

## Digital Temperature Controller (Simple Type)

# E5CD-800/E5CD-B-800 (48 × 48 mm)

**Optimize Control by Detecting Status Changes.**

**Easily Satisfy Both Productivity and Quality.**

**Models with Push-In Plus technology Added to Lineup.**

- Automatic optimization of control for changes in systems (Adaptive Control).
- Functions specialized for packaging machines (Temperature Sensors for Packaging Machines and Automatic Filter Adjustment).
- Function specialized for water-cooled extruders (Water-cooling Output Adjustment).
- Indication data (Power ON Time, Ambient Temperature, and Output ON/OFF Count).
- Basic performance is same as the E5□C-800 standard models.
- Draw-out structure for easy maintenance (Screw terminal blocks only).



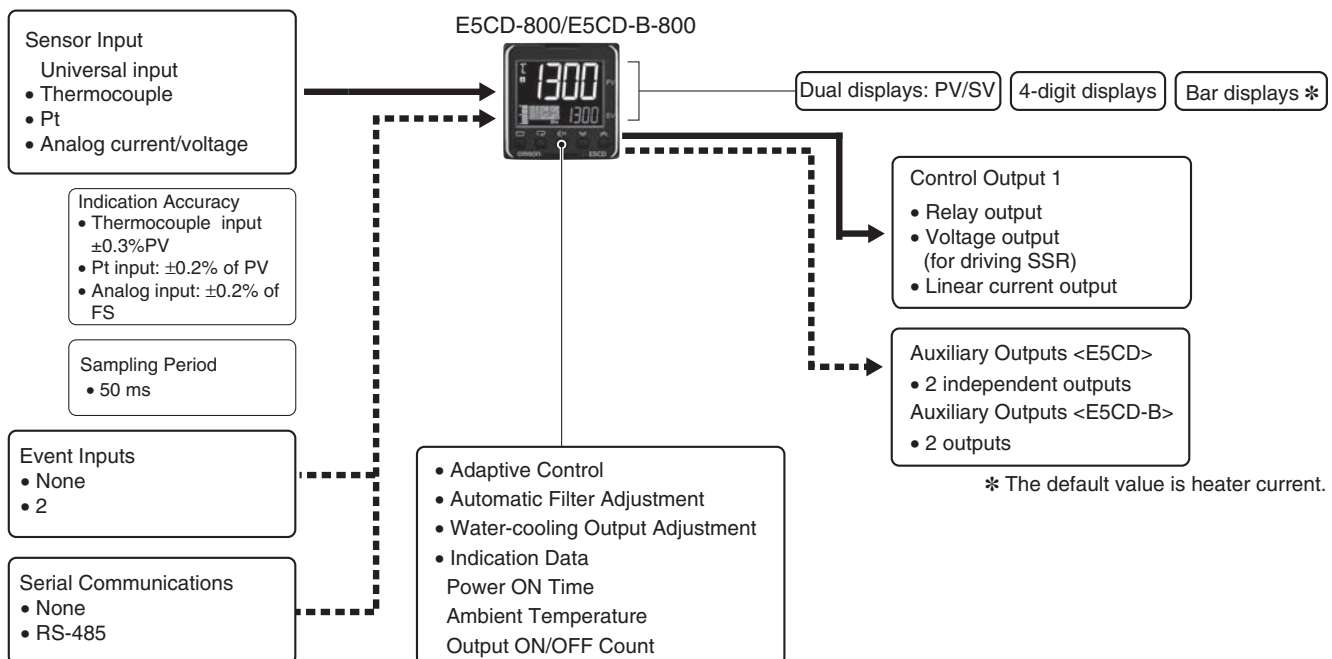
48 × 48 mm  
Screw Terminal Blocks  
E5CD-800

48 × 48 mm  
Push-In Plus Terminal Blocks  
E5CD-B-800

For the most recent information on models that have been certified for safety standards, refer to your OMRON website.

Refer to *Safety Precautions* on 43.

## Main I/O Functions



This datasheet is provided as a guideline for selecting products.

Be sure to refer to the following manuals for application precautions and other information required for operation before attempting to use the product.

E5□D Digital Temperature Controllers User's Manual (Cat. No. H224)

E5□D Digital Temperature Controllers Communications Manual (Cat. No. H225)

## Model Number Legend and Standard Models

### Model Number Legend

#### Models with Screw Terminal Blocks

E5CD-□□ 2 □ D M-□□□□ (Example: E5CD-RX2ADM-800)

① ② ③ ④ ⑤ ⑥

| Model | ①                       | ②                        | ③                    | ④             | ⑤          | ⑥       | Meaning                                   |                         |                     |  |
|-------|-------------------------|--------------------------|----------------------|---------------|------------|---------|---|-------------------------|---------------------|--|
|       | Control outputs 1 and 2 | No. of auxiliary outputs | Power supply voltage | Terminal type | Input type | Options |   |                         |                     |  |
| E5CD  |                         |                          |                      |               |            |         | 48 × 48 mm                                |                         |                     |  |
|       |                         |                          |                      |               |            |         | <b>Control output 1</b>                   | <b>Control output 2</b> |                     |  |
|       | RX                      |                          |                      |               |            |         | Relay output                              | None                    |                     |  |
|       | QX                      |                          |                      |               |            |         | Voltage output (for driving SSR)          | None                    |                     |  |
|       | CX                      |                          |                      |               |            |         | Linear current output                     | None                    |                     |  |
|       |                         | 2                        |                      |               |            |         | 2 independent outputs                     |                         |                     |  |
|       |                         |                          | A                    |               |            |         | 100 to 240 VAC                            |                         |                     |  |
|       |                         |                          | D                    |               |            |         | 24 VAC/DC                                 |                         |                     |  |
|       |                         |                          |                      | D             |            |         | Screw terminal blocks, draw-out structure |                         |                     |  |
|       |                         |                          |                      |               | M          |         | Universal input                           |                         |                     |  |
|       |                         |                          |                      |               |            |         | <b>HB alarm and HS alarm</b>              | <b>Communications</b>   | <b>Event inputs</b> |  |
|       |                         |                          |                      |               |            | 800     | ---                                       | ---                     | ---                 |  |
|       |                         |                          |                      |               | *1         | 802     | 1   | RS-485                  | ---                 |  |
|       |                         |                          |                      |               | *2         | 804     | ---                                       | RS-485                  | 2                   |  |

\*1. This option can be selected when the control output is RX or QX.

\*2. This option can be selected when the control output is CX.

## Heating and Cooling Control

### Using Heating and Cooling Control

#### ① Control Output Assignment

An auxiliary output is used as the cooling control output.

#### ② Control

If PID control is used, you can set PID control separately for heating and cooling.

This allows you to handle control systems with different heating and cooling response characteristics.

### List of Models

| Model           | Model           |
|-----------------|-----------------|
| E5CD-RX2ADM-800 | E5CD-CX2ADM-800 |
| E5CD-RX2DDM-800 | E5CD-CX2DDM-800 |
| E5CD-RX2ADM-802 | E5CD-CX2ADM-804 |
| E5CD-RX2DDM-802 | E5CD-CX2DDM-804 |
| E5CD-QX2ADM-800 |                 |
| E5CD-QX2DDM-800 |                 |
| E5CD-QX2ADM-802 |                 |
| E5CD-QX2DDM-802 |                 |

## Model Number Legend

Models with Push-In Plus Terminal Blocks

E5CD-□□ 2 □ B M-□□□ (Example: E5CD-RX2ABM-800)

