



Manufacture of the E5GN will be discontinued in March 2015.

## Safety Precautions for E5□N/E5□N-H/E5□N-HT

# Safety Precautions for E5□N/E5□N-H/E5□N-HT

CSM\_E5\_N\_E5\_N-H\_CN\_E\_3\_3

## Safety Precautions

Refer to *Safety Precautions for All Temperature Controllers*.

### CAUTION

Do not touch the terminals while power is being supplied.

Doing so may occasionally result in minor injury due to electric shock.



Do not allow pieces of metal, wire clippings, or fine metallic shavings or filings from installation to enter the product. Doing so may occasionally result in electric shock, fire, or malfunction.



Do not use the product where subject to flammable or explosive gas. Otherwise, minor injury from explosion may occasionally occur.



Do not leave the cable for the Support Software connected to the product. Malfunction may occur due to noise in the cable.



Do not use the Temperature Controller or Conversion Cable if it is damaged. Doing so may occasionally result in minor electric shock or fire.



Never disassemble, modify, or repair the product or touch any of the internal parts. Minor electric shock, fire, or malfunction may occasionally occur.



#### CAUTION - Risk of Fire and Electric Shock

a) This product is UL listed as Open Type Process Control Equipment. It must be mounted in an enclosure that does not allow fire to escape externally.

b) More than one disconnect switch may be required to de-energize the equipment before servicing the product.

c) Signal inputs are SELV, limited energy. \*1

d) Caution: To reduce the risk of fire or electric shock, do not interconnect the outputs of different Class 2 circuits. \*2



If the output relays are used past their life expectancy, contact fusing or burning may occasionally occur. Always consider the application conditions and use the output relays within their rated load and electrical life expectancy. The life expectancy of output relays varies considerably with the output load and switching conditions.



Tighten the terminal screws to the rated torque of between 0.74 and 0.90 N·m. \*3 Loose screws may occasionally result in fire.



Set the parameters of the product so that they are suitable for the system being controlled. If they are not suitable, unexpected operation may occasionally result in property damage or accidents.



A malfunction in the product may occasionally make control operations impossible or prevent alarm outputs, resulting in property damage. To maintain safety in the event of malfunction of the product, take appropriate safety measures, such as installing a monitoring device on a separate line.



A semiconductor is used in the output section of long-life relays. If excessive noise or surge is impressed on the output terminals, a short-circuit failure is likely to occur. If the output remains shorted, fire will occur due to overheating of the heater or other cause. Take measures in the overall system to prevent excessive temperature increase and to prevent fire from spreading.



Do not allow pieces of metal or wire cuttings to get inside the cable connector for the Support Software. Failure to do so may occasionally result in minor electric shock, fire, or damage to equipment.



Do not allow dust and dirt to collect between the pins in the connector on the Conversion Cable. Failure to do so may occasionally result in fire.



When inserting the body of the Temperature Controller into the case, confirm that the hooks on the top and bottom are securely engaged with the case. If the body of the Temperature Controller is not inserted properly, faulty contact in the terminal section or reduced water resistance may occasionally result in fire or malfunction.



When connecting the Control Output Unit to the socket, press it in until there is no gap between the Control Output Unit and the socket. Otherwise contact faults in the connector pins may occasionally result in fire or malfunction.



\*1. An SELV circuit is one separated from the power supply with double insulation or reinforced insulation, that does not exceed 30 V r.m.s. and 42.4 V peak or 60 VDC.

\*2. A class 2 power supply is one tested and certified by UL as having the current and voltage of the secondary output restricted to specific levels.

\*3. However, use the following tightening torques: E5CN-U: 0.5 N·m, E5GN: 0.43 to 0.58 N·m, auxiliary output 2 of E5GN: 0.5 to 0.6 N·m.

## Precautions for Safe Use

Be sure to observe the following precautions to prevent malfunction or adverse affects on the performance or functionality of the product. Not doing so may occasionally result in faulty operation.

1. This product is specifically designed for indoor use only.

Do not use this product in the following places:

- Places directly subject to heat radiated from heating equipment.
- Places subject to splashing liquid or oil atmosphere.
- Places subject to direct sunlight.
- Places subject to dust or corrosive gas (in particular, sulfide gas and ammonia gas).
- Places subject to intense temperature change.
- Places subject to icing and condensation.
- Places subject to vibration and large shocks.

