New Product

Digital Temperature Controller
E5□C/E5□C-T


Digital Temperature Controllers: E5□C Series

48 × 24 mm
- Models with Screw Terminal Blocks/
  Models with Screwless Clamp Terminal Blocks: E5GC (page 2)

48 × 48 mm
- Models with Screw Terminal Blocks: E5CC (page 18)
  - Models with Push-In Plus Terminal Blocks: E5CC-B (page 18)
  - Plug-in Models: E5CC-U (page 18)

48 × 96 mm
- Models with Screw Terminal Blocks: E5EC (page 40)
  - Models with Push-In Plus Terminal Blocks: E5EC-B (page 40)

96 × 96 mm
- Models with Screw Terminal Blocks: E5AC (page 40)
  - Models with Screw Terminal Blocks: E5DC (page 58)
    - Models with Push-In Plus Terminal Blocks: E5DC-B (page 58)

DIN 22.5-mm-wide Controllers That Mount to DIN Track

Programmable Digital Temperature Controllers: E5□C-T Series

48 × 48 mm
- Models with Screw Terminal Blocks: E5CC-T (page 78)

48 × 96 mm
- Models with Screw Terminal Blocks: E5EC-T (page 96)

96 × 96 mm
- Models with Screw Terminal Blocks: E5AC-T (page 96)
Digital Temperature Controller
E5GC (48 × 24 mm)

Easy Operation and High Performance of the E5GC Series in a Compact 48 × 24-mm Body

- A compact body of 48 × 24 × 90 mm (W × H × D) that is ideal for small equipment, laboratory instruments, and others.
- White PV display with a height of 10.5 mm for high visibility even with the compact body.
- Removable terminal block to simplify maintenance. Select from screw terminal blocks or screwless clamp terminal blocks for the wiring method.
- High-speed sampling at 50 ms.
- Easy connections to a PLC with programless communications.
- Set up the Controller without wiring the power supply by connecting to the computer with a Communications Conversion Cable (sold separately). Setup is easy with the CX-Thermo (sold separately).

Main I/O Functions

- Sensor Input
  - Universal input
  - Thermocouple
  - Pt
  - Analog current/voltage

- Event Inputs
  - None
  - 1
  - 2

- Auxiliary Outputs
  - None
  - 1
  - 2

- Serial Communications
  - None
  - RS-485

- Control Output 1
  - Relay output
  - Voltage output (for driving SSR)
  - Linear current output

- Dual displays: PV/SV
- 4-digit displays
- PF (shift) Key
- Temperature status display
- Simple programming
- Independent heating and cooling PID control
- Changed parameter display
- Display brightness setting
- Simple transfer output (only on models with linear current outputs)
- Work Bit Message

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.

E5GC Digital Temperature Controllers User’s Manual (Cat. No. H174)
E5GC Digital Temperature Controllers Communications Manual (Cat. No. H175)
Model Number Legend

E5GC-□□□□□□M-□□□□ (Example: E5GC-RX1A6M-015)

<table>
<thead>
<tr>
<th>Model</th>
<th>Control output 1 and 2</th>
<th>No. of auxiliary outputs</th>
<th>Power supply voltage</th>
<th>Terminal type</th>
<th>Input type</th>
<th>Options</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>E5GC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>48 × 24 mm</td>
</tr>
<tr>
<td>RX</td>
<td>Control output 1</td>
<td>Control output 2</td>
<td>Relay output</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QX</td>
<td>Voltage output</td>
<td></td>
<td>None</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CX</td>
<td>Linear current output</td>
<td></td>
<td>None</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>#1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>#2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td></td>
<td></td>
<td>100 to 240 VAC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td></td>
<td></td>
<td>24 VAC/DC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td>Screw terminal blocks (with cover)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
<td></td>
<td>Screwless clamp terminal blocks</td>
<td></td>
<td></td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td></td>
<td></td>
<td>Universal input</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HB alarm and HS alarm</th>
<th>Communications</th>
<th>Event inputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>000</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>015</td>
<td>---</td>
<td>RS-485</td>
</tr>
<tr>
<td>016</td>
<td>---</td>
<td>1</td>
</tr>
<tr>
<td>023</td>
<td>1</td>
<td>---</td>
</tr>
<tr>
<td>024</td>
<td>---</td>
<td>2</td>
</tr>
</tbody>
</table>

*1. The control output can be used as a simple transfer output.
*2. Only option 000 can be selected if an auxiliary output is zero.
*3. Option 016 and 023 can be selected only if two auxiliary outputs are selected.
*4. Option with HB and HS alarms (023) cannot be selected if a linear current output is selected for the control output.
*5. Option 024 can be selected only if one auxiliary output is selected.
*6. The specifications are different for Temperature Controllers with Push-In Plus terminal blocks. Refer to Precautions when Wiring on page 131.

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.
Optional Products (Order Separately)

USB-Serial Conversion Cable

<table>
<thead>
<tr>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>E58-CIFQ2</td>
</tr>
</tbody>
</table>

Communications Conversion Cable

<table>
<thead>
<tr>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>E58-CIFQ2-E</td>
</tr>
</tbody>
</table>

Note: Always use this product together with the E58-CIFQ2. This Cable is used to connect to the bottom-panel Setup Tool port.

Current Transformers (CTs)

<table>
<thead>
<tr>
<th>Hole diameter</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.8 mm</td>
<td>E54-CT1</td>
</tr>
<tr>
<td>5.8 mm</td>
<td>E54-CT1L*</td>
</tr>
<tr>
<td>12.0 mm</td>
<td>E54-CT3</td>
</tr>
<tr>
<td>12.0 mm</td>
<td>E54-CT3L*</td>
</tr>
</tbody>
</table>

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

Mounting Adapter

<table>
<thead>
<tr>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y92F-53 (2pcs)</td>
</tr>
</tbody>
</table>

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

Waterproof Packing

<table>
<thead>
<tr>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y92S-P12</td>
</tr>
</tbody>
</table>

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

Draw-out Jig

<table>
<thead>
<tr>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y92F-55</td>
</tr>
</tbody>
</table>

CX-Thermo Support Software

<table>
<thead>
<tr>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>EST2-2C-MV4</td>
</tr>
</tbody>
</table>

Note: CX-Thermo version 4.62 or higher is required for the E5GC. For the system requirements for the CX-Thermo, refer to information on the EST2-2C-MV4 on the OMRON website (www.ia.omron.com).

Terminal Covers (for E5GC-□6)

<table>
<thead>
<tr>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>E53-COV27</td>
</tr>
</tbody>
</table>

Note: This Terminal Covers is provided with the Digital Temperature Controller.
## Specifications

### Ratings

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Power supply voltage</strong></td>
<td>A in model number: 100 to 240 VAC, 50/60 Hz</td>
</tr>
<tr>
<td></td>
<td>D in model number: 24 VAC, 50/60 Hz; 24 VDC</td>
</tr>
<tr>
<td><strong>Operating voltage range</strong></td>
<td>85 to 110% of rated supply voltage</td>
</tr>
<tr>
<td><strong>Power consumption</strong></td>
<td>5.9 VA max. at 100 to 240 VAC, and 3.2 VA max. at 24 VAC or 1.8 W max. at 24 VDC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Sensor input</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Platinum resistance thermometer: Pt100 or JPt100</td>
</tr>
<tr>
<td></td>
<td>Infrared temperature sensor (ES1B): 10 to 70°C, 60 to 120°C, 115 to 165°C, or 140 to 260°C</td>
</tr>
<tr>
<td>Analog input</td>
<td>Current input: 4 to 20 mA or 0 to 20 mA</td>
</tr>
<tr>
<td></td>
<td>Voltage input: 1 to 5 V, 0 to 5 V, or 0 to 10 V</td>
</tr>
</tbody>
</table>

| **Input impedance**           | Current input: 150 Ω max., Voltage input: 1 μA min.                  |
|                               | (Use a 1:1 connection when connecting the ES2-HB-N/THB-N.)            |

| **Control method**            | ON/OFF control or 2-PID control (with auto-tuning)                 |

| **Control output**            | Relay output                                                        |
|                               | SPST-NO, 250 VAC, 2 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA (reference value) |
| **Voltage output**            | Output voltage 12 VDC ±20% (PNP), max. Load current: 21 mA, with short-circuit protection circuit |
| **Linear current output**     | 4 to 20 mA DC/0 to 20 mA DC, load: 500 Ω max., resolution: Approx. 10,000 |

| **Auxiliary output**          | Number of outputs: 1 or 2 (depends on model)                           |
|                               | Output specifications: SPST-NO relay outputs, 250 VAC, 2 A (resistive load), Electrical life: 100,000 operations, Minimum applicable load: 10 mA at 5 V (reference value) |

| **Event input**               | Number of inputs: 1 or 2 (depends on model)                             |
|                               | External contact input specifications: 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. |
|                               | Current flow: approx. 7 mA per contact                                   |

| **Setting method**            | Digital setting using front panel keys                                  |
| **Indication method**         | 11-segment digital displays and individual indicators                   |
|                               | Character height: PV: 10.5 mm, SV: 5.0 mm                              |
| **Multi SP**                  | Up to eight set points (SP0 to SP7) can be saved and selected using the event inputs, key operations, or serial communications. * |

### Other functions

| **Ambient operating temperature** | −10 to 55°C (with no condensation or icing), For 3-year warranty: −10 to 50°C with standard mounting (with no condensation or icing) |
| **Ambient operating humidity**   | 25 to 85%                                                             |
| **Storage temperature**          | −25 to 65°C (with no condensation or icing)                           |
| **Altitude**                     | 2,000 m max.                                                          |
| **Recommended fuse**             | T2A, 250 VAC, time-lag, low-breaking capacity                         |
| **Installation environment**     | Overvoltage category II, Pollution Degree 2 (EN/IEC/UL 61010-1)        |

*There are up to four event inputs.
### Input Ranges

**Thermocouple/Platinum Resistance Thermometer (Universal inputs)**

<table>
<thead>
<tr>
<th>Sensor type</th>
<th>Platinum resistance thermometer</th>
<th>Thermocouple</th>
<th>Infrared temperature sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor specification</td>
<td>Pt100</td>
<td>JPt100</td>
<td>K</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10 to 70°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2300</td>
</tr>
</tbody>
</table>

Shaded settings are the default settings.

The applicable standards for the input types are as follows:

- Pt100: JIS C 1604-1997, IEC 60751
- PtII: According to Platinel II electromotive force charts from BASF (previously Engelhard)
- C/W: W5Re/W26Re, JIS C 1602-2015, ASTM E988-1990

### Analog input

<table>
<thead>
<tr>
<th>Input specification</th>
<th>Current</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 to 20 mA</td>
<td>0 to 20 mA</td>
<td>1 to 5 V</td>
</tr>
</tbody>
</table>

Setting range: Usable in the following ranges by scaling:

-1999 to 9999, -199.9 to 999.9, -19.99 to 99.99 or -1.999 to 9.999

Set value: 25, 26, 27, 28, 29
## 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 to 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.

<table>
<thead>
<tr>
<th>Set value</th>
<th>Alarm type</th>
<th>Alarm output operation</th>
<th>Description of function</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Alarm function OFF</td>
<td>Output OFF</td>
<td>No alarm</td>
</tr>
<tr>
<td>1</td>
<td>Upper- and lower-limit #1</td>
<td>ON OFF L H SP PV</td>
<td>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.</td>
</tr>
<tr>
<td>2 (default)</td>
<td>Upper-limit</td>
<td>ON OFF X SP PV</td>
<td>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.</td>
</tr>
<tr>
<td>3</td>
<td>Lower-limit</td>
<td>ON OFF X SP PV</td>
<td>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.</td>
</tr>
<tr>
<td>4</td>
<td>Upper- and lower-limit range #1</td>
<td>ON OFF L H SP PV</td>
<td>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.</td>
</tr>
<tr>
<td>5</td>
<td>Upper- and lower-limit with standby sequence #1</td>
<td>ON OFF L H SP PV</td>
<td>A standby sequence is added to the upper- and lower-limit alarm (1). #6</td>
</tr>
<tr>
<td>6</td>
<td>Upper-limit with standby sequence</td>
<td>ON OFF X SP PV</td>
<td>A standby sequence is added to the upper-limit alarm (2). #6</td>
</tr>
<tr>
<td>7</td>
<td>Lower-limit with standby sequence</td>
<td>ON OFF X SP PV</td>
<td>A standby sequence is added to the lower-limit alarm (3). #6</td>
</tr>
<tr>
<td>8</td>
<td>Absolute-value upper-limit</td>
<td>ON OFF X SP PV</td>
<td>The alarm will turn ON if the process value is larger than the alarm value (X) regardless of the set point.</td>
</tr>
<tr>
<td>9</td>
<td>Absolute-value lower-limit</td>
<td>ON OFF X SP PV</td>
<td>The alarm will turn ON if the process value is smaller than the alarm value (X) regardless of the set point.</td>
</tr>
<tr>
<td>10</td>
<td>Absolute-value upper-limit with standby sequence</td>
<td>ON OFF X SP PV</td>
<td>A standby sequence is added to the absolute-value upper-limit alarm (8). #6</td>
</tr>
<tr>
<td>11</td>
<td>Absolute-value lower-limit with standby sequence</td>
<td>ON OFF X SP PV</td>
<td>A standby sequence is added to the absolute-value lower-limit alarm (9). #6</td>
</tr>
<tr>
<td>12</td>
<td>LBA (alarm 1 type only)</td>
<td>-</td>
<td>#7</td>
</tr>
<tr>
<td>13</td>
<td>PV change rate alarm</td>
<td>-</td>
<td>#8</td>
</tr>
<tr>
<td>14</td>
<td>SP absolute-value upper-limit alarm</td>
<td>ON OFF X SP</td>
<td>This alarm type turns ON the alarm when the set point (SP) is higher than the alarm value (X).</td>
</tr>
<tr>
<td>15</td>
<td>SP absolute-value lower-limit alarm</td>
<td>ON OFF X SP</td>
<td>This alarm type turns ON the alarm when the set point (SP) is lower than the alarm value (X).</td>
</tr>
<tr>
<td>16</td>
<td>MV absolute-value upper-limit alarm #9</td>
<td>Standard Control</td>
<td>This alarm type turns ON the alarm when the manipulated variable (MV) is higher than the alarm value (X).</td>
</tr>
<tr>
<td>17</td>
<td>MV absolute-value lower-limit alarm #9</td>
<td>Standard Control</td>
<td>This alarm type turns ON the alarm when the manipulated variable (MV) is lower than the alarm value (X).</td>
</tr>
</tbody>
</table>
**#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

<table>
<thead>
<tr>
<th>Case 1</th>
<th>Case 2</th>
<th>Case 3 (Always Off)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L H SP</td>
<td>SP L H</td>
<td>H L SP</td>
</tr>
<tr>
<td>H&lt;0, L&gt;0</td>
<td>H&lt;0, L&lt;0</td>
<td>H&lt;0, L&lt;0</td>
</tr>
<tr>
<td></td>
<td>[H] &lt; [L]</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Case 1</th>
<th>Case 2</th>
<th>Case 3 (Always On)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L H SP</td>
<td>SP L H</td>
<td>H L SP</td>
</tr>
<tr>
<td>H&lt;0, L&gt;0</td>
<td>H&lt;0, L&lt;0</td>
<td>H&lt;0, L&lt;0</td>
</tr>
<tr>
<td></td>
<td>[H] &lt; [L]</td>
<td></td>
</tr>
</tbody>
</table>

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

For Upper- and Lower-Limit Alarm Described Above at "2"
- In cases 1 and 2 above, the alarm is always OFF if the upper- and lower-limit hysteresis overlaps.
- In case 3, the alarm is always OFF.

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

The alarm is always OFF if upper- and lower-limit hysteresis overlaps.

**#6.** Refer to the E5GC Digital Temperature Controllers User’s Manual (Cat. No. H174) for information on the operation of the standby sequence.

**#7.** Refer to the E5GC Digital Temperature Controllers User’s Manual (Cat. No. H174) for information on the LBA.

**#8.** Refer to the E5GC Digital Temperature Controllers User’s Manual (Cat. No. H174) for information on the PV change rate alarm.

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

Indication accuracy (at the temperature of 23 °C)
Thermocouple: (±0.3% of indication value or ±1 °C, whichever is greater) ±1 digit max.
Platinum resistance thermometer: (±0.2% of indication value or ±0.8 °C, whichever is greater) ±1 digit max.
Analog input: ±0.2% FS ±1 digit max.
CT input: ±5% FS ±1 digit max.

Simple transfer output accuracy
±0.3% FS max.

Influence of temperature
Thermocouple input (R, S, B, C/W, PL II): (±1% of indication value or ±10 °C, whichever is greater) ±1 digit max.
Other thermocouple input: (±1% of indication value or ±4 °C, whichever is greater) ±1 digit max.
Platinum resistance thermometer: (±1% of indication value or ±2 °C, whichever is greater) ±1 digit max.

Influence of EMS.
(EN 61326-1)
Analog input: ±1% FS ±1 digit max.
CT input: ±5% FS ±1 digit max.

Input sampling period
50 ms

Hysteresis
Temperature input: 0.1 to 999.9 °C or °F (in units of 0.1 °C or °F)
Analog input: ±0.1% to 99.99% FS (in units of 0.01% FS)

Proportional band (P)
Temperature input: 0.1 to 999.9 °C or °F (in units of 0.1 °C or °F)
Analog input: 0.1% to 999.9% FS (in units of 0.1% FS)

Integral time (I)
0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s)

Derivative time (D)
0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s)

Proportional band (P) for cooling
Temperature input: 0.1 to 999.9 °C or °F (in units of 0.1 °C or °F)
Analog input: 0.1% to 999.9% FS (in units of 0.1% FS)

Integral time (I) for cooling
0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s)

Derivative time (D) for cooling
0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s)

Control period
0.1, 0.2, 0.5, 1 to 99 s (in units of 1 s)

Manual reset value
0.0% to 100.0% (in units of 0.1%)

Alarm setting range
−1,999 to 9,999 (decimal point position depends on input type)

Influence of signal source resistance
Thermocouple: 0.1°C/Ω max. (100 Ω max.), Platinum resistance thermometer: 0.1°C/Ω max. (10 Ω max.)

Insulation resistance
20 MΩ min. (at 500 VDC)

Dielectric strength
100 to 240 VAC: 3,000 VAC, 50/60 Hz for 1 min between terminals of different charge
24 VAC/DC: 2,300 VAC, 50/60 Hz for 1 min between terminals of different charge

Vibration
Malfunction: 10 to 55 Hz, 20 m/s² for 10 min each in X, Y, and Z directions
Resistance: 10 to 55 Hz, 20 m/s² for 2 hr each in X, Y, and Z directions

Shock
Malfunction: 100 m/s², 3 times each in X, Y, and Z directions
Resistance: 300 m/s², 3 times each in X, Y, and Z directions

Weight
Controller: Approx. 80 g, Mounting Adapter: Approx. 4 g × 2

Degree of protection
Front panel: IP66, Rear case: IP20, Terminals: IP00

Memory protection
Non-volatile memory (number of writes: 1,000,000 times)

Setup Tool
CX-Thermo version 4.62 or higher

Setup Tool port
E5GC side panel: An E58-CIFQ2 USB-Serial Conversion Cable is used to connect a USB port on the computer.
E5GC bottom panel: An E58-CIFQ2 USB-Serial Conversion Cable and E58-CIFQ2-E Conversion Cable are used together to connect a USB port on the computer.

Standards
Approved standards
UL1010-1/CSA C22.2 No.61010-1, Korean wireless regulations (Radio law: KC Mark) (Some models only.) #7, EAC

Conformed standards
EN 61010-1 (IEC 61010-1), RCM

EMC

Emission

EN: EMI: Radiated Interference Electromagnetic Field Strength: EN61326-1 #8
Noise Terminal Voltage: EN55011 Group 1, class A
EMS: EN61326-1 #8
ESD Immunity: EN61000-4-2
Electromagnetic Field Immunity: EN61000-4-3
 Burst Noise Immunity: EN61000-4-4
 Conducted Disturbance Immunity: EN61000-4-6
 Surge Immunity: EN61000-4-5
 Voltage Dip/Interrupting Immunity: EN61000-4-11

*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 temperature is ±2 °C ±1 digit max. The indication accuracy of B thermocouples 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 ±3 °C max.

*2. However, the precision between 0 and 4 mA for a 0 to 20 mA output is ±1% FS max.

*3. Ambient temperature: −10 °C to 23 °C to 55 °C, Voltage range: −15% to 10% of rated voltage

*4. K thermocouple at −100 °C max.: ±10 °C max.

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

*6. External serial communications (RS-485) and USB-Serial Conversion Cable communications can be used at the same time.

*7. Refer to your OMRON website for the most recent information on applicable models.

*8. Industrial electromagnetic environment (EN/IEC 61326-1 Table 2)
Communications Functions

<table>
<thead>
<tr>
<th>Applicable OS</th>
<th>Windows XP/Vista/7/8/10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable software</td>
<td>CX-Thermo version 4.62 or higher</td>
</tr>
<tr>
<td>Applicable models</td>
<td>E5: C-T Series, E5: C Series, and E5CB Series</td>
</tr>
<tr>
<td>USB interface standard</td>
<td>Conforms to USB Specification 2.0</td>
</tr>
<tr>
<td>DTE speed</td>
<td>38,400 bps</td>
</tr>
<tr>
<td>Connector specifications</td>
<td>Computer: USB (Type A plug) Digital Temperature Controller: Special serial connector</td>
</tr>
<tr>
<td>Power supply</td>
<td>Bus power (Supplied from the USB host controller)</td>
</tr>
<tr>
<td>Power supply voltage</td>
<td>5 VDC</td>
</tr>
<tr>
<td>Current consumption</td>
<td>450 mA max.</td>
</tr>
<tr>
<td>Output voltage</td>
<td>4.7±0.2 VDC (Supplied from USB-Serial Conversion Cable to the Digital Temperature Controller)</td>
</tr>
<tr>
<td>Output current</td>
<td>250 mA max. (Supplied from USB-Serial Conversion Cable to the Digital Temperature Controller)</td>
</tr>
</tbody>
</table>

* 7 or 8 bits
* 1 or 2 bits
* Vertical parity (none, even, odd)

RS-485: Multidrop

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, or 57,600 bps |
| Data bit length * | 7 or 8 bits |
| Stop bit length * | 1 or 2 bits |
| Error detection | Vertical parity (none, even, odd) Block check character (BCC) with CompoWay/F or CRC-16 with Modbus |
| Flow control | None |
| Interface | RS-485 |
| Retry function | None |
| Communications buffer | 217 bytes |
| Communications response wait time | 0 to 99 ms 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 E5: IC parameters, start and stop operation, etc. The E5: IC automatically performs communications with PLCs. No communications programming is required. Number of connected Digital Temperature Controllers: 32 max. (Up to 16 for the FX Series) Applicable PLCs: OMRON PLCs, Mitsubishi Electric PLCs, KEYENCE PLCs

Communications Specifications

**Component Communications**

- When Digital Temperature Controllers are connected, set points and RUN/STOP commands can be sent from the Digital Temperature Controller that is set as the master to the Digital Temperature Controllers that are set as slaves.
- Slope and offsets can be set for the set point. Number of connected Digital Temperature Controllers: 32 max. (including master)

**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.

**MELESEC** is a registered trademark of Mitsubishi Electric Corporation.
**KEYENCE** is a registered trademark of Keyence Corporation.
* Both the programless communications and the component communications support the copying.

**Current Transformer (Order Separately) Ratings**

<table>
<thead>
<tr>
<th>Component</th>
<th>E54-CT1</th>
<th>E54-CT3</th>
<th>E54-CT1L</th>
<th>E54-CT3L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dielectric strength</td>
<td>1,000 VAC for 1 min</td>
<td>1,500 VAC for 1 min</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vibration resistance</td>
<td>50 Hz, 98 m/s²</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>E54-CT1: Approx. 11.5 g</td>
<td>E54-CT3: Approx. 50 g</td>
<td>E54-CT1L: Approx. 14 g</td>
<td>E54-CT3L: Approx. 57 g</td>
</tr>
<tr>
<td>Accessories</td>
<td>E54-CT3 Only (Armatures (2) Plugs (2))</td>
<td>None</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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) 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) 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 35 ms for a control period of 0.1 s or 0.2 s.

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

- **Switching current (A)**
- **ESGC**
- **250 VAC, 30 VDC (resistive load) cosφ = 1

<table>
<thead>
<tr>
<th>Duty cycle</th>
<th>0.1</th>
<th>0.2</th>
<th>0.3</th>
<th>0.5</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>5</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life (× 10⁴ operations)</td>
<td>600</td>
<td>500</td>
<td>400</td>
<td>300</td>
<td>200</td>
<td>100</td>
<td>50</td>
<td>20</td>
<td>10</td>
</tr>
</tbody>
</table>

Switching current (A)
External Connections

**E5GC**

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.
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).

### Isolation/Insulation Block Diagrams

- **Power supply**
  - Sensor input and CT input
  - Communications and event inputs
  - Voltage output (for driving SSR) and linear current output
  - Relay output
  - Auxiliary outputs 1 and 2

- **Notation**
  - Reinforced insulation
  - Functional isolation

**Note:** Auxiliary outputs 1 to 2 are not insulated.
E5GC Terminal Block Appearance

Wires: AWG24 to AWG18 (equal to a cross-sectional area of 0.21 to 0.82 mm²) braided or solid wires

Note: Refer to Precautions When Wiring E5GC (Controllers with Screwless Clamp Terminal Blocks) on page 132 for information on wiring Controllers with screwless clamp terminal blocks.

Nomenclature

E5GC
**Controllers**

**E5GC-□B Controllers with Screw Terminal Blocks**

- Use two Mounting Adapters, either on the top and bottom or on the right and left.
- Setup Tool ports are provided as standard feature. Use these ports to connect a computer to the Digital Temperature Controller. The E58-CIFQ2 USB-Serial Conversion Cable is required to connect to the port on the side panel. The E58-CIFQ2 USB-Serial Conversion Cable and E58-CIFQ2-E Communications Conversion Cable are required to connect to the port on the bottom panel. (You cannot leave either port connected constantly during operation.)

**Mounted Separately**

- To mount the Temperature Controller so that it is waterproof, insert the Waterproof Packing onto the Temperature Controller. Group mounting does not allow waterproofing.

**Horizontally Group Mounted**

- Use Temperature Controllers with Screwless Clamp Terminal Blocks for vertical group mounting.

**E5GC-□C Controllers with Screwless Clamp Terminal Blocks**

- Use two Mounting Adapters, either on the top and bottom or on the right and left.
- Setup Tool ports are provided as standard feature. Use these ports to connect a computer to the Digital Temperature Controller. The E58-CIFQ2 USB-Serial Conversion Cable is required to connect to the port on the side panel. The E58-CIFQ2 USB-Serial Conversion Cable and E58-CIFQ2-E Communications Conversion Cable are required to connect to the port on the bottom panel. (You cannot leave either port connected constantly during operation.)

**Mounted Separately**

- To install the Temperature Controller, insert it into a square hole in a panel with a thickness of 1 to 8 mm, and then insert the enclosed adapter so that it locks into the grooves on the top and bottom or on the left and right of the rear case.

- Tighten the two mounting screws on the top and bottom or on the right and left of the Mounting Adapters alternately little by little to maintain a balance, and tighten them to a torque of between 0.29 and 0.39 N·m.

- When two or more Temperature Controllers are mounted, make sure that the surrounding temperature does not exceed the allowable operating temperature range given below.
  - Horizontal group mounting: −10 to 55°C
  - Vertical group mounting of two Controllers: −10 to 45°C
  - Vertical group mounting of three or more Controllers: −10 to 40°C

- If you use vertical group mounting, you cannot draw out the interior body of the Controller.
E5GC

Accessories (Order Separately)

USB-Serial Conversion Cable
E58-CIFQ2

Conversion Cable
E58-CIFQ2-E

Connecting to the E58-CIFQ2 USB-Serial Conversion Cable

Note: Always use this product together with the E58-CIFQ2.

Current Transformers

E54-CT1

Thru-current (Io) vs. Output Voltage (Eo)
(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

Thru-current (Io) A (r.m.s.)

Frequency: 50 Hz
Distortion:

No Distortion
10% Distortion
3% Distortion
1% Distortion

Output voltage (Eo) V (r.m.s.)

400V
200V
100V
50V
10V
1V

Through (Io) A (r.m.s.)

Frequency: 50 Hz
Distortion:

No Distortion
10% Distortion
3% Distortion
1% Distortion

Output voltage (Eo) V (r.m.s.)

400V
200V
100V
50V
10V
1V

Through (Io) A (r.m.s.)
E54-CT3 Accessories

- **Armature**
  Approx. 3 dia.

- **Plug**
  Approx. 6 dia.

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**

Cable (AWG18)

---

**Thru-current (Io) A (r.m.s.)**

<table>
<thead>
<tr>
<th>Frequency (Hz)</th>
<th>Distortion factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>10%</td>
</tr>
<tr>
<td>100</td>
<td>3%</td>
</tr>
<tr>
<td>1k</td>
<td>1%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output Voltage (Eo) V (r.m.s.)</th>
<th>100mV</th>
<th>10mV</th>
<th>1mV</th>
<th>100μV</th>
<th>10μV</th>
<th>1μV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thru-current (Io) A (r.m.s.)</td>
<td>100</td>
<td>10</td>
<td>1</td>
<td>100</td>
<td>10</td>
<td>1</td>
</tr>
</tbody>
</table>
Mounting Adapter
Y92F-53 (Two provided.)
One pair is provided with the Temperature Controller. Order the Mounting Adapter separately if it becomes lost or damaged.

Waterproof Packing
Y92S-P12
The Waterproof Packing is provided with the Temperature Controller. Order the Waterproof Packing separately if it becomes lost or damaged.

(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 a rough standard.)

Draw-out Jig
Y92F-55
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.