① ② ③ ④ ⑤ ⑥

| Model | ①                       | ②                        | ③                    | ④             | ⑤          | ⑥       | Meaning                          |                              |                         |                     |                        |  |  |
|-------|-------------------------|--------------------------|----------------------|---------------|------------|---------|----------------------------------|------------------------------|-------------------------|---------------------|------------------------|--|--|
|       | Control outputs 1 and 2 | No. of auxiliary outputs | Power supply voltage | Terminal type | Input type | Options |                                  |                              |                         |                     |                        |  |  |
| E5CD  |                         |                          |                      |               |            |         | 48 × 48 mm                       |                              |                         |                     |                        |  |  |
|       |                         |                          |                      |               |            |         | <b>Control output 1</b>          |                              | <b>Control output 2</b> |                     |                        |  |  |
|       | RX                      |                          |                      |               |            |         | Relay output                     |                              | None                    |                     |                        |  |  |
|       | QX                      |                          |                      |               |            |         | Voltage output (for driving SSR) |                              | None                    |                     |                        |  |  |
|       | CX                      |                          |                      |               |            |         | Linear current output            |                              | None                    |                     |                        |  |  |
|       |                         | 2                        |                      |               |            |         | 2 independent outputs            |                              |                         |                     |                        |  |  |
|       |                         |                          | A                    |               |            |         | 100 to 240 VAC                   |                              |                         |                     |                        |  |  |
|       |                         |                          | D                    |               |            |         | 24 VAC/DC                        |                              |                         |                     |                        |  |  |
|       |                         |                          |                      | B             |            |         | Push-In Plus terminal block      |                              |                         |                     |                        |  |  |
|       |                         |                          |                      |               | M          |         | Universal input                  |                              |                         |                     |                        |  |  |
|       |                         |                          |                      |               |            |         |                                  | <b>HB alarm and HS alarm</b> | <b>Communications</b>   | <b>Event inputs</b> | <b>Transfer Output</b> |  |  |
|       |                         |                          |                      |               |            |         | 800                              | ---                          | ---                     | ---                 | ---                    |  |  |
|       |                         |                          |                      |               |            | *1      | 802                              | 1                            | RS-485                  | ---                 | ---                    |  |  |
|       |                         |                          |                      |               |            | *2      | 804                              | ---                          | RS-485                  | 2                   | ---                    |  |  |

\*1. This option can be selected when the control output is RX or QX.

\*2. This option can be selected when the control output is CX.

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| E5CD-RX2ABM-800 | E5CD-CX2ABM-800 |
| E5CD-RX2DBM-800 | E5CD-CX2DBM-800 |
| E5CD-RX2ABM-802 | E5CD-CX2ABM-804 |
| E5CD-RX2DBM-802 | E5CD-CX2DBM-804 |
| E5CD-QX2ABM-800 |                 |
| E5CD-QX2DBM-800 |                 |
| E5CD-QX2ABM-802 |                 |
| E5CD-QX2DBM-802 |                 |

## Optional Products (Order Separately)

### Terminal Covers

(Cannot be used on a Push-In Plus terminal block type)

| Model            |
|------------------|
| E53-COV17        |
| E53-COV23 (3pcs) |

**Note:** The E53-COV10 cannot be used.

Refer to page 14 for the mounted dimensions.

### Waterproof Packing

| Model   |
|---------|
| Y92S-P8 |

**Note:** This Waterproof Packing is provided with the Digital Temperature Controller.

### Current Transformers (CTs)

| Hole diameter | Model     |
|---------------|-----------|
| 5.8 mm        | E54-CT1   |
| 5.8 mm        | E54-CT1L* |
| 12.0 mm       | E54-CT3   |
| 12.0 mm       | E54-CT3L* |

\*Lead wires are included with these CTs. If UL certification is required, use these CTs.

### Adapter

| Model   |
|---------|
| Y92F-45 |

**Note:** Use this Adapter when the panel has already been prepared for an E5B□ Controller.

### Waterproof Cover

| Model    |
|----------|
| Y92A-48N |

### Mounting Adapter

| Model   |
|---------|
| Y92F-49 |

**Note:** This Mounting Adapter is provided with the Digital Temperature Controller.

### DIN Track Mounting Adapter

(Cannot be used on a Push-In Plus terminal block type)

| Model   |
|---------|
| Y92F-52 |

### Front Covers

| Type             | Model    |
|------------------|----------|
| Hard Front Cover | Y92A-48H |
| Soft Front Cover | Y92A-48D |

### Draw-out Jig

(Cannot be used on a Push-In Plus terminal block type)

| Model   |
|---------|
| Y92F-58 |

# E5CD-800/E5CD-B-800

## Specifications

### Ratings

|                                      |  |   |
|--------------------------------------|--|---|
| <b>Power supply voltage</b>          |  | A in model number: 100 to 240 VAC, 50/60 Hz<br>D in model number: 24 VAC, 50/60 Hz; 24 VDC  |
| <b>Operating voltage range</b>       |  | 85% to 110% of rated supply voltage   |
| <b>Power consumption</b>             |  | Models with option selection of 800:5.2 VA max. at 100 to 240 VAC, and 3.1 VA max. at 24 VAC or 1.6 W max. at 24 VDC<br>All other models: 6.5 VA max. at 100 to 240 VAC, and 4.1 VA max. at 24 VAC or 2.3 W max. at 24 VDC  |
| <b>Sensor input</b>                  |  | Temperature input<br>Thermocouple: K, J, T, E, L, U, N, R, S, B, C/W, or PL II<br>Platinum resistance thermometer: Pt100 or JPt100<br>Infrared temperature sensor (ES1B): 10 to 70°C, 60 to 120°C, 115 to 165°C, or 140 to 260°C<br>Analog input<br>Current input: 4 to 20 mA or 0 to 20 mA<br>Voltage input: 1 to 5 V, 0 to 5 V, or 0 to 10 V  |
| <b>Input impedance</b>               |  | Current input: 150 Ω max., Voltage input: 1 MΩ min.<br>(Use a 1:1 connection when connecting the ES2-HB-N/THB-N)  |
| <b>Control method</b>                |  | ON/OFF control or 2-PID control (with auto-tuning)  |
| <b>Control output</b>                | <b>Relay output</b>                          | SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA (reference value)  |
|                                      | <b>Voltage output (for driving SSR)</b>      | Output voltage: 12 VDC ±20% (PNP), max. load current: 21 mA, with short-circuit protection circuit  |
|                                      | <b>Linear current output</b>                 | 4 to 20 or 0 to 20 mA DC, Load: 500 Ω max., Resolution: Approx. 10,000  |
| <b>Auxiliary output</b>              | <b>Number of outputs</b>                     | 2   |
|                                      | <b>Output specifications</b>                 | SPST-NO relay outputs: 250 VAC, E5CD: 3 A (resistive load), E5CD-B: 2 A (resistive load)<br>Electrical life: 100,000 operations, Minimum applicable load: 10 mA at 5 V (reference values)   |
| <b>Event input</b>                   | <b>Number of inputs</b>                      | 2   |
|                                      | <b>External contact input specifications</b> | Contact input: ON: 1 kΩ max., OFF: 100 kΩ min.  |
|                                      |  | Non-contact input: ON: Residual voltage: 1.5 V max., OFF: Leakage current: 0.1 mA max.<br>Current flow: Approx. 7 mA per contact  |
| <b>Setting method</b>                |  | Digital setting using front panel keys  |
| <b>Indication method</b>             |  | 11-segment digital display, individual indicators, and bar display<br>Character height: PV: 14.9 mm, SV: 7.1 mm   |
| <b>Multi SP</b>                      |  | Up to eight set points (SP0 to SP7) can be saved and selected using the key operations, or serial communications.   |
| <b>Bank switching</b>                |  | None  |
| <b>Other functions</b>               |  | Adaptive control, automatic filter adjustment, water-cooling output adjustment, indication data (power ON time monitor, ambient temperature monitor, and control output ON/OFF count monitors), parameter masking, operation after power ON, manual output, heating/cooling control, loop burnout alarm, SP ramp, other alarm functions, heater burnout (HB) alarm (including SSR failure (HS) alarm), 40% AT, 100% AT, MV limiter, input digital filter, robust tuning, PV input shift, run/stop, protection functions, extraction of square root, MV change rate limit, logic operations, temperature status display, simple programming, moving average of input value, and display brightness setting |
| <b>Ambient operating temperature</b> |  | -10 to 55°C (with no condensation or icing),<br>For 3-year warranty: -10 to 50°C with standard mounting (with no condensation or icing)   |
| <b>Ambient operating humidity</b>    |  | 25% to 85%  |
| <b>Storage temperature</b>           |  | -25 to 65°C (with no condensation or icing)   |
| <b>Altitude</b>                      |  | 2,000 m max.  |
| <b>Recommended fuse</b>              |  | T2A, 250 VAC, time-lag, low-breaking capacity   |
| <b>Installation environment</b>      |  | Overvoltage category II, Pollution Degree 2 (EN/IEC/UL 61010-1)   |



## Alarm Types

Each alarm can be independently set to one of the following 17 alarm types. The default is 2: Upper limit. (see note.)