2. Use and store the product within the rated ambient temperature and humidity.

Gang-mounting two or more Temperature Controllers, or mounting Temperature Controllers above each other may cause heat to build up inside the Temperature Controllers, which will shorten their service life. In such a case, use forced cooling by fans or other means of air ventilation to cool down the Temperature Controllers.

3. To allow heat to escape, do not block the area around the product. Do not block the ventilation holes on the product.

4. Be sure to wire properly with correct polarity of terminals.

5. Use the specified size of crimp terminals for wiring for the E5CN, E5AN, or E5EN (M3.5, width of 7.2 mm or less). For open-wired connections to the E5CN, E5AN, or E5EN, use stranded or solid copper wires with a gauge of AWG24 to AWG14 (equal to a cross-sectional area of 0.205 to 2.081 mm<sup>2</sup>). (The stripping length is 5 to 6 mm.) Up to two wires of the same size and type or two crimp terminals can be connected to one terminal. Do not connect more than two wires or more than two crimp terminals to the same terminal.

Use the specified size of crimp terminals for wiring for the E5GN (M3.0, width of 5.8 mm or less). For open-wired connections to the E5GN, use stranded or solid copper wires with a gauge of AWG24 to AWG18 (equal to a cross-sectional area of 0.205 to 0.8231 mm<sup>2</sup>). (The stripping length for screw terminals is 6 to 8 mm. The stripping length for screwless clamp terminals is 10 mm. The stripping length for auxiliary output 2 is 6 mm.) Up to two wires of the same size and type or two crimp terminals can be connected to one terminal. Do not connect more than two wires or more than two crimp terminals to the same terminal. Ferrules for screwless clamp terminals must be 0.8 to 1.4 mm in diameter and the exposed conductor must be 8 to 12 mm in length. Ferrules for auxiliary output 2 must be 0.8 to 1.5 mm in diameter and the exposed conductor must be 6 mm in length.

