Pneumatic components (Electro pneumatic Regulator)

Safety Precautions

Read this before starting use.
Please refer to Intro 43 for general details on the pneumatic components, and to "Safety Precautions" in this section for detailed cautions pertaining to each series.

1. Response time is affected by working pressure and load volume. If repeatability with stable response time is required, install a regulator in the previous stage.

2. Take the following measures to prevent malfunctions 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 load (solenoid valve, relay, etc.), to remove noise where it is 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.

3. When releasing secondary control pressure, such as an air blowing, to the atmosphere, pressure could fluctuate depending on piping conditions and flow conditions. Test under actual working conditions, or consult with CKD before using this method.

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

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

6. Tighten pipes with the appropriate torque.
   - Pipes must be connected with the appropriate torque to prevent air leakages and screw damage.
   - First tighten the screw by hand to prevent damage to screw threads, then use a tool.

Recommended tightening torque

<table>
<thead>
<tr>
<th>Set screw</th>
<th>Tightening torque N·m</th>
</tr>
</thead>
<tbody>
<tr>
<td>M5</td>
<td>1 to 1.5</td>
</tr>
<tr>
<td>Rc1/4</td>
<td>6 to 8</td>
</tr>
<tr>
<td>Rc3/8</td>
<td>13 to 15</td>
</tr>
</tbody>
</table>

1. Avoid using this product where it will be subject to direct sunlight, water, oil, etc.

2. Sufficiently flush air pipes before connecting to proportional pressure controls. Check that sealing tape is not caught when piping.

3. 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 solenoid valve and lead to faults.

4. Disassembling the regulator could result in problems. Operation after disassembly cannot be guaranteed.
ER100 Series

CAUTION

1 Poor air quality will worsen the characteristics and adversely affect the durability. For the pneumatics 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 the secondary pressure is lowered with an input signal, etc., the secondary air passes through the ER and is discharged from the exhaust port. Contamination of the secondary piping and 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.

The maximum current consumption for the voltage input type is 20mA or less for the ER150, and 25mA or less for the ER170.

CAUTION

1 As a principle, the ER100 must be installed vertically (with the coil part facing upward). The zero point and span point must be readjusted for other installation orientations. (As the default, the zero point is adjusted to 0.01MPa and the span point is adjusted to 0.49MPa (ER150) or 0.69MPa (ER170)).

Installation & Adjustment

1 Install at a place where the vibration is 2 m/s², 10 Hz or less.

WARNING

1 Do not loosen the orifice set screws when the primary pressure is applied as the orifice could pop out.

During use & Maintenance

1 During use & Maintenance
Pneumatic components (Electro Pneumatic and Electronic Regulators)

Safety Precautions

Read this before starting use.

Please refer to Intro 43 for general details on the pneumatic components, and to "Safety Precautions" in this section for detailed cautions pertaining to each series.

CAUTION

1 Poor air quality will worsen the characteristics and adversely affect the durability. For the pneumatics 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 ER and is discharged from the EXH port. Contamination of secondary piping and the inside of the load adversely affects characteristics, etc. Keep the inside of piping as clean as possible.

WARNING

1 Do not loosen the orifice set screws when the primary pressure is applied as the orifice could pop out.

Design & Selection

2 Failure to observe the following prevents correct pressure control:

- Do not set primary pressure to "set secondary pressure + 50 kPa" or less when the input signal is being input. Do not input the input signal (including power for the voltage input type) for 10 hours and over while primary pressure is released to the atmosphere.
- Install a pressure switch on the primary side so that if primary pressure drops to "set secondary pressure + 50 kPa" or less, the input signal and power to the ER300 are turned off.
- The body and internal circuit are connected with a capacitor, so do not conduct insulation resistance or withstand voltage tests, or the circuit is damaged.

3 The monitor output signal voltage differs with the model, and may vary with the product. Refer to the shaded section in the monitor output voltage range graph on page 507. Check output voltage before starting use. Note that even if output voltage differs, individual product precision is guaranteed. When connecting a detector to monitor output, use a detector with an input impedance of 1 MΩ and over.

ER300 Series

During use & Maintenance
EV2000 Series, EV0000 Series, EVS000 Series

**WARNING**

1. If the product is left with primary pressure applied when power is not ON, secondary pressure could rise to primary pressure. If this could pose a safety hazard, take measures by using a valve on the primary or secondary side, etc.

