cut diagonally is inserted.
- Tube connection state

From the end of the fitting, provide a straight section that is as long as the O.D. of the tube being used, and avoid sudden bends in the piping at the fitting insertion port. Check that the tube's tensile strength in the lateral direction does not exceed 40 N.
- Compatible blanking plug

Use a CKD specified blanking plug.
Blanking plug GWP□-B Series

Use/maintenance

Air Quality

⚠WARNING

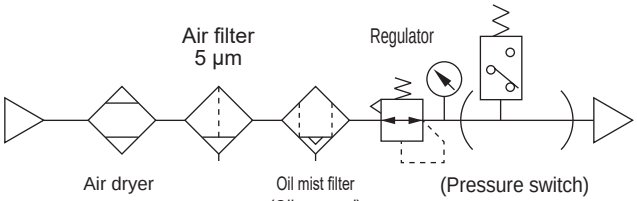
■ Do not supply anything other than compressed air.

■ Use clean compressed air that does not contain corrosive gases.

■ Use clean dry air of JIS B 8392-1:2012 (ISO 8573-1: 2010) [1:3:2] or equivalent.

⚠CAUTION

■ Poor air quality will worsen the characteristics and adversely affect the durability.
- For the pneumatic source, always supply clean air, from which solids, moisture and oil have been sufficiently removed with air dryer, filter and oil mist filter.



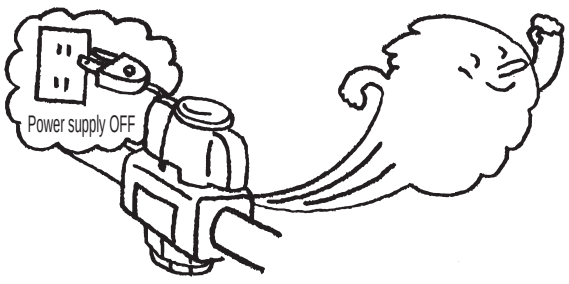
[Recommended air circuit]

- If the secondary side pressure is reduced, air on the secondary side will pass through the EVT interior and exit from the exhaust port (R). 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.
- Pneumatic components must be disassembled and assembled by qualified personnel.
Personnel involved in this step must have passed the Pneumatic Pressure Skill Test Class 2 or higher.
- Read the relevant product instruction manual thoroughly and fully familiarize yourself with the task before disassembling or assembling the pneumatic components.

Use/maintenance

⚠WARNING

■ 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.



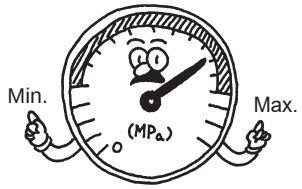
⚠CAUTION

■ To ensure that maintenance control is done correctly, conduct daily inspections and regular inspections.

● 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 pneumatics 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?

4. EVT 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?

■ 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 term of warranty 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 15cm³.

Others

⚠CAUTION

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

■ If power is turned OFF under pressure, control pressure is held.
To discharge pressure, lower set pressure and turn power OFF, or use a residual pressure exhaust valve, etc. This holding state is not guaranteed for a long periods.

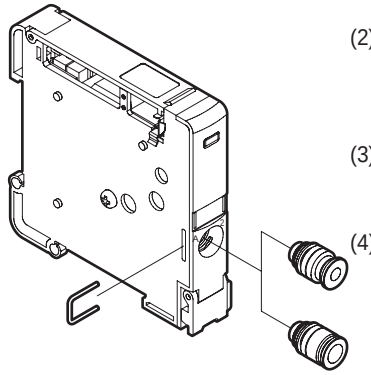
■ Check that supply pressure does not drop to less than the "Setting secondary pressure + max. control pressure x 0.1".
If primary side supply pressure is not supplied for long periods and when the secondary side control pressure is set greater than 0 MPa to 12% F.S., a loud thrumming sound will be generated and service life will be shortened. Avoid this type of usage.

■ When using the EVT Series, if there is leakage in the secondary piping, vibration could occur.
Securely pipe the system so that there is no leakage. Otherwise the set pressure cannot be maintained, causing a large buzzing noise and resulting in a shorter service life.

How to replace the cartridge fitting

⚠CAUTION

Check procedures before changing the push-in fitting size. If installed incorrectly, air leakage could occur.



(1) Remove the stopper pin with a screwdriver.
(2) Remove the fitting.
* Check that the filter is not removed when replacing the fitting.
(3) Insert the replacement fitting vertically to the end.
(4) Insert the stopper pin. Pull on the fitting to confirm that it is properly installed.