6. Do not wire the terminals that are not used.
7. To avoid inductive noise, keep the wiring for the product's terminal block away from power cables carry high voltages or large currents. Also, do not wire power lines together with or parallel to product wiring. Using shielded cables and using separate conduits or ducts is recommended.  
Attach a surge suppressor or noise filter to peripheral devices that generate noise (in particular, motors, transformers, solenoids, magnetic coils, or other equipment that have an inductance component).  
When a noise filter is used at the power supply, first check the voltage or current, and attach the noise filter as close as possible to the product.  
Allow as much space as possible between the product and devices that generate powerful high frequencies (high-frequency welders, high-frequency sewing machines, etc.) or surge.
8. Use this product within the rated load and power supply.
9. Make sure that the rated voltage is attained within two seconds of turning ON the power using a switch or relay contact. If the voltage is applied gradually, the power may not be reset or output malfunctions may occur.
10. Make sure that the Temperature Controller has 30 minutes or more to warm up after turning ON the power before starting actual control operations to ensure the correct temperature display.
11. When executing self-tuning, turn ON power to the load (e.g., heater) at the same time as or before supplying power to the product. If power is turned ON to the product before turning ON power to the load, self-tuning will not be performed properly and optimum control will not be achieved.
12. A switch or circuit breaker must be provided close to the product. The switch or circuit breaker must be within easy reach of the operator, and must be marked as a disconnecting means for this unit.
13. Always turn OFF the power supply before removing the body of the E5CN, E5AN, or E5EN from the case, and never touch nor apply shock to the terminals or electronic components. When inserting the interior of the product, do not allow the electronic components to touch the case.  
Always turn OFF the power supply before removing the terminal block from the E5GN, and never touch nor apply shock to the terminals or electronic components.
14. Do not use paint thinner or similar chemical to clean with. Use standard grade alcohol.
15. Design the system (e.g., control panel) considering the 2 seconds of delay that the product's output to be set after power ON.
16. The output may turn OFF when shifting to certain levels. Take this into consideration when performing control.
17. The number of non-volatile memory write operations is limited. Therefore, use RAM write mode when frequently overwriting data during communications or other operations.
18. Always touch a grounded piece of metal before touching the Temperature Controller to discharge static electricity from your body.
19. Do not remove the terminal block from the E5CN, E5AN, or E5EN. Doing so may result in failure or malfunction.
20. Control outputs (for driving SSR) that are voltage outputs are not isolated from the internal circuits. When using a grounded thermocouple, do not connect any of the control output terminals to ground. (Doing so may result in an unwanted circuit path, causing error in the measured temperature.)
21. When replacing the body of the E5CN, E5AN, or E5EN, check the condition of the terminals. If corroded terminals are used, contact failure in the terminals may cause the temperature inside the E5CN, E5AN, or E5EN to increase, possibly resulting in fire. If the terminals are corroded, replace the case as well.  
When removing the terminal block of the E5GN to replace the Digital Temperature Controller, check the condition of the terminals. If corroded terminals are used, contact failure in the terminals may cause the temperature inside the Digital Temperature Controller to increase, possibly resulting in fire. If the terminals are corroded, replace the terminal block as well.
22. Use suitable tools when taking the Temperature Controller apart for disposal. Sharp parts inside the Temperature Controller may cause injury.
23. When applying Lloyd's standards, install the Digital Temperature Controller according to the requirements given in *Shipping Standards*.
24. Do not use the Temperature Controller if the front sheet is peeling off or torn.
25. Check the orientation of the connectors on the Conversion Cable before connecting the Conversion Cable. Do not force a connector if it does not connect smoothly. Using excessive force may damage the connector.
26. Do not place heavy object on the Conversion Cable, bend the cable past its natural bending radius, or pull on the cable with undue force.
27. Do not connect or disconnect the Conversion Cable while communications are in progress. Product faults or malfunction may occur.
28. Make sure that the Conversion Cable's metal components are not touching the external power terminals.
29. Do not touch the connectors on the Conversion Cable with wet hands. Electrical shock may result.
30. Before using infrared communications, correctly attach the enclosed Mounting Adapter to the cable for the Support Software. When connecting the infrared port on the cable to the Support Software into the Adapter, insert the connector to the specified line. Communications may not be possible if the connector is not connected properly.
31. Read the information provided in the catalog and manual and be sure you understand it before attaching a Control Output Unit.
32. Check the specifications of the Control Output Unit and use it correctly.
33. For the power supply voltage input, use a commercial power supply with an AC input. Do not use the output from an inverter as the power supply. Depending on the output characteristics of the inverter, temperature increases in the product may cause smoke or fire damage even if the product has a specified output frequency of 50/60 Hz.

## Shipping Standards

The E5CN, E5CN-H, E5AN, E5AN-H, E5EN, and E5EN-H comply with Lloyd's standards. When applying the standards, the following installation and wiring requirements must be met in the application.

## Application Conditions

### 1) Installation Location

The E5CN, E5CN-H, E5AN, E5AN-H, E5EN, and E5EN-H comply with installation category ENV1 and ENV2 of Lloyd's standards. Therefore, they must be installed in a location equipped with air conditioning. They must therefore be installed in a location equipped with air conditioning. They cannot be used on the bridge or decks, or in a location subject to strong vibration.

### 2) Wiring Conditions

Install the recommended ferrite core and wrap the line around it three turns for the applicable lines (e.g., power supply cable line and signal lines) of the models listed in the following table. (See illustrations.) Install the ferrite cores as close to the terminal block of the E5□N as possible. (As a guideline, the ferrite core should be within 10 cm of the terminal block.)