Auxiliary outputs are allocated for alarms. ON delays and OFF delays (0 to 999 s) can also be specified.

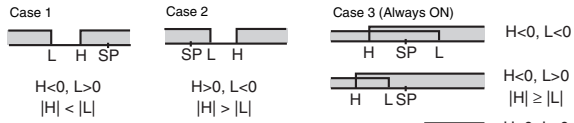
**Note:** In the default settings for models with HB or HS alarms, alarm 1 is set to a heater alarm (HA) and the Alarm Type 1 parameter is not displayed.

To use alarm 1, set the output assignment to alarm 1.

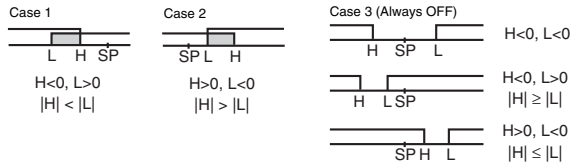
| Set value   | Alarm type                                       | Alarm output operation                   |  | Description of function  |
|-------------|--|--|--|--|
|             |  | When alarm value X is positive           | When alarm value X is negative           |  |
| 0           | Alarm function OFF                               | Output OFF                               |  | No alarm   |
| 1           | Upper- and lower-limit *1                        |  | *2                                       | Set the upward deviation in the set point for the alarm upper limit (H) and the lower deviation in the set point for the alarm lower limit (L). The alarm is ON when the PV is outside this deviation range. |
| 2 (default) | Upper-limit                                      |  |  | Set the upward deviation in the set point by setting the alarm value (X). The alarm is ON when the PV is higher than the SP by the deviation or more.  |
| 3           | Lower-limit                                      |  |  | Set the downward deviation in the set point by setting the alarm value (X). The alarm is ON when the PV is lower than the SP by the deviation or more.   |
| 4           | Upper- and lower-limit range *1                  |  | *3                                       | Set the upward deviation in the set point for the alarm upper limit (H) and the lower deviation in the set point for the alarm lower limit (L). The alarm is ON when the PV is inside this deviation range.  |
| 5           | Upper- and lower-limit with standby sequence *1  | *5                                       | *4                                       | A standby sequence is added to the upper- and lower-limit alarm (1). *6  |
| 6           | Upper-limit with standby sequence                |  |  | A standby sequence is added to the upper-limit alarm (2). *6   |
| 7           | Lower-limit with standby sequence                |  |  | A standby sequence is added to the lower-limit alarm (3). *6   |
| 8           | Absolute-value upper-limit                       |  |  | The alarm will turn ON if the process value is larger than the alarm value (X) regardless of the set point.  |
| 9           | Absolute-value lower-limit                       |  |  | The alarm will turn ON if the process value is smaller than the alarm value (X) regardless of the set point.   |
| 10          | Absolute-value upper-limit with standby sequence |  |  | A standby sequence is added to the absolute-value upper-limit alarm (8). *6  |
| 11          | Absolute-value lower-limit with standby sequence |  |  | A standby sequence is added to the absolute-value lower-limit alarm (9). *6  |
| 12          | LBA (alarm 1 type only)                          | -  |  | *7   |
| 13          | PV change rate alarm                             | -  |  | *8   |
| 14          | SP absolute-value upper-limit alarm              |  |  | This alarm type turns ON the alarm when the set point (SP) is higher than the alarm value (X).   |
| 15          | SP absolute-value lower-limit alarm              |  |  | This alarm type turns ON the alarm when the set point (SP) is lower than the alarm value (X).  |
| 16          | MV absolute-value upper-limit alarm *9           | Standard Control<br>                     | Standard Control<br>                     | This alarm type turns ON the alarm when the manipulated variable (MV) is higher than the alarm value (X).  |
|             |  | Heating/Cooling Control (Heating MV)<br> | Heating/Cooling Control (Heating MV)<br> |  |
|             |  | Always ON                                |  |  |
| 17          | MV absolute-value lower-limit alarm *9           | Standard Control<br>                     | Standard Control<br>                     | This alarm type turns ON the alarm when the manipulated variable (MV) is lower than the alarm value (X).   |
|             |  | Heating/Cooling Control (Cooling MV)<br> | Heating/Cooling Control (Cooling MV)<br> |  |
|             |  | Always ON                                |  |  |

\*1. With set values 1, 4 and 5, the upper and lower limit values can be set independently for each alarm type, and are expressed as "L" and "H."

\*2. Set value: 1, Upper- and lower-limit alarm



\*3. Set value: 4, Upper- and lower-limit range



\*4. Set value: 5, Upper- and lower-limit with standby sequence

For Upper- and Lower-Limit Alarm Described Above \*2

• Case 1 and 2

Always OFF when the upper-limit and lower-limit hysteresis overlaps.

• Case 3: Always OFF

\*5. Set value: 5, Upper- and lower-limit with standby sequence

Always OFF when the upper-limit and lower-limit hysteresis overlaps.

\*6. Refer to the *E5□D Digital Temperature Controllers User's Manual* (Cat. No. H224) for information on the operation of the standby sequence.

\*7. Refer to the *E5□D Digital Temperature Controllers User's Manual* (Cat. No. H224) for information on the loop burnout alarm (LBA).

\*8. Refer to the *E5□D Digital Temperature Controllers User's Manual* (Cat. No. H224) for information on the PV change rate alarm.

\*9. When heating/cooling control is performed, the MV absolute upper limit alarm functions only for the heating operation and the MV absolute lower limit alarm functions only for the cooling operation.