Terminal Covers
E53-COV27
The Terminal Covers is provided with the Digital Temperature Controller. Order the Terminal Covers separately if it becomes lost or damaged.
Digital Temperature Controller
E5CC/E5CC-B/E5CC-U (48 × 48 mm)

Large White PV Display That's Easier to Read.
Easy to Use, from Model Selection to Setup and Operation.
Models with Push-In Plus Terminal Blocks Added to Lineup.

- The white PV display with a height of 15.2 mm improves visibility.
- High-speed sampling at 50 ms.
- Select from models with screw terminal blocks, models with Push-In Plus terminal blocks for reduced wiring work, and Plug-in Models that can be removed from the terminal block.
- Short body with depth of only 60 mm. (Screw Terminal Blocks)
- Easy connections to a PLC with programless communications. Use component communications to link Temperature Controllers to each other.
- Set up the Controller without wiring the power supply by connecting to the computer with a Communications Conversion Cable (sold separately). Setup is easy with the CX-Thermo (sold separately).

Main I/O Functions

Sensor Input
Universal input
- Thermocouple
- Pt
- Analog current/voltage

Event Inputs
- E5CC: None
- E5CC-B: 2
- E5CC-U: 4

Remote SP Input
- E5CC: None
- E5CC-B: None
- E5CC-U: 1

Serial Communications
- E5CC/E5CC-B: None
- E5CC-U: None
- RS-485

Control Output 1
- Relay output
- Voltage output (for driving SSR)
- Linear current output

Control Output 2
- E5CC-B/E5CC-U: None
- E5CC-U: 3
- E5CC-B: 2
- E5CC-U: None

Auxiliary Outputs
- E5CC-B: None
- E5CC-U: 2
- E5CC-U: None

Transfer Output
- E5CC/B/E5CC-B: None
- E5CC-U: 1

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.
E5JC Digital Temperature Controllers User’s Manual (Cat. No. H174)
E5JC Digital Temperature Controllers Communications Manual (Cat. No. H175)
Model Number Legend and Standard Models

Model Number Legend
Models with Screw Terminal Blocks
E5CC- □ 3 □ 5 M- □ □ □ (Example: E5CC-RX3A5M-000)

<table>
<thead>
<tr>
<th>Model</th>
<th>Control outputs 1 and 2</th>
<th>No. of auxiliary outputs</th>
<th>Power supply voltage</th>
<th>Terminal type</th>
<th>Input type</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>E5CC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RX</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QX</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CX</td>
<td></td>
<td>3 (one common)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QQ</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CQ</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Meaning

- Control output 1: Relay output
- Control output 2: Voltage output (for driving SSR)
- Control output 3: Voltage output (for driving SSR)
- Control output 4: Voltage output (for driving SSR)
- Control output 5: Screw terminal blocks (with cover)
- Universal input

Note: Draw-out-type models of the E5CC are available. Ask your OMRON representative for details.

*1. Options with HB and HS alarms (001 and 003) cannot be selected if a linear current output is selected for the control output.
*2. The control output cannot be used as a transfer output.
*3. Option 004 can be selected only when “CX” is selected for the control outputs.

Heating and Cooling Control
Using Heating and Cooling Control

1. Control Output Assignment
   - If there is no control output 2, an auxiliary output is used as the cooling control output.
   - If there is a control output 2, the two control outputs are used for heating and cooling.
   (It does not matter which output is used for heating and which output is used for cooling.)
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.
Model Number Legend
Models with Push-In Plus Terminal Blocks

E5CC-RX2ABM-000

<table>
<thead>
<tr>
<th>Model</th>
<th>Control outputs 1 and 2</th>
<th>No. of auxiliary outputs</th>
<th>Power supply voltage</th>
<th>Terminal type</th>
<th>Input type</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>RX</td>
<td>Control output 1</td>
<td>Relay output</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QX</td>
<td>Control output 2</td>
<td>Voltage output (for driving SSR)</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CX</td>
<td></td>
<td>Linear current output #2</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| A     | 2 (one common)          |
| D     | Push-in plus terminal blocks |

| M     | Universal input         |

<table>
<thead>
<tr>
<th></th>
<th>HB alarm and HS alarm</th>
<th>Communications</th>
<th>Event inputs</th>
<th>Remote SP Input</th>
<th>Transfer output</th>
</tr>
</thead>
<tbody>
<tr>
<td>000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>001</td>
<td>1</td>
<td></td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>002</td>
<td>1</td>
<td>RS-485</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>004</td>
<td></td>
<td>RS-485</td>
<td>2</td>
<td></td>
<td>Provided.</td>
</tr>
</tbody>
</table>

*1. Options with HB and HS alarms (001, 002) cannot be selected if a linear current output is selected for the control output.

*2. The control output cannot be used as a transfer output.

**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.
### Model Number Legend

**Plug-in Models**

E5CC-[ ]-[ ]-[ ]-[ ]-[ ]-[ ]-[ ] (Example: E5CC-RW0AUM-000)

<table>
<thead>
<tr>
<th>Meanings</th>
<th>Options</th>
<th>Model</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control output 1</td>
<td>Control output 2</td>
<td>E5CC-RW0AUM-000</td>
<td>E5CC-RW0DUM-000</td>
</tr>
<tr>
<td>RW</td>
<td>Relay output (SPDT) None</td>
<td>E5CC-RW1AUM-000</td>
<td>E5CC-RW1DUM-000</td>
</tr>
<tr>
<td>QX</td>
<td>Voltage output (for driving SSR) None</td>
<td>E5CC-RW2AUM-000</td>
<td>E5CC-RW2DUM-000</td>
</tr>
<tr>
<td>CX</td>
<td>Linear current output * None</td>
<td>E5CC-QX0AUM-000</td>
<td>E5CC-QX0DUM-000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E5CC-QX1AUM-000</td>
<td>E5CC-QX1DUM-000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E5CC-QX2AUM-000</td>
<td>E5CC-QX2DUM-000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E5CC-CX0AUM-000</td>
<td>E5CC-CX0DUM-000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E5CC-CX1AUM-000</td>
<td>E5CC-CX1DUM-000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E5CC-CX2AUM-000</td>
<td>E5CC-CX2DUM-000</td>
</tr>
</tbody>
</table>

*The control output can be used as a simple transfer output for the Digital Temperature Controllers manufactured in May 2014 or later.

### List of Models

<table>
<thead>
<tr>
<th>Control output</th>
<th>No. of auxiliary outputs</th>
<th>Options</th>
<th>Model</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relay output</td>
<td></td>
<td></td>
<td>E5CC-RW0AUM-000</td>
<td>E5CC-RW0DUM-000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>E5CC-RW1AUM-000</td>
<td>E5CC-RW1DUM-000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>E5CC-RW2AUM-000</td>
<td>E5CC-RW2DUM-000</td>
</tr>
<tr>
<td>Voltage output</td>
<td></td>
<td></td>
<td>E5CC-QX0AUM-000</td>
<td>E5CC-QX0DUM-000</td>
</tr>
<tr>
<td>(for driving SSR)</td>
<td></td>
<td></td>
<td>E5CC-QX1AUM-000</td>
<td>E5CC-QX1DUM-000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>E5CC-QX2AUM-000</td>
<td>E5CC-QX2DUM-000</td>
</tr>
<tr>
<td>Linear current</td>
<td></td>
<td></td>
<td>E5CC-CX0AUM-000</td>
<td>E5CC-CX0DUM-000</td>
</tr>
<tr>
<td>output</td>
<td></td>
<td></td>
<td>E5CC-CX1AUM-000</td>
<td>E5CC-CX1DUM-000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>E5CC-CX2AUM-000</td>
<td>E5CC-CX2DUM-000</td>
</tr>
</tbody>
</table>

### 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.
Optional Products (Order Separately)

USB-Serial Conversion Cable

<table>
<thead>
<tr>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>E58-CIFQ2</td>
</tr>
</tbody>
</table>

Terminal Covers (for E5CC)

<table>
<thead>
<tr>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>E53-COV17</td>
</tr>
<tr>
<td>E53-COV23 (3pcs)</td>
</tr>
</tbody>
</table>

Note: The E53-COV10 cannot be used. Refer to page 33 for the mounted dimensions.

Waterproof Packing

<table>
<thead>
<tr>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y92S-P8</td>
</tr>
</tbody>
</table>

Note: The Waterproof Packing is provided only with E5CC/E5CC-B Controllers. The E5CC-U cannot be waterproofed even if the Waterproof Packing is attached.

Current Transformers (CTs)

<table>
<thead>
<tr>
<th>Hole diameter</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.8 mm</td>
<td>E54-CT1</td>
</tr>
<tr>
<td>5.8 mm</td>
<td>E54-CT1L *</td>
</tr>
<tr>
<td>12.0 mm</td>
<td>E54-CT3</td>
</tr>
<tr>
<td>12.0 mm</td>
<td>E54-CT3L *</td>
</tr>
</tbody>
</table>

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

Adapter

<table>
<thead>
<tr>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y92F-45</td>
</tr>
</tbody>
</table>

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

Waterproof Cover

<table>
<thead>
<tr>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y92A-48N</td>
</tr>
</tbody>
</table>

Mounting Adapter

<table>
<thead>
<tr>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y92F-49</td>
</tr>
</tbody>
</table>

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

DIN Track Mounting Adapter (for E5CC)

<table>
<thead>
<tr>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y92F-52</td>
</tr>
</tbody>
</table>

Sockets (for E5CC-U)

<table>
<thead>
<tr>
<th>Type</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front-connecting Socket</td>
<td>P2CF-11</td>
</tr>
<tr>
<td>Front-connecting Socket with Finger Protection</td>
<td>P2CF-11-E</td>
</tr>
<tr>
<td>Back-connecting Socket</td>
<td>P3GA-11</td>
</tr>
<tr>
<td>Terminal Cover for Back-connecting socket with Finger Protection</td>
<td>Y92A-48G</td>
</tr>
</tbody>
</table>

Front Covers

<table>
<thead>
<tr>
<th>Type</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard Front Cover</td>
<td>Y92A-48H</td>
</tr>
<tr>
<td>Soft Front Cover</td>
<td>Y92A-48D</td>
</tr>
</tbody>
</table>

CX-Thermo Support Software

<table>
<thead>
<tr>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>EST2-2C-MV4</td>
</tr>
</tbody>
</table>

Note: CX-Thermo version 4.5 or higher is required for the E5CC. CX-Thermo version 4.61 or higher is required for the E5CC-U. CX-Thermo version 4.65 or higher is required for the E5CC-B. CX-Thermo version 4.67 or higher is required for the E5CC-B linear current output type.

For the system requirements for the CX-Thermo, refer to information on the EST2-2C-MV4 on the OMRON website (www.ia.omron.com).
## Specifications

### Ratings

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Power supply voltage</strong></td>
<td>A in model number: 100 to 240 VAC, 50/60 Hz</td>
</tr>
<tr>
<td></td>
<td>D in model number: 24 VAC, 50/60 Hz, 24 VDC</td>
</tr>
<tr>
<td><strong>Operating voltage range</strong></td>
<td>85% to 110% of rated supply voltage</td>
</tr>
<tr>
<td><strong>Power consumption</strong></td>
<td>Models with option selection of 000: 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</td>
</tr>
<tr>
<td>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</td>
<td></td>
</tr>
</tbody>
</table>

**Sensor input**
- Temperature input
  - Platinum resistance thermometer: Pt100 or JPt100
  - Infrared temperature sensor (ES1B): 10 to 70°C, 60 to 120°C, 115 to 165°C, or 140 to 260°C
- Analog input
  - Current input: 4 to 20 mA or 0 to 20 mA
  - Voltage input: 1 to 5 V, 0 to 5 V, 0 to 10 V, or 0 to 50 mV (The 0 to 50 mV range applies to the E5CC-U only for those manufactured in May 2014 or later.)

**Input impedance**
- Current input: 150 Ω max., Voltage input: 1 MΩ min.
- (Use a 1:1 connection when connecting the ES2-HB-N/THB-N.)

**Control method**
- ON/OFF control or 2-PID control (with auto-tuning)

**Control output**
- **Relay output**
  - E5CC/E5CC-B: SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA (reference value)
  - E5CC-U: SPDT, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA (reference value)

**Voltage output**
- (for driving SSR)
  - Output voltage: 12 VDC ±20% (PNP), max. load current: 21 mA, with short-circuit protection circuit

**Linear current output**
- 4 to 20 mA DC/0 to 20 mA DC, load: 500 Ω max., resolution: approx. 10,000

**Auxiliary output**
- **Number of outputs**
  - E5CC: 3
  - E5CC-B: 2
  - E5CC-U: 1 or 2 (depends on model)

**Output specifications**
- SPST-NO relay outputs, 250 VAC, Models with 1 output: 3 A (resistive load), E5CC-U models with 2 outputs: 3 A (resistive load), E5CC-B models with 2 outputs: 2 A (resistive load), Models with 3 outputs: 2 A (resistive load), Electrical life: 100,000 operations, Minimum applicable load: 10 mA at 5 V (reference value)

**Event input #1**
- **Number of inputs**
  - E5CC: 2 or 4 (depends on model)
  - E5CC-B: 2 (depends on model)

**External contact input specifications**
- 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.
- Current flow: Approx. 7 mA per contact

**Transfer output #1**
- **Number of outputs**
  - 1 (only on models with a transfer output)

**Output specifications**
- Current output: 4 to 20 mA DC, load: 500 Ω max., resolution: approx. 10,000
- Linear voltage output: 1 to 5 VDC, load: 1 kΩ min., resolution: Approx. 10,000

**Setting method**
- Digital setting using front panel keys

**Remote SP input #1 #2**
- Current input: 4 to 20 mA DC or 0 to 20 mA DC (input impedance: 150 kΩ max.)
- Voltage input: 1 to 5 V, 0 to 5 V, or 0 to 10 V (input impedance: 10 kΩ min.)

**Indication method**
- 11-segment digital display and individual indicators
  - Character height: PV: 15.2 mm, SV: 7.1 mm

**Multi SP #3**
- Up to eight set points (SP0 to SP7) can be saved and selected using the event inputs, key operations, or serial communications.

**Bank switching**
- None

**Other functions**
- 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, self tuning, 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

**Ambient operating temperature**
- −10 to 55°C (with no condensation or icing), For 3-year warranty: −10 to 50°C with standard mounting (with no condensation or icing)

**Ambient operating humidity**
- 25% to 85%

**Storage temperature**
- −25 to 65°C (with no condensation or icing)

**Altitude**
- 2,000 m max.

**Recommended fuse**
- 2A, 250 VAC, time-lag, low-breaking capacity

**Installation environment**
- Overvoltage category II, Pollution Degree 2 (EN/IEC/UL 61010-1)

---

*1. There are no optional functions for the E5CC-U. Refer to Model Number Legend and List of Models on page 21.
*2. This function is not supported by the E5CC-B. Refer to Model Number Legend on page 20.
*3. With the E5CC-B, there can be up to four set points if event inputs are used to select them.
**Input Ranges**

Thermocouple/Platinum Resistance Thermometer (Universal inputs)

<table>
<thead>
<tr>
<th>Sensor type</th>
<th>Sensor specification</th>
<th>Platinum resistance thermometer</th>
<th>Thermocouple</th>
<th>Infrared temperature sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>K</td>
<td>J</td>
<td>T</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E</td>
<td>L</td>
<td>U</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N</td>
<td>R</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B</td>
<td>C/W</td>
<td>PLII</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Temperature range (°C)</th>
<th>Pt100</th>
<th>JPt100</th>
<th>K</th>
<th>J</th>
<th>T</th>
<th>E</th>
<th>L</th>
<th>U</th>
<th>N</th>
<th>R</th>
<th>S</th>
<th>B</th>
<th>C/W</th>
<th>PLII</th>
</tr>
</thead>
<tbody>
<tr>
<td>-200</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<td>-150</td>
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<td>0</td>
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<tr>
<td>-100</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

**Shaded settings are the default settings.**

The applicable standards for the input types are as follows:
- Pt100, JPt100: JIS C 1604-1989, JIS C 1606-1989
- L: Fe-CuNi, DIN 43710-1985
- Pt100: JIS C 1604-1997, IEC 60751
- U: Cu-CuNi, DIN 43710-1985
- PL II: According to Platinel II electromotive force charts from BASF (previously Engelhard)
- C/W: W5Re/W26Re, JIS C 1602-2015, ASTM E988-1990

**Analog input**

<table>
<thead>
<tr>
<th>Input type</th>
<th>Current</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4 to 20 mA</td>
<td>0 to 20 mA</td>
</tr>
</tbody>
</table>

**Setting range**

Usable in the following ranges by scaling:
- -1999 to 9999, -199.9 to 999.9,
- -19.99 to 99.99 or -1.999 to 9.999

**Set value**

<table>
<thead>
<tr>
<th></th>
<th>25</th>
<th>26</th>
<th>27</th>
<th>28</th>
<th>29</th>
<th>30</th>
</tr>
</thead>
</table>

# The range applies to the E5CC-U only for those manufactured in May 2014 or later.
### Alarm Types

Each alarm can be independently set to one of the following 19 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.

<table>
<thead>
<tr>
<th>Set value</th>
<th>Alarm type</th>
<th>Alarm output operation</th>
<th>Description of function</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Alarm function OFF</td>
<td>Output OFF</td>
<td>No alarm</td>
</tr>
<tr>
<td>1</td>
<td>Upper- and lower-limit</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>*1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Upper-limit</td>
<td></td>
<td>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.</td>
</tr>
<tr>
<td>3</td>
<td>Lower-limit</td>
<td></td>
<td>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.</td>
</tr>
<tr>
<td>4</td>
<td>Upper- and lower-limit range</td>
<td></td>
<td>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.</td>
</tr>
<tr>
<td>5</td>
<td>Upper- and lower-limit with standby sequence</td>
<td></td>
<td>A standby sequence is added to the upper- and lower-limit alarm (1).</td>
</tr>
<tr>
<td>6</td>
<td>Upper-limit with standby sequence</td>
<td></td>
<td>A standby sequence is added to the upper-limit alarm (2).</td>
</tr>
<tr>
<td>7</td>
<td>Lower-limit with standby sequence</td>
<td></td>
<td>A standby sequence is added to the lower-limit alarm (3).</td>
</tr>
<tr>
<td>8</td>
<td>Absolute-value upper-limit</td>
<td></td>
<td>The alarm will turn ON if the process value is higher than the alarm value (X) regardless of the set point.</td>
</tr>
<tr>
<td>9</td>
<td>Absolute-value lower-limit</td>
<td></td>
<td>The alarm will turn ON if the process value is lower than the alarm value (X) regardless of the set point.</td>
</tr>
<tr>
<td>10</td>
<td>Absolute-value upper-limit with standby sequence</td>
<td></td>
<td>A standby sequence is added to the absolute-value upper-limit alarm (8).</td>
</tr>
<tr>
<td>11</td>
<td>Absolute-value lower-limit with standby sequence</td>
<td></td>
<td>A standby sequence is added to the absolute-value lower-limit alarm (9).</td>
</tr>
<tr>
<td>12</td>
<td>LBA (alarm 1 type only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>PV change rate alarm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>SP absolute-value upper-limit alarm</td>
<td></td>
<td>This alarm type turns ON the alarm when the set point (SP) is higher than the alarm value (X).</td>
</tr>
<tr>
<td>15</td>
<td>SP absolute-value lower-limit alarm</td>
<td></td>
<td>This alarm type turns ON the alarm when the set point (SP) is lower than the alarm value (X).</td>
</tr>
<tr>
<td>16</td>
<td>MV absolute-value upper-limit alarm</td>
<td></td>
<td>This alarm type turns ON the alarm when the manipulated variable (MV) is higher than the alarm value (X).</td>
</tr>
<tr>
<td>17</td>
<td>MV absolute-value lower-limit alarm</td>
<td></td>
<td>This alarm type turns ON the alarm when the manipulated variable (MV) is lower than the alarm value (X).</td>
</tr>
<tr>
<td>18</td>
<td>RSP absolute-value upper-limit alarm</td>
<td></td>
<td>This alarm type turns ON the alarm when the remote SP (RSP) is higher than the alarm value (X).</td>
</tr>
<tr>
<td>19</td>
<td>RSP absolute-value lower-limit alarm</td>
<td></td>
<td>This alarm type turns ON the alarm when the remote SP (RSP) is lower than the alarm value (X).</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Case 1</th>
<th>Case 2</th>
<th>Case 3 (Always On)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>H</td>
<td>SP</td>
</tr>
<tr>
<td>H=0, L&gt;0</td>
<td>H=0, L&lt;0</td>
<td>H=0, L=0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Case 1</th>
<th>Case 2</th>
<th>Case 3 (Always OFF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>H</td>
<td>SP</td>
</tr>
<tr>
<td>H=0, L&gt;0</td>
<td>H=0, L&lt;0</td>
<td>H=0, L=0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 E5CC Digital Temperature Controllers User’s Manual (Cat. No. H174) for information on the operation of the standby sequence.

7. Refer to the E5CC Digital Temperature Controllers User’s Manual (Cat. No. H174) for information on the loop burnout alarm (LBA).

8. Refer to the E5CC Digital Temperature Controllers User’s Manual (Cat. No. H174) 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.

10. This value is displayed only when a remote SP input is used. It functions in both Local SP Mode and Remote SP Mode. Remote SP input is supported only for the E5CC.
Characteristics

| Indication accuracy (at the ambient temperature of 23°C) | E5CC/E5CC-B  
|--------------------------------------------------------|--------------------------------------------------------|--------------------------------------------------------|--------------------------------------------------------|--------------------------------------------------------|
| Thermocouple: (±0.3% of indication value or ±1°C, whichever is greater) ±1 digit max.  
Platinum resistance thermometer: (±0.2% of indication value or ±0.8°C, whichever is greater) ±1 digit max.  
Analog input:  
CT input:  
ESCC-U  
Thermocouple: (±1% of indication value or ±2°C, whichever is greater) ±1 digit max.  
Platinum resistance thermometer: (±0.2% of indication value or ±0.8°C, whichever is greater) ±1 digit max.  
Analog input:  |
| Transfer output accuracy  
±0.3% FS max.  
Simple transfer output accuracy  
±0.3% FS max.  
Remote SP Input Type  
±0.2% FS ±1 digit max.  
Influence of temperature  
Thermocouple (R, S, B, C/W, PL II): (±1% of indication value or ±10°C, whichever is greater) ±1 digit max.  
Other thermocouple input: (±1% of indication value or ±4°C, whichever is greater) ±1 digit max.  |
| Influence of voltage  
Platinum resistance thermometer: (±1% of indication value or ±2°C, whichever is greater) ±1 digit max.  
Analog input:  
CT input:  
ESCC-U  |
| Influence of EMS  
(at EN 61326-1)  
CT input:  
ESCC-U  |
| Input sampling period  
50 ms  
Hysteresis  
Temperature input: 0.1 to 999.9°C or °F (in units of 0.1°C or °F)  
Analog input: 0.01% to 99.99% FS (in units of 0.01% FS)  
Proportional band (P)  
Temperature input: 0.1 to 999.9°C or °F (in units of 0.1°C or °F)  
Analog input: 0.1% to 99.99% FS (in units of 0.1% FS)  
Integral time (I)  
0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s)  
Derivative time (D)  
0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s)  
Proportional band (P) for cooling  
Temperature input: 0.1 to 999.9°C or °F (in units of 0.1°C or °F)  
Analog input: 0.1% to 99.99% FS (in units of 0.1% FS)  
Integral time (I) for cooling  
0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s)  
Derivative time (D) for cooling  
0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s)  |
| Control period  
0.1, 0.2, 0.5, 1 to 99 s (in units of 1 s)  
Manual reset value  
0.0 to 100.0% (in units of 0.1%)  
Alarm setting range  
-1999 to 9999 (decimal point position depends on input type)  
Influence of signal source resistance  
Thermocouple: 0.1°C/Ω max. (100 Ω max.)  
Platinum resistance thermometer: 0.1°C/Ω max. (10 Ω max.)  
Insulation resistance  
20 MΩ min. (at 500 VDC)  
Dielectric strength  
3,000 VAC, 50/60 Hz for 1 min between terminals of different charge  
Vibration  
Malfunction  
10 to 55 Hz, 20 m/s² for 10 min each in X, Y, and Z directions  
Resistance  
10 to 55 Hz, 20 m/s² for 2 hrs each in X, Y, and Z directions  
Shock  
Malfunction  
100 m/s², 3 times each in X, Y, and Z directions  
Resistance  
300 m/s², 3 times each in X, Y, and Z directions  
Weight  
E5CC/E5CC-B: Controller: Approx. 120 g, Mounting Adapter: Approx. 10 g  
E5CC-U: Controller: Approx. 100 g, Mounting Adapter: Approx. 10 g  
Degree of protection  
E5CC/E5CC-B: Front panel: IP66, Rear case: IP20, Terminals: IP00  
E5CC-U: Front panel: IP50, Rear case: IP20, Terminals: IP00  
Memory protection  
Non-volatile memory (number of writes: 1,000,000 times)  
Setup Tool  
E5CC: CX-Thermo version 4.5 or higher  
E5CC-B: CX-Thermo version 4.65 or higher  
E5CC-U: CX-Thermo version 4.61 or higher  
Setup Tool port  
E5CC/E5CC-B/E5CC-U top panel: An E58-CIFQ2 USB-Serial Conversion Cable is used to connect to a USB port on the computer.  |

*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 ±2°C ±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°C to 800°C is ±3°C max. The indication accuracy of the R and S thermocouples at a temperature of 200°C max. is ±3°C ±1 digit max. The indication accuracy of C/W thermocouples is (±0.3% of PV or ±3°C, whichever is greater) ±1 digit max. The indication accuracy of PL II thermocouples is (±0.3% of PV or ±2°C, whichever is greater) ±1 digit max.  
*2. However, the precision between 0 and 4 mA for a 0 to 20 mA output is ±1% FS max.  
*3. Ambient temperature: -10°C to 23°C to 55°C, Voltage range: -15% to 10% of rated voltage  
*4. K thermocouple at -100°C max.: ±10°C max.  
*5. The unit is determined by the setting of the Integral/Derivative Time Unit parameter.  
*6. External communications (RS-485) and USB-serial conversion cable communications can be used at the same time.  
*7. CX-Thermo version 4.67 or higher is required for the E5CC-B linear current output type.
<table>
<thead>
<tr>
<th>Standards</th>
<th>Approved standards</th>
<th>Conformed standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>cULus: UL 61010-1/CSA C22.2 No.61010-1</td>
<td>KOSHA (S Mark) certification (Some models only.) #8, Korean wireless regulations (Radio law: KC Mark) (Some models only.) #9, Lloyd's standards #10, EAC</td>
<td>EN 61010-1 (IEC 61010-1), RCM</td>
</tr>
</tbody>
</table>

**EMC**

<table>
<thead>
<tr>
<th>Standards</th>
<th>Approved standards</th>
<th>Conformed standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMI: Radiated Interference Electromagnetic Field Strength</td>
<td>EN 61326-1 #11</td>
<td>EN 61326-1 Group 1, class A</td>
</tr>
<tr>
<td>Noise Terminal Voltage</td>
<td>EN 55011 Group 1, class A</td>
<td>EN 55011 Group 1, class A</td>
</tr>
<tr>
<td>ESD Immunity</td>
<td>EN 61000-4-2</td>
<td>EN 61326-1 #11</td>
</tr>
<tr>
<td>Electromagnetic Field Immunity</td>
<td>EN 61000-4-3</td>
<td>EN 61000-4-3</td>
</tr>
<tr>
<td>Burst Noise Immunity</td>
<td>EN 61000-4-4</td>
<td>EN 61000-4-4</td>
</tr>
<tr>
<td>Conducted Disturbance Immunity</td>
<td>EN 61000-4-6</td>
<td>EN 61000-4-6</td>
</tr>
<tr>
<td>Surge Immunity</td>
<td>EN 61000-4-5</td>
<td>EN 61000-4-5</td>
</tr>
<tr>
<td>Voltage Dip/Interrupting Immunity</td>
<td>EN 61000-4-11</td>
<td>EN 61000-4-11</td>
</tr>
</tbody>
</table>

#8. The E5CC-U plug-in model is certified for UL listing only when used together with the OMRON P2CF-11 or P2CF-11-E Socket. The P3GA-11 is not certified for UL listing.

#9. Access the following website for information on certified models. [http://www.is.omron.com/support/models/index.html](http://www.is.omron.com/support/models/index.html)

#10. Refer to information on maritime standards in Shipping Standards on page 124 for compliance with Lloyd's Standards.

