Safety Precautions

Always read this section before use.

Electro-pneumatic regulator

Design & selection

⚠CAUTION

- Response time 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 proceeding stage.
- 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 CR or diode on the inductive load (solenoid valve, relay, etc.) and remove noise when generated.
  - Separate wiring to proportional pressure controls 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 shield wire for the serial transmission communication cable must be treated based on communication specifications.
- When releasing secondary control pressure, such as an air blowing, to the atmosphere, pressure could fluctuate depending on piping conditions and flow conditions. Test the product under actual working conditions, or contact CKD before using this method.
- When selecting 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, and the accuracy, etc., 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.
- CE-compliance working conditions
  CKD electro pneumatic regulators (EV and MEVT Series) are conforming 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 assessment of this product is performed by using a cable pairing a power supply line and a signal line, treating this cable as a signal line.
  - This product is not equipped with surge protection. Implement surge protection measures on the system side.

Mounting / Installation / adjustment

⚠CAUTION

- Do not use the product where the product is exposed to direct sunlight or may come in contact with water or oil.
- Sufficiently flush air pipes before connecting to proportional pressure controls.
  Prevent pipe from catching tips of sealing tape when piping.
- Mount the product as indicated in the individual precautions.
- When connecting pipes, wrap sealing tape in the opposite direction from threads starting 2 mm inside from the end of piping threads.

- If sealing tape protrudes from pipe threads, it could be cut when screwed in. This could cause the tape to enter the pneumatic components and lead to faults.
- Correct pressure control is not possible if the exhaust port is plugged. Release this port to the atmosphere.
- Use proper torque to tighten the pipes when connecting them.
  - To prevent air leak and to protect threads from damage.
  - First tighten the screw by hand to prevent threads, 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

- Open the package in a clean room.
  - The products are wrapped in an antistatic sheet before packaged in a box. If you install the product in a clean room, we recommend you to take it out of the box outside the clean room before you bring it in and to open the package in the clean room.
- Tighten with an appropriate torque when using CKD cable option M12 connector. Recommended tightening torque: 0.4 to 0.49 N·m

During 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 board is assembled inside. Using the product with the cover or housing removed could result in unexpected accidents or trouble.

EV210*V Series for vacuum control

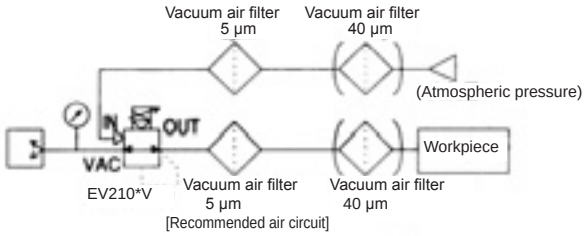
Design & selection

⚠WARNING

- If the product is left with working pressure (vacuum source pressure) applied when power is OFF, the secondary pressure degree of vacuum could rise to the working pressure. If this poses a safety hazard, take 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 an environment where dust is a concern, it is recommended to use a filter.
  - As with secondary side load, if piping or the inface of the load is contaminated, characteristics and durability could be adversely affected. Blow air to remove foreign matter before connecting.
  - Install an air filter as shown in the recommended air circuit below if necessary.



- 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 shut-off valve. This holding state is not guaranteed for a long time.
- Working pressure is used to supply specified pressure to control pressure. Use the device within the working pressure range.
  - If working pressure is not supplied for a long time when secondary pressure is set within more than 0 MPa to 12% F.S., or if the product is left for a long time with working pressure at "control pressure + (-10 kPa)" or less, product life is shortened.
- Set the input signal within the specifications.
  - Applying a signal exceeding the range could reduce the life and properties. Do not use in this way.
- The current input can be used with input signal 1 to 5 V, but as opposed to other voltage input types, input impedance is small (250 Ω).
  Use an appropriate voltage generator.
- When the current input 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.
    Consult with PLC maker.
- Apply a signal to offset the residual pressure (-5 kPa 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 if pressure is set to 0 MPa, secondary pressure is not released and remains within 0 to -5 kPa range.
  - If 0 MPa is required, install a 3-way valve on the secondary side to switch to atmosphere, etc.

