

# Electronic Thermostat E5L

## Ideal for Simple Built-in Control.

- A high switching capacity of 10 A at 250 VAC enables direct load switching.
- A sensor is provided to enable immediate application.
- Sockets with finger protection (PTF14A-E) or without finger protection (PTF14A) can be used.
- Simple operation and settings. Even simpler with digital models.



## Model Number Structure

### Model Number Legend

E5L-□□  
1 2

| 1. Setting and Indication Methods | 2. Set temperature       |
|-----------------------------------|--------------------------|
| A: Analog setting, no display     | -30-20 : -30 to +20°C    |
| C: Digital setting, display       | 0-50 : 0 to +50°C        |
|                                   | 0-100 : 0 to +100°C      |
|                                   | 100-200 : +100 to +200°C |

## Ordering Information

### Electronic Thermostats

#### E5L-A□

| Size       | Type    | Control method   | Control output | Model         |
|------------|---------|------------------|----------------|---------------|
| 45 × 35 mm | Plug-in | ON/OFF operation | Relay          | E5L-A -30-20  |
|            |         |                  |                | E5L-A 0-50    |
|            |         |                  |                | E5L-A 0-100   |
|            |         |                  |                | E5L-A 100-200 |

#### E5L-C□

| Size       | Type    | Control method   | Control output | Model         |
|------------|---------|------------------|----------------|---------------|
| 45 × 35 mm | Plug-in | ON/OFF operation | Relay          | E5L-C -30-20  |
|            |         |                  |                | E5L-C 0-100   |
|            |         |                  |                | E5L-C 100-200 |

**Note:** The E5L-C is not available with a set temperature range of 0 to 50°C.

### Options (Order Separately)

#### Sockets

| Type                    | Model    |
|-------------------------|----------|
| Front-connecting Socket | PTF14A   |
|                         | PTF14A-E |

# E5L

## Ratings and Characteristics

### Ratings

| Item                    | Model | E5L-A□  | E5L-C□   |
|-------------------------|-------|---|--|
| Power supply voltage    |       | 100 to 240 VAC, 50/60 Hz                                      |  |
| Operating voltage range |       | 85% to 110% of the rated supply voltage                       |  |
| Power consumption       |       | Approx. 3 VA  |  |
| Inputs                  |       | Element-interchangeable thermistor                            |  |
| Control method          |       | ON/OFF control  |  |
| Control output          |       | SPDT contacts, 250 VAC, 10 A, $\cos\phi = 1$ (resistive load) | SPST-NO contacts, 250 VAC, 10 A, $\cos\phi = 1$ (resistive load)   |
| Setting method          |       | Analog setting  | Digital settings using keys on front panel   |
| Indication method       |       | No display  | LCD digital display (character height: 12 mm)  |
| Other functions         |       |   | <ul style="list-style-type: none"> <li>• Setting protection (key protection)</li> <li>• Input shift</li> <li>• Direct/reverse operation</li> </ul> |
| Ambient temperature     |       | -10 to 55°C (with no icing or condensation)                   |  |
| Ambient humidity        |       | 25% to 85%  |  |
| Storage temperature     |       | -25°C to 65°C (with no icing or condensation)                 |  |