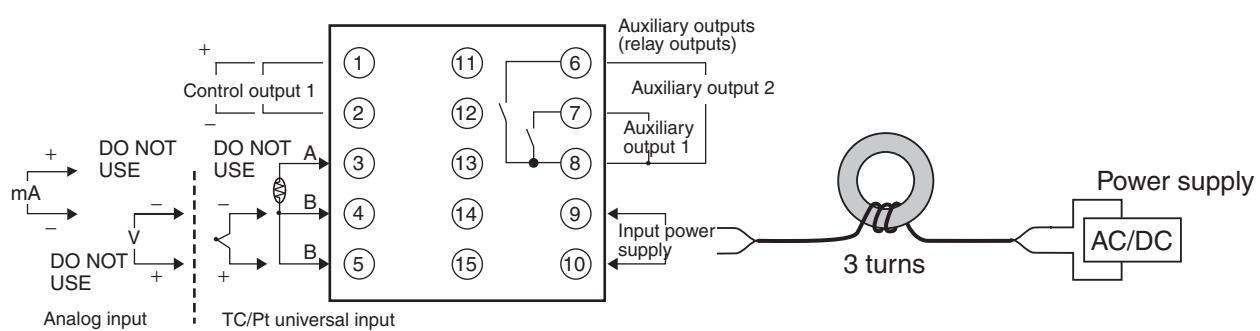
#### ● Lines Requiring Ferrite Cores

Model	Signal and power lines provided with ferrite cores
E5CN, E5CN-U, or E5CN-H	Input power supply
E5EN, E5AN, E5EN-H, or E5AN-H	Input power supply and I/O lines (control outputs (1 and 2), communications, event inputs (1 to 4), transfer output, and external power supply (Advanced Type models do not have an external power supply.))