During use & maintenance

⚠CAUTION

- Correct pressure control is not possible if 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, use 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 shield cable connector is a 4-conductor shield wire.
- When not using the green special application wire (monitor output, etc.), insulate so that there is no contact with other wires (including the shield wire). Unintended connection to the ground, etc., could cause malfunction or damage the product.
  Also wiring must be kept away from a noise source such as an intense electric field.
  Otherwise an external induction noise added to the monitor 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 discharge 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 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 million repeated operations, whichever is earlier, so use this as an inspection guideline.
  * The conditions for the 1 million operations listed in the term of warranty are as follows.
  When repeatedly, in a step, applying an input signal which causes the control pressure to rise from zero to 90% of the max. 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.

Thin electro pneumatic regulator MEVT Series

Design & selection

Circuit design

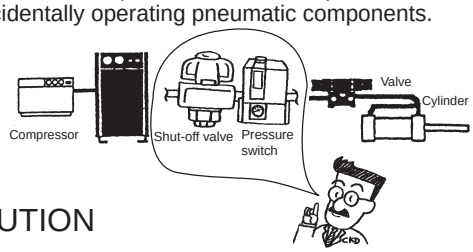
⚠WARNING

■ Understand compressed air features before designing a pneumatic circuit.
- The same functions as mechanical, hydraulic, and electrical methods cannot be anticipated when instantaneous holding of emergency stop is required.
- Pop-out, air discharge, or leakage due to air compression and expansion could occur.

■ Confirm that the product withstands the working environment.
- This product cannot be used in an atmosphere containing corrosive gas, 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 protect.
- This product cannot be used in an explosive gas atmosphere.

■ Care must be taken to the electrical circuit during emergency stop and cylinder operation, etc., during a service interruption.

■ Install a "pressure switch" and "shut-off valve" on the device's compressed air supply side.
- The pressure switch disables operation if set pressure cannot be reached. The residual pressure release valve will release compressed air left in the pneumatic pressure circuit, and will prevent the residual pressure from accidentally operating pneumatic components.



⚠CAUTION

■ Indicate the maintenance conditions in the device's instruction manual.
- The product's function can drop markedly with working status, working environment, and maintenance, and can prevent safety from being attained. With correct maintenance, the product functions can be used to the fullest.

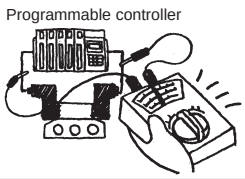
■ Use the constant voltage power supply.

■ Set the input signal within the specifications.
- Applying a signal exceeding the range could reduce the life and properties. Do not use in this way.

■ 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 prevent malfunctions due to 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 CR or diode on the inductive load (solenoid valve, relay, etc.), to remove noise where it is generated.
- Separate wiring to the MEVT device from strong magnetic fields.
- Use the designated wire material for the serial transmission line.
- If operation could be affected by noise, wire the power supply independently for each manifold if possible.
- Keep the power supply cable as short as possible.
- Do not share power with components such as an inverter, motor, etc., that cause noise.
- Do not lay the power wire, signal wire, and other power cables in parallel.

■ Precautions for wiring
- When wiring the common terminal block or D sub-connector, the power supply ground 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 output. Consult with the PLC maker. When using a shield wire, connect it to the ground 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 large beating sound will be generated and life will be shortened.

■ Residual pressure of 2 kPa or less (EVT100) or 10 kPa or less (EVT500) will be 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 the atmosphere, etc.

⚠CAUTION

■ Install a valve on the primary side and secondary side as necessary.
- If the regulator is left with power off and primary pressure applied, secondary pressure could rise to the primary pressure level. If this poses a safety hazard, take 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 when using outside designated specifications or for special applications.
- Ambient temperature
  · Higher than 50˚C or lower than 5˚C.
- Vibration/shock
  · Vibration 50 m/s^2 and over and impact 300 m/s^2 and over.