**CAUTION**

1. Poor air quality will worsen the characteristics and adversely affect the durability. For the pneumatics 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.

2. If power is turned OFF under pressure, secondary pressure is held. To discharge pressure, lower set pressure with an input signal and then turn power OFF, or use a shut-off valve, etc. This holding state is not guaranteed for a long time.

3. Primary pressure is used to supply specified pressure to secondary pressure. Check that it does not drop to less than the "set secondary pressure + maximum control pressure x 0.1". If primary pressure is not supplied for a long time when secondary pressure is set within more than 0 MPa to 12% F.S., product life is shortened. Avoid this use.

4. With the EV2000 Series, even if pressure is set to 0 MPa, secondary pressure is not released and remains at less than 5 kPa. If 0 MPa is required, bleed the secondary side, or install a 3-way valve on the secondary side to switch to atmosphere, etc.

5. When using the EV0000 Series and EVS000 Series, if there is a leak in secondary piping, oscillation could occur. Accurately pipe so that there are no leaks. When using for blowing applications, or when back pressure is applied on the secondary side, it is not possible to maintain set pressure. A large beating sound is generated and life is shortened. Avoid this use.

6. When the current input type is wired, the power ground and signal common are shared. When driving 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 the PLC maker.

7. In the EV2509 Series, two supply port systems are provided on the left and right of the unit. These are indicated as IN1 and IN2. Plug the system not used.

8. The current input type 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.

9. When using a cylinder with large leakage, such as a fine speed cylinder, with the EV0000 Series or EVS000 Series, it is not possible to maintain set pressure. A large beating sound is generated and life is shortened. Avoid this use.

**WARNING**

1. The optional shield cable connector is a 4-core shield wire. With other wires (including the shield wire).

**During use & Maintenance**

1. The optional shield cable connector is a 4-core shield wire. When not using the green special application wire (monitor output, etc.) with the EV2000 Series or EV0000 Series, insulate so that there is no contact with the green wire and shield wire to the power supply ground.
Pneumatic components (Electro pneumatic Regulator)

Safety Precautions

Read this before starting use.
Please refer to Intro 43 for general details on the pneumatic components, and to "Safety Precautions" in this section for detailed cautions pertaining to each series.

EV210□V Series for Vacuum Control

**WARNING**

1. If the product is left with working pressure (vacuum source pressure) applied when power is not ON, 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**

1. 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.

2. If power is turned OFF while the working pressure side is in a vacuum state, secondary pressure is held. To release secondary pressure to the atmospheric level, lower the input signal and then turn power OFF, or use a shut-off valve, etc. This holding state is not guaranteed for a long time.

**CAUTION**

1. Correct pressure control is not possible if the IN port is plugged. Release this port to the atmosphere.

2. When connecting a joint to the piping port (VAC, OUT, IN), use seal material (sealing tape, gel sealant) to prevent leaks. Check that seal material or piping screw swarf does not enter the port. When tightening the VAC port joint, use a wrench on the intake block (27).

**CAUTION**

1. When using the oil-sealed rotary vacuum pump, break the vacuum with a shut-off valve, etc., after turning vacuum pump power OFF to prevent oil from flowing.
WARNING

Designing the circuit

1 Fully understand characteristics of compressed air before designing the pneumatic circuit.
   • If instantaneous stopping and holding are required during an emergency stop, functions equivalent to mechanical, hydraulic or electrical methods cannot be anticipated.
   • Pop out, ejection, and leaks are caused by air compressibility and expansion.

2 Check that the product can withstand the working environment.
   • This product cannot be used in an environment containing corrosive gas, chemical liquids, solvents, water, steam 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 a flammable environment.

CAUTION

1 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.

2 Use the constant voltage power supply.

3 Check the leakage current to prevent malfunctions caused by leakage current from other control components.
   When using a programmable controller, etc., leakage current could cause the EVT to malfunction.

4 Take the following measures to prevent malfunctions 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.), and 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 when possible.

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

4 Install a "pressure switch" and "shut-off valve" on the device’s compressed air supply side.
   • The pressure switch uses disable operation if set pressure cannot be reached. The shut-off valve exhausts compressed air in the pneumatic circuit, and prevents accidents caused by operation of the pneumatic devices by residual pressure.

