
- Indication Accuracy
  Thermocouple input: ±0.3% of PV (previous models: ±0.5%)
  Pt input: ±0.2% of PV (previous models: ±0.5%)
  Analog input: ±0.2% FS (previous models: ±0.5%)
- New E5CN-U Models (Plug-in Models) with analog inputs and current outputs.
- A PV/SV-status display function can be set to automatically alternate between displaying the status of the Temperature Controller (auto/manual, RUN/STOP, and alarms) and the PV or SV.
- Preventive maintenance for relays in the Temperature Controller using a Control Output ON/OFF Counter.

Main I/O Functions

- Event Inputs
  - None
  - Two
- Sensor Inputs
  - Universal thermocouple/Pt inputs (Models with temperature inputs)
  - Analog current/voltage inputs (Models with analog inputs)
- Indication Accuracy
  - Thermocouple input: ±0.3% of PV
  - Pt input: ±0.2% of PV
  - Analog input: ±0.2% FS
- Sampling Period
  - 250 ms
- Control Output 1
  - Relay output
  - Voltage output (for driving SSR)
  - Current output
  - Long-life relay output (hybrid)
- Control Output 2
  - None
  - Voltage output (for driving SSR)
- Auxiliary Outputs
  - None
  - One
  - Two
- 2-level Display: PV and SV
- 4-digit Display
- Auto/manual switching
- Temperature Controller status display
- Simple program function
- Control output ON/OFF count alarm
- PV change rate alarm
- Models also available with RS-485 communications

This data sheet is provided as a guideline for selecting products. Be sure to refer to the following user manuals for application precautions and other information required for operation before attempting to use the product.

- E5CN/E5AN/E5EN/E5GN Digital Temperature Controllers User's Manual Basic Type (Cat. No. H156)
- E5CN/E5AN/E5EN/E5GN Digital Temperature Controllers Communications Manual Basic Type (Cat. No. H158)
Note: Models with one control output and one or two auxiliary outputs and models with two control outputs can be used for heating/cooling control.

Model Number Structure

**Model Number Legend**

**Controllers**

E5CN-[M]+[a]-500

1. Control Output 1
   - R: Relay output
   - Q: Voltage output (for driving SSR)
   - C: Current output
   - Y: Long-life relay output (hybrid) *1

2. Auxiliary Outputs 2
   - Blank: None
   - 2: Two outputs

3. Option
   - M: Option Unit can be mounted.

4. Input Type
   - T: Universal thermocouple/platinum resistance thermometer
   - L: Analog current/voltage input

5. Power Supply Voltage
   - Blank: 100 to 240 VAC
   - D: 24 VAC/VDC

6. Case Color
   - Blank: Black
   - W: Silver

7. Terminal Cover
   - -500: With terminal cover

**Option Units**

E53-CN-@@@@

1. Applicable Controller
   - CN: E5CN or E5CN-H

2. Function 1
   - Blank: None
   - Q: Control output 2 (voltage for driving SSR)
   - P: Power supply for sensor

3. Function 2
   - Blank: None
   - H: Heater burnout/SSR failure/Heater overcurrent detection (CT1)
   - HH: Heater burnout/SSR failure/Heater overcurrent detection (CT2)
   - B: Two event inputs
   - 03: RS-485 communications
   - H03: Heater burnout/SSR failure/Heater overcurrent detection (CT1) + RS-485 communications
   - HB: Heater burnout/SSR failure/Heater overcurrent detection (CT1) + Two event inputs
   - HH03: Heater burnout/SSR failure/Heater overcurrent detection (CT2) + RS-485 communications

4. Version
   - N2: Applicable only to models released after January 2008

Note: 1. Not all combinations of function 1 and function 2 specifications are possible for Option Units (E53-@@@-@@@).
2. Estimates can be provided for coatings and other specifications that are not given in the datasheet. Ask your OMRON representative for details.
*1. Always connect an AC load to a long-life relay output. The output will not turn OFF if a DC load is connected because a triac is used for switching the circuit. For details, check the conditions in Ratings.
*2. Auxiliary outputs are contact outputs that can be used to output alarms or results of logic operations.
# Ordering Information