■ The accuracy of pressure is affected by self-heating due to energization in addition to temperature characteristics.

The more station No. of manifolds increases, the more the influence grows. To ensure a stabler pressure, set a longer stand-by time (over 30 min. after energization).

■ Drip-proof environment
This product's degree of protection is IP40 or equivalent. Do not install this product where water, salt, dust, or swarf is present or in a pressurized or depressurized environment. Use where the temperature changes greatly or where high humidity environment could cause damage through dew condensation.

■ CE-compliance working conditions
MEVT is conforming 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 of shorter than 3 m.

Mounting / Installation / adjustment

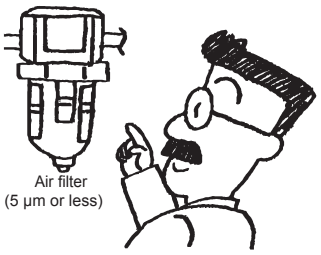
Mounting

⚠WARNING

■ Do not install MEVT by supporting it with pipes.
● Fix MEVT body.
■ Do not wash MEVT with water or solvent, or paint the body.
● Some resin parts may be damaged.
Paint could plug the exhaust port and result in malfunctions.

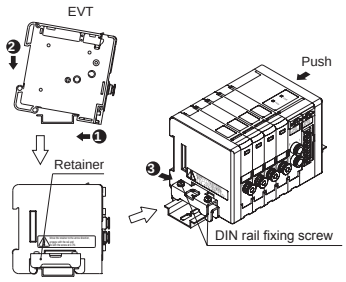
⚠CAUTION

■ Secure sufficient space around EVT for installation, removal, wiring, and piping work.
■ Install a pneumatic filter just before using the pneumatic component in the circuit.
■ Response is affected by working pressure and load volume. If repeatability with stable responsiveness is required, install a regulator in the proceeding stage.



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

Note: If retainer jaws are not securely set, air could leak or the product could drop. Check that these jaws are secure.



Piping

⚠CAUTION

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

■ Connect piping so that connections are not dislocated by system movement, vibration, or tension.
■ The exhaust port (R) should be open to the atmosphere to discharge air appropriately.
■ Do not narrow EVT exhaust port (R) to smaller than the connected pipe port size.
Otherwise air may be taken in at the exhaust port (R) of EVT due to valve element operation, causing foreign matter around the exhaust port (R) to enter the inside. Foreign matter may enter also when the exhaust port (R) is open upward.
Install a silencer and/or make the exhaust port (R) open downward.
● Actuator will not operate correctly if exhaust air is not discharged smoothly. In case of the manifold, exhaust air may prevent other EVTs' normal operation.
■ When supplying compressed air for the first time after connecting pipes, do not apply high pressure suddenly.
● Piping connection could be dislocated or the piping tube jump about 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 where spatter could scatter.

■ Piping connection
- Applicable tube

Use 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° and over (rubber hardness meter). If a tube that does not satisfy the diameter accuracy or hardness is used, the chucking force may drop, the tube may dislocate, or may be difficult to insert.

Tube size

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

Tolerance of O.D.

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, this could result in dislocation or leakage)

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

- Min. tube length

As a guide, the output port (A) tube length should have a capacity of 1 cc and over.
(Otherwise this could result in vibration)

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

- Cut of tube

Use a tube knife (AZ1200), and cut at a right angle to the axis. Air could leak if a tube cut at a slant is inserted.
- Tube connection state

Provide a straight section as long as O.D. of the tube being used from the end of the fitting, and avoid piping with a sudden bending at the fitting insertion port. Check that the tube's tensile force in the lateral direction does not exceed 40 N.
- Applicable blanking plug

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

During use & maintenance

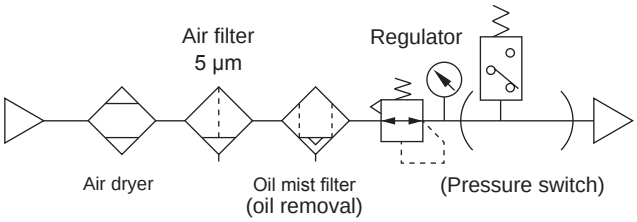
Quality of air

⚠ WARNING

■ Do not supply other than compressed air.
■ Use clean compressed air that does not contain corrosive gases.
■ Use clean dry air of "JISB8392-1:2012 (ISO85731-1:2010) [1:3:2] equivalent".