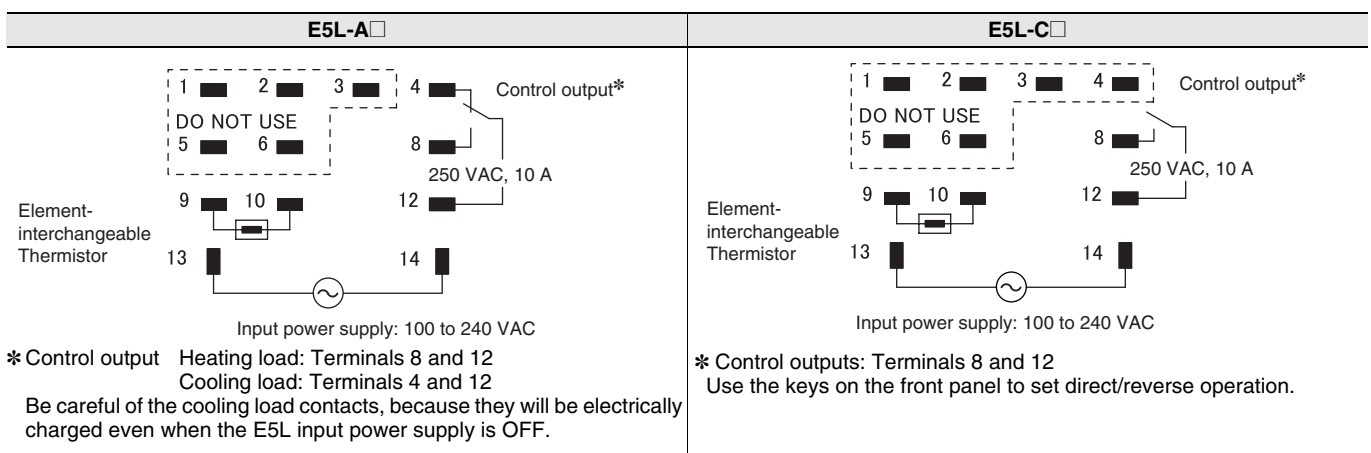
**Note:** Do not use the output from an Inverter as the power supply.

### Characteristics

| Item  | Model | E5L-A□  | E5L-C□   |
|---|-------|---|--|
| Indication accuracy                               |       | ---   | $\pm(1^\circ\text{C} + 1 \text{ digit}) \text{ max.}^*$  |
| Setting accuracy                                  |       | ---   | $\pm(1^\circ\text{C} + 1 \text{ digit}) \text{ max.}^*$  |
| Hysteresis  |       | -30 to 20°C models: Approx. 0.5 to 2.5°C (variable)<br>0 to 50°C models: Approx. 0.5 to 4°C (variable)<br>0 to 100°C models: Approx. 0.5 to 4°C (variable)<br>100 to 200°C models: Approx. 0.7 to 4°C (variable)  | 1 to 9°C (in increments of 1°C)  |
| Repeat accuracy                                   |       | 1% FS max.  | ---  |
| Minimum scale (standard scale)                    |       | -30 to 20°C models and 0 to 50°C models: 5°C<br>0 to 100°C models and 100 to 200°C models: 10°C   | ---  |
| Influence of temperature                          |       | ---   | $\pm((1\% \text{ of PV or } 2^\circ\text{C, whichever is greater}) + 1 \text{ digit}) \text{ max.}$  |
| Influence of voltage                              |       | ---   |  |
| Sampling period                                   |       | ---   | 2 s  |
| Insulation resistance                             |       | 100 M $\Omega$ max. (at 500 VDC)  |  |
| Dielectric strength                               |       | 2,300 VAC, 50/60 Hz for 1 min (between charged terminals and uncharged metallic parts, between power supply terminals and input terminals, between power supply terminals and output terminals, and between input terminals and output terminals)               |  |
| Vibration (malfunction)                           |       | Frequency of 10 to 55 Hz, 0.5-mm double amplitude for 10 min each in X, Y, and Z directions   |  |
| Vibration (destruction)                           |       | Frequency of 10 to 55-Hz, 0.75-mm double amplitude for 2 h each in X, Y, and Z directions   |  |
| Shock (malfunction)                               |       | 147 m/s <sup>2</sup> , 3 times each in 6 directions   | 100 m/s <sup>2</sup> , 3 times each in 6 directions  |
| Shock (destruction)                               |       | 294 m/s <sup>2</sup> , 3 times each in 6 directions   |  |
| Electrical life expectancy (control output relay) |       | 100,000 operations min (at maximum applicable load)   |  |
| Memory protection                                 |       | ---   | Non-volatile memory (100,000 write operations)   |
| Weight (Thermostat)                               |       | Approx. 80 g (Thermostat only)  |  |
| Degree of protection                              |       | Front panel: IP40, Terminals: IP00  |  |
| Approved standards                                |       | ---   |  |
| Conformed standards                               |       | EN 61010-1 (IEC 61010-1), Pollution Degree 2, Overvoltage Category II   |  |
| EMC Directives                                    |       | EMI:<br>Radiated EMI:<br>Conducted EMI:<br>EMS:<br>Electrostatic discharge immunity:<br>Electromagnetic field strength immunity:<br>Burst noise immunity:<br>Conducted disturbance immunity:<br>Surge immunity:<br>Voltage dip and power interruption immunity: | EN61326-1<br>EN55011 Group1 ClassA<br>EN55011 Group1 ClassA<br>EN61326-1<br>EN61000-4-2<br>EN61000-4-3<br>EN61000-4-4<br>EN61000-4-6<br>EN61000-4-5<br>EN6100-4-11 |