Characteristics

|   |  |   |
|---|--|---|
| <b>Indication accuracy (at the ambient temperature of 23°C)</b> |  | Thermocouple: ( $\pm 0.3\%$ of indication value or $\pm 1^\circ\text{C}$ , whichever is greater) $\pm 1$ digit max. *1<br>Platinum resistance thermometer:<br>( $\pm 0.2\%$ of indication value or $\pm 0.8^\circ\text{C}$ , whichever is greater) $\pm 1$ digit max.<br>Analog input: $\pm 0.2\%$ FS $\pm 1$ digit max.<br>CT input: $\pm 5\%$ FS $\pm 1$ digit max. |
| <b>Influence of temperature *2</b>                              |  | Thermocouple input (R, S, B, C/W, PL II):<br>( $\pm 1\%$ of indication value or $\pm 10^\circ\text{C}$ , whichever is greater) $\pm 1$ digit max.<br>Other thermocouple input:<br>( $\pm 1\%$ of indication value or $\pm 4^\circ\text{C}$ , whichever is greater) $\pm 1$ digit max. *3  |
| <b>Influence of voltage *2</b>                                  |  | Platinum resistance thermometer:<br>( $\pm 1\%$ of indication value or $\pm 2^\circ\text{C}$ , whichever is greater) $\pm 1$ digit max.   |
| <b>Influence of EMS. (at EN 61326-1)</b>                        |  | Analog input: $\pm 1\%$ FS $\pm 1$ digit max.<br>CT input: $\pm 5\%$ FS $\pm 1$ digit max.  |
| <b>Input sampling period</b>                                    |  | 50 ms   |
| <b>Hysteresis</b>   |  | Temperature input: 0.1 to 999.9°C or °F (in units of 0.1°C or °F)<br>Analog input: 0.01% to 99.99% FS (in units of 0.01% FS)  |
| <b>Proportional band (P)</b>                                    |  | Temperature input: 0.1 to 999.9°C or °F (in units of 0.1°C or °F)<br>Analog input: 0.1% to 999.9% FS (in units of 0.1% FS)  |
| <b>Integral time (I)</b>  |  | 0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) *4  |
| <b>Derivative time (D)</b>                                      |  | 0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) *4  |
| <b>Proportional band (P) for cooling</b>                        |  | Temperature input: 0.1 to 999.9°C or °F (in units of 0.1°C or °F)<br>Analog input: 0.1% to 999.9% FS (in units of 0.1% FS)  |
| <b>Integral time (I) for cooling</b>                            |  | 0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) *4  |
| <b>Derivative time (D) for cooling</b>                          |  | 0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) *4  |
| <b>For adaptive control</b>                                     | <b>SP response proportional band</b>                         | Temperature input: 0.1 to 999.9°C or °F (in units of 0.1°C or °F)   |
|   | <b>SP response integral time</b>                             | 0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) *4  |
|   | <b>SP response derivative time</b>                           | 0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) *4  |
|   | <b>Disturbance proportional band</b>                         | Temperature input: 0.1 to 999.9°C or °F (in units of 0.1°C or °F)   |
|   | <b>Disturbance integral time</b>                             | 0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) *4  |
| <b>Disturbance derivative time</b>                              |  | 0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) *4  |
| <b>Control period</b>   |  | 0.1, 0.2, 0.5, 1 to 99 s (in units of 1 s)  |
| <b>Manual reset value</b>                                       |  | 0.0 to 100.0% (in units of 0.1%)  |
| <b>Alarm setting range</b>                                      |  | -1999 to 9999 (decimal point position depends on input type)  |
| <b>Influence of signal source resistance</b>                    |  | Thermocouple: 0.1°C/ $\Omega$ max. (100 $\Omega$ max.)<br>Platinum resistance thermometer: 0.1°C/ $\Omega$ max. (10 $\Omega$ max.)  |
| <b>Insulation resistance</b>                                    |  | 20 M $\Omega$ min. (at 500 VDC)   |
| <b>Dielectric strength</b>                                      |  | 3,000 VAC, 50/60 Hz for 1 min between terminals of different charge   |
| <b>Vibration</b>  | <b>Malfunction</b>   | 10 to 55 Hz, 20 m/s <sup>2</sup> for 10 min each in X, Y, and Z directions  |
|   | <b>Resistance</b>  | 10 to 55 Hz, 20 m/s <sup>2</sup> for 2 hrs each in X, Y, and Z directions   |
| <b>Shock</b>  | <b>Malfunction</b>   | 100 m/s <sup>2</sup> , 3 times each in X, Y, and Z directions   |
|   | <b>Resistance</b>  | 300 m/s <sup>2</sup> , 3 times each in X, Y, and Z directions   |
| <b>Weight</b>   |  | Controller: Approx. 120 g, Mounting Adapter: Approx. 10 g   |
| <b>Degree of protection</b>                                     |  | Front panel: IP66, Rear case: IP20, Terminals: IP00   |
| <b>Memory protection</b>  |  | Non-volatile memory (number of writes: 1,000,000 times)   |
| <b>Standards</b>  | <b>Approved standards</b>                                    | cULus: UL 61010-1/CSA C22.2 No.61010-1,<br>Korean wireless regulations (Radio law: KC Mark)   |
|   | <b>Conformed standards</b>                                   | EN 61010-1 (IEC 61010-1) and RCM standards  |
| <b>EMC</b>  | <b>EMI:</b>  | EN 61326-1 *5   |
|   | <b>Radiated Interference Electromagnetic Field Strength:</b> | EN 55011 Group 1, class A   |
|   | <b>Noise Terminal Voltage:</b>                               | EN 55011 Group 1, class A   |
|   | <b>EMS:</b>  | EN 61326-1 *5   |
|   | <b>ESD Immunity:</b>   | EN 61000-4-2  |
|   | <b>Electromagnetic Field Immunity:</b>                       | EN 61000-4-3  |
|   | <b>Burst Noise Immunity:</b>                                 | EN 61000-4-4  |
| <b>Conducted Disturbance Immunity:</b>                          | EN 61000-4-6   |   |
| <b>Surge Immunity:</b>  | EN 61000-4-5   |   |
| <b>Voltage Dip/Interrupting Immunity:</b>                       | EN 61000-4-11  |   |

\*1. The indication accuracy of K thermocouples in the -200 to 1,300°C range, T and N thermocouples at a temperature of -100°C max., and U and L thermocouples at any temperatures is  $\pm 2^\circ\text{C} \pm 1$  digit max. The indication accuracy of the B thermocouple at a temperature of 400°C max. is not specified. The indication accuracy of B thermocouples at a temperature of 400 to 800°C is  $\pm 3^\circ\text{C}$  max. The indication accuracy of the R and S thermocouples at a temperature of 200°C max. is  $\pm 3^\circ\text{C} \pm 1$  digit max. The indication accuracy of C/W thermocouples is ( $\pm 0.3\%$  of PV or  $\pm 3^\circ\text{C}$ , whichever is greater)  $\pm 1$  digit max. The indication accuracy of PL II thermocouples is ( $\pm 0.3\%$  of PV or  $\pm 2^\circ\text{C}$ , whichever is greater)  $\pm 1$  digit max.

\*2. Ambient temperature: -10°C to 23°C to 55°C, Voltage range: -15% to 10% of rated voltage

\*3. K thermocouple at -100°C max.:  $\pm 10^\circ\text{C}$  max.

\*4. The unit is determined by the setting of the Integral/Derivative Time Unit parameter.

\*5. Industrial electromagnetic environment (EN/IEC 61326-1 Table 2)

## Communications Specifications

|                                     |   |
|-------------------------------------|---|
| Transmission line connection method | RS-485: Multidrop   |
| Communications                      | RS-485 (two-wire, half duplex)  |
| Synchronization method              | Start-stop synchronization  |
| Protocol                            | CompoWay/F, or Modbus   |
| Baud rate *                         | 9,600, 19,200, 38,400, 57,600, or 115,200 bps   |
| Transmission code                   | ASCII   |
| Data bit length *                   | 7 or 8 bits   |
| Stop bit length *                   | 1 or 2 bits   |
| Error detection                     | Vertical parity (none, even, odd)<br>Block check character (BCC) with CompoWay/F or CRC-16 Modbus |
| Flow control                        | None  |
| Interface                           | RS-485  |
| Retry function                      | None  |
| Communications buffer               | 217 bytes   |
| Communications response wait time   | 0 to 99 ms<br>Default: 20 ms  |

\* The baud rate, data bit length, stop bit length, and vertical parity can be individually set using the Communications Setting Level.

## Communications Functions

|                            |  |
|----------------------------|--|
| Programless communications | You can use the memory in the PLC to read and write E5CD-800/E5CD-B-800 parameters, start and stop operation, etc. The E5CD-800/E5CD-B-800 automatically performs communications with PLCs. No communications programming is required.<br>Number of connected Digital Temperature Controllers: 32 max. (Up to 16 for the FX3)<br>Applicable PLCs<br>OMRON PLCs CS Series, CJ Series, CP Series, NJ Series, or NX1P<br>Mitsubishi Electric PLCs MELSEC Q Series, L Series, FX3 Series, or iQ-R Series<br>KEYENCE PLCs KEYENCE KV Series |
| Copying *                  | When Digital Temperature Controllers are connected, the parameters can be copied from the Digital Temperature Controller that is set as the master to the Digital Temperature Controllers that are set as slaves.  |

MELSEC is a registered trademark of Mitsubishi Electric Corporation.

KEYENCE is a registered trademark of Keyence Corporation.

\*Programless communications supports the copying function.