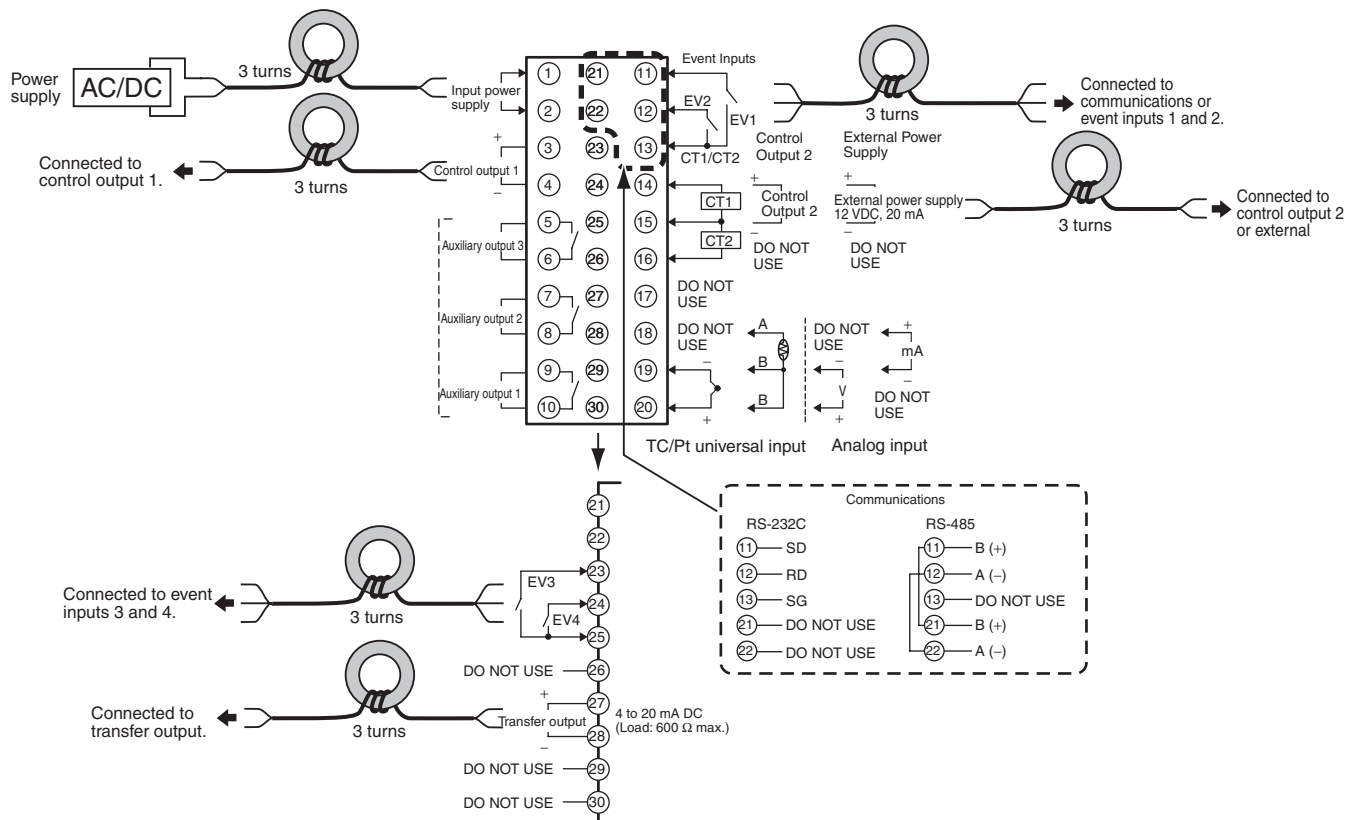
#### ● Recommended Ferrite Core

Manufacturer	Seiwa Electric Mfg. Co., Ltd.
Model	E04RA310190100

#### ● Ferrite Core Connection Examples



#### E5AN/E5EN/E5AN-H/E5EN-H



## Precautions for Correct Use

### Service Life

1. Use the product within the following temperature and humidity ranges:  
Temperature: -10 to 55°C (with no icing or condensation)  
Humidity: 25% to 85%  
If the product is installed inside a control board, the ambient temperature must be kept to under 55°C, including the temperature around the product.
2. The service life of electronic devices like Temperature Controllers is determined not only by the number of times the relay is switched but also by the service life of internal electronic components. Component service life is affected by the ambient temperature: the higher the temperature, the shorter the service life and, the lower the temperature, the longer the service life. Therefore, the service life can be extended by lowering the temperature of the Temperature Controller.
3. When two or more Temperature Controllers are mounted horizontally close to each other or vertically next to one another, the internal temperature will increase due to heat radiated by the Temperature Controllers and the service life will decrease. In such a case, use forced cooling by fans or other means of air ventilation to cool down the Temperature Controllers. When providing forced cooling, however, be careful not to cool down the terminals sections alone to avoid measurement errors.

### Measurement Accuracy

1. When extending or connecting the thermocouple lead wire, be sure to use compensating wires that match the thermocouple types.
2. When extending or connecting the lead wire of the platinum resistance thermometer, be sure to use wires that have low resistance and keep the resistance of the three lead wires the same.
3. Mount the product so that it is horizontally level.
4. If the measurement accuracy is low, check to see if input shift has been set correctly.

### Waterproofing

The degree of protection is as shown below. Sections without any specification on their degree of protection or those with IP□0 are not waterproof.

Front panel: IP66

Rear case: IP20, Terminal section: IP00

(E5CN-U: Front panel: IP50, rear case: IP20, terminals: IP00)

### Operating Precautions

1. It takes approximately two seconds for the outputs to turn ON from after the power supply is turned ON. Due consideration must be given to this time when incorporating Temperature Controllers in a sequence circuit.
2. When using self-tuning, turn ON power for the load (e.g., heater) at the same time as or before supplying power to the Temperature Controller. If power is turned ON for the Temperature Controller before turning ON power for the load, self-tuning will not be performed properly and optimum control will not be achieved.
3. When starting operation after the Temperature Controller has warmed up, turn OFF the power and then turn it ON again at the same time as turning ON power for the load. (Instead of turning the Temperature Controller OFF and ON again, switching from STOP mode to RUN mode can also be used.)
4. Avoid using the Controller in places near a radio, television set, or wireless installing. These devices can cause radio disturbances which adversely affect the performance of the Controller.

### Others

1. The disk that is included with the Conversion Cable is designed for a computer CD-ROM driver. Never attempt to play the disk in a general-purpose audio player.
2. Do not connect or disconnect the Conversion Cable connector repeatedly over a short period of time. The computer may malfunction.
3. After connecting the Conversion Cable to the computer, check the COM port number before starting communications. The computer requires time to recognize the cable connection. This delay does not indicate failure.
4. Do not connect the Conversion Cable through a USB hub. Doing so may damage the Conversion Cable.