\* The accuracy of the accessory thermistor is not included.

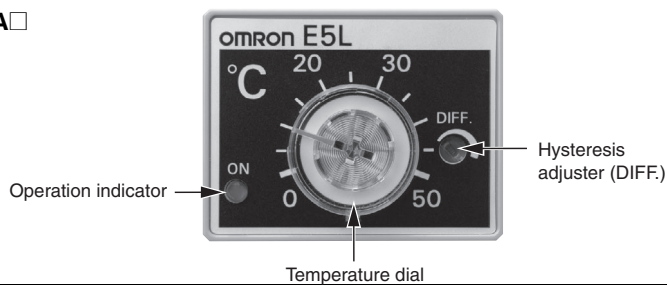
## External Connections



**Note:** For thermistor wiring, separate the input power supply and load lines as much as possible to avoid the influence of inductive noise.

## Nomenclature

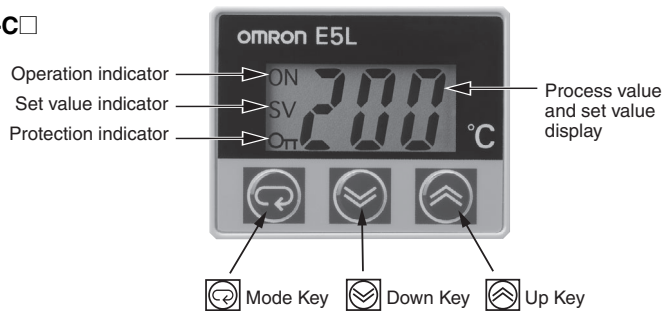
### E5L-A□



### Operation Indicator

| Operation indicator | Output status |              |
|---------------------|---------------|--------------|
|                     | Heating load  | Cooling load |
| Lit red.            | ON            | OFF          |
| Not lit.            | OFF           | ON           |

### E5L-C□



### Operation Indicator: ON

| Operation indicator | Output status     |                  |
|---------------------|-------------------|------------------|
|                     | Reverse operation | Direct operation |
| Lit                 | ON                | ON               |
| Not lit             | OFF               | OFF              |

### Set Value Indicator: SV

Lit when the set value is displayed.

### Setting Protection Indicator: OTT

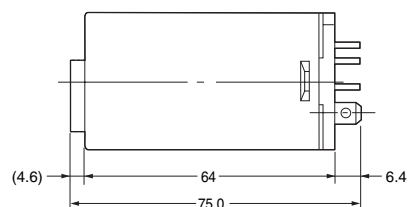
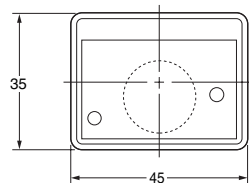
Lit when setting protection is set.