## Current Transformer (Order Separately) Ratings

|                      | E54-CT1<br>E54-CT3                               | E54-CT1L<br>E54-CT3L                             |
|----------------------|--|--|
| Dielectric strength  | 1,000 VAC for 1 min                              | 1,500 VAC for 1 min                              |
| Vibration resistance | 50 Hz, 98 m/s <sup>2</sup>                       |  |
| Weight               | E54-CT1: Approx. 11.5 g<br>E54-CT3: Approx. 50 g | E54-CT1L: Approx. 14 g<br>E54-CT3L: Approx. 57 g |
| Accessories          | E54-CT3 Only<br>Armatures (2)<br>Plugs (2)       | None   |

## Heater Burnout Alarms and SSR Failure Alarms

|   |  |
|---|--|
| CT input (for heater current detection) | Models with detection for single-phase heaters: One input                  |
| Maximum heater current                  | 50 A AC  |
| Input current indication accuracy       | ±5% FS ±1 digit max.   |
| Heater burnout alarm setting range *1   | 0.1 to 49.9 A (in units of 0.1 A)<br>Minimum detection ON time: 100 ms *3  |
| SSR failure alarm setting range *2      | 0.1 to 49.9 A (in units of 0.1 A)<br>Minimum detection OFF time: 100 ms *4 |

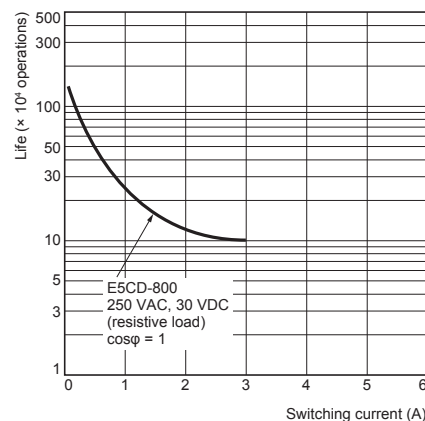
\*1. For heater burnout alarms, the heater current will be measured when the control output is ON, and the output will turn ON if the heater current is lower than the set value (i.e., heater burnout detection current value).

\*2. For SSR failure alarms, the heater current will be measured when the control output is OFF, and the output will turn ON if the heater current is higher than the set value (i.e., SSR failure detection current value).

\*3. The value is 30 ms for a control period of 0.1 s or 0.2 s.

\*4. The value is 38 ms for a control period of 0.1 s or 0.2 s.

## Electrical Life Expectancy Curve for Control Output Relay (Reference Values)



# E5CD-800/E5CD-B-800

## External Connections

### E5CD-800 (Screw Terminal Blocks)

**Control output 1**

Relay output  
250 VAC, 3 A (resistive load)

Voltage output  
(for driving SSR)  
12 VDC, 21 mA

Linear current output  
0 to 20 mA DC  
4 to 20 mA DC  
Load: 500 Ω max

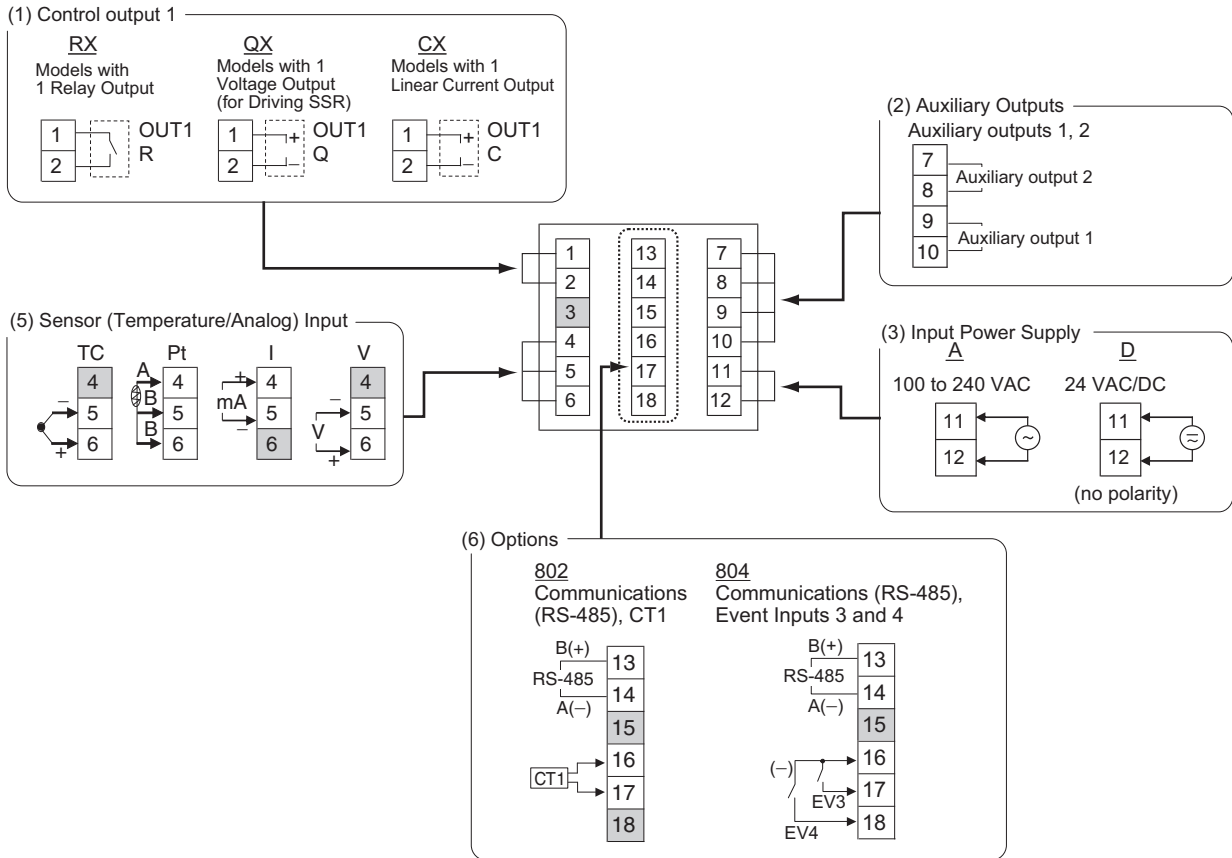
**Auxiliary outputs 1, 2**

Relay outputs  
250 VAC, 3 A (resistive load)

E5CD-□□ 2 □ D M - □□□□  
(1) (2) (3) (4) (5) (6)