#11. Industrial electromagnetic environment (EN/IEC 61326-1 Table 2)
Communications Functions

Programless communications #1

You can use the memory in the PLC to read and write:
- ES: C parameters, start and stop operation, etc.
- The ES: C automatically performs communications with PLCs. No communications programming is required.
- Number of connected Digital Temperature Controllers: 32 max. (Up to 16 for the FX Series)

Applicable PLCs
- OMRON PLCs
- CS Series, CJ Series, CP Series, NJ Series, or NXK-P
- Mitsubishi Electric PLCs
- MELSEC Q Series, L Series, FX3 Series, or Q-R Series
- KEYENCE PLCs
- KEYENCE KV Series

Communications Specifications

<table>
<thead>
<tr>
<th>Applicable OS</th>
<th>Windows XP/Vista/7/8/10 #1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable software</td>
<td>CX-Thermo version 4.5 or higher (Version 4.61 or higher is required for the E5CC-U, Version 4.65 or higher is required for the E5CC-B #3.)</td>
</tr>
<tr>
<td>Applicable models</td>
<td>E5C: CT Series, E5C: C Series, and E5CB Series</td>
</tr>
<tr>
<td>USB interface standard</td>
<td>Conforms to USB Specification 2.0</td>
</tr>
<tr>
<td>DTE speed</td>
<td>38400 bps</td>
</tr>
<tr>
<td>Connector specifications</td>
<td>Computer: USB (type A plug) Digital Temperature Controller: Special serial connector</td>
</tr>
<tr>
<td>Power supply</td>
<td>Bus power (Supplied from USB host controller)</td>
</tr>
<tr>
<td>Power supply voltage</td>
<td>5 VDC</td>
</tr>
<tr>
<td>Current consumption</td>
<td>450 mA max.</td>
</tr>
<tr>
<td>Output voltage</td>
<td>0.7±0.2 VDC (Supplied from USB-Serial Conversion Cable to the Digital Temperature Controller.)</td>
</tr>
<tr>
<td>Output current</td>
<td>290 mA max. (Supplied from USB-Serial Conversion Cable to the Digital Temperature Controller.)</td>
</tr>
<tr>
<td>Ambient operating temperature</td>
<td>0 to 55°C (with no condensation or icing)</td>
</tr>
<tr>
<td>Ambient operating humidity</td>
<td>10% to 80%</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-20 to 60°C (with no condensation or icing)</td>
</tr>
<tr>
<td>Storage humidity</td>
<td>10% to 80%</td>
</tr>
<tr>
<td>Altitude</td>
<td>0 to 2,000 m max.</td>
</tr>
<tr>
<td>Weight</td>
<td>Approx. 100 g</td>
</tr>
</tbody>
</table>

Communications

RS-485 (two-wire, half duplex)

RS-485

CompoWay/F, or Modbus

Start-stop synchronization

Error detection

Vertical parity (none, even, odd)

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

Default: 20 ms

Error detection

Block check character (BCC) with CompoWay/F or CRC-16 Modbus

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

Current Transformer (Order Separately) Ratings

<table>
<thead>
<tr>
<th>Component</th>
<th>Communications #1</th>
</tr>
</thead>
<tbody>
<tr>
<td>E54-CT1</td>
<td>When Digital Temperature Controllers are connected, set points and RUN/STOP commands can be sent from the Digital Temperature Controller that is set as the master to the Digital Temperature Controllers that are set as slaves. Slope and offsets can be set for the set point. Number of connected Digital Temperature Controllers: 32 max. (including master)</td>
</tr>
<tr>
<td>E54-CT1L</td>
<td>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.</td>
</tr>
</tbody>
</table>

Copying #2

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.

#1. A Temperature Controller with version 1.1 or higher is required. A Temperature Controller with version 2.1 or higher is required for the FX Series or the KV Series.

#2. Both the programless communications and the component communications support the copying.

Heater Burnout Alarms and SSR Failure Alarms

CT input (for heater current detection)

Models with detection for single-phase heaters: One input

Models with detection for single-phase or three-phase heaters: Two inputs

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)

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)

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 35 ms for a control period of 0.1 s or 0.2 s.

Electrical Life Expectancy Curve for Control Output Relays (Reference Values)
External Connections

E5CC (Screw 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.
4. The E5CC 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.
5. Due to UL Listing requirements, use the E54-CT1L or E54-CT3L Current Transformer with the factory wiring (internal wiring).

---

Use no-voltage inputs for the event inputs.
The polarity for non-contact inputs is given in parentheses.
E5CC-B (Push-In Plus Terminal Blocks)

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 Wiring Precautions for E5C-B (Controllers with Push-In Plus Terminal Blocks) on page 133 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. Do not exceed the maximum number of Temperature 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 XOBA or XOBA7 current transformer that is UL Listed for field wiring (external wiring) and not the factory wiring (internal wiring).

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 Wiring Precautions for E5C-B (Controllers with Push-In Plus Terminal Blocks) on page 133 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. Do not exceed the maximum number of Temperature 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 XOBA or XOBA7 current transformer that is UL Listed for field wiring (external wiring) and not the factory wiring (internal wiring).
E5CC-U (Plug-in Models)

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.

Isolation/Insulation Block Diagrams

E5CC Models with 3 Auxiliary Outputs

- Power supply
- Sensor input, CT inputs, and remote SP input
- Communications and event inputs
- Voltage output (for driving SSR), linear current output, and transfer output
- Relay output
- Auxiliary outputs 1, 2, 3

Note: Auxiliary outputs 1 to 3 are not insulated.

E5CC-U Models with 2 Auxiliary Outputs

- Power supply
- Sensor input
- Voltage output (for driving SSR) and linear current output
- Relay output
- Auxiliary outputs 1 and 2

: Reinforced insulation
: Functional isolation

E5CC-B Models with 2 Auxiliary Outputs

- Power supply
- Sensor input and CT input
- Communications and event inputs
- Voltage output (for driving SSR), linear current output and transfer output
- Relay output
- Auxiliary outputs 1, 2

: Reinforced insulation
: Functional isolation
Nomenclature

**E5CC**
- Temperature unit
- Operation indicators

**E5CC-B**
- No. 1 display
- PV or specified parameter
- No. 2 display
- SP or specified parameter value

**E5CC-U**
- Use the M Key to change to another parameter.
- Use the U Keys to set the parameter.

---

**Dimensions**

(Unit: mm)

**Controllers**

**E5CC**

---

**E5CC-B**

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The Setup Tool port is on the top of the Temperature Controller. It is used to connect the Temperature Controller to the computer to use the Setup Tool. The E58-CIFQ2 USB-Serial Conversion Cable is required to make the connection. Refer to the instructions that are provided with the USB-Serial Conversion Cable for the connection procedure.

**Note:** Do not leave the USB-Serial Conversion Cable connected when you use the Temperature Controller.

- 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.
- Use a control panel thickness of 1 to 3 mm if the Y92A-48N and a USB-Serial Conversion Cable are used together.
The Setup Tool port is on the top of the Temperature Controller. It is used to connect the Temperature Controller to the computer to use the Setup Tool. The E58-CIFQ2 USB-Serial Conversion Cable is required to make the connection. Refer to the instructions that are provided with the USB-Serial Conversion Cable for the connection procedure.

**Note:** Do not leave the USB-Serial Conversion Cable connected when you use the Temperature Controller.

### Accessories (Order Separately)

#### USB-Serial Conversion Cable

E58-CIFQ2

#### Terminal Covers

- **E53-COV17**
- **E53-COV23 (Three Covers provided.)**

#### Terminal Cover (for the P3GA-11 Back-connecting Socket)

Y92A-48G

**Note:** You can attach the P3GA-11 Back-connecting Socket for finger protection.
Waterproof Packing
Y92S-P8 (for DIN 48 × 48)

The Waterproof Packing is provided only with the E5CC/E5CC-B. It is not included with the E5CC-U. 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 a rough standard.) The E5CC-U cannot be waterproofed even if the Waterproof Packing is attached.

Current Transformers

E54-CT1

Thru-current (Io) vs. Output Voltage (Eo)
(Reference Values)

<table>
<thead>
<tr>
<th>E54-CT1 or E54-CT1L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum continuous heater current: 50 A (50/60 Hz)</td>
</tr>
<tr>
<td>Number of windings: 400±2</td>
</tr>
<tr>
<td>Winding resistance: 18±2 Ω</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Thru-current (Io) A (r.m.s.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output voltage (Eo) V (r.m.s.)</td>
</tr>
<tr>
<td>100V</td>
</tr>
<tr>
<td>50Hz</td>
</tr>
<tr>
<td>Distortion factor</td>
</tr>
<tr>
<td>10%</td>
</tr>
<tr>
<td>3%</td>
</tr>
<tr>
<td>1%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RL=10Ω</th>
</tr>
</thead>
<tbody>
<tr>
<td>100mV</td>
</tr>
<tr>
<td>10μV</td>
</tr>
<tr>
<td>10kΩ</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Thru-current (Io) A (r.m.s.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output voltage (Eo) V (r.m.s.)</td>
</tr>
<tr>
<td>100mV</td>
</tr>
<tr>
<td>10μV</td>
</tr>
<tr>
<td>10kΩ</td>
</tr>
</tbody>
</table>

E54-CT1L

Shrinkable tube
Cable (AWG18)
Case (PBT)
Filler (epoxy)
Mark (yellow)
E54-CT3 Accessories

- Armature
  - Approx. 3 dia.
  - 12 dia.
  - 2.36 dia.

- Plug
  - Approx. 6 dia.
  - (22)

Connection Example

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

Through-current (Io) A (r.m.s.)

<table>
<thead>
<tr>
<th>Through-current (Io) A (r.m.s.)</th>
<th>1000</th>
<th>1000</th>
<th>1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency (Hz)</td>
<td>50</td>
<td>60</td>
<td>50</td>
</tr>
<tr>
<td>Distortion factor (%)</td>
<td>1</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>500Ω</td>
<td>100</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>100Ω</td>
<td>100</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>50Ω</td>
<td>100</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>10Ω</td>
<td>100</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>10mV</td>
<td>100</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>100mV</td>
<td>100</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

Output voltage (Eo) V (r.m.s.)

<table>
<thead>
<tr>
<th>Output voltage (Eo) V (r.m.s.)</th>
<th>1000</th>
<th>1000</th>
<th>1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency (Hz)</td>
<td>50</td>
<td>60</td>
<td>50</td>
</tr>
<tr>
<td>Distortion factor (%)</td>
<td>1</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>500Ω</td>
<td>100</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>100Ω</td>
<td>100</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>50Ω</td>
<td>100</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>10Ω</td>
<td>100</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>10mV</td>
<td>100</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>100mV</td>
<td>100</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>
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 the E5B-CIFQUSB-Serial Conversion Cable if you use the Y92F-45 Adapter. To use the USB-Serial Conversion Cable to make the settings, do so before you mount the Temperature Controller in the panel.  
4. You cannot use it together with the Y92F-49 Adapter that is enclosed with the Controller.

Mounted to E5CC

DIN Track Mounting Adapter

Y92F-52  
Note: This Adapter cannot be used together with the Terminal Cover.  
Remove the Terminal Cover to use the Adapter.

Mounted to E5CC

This Adapter is used to mount the E5CC 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.
### Watertight Cover
Y92A-48N

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

### Mounting Adapter
Y92F-49

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

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

**Note:**
1. Using any other sockets will adversely affect accuracy. Use only the specified sockets.
2. A Protective Cover for finger protection (Y92A-48G) is also available.
3. You cannot use the P3GA-11 together with the Y92F-45.
Large White PV Display That’s Easier to Read. Easy to Use, from Model Selection to Setup and Operation. Models with Push-In Plus Terminal Blocks Added to 48 x 96-mm Lineup.

- A white LCD PV display with a height of approx. 18 mm for the E5EC/E5EC-B and 25 mm for the E5AC improves visibility.
- High-speed sampling at 50 ms.
- With 48 x 96-mm Controllers, you can select between screw terminal blocks or Push-In Plus terminal blocks to save wiring work.
- Short body with depth of only 60 mm. (Screw Terminal Blocks)
- Easy connections to a PLC with programless communications. Use component communications to link Temperature Controllers to each other.
- Tool ports are provided both on the top panel and the front panel. Set up the Controller without wiring the power supply by connecting to the computer with a Communications Conversion Cable (sold separately). Setup is easy with the CX-Thermo (sold separately).

Main I/O Functions

- **Sensor Input**
  - Universal input
  - Thermocouple
  - Pt
  - Analog current/voltage

- **Indication Accuracy**
  - Thermocouple input: ±0.3% of PV
  - Pt input: ±0.2% of PV
  - Analog input: ±0.2% of FS

- **Sampling Period**
  - 50 ms

- **Event Inputs**
  - None
  - 2
  - 4
  - 6

- **Remote SP Input**
  - None
  - 1

- **Serial Communications**
  - None
  - RS-485

- **Three-level Display**
  - PV, SV, and MV displayed at the same time.

- **4-digit displays**

- **Control Output 1**
  - Relay output
  - Voltage output (for driving SSR)
  - Linear current output

- **Control Output 2**
  - E5EC/E5AC
  - Voltage output (for driving SSR)
  - Relay output
  - Linear current output

- **Auxiliary Outputs**
  - E5EC/E5AC
  - None
  - 2
  - 4

- **Transfer Output**
  - None
  - 1

* CSA conformance evaluation by UL.

Refer to your OMRON website for the most recent information on applicable safety standards.

Refer to Safety Precautions on page 122.

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.

E5JC Digital Temperature Controllers User’s Manual (Cat. No. H174)
E5JC Digital Temperature Controllers Communications Manual (Cat. No. H175)
Model Number Legend and Standard Models

Model Number Legend
Models with Screw Terminal Blocks

E5EC-□□ □□ □□ □□-□□□□ (Example: E5EC-RX4A5M-000)

E5AC-□□ □□ □□ □□-□□□□ (Example: E5AC-RX4A5M-000)

*1. The options that can be selected depend on the type of control output.
*2. The control output cannot be used as a transfer output.
*3. A model with four auxiliary outputs must be selected.

Note: Draw-out-type models of the E5EC and E5AC are available. Ask your OMRON representative for details.

Heating and Cooling Control

Using Heating and Cooling Control

1. Control Output Assignment
   If there is no control output 2, an auxiliary output is used as the cooling control output.
   If there is a control output 2, the two control outputs are used for heating and cooling.
   (It does not matter which output is used for heating and which output is used for cooling.)

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.
Model Number Legend
Models with Push-In Plus Terminal Blocks
E5EC-□□ □ □ B M-□□□ (Example: E5EC-RX4ABM-000)

*1. Option 004 and 014 cannot be selected if RX or QX is selected for the control output.
*2. Option 008, 010 and 011 cannot be selected if CX is selected for the control output.
*3. The control output cannot be used as a simple transfer output.

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.
Optional Products (Order Separately)

**USB-Serial Conversion Cable**
- Model: E58-CIFQ2

**Communications Conversion Cable**
- Model: E58-CIFQ2-E
  
  **Note:** Always use this product together with the E58-CIFQ2. This Cable is used to connect to the front-panel Setup Tool port.

**Terminal Covers (for E5EC/E5AC)**
- Model: E53-COV24 (3pcs)
  
  **Note:** The Terminal Covers E53-COV24 are provided with the Digital Temperature Controller.

**Waterproof Packing**
- Applicable Controller: E5EC/E5EC-B
  - Model: Y92S-P9
- Applicable Controller: E5AC
  - Model: Y92S-P10
  
  **Note:** This Waterproof Packing is provided with the Digital Temperature Controller.

**Waterproof Cover**
- Applicable Controller: E5EC/E5EC-B
  - Model: Y92A-49N
- Applicable Controller: E5AC
  - Model: Y92A-96N

**Front Port Cover**
- Model: Y92S-P7
  
  **Note:** This Front Port Cover is provided with the Digital Temperature Controller.

**Mounting Adapter**
- Model: Y92F-51 (2pcs)
  
  **Note:** This Mounting Adapter is provided with the Digital Temperature Controller.

**Current Transformers (CTs)**

<table>
<thead>
<tr>
<th>Hole diameter</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.8 mm</td>
<td>E54-CT1</td>
</tr>
<tr>
<td>5.8 mm</td>
<td>E54-CT1L *</td>
</tr>
<tr>
<td>12.0 mm</td>
<td>E54-CT3</td>
</tr>
<tr>
<td>12.0 mm</td>
<td>E54-CT3L *</td>
</tr>
</tbody>
</table>

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

**CX-Thermo Support Software**

<table>
<thead>
<tr>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>EST2-2C-MV4</td>
</tr>
</tbody>
</table>

**Note:** CX-Thermo version 4.5 or higher is required for the E5EC/E5AC.

CX-Thermo version 4.65 or higher is required for the E5EC-B.

CX-Thermo version 4.67 or higher is required for the E5CC-B linear current output type.

For the system requirements for the CX-Thermo, refer to information on the EST2-2C-MV4 on the OMRON website (www.ia.omron.com).
## E5EC/E5EC-B/E5AC

### Specifications

#### Ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>E5EC/E5EC-B Models with option selection of 000: 6.6 VA max. at 100 to 240 VAC, and 4.1 VA max. at 24 VAC or 2.3 W max. at 24 VDC</th>
<th>E5EC-B All other models: 8.3 VA max. at 100 to 240 VAC, and 5.5 VA max. at 24 VAC or 3.2 W max. at 24 VDC</th>
<th>E5AC All other models: 9.0 VA max. at 100 to 240 VAC, and 5.6 VA max. at 24 VAC or 3.4 W max. at 24 VDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply voltage</td>
<td>A in model number: 100 to 240 VAC, 50/60 Hz D in model number: 24 VAC, 50/60 Hz; 24 VDC</td>
<td>-------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Operating voltage range</td>
<td>85 to 110% of rated supply voltage</td>
<td>-------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>

#### Sensor input

- **Temperature input**: Thermocouple: K, J, T, E, L, U, N, R, S, B, C/W, or PL II
- **Infrared temperature sensor (ES1B)**: 10 to 70°C, 60 to 120°C, 115 to 165°C, or 140 to 260°C

#### Power consumption

- **Current input**: 150 Ω max., Voltage input: 1 M Ω min. (Use a 1:1 connection when connecting the ES2-HB-N/THB-N.)
- **Voltage output** (for driving SSR): Output voltage: 12 VDC ±20% (PNP), max. load current: 40 mA, with short-circuit protection circuit (The maximum load current is 21 mA for models with two control outputs.)
- **Linear current output**: 4 to 20 mA DC/0 to 20 mA DC, load: 500 Ω max., resolution: approx. 10,000

#### Control output

- **Relay output**
  - SPST-NO: 250 VAC, 5 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA (reference value)
- **Voltage output** (for driving SSR)
  - Output voltage: 12 VDC ±20% (PNP), max. load current: 40 mA, with short-circuit protection circuit (The maximum load current is 21 mA for models with two control outputs.)
- **Linear current output**: 4 to 20 mA DC/0 to 20 mA DC, load: 500 Ω max., resolution: approx. 10,000

#### Auxiliary output

- **Number of outputs**: SPST-NO: relay outputs, 250 VAC. Models with 2 outputs: 3 A (resistive load), Models with 4 outputs: 2 A (resistive load), Electrical life: 100,000 operations, Minimum applicable load: 10 mA at 5 V (reference value)

#### Event input

- **Number of inputs**: 2, 4 or 6 (depends on model)
- **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.
- **Current flow**: Approx. 7 mA per contact

#### Transfer output

- **Number of outputs**: 1 (only on models with a transfer output)
- **Current output**: 4 to 20 mA DC, Load: 500 Ω max., Resolution: Approx. 10,000
- **Linear voltage output**: 1 to 5 VDC, load: 1 kΩ min., Resolution: Approx. 10,000

#### Remote SP input

- **Current input**: 4 to 20 mA DC or 0 to 20 mA DC (input impedance: 150 Ω max.)
- **Voltage input**: 1 to 5 V, 0 to 5 V, or 0 to 10 V (input impedance: 1 Ω min.)

#### Potentiometer input

- **Digital setting using front panel keys**
- **Character height**: E5EC/E5EC-B: PV: 18.0 mm, SV: 11.0 mm, MV: 7.8 mm E5AC: PV: 25.0 mm, SV: 15.0 mm, MV: 9.5 mm
- **Three displays Contents**: PV/SV/MV, PV/SV/Multi-SP, or PV/SV/Remaining soak time, etc
- **Numbers of digits**: 4 digits each for PM, SV, and MV displays

#### Setting method

- **Digital setting using front panel keys**
- **Indication method**: 11-segment digital display and individual indicators
  - Character height: E5EC/E5EC-B: PV: 18.0 mm, SV: 11.0 mm, MV: 7.8 mm E5AC: PV: 25.0 mm, SV: 15.0 mm, MV: 9.5 mm
  - Three displays Contents: PV/SV/MV, PV/SV/Multi-SP, or PV/SV/Remaining soak time, etc
  - Numbers of digits: 4 digits each for PM, SV, and MV displays

#### Multi SP

- **Up to eight set points (SP0 to SP7) can be saved and selected using the event inputs, key operations, or serial communications.**

#### Bank switching

- **None**

#### Other functions

- **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, self tuning, 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**

#### Ambient operating temperature

- **−10 to 55°C** (with no condensation or icing). For 3-year warranty: −10 to 50°C with standard mounting (with no condensation or icing)

#### Ambient operating humidity

- **25 to 85%**

#### Storage temperature

- **−25 to 65°C** (with no condensation or icing)

#### Altitude

- **2,000 m max.**

#### Recommended fuse

- **T2A, 250 VAC, time-lag, low-breaking capacity**

#### Installation environment

- Overyoltage category II, Pollution Degree 2 (EN/IEC/UL 61010-1)

*This function is not supported by the E5EC-B. Refer to Model Number Legend on page 42.*
**Input Ranges**

**Thermocouple/Platinum Resistance Thermometer (Universal inputs)**

<table>
<thead>
<tr>
<th>Sensor type</th>
<th>Platinum resistance thermometer</th>
<th>Thermocouple</th>
<th>Infrared temperature sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor specification</td>
<td>PT100</td>
<td>JP100</td>
<td>K</td>
</tr>
<tr>
<td>10 to 70°C</td>
<td>60 to 120°C</td>
<td>115 to 165°C</td>
<td>140 to 260°C</td>
</tr>
</tbody>
</table>

Shaded settings are the default settings.

The applicable standards for the input types are as follows:
- JPt100: JIS C 1604-1997, IEC 60751
- L: Fe-CuNi, DIN 43710-1985
- Pt100: JIS C 1604-1997, IEC 60751
- U: Cu-CuNi, DIN 43710-1985
- PL II: According to Platinel II electromotive force charts from BASF (previously Engelhard)
- C/W: W5Re/W26Re, JIS C 1602-2015, ASTM E988-1990

**Analog input**

<table>
<thead>
<tr>
<th>Input type</th>
<th>Current</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input specification</td>
<td>4 to 20 mA</td>
<td>0 to 20 mA</td>
</tr>
</tbody>
</table>

Setting range: Usable in the following ranges by scaling: -1999 to 9999, -199.9 to 9999.9, -19.99 to 99.99 or -1.999 to 9.999

Set value: 25 26 27 28 29
### Alarm Types

Each alarm can be independently set to one of the following 19 alarm types. The default is 2: Upper limit. (see note.)

**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.

<table>
<thead>
<tr>
<th>Set value</th>
<th>Alarm type</th>
<th>Alarm output operation</th>
<th>Description of function</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Alarm function OFF</td>
<td>Output OFF</td>
<td>No alarm</td>
</tr>
<tr>
<td>1</td>
<td>Upper- and lower-limit #1</td>
<td>ON OFF</td>
<td>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 higher than the SP by the deviation or more.</td>
</tr>
<tr>
<td>2</td>
<td>Upper-limit</td>
<td>ON OFF</td>
<td>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.</td>
</tr>
<tr>
<td>3</td>
<td>Lower-limit</td>
<td>ON OFF</td>
<td>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.</td>
</tr>
<tr>
<td>4</td>
<td>Upper- and lower-limit range #1</td>
<td>ON OFF</td>
<td>A standby sequence is added to the upper- and lower-limit alarm (1).</td>
</tr>
<tr>
<td>5</td>
<td>Upper- and lower-limit with standby sequence #1</td>
<td>ON OFF</td>
<td>A standby sequence is added to the upper-limit alarm (2).</td>
</tr>
<tr>
<td>6</td>
<td>Upper-limit with standby sequence</td>
<td>ON OFF</td>
<td>A standby sequence is added to the upper-limit alarm (2).</td>
</tr>
<tr>
<td>7</td>
<td>Lower-limit with standby sequence</td>
<td>ON OFF</td>
<td>A standby sequence is added to the lower-limit alarm (3).</td>
</tr>
<tr>
<td>8</td>
<td>Absolute-value upper-limit</td>
<td>ON OFF</td>
<td>The alarm will turn ON if the process value is larger than the alarm value (X) regardless of the set point.</td>
</tr>
<tr>
<td>9</td>
<td>Absolute-value lower-limit</td>
<td>ON OFF</td>
<td>The alarm will turn ON if the process value is smaller than the alarm value (X) regardless of the set point.</td>
</tr>
<tr>
<td>10</td>
<td>Absolute-value upper-limit with standby sequence</td>
<td>ON OFF</td>
<td>A standby sequence is added to the absolute-value upper-limit alarm (8).</td>
</tr>
<tr>
<td>11</td>
<td>Absolute-value lower-limit with standby sequence</td>
<td>ON OFF</td>
<td>A standby sequence is added to the absolute-value lower-limit alarm (9).</td>
</tr>
<tr>
<td>12</td>
<td>LBA (alarm 1 type only)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>13</td>
<td>PV change rate alarm</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>14</td>
<td>SP absolute-value upper-limit alarm</td>
<td>ON OFF</td>
<td>This alarm type turns ON the alarm when the set point (SP) is higher than the alarm value (X).</td>
</tr>
<tr>
<td>15</td>
<td>SP absolute-value lower-limit alarm</td>
<td>ON OFF</td>
<td>This alarm type turns ON the alarm when the set point (SP) is lower than the alarm value (X).</td>
</tr>
<tr>
<td>16</td>
<td>MV absolute-value upper-limit alarm #9</td>
<td>ON OFF</td>
<td>This alarm type turns ON the alarm when the manipulated variable (MV) is higher than the alarm value (X).</td>
</tr>
<tr>
<td>17</td>
<td>MV absolute-value lower-limit alarm #9</td>
<td>ON OFF</td>
<td>This alarm type turns ON the alarm when the manipulated variable (MV) is lower than the alarm value (X).</td>
</tr>
<tr>
<td>18</td>
<td>RSP absolute-value upper-limit alarm #10</td>
<td>ON OFF</td>
<td>This alarm type turns ON the alarm when the remote SP (RSP) is higher than the alarm value (X).</td>
</tr>
<tr>
<td>19</td>
<td>RSP absolute-value lower-limit alarm #10</td>
<td>ON OFF</td>
<td>This alarm type turns ON the alarm when the remote SP (RSP) is lower than the alarm value (X).</td>
</tr>
</tbody>
</table>
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
   - Case 1 and 2: Always OFF when the upper-limit and lower-limit hysteresis overlaps.
   - Case 3: Always OFF

3. Set value: 4, Upper- and lower-limit range
   - Case 1:
     - L: H < |L|
     - H: L > |L|
   - Case 2:
     - L: H > |L|
     - H: L < |L|
   - Case 3 (Always OFF):
     - H: L < |L|
     - L: H > |L|

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 E5EC Digital Temperature Controllers User’s Manual (Cat. No. H174) for information on the operation of the standby sequence.

7. Refer to the E5EC Digital Temperature Controllers User’s Manual (Cat. No. H174) for information on the loop burnout alarm (LBA). This setting cannot be used with a position-proportional model.

8. Refer to the E5EC Digital Temperature Controllers User’s Manual (Cat. No. H174) 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.