## Dimensions

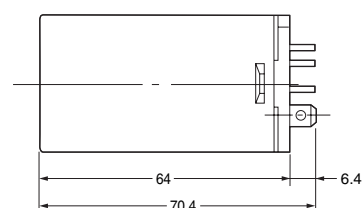
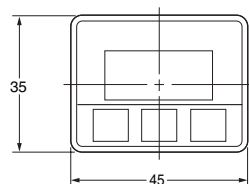
(Unit: mm)

### Thermostats

#### E5L-A□



#### E5L-C□



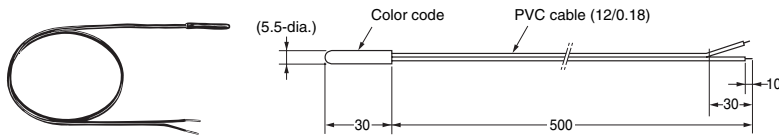
## Wiring Connection Sockets (Order Separately)

| Dimensions           |  | Terminal Arrangement and Internal Connections | Mounting Hole Dimensions                                      |
|----------------------|--|---|---|
| <p><b>PTF14A</b></p> | <p><b>PTF14A-E Socket with Finger Protection</b></p> | <p>(TOP VIEW)</p>                             | <p>(TOP VIEW)</p> <p>Note: Can be mounted to a DIN Track.</p> |

## Accessories

### E52-THE-E5L Element-interchangeable Thermistor

Included with the following models: -30 to 20°C, 0 to 50°C, and 0 to 100°C.

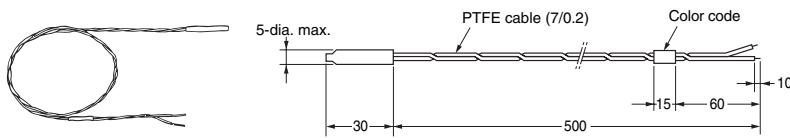


### Temperature Range

| Temperature range | Color code | Nominal resistance | Thermistor constant | Lead wires               |
|-------------------|------------|--------------------|---------------------|--------------------------|
| -30 to 20°C       | Blue       | 6 kΩ (0°C)         | 3,390 K             | Heat-resistant PVC cable |
| 0 to 100°C*       | Black      | 6 kΩ (0°C)         | 3,390 K             | PVC cable                |
| 100 to 200°C      | Yellow     | 0.55 kΩ (200°C)    | 4,300 K             | PTFE                     |

Note: PVC cable is heat resistant from -40 to 105°C.  
PTFE cable is heat resistant from -40 to 250°C.  
\* Use a 0 to 100°C thermistor for 0 to 50°C applications.

Included with 100 to 200°C Models.



### Tolerance

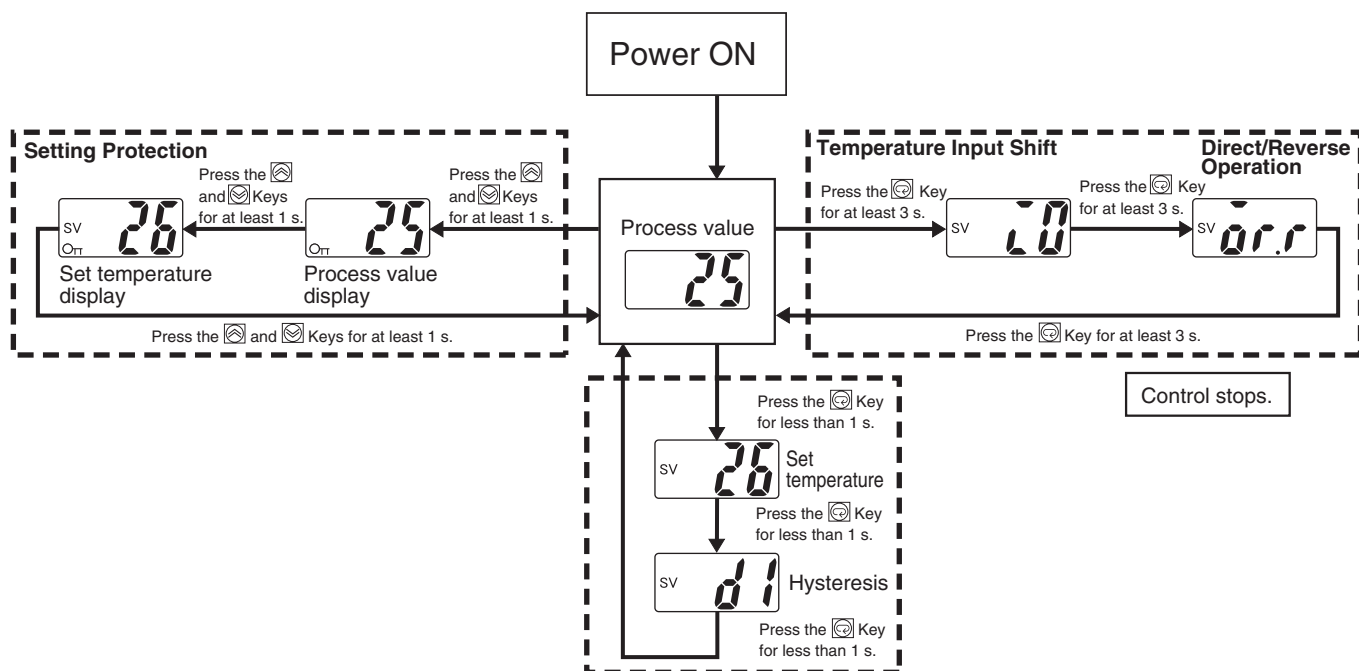
| Measured temperature | Tolerance                     |
|----------------------|-------------------------------|
| -30 to 100°C         | ±2°C max.                     |
| 100 to 200°C         | Measured temperature ±2% max. |