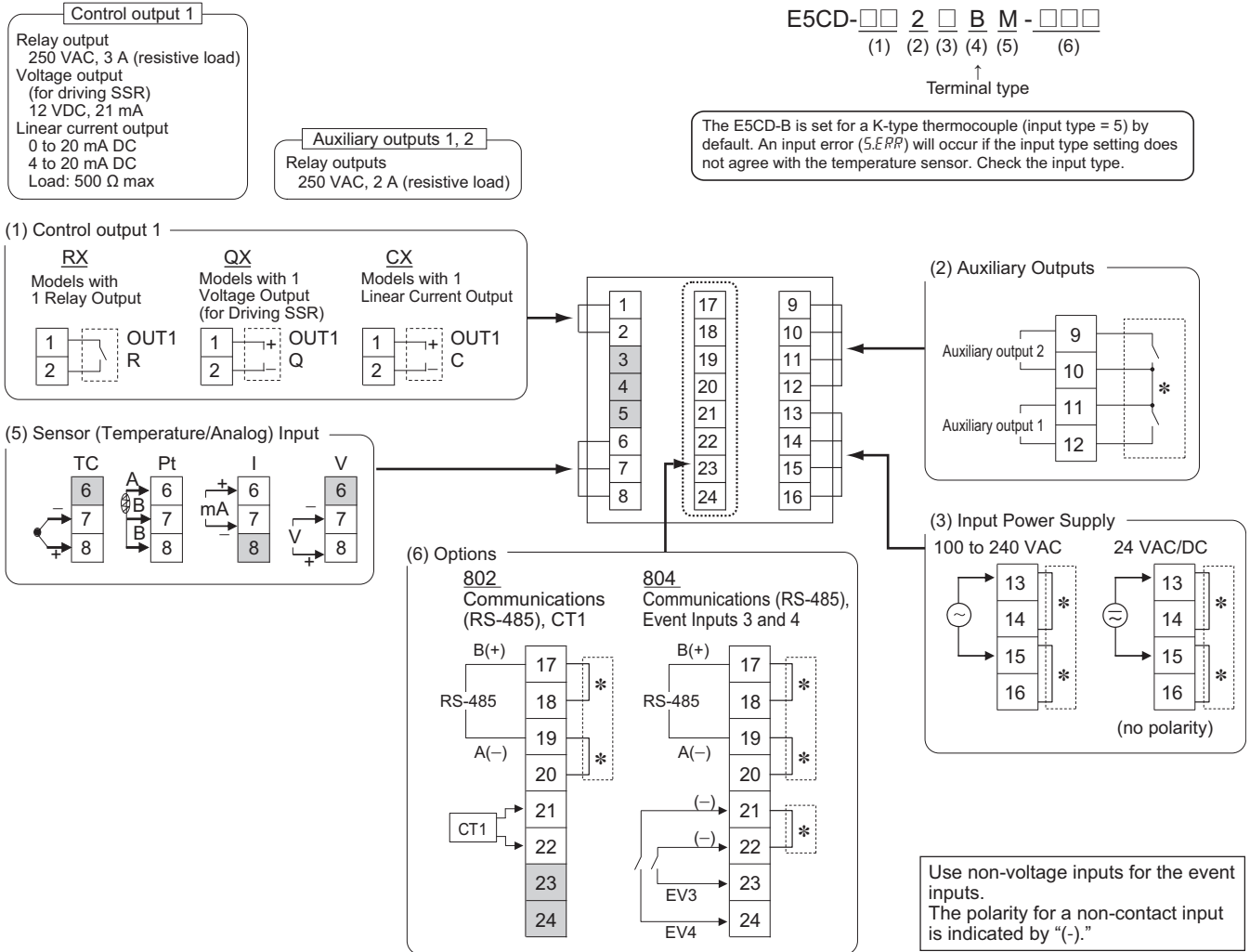
↑  
Terminal type

The E5CD-800 is set for a K-type thermocouple (input type = 5) by default. An input error (s.err) will occur if the input type setting does not agree with the temperature sensor. Check the input type.



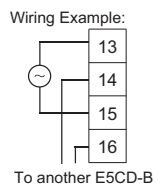
- Note:**
1. The application of the terminals depends on the model.
  2. Do not wire the terminals that are shown with a gray background.
  3. When complying with EMC standards, the cable that connects the sensor must be 30 m or less. If the cable length exceeds 30 m, compliance with EMC standards will not be possible.
  4. Connect M3 crimped terminals.
  5. Due to UL Listing requirements, use the E54-CT1L or E54-CT3L Current Transformer with the factory wiring (internal wiring). Use a UL category XOBA or XOBA7 current transformer that is UL Listed for field wiring (external wiring) and not the factory wiring (internal wiring).

E5CD-B-800 (Push-In Plus Terminal Blocks)



- Note:**
1. The application of the terminals depends on the model.
  2. Do not wire the terminals that are shown with a gray background.
  3. When complying with EMC standards, the cable that connects the sensor must be 30 m or less. If the cable length exceeds 30 m, compliance with EMC standards will not be possible.
  4. Refer to E5□D-B (Push-In Plus terminal block types) on page 48 for wire specifications and wiring methods.

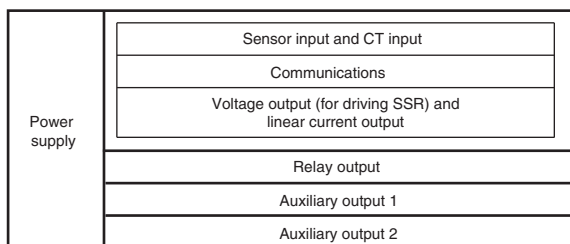
5. Common terminals are indicated with asterisks (\*). You can use the input power supply and communications common terminals for crossover wiring. Controllers given below if you use crossover wiring for the input power supply.  
 100 to 240 VAC Controllers: 16 max.  
 24 VAC/VDC Controllers: 8 max.



6. Due to UL Listing requirements, use the E54-CT1L or E54-CT3L Current Transformer with the factory wiring (internal wiring). Use a UL category X0BA or X0BA7 current transformer that is UL Listed for field wiring (external wiring) and not the factory wiring (internal wiring).

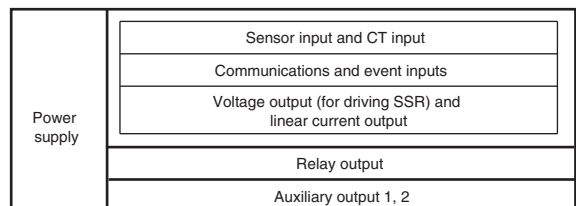
Isolation/Insulation Block Diagrams

E5CD-B



: Reinforced insulation  
 : Functional isolation

E5CD-B-800

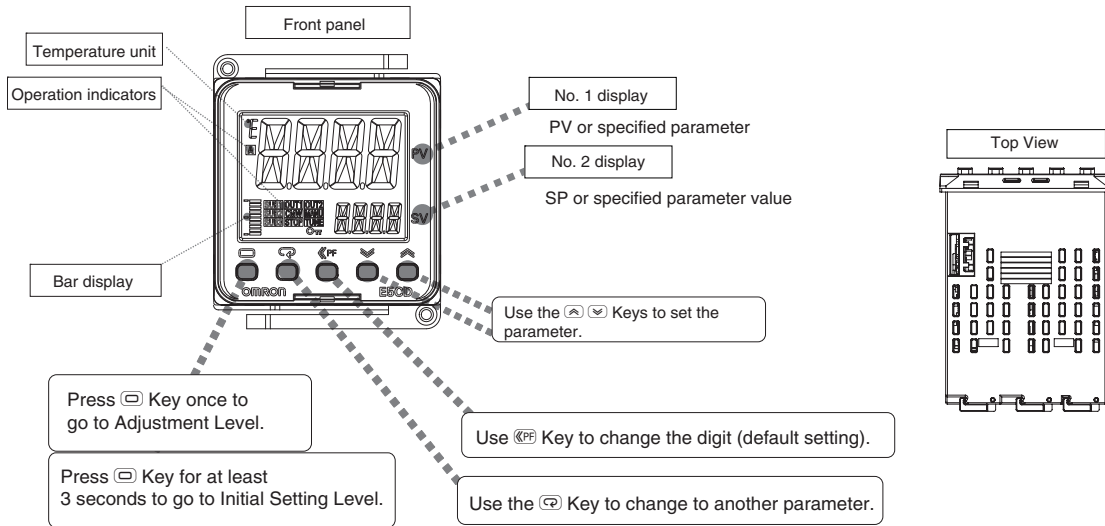


: Reinforced insulation  
 : Functional isolation

# E5CD-800/E5CD-B-800

## Nomenclature

### E5CD-800/E5CD-B-800

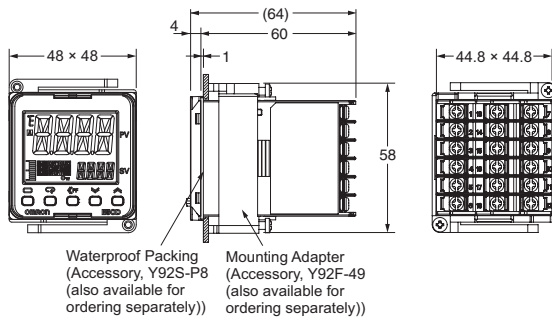


## Dimensions

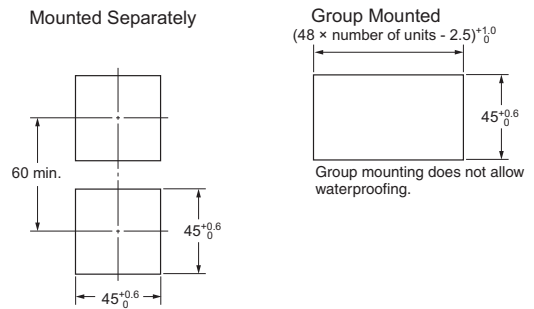
(Unit: mm)