10. This value is displayed only when a remote SP input is used. It functions in both Local SP Mode and Remote SP Mode.
### Characteristics

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Indication accuracy</strong> <em>(at the ambient temperature of 23°C)</em></td>
<td>Thermocouple: ±0.3% of indication value or ±1°C, whichever is greater) ±1 digit max. Platinium resistance thermometer: ±0.2% of indication value or ±0.8°C, whichever is greater) ±1 digit max. Analog input: ±0.2% FS ±1 digit max. CT input: ±5% FS ±1 digit max. Potentiometer input: ±5% FS ±1 digit max.</td>
</tr>
<tr>
<td><strong>Transfer output accuracy</strong></td>
<td>±0.3% FS max.</td>
</tr>
<tr>
<td><strong>Remote SP Input Type</strong></td>
<td>±0.2% FS ±1 digit max.</td>
</tr>
<tr>
<td><strong>Influence of temperature #2</strong></td>
<td>Thermocouple input (R, S, B, C, W, PL II): ±1% of indication value or ±10°C, whichever is greater) ±1 digit max. Other thermocouple input: ±1% of indication value or ±4°C, whichever is greater) ±1 digit max. Platinium resistance thermometer: ±1% of indication value or ±2°C, whichever is greater) ±1 digit max.</td>
</tr>
<tr>
<td><strong>Influence of voltage #2</strong></td>
<td>Analog input: ±1%FS ±1 digit max.</td>
</tr>
<tr>
<td><strong>Influence of EMS.</strong> <em>(at EN 61326-1)</em></td>
<td>CT input: ±5% FS ±1 digit max. Remote SP input: ±1% FS ±1 digit max.</td>
</tr>
<tr>
<td><strong>Input sampling period</strong></td>
<td>50ms</td>
</tr>
<tr>
<td><strong>Hysteresis</strong></td>
<td>Temperature input: 0.1 to 999.9°C or °F (in units of 0.1°C or °F) Analog input: 0.01% to 99.99% FS (in units of 0.01% FS)</td>
</tr>
<tr>
<td><strong>Proportional band (P)</strong></td>
<td>Temperature input: 0.1 to 999.9°C or °F (in units of 0.1°C or °F) Analog input: 0.01% to 99.99% FS (in units of 0.01% FS)</td>
</tr>
<tr>
<td><strong>Integral time (I)</strong></td>
<td>Standard, heating/cooling, or Position-proportional (Close): 0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) Position-proportional (Floating): 1 to 9999 s (in units of 1 s), 0.1 to 999.9 s (in units of 0.1 s)#4</td>
</tr>
<tr>
<td><strong>Derivative time (D)</strong></td>
<td>0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) #4</td>
</tr>
<tr>
<td><strong>Proportional band (P) for cooling</strong></td>
<td>Temperature input: 0.1 to 999.9°C or °F (in units of 0.1°C or °F) Analog input: 0.01% to 99.99% FS (in units of 0.01% FS)</td>
</tr>
<tr>
<td><strong>Integral time (I) for cooling</strong></td>
<td>0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) #4</td>
</tr>
<tr>
<td><strong>Derivative time (D) for cooling</strong></td>
<td>0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) #4</td>
</tr>
<tr>
<td><strong>Control period</strong></td>
<td>0.1, 0.2, 0.5, 1 to 99 s (in units of 1 s) 0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) #4</td>
</tr>
<tr>
<td><strong>Manual reset value</strong></td>
<td>0.0 to 100.0% (in units of 0.1%)</td>
</tr>
<tr>
<td><strong>Alarm setting range</strong></td>
<td>-1999 to 9999 (decimal point position depends on input type)</td>
</tr>
<tr>
<td><strong>Influence of signal source resistance</strong></td>
<td>Thermocouple: 0.1°C/Ω max. (100 Ω max.) Platinium resistance thermometer: 0.1°C/Ω max. (10 Ω max.)</td>
</tr>
<tr>
<td><strong>Insulation resistance</strong></td>
<td>20 MΩ min. (at 500 VDC)</td>
</tr>
<tr>
<td><strong>Dielectric strength</strong></td>
<td>3,000 VAC, 50/60 Hz for 1 min between terminals of different charge</td>
</tr>
<tr>
<td><strong>Vibration</strong></td>
<td>Malfunction: 10 to 55 Hz, 20 m/s² for 10 min each in X, Y, and Z directions Resistance: 10 to 55 Hz, 20 m/s² for 2 hrs each in X, Y, and Z directions</td>
</tr>
<tr>
<td><strong>Shock</strong></td>
<td>Malfunction: 100 m/s², 3 times each in X, Y, and Z directions Resistance: 300 m/s², 3 times each in X, Y, and Z directions</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>E5EC/ESECB Controller: Approx. 210 g, Mounting Adapter: Approx. 24 g E5AC: Controller: Approx. 250 g, Mounting Adapter: Approx. 24 g</td>
</tr>
<tr>
<td><strong>Degree of protection</strong></td>
<td>E5EC/ESECB: Controller: Approx. 210 g, Mounting Adapter: Approx. 4 g E5AC: Controller: Approx. 250 g, Mounting Adapter: Approx. 4 g</td>
</tr>
<tr>
<td><strong>Memory protection</strong></td>
<td>Non-volatile memory (number of writes: 1,000,000 times)</td>
</tr>
<tr>
<td><strong>Setup Tool</strong></td>
<td>E5EC/ESECB: CX-Thermo version 4.5 or higher E5EC-B: CX-Thermo version 4.6 or higher #9</td>
</tr>
<tr>
<td><strong>Setup Tool port</strong></td>
<td>E5EC/ESECB/E5AC top panel: An E58-CIFQ2 USB-Serial Conversion Cable is used to connect to a USB port on the computer #5 E5EC/ESECB/E5AC front panel: Analog input: 0.01% to 99.99% FS (in units of 0.01% FS)</td>
</tr>
<tr>
<td><strong>Standards</strong></td>
<td><strong>Approved standards</strong> cULus: UL 61010-1/CSA C22.2 No.61010-1, Korean wireless regulations (Radio law: KC Mark) (Some models only.) #6, Lloyd’s standards #7, EAC</td>
</tr>
<tr>
<td><strong>Conformed standards</strong></td>
<td>EN 61010-1 (IEC 61010-1), IEC 61326-1, EAC</td>
</tr>
</tbody>
</table>

#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 ±2°C ±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 ±3°C max. The indication accuracy of the R and S thermocouples at a temperature of 200°C max. is ±3°C ±1 digit max. The indication accuracy of PT100 thermocouples is ±0.3% of PT100 or ±3°C, whichever is greater) ±1 digit max. The indication accuracy of PT100 thermocouples is ±0.3% of PT100 or ±2°C, whichever is greater) ±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.: ±10°C max. #4. The unit is determined by the setting of the Integral/Derivative Time Unit parameter. #5. External communications (RS-485) and USB-serial conversion cable communications can be used at the same time. #6. Refer to the OMRON website for the most recent information on applicable models. #7. Refer to information on maritime standards in *Shipping Standards* on page 124 for compliance with Lloyd’s Standards. #8. Industrial electromagnetic environment (EN/IEC 61326-1 Table 2) #9. CX-Thermo version 4.67 or higher is required for the E5CC-B linear current output type.
USB-Serial Conversion Cable

<table>
<thead>
<tr>
<th>Applicable OS</th>
<th>Windows XP/Visa/7/8/10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable software</td>
<td>E5CC/E5AC/CX-Thermo version 4.5 or higher</td>
</tr>
<tr>
<td>Applicable models</td>
<td>E5-CT Series, E5-C Series, and E5CB Series</td>
</tr>
<tr>
<td>USB interface standard</td>
<td>Conforms to USB Specification 2.0</td>
</tr>
<tr>
<td>DTE speed</td>
<td>38,400 bps</td>
</tr>
<tr>
<td>Connector specifications</td>
<td>Computer: USB (type A plug)</td>
</tr>
<tr>
<td>Power supply</td>
<td>Bus power (Supplied from USB host controller)</td>
</tr>
<tr>
<td>Power supply voltage</td>
<td>5 VDC</td>
</tr>
<tr>
<td>Current consumption</td>
<td>450 mA max.</td>
</tr>
<tr>
<td>Output voltage</td>
<td>4.7±0.2 VDC (Supplied from USB-Serial Conversion Cable to the Digital Temperature Controller.)</td>
</tr>
<tr>
<td>Output current</td>
<td>250 mA max. (Supplied from USB-Serial Conversion Cable to the Digital Temperature Controller.)</td>
</tr>
<tr>
<td>Ambient operating temperature</td>
<td>0 to 55°C (with no condensation or icing)</td>
</tr>
<tr>
<td>Ambient operating humidity</td>
<td>10% to 80%</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-20 to 60°C (with no condensation or icing)</td>
</tr>
<tr>
<td>Storage humidity</td>
<td>10% to 80%</td>
</tr>
<tr>
<td>Altitude</td>
<td>2,000 m max.</td>
</tr>
<tr>
<td>Weight</td>
<td>Approx. 120 g</td>
</tr>
</tbody>
</table>

Note: A driver must be installed on the computer. Refer to the Instruction Manual included with the Cable for the installation procedure.

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 | 9600, 19200, 38400, or 57600 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) |
| Interface | RS-485 |
| Retry function | None |
| Communications buffer | 217 bytes |
| Communications response wait time | 0 to 99 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 ES:1C parameters, start and stop operation, etc. The ES:1C automatically performs communications with PLCs. No communications programming is required. Number of connected Digital Temperature Controllers: 32 max. (Up to 16 for the FX Series) Applicable PLCs: OMRON PLCs, CS Series, CJ Series, CP Series, NJ Series, or NX Series Mitsubishi Electric PLCs: MELSEC Q Series, L Series, FX3 Series, or Q-R Series KEYENCE PLCs: KEYENCE KV Series |

Component Communications

| Communications Setting Level | When Digital Temperature Controllers are connected, set points and RUN/STOP commands can be sent from the Digital Temperature Controller that is set as the master to the Digital Temperature Controllers that are set as slaves. Slope and offsets can be set for the set point. Number of connected Digital Temperature Controllers: 32 max. (including master) |

Copying

| 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. *1. A Temperature Controller with version 1.1 or higher is required. A Temperature Controller with version 2.1 or higher is required for the FX Series or the KV Series. *2. Both the programless communications and the component communications support the copying.

Current Transformer (Order Separately) Ratings

| CT input (for heater current detection) | Models with detection for singlephase heaters: One input Models with detection for singlephase or three-phase heaters: Two inputs |
| Maximum heater current | 50 A AC |
| Input current indication accuracy | ±5% FS ±1 digit max. |
| Heater burnout alarm setting range | 0.1 to 49.9 A (in units of 0.1 A) Minimum detection ON time: 100 ms |
| SSR failure alarm setting range | 0.1 to 49.9 A (in units of 0.1 A) Minimum detection OFF time: 100 ms |

Electrical Life Expectancy Curve for Control Output Relays (Reference Values)
E5EC/E5EC-B/E5AC

External Connections

Control output 1
Relay output: 250 VAC, 5 A (resistive load)
Voltage output (for driving SSR): 12 VDC, 40 mA
When there is a Control Output 2:
Relay output: 250 VAC, 5 A (resistive load)
Voltage output (for driving SSR): 12 VDC, 21 mA
Linear current output: 4 to 20 mA DC
Load: 500 Ω max.

Control output 2
Relay output: 250 VAC, 5 A (resistive load)
Voltage output (for driving SSR): 12 VDC, 21 mA
Linear current output: 4 to 20 mA DC
Load: 500 Ω max.

Auxiliary outputs 1, 2, 3, 4
Relay output: Models with 4 auxiliary outputs: 250 VAC, 2 A (resistive load)
Voltage output: Models with 1 auxiliary output: 12 VDC, 40 mA (for driving SSR)
Voltage output: Models with 1 relay output: 12 VDC, 5 A
Linear current output: Models with 1 linear current output: 4 to 20 mA DC
Load: 500 Ω max.

Options
004 Communications and 2 event inputs
005 Communications, 2 event inputs, and 2 CT inputs
011 Communications, 4 event inputs, 1 CT input, transfer output, and remote SP input
014 Communications, 4 event inputs, transfer output, and remote SP input

Input Power Supply
100 to 240 VAC, 24 VAC/DC

Potentiometer Input
Use no-voltage inputs for the event inputs. The polarity for non-contact inputs is given in parentheses.

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.
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 XOB4 or XOB47 current transformer that is UL Listed for field wiring (external wiring) and not the factory wiring (internal wiring).
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 Wiring Precautions for E5C-B (Controllers with Push-In Plus Terminal Blocks) on page 133 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. Do not exceed the maximum number of Temperature 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.

Wiring Example:

To another E5C-C:

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 XOBA or XOBA7 current transformer that is UL Listed for field wiring (external wiring) and not the factory wiring (internal wiring).
E5EC/E5EC-B/E5AC

Isolation/Insulation Block Diagrams

Models with 2 Auxiliary Outputs

Power Supply
- Sensor input, CT inputs, and remote SP input
- Communications and event inputs
- Voltage output (for driving SSR) and transfer output
- Relay output
- Auxiliary output 1
- Auxiliary output 2

Note: Auxiliary outputs 1 to 2 and 3 to 4 are not insulated.

Nomenclature

E5EC/E5EC-B

- Temperature unit
- Operation indicators
- Front-panel Setup Tool port

- No. 1 display
  - PV or specified parameter
- No. 2 display
  - SP or specified parameter value
- No. 3 display
  - Manipulated value or other value

Use the \( \text{A} \) or \( \text{D} \) Keys to set the parameter.

Use the \( \text{M} \) Key to change the digit (default setting).

Use the \( \text{O} \) Key to change to another parameter.

Press the \( \text{O} \) Key once to go to the Adjustment Level.

Press the \( \text{O} \) Key for at least 3 seconds to go to the Initial Setting Level.

E5AC

- Temperature unit
- Operation indicators
- Front-panel Setup Tool port

- No. 1 display
  - PV or specified parameter
- No. 2 display
  - SP or specified parameter value
- No. 3 display
  - Manipulated value or other value

Press the \( \text{A} \) or \( \text{D} \) Key to set the parameter.

Press the \( \text{O} \) Key to change the digit (default setting).

Press the \( \text{O} \) Key to change to another parameter.

Press the \( \text{O} \) Key once to go to the Adjustment Level.

Press the \( \text{O} \) Key for at least 3 seconds to go to the Initial Setting Level.
### Dimensions (Unit: mm)

#### Controllers

**E5EC**

- Dimensions
- **Mounting Adapter**: Accessory, Y92F-51 (also available for ordering separately)
- **Waterproof Packing**: Accessory, Y92S-P9 (also available for ordering separately)

**E5EC-B**

- Dimensions
- **Mounting Adapter**: Accessory, Y92F-51 (also available for ordering separately)
- **Waterproof Packing**: Accessory, Y92S-P9 (also available for ordering separately)

- **Setup Tool ports are provided as standard feature. Use these ports to connect a computer to the Digital Temperature Controller. The E58-CIFQ2 USB-Serial Conversion Cable is required to connect to the port on the top panel. The E58-CIFQ2 USB-Serial Conversion Cable and E58-CIFQ2-E Communications Conversion Cable are required to connect to the port on the front panel. (You cannot leave either port connected constantly during operation.)**

- **E5EC**: Selections for Control Outputs 1 and 2: QQ, QR, RR, CC, PR, or CQ If you also specify 011, 013, or 014 for the option selection and use group mounting, the ambient temperature must be 45°C or less. Maintain the following spacing when more than one Digital Controller is installed at an ambient temperature of 55°C.

- **Mounted Separately**
  - 46 × number of units + 2.5
  - 60 min.

- **Group Mounted**
  - 120 min.
  - Group mounting does not allow waterproofing.

- **Recommended panel thickness is 1 to 8 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.**
E5AC

Mounting Adapter (Accessory, Y92F-51 (also available for ordering separately))

Waterproof Packing (Accessory, Y92S-P10 (also available for ordering separately))

- Setup Tool ports are provided as standard feature. Use these ports to connect a computer to the Digital Temperature Controller. The E58-CIFQ2 USB-Serial Conversion Cable is required to connect to the port on the top panel. The E58-CIFQ2 USB-Serial Conversion Cable and E58-CIFQ2-E Communications Conversion Cable are required to connect to the port on the front panel. (You cannot leave either port connected constantly during operation.)

- Recommended panel thickness is 1 to 8 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.

Group Mounted

(96 x number of units – 3.5)/6

92/3

Group mounting does not allow waterproofing.

120 min.

Mounted Separately

32/3

92/3

92/3

92/3
## Accessories (Order Separately)

**USB-Serial Conversion Cable**

**E58-CIFQ2**

- **USB connector** (type A plug)
- **Serial connector**
- **LED (RD)**
- **LED (PWR)**
- **LED (SD)**

---

**Conversion Cable**

**E58-CIFQ2-E**

- Conversion Cable
- Connecting to the E58-CIFQ2 USB-Serial Conversion Cable

**Note:** Always use this product together with the E58-CIFQ2.

---

**Terminal Covers**

**E53-COV24 (Three Covers provided.)**

**Waterproof Packing**

**Y92S-P9 (for DIN 48 × 96)**

- The Waterproof Packing is provided with the Temperature Controller.
- Order the Waterproof Packing separately if it becomes lost or damaged.
- The degree of protection when the Waterproof Packing is used is IP66.
- Also, keep the Port Cover on the front-panel Setup Tool port of the E5EC/E5EC-B/E5AC securely closed.
- To maintain an IP66 degree of protection, the Waterproof Packing and the Port Cover for the front-panel Setup Tool port must be periodically replaced because they may deteriorate, shrink, or harden depending on the operating environment.
- The replacement period will vary with the operating environment.
- Check the required period in the actual application. Use 3 years or sooner as a guideline.

**Y92S-P10 (for DIN 96 × 96)**

---

**Setup Tool Port Cover for top panel**

**Y92S-P7**

**Mounting Adapter**

**Y92F-51 (Two Adapters provided.)**

- One pair is provided with the Controller.
- Order the Mounting Adapter separately if it becomes lost or damaged.
**Watertight Cover**

**Y92A-49N (48 × 96)**

- Dimensions: 67.6 × 131.7 × 28.9

**Y92A-96N (96 × 96)**

- Dimensions: 115.6 × 131.7 × 28.9

---

**Current Transformers**

**E54-CT1**

- Thru-current (Io) vs. Output Voltage (Eo)
- **(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**

- Thru-current (Io) A (r.m.s.)
- **Frequency: 50 Hz**
- **Distortion factor**
  - 100%: 10%
  - 90%: 3%
  - 1%: 1%

---

**Wiring Details**

- **Filler (epoxy)**
- **Case (PBT)**
- **Shrinkable tube**
- **Cable (AWG18)**
E54-CT3 Accessories

- Armature
  - Approx. 3 dia.

- Plug
  - Approx. 6 dia.

Connection Example

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

Thru-current (Io) A (r.m.s.)

Output voltage (Eo) V (r.m.s.)

Cable (AWG18)

E54-CT3L

Filler (epoxy)
Case (PBT)
Two, M3 (depth: 4)
Digital Temperature Controller

**E5DC/E5DC-B (22.5 mm Wide, and DIN Track-mounting Type)**

The E5DC Mounts to DIN Track and Is Ideal for Connections to HMIs and PLCs. It provides the Same Easy Operation and Advanced Performance as the Rest of the E5□C Series.

Models with Push-In Plus Terminal Blocks Added to Lineup.

- A slim body at 85 × 22.5 mm (D × W) that fits into narrow control panels and mounts to DIN Track.
- Removable terminal block for easy replacement to simplify maintenance.
- Select from models with screw terminal blocks and models with Push-In Plus terminal blocks for reduced wiring work.
- No need for power supply and communication line wiring when using connectors with Push-In Plus terminal blocks. (Maximum connectable units: 16)
- High-speed sampling at 50 ms for applications with high-speed temperature increases.
- Easy connections to a PLC with programless communications.
- Set up the Controller without wiring the power supply by connecting to the computer with a Communications Conversion Cable (sold separately). Setup is easy with the CX-Thermo (sold separately).
- Models are available with up to 2 auxiliary outputs and 1 event input to complete basic functions.
- A white PV display (height: 8.5 mm) is easy to read when setting up, checking alarms, and making settings in a control panel.

Main I/O Functions
Model Number Legend and Standard Models

Model Number Legend
Models with Screw Terminal Blocks
E5DC-RX0ASM-015 (Example: E5DC-RX0ASM-015)

<table>
<thead>
<tr>
<th>Model</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>Meaning</th>
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<tbody>
<tr>
<td>E5DC</td>
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</tbody>
</table>

*1. The control output can be used as a simple transfer output for the Digital Temperature Controllers manufactured in July 2014 or later.
*2. Option 000 can be selected only if two auxiliary outputs are selected.
*3. Options 002 and 017 can be selected only if the control output is a relay output or voltage output and two auxiliary outputs are selected.
*4. Option 015 cannot be selected if the control output is a relay output or voltage output and two auxiliary outputs are selected.
*5. Options 016 can be selected only if the control output is a linear current output and two auxiliary outputs are selected.

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 Number Legend
Models with Push-In Plus Terminal Blocks
E5DC-□□□□ B-□□ (Example: E5DC-QX2ABM-002)

<table>
<thead>
<tr>
<th>Model</th>
<th>Control output 1 and 2</th>
<th>No. of auxiliary outputs</th>
<th>Power supply voltage</th>
<th>Terminal type</th>
<th>Input type</th>
<th>Options</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>E5DC</td>
<td>Control output 1</td>
<td>0</td>
<td>-</td>
<td>Relay output</td>
<td>None</td>
<td>0</td>
<td>22.5 mm wide and mounts to DIN Track</td>
</tr>
<tr>
<td></td>
<td>Control output 2</td>
<td>2 (one common)</td>
<td>100 to 240 VAC</td>
<td>Voltage output (for driving SSR)</td>
<td>None</td>
<td>#1 CX</td>
<td>Linear current output #1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>universal input</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*1. The control output can be used as a simple transfer output for the Digital Temperature Controllers manufactured in July 2014 or later.
*2. Option 000 can be selected only if two auxiliary outputs are selected.
*3. Options 002 and 017 can be selected only if the control output is a relay output or voltage output and two auxiliary outputs are selected.
*4. Option 015 cannot be selected if the control output is a relay output or voltage output and two auxiliary outputs are selected.

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

<table>
<thead>
<tr>
<th>Control output</th>
<th>No. of auxiliary outputs</th>
<th>Options</th>
<th>Model</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>HB alarm and HS alarm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relay output</td>
<td>2</td>
<td>Detection for single-phase heater</td>
<td>E5DC-RX2ABM-000</td>
<td>E5DC-RX2ABM-000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RS-485</td>
<td>E5DC-RX2ABM-002</td>
<td>E5DC-RX2ABM-002</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>E5DC-RX0ABM-015</td>
<td>E5DC-RX0ABM-015</td>
</tr>
<tr>
<td>Voltage output (for driving SSR)</td>
<td>2</td>
<td>Detection for single-phase heater</td>
<td>E5DC-QX2ABM-000</td>
<td>E5DC-QX2ABM-000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RS-485</td>
<td>E5DC-QX2ABM-002</td>
<td>E5DC-QX2ABM-002</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>E5DC-QX0ABM-015</td>
<td>E5DC-QX0ABM-015</td>
</tr>
<tr>
<td>Linear current output</td>
<td>2</td>
<td></td>
<td>E5DC-CX2ABM-000</td>
<td>E5DC-CX2ABM-000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>E5DC-CX0ABM-015</td>
<td>E5DC-CX0ABM-015</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>E5DC-CX2ABM-015</td>
<td>E5DC-CX2ABM-015</td>
</tr>
</tbody>
</table>
## Optional Products (Order Separately)

<table>
<thead>
<tr>
<th><strong>Terminal Unit</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model</strong></td>
<td><strong>E5DC-SCT1S</strong></td>
</tr>
<tr>
<td><strong>Push-In Plus Terminal Unit</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Model</strong></td>
<td><strong>E5DC-SCT1B</strong></td>
</tr>
<tr>
<td><strong>USB-Serial Conversion Cable</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Model</strong></td>
<td><strong>E58-CIFQ2</strong></td>
</tr>
<tr>
<td><strong>Communications Conversion Cable</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Model</strong></td>
<td><strong>E58-CIFQ2-E</strong></td>
</tr>
</tbody>
</table>

- **Note:** Always use this product together with the E58-CIFQ2. This cable is used to connect to the front-panel Setup Tool port.

<table>
<thead>
<tr>
<th><strong>Current Transformers (CTs)</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hole diameter</strong></td>
<td><strong>Model</strong></td>
</tr>
<tr>
<td><strong>5.8 mm</strong></td>
<td><strong>E54-CT1</strong></td>
</tr>
<tr>
<td><strong>5.8 mm</strong></td>
<td><strong>E54-CT1L</strong></td>
</tr>
<tr>
<td><strong>12.0 mm</strong></td>
<td><strong>E54-CT3</strong></td>
</tr>
<tr>
<td><strong>12.0 mm</strong></td>
<td><strong>E54-CT3L</strong></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th><strong>Mounting Adapter</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model</strong></td>
<td><strong>Y92F-53 (2pcs)</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Short Bars (for E5DC)</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model</strong></td>
<td><strong>Y92S-P11 (4 pcs)</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>CX-Thermo Support Software</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model</strong></td>
<td><strong>EST2-2C-MV4</strong></td>
</tr>
</tbody>
</table>

- **Note:** CX-Thermo version 4.6 or higher is required for the E5DC. CX-Thermo version 4.69 or higher is required for the E5DC-B. For the system requirements for the CX-Thermo, refer to information on the EST2-2C-MV4 on the OMRON website (www.ia.omron.com).

<table>
<thead>
<tr>
<th><strong>End Plate</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model</strong></td>
<td><strong>PFP-M</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Spacer</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model</strong></td>
<td><strong>PFP-S</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>DIN Tracks</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model</strong></td>
<td><strong>PFP-100N</strong></td>
</tr>
<tr>
<td><strong>Model</strong></td>
<td><strong>PFP-50N</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Unit Labels</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model</strong></td>
<td><strong>Y92S-L2</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>End Cover</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model</strong></td>
<td><strong>Y92F-54</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Connector Cover (for E5DC-B)</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model</strong></td>
<td><strong>E53-COV26</strong></td>
</tr>
</tbody>
</table>
# Specifications

## Ratings

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
</table>
| **Power supply voltage**                          | A in model number: 100 to 240 VAC, 50/60 Hz  
                                                        0 in model number: 24 VAC, 50/60 Hz; 24 VDC |
| **Operating voltage range**                       | 85 to 110% of rated supply voltage                                       |
| **Power consumption**                             | 4.9 VA max. at 100 to 240 VAC, and 2.8 VA max. at 24 VDC or 1.5 W max. at 24 VDC |
| **Sensor input**                                  | Temperature input: K, J, T, E, L, U, N, R, S, B, CW, or PL II  
                                                        Platinum resistance thermometer: Pt100 or JPt100  
                                                        Infrared temperature sensor (ES1B): 10 to 70°C, 60 to 120°C, 115 to 165°C, or 140 to 260°C  
                                                        Analog input: Current input: 4 to 20 mA or 0 to 20 mA  
                                                        Voltage input: 1 to 5 V, 0 to 5 V, or 0 to 10 V |
| **Input impedance**                               | Current input: 150 Ω max., Voltage input: 1 MΩ min.  
                                                        (Use a 1:1 connection when connecting the ES2-HB-N/THB-N.) |
| **Control method**                                | ON/OFF control or 2-PID control (with auto-tuning)                       |
| **Control output**                                | Relay output: SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA (reference value)  
                                                        Voltage output (for driving SSR): Output voltage 12 VDC ±20% (PNP), max. Load current: 21 mA, with short-circuit protection circuit  
                                                        Linear current output: 4 to 20 mA DC/0 to 20 mA DC, load: 500 Ω max., resolution: Approx. 10,000 |
| **Auxiliary output**                              | Number of outputs: 2 (depends on model)                                  |
| **Output specifications**                         | SPST-NO relay outputs: 250 VAC, 2 A (resistive load), Electrical life: 100,000 operations, Minimum applicable load: 10 mA at 5 V (reference value) |
| **Event input #1**                                | Number of inputs: 1 (depends on model)                                  |
| **External contact input specifications**         | 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.  
                                                        Current flow: approx. 7 mA per contact |
| **Setting method**                                | Digital setting using front panel keys                                    |
| **Indication method**                             | 11-segment digital displays and individual indicators  
                                                        Character height: PV: 8.5 mm, SV: 8.0 mm |
| **Multi SP**                                       | Up to eight set points (SP0 to SP7) can be saved and selected using the event inputs, key operations, or serial communications. #2 |
| **Bank switching**                                | None                                                                    |
| **Other functions**                               | 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, self tuning, 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, display brightness setting, simple transfer output, #3 and work bit message #3 |
| **Ambient operating temperature**                 | −10 to 55°C (with no condensation or icing), For 3-year warranty: −10 to 50°C with standard mounting (with no condensation or icing) |
| **Ambient operating humidity**                    | 25 to 85%                                                               |
| **Storage temperature**                           | −25 to 65°C (with no condensation or icing)                            |
| **Altitude**                                       | 2,000 m max.                                                            |
| **Recommended fuse**                              | T2A, 250 VAC, time-lag, low-breaking capacity                           |
| **Installation environment**                      | Overvoltage category II, Pollution Degree 2 (EN/IEC/UL 61010-1)          |

#1. This function is not supported by the E5DC-B. Refer to Model Number Legend on page 60.  
#2. Only two set points are selectable for event inputs.  
#3. Usage is possible for the Digital Temperature Controllers manufactured in July 2014 or later.
## Input Ranges

### Thermocouple/Platinum Resistance Thermometer (Universal inputs)

<table>
<thead>
<tr>
<th>Sensor type</th>
<th>Platinum resistance thermometer</th>
<th>Thermocouple</th>
<th>Infrared temperature sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor specification</td>
<td>Pt100</td>
<td>JPt100</td>
<td>K</td>
</tr>
<tr>
<td>Temperature range (°C)</td>
<td>2300</td>
<td>1800</td>
<td>1700</td>
</tr>
<tr>
<td>Temperature range (°C)</td>
<td>-200</td>
<td>-199.9</td>
<td>-200</td>
</tr>
</tbody>
</table>

- Shaded settings are the default settings.

The applicable standards for the input types are as follows:

- **K, J, T, E, N, R, S, B:** JIS C 1602-2015, IEC 60584-1
- **JPt100:** JIS C 1604-1997, IEC 60751
- **L:** Fe-CuNi, DIN 43710-1985
- **U:** Cu-CuNi, DIN 43710-1985
- **Pt100:** JIS C 1604-1997, IEC 60751
- **C/W:** W5Re/W26Re, JIS C 1602-2015, ASTM E988-1990
- **PLII:** According to Platinel II electromotive force charts from BASF (previously Engelhard)

### Analog input

<table>
<thead>
<tr>
<th>Input type</th>
<th>Current</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input specification</td>
<td>4 to 20 mA</td>
<td>0 to 20 mA</td>
</tr>
<tr>
<td>Setting range</td>
<td>Usable in the following ranges by scaling: -1999 to 9999, -199.9 to 999.9, -19.99 to 99.99 or -1.999 to 9.999</td>
<td></td>
</tr>
<tr>
<td>Set value</td>
<td>25</td>
<td>26</td>
</tr>
</tbody>
</table>
## 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 to 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.

<table>
<thead>
<tr>
<th>Set value</th>
<th>Alarm type</th>
<th>Alarm output operation</th>
<th>Description of function</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Alarm function OFF</td>
<td>Output OFF</td>
<td>No alarm</td>
</tr>
<tr>
<td>1</td>
<td>Upper- and lower-limit #1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 (default)</td>
<td>Upper-limit</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Lower-limit</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Upper- and lower-limit range #1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Upper- and lower-limit with standby sequence #1</td>
<td></td>
<td>A standby sequence is added to the upper- and lower-limit alarm (1).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Upper-limit with standby sequence</td>
<td></td>
<td>A standby sequence is added to the upper-limit alarm (2).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Lower-limit with standby sequence</td>
<td></td>
<td>A standby sequence is added to the lower-limit alarm (3).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Absolute-value upper-limit</td>
<td></td>
<td>The alarm will turn ON if the process value is larger than the alarm value (X) regardless of the set point.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Absolute-value lower-limit</td>
<td></td>
<td>The alarm will turn ON if the process value is smaller than the alarm value (X) regardless of the set point.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Absolute-value upper-limit with standby sequence</td>
<td></td>
<td>A standby sequence is added to the absolute-value upper-limit alarm (8).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Absolute-value lower-limit with standby sequence</td>
<td></td>
<td>A standby sequence is added to the absolute-value lower-limit alarm (9).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>LBA (alarm 1 type only)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>PV change rate alarm</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>SP absolute-value upper-limit alarm</td>
<td></td>
<td>This alarm type turns ON the alarm when the set point (SP) is higher than the alarm value (X).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>SP absolute-value lower-limit alarm</td>
<td></td>
<td>This alarm type turns ON the alarm when the set point (SP) is lower than the alarm value (X).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>MV absolute-value upper-limit alarm #9</td>
<td></td>
<td>This alarm type turns ON the alarm when the manipulated variable (MV) is higher than the alarm value (X).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>MV absolute-value lower-limit alarm #9</td>
<td></td>
<td>This alarm type turns ON the alarm when the manipulated variable (MV) is lower than the alarm value (X).</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Case 1</th>
<th>Case 2</th>
<th>Case 3 (Always OFF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L H SP</td>
<td>H &gt; 0, L &lt; 0</td>
<td>H &gt; 0, L &lt; 0</td>
</tr>
<tr>
<td>H &lt; 0, L &gt; 0</td>
<td>[H] &lt;</td>
<td>L</td>
</tr>
<tr>
<td></td>
<td>[H] &gt;</td>
<td>L</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Case 1</th>
<th>Case 2</th>
<th>Case 3 (Always ON)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L H SP</td>
<td>H &gt; 0, L &lt; 0</td>
<td>H &gt; 0, L &lt; 0</td>
</tr>
<tr>
<td>H &lt; 0, L &gt; 0</td>
<td>[H] &lt;</td>
<td>L</td>
</tr>
<tr>
<td></td>
<td>[H] &gt;</td>
<td>L</td>
</tr>
</tbody>
</table>

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

For Upper- and Lower-Limit Alarm Described Above at *2
- In cases 1 and 2 above, the alarm is always OFF if the upper- and lower-limit hysteresis overlaps.
- In case 3, the alarm is always OFF.