5 Precautions for wiring
   • When wiring the common gland and D-sub connector, the power supply gland 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. Consult with the PLC maker. When using a shield wire, connect it to the ground on the power supply side.

6 This regulator cannot be used with a cylinder having a large leakage rate, such as a fine speed cylinder or an air bearing cylinder.
   • When using for blowing applications or when back pressure is applied on the secondary side, it is not be possible to maintain the set pressure. A large beating sound is generated and life is shortened. Avoid this use.

For 24 VDC 1.8 mA or less

Design & Selection

Thin Electro Pneumatic Regulator MEVT Series
### Safety Precautions

Read this before starting use.
Please refer to Intro 43 for general details on the pneumatic components, and to "Safety Precautions" in this section for detailed cautions pertaining to each series.

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#### Thin Electro Pneumatic Regulator MEVT Series

<table>
<thead>
<tr>
<th><em>CAUTION</em></th>
<th><em>Design &amp; Selection</em></th>
</tr>
</thead>
</table>
| **7** Use a valve on the supply side and output side when required.  
- If the product is left with the supply pressure applied when power is not ON, secondary pressure could rise to the supply pressure. If this could pose a safety hazard, take measures on the system by using a valve on the supply side or output side, etc. | **6** Working environment  
Avoid using this product where it is subject to direct sunlight, water, or oil, etc. Consult with CKD on specifications when using outside designated specifications or for special applications.  
- Ambient temperature  
  - Do not use this product in an environment hotter than 50°C or an environment colder than 5°C.  
  - Vibration and impact  
  - Do not use this product where vibration exceeds 50 m/s², or where impact exceeds 300 m/s². |

<table>
<thead>
<tr>
<th><em>WARNING</em></th>
<th><em>Installation &amp; Adjustment</em></th>
</tr>
</thead>
</table>
| **1** Do not install the MEVT by supporting it with pipes.  
- Fix the MEVT. | **2** Do not wash the MEVT with water or solvent, or paint the body.  
- The MEVT is made of resin parts, and could be damaged. Paint could plug the exhaust port and result in malfunctions. |

<table>
<thead>
<tr>
<th><em>CAUTION</em></th>
<th><em>Installation &amp; Adjustment</em></th>
</tr>
</thead>
</table>
| **2** Install an air filter before the circuit using the pneumatic components.  
**3** The response time is affected by working pressure and load volume. If reproducibility with stable response time is required, install a regulator before the product. | 1. Set the jaws into the DIN rail in the order of (1) and (2).  
2. Press the retainer in the direction of (3).  
3. While holding down so that there is no gap between blocks, tighten DIN set screws. (Recommended tightening torque 0.6 to 0.8 N·m)  
- If retainer jaws are not securely set, air could leak or the product could drop. Check that these jaws are secure. |

| **4** Mounting  
- 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 at pitch of 50 to 100 mm, and check that there are no problems with installation.  
- There is no restriction for installation or mounting, but vibration could loosen set screws and drop the manifold.  
- Mounting and removal of the MEVT  
  **Removal**  
  Loosen the four DIN rail set screws (two each on left/right)  
  **Mounting** | **Piping**  
**1** Do not remove 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 faults or malfunctions.  
**2** Flush pipes just before connecting to the pneumatic component.  
- Check that foreign matter in pipes does not enter the EVT. |
Thin Electro Pneumatic Regulator MEVT Series

⚠️ CAUTION

Installation & Adjustment

Piping

3. Pipe so that the pipe connection does not dislocate when the device moves or vibrates, or when the pipe is pulled, etc.

4. Release the exhaust port (R) to the atmosphere so that exhaust is proper.

5. Do not restrict the EVT exhaust port (R) to a bore smaller than the piping connection port. Valving element operation causes breathing at the EVT exhaust port (R), so foreign matter around(R) could be sucked in or enter if the exhaust port (R) is facing upward. Install a silencer or pipe in the exhaust port (R) facing downward.

- The actuator does not function correctly if exhaust is not smooth. When using a manifold, exhaust could prevent the other EVT units from functioning correctly.