## Mounting Brackets (Two)

## Temperature Sensors (Order Separately)

E52-THE5A, E52-THE6D, and E52-THE6F Temperature Sensors can be ordered separately. For details, refer to an *OMRON Web site*.

# Operating the E5L-C



## Set temperature

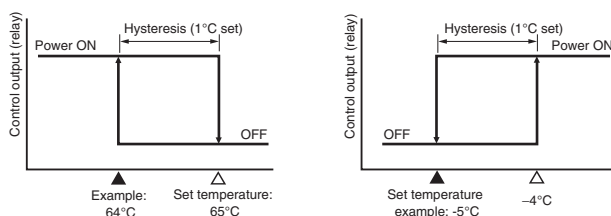
1. Press the [F] Key to enter the Set Temperature Mode.
  2. Press the [M] and [F] Keys to set the temperature. The display will continue to change for as long as the key is held down.
- Note:** The default setting is the lowest temperature in the range.

## Setting the Hysteresis

1. Press the [F] Key to enter the Hysteresis Mode.
  2. Press the [M] and [F] Keys to set the value. Each time the key is pressed, the setting will change by 1°C. The setting will not continue to change even if the key is held down. The key must be released after each change. The hysteresis can be set from 1 to 9°C, in increments of 1°C.
- Note:** The default setting is 1°C.

| Hysteresis | Display |
|------------|---------|
| +1°C       | SV d1   |
| +5°C       | SV d5   |
| +9°C       | SV d9   |

## Reverse Operation (Heating Control) Direct Operation (Cooling Control)



## Setting the Temperature Input Shift

1. Press the [F] Key for at least 3 s to enter the Temperature Input Shift Mode.
  2. Press the [M] and [F] Keys to set the value. Each time the key is pressed, the setting will change by 1°C. The setting will not continue to change as the key is held down. The key must be released after each change. The input shift can be set from -9 to 9°C, in increments of 1°C.
- Note:** 1. The default setting is 0°C.  
2. The control output turns OFF while this setting is being made.







| Input shift display | Thermistor measured temperature | Temperature display |
|---------------------|---------------------------------|---------------------|
| SV 20 (No shift)    | 25°C                            | 25°C                |
| SV 29 (+9°C shift)  | 25°C                            | 34°C                |
| SV -29 (-9°C shift) | 25°C                            | 16°C                |