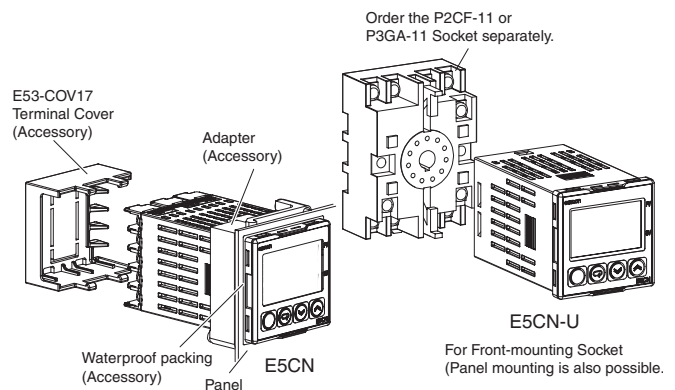
5. Do not use an extension cable to extend the Conversion Cable length when connecting to the computer. Doing so may damage the Conversion Cable.
6. The E5AN-H/E5EN-H use the same port for communications through the infrared port and the Support Software port. Do not attempt to use communications through the Support Software port when the infrared port is being used.

### Mounting

#### Mounting to a Panel

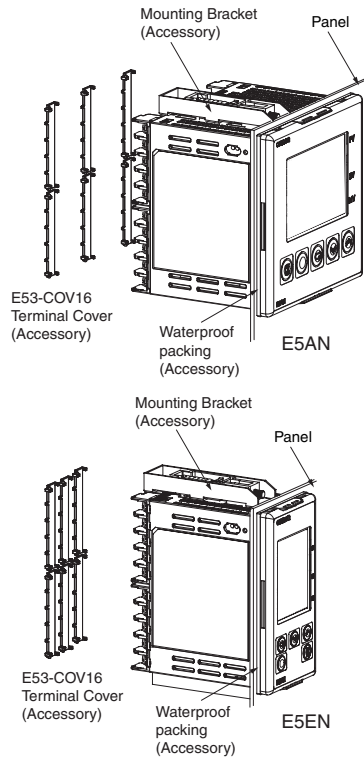
For waterproof mounting, waterproof packing must be installed on the Controller. Waterproofing is not possible when group mounting several Controllers. Waterproof packing is not necessary when there is no need for the waterproofing function.

#### E5CN



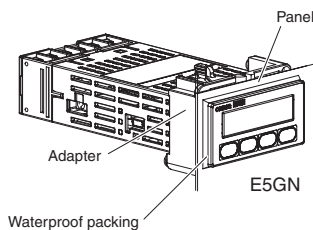
1. The Panel Mounting Adapter is also included with the E5CN-U. There is no waterproof packing included with the E5CN-U.
2. Insert the E5CN/E5CN-U into the mounting hole in the panel.
3. Push the adapter from the terminals up to the panel, and temporarily fasten the E5CN/E5CN-U.
4. Tighten the two fastening screws on the adapter. Alternately tighten the two screws little by little to maintain a balance. Tighten the screws to a torque of 0.29 to 0.39 N·m.

## E5EN/E5AN



1. Insert the E5AN/E5EN into the square mounting hole in the panel (thickness: 1 to 8 mm). Attach the Mounting Brackets provided with the product to the mounting grooves on the top and bottom surfaces of the rear case.
2. Use a ratchet to alternately tighten the screws on the top and bottom Mounting Brackets little by little to maintain balance, until the ratchet turns freely.

## E5GN



1. Insert the E5GN into the mounting hole in the panel.
2. Push the adapter from the terminals up to the panel, and temporarily fasten the E5GN.
3. Tighten the two fastening screws on the adapter. Alternately tighten the two screws little by little to maintain a balance. Tighten the screws to a torque of 0.29 to 0.39 N·m.

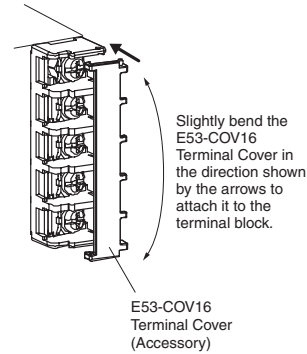
## Mounting the Terminal Cover

### E5CN

Make sure that the “UP” mark is facing up, and then attach the E53-COV17 Terminal Cover to the holes on the top and bottom of the Temperature Controller.