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

The alarm is always OFF if upper- and lower-limit hysteresis overlaps.

6. Refer to the E5DC Digital Temperature Controllers User’s Manual (Cat. No. H174) for information on the operation of the standby sequence.

7. Refer to the E5DC Digital Temperature Controllers User’s Manual (Cat. No. H174) for information on the LBA.

8. Refer to the E5DC Digital Temperature Controllers User’s Manual (Cat. No. H174) for information on the PV change rate alarm.

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

| Indicator accuracy (when mounted individually, ambient temperature of 23 °C) | Thermocouple: (±0.3 % of indication value or ±1 °C, whichever is greater) ±1 digit max. #1  
Platinum resistance thermometer: (±0.2 % of indication value or ±0.8 °C, whichever is greater) ±1 digit max.  
Analog input: ±0.2% FS ±1 digit max.  
CT input: ±5% FS ±1 digit max. |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple transfer output accuracy</td>
<td>±0.3% FS max. #2</td>
</tr>
</tbody>
</table>
| Influence of temperature *3 | Thermocouple input (R, S, B, C/W, PL II): (±1% of indication value or ±10 °C, whichever is greater) ±1 digit max.  
Other thermocouple input: (±1% of indication value or ±4 °C, whichever is greater) ±1 digit max. #4 |
| Influence of voltage *3 | Platinum resistance thermometer: (±1% of indication value or ±2 °C, whichever is greater) ±1 digit max.  
Analog input: ±1% FS ±1 digit max.  
CT input: ±5% FS ±1 digit max. |
| Influence of EMS. (at EN 61326-1) | R, S, B, W, or PLII thermocouple: (±1% of PV or ±10 °C, whichever is greater) ±1 digit max.  
Other thermocouple: (±1% of PV or ±4 °C, whichever is greater) ±1 digit max. #4 |
| Installation influence (E5DC only) | *6. External serial communications (RS-485) and USB-Serial Conversion Cable communications can be used at the same time.  
*5. Refer to your OMRON website for the most recent information on applicable models.  
*4. Industrial electromagnetic environment (EN/IEC 61326-1 Table 2)  
*3. 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 temperature is ±2 °C ±1 digit max. The indication accuracy of B thermocouples 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 ±3 °C max.  
The indication accuracy of R and S thermocouples at a temperature of 200 °C max. is ±3 °C ±1 digit max. The indication accuracy of C/W thermocouples is (±0.3% of PV or ±3 °C, whichever is greater) ±1 digit max.  
The indication accuracy of PLI thermocouples is (±0.3% of PV or ±2 °C, whichever is greater) ±1 digit max. |
| Input sampling period | 50 ms |
| Hysteresis | Temperature input: 0.1 to 999.9 °C or °F (in units of 0.1 °C or °F)  
Analog input: 0.1% to 99.99% FS (in units of 0.01% FS)  
Analog input: ±1% FS ±1 digit max. |
| Proportional band (P) | Temperature input: 0.1 to 999.9 °C or °F (in units of 0.1 °C or °F)  
Analog input: 0.1% to 99.99% FS (in units of 0.1% FS)  
Analog input: ±1% FS ±1 digit max. |
| Integral time (I) | 0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) #5 |
| Derivative time (D) | 0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) #5 |
| Proportional band (P) for cooling | Temperature input: 0.1 to 999.9 °C or °F (in units of 0.1 °C or °F)  
Analog input: 0.1% to 99.99% FS (in units of 0.1% FS)  
Analog input: ±1% FS ±1 digit max. |
| Integral time (I) for cooling | 0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) #5 |
| Derivative time (D) for cooling | 0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) #5 |
| Control period | 0.1, 0.2, 0.5, 1 to 99 s (in units of 1 s) |
| Manual reset value | 0.0% to 100.0% (in units of 0.1%) |
| Alarm setting range | −1,999 to 9,999 (decimal point position depends on input type) |
| Influence of signal source resistance | Thermocouple: 0.1°C/Ω max. (100 Ω max.), Platinum resistance thermometer: 0.1°C/Ω max. (10 Ω max.) |
| Insulation resistance | 20 MΩ min. (at 500 VDC) |
| Dielectric strength | 3,000 VAC, 50/60 Hz for 1 min between terminals of different charge |
| Vibration | Malfunction: 10 to 55 Hz, 20 m/s² for 10 min each in X, Y, and Z directions  
Resistance: 10 to 55 Hz, 20 m/s² for 2 hr each in X, Y, and Z directions |
| Shock | Malfunction: 100 m/s², 3 times each in X, Y, and Z directions  
Resistance: 300 m/s², 3 times each in X, Y, and Z directions |
| Weight | Main unit: Approx. 80 g, Models with Screw Terminal Unit: Approx. 40 g,  
Models with Push-In Plus Terminal Unit: Approx. 40 g |
| Degree of protection | Main unit: IP20, Terminal unit: IP00 |
| Memory protection | Non-volatile memory (number of writes: 1,000,000 times) |
| Setup Tool | CX-Thermo version 4.8 or higher |
| Setup Tool port | E5DC/E5DC-B bottom panel: An E58-CIFQ2 USB-Serial Conversion Cable is used to connect a USB port on the computer. #6  
E5DC/E5DC-B front panel: An E58-CIFQ2 USB-Serial Conversion Cable and E58-CIFQ2-E Conversion Cable are used together to connect a USB port on the computer. #6 |
| Standards | cULus: UL 61010-1/CSA C22.2 No. 61010-1, Korean wireless regulations (Radio law: KC Mark) (Some models only.), Lloyd’s standards (E5DC only) #7, EAC |
| Conformed standards | EN 61010-1 (IEC 61010-1), RCM |

*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 temperature is ±2 °C ±1 digit max. The indication accuracy of B thermocouples 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 ±3 °C max.  
The indication accuracy of R and S thermocouples at a temperature of 200 °C max. is ±3 °C ±1 digit max. The indication accuracy of C/W thermocouples is (±0.3% of PV or ±3 °C, whichever is greater) ±1 digit max.  
The indication accuracy of PLI thermocouples is (±0.3% of PV or ±2 °C, whichever is greater) ±1 digit max.  
*2. However, the precision between 0 and 4 mA for a 0 to 20 mA output is ±1% FS max.  
*3. Ambient temperature: –10 °C to 23 °C to 55 °C, Voltage range: –15% to 10% of rated voltage  
*4. K thermocouple at –100 °C max.: ±10 °C max.  
*5. The unit is determined by the setting of the Integral/Derivative Time Unit parameter.  
*6. External serial communications (RS-485) and USB-Serial Conversion Cable communications can be used at the same time.  
*7. Refer to your OMRON website for the most recent information on applicable models.  
*8. Refer to information on maritime standards in Shipping Standards on page 124 for compliance with Lloyd’s Standards.  
*9. Industrial electromagnetic environment (EN/IEC 61326-1 Table 2)
USB-Serial Conversion Cable

**Applicable OS:** Windows XP/Vista/7/8/10

**Applicable software:** C-Thermo version 4.6 or higher

**Applicable models:** E5-IC-T Series, E5IC-C Series, and E5CB Series

**USB interface standard:** Conforms to USB Specification 2.0

**DTE speed:** 38,400 bps

**Connector specifications:** Computer: USB (Type A plug) Digital Temperature Controller: Special serial connector

**Power supply:** Bus power (Supplied from the USB host controller)

**Power supply voltage:** 5 VDC

**Current consumption:** 450 mA max.

**Output voltage:** 4.7±0.2 VDC (Supplied from USB-Serial Conversion Cable to the Digital Temperature Controller.)

**Output current:** 250 mA max. (Supplied from USB-Serial Conversion Cable to the Digital Temperature Controller.)

**Ambient operating temperature:** 0 to 55°C (with no condensation or icing)

**Ambient operating humidity:** 10% to 80%

**Storage temperature:** –20 to 60°C (with no condensation or icing)

**Storage humidity:** 10% to 80%

**Altitude:** 2,000 m max.

**Weight:** Approx. 120 g

Windows is a registered trademark of Microsoft Corporation in the United States and other countries.

*1. CX-Thermo version 4.6 or higher runs on Windows 10.

*2. Use a high-power port for the USB port.

**Note:** A driver must be installed on the computer. Refer to the Instruction Manual included with the Cable for the installation procedure.

**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, or 57,600 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) Block check character (BCC) with CompoWay/F or CRC-16 with Modbus |
| Flow control | None |
| Interface | RS-485 |
| Retry function | None |
| Communications buffer | 217 bytes |
| Communications response wait time | 0 to 99 ms |

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

**Communications Functions**

You can use the memory in the PLC to read and write E5IC parameters, start and stop operation, etc. The E5IC automatically performs communications with PLCs. No communications programming is required. Number of connected Digital Temperature Controllers: 32 max. (Up to 16 for the FX Series)

**Applicable PLCs**

- OMRON PLCs: CS Series, CJ Series, CP Series, NJ Series, or NX1P
- Mitsubishi Electric PLCs: MELSEC Q Series, L Series, FX3 Series, or Q-R Series
- KEYENCE PLCs: E5DC/E5DC-B

**Component Communications #1**

- **When Digital Temperature Controllers are connected:** set points and RUN/STOP commands can be sent from the Digital Temperature Controller that is set as the master to the Digital Temperature Controllers that are set as slaves.
- **Copy #2**
- **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.

**COPYING**

*1. A Temperature Controller with version 2.1 or higher is required for the FX Series or the KV Series.

*2. Both the programless communications and the component communications support the copying.

**Current Transformer (Order Separately) Ratings**

<table>
<thead>
<tr>
<th>E54-CT1</th>
<th>E54-CT3</th>
<th>E54-CT1L</th>
<th>E54-CT3L</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dielectric strength</strong></td>
<td>1,000 VAC for 1 min</td>
<td>1,500 VAC for 1 min</td>
<td></td>
</tr>
<tr>
<td><strong>Vibration resistance</strong></td>
<td>50 Hz, 98 m/s²</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>E54-CT1: Approx. 11.5 g</td>
<td>E54-CT1L: Approx. 14 g</td>
<td></td>
</tr>
<tr>
<td><strong>Accessories</strong></td>
<td>E54-CT3 Only Armatures (2) Plugs (2)</td>
<td>None</td>
<td></td>
</tr>
</tbody>
</table>

**Heater Burnout Alarms and SSR Failure Alarms**

**Heater Burnout Alarms**

- **E5DC/E5DC-B**

**SSR Failure Alarms**

- **E5DC/E5DC-B**

**Switching current (A)**

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

<table>
<thead>
<tr>
<th>Life (hr)</th>
<th>100</th>
<th>150</th>
<th>200</th>
<th>250</th>
<th>300</th>
<th>350</th>
<th>400</th>
<th>450</th>
<th>500</th>
<th>550</th>
<th>600</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current (A)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
</tr>
</tbody>
</table>

*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 35 ms for a control period of 0.1 s or 0.2 s.
E5DC/E5DC-B

External Connections

E5DC (Models with Screw Terminal Blocks)

- 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, 2 A (resistive load)

- Input Power Supply
  100 to 240 VAC
  24 VAC/DC
  (no polarity)

- Control Output
  1 linear current output
  1 relay output
  1 voltage output
  (for driving SSR)

- Communications and 1 CT
  002
  RS-485
  B(+)
  A(−)

- One event input
  017
  EVT

- Communications
  016
  RS-485
  B(+)
  A(−)

- One event input and 1 CT
  015
  EVT

- Sensor (Temperature/Analog) Input
  TC
  Pt
  12
  13
  14

- Options
  002
  Communications and 1 CT
  One event input

- 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.
  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 XOB or XOB7 current transformer that is UL Listed for field wiring (external wiring) and not the factory wiring (internal wiring).
  6. The terminal layout is different than models with Push-In Plus terminal blocks. Check the terminal arrangement before wiring.
E5DC-B (Models with 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 30m, compliance with EMC standards will not be possible.
4. Refer to Wiring Precautions for E5@C-B (Controllers with Push-In Plus Terminal Blocks) on page 133 for wire specifications and wiring methods.
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).
6. The terminal layout is different than models with screw terminal blocks. Check the terminal arrangement before wiring.
7. The event input specification main unit is not used with models with Push-In Plus terminal blocks.

Isolation/Insulation Block Diagrams

E5DC

<table>
<thead>
<tr>
<th>Power supply</th>
<th>Sensor input and CT input</th>
<th>Communications and event input</th>
<th>Voltage output (for driving SSR) and linear current output</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Relay output

Auxiliary outputs 1 and 2

Note: 1. Power supply: : Reinforced insulation
   : Functional isolation

E5DC-B

<table>
<thead>
<tr>
<th>Power supply</th>
<th>Sensor input and CT input</th>
<th>Communications</th>
<th>Voltage output (for driving SSR) and linear current output</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Relay output

Auxiliary outputs 1 and 2

Note: Auxiliary outputs 1 to 2 are not insulated.
E5DC/E5DC-B

Nomenclature

**E5DC**
**E5DC-B**

**Front-panel Setup Tool port**

**Front panel**
- **Operation indicators**
  - PV or specified parameter
  - SP or specified parameter value
- **No. 1 display**
  - Use the `M` Key to change to another parameter.
- **No. 2 display**
  - Use the `U` Keys to set the parameter.

**Use the `S` Key to change the digit (default setting).**

**Press `O` Key once to go to Adjustment Level.**

**Press `O` Key for at least 3 seconds to go to Initial Setting Level.**

**Bottom View of E5DC/E5DC-B**

**Bottom-panel Setup Tool port**

**Use the `S` Key to change the digit (default setting).**

**Press `O` Key once to go to Adjustment Level.**

**Use the `S` Key to change the digit (default setting).**

**Press `O` Key for at least 3 seconds to go to Initial Setting Level.**
**Dimensions**

<table>
<thead>
<tr>
<th>Controllers</th>
</tr>
</thead>
</table>

**E5DC**

The above figure shows the Terminal Unit attached to the Main Unit.

**E5DC-B**

The above figure shows the Push-In Plus Terminal Unit attached to the Main Unit.

- Setup Tool ports are provided as standard feature. Use these ports to connect a computer to the Digital Temperature Controller. The E58-CIFQ2 USB-Serial Conversion Cable is required to connect to the port on the bottom panel. The E58-CIFQ2 USB-Serial Conversion Cable and E58-CIFQ2-E Communications Conversion Cable are required to connect to the port on the front panel. (You cannot leave either port connected constantly during operation.)

- Recommended panel thickness is 1 to 8 mm.
- Group mounting is not possible in the vertical direction. (Maintain the specified mounting space between Controllers.)
- When two or more Digital Temperature Controllers are mounted, make sure that the surrounding temperature does not exceed the allowable operating temperature specified in the specifications.
E5DC/E5DC-B

Accessories (Order Separately)

Terminal Unit
E5DC-SCT1S

Push-In Plus Terminal Unit
E5DC-SCT1B

USB-Serial Conversion Cable
E58-CIFQ2

Conversion Cable
E58-CIFQ2-E

Note: Always use this product together with the E58-CIFQ2.
Current Transformers

E54-CT1

Thru-current (Io) vs. Output Voltage (Eo) (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

Output voltage (Eo) V (r.m.s.)

Thru-current (Io) A (r.m.s.)

Frequency: 50 Hz
Distortion factor: 100 V

Mark (yellow)
E54-CT3 Accessories

• Armature
  - Approx. 3 dia.
  - Two, M3 (depth: 4)

• Plug
  - Approx. 6 dia.
  - (22)

E54-CT3L

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

<table>
<thead>
<tr>
<th>Thru-current (Io) A (r.m.s.)</th>
<th>Output voltage (50 V) V (r.m.s.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100mV</td>
<td>1000Ω</td>
</tr>
<tr>
<td>10mV</td>
<td>1000Ω</td>
</tr>
<tr>
<td>1V</td>
<td>1000Ω</td>
</tr>
<tr>
<td>10V</td>
<td>1000Ω</td>
</tr>
<tr>
<td>100V</td>
<td>1000Ω</td>
</tr>
<tr>
<td>1kΩ</td>
<td>1000Ω</td>
</tr>
<tr>
<td>50kΩ</td>
<td>1000Ω</td>
</tr>
<tr>
<td>500kΩ</td>
<td>1000Ω</td>
</tr>
<tr>
<td>∞</td>
<td>1000Ω</td>
</tr>
</tbody>
</table>

- Distortion factor:
  - 10%
  - 3%
  - 1%

- Frequency: 50 Hz

- Cable (AWG18)
- Case (PBT)
- Filler (epoxy)
- Two, M3 (depth: 4)
Mounting Adapters
Y92F-53 (Two included.)
This accessory is not included with the product. Order it separately to mount the product to a panel.

Short Bars
Y92S-P11 (Four included.)
Use this product to connect between terminals (for power supplies, communications, etc.) when you use multiple E5DC Controllers.

End Plate
PFP-M

DIN Tracks
PFP-100N
PFP-50N

* Dimensions in parentheses are for the PFP-50N.

Spacer
PFP-S

Unit Labels
Y92S-L2
The Unit Labels for the Digital Panel Meter are used. Use either the °C or °F label from the sheet.

End Cover
Y92F-54 (Two included.)
Use the End Cover when you mount the E5DC/E5DC-B to a panel to hide the gap between the Controller and the panel.
Connector Cover
E53-COV26

Male connector cover  Female connector cover

E5DC-B Push-In Plus Terminal Units are mounted with both a male and female connector cover (E53-COV26). Order the connector cover separately if it becomes lost or damaged.
Programmable Controllers Join the E5□C Series!
Program up to 256 segments can handle a wide variety of applications.

- Set up to 8 Programs (Patterns) with 32 Segments (Steps) Each
- The white PV display with a height of 15.2 mm improves visibility.
- High-speed sampling at 50 ms.
- Models are available with up to 3 auxiliary outputs, up to 4 event inputs, and a transfer output to cover a wide range of applications.
- Short body with depth of only 60 mm.
- Set up the Controller without wiring the power supply by connecting to the computer with a Communications Conversion Cable (sold separately). Setup is easy with the CX-Thermo (sold separately).
- Easy connections to a PLC with programless communications. Use component communications to link Temperature Controllers to each other.

Main I/O Functions

Sensor Input
Universal input
- Thermocouple
- Pt
- Analog current/voltage

Indication Accuracy
- Thermocouple input: ±0.3% of PV
- Pt input: ±0.2% of PV
- Analog input: ±0.2% of FS

Sampling Period
- 50 ms

Event Inputs
- None
- 2
- 4

Serial Communications
- None
- RS-485

Control Output 1
- Relay output
- Voltage output (for driving SSR)
- Linear current output

Control Output 2
- None
- Voltage output (for driving SSR)

Auxiliary Outputs
- 3

Transfer Output
- None
- 1

PF (shift) Key
- Temperature status display
- Operating and editing the program
- Independent heating and cooling
- PID control
- Parameter mask setting
- Display brightness setting

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□C-T Digital Temperature Controllers Programmable Type User’s Manual (Cat. No. H185)
E5□C-T Digital Temperature Controllers Programmable Type Communications Manual (Cat. No. H186)
### Model Number Legend and Standard Models

#### Model Number Legend

Models with Screw Terminal Blocks

**E5CC-T [3] [5] M-[ ]**  (Example: E5CC-TRX3A5M-000)

#### Model Number Legend

<table>
<thead>
<tr>
<th>Model</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>E5CC-T</td>
<td>48×48 mm Programmable Type</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RX</td>
<td></td>
<td>Control output 1</td>
<td></td>
<td>Control output 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QX</td>
<td></td>
<td>Relay output</td>
<td></td>
<td>None</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CX</td>
<td></td>
<td>Voltage output (for driving SSR)</td>
<td></td>
<td>None</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QQ</td>
<td></td>
<td>Voltage output (for driving SSR)</td>
<td></td>
<td>Voltage output (for driving SSR)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CQ</td>
<td></td>
<td>Linear current output #2</td>
<td></td>
<td>Voltage output (for driving SSR)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>Control outputs 1 and 2</th>
<th>No. of auxiliary outputs</th>
<th>Power supply voltage</th>
<th>Terminal type</th>
<th>Input type</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>RX</td>
<td>1</td>
<td>24 VAC/DC</td>
<td>Screw terminal blocks (with cover)</td>
<td>Universal input</td>
<td></td>
</tr>
<tr>
<td>QX</td>
<td>3</td>
<td>100 to 240 VAC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CX</td>
<td>3</td>
<td>100 to 240 VAC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QQ</td>
<td>3</td>
<td>24 VAC/DC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CQ</td>
<td>3</td>
<td>24 VAC/DC</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>Model</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>E5CC-T</td>
<td>48×48 mm Programmable Type</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RX</td>
<td></td>
<td>Control output 1</td>
<td></td>
<td>Control output 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QX</td>
<td></td>
<td>Relay output</td>
<td></td>
<td>None</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CX</td>
<td></td>
<td>Voltage output (for driving SSR)</td>
<td></td>
<td>None</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QQ</td>
<td></td>
<td>Voltage output (for driving SSR)</td>
<td></td>
<td>Voltage output (for driving SSR)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CQ</td>
<td></td>
<td>Linear current output #2</td>
<td></td>
<td>Voltage output (for driving SSR)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

| *1 | Options with HB and HS alarms (001 and 003) cannot be selected if a linear current output is selected for the control output. |
|    | *2. The linear current output cannot be used as a transfer output. |
|    | *3. Option 004 can be selected only when “CX” is selected for the control outputs. |

---

### Heating and Cooling Control

#### Using Heating and Cooling Control

1. **Control Output Assignment**
   - If there is no control output 2, an auxiliary output is used as the cooling control output.
   - If there is a control output 2, the two control outputs are used for heating and cooling.
   - (It does not matter which output is used for heating and which output is used for cooling.)
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.
### Optional Products (Order Separately)

**USB-Serial Conversion Cable**

<table>
<thead>
<tr>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>E58-CIFQ2</td>
</tr>
</tbody>
</table>

**Terminal Covers**

<table>
<thead>
<tr>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>E53-COV17</td>
</tr>
<tr>
<td>E53-COV23 (3pcs)</td>
</tr>
</tbody>
</table>

**Note:** The Terminal Covers E53-COV23 are provided with the Digital Temperature Controller. The E53-COV10 cannot be used. Refer to page 89 for the mounted dimensions.

**Waterproof Packing**

<table>
<thead>
<tr>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y92S-P8</td>
</tr>
</tbody>
</table>

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

**Current Transformers (CTs)**

<table>
<thead>
<tr>
<th>Hole diameter</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.8 mm</td>
<td>E54-CT1</td>
</tr>
<tr>
<td>5.8 mm</td>
<td>E54-CT1L</td>
</tr>
<tr>
<td>12.0 mm</td>
<td>E54-CT3</td>
</tr>
<tr>
<td>12.0 mm</td>
<td>E54-CT3L</td>
</tr>
</tbody>
</table>

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

**Adapter**

<table>
<thead>
<tr>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y92F-45</td>
</tr>
</tbody>
</table>

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

**Waterproof Cover**

<table>
<thead>
<tr>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y92A-48N</td>
</tr>
</tbody>
</table>

**Mounting Adapter**

<table>
<thead>
<tr>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y92F-49</td>
</tr>
</tbody>
</table>

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

**DIN Track Mounting Adapter**

<table>
<thead>
<tr>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y92F-52</td>
</tr>
</tbody>
</table>

### Front Covers

<table>
<thead>
<tr>
<th>Type</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard Front Cover</td>
<td>Y92A-48H</td>
</tr>
<tr>
<td>Soft Front Cover</td>
<td>Y92A-48D</td>
</tr>
</tbody>
</table>

### CX-Thermo Support Software

<table>
<thead>
<tr>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>EST2-2C-MV4</td>
</tr>
</tbody>
</table>

**Note:** CX-Thermo version 4.61 or higher is required for the E5CC-T. For the system requirements for the CX-Thermo, refer to information on the EST2-2C-MV4 on the OMRON website (www.ia.omron.com).
### Specifications

#### Ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply voltage</td>
<td>A in model number: 100 to 240 VAC, 50/60 Hz</td>
</tr>
<tr>
<td></td>
<td>D in model number: 24 VAC, 50/60 Hz; 24 VDC</td>
</tr>
<tr>
<td>Operating voltage range</td>
<td>85 to 110% of rated supply voltage</td>
</tr>
<tr>
<td>Power consumption</td>
<td>7.5 VA max. at 100 to 240 VAC, and 4.1 VA max. at 24 VAC or 2.3 W max. at 24 VDC</td>
</tr>
<tr>
<td><strong>Sensor input</strong></td>
<td><strong>Temperature input</strong></td>
</tr>
<tr>
<td></td>
<td>Platinum resistance thermometer: Pt100 or JPt100</td>
</tr>
<tr>
<td></td>
<td>Infrared temperature sensor (ES1B): 10 to 70°C, 60 to 120°C, 115 to 165°C, 140 to 260°C</td>
</tr>
<tr>
<td></td>
<td>Analog input</td>
</tr>
<tr>
<td></td>
<td>Current input: 4 to 20 mA or 0 to 20 mA</td>
</tr>
<tr>
<td></td>
<td>Voltage input: 1 to 5 V, 0 to 5 V, or 0 to 10 V</td>
</tr>
<tr>
<td>Input impedance</td>
<td>Current input: 150 Ω max., Voltage input: 1 MΩ min. (Use a 1:1 connection when connecting the ES2-HB-N/THB-N.)</td>
</tr>
<tr>
<td><strong>Control method</strong></td>
<td>2-PID control (with auto-tuning) or ON/OFF control</td>
</tr>
<tr>
<td><strong>Control output</strong></td>
<td>Relay output</td>
</tr>
<tr>
<td></td>
<td>SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA (reference value)</td>
</tr>
<tr>
<td></td>
<td>Voltage output (for driving SSR)</td>
</tr>
<tr>
<td></td>
<td>Output voltage: 12 VDC ±20% (PNP), max. load current: 21 mA, with short-circuit protection circuit</td>
</tr>
<tr>
<td><strong>Linear current output</strong></td>
<td>4 to 20 mA DC/0 to 20 mA DC, load: 500 Ω max., resolution: approx. 10,000</td>
</tr>
<tr>
<td><strong>Auxiliary output</strong></td>
<td>Number of outputs</td>
</tr>
<tr>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Output specifications</td>
</tr>
<tr>
<td></td>
<td>SPST-NO relay outputs, 250 VAC, Models with 3 outputs: 2 A (resistive load), Electrical life: 100,000 operations, Minimum applicable load: 10 mA at 5 V (reference value)</td>
</tr>
<tr>
<td><strong>Event input</strong></td>
<td>Number of inputs</td>
</tr>
<tr>
<td></td>
<td>2 or 4 (depends on model)</td>
</tr>
<tr>
<td></td>
<td>External contact input specifications</td>
</tr>
<tr>
<td></td>
<td>Contact input: ON: 1 kΩ max., OFF: 100 kΩ min.</td>
</tr>
<tr>
<td></td>
<td>Non-contact input: ON: Residual voltage: 1.5 V max., OFF: Leakage current: 0.1 mA max.</td>
</tr>
<tr>
<td></td>
<td>Current flow: Approx. 7 mA per contact</td>
</tr>
<tr>
<td><strong>Transfer output</strong></td>
<td>Number of outputs</td>
</tr>
<tr>
<td></td>
<td>1 (only on models with a transfer output)</td>
</tr>
<tr>
<td></td>
<td>Output specifications</td>
</tr>
<tr>
<td></td>
<td>Current output: 4 to 20 mA DC, load: 500 Ω max., resolution: approx. 10,000</td>
</tr>
<tr>
<td></td>
<td>Linear voltage output: 1 to 5 VDC, load: 1 kΩ min., resolution: Approx. 10,000</td>
</tr>
<tr>
<td><strong>Setting method</strong></td>
<td>Digital setting using front panel keys</td>
</tr>
<tr>
<td><strong>Indication method</strong></td>
<td>11-segment digital display and individual indicators</td>
</tr>
<tr>
<td></td>
<td>Character height: PV: 15.2 mm, SV: 7.1 mm</td>
</tr>
<tr>
<td><strong>Bank switching</strong></td>
<td>None</td>
</tr>
<tr>
<td><strong>Other functions</strong></td>
<td>Manual output, heating/cooling control, loop burnout alarm, 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, protection functions, extraction of square root, MV change rate limit, logic operations, temperature status display, moving average of input value, and display brightness setting</td>
</tr>
<tr>
<td><strong>Ambient operating temperature</strong></td>
<td>−10 to 55°C (with no condensation or icing), For 3-year warranty: −10 to 50°C with standard mounting (with no condensation or icing)</td>
</tr>
<tr>
<td><strong>Ambient operating humidity</strong></td>
<td>25 to 85%</td>
</tr>
<tr>
<td><strong>Storage temperature</strong></td>
<td>−25 to 65°C (with no condensation or icing)</td>
</tr>
<tr>
<td><strong>Altitude</strong></td>
<td>2,000 m max.</td>
</tr>
<tr>
<td><strong>Recommended fuse</strong></td>
<td>T2A, 250 VAC, time-lag, low-breaking capacity</td>
</tr>
<tr>
<td><strong>Installation environment</strong></td>
<td>Overvoltage category II, Pollution Degree 2 (EN/IEC/UL 61010-1)</td>
</tr>
</tbody>
</table>
**Input Ranges**

Thermocouple/Platinum Resistance Thermometer (Universal inputs)

<table>
<thead>
<tr>
<th>Sensor type</th>
<th>Platinum resistance thermometer</th>
<th>Thermocouple</th>
<th>Infrared temperature sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specification</td>
<td>Pt100</td>
<td>JPt100</td>
<td>K</td>
</tr>
<tr>
<td>Temperature range (°C)</td>
<td>2300</td>
<td>1800</td>
<td>1300</td>
</tr>
<tr>
<td>Set value</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

Shaded settings are the default settings.