### Controllers

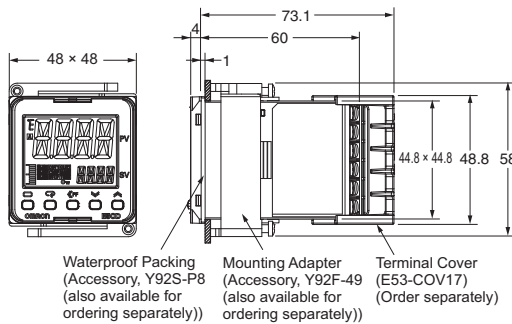
#### E5CD-800



#### Panel Cutout

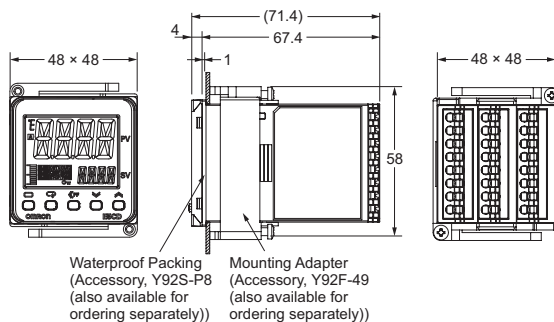


#### With Terminal Covers (E53-COV17, Order separately) Mounted



- Recommended panel thickness is 1 to 5 mm.
- Group mounting is not possible in the vertical direction. (Maintain the specified mounting space between Controllers.)
- To mount the Controller so that it is waterproof, insert the waterproof packing onto the Controller.
- When two or more Controllers are mounted, make sure that the surrounding temperature does not exceed the allowable operating temperature specified in the specifications.

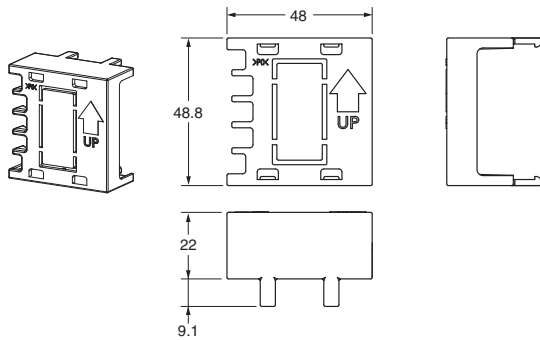
#### E5CD-B-800



## Accessories (Order Separately)

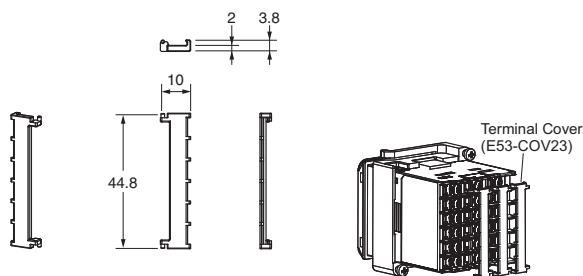
**Terminal Covers** (Cannot be used on a Push-In Plus terminal block type)

**E53-COV17**



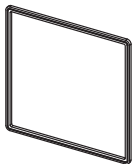
**Terminal Covers** (Cannot be used on a Push-In Plus terminal block type)

**E53-COV23 (Three Covers provided.)**



## Waterproof Packing

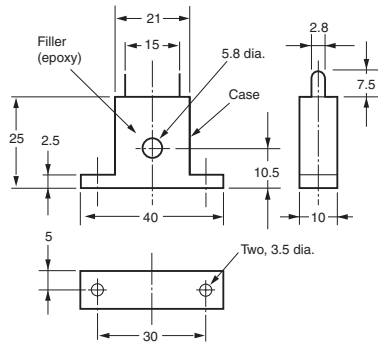
**Y92S-P8 (for DIN 48 × 48)**



The Waterproof Packing is provided with the Digital Temperature Controller. Order the Waterproof Packing separately if it becomes lost or damaged. The Waterproof Packing can be used to achieve an IP66 degree of protection. (Deterioration, shrinking, or hardening of the waterproof packing may occur depending on the operating environment. Therefore, periodic replacement is recommended to ensure the level of waterproofing specified in IP66. The time for periodic replacement depends on the operating environment. Be sure to confirm this point at your site. Consider three years as rough standard.)

## Current Transformers

### E54-CT1



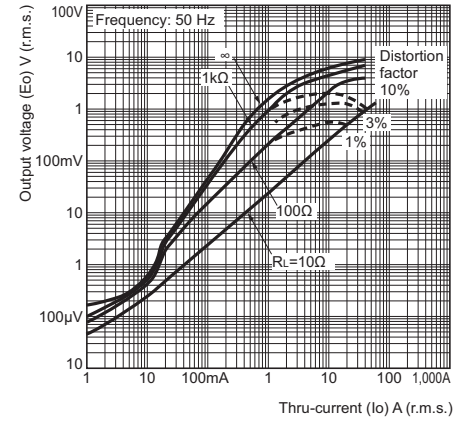
### Thru-current ( $I_o$ ) vs. Output Voltage ( $E_o$ ) (Reference Values)

#### E54-CT1 or E54-CT1L

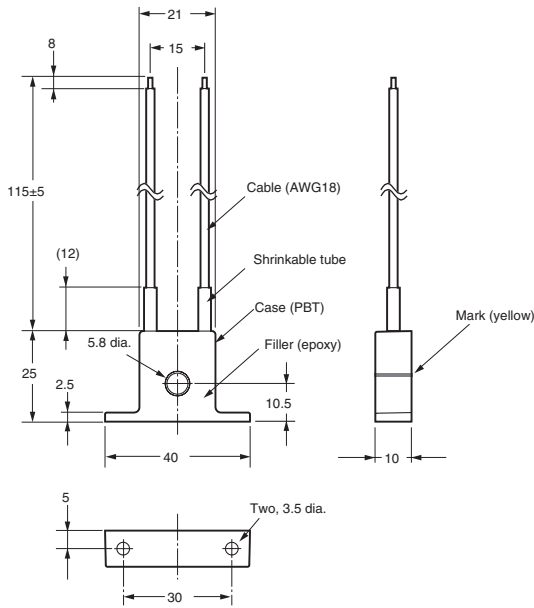
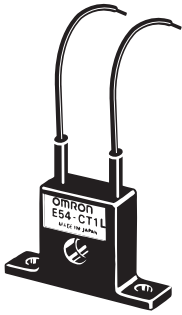
Maximum continuous heater current: 50 A (50/60 Hz)