### E5AN/E5EN

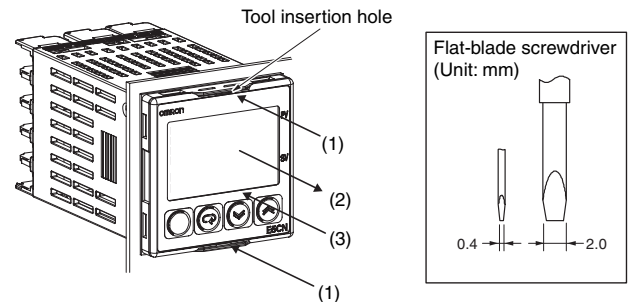
Slightly bend the E53-COV16 Terminal Cover to attach it to the terminal block as shown in the following diagram. The Terminal Cover cannot be attached in the opposite direction.



## Removing the Temperature Controller from the Case

The Temperature Controller can be removed from the case to perform maintenance without removing the terminal leads. This is possible for only the E5CN, E5AN, and E5EN, and not for the E5CN-U or E5GN. Check the specifications of the case and Temperature Controller before removing the Temperature Controller from the case.

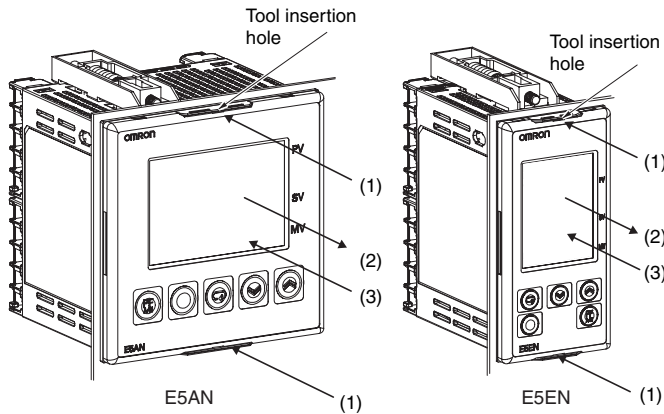
### E5CN



1. Insert a flat-blade screwdriver into the two tool insertion holes (one on the top and one on the bottom) to release the hooks.
2. Insert the flat-blade screwdriver in the gap between the front panel and rear case, and pull out the front panel slightly. Hold the top and bottom of the front panel and carefully pull it out toward you, without applying unnecessary force.
3. When inserting the body of the Temperature Controller into the case, make sure the PCBs are parallel to each other, make sure that the sealing rubber is in place, and press the E5CN toward the rear case into position. While pushing the E5CN into place, push down on the hooks on the top and bottom surfaces of the rear case so that the hooks are securely locked in place. Be sure that electronic components do not come into contact with the case.



## E5AN/E5EN



1. Insert a flat-blade screwdriver into the two tool insertion holes (one on the top and one on the bottom) to release the hooks.
2. Insert the flat-blade screwdriver in the gap between the front panel and rear case (two on the top and two on the bottom), and use it to pry and pull out the front panel slightly. Then, pull out on the front panel gripping both sides. Be sure not to impose excessive force on the panel.
3. When inserting the body of the Temperature Controller into the case, make sure the PCBs are parallel to each other, make sure that the sealing rubber is in place, and press the E5AN/E5EN toward the rear case until it snaps into position. While pressing the E5AN/E5EN into place, press down on the hooks on the top and bottom surfaces of the rear case so that the hooks securely lock in place. Make sure that electronic components do not come into contact with the case.

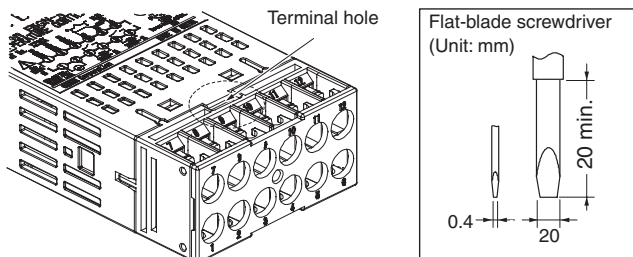
## Removing the Terminal Block

The terminal block can be removed from the E5GN. It is not possible for the E5CN, E5AN, E5EN, and E5CN-U.

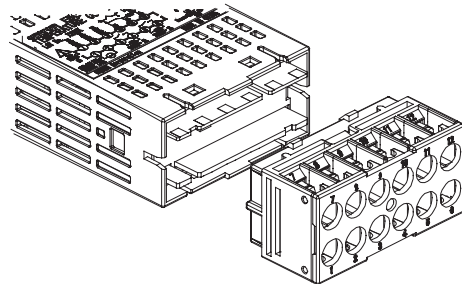
### E5GN

The body of the Controller can be replaced by removing the terminal block from the E5GN.