The applicable standards for the input types are as follows:

- **K, T, E, N, R, S, B**: JIS C 1602-2015, IEC 60584-1
- **JPt100**: JIS C 1604-1989, JIS C 1606-1999
- **L**: Fe-CuNi, DIN 43710-1985
- **Pt100**: JIS C 1604-1997, IEC 60751
- **U**: Cu-CuNi, DIN 43710-1985
- **PL II**: According to Platinel II electromotive force charts from BASF (previously Engelhard)
- **C/W**: WR5Re/W26Re, JIS C 1602-2015, ASTM E988-1990

**Analog input**

<table>
<thead>
<tr>
<th>Input type</th>
<th>Current</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specification</td>
<td>4 to 20 mA</td>
<td>0 to 20 mA</td>
</tr>
<tr>
<td>Setting range</td>
<td>Usable in the following ranges by scaling:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-1999 to 9999, -199.9 to 999.9,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-19.99 to 99.99 or -1.999 to 9.999</td>
<td></td>
</tr>
<tr>
<td>Set value</td>
<td>25</td>
<td>26</td>
</tr>
</tbody>
</table>
## 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.

<table>
<thead>
<tr>
<th>Set value</th>
<th>Alarm type</th>
<th>Alarm output operation</th>
<th>Description of function</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Alarm function OFF</td>
<td>Output OFF</td>
<td>No alarm</td>
</tr>
<tr>
<td>1</td>
<td>Upper- and lower-limit #1</td>
<td><img src="#" alt="Diagram" /></td>
<td>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.</td>
</tr>
<tr>
<td>2 (default)</td>
<td>Upper-limit</td>
<td><img src="#" alt="Diagram" /></td>
<td>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.</td>
</tr>
<tr>
<td>3</td>
<td>Lower-limit</td>
<td><img src="#" alt="Diagram" /></td>
<td>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.</td>
</tr>
<tr>
<td>4</td>
<td>Upper- and lower-limit range #1</td>
<td><img src="#" alt="Diagram" /></td>
<td>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.</td>
</tr>
<tr>
<td>5</td>
<td>Upper- and lower-limit with standby sequence #1</td>
<td><img src="#" alt="Diagram" /></td>
<td>A standby sequence is added to the upper- and lower-limit alarm (1). #6</td>
</tr>
<tr>
<td>6</td>
<td>Upper-limit with standby sequence</td>
<td><img src="#" alt="Diagram" /></td>
<td>A standby sequence is added to the upper-limit alarm (2). #6</td>
</tr>
<tr>
<td>7</td>
<td>Lower-limit with standby sequence</td>
<td><img src="#" alt="Diagram" /></td>
<td>A standby sequence is added to the lower-limit alarm (3). #6</td>
</tr>
<tr>
<td>8</td>
<td>Absolute-value upper-limit</td>
<td><img src="#" alt="Diagram" /></td>
<td>The alarm will turn ON if the process value is larger than the alarm value (X) regardless of the set point.</td>
</tr>
<tr>
<td>9</td>
<td>Absolute-value lower-limit</td>
<td><img src="#" alt="Diagram" /></td>
<td>The alarm will turn ON if the process value is smaller than the alarm value (X) regardless of the set point.</td>
</tr>
<tr>
<td>10</td>
<td>Absolute-value upper-limit with standby sequence</td>
<td><img src="#" alt="Diagram" /></td>
<td>A standby sequence is added to the absolute-value upper-limit alarm (8). #6</td>
</tr>
<tr>
<td>11</td>
<td>Absolute-value lower-limit with standby sequence</td>
<td><img src="#" alt="Diagram" /></td>
<td>A standby sequence is added to the absolute-value lower-limit alarm (9). #6</td>
</tr>
<tr>
<td>12</td>
<td>LBA (alarm 1 type only)</td>
<td>-</td>
<td>#7</td>
</tr>
<tr>
<td>13</td>
<td>PV change rate alarm</td>
<td>-</td>
<td>#8</td>
</tr>
<tr>
<td>14</td>
<td>SP absolute-value upper-limit alarm</td>
<td><img src="#" alt="Diagram" /></td>
<td>This alarm type turns ON the alarm when the set point (SP) is higher than the alarm value (X).</td>
</tr>
<tr>
<td>15</td>
<td>SP absolute-value lower-limit alarm</td>
<td><img src="#" alt="Diagram" /></td>
<td>This alarm type turns ON the alarm when the set point (SP) is lower than the alarm value (X).</td>
</tr>
<tr>
<td>16</td>
<td>MV absolute-value upper-limit alarm #9</td>
<td><img src="#" alt="Diagram" /></td>
<td>This alarm type turns ON the alarm when the manipulated variable (MV) is higher than the alarm value (X).</td>
</tr>
<tr>
<td>17</td>
<td>MV absolute-value lower-limit alarm #9</td>
<td><img src="#" alt="Diagram" /></td>
<td>This alarm type turns ON the alarm when the manipulated variable (MV) is lower than the alarm value (X).</td>
</tr>
</tbody>
</table>
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
   - Case 1 and 2: Always OFF when the upper-limit and lower-limit hysteresis overlaps.
   - Case 3: Always OFF

3. Set value: 4, Upper- and lower-limit range
   - Case 1 and 2: Always OFF when the upper-limit and lower-limit hysteresis overlaps.

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
     - Case 3: Always OFF

5. Refer to the E5CC-T Digital Temperature Controllers Programmable Type User's Manual (Cat. No. H185) for information on the operation of the standby sequence.

6. Refer to the E5CC-T Digital Temperature Controllers Programmable Type User's Manual (Cat. No. H185) for information on the loop burnout alarm (LBA).

7. Refer to the E5CC-T Digital Temperature Controllers Programmable Type User's Manual (Cat. No. H185) for information on the PV change rate alarm.

8. 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

<table>
<thead>
<tr>
<th>Indicator accuracy (at the ambient temperature of 23°C)</th>
<th>Thermocouple: (±0.3% of indication value or ±1°C, whichever is greater) ±1 digit max.</th>
<th>#1 Platinum resistance thermomemt: (±0.2% of indication value or ±0.8°C, whichever is greater) ±1 digit max.</th>
<th>Analog input: ±0.2% FS ±1 digit max.</th>
<th>CT input: ±5% FS ±1 digit max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transfer output accuracy</td>
<td>±0.3% FS max.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Influence of temperature #2</td>
<td>Thermocouple input (R, S, B, C/W, PL II): (±1% of indication value or ±10°C, whichever is greater) ±1 digit max.</td>
<td>#1 Platinum resistance thermomemt: (±1% of indication value or ±2°C, whichever is greater) ±1 digit max.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Influence of voltage #2</td>
<td>Other thermocouple input: (±1% of indication value or ±4°C, whichever is greater) ±1 digit max.</td>
<td>#3 Platinum resistance thermomemt: (±1% of indication value or ±2°C, whichever is greater) ±1 digit max.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Influence of EMS. (at EN 61326-1)</td>
<td>Analog input: ±1%FS ±1 digit max.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CT input: ±5% FS ±1 digit max.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input sampling period</td>
<td>50 ms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hysteresis</td>
<td>Temperature input: 0.1 to 999.9°C or °F (in units of 0.1°C or °F)</td>
<td>Analog input: 0.01% to 99.99% FS (in units of 0.01% FS)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proportional band (P)</td>
<td>Temperature input: 0.1 to 999.9°C or °F (in units of 0.1°C or °F)</td>
<td>Analog input: 0.1% to 999.9% FS (in units of 0.1% FS)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Integral time (I)</td>
<td>0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) #4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Derivative time (D)</td>
<td>0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) #4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proportional band (P) for cooling</td>
<td>Temperature input: 0.1 to 999.9°C or °F (in units of 0.1°C or °F)</td>
<td>Analog input: 0.1% to 999.9% FS (in units of 0.1% FS)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Integral time (I) for cooling</td>
<td>0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) #4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Derivative time (D) for cooling</td>
<td>0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) #4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control period</td>
<td>0.1, 0.2, 0.5, 1 to 99 s (in units of 1 s)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual reset value</td>
<td>0.0 to 100.0% (in units of 0.1%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alarm setting range</td>
<td>-1999 to 9999 (decimal point position depends on input type)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Influence of signal source resistance</td>
<td>Thermodcouple: 0.1°C/°C max. (100 °Lmax.)</td>
<td>Platinum resistance thermomet: 0.1°C/°C max. (10 °Lmax.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insulation resistance</td>
<td>20 MΩ min. (at 500 VDC)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dielectric strength</td>
<td>3,000 VAC, 50/60 Hz for 1 min between terminals of different charge</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vibration</td>
<td>10 to 55 Hz, 20 m/s² for 10 min each in X, Y, and Z directions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shock</td>
<td>10 to 55 Hz, 20 m/s² for 2 hrs each in X, Y, and Z directions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>Controller: Approx. 120 g, Mounting Adapter: Approx. 10 g</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Degree of protection</td>
<td>Front panel: IP66, Rear case: IP20, Terminals: IP00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Memory protection</td>
<td>Non-volatile memory (number of writes: 1,000,000 times)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Setup Tool</td>
<td>CX-Thermo version 4.01 or higher</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Setup Tool port</td>
<td>ESCC-T top panel: An E58-CIFQ2 USB-Serial Conversion Cable is used to connect to a USB port on the computer. #5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standards</td>
<td>Approved standards</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>cULus: UL 61010-1/CSA C22.2 No.61010-1, Korean wireless regulations (Radio law: KC Mark) (Some models only.) #6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conformed standards</td>
<td>EN 61010-1 (IEC 61010-1), RCM</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### EMC

<table>
<thead>
<tr>
<th>EMI: Radiated Interference Electromagnetic Field Strength:</th>
<th>EN 61326-1 #7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise Terminal Voltage:</td>
<td>EN 55011 Group 1, class A</td>
</tr>
<tr>
<td>EMS:</td>
<td>EN 61326-1 #7</td>
</tr>
<tr>
<td>ESD Immunity:</td>
<td>EN 61000-4-2</td>
</tr>
<tr>
<td>Electromagnetic Field Immunity:</td>
<td>EN 61000-4-3</td>
</tr>
<tr>
<td>Burst Noise Immunity:</td>
<td>EN 61000-4-4</td>
</tr>
<tr>
<td>Conducted Disturbance Immunity:</td>
<td>EN 61000-4-6</td>
</tr>
<tr>
<td>Surge Immunity:</td>
<td>EN 61000-4-5</td>
</tr>
<tr>
<td>Voltage Dip/Interrupting Immunity:</td>
<td>EN 61000-4-11</td>
</tr>
</tbody>
</table>

*1. The indication accuracy of K thermocouples in the –200 to 1300°C range, T and N thermocouples at a temperature of –100°C max., and U and L thermocouples at any temperatures is ±2°C ±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 ±3°C max. The indication accuracy of the R and S thermocouples at a temperature of 200°C max. is ±3°C ±1 digit max. The indication accuracy of C/W thermocouples is ±0.3% of PV or ±3°C, whichever is greater) ±1 digit max. The indication accuracy of PL II thermocouples is ±0.3% of PV or ±2°C, whichever is greater) ±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: ±10°C/°C max.

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

*5. External communications (RS-485) and USB-serial conversion cable communications can be used at the same time.

*6. Refer to your OMRON website for the most recent information on applicable models.

*7. Industrial electromagnetic environment (EN/IEC 61326-1 Table 2)
### Program Control

<table>
<thead>
<tr>
<th>Feature</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of programs (patterns)</td>
<td>8</td>
</tr>
<tr>
<td>Number of segments (steps)</td>
<td>32</td>
</tr>
<tr>
<td>Segment setting method</td>
<td>Time setting (Segment set with set point and time.)</td>
</tr>
<tr>
<td></td>
<td>Slope setting (Segment set with segment type, set point, slope, and time.)</td>
</tr>
<tr>
<td>Segment times</td>
<td>0 h 0 min to 99 h 59 min</td>
</tr>
<tr>
<td></td>
<td>0 min 0 s to 99 min 59 s</td>
</tr>
<tr>
<td>Alarm setting</td>
<td>Set separately for each program.</td>
</tr>
<tr>
<td>Reset operation</td>
<td>Select either stopping control or fixed SP operation.</td>
</tr>
<tr>
<td>Startup operation</td>
<td>Select continuing, resetting, manual operation, or run mode.</td>
</tr>
<tr>
<td>PID sets</td>
<td>Number of sets 8</td>
</tr>
<tr>
<td></td>
<td>Setting method Set separately for each program (automatic PID group selection also supported).</td>
</tr>
<tr>
<td>Alarm SP function</td>
<td>Select from ramp SP and target SP.</td>
</tr>
<tr>
<td>Program status control</td>
<td>Segment operation Advance, segment jump, hold, and wait</td>
</tr>
<tr>
<td></td>
<td>Program operation Program repetitions and program links</td>
</tr>
<tr>
<td>Wait operation</td>
<td>Wait method Waiting at segment ends</td>
</tr>
<tr>
<td></td>
<td>Wait width setting Same wait width setting for all programs</td>
</tr>
<tr>
<td>Time signals</td>
<td>Number of outputs 2</td>
</tr>
<tr>
<td></td>
<td>Number of ON/OFF Operations 1 each per output</td>
</tr>
<tr>
<td></td>
<td>Setting method Set separately for each program.</td>
</tr>
<tr>
<td>Program status output</td>
<td>Program end output (pulse width can be set), run output, stage output</td>
</tr>
<tr>
<td>Program startup operation</td>
<td>PV start Select from segment 1 set point, slope-priority PV start</td>
</tr>
<tr>
<td></td>
<td>Standby 0 h 0 min to 99 h 59 min</td>
</tr>
<tr>
<td></td>
<td>0 day 0 h to 99 day 23h</td>
</tr>
<tr>
<td>Operation end operation</td>
<td>Select from resetting, continuing control at final set point, and fixed SP control.</td>
</tr>
<tr>
<td>Program SP shift</td>
<td>Same program SP shift for all programs</td>
</tr>
</tbody>
</table>
USB-Serial Conversion Cable

Applicable OS: Windows XP/Vista/7/8/10
Applicable software: CX-Thermo version 4.61 or higher
Applicable models: E5C-T Series, E5C-T Series, and E5CBB Series
USB interface standard: Conforms to USB Specification 2.0
DTE speed: 38400 bps

Communications Functions

You can use the memory in the PLC to read and write E5C-T parameters, start and reset operation, etc. The E5C-T automatically performs communications with PLCs. No communications programming is required. Number of connected Digital Temperature Controllers: 32 max. (including master).

Component Communications

When Digital Temperature Controllers are connected, set points and RUN/STOP commands can be sent from the Digital Temperature Controller that is set as the master to the Digital Temperature Controllers that are set as slaves.
Slope and offsets can be set for the set point.
Number of connected Digital Temperature Controllers: 32 max. (including master).

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.
Both the programless communications and the component communications support the copying.

Current Transformer (Order Separately) Ratings

<table>
<thead>
<tr>
<th>E54-CT1</th>
<th>E54-CT3</th>
<th>E54-CT1L</th>
<th>E54-CT3L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dielectric strength</td>
<td>1,000 VAC for 1 min</td>
<td>1,500 VAC for 1 min</td>
<td></td>
</tr>
<tr>
<td>Vibration resistance</td>
<td>50 Hz. 98 m/s²</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>E54-CT1: Approx. 11.5 g</td>
<td>E54-CT3: Approx. 50 g</td>
<td>E54-CT1L: Approx. 14 g</td>
</tr>
<tr>
<td>Accessories</td>
<td>E54-CT3 Only</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Heater Burnout Alarms and SSR Failure Alarms

CT input (for heater current detection)
Models with detection for single-phase heaters: One input
Models with detection for single-phase or three-phase heaters: Two inputs

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)
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)
Minimum detection OFF time: 100 ms *4

Life (× 10⁴ operations)

<table>
<thead>
<tr>
<th>E5CC-T</th>
<th>E54-CT1</th>
<th>E54-CT3</th>
</tr>
</thead>
<tbody>
<tr>
<td>10⁴</td>
<td>10⁴</td>
<td>10⁴</td>
</tr>
<tr>
<td>10⁵</td>
<td>10⁵</td>
<td>10⁵</td>
</tr>
<tr>
<td>10⁶</td>
<td>10⁶</td>
<td>10⁶</td>
</tr>
</tbody>
</table>

Electrical Life Expectancy Curve for Relays (Reference Values)
**E5CC-T**

**External Connections**

**E5CC-T**

**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.
5. Use no-voltage inputs for the event inputs. The polarity for non-contact inputs is given in parentheses.

**Isolation/Insulation Block Diagrams**

**Models with 3 Auxiliary Outputs**

**Isolation/Insulation Block Diagrams**

**Models with 3 Auxiliary Outputs**
Nomenclature

E5CC-T

Temperature unit Operation indicators

Press \( \Delta \) Key once to go to Program Setting Level.

Press \( \Delta \) Key for at least 3 seconds to go to Initial Setting Level.

Use the \( \Delta \) Key to change to another parameter.

Press \( \Delta \) and \( \uparrow \) Keys simultaneously for at least 1 second to switch between run and reset status.

Use \( \Delta \) Key to change the digit (default setting).

Press \( \Delta \) Key for at least 1 second when Process value/Set point parameter are displayed in Program SP Mode to go to Display Segment Selection parameter in Program Setting Level.

Use the \( \Delta, \uparrow \) Keys to set the parameter.

Top View of E5CC-T

No. 1 display

No. 2 display

Top-panel Setup Tool port

Use the \( \Delta, \uparrow \) Keys to set the parameter.

PV or specified monitor/setting parameter

SP or specified monitor/parameter value

Dimensions

(Unit: mm)

Controllers

E5CC-T

The Setup Tool port is on the top of the Temperature Controller. It is used to connect the Temperature Controller to the computer to use the Setup Tool.

The E5CIFQ2 USB-Serial Conversion Cable is required to make the connection.

Refer to the instructions that are provided with the USB-Serial Conversion Cable for the connection procedure.

Note: Do not leave the USB-Serial Conversion Cable connected when you use the Temperature Controller.

- 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.
- Use a control panel thickness of 1 to 3 mm if the Y92A-48N and a USB-Serial Conversion Cable are used together.
Accessories (Order Separately)

USB-Serial Conversion Cable
E58-CIFQ2

Terminal Covers

E53-COV17

E53-COV23 (Three Covers provided.)

Waterproof Packing
Y92S-P8 (for DIN 48 × 48)

The Waterproof Packing is provided with the 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 a rough standard.)
Current Transformers

E54-CT1

Thru-current (Io) vs. Output Voltage (Eo)
(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

Thru-current (Io) A (r.m.s.)
**E5CC-T**

**E54-CT3**

**E54-CT3 Accessories**
- **Armature**
  - Approx. 3 dia.
  - 12 dia.
- **Plug**
  - Approx. 6 dia.

**Connection Example**

**Thru-current (Io) vs. Output Voltage (Eo)**

Reference Values

<table>
<thead>
<tr>
<th>E54-CT3 or E54-CT3L</th>
<th>Maximum continuous heater current: 120 A (50/60 Hz)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Maximum continuous heater current for an OMRON Digital Temperature Controller is 50 A.)</td>
</tr>
<tr>
<td></td>
<td>Number of windings: 400±2</td>
</tr>
<tr>
<td></td>
<td>Winding resistance: 8±0.8 Ω</td>
</tr>
</tbody>
</table>

**E54-CT3L**

**E54-CT3L Accessories**
- **Armature**
  - Approx. 3 dia.
  - 12 dia.
- **Plug**
  - Approx. 6 dia.

**Connection Example**

**Thru-current (Io) A (r.m.s.)**

- 1 10 100mA 1 10 100 1,000A

**Output voltage (Eo) V (r.m.s.)**

- 100V

**Frequency**

- Distortion factor 10%
- 100mA
- 10mA
- 1mA
- 100μV
- 100μV
- 100mV
- 1V
- 10V
- 100V
- 1k
- 10k
- 100k
- 1M

**Resistors (Ω)**

- 10Ω
- 22Ω
- 50Ω
- 100Ω
- 500Ω
- 1kΩ
- 10kΩ
- 100kΩ
- 1MΩ
- ∞
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 the E58-CIF02 USB-Serial Conversion Cable if you use the Y92F-45 Adapter. To use the USB-Serial Conversion Cable to make the settings, do so before you mount the Temperature Controller in the panel.
4. You cannot use this Adapter together with the Y92F-49 Adapter that is provided with the E5CC-T Temperature Controller.

Mounted to E5CC-T

DIN Track Mounting Adapter

**Y92F-52**

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

**Note:** This Adapter is used to mount the E5CC-T 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.
**Watertight Cover**
Y92A-48N

**Mounting Adapter**
Y92F-49

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

---

**Protective Cover**
Y92A-48D

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

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

---

**Protective Cover**
Y92A-48H

This Protective Cover is hard type. Please use it for the mis-operation prevention etc.
Programmable Temperature Controller (Digital Controller)

Programmable Controllers Join the E5□C Series!
Program up to 256 segments can handle a wide variety of applications.

- Set up to 8 Programs (Patterns) with 32 Segments (Steps) Each
- A white LCD PV display with a height of approx. 18 mm for the E5EC-T and 25 mm for the E5AC-T improves visibility.
- Tool ports are provided both on the top panel and the front panel. Set up the Controller without wiring the power supply by connecting to the computer with a Communications Conversion Cable (sold separately). Setup is easy with the CX-Thermo (sold separately).
- High-speed sampling at 50 ms.
- Models are available with up to 4 auxiliary outputs, up to 6 event inputs, and a transfer output to cover a wide range of applications.
- Short body with depth of only 60 mm.
- Easy connections to a PLC with programless communications. Use component communications to link Temperature Controllers to each other.
- The new position-proportional control models allow you to control valves as well.

Main I/O Functions

Sensor Input
- Universal input
- Thermocouple
- Pt
- Analog current/voltage

Indication Accuracy
- Thermocouple input: ±0.3% of PV
- Pt input: ±0.2% of PV
- Analog input: ±0.2% of FS

Sampling Period
- 50 ms

Event Inputs
- None
- 2
- 4
- 6

Serial Communications
- None
- RS-485

Control Output 1
- Relay output
- Voltage output (for driving SSR)
- Linear current output

Control Output 2
- Voltage output (for driving SSR)
- Relay output
- Linear current output

Auxiliary Outputs
- 4

Transfer Output
- None
- 1

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□C-T Digital Temperature Controllers Programmable Type User’s Manual (Cat. No. H185)
E5□C-T Digital Temperature Controllers Programmable Type Communications Manual (Cat. No. H186)
Model Number Legend and Standard Models

Models with Screw Terminal Blocks

<table>
<thead>
<tr>
<th>Model</th>
<th>Control outputs 1 and 2</th>
<th>No. of auxiliary outputs</th>
<th>Power supply voltage</th>
<th>Terminal type</th>
<th>Input type</th>
<th>Options</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>E5EC-T</td>
<td>48 x 96 mm Programmable Type</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E5AC-T</td>
<td>96 x 96 mm Programmable Type</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Control output 1 | Control output 2
---|---
RX | Relay output
OX | Voltage output (for driving SSR)
CX | Linear current output
QQ | Voltage output (for driving SSR)
QR | Voltage output (for driving SSR)
RR | Relay output
CC | Linear current output
CO | Linear current output
PR | Position-proportional relay output

4 | 4 (auxiliary outputs 1 and 2 with same common and auxiliary outputs 3 and 4 with same common)
A | 100 to 240 VAC
D | 24 VAC/DC
5 | Screw terminal blocks (with cover)
M | Universal input

*1. The options that can be selected depend on the type of control output.
*2. The linear current output cannot be used as a transfer output.

Heating and Cooling Control

Using Heating and Cooling Control

1. Control Output Assignment
   - If there is no control output 2, an auxiliary output is used as the cooling control output.
   - If there is a control output 2, the two control outputs are used for heating and cooling.
   - (It does not matter which output is used for heating and which output is used for cooling.)

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.
Optional Products (Order Separately)

USB-Serial Conversion Cable

<table>
<thead>
<tr>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>E58-CIFQ2</td>
</tr>
</tbody>
</table>

Communications Conversion Cable

<table>
<thead>
<tr>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>E58-CIFQ2-E</td>
</tr>
</tbody>
</table>

Note: Always use this product together with the E58-CIFQ2. This Cable is used to connect to the front-panel Setup Tool port.

Terminal Covers

<table>
<thead>
<tr>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>E53-COV24 (3pcs)</td>
</tr>
</tbody>
</table>

Note: The Terminal Covers E53-COV24 are provided with the Digital Temperature Controller.

Waterproof Packing

<table>
<thead>
<tr>
<th>Applicable Controller</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>E5EC-T</td>
<td>Y92S-P9</td>
</tr>
<tr>
<td>E5AC-T</td>
<td>Y92S-P10</td>
</tr>
</tbody>
</table>

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

Waterproof Cover

<table>
<thead>
<tr>
<th>Applicable Controller</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>E5EC-T</td>
<td>Y92A-49N</td>
</tr>
<tr>
<td>E5AC-T</td>
<td>Y92A-96N</td>
</tr>
</tbody>
</table>

Front Port Cover

<table>
<thead>
<tr>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y92S-P7</td>
</tr>
</tbody>
</table>

Note: This Front Port Cover is provided with the Digital Temperature Controller.

Mounting Adapter

<table>
<thead>
<tr>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y92F-51 (2pcs)</td>
</tr>
</tbody>
</table>

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

Current Transformers (CTs)

<table>
<thead>
<tr>
<th>Hole diameter</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.8 mm</td>
<td>E54-CT1</td>
</tr>
<tr>
<td>5.8 mm</td>
<td>E54-CT1L²</td>
</tr>
<tr>
<td>12.0 mm</td>
<td>E54-CT3</td>
</tr>
<tr>
<td>12.0 mm</td>
<td>E54-CT3L²</td>
</tr>
</tbody>
</table>

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

CX-Thermo Support Software

<table>
<thead>
<tr>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>EST2-2C-MV4</td>
</tr>
</tbody>
</table>

Note: CX-Thermo version 4.61 or higher is required for the E5EC-T/ E5AC-T.

For the system requirements for the CX-Thermo, refer to information on the EST2-2C-MV4 on the OMRON website (www.ia.omron.com).
### Specifications

#### Ratings

<table>
<thead>
<tr>
<th>Specification</th>
<th>E5EC-T/A in model number: 100 to 240 VAC, 50/60 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating voltage range</td>
<td>85 to 110% of rated supply voltage</td>
</tr>
<tr>
<td>Power supply voltage</td>
<td>A in model number: 100 to 240 VAC, 50/60 Hz</td>
</tr>
<tr>
<td></td>
<td>D in model number: 24 VAC, 24 VDC</td>
</tr>
<tr>
<td>Power consumption</td>
<td>E5EC-T: 8.7 VA max. at 100 to 240 V, and 5.5 VA max. at 24 V</td>
</tr>
<tr>
<td></td>
<td>E5AC-T: 9.0 VA max. at 100 to 240 V, and 5.8 VA max. at 24 V, 34 W max. at 24 V</td>
</tr>
</tbody>
</table>

**Sensor input**

- Platinum resistance thermometer: Pt100 or JPt100
- Infrared temperature sensor (ES1B): 10 to 70°C, 60 to 120°C, 115 to 165°C, or 140 to 260°C
- Analog input: Current input: 4 to 20 mA or 0 to 20 mA
  - Voltage input: 1 to 5 V, 0 to 5 V, or 0 to 10 V

**Input impedance**

- Current input: 150 Ω max., Voltage input: 1 MΩ min. (Use a 1:1 connection when connecting the ES2-HB-N/THB-N.)
- Current input: 100 Ω to 10 kΩ
- Voltage input: 1 MΩ max.