⚠ CAUTION

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



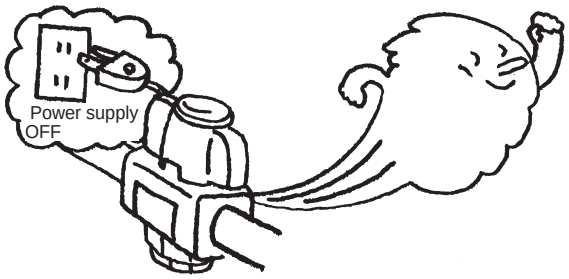
[Recommended air circuit]

- If the secondary side pressure is reduced, air on the secondary side will pass through inside EVT and exit from the exhaust port (R). Contamination on the secondary piping and the inface of the load will have an adverse effect on the characteristics, etc. Thus, keep the inface of the piping as clean as possible.
- Pneumatic components must be disassembled and assembled by a qualified worker.
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 work before disassembling or assembling the pneumatic component.

During use & maintenance

⚠ WARNING

■ Be sure to turn power OFF, stop supplying compressed air, and check that there is no residual pressure before starting maintenance.
- These are required conditions to ensure safety.



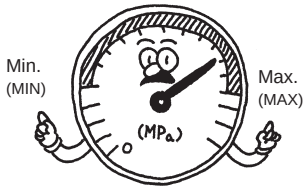
⚠CAUTION

■ Conduct daily inspections and regular inspections to ensure that maintenance control is done correctly.

● If maintenance is not correctly controlled, the product's functions could drop markedly and lead to a shortened life, damage, malfunctions, faults, and accidents.

1. Pressure control of supplied compressed air

● Is the set pressure supplied? Does the pressure gauge indicate the set pressure during operation of the device?



2. Control of pneumatics filter

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

3. Air leak management at pipe joints

● 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?
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 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 million repeated operations, whichever is earlier, so use this as an inspection guideline.

* The conditions for the 1 million operations listed in the term of warranty are as follows.
When the input signal which causes the control pressure to rise from zero to the max. control pressure is repeatedly applied in steps. The working air quality in this case shall be clean compressed air from the recommended air circuit. The secondary side load capacity shall be 15cm^3.

Others

⚠CAUTION

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

■ If power is turned OFF in pressurized state, control pressure is held.
To discharge pressure, lower set pressure and turn power OFF, or use a shut-off valve, etc. This holding state is not guaranteed for a long time.

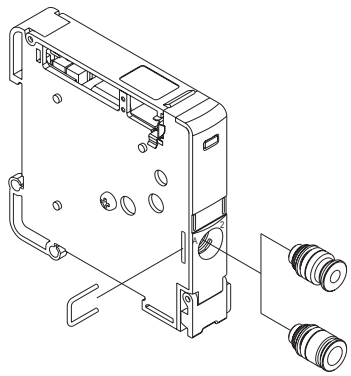
■ Check that supply pressure does not drop to less than the "set secondary pressure + max. control pressure × 0.1".
If supply pressure is not supplied for a long time when control pressure is set within more than 0 MPa to 12% F.S., large beating sound is generated and product life will be shortened. Avoid using so.

■ When using EVT Series, if there is leakage in 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 will result in shorter service life.

How to replace cartridge fitting

⚠CAUTION

Check procedures before changing the push-in fitting size. If installed not correctly, leakage could be occurred.



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

Model No. of cartridge push-in fitting

Model No.	Part name	Model No.
EVT	ø4 straight	4G1-JOINT-C4-P70
	ø6 straight	4G1-JOINT-C6-P70