## Setting Direct or Reverse Operation

1. Press the [F] Key for at least 3 s to enter the Direct/Reverse Selection Mode.
  2. Press the [M] and [F] Keys to set the value. Direct operation can be set by pressing the [M] Key, and reverse operation can be set by pressing the [F] Key.
- Note:** 1. The default setting is for reverse operation.  
2. The control output turns OFF while this setting is being made.

| Direct/reverse operation | Display |
|--------------------------|---------|
| Reverse operation        | SV Orr  |
| Direct operation         | SV Ord  |

## Setting Protection

1. Setting Protection (Process Value Display)  
Press the  and  Keys simultaneously while the process value is being displayed to change to the setting protection state.
2. Setting Protection (Set Temperature Display)  
From the Setting Protection (process value display) Mode, press the  and  Keys simultaneously to change to the setting protection (set temperature display) state.
3. From the Setting Protection (set temperature display) Mode, press the  and  Keys simultaneously to return to the process value display with no setting protection.

| Display example         | Display   |
|-------------------------|---|
| Process value display   | ON<br>OFF        |
| Set temperature display | ON<br>SV<br>OFF  |

- Note:**
1. Setting protection disables key operations to prevent the settings from being changed accidentally. OFF will be lit while protection is in effect.
  2. Protection will be maintained even when the power supply is turned OFF and ON.

## Error Displays and Causes

### E5L-A

When a thermistor disconnection occurs, the built-in relay operates at the OFF side (when NO contacts are used).

| Thermistor    | NO contacts<br>(Terminal numbers 8 and 12)<br>* Heating load | NC contacts<br>(Terminal numbers 4 and 12)<br>* Cooling load |
|---------------|--|--|
| Disconnection | OFF  | ON   |
| Short-circuit | OFF  | ON   |

### E5L-C

When an error occurs, the display shows the error code. Take the necessary measures, referring to the following table.

| Display        | Meaning                    | Cause   | Control output                                  |
|----------------|----------------------------|---|---|
| FFF (lit)      | Overflow                   | The process value is higher than the set temperature range. | Reverse operation: OFF<br>Direct operation: ON  |
| ---            | Underflow                  | The process value is lower than the set temperature range   | Reverse operation: ON<br>Direct operation: OFF  |
| FFF (flashing) | Thermistor short-circuited | The thermistor is short-circuited.                          | Reverse operation: OFF<br>Direct operation: OFF |
| ---            | Thermistor disconnected    | The thermistor is disconnected.                             | Reverse operation: OFF<br>Direct operation: OFF |
| E11 (lit)      | Memory error               | The thermostat has failed.                                  | OFF   |

- Note:**
1. Errors are not displayed while settings are being changed, except for memory errors. The control output status will be as shown in the above table while the set temperature or hysteresis is being set. The control output will be OFF while the temperature input shift or direct/reverse operation setting is being set. Key operations will be possible when an error occurs, except for a memory error.
  2. The setting protection indicator (OFF) and set value indicator ("SV") will be continued even when settings are protected, except when a memory error occurs.

## Safety Precautions

### 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.



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



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 between 0.74 and 0.90 N·m. Loose screws may occasionally result in fire.



Set the parameters and wiring of the Product so that they are suitable for the system being controlled. 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.



### Precautions for Safe Use

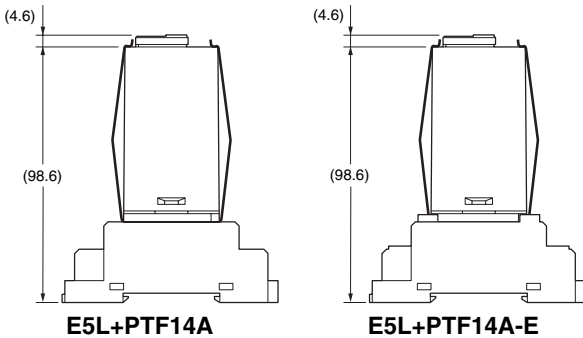
Be sure to observe the following precautions to prevent failure to operate, malfunction, or adverse effects on the performance and functions of the Thermostat. Not doing so may occasionally result in unexpected events.