**Control output**

- Relay output: SPST-NO, 250 VAC, 5 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA (reference value)
- Voltage output (for driving SSR): Output voltage: 12 VDC ±20% (PNP), max. load current: 40 mA, with short-circuit protection circuit (The maximum load current is 21 mA for models with two control outputs.)
- Linear current output: 4 to 20 mA DC/0 to 20 mA DC, load: 500 Ω max., resolution: approx. 10,000

**Auxiliary output**

- Number of outputs: 4
- Output specifications: SPST-NO, relay outputs, 250 VAC, Models with 4 outputs: 2 A (resistive load), Electrical life: 100,000 operations, Minimum applicable load: 10 mA at 5 V (reference value)

**Event input**

- Number of inputs: 2, 4 or 6 (depends on model)
- External contact input specifications: 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.
- Current flow: Approx. 7 mA per contact

**Transfer output**

- Number of outputs: 1 (only on models with a transfer output)
- Output specifications: Current output: 4 to 20 mA DC, Load: 500 Ω max., Resolution: Approx. 10,000
  - Linear voltage output: 1 to 5 VDC, load: 1 kΩ min., Resolution: Approx. 10,000

**Potentiometer input**

- 100 Ω to 10 kΩ
- Setting method: Digital setting using front panel keys

**Indication method**

- 11-segment digital display and individual indicators
- Character height: E5EC-T: PV: 18.0 mm, SV: 11.0 mm, MV: 7.8 mm
  - E5AC-T: PV: 25.0 mm, SV: 15.0 mm, MV: 9.5 mm
- Three displays. Contents: PV, SP, program No. and segment No., remaining segment time, or MV (valve opening)
- Numbers of digits: 4 digits

**Bank switching**

- None

**Other functions**

- Manual output, heating/cooling control, loop burnout alarm, 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, protection functions, extraction of square root, MV change rate limit, logic operations, temperature status display, moving average of input value, and display brightness setting
- Ambient operating temperature: −10 to 55°C (with no condensation or icing), For 3-year warranty: −10 to 50°C with standard mounting (with no condensation or icing)
- Ambient operating humidity: 25 to 85%
- Storage temperature: −25 to 65°C (with no condensation or icing)
- Altitude: 2,000 m max.
- Recommended fuse: T2A, 250 VAC, time-lag, low-breaking capacity
- Installation environment: Overvoltage category II, Pollution Degree 2 (EN/IEC/UL 61010-1)
### Input Ranges

#### Thermocouple/Platinum Resistance Thermometer (Universal inputs)

<table>
<thead>
<tr>
<th>Sensor type</th>
<th>Platinum resistance thermometer</th>
<th>Thermocouple</th>
<th>Infrared temperature sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor specification</td>
<td>Pt100</td>
<td>JPt100</td>
<td>K</td>
</tr>
<tr>
<td>Temperature range (°C)</td>
<td>0 to 2300</td>
<td>0 to 1800</td>
<td>0 to 1700</td>
</tr>
<tr>
<td>Set value</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

- **L**: Fe-CuNi, DIN 43710-1985
- **Pt100**: JIS C 1604-1997, IEC 60751
- **U**: Cu-CuNi, DIN 43710-1985
- **C/W**: W5Re/W26Re, JIS C 1602-2015, ASTM E988-1990
- **PL II**: According to Platinel II electromotive force charts from BASF (previously Engelhard)

The applicable standards for the input types are as follows:
- **K, T, E, N, R, S, B**: JIS C 1602-2015, IEC 60584-1
- **L**: Fe-CuNi, DIN 43710-1985
- **Pt100**: JIS C 1604-1997, IEC 60751
- **U**: Cu-CuNi, DIN 43710-1985
- **C/W**: W5Re/W26Re, JIS C 1602-2015, ASTM E988-1990

#### Analog input

<table>
<thead>
<tr>
<th>Input type</th>
<th>Current</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input specification</td>
<td>4 to 20 mA</td>
<td>0 to 20 mA</td>
</tr>
</tbody>
</table>

- **Setting range**: Usable in the following ranges by scaling:
  - -1999 to 9999, -199.9 to 999.9, -19.99 to 99.99 or -1.999 to 9.999

| Setting range | 25 | 26 | 27 | 28 | 29 |
## 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.

<table>
<thead>
<tr>
<th>Set value</th>
<th>Alarm type</th>
<th>Alarm output operation</th>
<th>Description of function</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Alarm function OFF</td>
<td>Output OFF</td>
<td>No alarm</td>
</tr>
<tr>
<td>1</td>
<td>Upper- and lower-limit</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>(default)</td>
<td>Upper-limit</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Lower-limit</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Upper- and lower-limit range</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Upper- and lower-limit with standby sequence</td>
<td>A standby sequence is added to the upper- and lower-limit alarm (1).</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Upper-limit with standby sequence</td>
<td>A standby sequence is added to the upper-limit alarm (2).</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Lower-limit with standby sequence</td>
<td>A standby sequence is added to the lower-limit alarm (3).</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Absolute-value upper-limit</td>
<td>The alarm will turn ON if the process value is larger than the alarm value (X) regardless of the set point.</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Absolute-value lower-limit</td>
<td>The alarm will turn ON if the process value is smaller than the alarm value (X) regardless of the set point.</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Absolute-value upper-limit with standby sequence</td>
<td>A standby sequence is added to the absolute-value upper-limit alarm (8).</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Absolute-value lower-limit with standby sequence</td>
<td>A standby sequence is added to the absolute-value lower-limit alarm (9).</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>LBA (alarm 1 type only)</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>
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
   - Case 1 and 2: Always OFF when the upper-limit and lower-limit hysteresis overlaps.
   - Case 3: Always OFF

3. Set value: 4, Upper- and lower-limit range
   - Case 3 (Always OFF): Always OFF when the upper-limit and lower-limit hysteresis overlaps.

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 E5EC-T Digital Temperature Controllers Programmable Type User's Manual (Cat. No. H185) for information on the operation of the standby sequence.

7. Refer to the E5EC-T Digital Temperature Controllers Programmable Type User's Manual (Cat. No. H185) for information on the loop burnout alarm (LBA). This setting cannot be used with a position-proportional model.

8. Refer to the E5EC-T Digital Temperature Controllers Programmable Type User's Manual (Cat. No. H185) 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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Indication accuracy</strong> (at the ambient temperature of 23°C)</td>
<td>Thermocouple: (±0.3% of indication value or ±1°C, whichever is greater) ±1 digit max. #1 Platinum resistance thermometer: (±0.2% of indication value or ±0.8°C, whichever is greater) ±1 digit max. Analog input: ±0.2% FS ±1 digit max. CT input: ±5% FS ±1 digit max. Potentiometer input: ±5% FS ±1 digit max.</td>
</tr>
<tr>
<td><strong>Transfer output accuracy</strong></td>
<td>±0.3% FS max.</td>
</tr>
<tr>
<td><strong>Influence of temperature #2</strong></td>
<td>Thermocouple input (R, S, B, C/W, PL II): (±1% of indication value or ±10°C, whichever is greater) ±1 digit max.</td>
</tr>
<tr>
<td><strong>Influence of voltage #2</strong></td>
<td>Other thermocouple input: (±1% of indication value or ±4°C, whichever is greater) ±1 digit max. #3 Platinum resistance thermometer: (±1% of indication value or ±2°C, whichever is greater) ±1 digit max. Analog input: ±1%FS ±1 digit max. CT input: ±5% FS ±1 digit max.</td>
</tr>
<tr>
<td><strong>Influence of EMS.</strong> (at EN 61326-1)</td>
<td>Refer to your OMRON website for the most recent information on applicable models.</td>
</tr>
<tr>
<td><strong>Input sampling period</strong></td>
<td>50ms</td>
</tr>
<tr>
<td><strong>Hysteresis</strong></td>
<td>Temperature input: 0.1 to 999.9°C or °F (in units of 0.1°C or °F) Analog input: 0.01% to 99.99% FS (in units of 0.01% FS)</td>
</tr>
<tr>
<td><strong>Proportional band (P)</strong></td>
<td>Temperature input: 0.1 to 999.9°C or °F (in units of 0.1°C or °F) Analog input: 0.1 to 999.9% FS (in units of 0.1% FS)</td>
</tr>
<tr>
<td><strong>Integral time (I)</strong></td>
<td>Standard, heating/cooling, or Position-proportional (Close): 0 to 9999 s (in units of 1 s), 0.0 to 99.9 s (in units of 0.1 s) Position-proportional (Floating): 1 to 9999 s (in units of 1 s), 0.1 to 99.9 s (in units of 0.1 s) #4</td>
</tr>
<tr>
<td><strong>Derivative time (D)</strong></td>
<td>0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) #4</td>
</tr>
<tr>
<td><strong>Proportional band (P) for cooling</strong></td>
<td>Temperature input: 0.1 to 999.9°C or °F (in units of 0.1°C or °F) Analog input: 0.1 to 999.9% FS (in units of 0.1% FS)</td>
</tr>
<tr>
<td><strong>Integral time (I) for cooling</strong></td>
<td>0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) #4</td>
</tr>
<tr>
<td><strong>Derivative time (D) for cooling</strong></td>
<td>0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) #4</td>
</tr>
<tr>
<td><strong>Control period</strong></td>
<td>0.1, 0.2, 0.5, 1 to 99 s (in units of 1 s)</td>
</tr>
<tr>
<td><strong>Manual reset value</strong></td>
<td>0.0 to 100.0% (in units of 0.1%)</td>
</tr>
<tr>
<td><strong>Alarm setting range</strong></td>
<td>-1999 to 9999 (decimal point position depends on input type)</td>
</tr>
<tr>
<td><strong>Influence of signal source resistance</strong></td>
<td>Thermocouple: 0.1°C/Ω max. (100 Ω max.) Platinum resistance thermometer: 0.1°C/Ω max. (10 Ω max.)</td>
</tr>
<tr>
<td><strong>Insulation resistance</strong></td>
<td>20 MΩ min. (at 500 VDC)</td>
</tr>
<tr>
<td><strong>Dielectric strength</strong></td>
<td>3,000 VAC, 50/60 Hz for 1 min between terminals of different charge</td>
</tr>
<tr>
<td><strong>Vibration</strong></td>
<td>Malfunction: 10 to 55 Hz, 20 m/s² for 10 min each in X, Y, and Z directions Resistance: 10 to 55 Hz, 20 m/s² for 2 hrs each in X, Y, and Z directions</td>
</tr>
<tr>
<td><strong>Shock</strong></td>
<td>Malfunction: 100 m/s², 3 times each in X, Y, and Z directions Resistance: 300 m/s², 3 times each in X, Y, and Z directions</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>E5EC-T: Controller: Approx. 210 g, Mounting Adapter: Approx. 4 g × 2 E5AC-T: Controller: Approx. 250 g, Mounting Adapter: Approx. 4 g × 2</td>
</tr>
<tr>
<td><strong>Degree of protection</strong></td>
<td>Front panel: IP66, Rear case: IP20, Terminals: IP00</td>
</tr>
<tr>
<td><strong>Memory protection</strong></td>
<td>Non-volatile memory (number of writes: 1,000,000 times)</td>
</tr>
<tr>
<td><strong>Setup Tool</strong></td>
<td>CX-Thermo version 4.61 or higher</td>
</tr>
<tr>
<td><strong>Setup Tool port</strong></td>
<td>E5EC-T/E5AC-T top panel: An E58-CIFQ2 USB-Serial Conversion Cable is used to connect to a USB port on the computer. #5 E5EC-T/E5AC-T front panel: An E58-CIFQ2 USB-Serial Conversion Cable and E58-CIFQ2-E Conversion Cable are used together to connect to a USB port on the computer. #5</td>
</tr>
<tr>
<td><strong>Standards</strong></td>
<td>Approved standards: cULus: UL 61010-1/CSA C22.2 No.61010-1, Korean wireless regulations (Radio law: KC Mark) (Some models only) #6 Conformed standards: EN 61010-1 (IEC 61010-1), RCM</td>
</tr>
<tr>
<td><strong>EMC</strong></td>
<td>EMI: EN 61326-1 #7 Radiated Interference Electromagnetic Field Strength: EN 55011 Group 1, class A Noise Terminal Voltage: EN 55011 Group 1, class A EMS: EN 61326-1 #7 ESD Immunity: EN 61000-4-2 Electromagnetic Field Immunity: EN 61000-4-3 Burst Noise Immunity: EN 61000-4-4 Conducted Disturbance Immunity: EN 61000-4-6 Surge Immunity: EN 61000-4-5 Voltage Dip/Interrupting Immunity: EN 61000-4-11</td>
</tr>
</tbody>
</table>

*1. The indication accuracy of K thermocouples in the -200 to 1300°C range, T and N thermocouples at a temperature of -100°C max., and U and L thermocouples at any temperatures is ±2°C ±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 ±3°C max. The indication accuracy of the R and S thermocouples at a temperature of 200°C max. is ±3°C ±1 digit max. The indication accuracy of C/W thermocouples is (±0.3% of PV or ±3°C, whichever is greater) ±1 digit max. #2. Ambient temperature: -10°C to 25°C or 55°C, Voltage range: ±15% to 10% of rated voltage #3. K thermocouple at -100°C max.: ±1°C max. #4. The unit is determined by the setting of the Integral/Derivative Time Unit parameter. #5. External communications (RS-485) and USB-serial conversion cable communications can be used at the same time. #6. Refer to your OMRON website for the most recent information on applicable models. #7. Industrial electromagnetic environment (EN/IEC 61326-1 Table 2)
### Program Control

<table>
<thead>
<tr>
<th>Feature</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of programs (patterns)</td>
<td>8</td>
</tr>
<tr>
<td>Number of segments (steps)</td>
<td>32</td>
</tr>
</tbody>
</table>
| Segment setting method               | Time setting (Segment set with set point and time.)  
Slope setting (Segment set with segment type, set point, slope, and time.) |
| Segment times                        | 0 h 0 min to 99 h 59 min                     |
|                                      | 0 min 0 s to 99 min 59 s                     |
| Alarm setting                        | Set separately for each program.             |
| Reset operation                      | Select either stopping control or fixed SP operation. |
| Startup operation                     | Select continuing, resetting, manual operation, or run mode. |
| PID sets                              | Number of sets: 8                           |
|                                      | Setting method: Set separately for each program (automatic PID group selection also supported). |
| Alarm SP function                    | Select from ramp SP and target SP.           |
| Program status control               | Segment operation: Advance, segment jump, hold, and wait |
|                                      | Program operation: Program repetitions and program links |
| Wait operation                       | Wait method: Waiting at segment ends         |
|                                      | Wait width setting: Same wait width setting for all programs |
| Time signals                         | Number of outputs: 2                        |
|                                      | Number of ON/OFF Operations: 1 each per output |
|                                      | Setting method: Set separately for each program. |
| Program status output                | Program end output (pulse width can be set), run output, stage output |
| Program startup operation            | PV start: Select from segment 1 set point, slope-priority PV start |
|                                      | Standby: 0 h 0 min to 99 h 59 min            |
|                                      | 0 day 0 h to 99 day 23h                      |
| Operation end operation              | Select from resetting, continuing control at final set point, and fixed SP control. |
| Program SP shift                     | Same program SP shift for all programs       |
Communications Functions

You can use the memory in the PLC to read and write E5:C-T parameters, start and reset operation, etc. The E5:C-T automatically performs communications with PLCs. No communications programming is required.

Number of connected Digital Temperature Controllers: 32 max.

Special serial connector

USB-Serial Conversion Cable

- Applicable OS: Windows XP/Vista/7/8/10
- Applicable software: CX-Thermo version 4.61 or higher
- Applicable models: E5:C-T Series, E5:C Series, and E5CB Series
- USB interface standard: Conforms to USB Specification 2.0.
- DTE speed: 38400 bps
- Connector specifications: Computer: USB (type A plug) Digital Temperature Controller: Special serial connector
- Power supply: Bus power (Supplied from USB host controller.)
- Power supply voltage: 5 VDC
- Current consumption: 450 mA max.
- Output voltage: 4.7±0.2 VDC
- Output current: 250 mA max.
- Ambient operating temperature: 0 to 55°C (with no condensation or icing)
- Ambient operating humidity: 10% to 80%
- Storage temperature: -20 to 60°C (with no condensation or icing)
- Storage humidity: 10% to 80%
- Altitude: 2,000 m max.
- Weight: Approx. 120 g

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Note: A driver must be installed on the computer. Refer to the Instruction Manual included with the Cable for the installation procedure.

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*: 9600, 19200, 38400, or 57600 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) 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 Default: 20 ms

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

Component Communications

- When Digital Temperature Controllers are connected, set points and RUN/STOP commands can be sent from the Digital Temperature Controller that is set as the master to the Digital Temperature Controllers that are set as slaves.
- Slope and offsets can be set for the set point.
- Number of connected Digital Temperature Controllers: 32 max. (including master)

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.

Both the programless communications and the component communications support the copying.

Current Transformer (Order Separately) Ratings

<table>
<thead>
<tr>
<th>Dielectric strength</th>
<th>E54-CT1</th>
<th>E54-CT3</th>
<th>E54-CT1L</th>
<th>E54-CT3L</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,000 VAC for 1 min</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1,500 VAC for 1 min</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vibration resistance</td>
<td>50 Hz, 98 m/s²</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>E54-CT1: Approx. 11.5 g</td>
<td>E54-CT3: Approx. 50 g</td>
<td>E54-CT1L: Approx. 14 g</td>
<td>E54-CT3L: Approx. 57 g</td>
</tr>
<tr>
<td>Accessories</td>
<td>E54-CT3 Only Armatures (2) Plugs (2)</td>
<td>None</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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) 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) 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 35 ms for a control period of 0.1 s or 0.2 s.

Electrical Life Expectancy Curve for Relays (Reference Values)
**Isolation/Insulation Block Diagrams**

### Models with 4 Auxiliary Outputs

#### Models with 4 Auxiliary Outputs

<table>
<thead>
<tr>
<th>Terminal Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control output 1</td>
<td>Relay output 250 VAC, 5 A (resistive load)</td>
</tr>
<tr>
<td>Auxiliary output 1</td>
<td>Voltage output (for driving SSR)</td>
</tr>
<tr>
<td>Linear current output</td>
<td>Linear current output 0 to 20 mA DC</td>
</tr>
<tr>
<td>Load: 500 Ω max.</td>
<td>Voltage output (for driving SSR)</td>
</tr>
<tr>
<td>Linear current output</td>
<td>Linear current output 0 to 20 mA DC</td>
</tr>
<tr>
<td>Load: 500 Ω max.</td>
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<td>Voltage output (for driving SSR)</td>
</tr>
<tr>
<td>Linear current output</td>
<td>Linear current output 0 to 20 mA DC</td>
</tr>
<tr>
<td>Load: 500 Ω max.</td>
<td>Voltage output (for driving SSR)</td>
</tr>
</tbody>
</table>

#### 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.
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).

---

**Models with 1 Auxiliary Output**

<table>
<thead>
<tr>
<th>Terminal Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control output 1</td>
<td>Relay output 250 VAC, 5 A (resistive load)</td>
</tr>
<tr>
<td>Auxiliary output 1</td>
<td>Voltage output (for driving SSR)</td>
</tr>
<tr>
<td>Linear current output</td>
<td>Linear current output 0 to 20 mA DC</td>
</tr>
<tr>
<td>Load: 500 Ω max.</td>
<td>Voltage output (for driving SSR)</td>
</tr>
<tr>
<td>Relay output</td>
<td>Voltage output (for driving SSR)</td>
</tr>
<tr>
<td>Linear current output</td>
<td>Linear current output 0 to 20 mA DC</td>
</tr>
<tr>
<td>Load: 500 Ω max.</td>
<td>Voltage output (for driving SSR)</td>
</tr>
<tr>
<td>Relay output</td>
<td>Voltage output (for driving SSR)</td>
</tr>
<tr>
<td>Linear current output</td>
<td>Linear current output 0 to 20 mA DC</td>
</tr>
<tr>
<td>Load: 500 Ω max.</td>
<td>Voltage output (for driving SSR)</td>
</tr>
</tbody>
</table>

#### Note:

- Reinforced insulation
- Functional isolation

Note: Auxiliary outputs 1 to 2 and 3 to 4 are not insulated.
Nomenclature

**E5EC-T**

- Front Panel
- Top View of E5EC-T
- Temperature unit
- Operation indicators
- Use the \( \text{M} \) Key to change to another parameter.
- No. 1 display
- PV or specified monitor/parameter
- No. 2 display
- SP or specified monitor/parameter value
- No. 3 display
- Program No., segment No., remaining segment time, or MV (valve opening).
- Use the \( \text{U} \) and \( \text{D} \) Keys to set the parameter.
- Front-panel Setup Tool port
- Press \( \text{O} \) Key for at least 3 seconds to go to Initial Setting Level.
- Operation indicators
- Use the \( \text{O} \) Key once to go to Program Setting Level.
- No. 1 display
- PV or specified monitor/parameter
- No. 2 display
- SP or specified monitor/parameter value
- No. 3 display
- Program No. and segment No., remaining segment time, or MV (valve opening).
- Use the \( \text{O} \) Key to change to another parameter.
- Press the \( \text{S} \) Key to change the digit (default setting).
- Press the \( \text{U} \) Key for at least 1 second when Process value/Set point parameter are displayed in Program SP Mode to go to Display Segment Selection parameter in Program Setting Level.
- Press \( \text{M} \) and \( \text{D} \) Keys simultaneously for at least 1 second to switch between run and reset status.

**E5AC-T**

- Front Panel
- Top View of E5AC-T
- Temperature unit
- Operation indicators
- Use the \( \text{M} \) Key to change the digit (default setting).
- No. 1 display
- PV or specified monitor/parameter
- No. 2 display
- SP or specified monitor/parameter value
- No. 3 display
- Program No. and segment No., remaining segment time, or MV (valve opening).
- Use the \( \text{U} \) or \( \text{D} \) Key to set the parameter.
- Front-panel Setup Tool port
- Press the \( \text{O} \) Key for at least 3 seconds to go to Initial Setting Level.
- No. 1 display
- PV or specified monitor/parameter
- No. 2 display
- SP or specified monitor/parameter value
- No. 3 display
- Program No. and segment No., remaining segment time, or MV (valve opening).
- Use the \( \text{S} \) Key to change the digit (default setting).
- Press the \( \text{M} \) and \( \text{D} \) Keys simultaneously for at least 1 second to switch between run and reset status.
**E5EC-T/E5AC-T**

**Dimensions**

(Unit: mm)

**Controllers**

**E5EC-T**

- **Mounting Adapter** (Accessory, Y92F-51 also available for ordering separately)
- **Waterproof Packing** (Accessory, Y92S-P9 also available for ordering separately)

- **Setup Tool ports** are provided as standard feature. Use these ports to connect a computer to the Digital Temperature Controller. The E58-CIFQ2 USB-Serial Conversion Cable is required to connect to the port on the top panel. The E58-CIFQ2 USB-Serial Conversion Cable and E58-CIFQ2-E Communications Conversion Cable are required to connect to the port on the front panel. (You cannot leave either port connected constantly during operation.)

- **Selections for Control Outputs 1 and 2**: QQ, QR, RR, CC, PR, or CQ. If you also specify 019, 021, 022 for the option selection and use group mounting, the ambient temperature must be 45°C or less. Maintain the following spacing when more than one Digital Controller is installed at an ambient temperature of 55°C.

- **Recommended panel thickness**: 1 to 8 mm.
- **Group mounting is not possible in the vertical direction**. (Maintain the specified mounting space between Controllers.)
- **To mount the Controller so 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.

- **Group Mounted**
  - (48 x number of units − 2.5) + 1.0
  - Group mounting does not allow waterproofing.

- **Mounted Separately**
  - 45° ± 0.5

- **Distances**
  - 48 mm
  - 92° ± 0.5
  - 120 min.
  - 60 min.
- Setup Tool ports are provided as standard feature. Use these ports to connect a computer to the Digital Temperature Controller. The E58-CIFQ2 USB-Serial Conversion Cable is required to connect to the port on the top panel. The E58-CIFQ2 USB-Serial Conversion Cable and E58-CIFQ2-E Communications Conversion Cable are required to connect to the port on the front panel. (You cannot leave either port connected constantly during operation.)

- Recommended panel thickness is 1 to 8 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.
E5EC-T/E5AC-T

Accessories (Order Separately)

USB-Serial Conversion Cable
E58-CIFQ2

Conversion Cable
E58-CIFQ2-E

Connecting to the E58-CIFQ2 USB-Serial Conversion Cable

Note: Always use this product together with the E58-CIFQ2.

Terminal Covers
E53-COV24 (Three Covers provided.)

Waterproof Packing
Y92S-P9 (for DIN 48 × 96)

The Waterproof Packing is provided with the Temperature Controller. Order the Waterproof Packing separately if it becomes lost or damaged. The degree of protection when the Waterproof Packing is used is IP66. Also, keep the Port Cover on the front-panel Setup Tool port of the E5EC-T/E5AC-T securely closed. To maintain an IP66 degree of protection, the Waterproof Packing and the Port Cover for the front-panel Setup Tool port must be periodically replaced because they may deteriorate, shrink, or harden depending on the operating environment. The replacement period will vary with the operating environment. Check the required period in the actual application. Use 3 years or sooner as a guideline.

Setup Tool Port Cover for top panel
Y92S-P7

Order this Port Cover separately if the Port Cover on the front-panel Setup Tool port is lost or damaged. The Waterproof Packing must be periodically replaced because it may deteriorate, shrink, or harden depending on the operating environment.

Mounting Adapter
Y92F-51 (Two Adapters provided.)

One pair is provided with the Controller. Order the Mounting Adapter separately if it becomes lost or damaged.
Current Transformers

**E54-CT1**

- Filler (epoxy)
- Case (PBT)
- Shrinkable tube
- Cable (AWG18)
- Mark (yellow)

**E54-CT1L**

- Cable (AWG18)
- Shrinkable tube
- Case (PBT)
- Mark (yellow)

**Thru-current (Io) vs. Output Voltage (Eo)**

*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

---

**Watertight Cover**

**Y92A-49N (48 × 96)**

**Y92A-96N (96 × 96)**
E54-CT3

Accessories
- Armature
- Plug

Connection Example

E54-CT3L

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

Filler (epoxy)
Case (PBT)
Cable (AWG18)
Setting Levels Diagram

This diagram shows all of the setting levels. To move to the advanced function setting level and calibration level, you must enter passwords. Some parameters are not displayed depending on the protect level setting and the conditions of use. Control stops when you move from the operation level to the initial setting level.

*1. Set the PF Setting parameter to \texttt{a-m} (Auto/Manual).

*2. The No. 1 display will flash when the keys are pressed for 1 s or longer.

*3. Set the PF Setting parameter to \texttt{pf dp} (monitor/setting items).
This diagram shows all of the setting levels. To move to the advanced function setting level and calibration level, you must enter passwords. Some parameters are not displayed depending on the protect level setting and the conditions of use.

1. Set the PF Setting parameter to a-m (Auto/Manual).
2. The No. 1 display will flash when the keys are pressed for 1 s or longer.
3. Set the PF Setting parameter to PFdp (monitor/setting items).

Press \( \ominus \) and \( \ominus \) Keys for at least 1 s.
Press \( \ominus \) Key for less than 1 s.
Press \( \ominus \) Key for at least 1 s.
Press \( \ominus \) and \( \ominus \) Keys for at least 3 s.
Press \( \ominus \) Key for less than 1 s.
Press \( \ominus \) Key for at least 3 s.
Press \( \ominus \) Key for less than 1 s.
Press \( \ominus \) Key for less than 1 s.
Press \( \ominus \) Key for less than 1 s.
The following pages describe the parameters set in each level. Some parameters may not be displayed depending on the model and other settings.
Some parameters may not be displayed depending on the model and other settings.

Starting in manual mode

Press  Key for at least 3 s while R-Off is displayed.

Press  or  Key for at least 1 s.*

Monitor/Setting Item Level

Press  Key for less than 1 s.

Program Setting Level

Press  Key for less than 1 s.

PID Setting Level

Press  Key for less than 1 s.

Adjustment Level

Press  Key for less than 1 s.
Press \( \text{Ctrl} + \) Key for at least 3 s. (The key pressing time can be changed in the Move to Protect Level Time parameter (Advanced Function Setting Level).)

Press \( \text{Ctrl} + \) Key for at least 1 s.

Press \( \text{Ctrl} + \) Key for at least 3 s.

Press \( \text{Ctrl} + \) Key for at least 1 s.

Press \( \text{Ctrl} + \) Key for less than 1 s.

Models with communications only: Changes to settings are applied when the power is cycled or a software reset is performed.

*1 When PF Setting = A-M.
*2 When PF Setting = PFDP.
### Error Displays (Troubleshooting)

When an error occurs, the No. 1 display or No. 2 display shows the error code. Take necessary measure according to the error code, referring to the following table.

<table>
<thead>
<tr>
<th>Display</th>
<th>Name</th>
<th>Meaning</th>
<th>Action</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEPP</td>
<td>Input error</td>
<td>The input value exceeded the control range.* The input type is not set correctly. The sensor is disconnected or short-circuited. The sensor is not wired correctly. The sensor is not wired.</td>
<td>Check the wiring for input to be sure it is wired correctly, not broken, and not shorted. Also check the input type. If there are no problems in the wiring or input type settings, cycle the power supply. If the display remains the same, replace the Digital Temperature Controller. If the display is restored to normal, then the probable cause is external noise affecting the control system. Check for external noise.</td>
<td>After the error occurs and it is displayed, the alarm output will operate as if the upper limit was exceeded. It will also operate as if transfer output exceeded the upper limit. If an input error is assigned to a control output or auxiliary output, the output will turn ON when the input error occurs. The error message will appear in the display for the PV.</td>
</tr>
<tr>
<td>cccc</td>
<td>Display range exceeded</td>
<td>Below -1,999</td>
<td>-</td>
<td>Control continues and operation is normal. The value will appear in the display for the PV. Refer to the E5C Digital Temperature Controllers User’s Manual (Cat. No. H174) or the E5C-T Digital Temperature Controllers Programmable Type User’s Manual (Cat. No. H185) for information on the controllable range.</td>
</tr>
<tr>
<td>dddd</td>
<td>Above 9,999</td>
<td>The PV is displayed for the range that is given on the left (the number without the decimal point).</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>E333</td>
<td>A/D converter error</td>
<td>There is an error in the internal circuits.</td>
<td>After checking the input error, turn the power OFF then back ON again. If the display remains the same, the controller must be repaired. If the display is restored to normal, then a probable cause can be external noise affecting the control system. Check for external noise.</td>
<td>The control outputs, auxiliary outputs, and transfer outputs turn OFF. (A current output will be approx. 0 mA and a linear voltage output will be approx. 0V.)</td>
</tr>
<tr>
<td>E111</td>
<td>Memory error</td>
<td>There is an error in the internal memory operation.</td>
<td>First, cycle the power supply. If the display remains the same, the controller must be repaired. If the display is restored to normal, then a probable cause can be external noise affecting the control system. Check for external noise.</td>
<td>The control outputs, auxiliary outputs, and transfer outputs turn OFF. (A current output will be approx. 0 mA and a linear voltage output will be approx. 0V.)</td>
</tr>
<tr>
<td>FFFF</td>
<td>Overcurrent</td>
<td>This error is displayed when the peak current exceeds 55.0 A.</td>
<td>-</td>
<td>Control continues and operation is normal. The error message will appear for the following displays. Heater Current Value 1 Monitor Heater Current Value 2 Monitor Leakage Current Value 1 Monitor Leakage Current Value 2 Monitor</td>
</tr>
<tr>
<td>EL1</td>
<td>HB or HS alarm</td>
<td>If there is a HB or HS alarm, the No. 1 display will flash in the relevant setting level.</td>
<td>-</td>
<td>The No. 1 display for the following parameter flashes in Operation Level or Adjustment Level. Heater Current Value 1 Monitor Heater Current Value 2 Monitor Leakage Current Value 1 Monitor Leakage Current Value 2 Monitor However, control continues and operation is normal.</td>
</tr>
<tr>
<td>LCR1</td>
<td>Potentiometer Input Error (Position-proportional Models Only)</td>
<td>“-----” will be displayed for the Valve Opening Monitor parameter if any of the following error occurs.</td>
<td>Check for the above errors.</td>
<td>Close control: The control output is OFF or the value that is set for the MV at PV Error parameter is output. Floating control: Operation will be normal.</td>
</tr>
<tr>
<td>LCR2</td>
<td></td>
<td>• Motor calibration has not been performed. • The wiring of the potentiometer is incorrect or broken. • The potentiometer input value is incorrect (e.g., the input is out of range or the potentiometer has failed).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Be sure to read the precautions for all E5□C/E5□C-T models in the website at: http://www.ia.omron.com/

**Warning Indications**

<table>
<thead>
<tr>
<th>CAUTION</th>
<th>Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or in property damage.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precautions for Safe Use</td>
<td>Supplementary comments on what to do or avoid doing, to use the product safely.</td>
</tr>
<tr>
<td>Precautions for Correct Use</td>
<td>Supplementary comments on what to do or avoid doing, to prevent failure to operate, malfunction or undesirable effect on product performance.</td>
</tr>
</tbody>
</table>

**Meaning of Product Safety Symbols**

- Used to warn of the risk of electric shock under specific conditions.
- Used for general prohibitions for which there is no specific symbol.
- Used to indicate prohibition when there is a risk of minor injury from electrical shock or other source if the product is disassembled.
- Used for general CAUTION, WARNING, or DANGER precautions for which there is no specified symbol. (This symbol is also used as the alerting symbol, but shall not be used in this meaning on the product.)
- Used for general mandatory action precautions for which there is no specified symbol.