6. When supplying compressed air after connecting pipes, check that high pressure is not supplied suddenly.

- The pipe connection could dislocate causing the piping tube to bounce and result in accidents.
- NOTE: If compressed air is supplied too slowly, the sealing mechanism in the EVT does not form a seal and results in air leaks.

7. Before supplying compressed air after connecting pipes, check that there are no air leaks at any pipe connections.

- Apply leakage detection fluid onto pipe connections, and check for air leaks.

8. Observe the following precaution when using nylon tubes or urethane tubes for piping material.

- Use flame-resistant tubes where spatter could scatter.

9. Connecting pipes

- Applicable tubes
  Use CKD-designated tubes.
  Soft nylon (F-1500 Series)
  Urethane (U-9500 Series)

When using a commercially available tube, check external dimension accuracy, thickness, and hardness. Use a urethane tube with a hardness of 93° and over (rubber hardness meter).

If a tube that does not satisfy diameter accuracy or hardness is used, chocking may drop or the tube may be dislocated or difficult to insert.

Tube dimensions

<table>
<thead>
<tr>
<th>Outer diameter mm</th>
<th>Bore size mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 dia. 2.5 dia.</td>
<td>2 dia. 6 dia. 4 dia. 4 dia.</td>
</tr>
</tbody>
</table>

Tolerance of outer diameter

- Soft/hard nylon ±0.1mm
- Urethane 4 dia., 6 dia. +0.1mm -0.15mm

- Tube bending radius
  The tube's bending radius must be higher than the minimum bending radius. Otherwise, this could result in dislocation or leaks.

<table>
<thead>
<tr>
<th>Tube diameter</th>
<th>Minimum bending radius mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 dia. 10</td>
<td>10</td>
</tr>
<tr>
<td>6 dia. 20</td>
<td>20</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Tube diameter</th>
<th>Minimum length mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 dia. 200</td>
<td>80</td>
</tr>
<tr>
<td>6 dia. 320</td>
<td>80</td>
</tr>
</tbody>
</table>

- Cutting the tube
  Use a tube cutter (AZ1200), and cut at a right angle to the axis.
  Air could leak with a tube cut at a slant.

- State of tube connection
  Provide a straight section as long as the outer diameter of the tube used from the end of the joint, and avoid piping with a sudden curve at the joint insertion port. Check that the tube's lateral tensile strength does not exceed 40 N.

- Applicable blanking plug
  Use a CKD-designated blanking plug.
  Blanking plug GWP*-B Series
Thin Electro Pneumatic Regulator MEVT Series

**WARNING**

**During use & Maintenance**

**Air quality**

1. Supply only compressed air.
2. Supply clean compressed air that contains no corrosive gases.
3. Use “ISO Class 1.3.2” clean dry air from which oil has been removed.

**Operation and maintenance**

1. Before servicing the product, turn power OFF, stop the compressed air supply, and check that there is no residual pressure.
   - This condition is mandatory for safety.

**CAUTION**

**During use & Maintenance**

**Air quality**

1. 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]

- When control pressure is lowered with an input signal, etc., secondary air passes through the EVT and is discharged from the exhaust port (R). Contamination of secondary piping and the inside of the load side adversely affect characteristics, etc. Keep the inside of piping as clean as possible.
- The pneumatic component 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.

Pneumatic components (Electro pneumatic Regulator)

**Safety Precautions**

Read this before starting use. Please refer to Intro 43 for general details on the pneumatic components, and to "Safety Precautions" in this section for detailed cautions pertaining to each series.
**Thin Electro Pneumatic Regulator MEVT Series**

**CAUTION**

**During use & Maintenance**

**Operation and maintenance**

1. **Plan daily inspections and periodic inspections to ensure that maintenance is correctly controlled.**
   - If maintenance is not correctly controlled, product functions could drop markedly and shorten life or cause damage, malfunctions, faults, or accidents.

2. **Control of supplied compressed air pressure**
   - Is set pressure supplied? Does the pressure gauge indicate set pressure during operation of the device?

   ![Maximum (MNH) Minimum (MNH) graph]

3. **Control of air filter**
   - Is the drain correctly discharged?
   - Is the bowl or element dirty?

4. **Control of compressed air leaks from piping connections**
   - Is the state of the connection, especially at the movable sections, normal?

5. **Control of EVT operation state**
   - Are operations delayed? Is exhaust normal?