1. The Product is designed for indoor use only. Do not use the Product outdoors or in any of the following locations.
  - Locations directly subject to heat radiated from heating equipment
  - Locations subject to water or oil
  - Locations subject to direct sunlight
  - Locations subject to dust or corrosive gas (in particular, sulfide gas and ammonia gas)
  - Locations subject to sudden or extreme temperature changes
  - Locations subject to icing or condensation
  - Locations subject to vibration or shock
2. Use and store the Product within the rated temperature and humidity ranges. Provide forced cooling if required.
3. To allow heat to escape, do not block the area around the Product.
4. Be sure to wire the Product properly with the correct terminal polarity.
5. Use the specified size of crimped terminals for wiring (M3.5, width of 6.8 mm or less). To connect bare wires to the terminals, use 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.) Do not connect more than two wires or two crimp terminals to one terminal. When connecting two wires, they must be of the same size and type.
6. Do not connect anything to terminals that are not used.
7. Allow as much space as possible between the Thermostat and devices that generate powerful high frequencies or surges. Separate the wiring to the Thermostat from high-voltage or high-current lines, and do not place the wiring to the Thermostat in parallel with or in the same wiring paths as power lines.
8. Use this Product within the rated load and power supply specifications.
9. Turn ON the power supply at least 30 minutes prior to starting control operations.
10. A switch or circuit breaker must be provided close to the Thermostat. The switch or circuit breaker must be within easy reach of the operator, and must be marked as a disconnecting means for the Thermostat.
11. Do not use paint thinner or similar solvents to clean the Thermostat. Use standard grade alcohol.
12. Design the system (e.g., the control panel) considering the 2.5 second of delay between turning ON the Thermostat and stabilization of the Thermostat's output.

## Precautions for Correct Use

### Mounting the Thermostat

- Using the PTF14A Socket or PTF14A-E Socket with Finger Protection, mount the Thermostat to the bracket that is provided.



- The structure does not allow the case to be removed. Do not apply excessive force when mounting the Thermostat.

### Settings

- E5L-A□ Temperature Dial
  - The temperature dial has some backlash. To adjust the temperature more accurately, turn the dial clockwise when adjusting the temperature.
  - Do not change the setting of the temperature dial more than 20 times.
  - Do not attempt to turn the dial past the range of the setting scale. Applying excessive force may damage the Thermostat.
- E5L-A□ Hysteresis Dial
  - This dial can be used to set hysteresis for the ON/OFF operation. Turn the dial clockwise to reduce the hysteresis and counterclockwise to increase the hysteresis. Increase the hysteresis to extend the life of the relay by preventing relay chattering caused by the control output turning ON and OFF frequently.
  - Do not change the setting of the temperature dial more than 20 times.

### Mounting the Thermistor

- Select a location for the temperature sensor of the thermistor where the temperature distribution of sensing objects will not be changed by installation.
- Insert the temperature sensor as far in as possible.
- When measuring fluid temperature, the thermistor should be installed against the current. Before mounting, take factors such as the bending moment of inertia and vibration into consideration.
- Do not apply mechanical force to the temperature-sensing part of the thermistor.
- The E52-THE□□ Thermistor can be used for applications that require metal protective tubing. Consult with your OMRON representative.

### Other Precautions

- Do not use the E5L-C□ if the front sheet is peeling or torn.
- Use appropriate tools to disassemble the Thermostat for disposal.







# Warranty and Application Considerations

## Read and Understand This Catalog

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

## Warranty and Limitations of Liability

### WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

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## Application Considerations

### SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.

Take all necessary steps to determine the suitability of the product for the systems, machines, and equipment with which it will be used.

Know and observe all prohibitions of use applicable to this product.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

## Disclaimers

### PERFORMANCE DATA

Performance data given in this catalog is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON *Warranty and Limitations of Liability*.

### CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons. Consult with your OMRON representative at any time to confirm actual specifications of purchased product.

### DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

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