Number of windings: 400±2

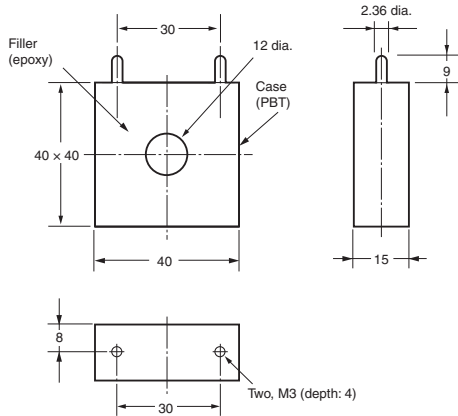
Winding resistance: 18±2 Ω



### E54-CT1L

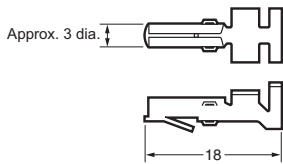


**E54-CT3**

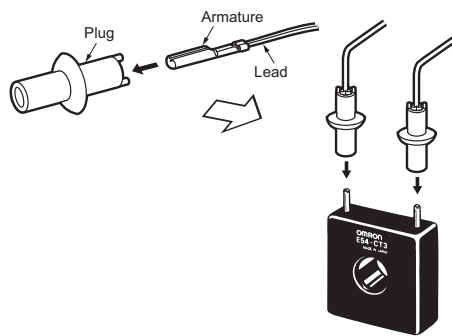


**E54-CT3 Accessories**

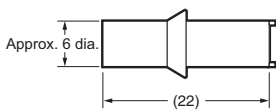
• **Armature**



**Connection Example**

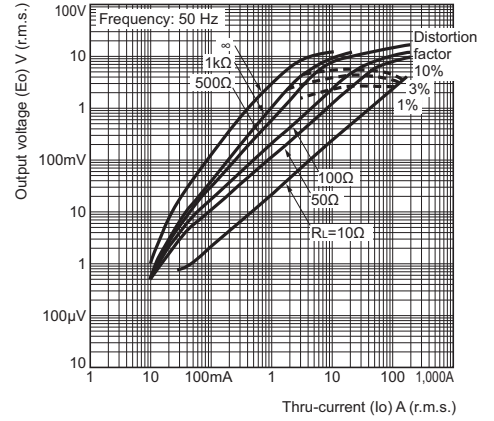


• **Plug**

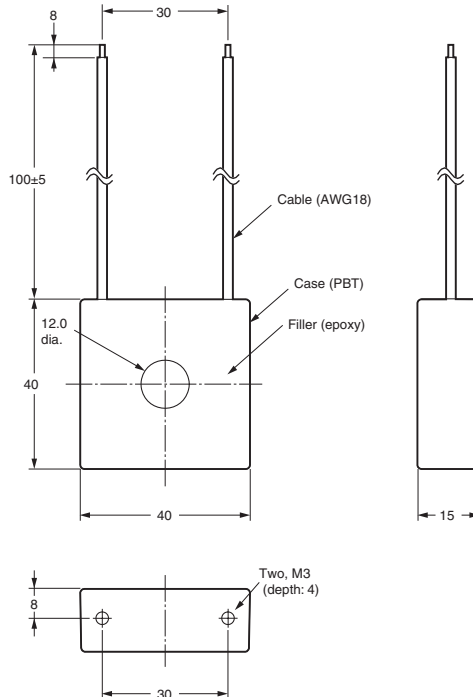


**Thru-current (Io) vs. Output Voltage (Eo)  
(Reference Values)  
E54-CT3 or E54-CT3L**

Maximum continuous heater current: 120 A (50/60 Hz)  
 (Maximum continuous heater current for an OMRON Digital Temperature Controller is 50 A.)  
 Number of windings: 400±2  
 Winding resistance: 8±0.8 Ω



**E54-CT3L**



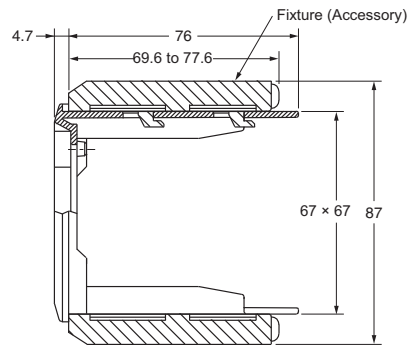
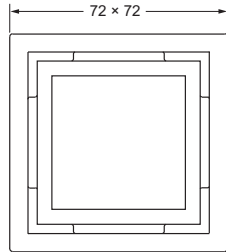
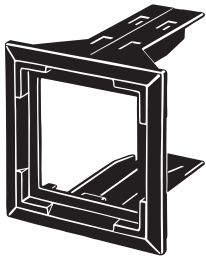


# E5CD-800/E5CD-B-800

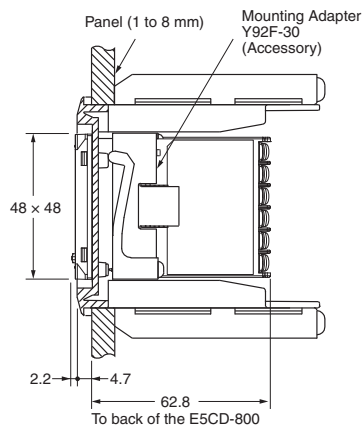
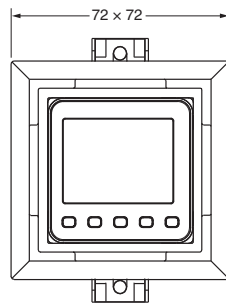
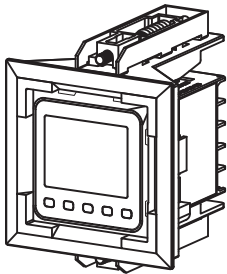
## Adapter

**Y92F-45**

- Note:**
1. Use this Adapter when the Front Panel has already been prepared for the E5B□.
  2. Only black is available.
  3. You cannot use it together with the Y92F-49 Adapter that is enclosed with the Controller.



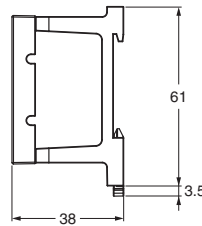
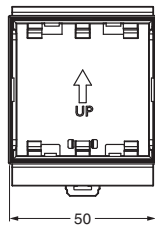
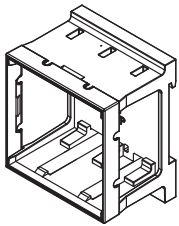
## Mounting Example



## DIN Track Mounting Adapter (Cannot be used on a Push-In Plus terminal block type)

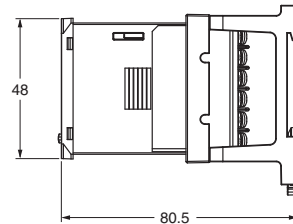
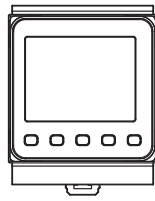
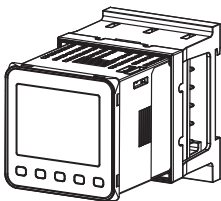
**Y92F-52**

- Note:** This Adapter cannot be used together with the Terminal Cover.  
Remove the Terminal Cover to use the Adapter.

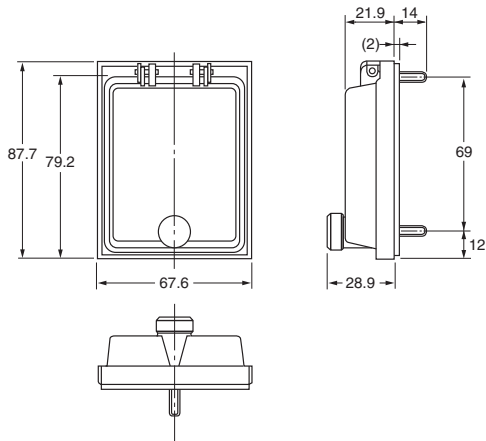


This Adapter is used to mount the E5CD-800 to a DIN Track. If you use the Adapter, there is no need for a plate to mount in the panel or to drill mounting holes in the panel.

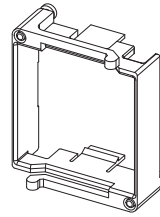
## Mounting Example



**Waterproof Cover**  
Y92A-48N



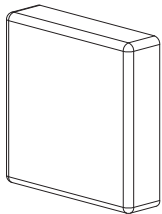
**Mounting Adapter**  
Y92F-49



The Mounting Adapter is provided with the Digital Temperature Controller. Order this Adapter separately if it becomes lost or damaged.

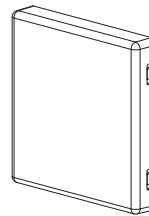
**Front Cover**  
Y92A-48D

**Note:** This Front Cover cannot be used if the Waterproof Packing is installed.



This Front Cover is soft type. It is able to operate the controller with using this cover.

**Front Cover**  
Y92A-48H



This Front Cover is hard type. Please use it for the mis-operation prevention etc.

**Draw-out Jig** (Cannot be used on a Push-In Plus terminal block type)  
Y92F-58

Use this Draw-out Jig to remove the interior body of the Digital Temperature Controller from the case to perform maintenance without removing the terminal wiring.