**CAUTION**

- Do not touch the terminals while power is being supplied. Doing so may occasionally result in minor injury due to electric shock.
- Electric shock may occur. Do not touch any cables or connectors with wet hands.
- Minor electric shock, fire, or malfunction may occasionally occur. Do not allow any metal, conductors, chips from mounting work, or water to enter the interior of the Digital Controller, the Setting Tool port, or between the pins on the Setting Tool cable connector. If you do not use the Setting Tool port on the front panel, close the cover securely so that the above foreign matter does not enter.
- Do not use the Digital Temperature Controller where subject to flammable or explosive gas. Otherwise, minor injury from explosion may occasionally occur.
- Not doing so may occasionally result in fire. Do not allow dirt or other foreign objects to enter the Setup Tool port or ports, or between the pins on the connectors on the Setup Tool cable.

- Minor electric shock or fire may occasionally occur. Do not use any cables that are damaged.
- 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**

1. 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.
2. More than one disconnect switch may be required to de-energize the equipment before servicing the product.
3. Signal inputs are SELV, limited energy. *
4. Caution: To reduce the risk of fire or electric shock, do not interconnect the outputs of different Class 2 circuits. *

- 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.

- Even if you replace only the Main Unit of the E5DC/E5DC-B, check the condition of the Terminal Unit. 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 Unit as well.

- Tighten the terminal screws to the rated torque of between 0.43 and 0.58 Nm. *
- 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.

*1. E5CC, E5EC, E5AC, and E5DC Digital Temperature Controllers that were shipped through November 2013 are UL recognized.
*2. An SELV (separated extra-low voltage) system is one with a power supply that has double or reinforced insulation between the primary and the secondary circuits and has an output voltage of 30 V r.m.s. max. and 42.4 V peak max. or 60 V DC max.
*3. A class 2 circuit is one tested and certified by UL as having the current and voltage of the secondary output restricted to specific levels.
*4. The specified torque is 0.5 N·m for the E5CC-U.
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. Do not handle the Digital Temperature Controller in ways that exceed the ratings.

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.

3. To allow heat to escape, do not block the area around the Digital Temperature Controller.

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

5. Use copper stranded or solid wires to connect bare wires.

Recommended Wire

<table>
<thead>
<tr>
<th>Model</th>
<th>Wire Size</th>
<th>Wire Stripping length</th>
</tr>
</thead>
<tbody>
<tr>
<td>E5CC/E5EC/ESAC/ESDC/E5 DC-T/E5GC (Controllers with Screw Terminal Blocks)</td>
<td>AWG24 to AWG18 (0.21 to 0.82mm²)</td>
<td>6 to 8 mm</td>
</tr>
<tr>
<td>E5GC (Controllers with Screwless Clamp Terminal Blocks)</td>
<td>AWG24 to AWG14 (0.20 to 2.09mm²)</td>
<td>8 to 12 mm</td>
</tr>
<tr>
<td>E5CC-U (Plug-in model)</td>
<td>AWG24 to AWG14 (0.20 to 2.09mm²)</td>
<td>5 to 6 mm</td>
</tr>
<tr>
<td>E5GC (Controllers with Screwless Clamp Terminal Blocks)</td>
<td>0.25 to 1.5mm²</td>
<td>Ferrules used: 10 mm #1 Ferrules not used: 8 mm</td>
</tr>
</tbody>
</table>

#1. Please use Ferrules with UL certification (R/C).

Use the specified size of crimped terminals to wire the E5CC, E5EC, E5AC, E5DC, and E5GC (models with screw terminal blocks) and the E5:C-T and E5CC-U (plug-in models).

Recommended Crimped Terminal Size

<table>
<thead>
<tr>
<th>Model</th>
<th>Wire Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>E5CC/E5EC/ESAC/ESDC/E5:C-T/ E5GC (Controllers with Screw Terminal Blocks)</td>
<td>M3, Width: 5.8 mm max.</td>
</tr>
<tr>
<td>E5GC (Controllers with Screwless Clamp Terminal Blocks)</td>
<td>M3.5, Width: 7.2 mm max.</td>
</tr>
<tr>
<td>E5CC-U (Plug-in model)</td>
<td>M3.5, Width: 7.2 mm max.</td>
</tr>
</tbody>
</table>

For the E5:C-B(Push-In Plus model), connect only one wire to each terminal.

For other models, up to two wires of same size and type, or two crimp terminals, can be inserted into a single terminal.

When connecting two wires to one terminal on an E5GC Digital Temperature Controller with a screwless clamp terminal blocks, use two crimped ferrules with a diameter of 0.8 to 1.4 mm and an exposed conductor length of 8 to 12 mm. #2

#2. The E5GC Digital Temperature Controller with screwless clamp terminal blocks underwent UL testing with one braided wire connected.

6. Do not wire the terminals that are not used.

7. Use a commercial power supply for the power supply voltage input to a Digital Temperature Controller with AC input specifications. Do not use the output from an inverter as the power supply.

8. To avoid inductive noise, keep the wiring for the product’s terminal block away from power cables carrying 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.

9. 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 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.

10. 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.

11. Make sure that the Digital 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.

12. When executing self-tuning with E5:C, 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.

13. 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.

14. Use a soft and dry cloth to clean the product carefully. Do not use organic solvent, such as paint thinner, benzine or alcohol to clean the product.

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 you move to the initial setting level. Take this into consideration when performing control operations.

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 Digital Temperature Controller to discharge static electricity from your body.


20. For compliance with Lloyd’s standards, the E5CC, E5CC-B, E5EC-B, E5EC-U, E5EC, E5AC, and E5DC must be installed under the conditions that are specified in Shipping Standards.

21. For the Digital Temperature Controller with two Setup Tool ports (E5EC/E5EC-B/E5AC/E5DC/E5DC-B/E5GC), do not connect cables to both ports at the same time. The Digital Temperature Controller may be damaged or may malfunction.

22. 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. The Digital Temperature Controller may be damaged.
23. Do not disconnect the Communications Conversion Cable or the USB-Serial Conversion Cable while communications are in progress. Damage or malfunction may occur.

24. Do not touch the external power supply terminals or other metal parts on the Digital Temperature Controller.

25. Do not exceed the communications distance that is given in the specifications and use the specified communications cable. Refer to the E5□/C Digital Temperature Controllers User’s Manual (Cat. No. H174) for information on the communications distances and cables for the E5□/C.


26. Do not leave the communications cables past their natural bending radius. Do not pull on the communications cables.

27. Do not turn the power supply to the Digital Temperature Controller ON or OFF while the USB-Serial Conversion Cable is connected. The Digital Temperature Controller may malfunction.

28. Make sure that the hooks on the top and bottom are securely engaged with the case.

29. Check for any corrosion on the terminals.

30. Noise may enter on the USB-Serial Conversion Cable, possibly causing equipment malfunctions. Do not leave the USB-Serial Conversion Cable connected to the equipment.

31. For the E5DC/E5DC-B, when you attach the Main Unit to the Terminal Unit, make sure that the hooks on the Main Unit are securely inserted into the Terminal Unit.

32. For the E5CC-U, when you attach the Main Unit to the socket, make sure that the hooks on the socket are securely inserted into the Main Unit.

33. Install the DIN Track vertically to the ground.

34. For the E5DC/E5DC-B, always turn OFF the power supply before connecting the Main Unit to or disconnecting the Main Unit from the Terminal Unit, and never touch nor apply shock to the terminals or electronic components. When connecting or disconnecting the Main Unit, do not allow the electronic components to touch the case.

35. Observe the following precautions when you remove the terminal block or pulling out the interior of the product of the E5GC.

• Always follow the instructions provided in the E5□/C Digital Temperature Controllers User’s Manual (Cat. No. H174).

• Turn OFF the power supply before you start and never touch nor apply shock to the terminals or electric components. When you insert the interior body of the Digital Temperature Controller, do not allow the electronic components to touch the case.

• Check for any corrosion on the terminals.

• When you insert the interior body into the rear case, confirm that the hooks on the top and bottom are securely engaged with the case.

36. Observe the following precautions when you wire the E5□/C-B.

• Always follow the wiring instructions provided in Wiring Precautions for E5□/C-B (Controllers with Push-In Plus Terminal Blocks) on page 133.

• Do not wire anything to the release holes.

• Do not tilt or twist a flat-blade screwdriver while it is inserted into a release hole on the terminal block. The terminal block may be damaged.

• Insert a flat-blade screwdriver into the release holes at an angle. The terminal block may be damaged if you insert the screwdriver straight in.

• Do not allow the flat-blade screwdriver to fall out while it is inserted into a release hole.

• Do not bend a wire past its natural bending radius or pull on it with excessive force. Doing so may cause the wire to break.

• Do not use crossover wiring except for the input power supply and communications.

• Do not use crossover wiring for the E5CC-B/ESEC-B except for the input power supply and communications. Do not use crossover wiring for the E5DC-B.

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**Shipping Standards**

The E5CC, E5CC-B, E5CC-U, E5EC, E5EC-B, E5AC, and E5DC comply with Lloyd’s standards. When applying the standards, the following installation requirements must be met in the application. Also insert the Waterproof Packing on the backside of the front panel.

**Application Conditions**

**Installation Location**

The E5CC, E5CC-B, E5CC-U, E5EC, E5EC-B, E5AC, and E5DC comply with installation category ENV1 and ENV2 of Lloyd’s standards. Therefore, they must 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.

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**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 Digital 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 Digital Temperature Controller.

3. When two or more Digital 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 Digital 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 Digital 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 (Not applicable to the E5CC-U/E5DC/E5DC-B.)
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
When waterproofing is required, insert the Waterproof Packing on the backside of the front panel. Keep the Port Cover on the front-panel Setup Tool port of the ESEC/ESEC-B/E5AC/E5AC-T/E5AC-T securely closed. The degree of protection when the Waterproof Packing is used is IP66. To maintain an IP66 degree of protection, the Waterproof Packing and the Port Cover for the front-panel Setup Tool port must be periodically replaced because they may deteriorate, shrink, or harden depending on the operating environment. The replacement period will vary with the operating environment. Check the required period in the actual application. Use 3 years or sooner as a guideline.

Operating Precautions
1. When using self-tuning, turn ON power for the load (e.g., heater) at the same time as or before supplying power to the Digital Temperature Controller. If power is turned ON for the Digital Temperature Controller before turning ON power for the load, self-tuning will not be performed properly and optimum control will not be achieved.
When starting operation after the Digital 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 Digital Temperature Controller OFF and ON again, switching from STOP mode to RUN mode can also be used.)
2. Avoid using the Digital Temperature 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. Do not Connect or disconnect the Conversion Cable connector repeatedly over a short period of time. The computer may malfunction.
2. 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.
3. Do not connect the Conversion Cable through a USB hub. Doing so may damage the Conversion Cable.
4. Do not use an extension cable to extend the Conversion Cable length when connecting to the computer. Doing so may damage the Conversion Cable.

Wiring
When linking the units together, connect the power cable only to the unit at the left end of the linkage block. Incorrect wiring can be shorted inside the unit resulting in damage to the unit. Do not perform crossover wiring between each linkage block, or to another device. This could result in a breakdown or incorrect operation.

Operating Precautions
1. For waterproof mounting, waterproof packing must be installed on the Digital Temperature Controller. Waterproofing is not possible when group mounting several Digital Temperature Controllers.
2. Insert the E5GC into the mounting hole in the panel.
3. Use two Mounting Adapters, either on the top and bottom or on the right and left.
4. Push the Adapters from the terminals up to the panel, and temporarily fasten the E5GC.
5. 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.
There are two models of Terminal Covers that you can use with the E5CC/E5CC-T.

- **E5CC-U**
  For the Wiring Socket for the E5CC-U, purchase the P2CF-11 or PG3A-11 separately.

1. For waterproof mounting, waterproof packing must be installed on the Digital Temperature Controller. Waterproofing is not possible when group mounting several Digital Temperature Controllers. The E5CC-U cannot be waterproofed even if the Waterproof Packing is inserted.
2. Insert the E5CC/E5CC-B/E5CC-U/E5CC-T into the mounting hole in the panel.
3. Push the adapter from the terminals up to the panel, and temporarily fasten the E5CC/E5CC-B/E5CC-U/E5CC-T.
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.

**E5DC/E5DC-B**

1. Insert the E5DC/E5DC-B into the mounting hole in the panel.
2. Push the Adapter from the Terminal Unit up to the panel, and temporarily fasten the E5DC/E5DC-B.
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.

**E5EC/E5EC-B/E5AC/E5EC-T/E5AC-T**

1. For waterproof mounting, waterproof packing must be installed on the Digital Temperature Controller. Waterproofing is not possible when group mounting several Digital Temperature Controllers.
2. Insert the E5EC/E5EC-B/E5AC/E5EC-T/E5AC-T into the mounting hole in the panel.
3. Push the adapter from the terminals up to the panel, and temporarily fasten the E5EC/E5EC-B/E5AC/E5EC-T/E5AC-T.
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.

**E5EC Mounting to and Removing from DIN Track**

- **Mounting a Unit**
  Pull down the DIN Track hook on the Terminal Unit and catch the top hook on the DIN Track. Press the Unit onto the DIN Track until the DIN Track hooks are locked in place.

- **Removing a Unit**
  Pull down the DIN Track Hook with a flat-blade screwdriver and lift up the Unit.


**Removing the Main Unit**
Press in the two hooks on the Main Unit and remove the Main Unit from the Terminal Unit.

**End Plate Installation**
Make sure to attach PFP-M End Plates to the ends of the Units.

**E5DC-B**

**Mounting to and Removing from DIN Track**
- **Mounting a Unit**
  Mount the Main Unit after first mounting the Terminal Unit on the DIN Track.
  1. Pull down the hook.
  2. Catch the top hook on the DIN Track.
  3. Press the Unit onto the DIN Track.
  4. Make sure that the hooks are locked in place.

- **Removing a Unit**
  Pull down on the DIN Track Hook with a flat-blade screwdriver and lift up the Unit.

**Mounting to a DIN Track in Connection**
1. Remove the connector cover on the side to use for connecting to another terminal unit, and attach the unit to the DIN Track.
2. Connect the terminal unit connector to the next unit.
3. Wire the terminal units.
4. Insert the main units into the terminal units.
Removing from the DIN Track
1. Remove the Main Unit from the Terminal Unit.
2. Remove the Terminal Units.
3. Remove the Terminal Units from the DIN Track.

Mounting to a Panel in Connection
1. Insert the main unit into the mounting hole in the panel.
2. Mount the previously rewired terminal unit to the main unit.
3. Push the adapter from the terminal unit side until it comes into contact with the panel to temporarily secure the unit, and then 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.
4. On the wired terminal unit, remove the connector cover on the side to use for connection to another terminal unit, and then connect the units together.

Removing from the Mounting Panel
1. Remove the Adapter attached to the Main Unit.
2. Push the adapter from the terminal unit side until it comes into contact with the panel to temporarily secure the unit, and then 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.
2. Remove the Main Unit from the Terminal Unit.

3. Remove the Terminal Units.

**Removing the Connector Cover E5DC-B**
1. For both male and female covers, insert the tip of a flat-blade screwdriver into the cutout on the connector cover to remove the connector cover.

**Attaching the Connector Cover E5DC-B**

For male connector covers
1. Press on the connector cover until it clicks into place. There is no vertical direction for male connector covers.

For female connector covers
1. Insert the projecting part on the female connector cover into the groove on the terminal unit.
2. Press on the female connector cover until it clicks into place in the cutout.

**Mounting the DIN Track**
Attach the DIN Track to the inside of the control panel with screws to at least three locations.
- DIN Track (sold separately)
  - PFP-50N (50 cm) and PFP-100N (100 cm)

Install the DIN Track vertically to the ground.

Vertical: OK
Horizontal: NG
Mounting the Terminal Cover
E5CC/E5CC-T
Slightly bend the E53-COV23 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. E53-COV17 Terminal Cover can be also attached.
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 Digital Temperature Controller.

E5CC/E5AC/E5EC-T/E5AC-T
Slightly bend the E53-COV24 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.

Attaching the End Cover
E5DC/E5DC-B
1. Install the E5DC/E5DC-B in a panel.
2. Peel off the release paper from the double-sided tape on the End Cover.
3. Align the tabs on the End Cover with the depressions on the E5DC/E5DC-B and attach the End Cover.
4. Secure the End Cover so that the double-sided tape is firmly attached.
Removing the Digital Temperature Controller from the case
E5GC
You can use the Y92F-55 Draw-out Jig to remove the interior body of the Digital Temperature Controller from the case to perform maintenance without removing the terminal wiring. This is possible only for the E5GC. Check the specifications of the case and Digital Temperature Controller before removing the Digital Temperature Controller from the case.

1. Draw out the interior body from the rear case.
   1. Slowly insert the Draw-out Jig into the Draw-out Jig insertion holes laterally until it clicks into place. (There is a hole at both the top and bottom.) (If you attempt to draw out the interior body of the Digital Controller when only one hook is engaged, the Digital Controller may be damaged.)
   2. Pull out the Draw-out Jig together with the front panel. Do not pull with excessive force. Slowly pull out the Digital Controller laterally. (If you pull the interior body out at an angle, the Digital Controller may be damaged.)
   3. After the interior body is free from the rear case, support the interior body with one hand and draw it out slowly in a horizontal direction.

2. Insert the new interior body into the rear case.
   1. When inserting the interior body back into the rear case, make sure the PCBs are parallel to each other, mount the sealing rubber, and press the interior body toward the rear case and into position, making sure that the sealing rubber does not move.
   2. When you press the Digital Controller into position, press down on the rear case hooks so that the case hooks securely lock in place. (There are rear case hooks at both the top and bottom of the rear case.) If the Digital Controller is not correctly mounted into the rear case, the rear case may not be waterproof. When inserting the Digital Controller, do not allow the electronic components to touch the rear case.

Precautions when Wiring
- Separate input leads and power lines in order to prevent external noise.
- Use crimp terminals when wiring the screw terminal blocks.
- Use the suitable wiring material and crimp tools for crimp terminals.
- Tighten the terminal screws to a torque of 0.43 to 0.58 N·m. The specified torque is 0.5 N·m for the E5CC-U.

E5CC/E5EC/E5AC/E5DC/E5GC (Controllers with Screw Terminal Blocks) and E5CC-U (Plug-in model)

Wire Size
Use the wire sizes and stripping lengths given in the following table.

<table>
<thead>
<tr>
<th>Model</th>
<th>Wire Size</th>
<th>Stripping length</th>
</tr>
</thead>
<tbody>
<tr>
<td>E5CC/E5EC/E5AC/E5DC/E5GC</td>
<td>AWG24 to AWG18 (0.21 to 0.82 mm²)</td>
<td>6 to 8 mm (without crimp terminals)</td>
</tr>
<tr>
<td>E5CC-U</td>
<td>AWG24 to AWG14 (0.21 to 2.08 mm²)</td>
<td>5 to 6 mm (without crimp terminals)</td>
</tr>
</tbody>
</table>

- If you use crimp terminals, use the stripping length that is recommended by the manufacturer of the crimp terminals.
- To reduce the affects of noise, use shielded twisted-pair cable for the signal lines.
Crimp Terminal
For the E5CC/E5EC/E5AC/E5DC/E5GC (Controllers with Screw Terminal Blocks) or E5C-T, use the following types of crimp terminals for M3 screws.

Although you can connect two crimp terminals with insulation sleeves to one terminal, you cannot do so if the diameter of the insulation sleeves is too large. Select a crimp terminal that can be tightened as shown below. (Excluding the E5CC-U)

**E5CC, E5EC, E5AC, or E5C-T**

**E5GC or E5DC**

*Note: Be careful in the tightening direction, as the terminal block is at an angle.*

Some terminal blocks have a large crimp part. In this case, bend the terminal in advance as shown in the figure, and tighten slowly to ensure that the terminal screw is vertical to the terminal surface of the terminal block.

For the E5CC-U, use the following types of crimp terminals for M3.5 screws.

- If you use crimp terminals for the E5DC, use crimp terminals with insulation sleeves. If you use a bare crimp terminal with no insulation, the terminal may short with the terminal above or below it. If you use bare crimp terminals, cover the crimped sections with insulating marking tubes. Secure the marking tubes so that they do not move.

**Recommended Crimp Terminals with Insulation Sleeves for the E5DC**

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Model number</th>
</tr>
</thead>
<tbody>
<tr>
<td>J.S.T. Mfg. Co.</td>
<td>V1.25-B3A</td>
</tr>
<tr>
<td></td>
<td>V0.5-3A</td>
</tr>
</tbody>
</table>

E5GC (Controllers with Screwless Clamp Terminal Blocks)

1. **Connection Method for Screwless Clamp Terminals**
The same method is used to connect stranded wires, solid wires, and ferrules.

**Part Names of the Terminal Block**

<table>
<thead>
<tr>
<th>Pusher</th>
<th>Terminal (Insertion) hole</th>
</tr>
</thead>
</table>

**Connection Method**

1. Press the pusher with a flat-blade screwdriver.
2. With the screwdriver still pressing the pusher, insert the wire into the terminal (Insertion) hole.
3. Remove the flat-blade screwdriver from the pusher.

**Checking Connections**

- After insertion, pull gently on the wire to make sure that it will not come out (i.e., to confirm that it is held by the terminal block).

2. **Removal Method for Screwless Clamp Terminals**
The same method is used to remove stranded wires, solid wires, and ferrules.

1. Press the pusher with a flat-blade screwdriver.
2. With the screwdriver still pressing the pusher, pull the wire out of the terminal (Insertion) hole.
3. Remove the flat-blade screwdriver from the pusher.
### 3. Recommended Wire Size and Ferrules

#### Wire Size
Use the wire sizes and stripping lengths given in the following table.

<table>
<thead>
<tr>
<th>Wire Size</th>
<th>Stripping length</th>
</tr>
</thead>
<tbody>
<tr>
<td>AWG24 to AWG18</td>
<td>8 to 12 mm</td>
</tr>
<tr>
<td>(0.21 to 0.82 mm²)</td>
<td></td>
</tr>
</tbody>
</table>

#### Ferrules
Ferrules must be 0.8 to 1.4 mm in diameter. The exposed conductor inserted into the terminal must be 8 to 12 mm in length.

#### Recommended ferrules

<table>
<thead>
<tr>
<th>Manufacturer name</th>
<th>Model number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Altech Corp.</td>
<td>2623.0</td>
</tr>
<tr>
<td>Daido Solderless Terminal Mfg. Co.</td>
<td>AVA-0.5</td>
</tr>
<tr>
<td>J.S.T. Mfg. Co.</td>
<td>TUB-0.5</td>
</tr>
<tr>
<td>Nichifu Co., Ltd.</td>
<td></td>
</tr>
<tr>
<td>Single (1 wire)</td>
<td>TGNTC-1.25-9T</td>
</tr>
<tr>
<td></td>
<td>TGVTC-1.25-11T</td>
</tr>
<tr>
<td></td>
<td>TGNTC-1.25-11T</td>
</tr>
<tr>
<td></td>
<td>TG0-3-9.5</td>
</tr>
<tr>
<td></td>
<td>TC1.25-11S-ST</td>
</tr>
<tr>
<td></td>
<td>TC1.25-11S</td>
</tr>
<tr>
<td></td>
<td>TC2-11S</td>
</tr>
<tr>
<td>Double (2 wires)</td>
<td>TGWVTC-1.25-9T</td>
</tr>
<tr>
<td></td>
<td>TGWVT-1.25-11T</td>
</tr>
</tbody>
</table>

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### E5□□C-B (Controllers with Push-In Plus Terminal Blocks)

#### 1. Connecting Wires to the Push-In Plus Terminal Block

**Part Names of the Terminal Block**

- **E5CC-B/EC-B**
- **E5DC-B**

**Connecting Wires with Ferrules and Solid Wires**
Insert the solid wire or ferrule straight into the terminal block until the end touches the terminal block.

**E5CC-B/EC-B**
- Terminal hole
- (Insertion) hole

**E5DC-B**
- Terminal hole
- Release hole

If a wire is difficult to connect because it is too thin, use a flat-blade screwdriver in the same way as when connecting stranded wire.

#### Connecting Stranded Wires
Use the following procedure to connect the wires to the terminal block.

1. Hold a flat-blade screwdriver at an angle and insert it into the release hole. The angle should be between 10° and 15°. If the flat-blade screwdriver is inserted correctly, you will feel the spring in the release hole.
2. With the flat-blade screwdriver still inserted into the release hole, insert the wire into the terminal hole until it strikes the terminal block.
3. Remove the flat-blade screwdriver from the release hole.

#### Checking Connections
- After the insertion, pull gently on the wire to make sure that it will not come off and the wire is securely fastened to the terminal block.
- To prevent short circuits, insert stripped part of a stranded or solid wire or the conductor part of a ferrule until it is hidden inside the terminal insertion hole. (See the following diagram.)
2. Removing Wires from the Push-In Plus Terminal Block
Use the following procedure to remove wires from the terminal block. The same method is used to remove stranded wires, solid wires, and ferrules.

1. Hold a flat-blade screwdriver at an angle and insert it into the release hole.
2. With the flat-blade screwdriver still inserted into the release hole, remove the wire from the terminal insertion hole.
3. Remove the flat-blade screwdriver from the release hole.

E5CC-B/EC-B

Flat-blade screwdriver

10 to 15°

3. Recommended Ferrules and Crimp Tools
Recommended ferrules

<table>
<thead>
<tr>
<th>Applicable wire (mm²)</th>
<th>Ferrule Conductor length (mm)</th>
<th>Recommended ferrules</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.25</td>
<td>24</td>
<td>A10.25-8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>H0.25/12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FE-0.25-8N-YE</td>
</tr>
<tr>
<td>0.34</td>
<td>22</td>
<td>A10.34-8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>H0.34/12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FE-0.34-8N-TQ</td>
</tr>
<tr>
<td>0.5</td>
<td>20</td>
<td>A10.5-8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>H0.5/14</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FE-0.5-8N-WH</td>
</tr>
<tr>
<td>0.75</td>
<td>18</td>
<td>A10.75-8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>H0.75/14</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FE-0.75-8N-GY</td>
</tr>
<tr>
<td>1</td>
<td>18</td>
<td>A11-8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>H1.0/14</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FE-1.0-8N-RD</td>
</tr>
<tr>
<td>1.5</td>
<td>16</td>
<td>A11.5-8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>H1.5/14</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FE-1.5-8N-BK</td>
</tr>
</tbody>
</table>

Recommended crimp tool

<table>
<thead>
<tr>
<th>Model</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESD 0.4x2.5</td>
<td>Wera</td>
</tr>
<tr>
<td>SZS 0.4x2.5</td>
<td>Phoenix Contact</td>
</tr>
<tr>
<td>SZF 0-0,4x2.5</td>
<td>Phoenix Contact</td>
</tr>
<tr>
<td>0.4x2.5x75 302</td>
<td>Wiha</td>
</tr>
<tr>
<td>AEF.2,5x75</td>
<td>Facom</td>
</tr>
<tr>
<td>210-719</td>
<td>Wago</td>
</tr>
<tr>
<td>SDIS 0.4x2.5x75</td>
<td>Weidmuller</td>
</tr>
<tr>
<td>9900 (-2.5x75)</td>
<td>Vessel</td>
</tr>
</tbody>
</table>

Note: 1. Make sure that the outer diameter of the wire coating is smaller than the inner diameter of the insulation sleeve of the recommended ferrule.
2. Make sure that the ferrule processing dimensions conform to the following figures.
Three-year Guarantee

Period of Guarantee
The guarantee period of the Unit is three years starting from the date the Unit is shipped from the factory.

Scope of Guarantee
The Unit is guaranteed under the following operating conditions.
1. Average Operating Temperature
   (see note): −10°C to 50°C
   (Mounted to panel or DIN Track.)

Example: Mounted to Panel

Note: Average Operating Temperature
Refer to the process temperature of the Unit mounted to a control panel and connected to peripheral devices on condition that the Unit is in stable operation, sensor input type K is selected for the Unit, the positive and negative thermocouple input terminals of the Unit are short-circuited, and the ambient temperature is stable.

Should the Unit malfunction during the guarantee period, OMRON shall repair the Unit or replace any parts of the Unit at the expense of OMRON.
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