1. Insert a flat-blade screwdriver into the tool holes (one on the top and one on the bottom) to release the hooks. Do not apply excessive force.



2. Pull the terminal block out while the hooks are released.



**Note:** The method for removing the terminal block is the same for both screw terminal blocks and screwless clamp terminal blocks.  
Do not connect a different type of terminal block to a Controller. For example, do not replace a screw terminal block with a screwless clamp terminal block. The temperature indication accuracy will decrease.

## Precautions when Wiring

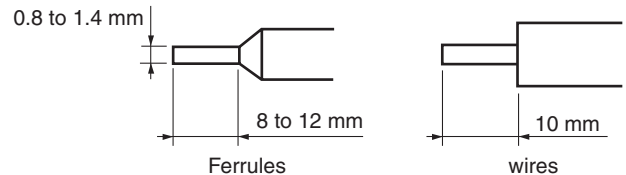
- Separate input leads and power lines in order to prevent external noise.
- Use a shielded, AWG24 to AWG14 (cross-sectional area of 0.205 to 2.081 mm<sup>2</sup>) twisted-pair cable for the E5CN, E5EN, or E5AN. Use a shielded, AWG24 to AWG18 (cross-sectional area of 0.205 to 0.823 mm<sup>2</sup>) twisted-pair cable for the E5GN. The stripping length is 5 to 6 mm for the E5CN, E5AN, or E5EN, and 6 to 8 mm for the E5GN.
- Use crimp terminals when wiring the terminals.
- Use the suitable wiring material and crimp tools for crimp terminals.
- Tighten the terminal screws to a torque of 0.5 N·m for the E5CN-U and E5GN and to 0.74 to 0.90 N·m for other models. The terminal torque is 0.5 to 0.6 N·m for auxiliary output 2 on the E5GN.
- For the E5CN, E5AN, or E5EN, use the following types of crimp terminals for M3.5 screws.



- For the E5GN, use the following types of crimp terminals for M3.0 screws.



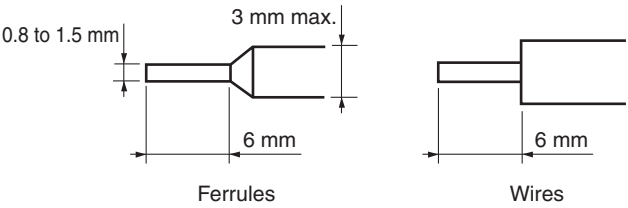
- For E5GN screwless clamp terminal blocks, use wires with a gauge of AWG24 to AWG18 (equal to a cross-sectional area of 0.205 to 0.823 mm<sup>2</sup>). The length of the conductive portion inserted into the terminal must be 10 mm for wires and 8 to 12 mm for ferrules. Ferrules must be 0.8 to 1.4 mm in diameter.



- Recommended Ferrules for E5GN Screwless Clamp Terminals

Manufacturer		Model number
Altech Corp.		2623.0
Daido Solderless Terminal Mfg. Co.		AVA-0.5
J.S.T. Mfg. Co.		TUB-0.5
Nichifu Co.	Single (1 wire)	TGNTC-1.25-9T TGVTC-1.25-11T TGNTC-1.25-11T TC0.3-9.5 TC1.25-11S-ST TC1.25-11S TC2-11S
	Double (2 wires)	TGWVTC-1.25-9T TGWVTC-1.25-11T

- Use wires with a gauge of AWG24 to AWG18 (0.205 to 0.823 mm<sup>2</sup>) for auxiliary output 2 on the E5GN.  
The exposed conductor length inserted into the terminal for wires or ferrules must be 6 mm. Ferrules must be 0.8 to 1.5 mm in diameter.



- Recommended Ferrules for SUB2 on E5GN

Manufacturer	Model number
Phoenix Contact	Al 0,25-6 BU
	Al 0,34-6 TQ
	Al 0,5-6 WH
	Al 0,75-6 GY
	Al 1-6 RD

**Note:** Do not remove the terminal block from the E5AN, E5EN, or E5CN. Doing so may cause product malfunction or incorrect operation.