6. **Control of pneumatic actuator operation**
   - Is operation smooth? Is the end stop state normal? Is the coupling with the load normal?

**Miscellaneous**

1. **Disassembling the regulator could result in trouble.**
   - Operation after disassembly cannot be guaranteed.

2. **If power is turned OFF under pressure, 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.

3. **Check that supply pressure does not drop to less than the "control pressure + maximum control pressure x 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 is cut. Avoid this use.

4. **When using the EVT Series, if there are leaks in secondary piping, vibration could occur.**
   - Securely pipe the system so that there are no leaks. Leaks will prevent set pressure from being held, large beating sound is generated and product life is shortened. Avoid this use.

**Replacing the cartridge joint**

When changing the push in cartridge joint size, refer to the procedures and replace. If the cartridge joint is not installed correctly, air leaks, etc., could occur.

1. Remove the stopper pin with a screw driver, etc.
2. Pull out the joint.
   - Check that the filter is not removed when replacing.
3. Insert the joint for replacement vertically until it reaches the back.
4. Insert the stopper pin. Pull on the joint and check that it is mounted properly.

**Push in cartridge joint model No.**

<table>
<thead>
<tr>
<th>Model</th>
<th>Part name</th>
<th>Model No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVT</td>
<td>4 dia. straight</td>
<td>EVT-JOINT-C4</td>
</tr>
<tr>
<td></td>
<td>6 dia. straight</td>
<td>EVT-JOINT-C6</td>
</tr>
</tbody>
</table>

For further assistance, please consult the manual or contact the manufacturer.
Pneumatic components (Electro pneumatic Regulator)

Safety Precautions

Read this before starting use.
Please refer to Intro 43 for general details on the pneumatic components, and to "| Safety Precautions" in this section for detailed cautions pertaining to each series.

Proportional valve 3AP, 2/3AF Series

CAUTION

1. This regulator has a highly accurate metal spool structure, so poor quality air adversely affects characteristics and durability. Use an air filter to suppress the generation of drain, and a submicron air filter (0.3\(\mu\)m) to remove solids such as tar and carbon.

Design & Selection

2. This regulator can be used in prelubricated applications. If lubrication is required, use Turbine Oil Class 1 (ISOVG32). Lubrication is effective in lowering the effect of air quality and lengthens life.

3. When using the pressure type (3AP), design secondary load volume as 300 cm\(^3\) and over to prevent secondary pressure from vibrating.

4. Characteristics of flow control (2AF, 3AF) indicate the effective sectional area for the valve. When designing the system, the composite effective sectional area with piping and joints is applied and linearity changes. The effective sectional area of parts other than the valve should be designed with 1.4-fold to 2-fold larger effective sectional area. Note that if the cylinder has a restricted connection port, the required speed may not be attained.

CAUTION

1. Install the proportional valve so the spool is parallel.

2. The proportional valve will become hot, so do not install it near devices, etc., affected by heat.

Installation & Adjustment

3. Vibration is generated from the proportional valve body, so use vibration proofing when installing the valve near devices, etc., easily affected by vibration.

APC Series

WARNING

1. When using AC power specifications, there is a risk of electrical shock if the AC power supply section is touched while power is ON. Turn power OFF before starting wiring. Do not touch charged sections with wet hands.

CAUTION

1. The controller is damaged if power terminal and input signal terminal polarities are reversed.

2. Do not input a setting signal from an external source while the potentiometer is connected.

3. Do not excessively tighten terminal screws.

4. The APC body becomes hot, so do not install it near devices, etc., affected by heat.
**WARNING**

1. Use a 2 kΩ or larger external variable resistor for manual purposes.

2. Input signals for the EV Series and ER Series differ with the model. Select the "0 to 10V" type input signal when using the PI Series.

**INSTALLATION & ADJUSTMENT**

1. There is a risk of electrical shock if the AC power supply section is touched while power is ON. Turn power OFF before starting wiring. Do not touch charged sections with wet hands.

**CAUTION**

1. Do not wire the output terminal over long distances.

2. Do not excessively tighten terminal screws.

3. Connect external output power only to the ER300 Series or EV Series. The controller cannot be connected.

4. Avoid using this product where it is subject to vibration or impact.

5. Twist the PI output wire when possible. Twist the two wires.