Model No. of cartridge push-in fitting

Model	Part name	Model No.
EVT	ø4 straight	4G1-JOINT-C4
	ø6 straight	4G1-JOINT-C6

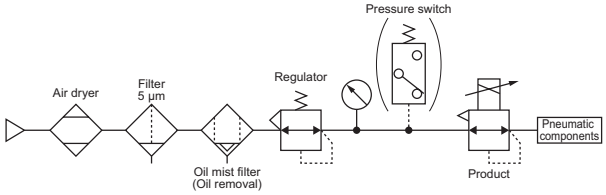
Product-specific cautions: EVS2 Series

Design/selection

⚠CAUTION

■ Poor air quality will worsen the characteristics and adversely affect the durability.

● The pneumatic source should use clean compressed air obtained by removing solid particles, moisture and oil from the fluid using air dryers, filters and oil mist filters.
(JIS B8392-1: 2012 (ISO 8573-1: 2010) [1:3:2])



If the control pressure is reduced, air on the secondary side will pass through inside the product and exit from the exhaust port (port R). 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 the regulator is left with the power OFF and the primary pressure applied, the secondary pressure could rise to the primary pressure level. If this poses a safety hazard, take system safety measures using a valve on the primary side or secondary side, etc.

■ If power is turned OFF under pressure, control pressure is held.

● To discharge pressure, lower set pressure and turn power OFF, or use a residual pressure exhaust valve, etc. This holding state is not guaranteed for extended periods of time.

■ The working pressure is applied to supply the specified pressure for the control pressure. Ensure that the working pressure stays within the specified range.

● Especially when the control pressure has been set to from 0% F.S. to 12% F.S. and the working pressure is not supplied. If the working pressure becomes near or lower than the control pressure, unnecessary operation of the solenoid valve will occur resulting in a shorter service life.

■ Control of this product will not be possible if the input signal range is only set from 0% F.S. to 1% F.S.

■ Applying an input signal outside the specifications will cause unnecessary operation of the solenoid valve, resulting in shorter service life and deteriorated performance. Keep the signal within the specifications.

Mounting, installation and adjustment

⚠CAUTION

FF The exhaust port (port R) should be open to the atmosphere to discharge air.

■ Min. tube length

As a guideline, the output port (A) pipe length should have a capacity of 1 cc and over. (Failure to do so could result in vibration)

(For reference) Tube size ø4: Min. 320 mm
Tube size ø6: Min. 80 mm

■ Do not use the product if there is leakage on the secondary side, the secondary side is open for blowing, or the secondary side is open to the atmosphere. Otherwise the set pressure cannot be maintained, causing a loud buzzing noise and resulting in a shorter service life.

■ In the wiring of the product, the ground line of the power supply serves as the signal common line. When driving several EVS2 units with one PC and D/A unit, depending on the D/A unit circuit, wiring could prevent the correct signal from being output. Consult with the PC manufacturer.

■ The optional shielded cable connector is a 4-conductor shield wire.

When not using the green wire (for analog output), insulate it to prevent it from contacting with other wires (including shielded wires).

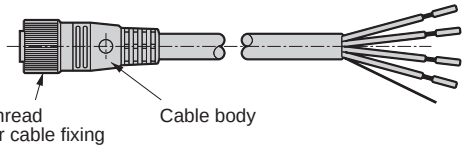
Use/maintenance

⚠ CAUTION

■ The optional shielded cable connector is a 4-conductor shield wire.

■ When not using the green special wire (for monitor output, etc.) for the EVS2 Series, insulate it to prevent it from contacting other wires (including shielded wires). Unintended connection to the ground, etc., could cause malfunction or damage to the product.
Also, the wiring must be kept away from noise sources such as an intense electric fields. Otherwise an external induction noise added to the analog output will cause product damage.
- The shielded wire on the body of the EVS2 Series is connected to the green wire of the optional shielded cable connector. Connect the green wire and shielded wire to the ground line of the power supply.

■ When connecting the shielded cable connector, keep the cable body stable and fasten the cable fixing screw by hand. If the cable is not kept stable, the connector on the product body side will turn and may be damaged.



■ 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 term of warranty 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 air quality must be clean compressed air from the recommended air circuit and the secondary side load capacity is to be 15 cm^3 for the EVS2 Series.