## Controllers with Terminal Blocks

<table>
<thead>
<tr>
<th>Size</th>
<th>Case color</th>
<th>Power supply voltage</th>
<th>Input type</th>
<th>Auxiliary outputs</th>
<th>Control output 1</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/16 DIN</td>
<td>Black</td>
<td>100 to 240 VAC</td>
<td>Thermocouple or Resistance thermometer</td>
<td>None</td>
<td>Relay output</td>
<td>E5CN-RMT-500</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Voltage output (for driving SSR)</td>
<td>E5CN-QMT-500</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Current output</td>
<td>E5CN-CMT-500</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24 VAC/VDC</td>
<td>Thermocouple or Resistance thermometer</td>
<td>None</td>
<td>Relay output</td>
<td>E5CN-RMTD-500</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Voltage output (for driving SSR)</td>
<td>E5CN-QMTD-500</td>
</tr>
<tr>
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<td>Current output</td>
<td>E5CN-CMTD-500</td>
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<tr>
<td></td>
<td></td>
<td>100 to 240 VAC</td>
<td>Analog (current/voltage)</td>
<td>None</td>
<td>Relay output</td>
<td>E5CN-RML-500</td>
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<tr>
<td></td>
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<td></td>
<td>Voltage output (for driving SSR)</td>
<td>E5CN-QML-500</td>
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<td>Current output</td>
<td>E5CN-CML-500</td>
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<td></td>
<td></td>
<td>24 VAC/VDC</td>
<td>Analog (current/voltage)</td>
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<td>Relay output</td>
<td>E5CN-RMLD-500</td>
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<td>Voltage output (for driving SSR)</td>
<td>E5CN-QMLD-500</td>
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<td>Current output</td>
<td>E5CN-CMLD-500</td>
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<tr>
<td></td>
<td>Silver</td>
<td>100 to 240 VAC</td>
<td>Thermocouple or Resistance thermometer</td>
<td>None</td>
<td>Relay output</td>
<td>E5CN-RMT-W-500</td>
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<tr>
<td></td>
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<td></td>
<td>Voltage output (for driving SSR)</td>
<td>E5CN-QMT-W-500</td>
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<td>Current output</td>
<td>E5CN-CMT-W-500</td>
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<tr>
<td></td>
<td></td>
<td>24 VAC/VDC</td>
<td>Thermocouple or Resistance thermometer</td>
<td>2</td>
<td>Relay output</td>
<td>E5CN-RMT-W-500</td>
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<tr>
<td></td>
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<td></td>
<td>Voltage output (for driving SSR)</td>
<td>E5CN-QMT-W-500</td>
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<td></td>
<td></td>
<td>Current output</td>
<td>E5CN-CMT-W-500</td>
</tr>
</tbody>
</table>

**Note:** Models with analog inputs do not have temperature unit indicators.

## Option Units

One of the following Option Units can be mounted to provide the E5CN with additional functions.

<table>
<thead>
<tr>
<th>Communications</th>
<th>Functions</th>
<th>Model (See Note 2.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS-485</td>
<td>3-phase heater burnout/SSR failure/Heater overcurrent detection</td>
<td>E53-CNH03N2</td>
</tr>
<tr>
<td></td>
<td>Event inputs</td>
<td>E53-CNHB03N2</td>
</tr>
<tr>
<td>RS-485</td>
<td>Event inputs</td>
<td>E53-CNPHN2</td>
</tr>
<tr>
<td>RS-485</td>
<td>Event inputs</td>
<td>E53-CN03N2</td>
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<tr>
<td>RS-485</td>
<td>Event inputs</td>
<td>E53-CNHB03N2</td>
</tr>
<tr>
<td>RS-485</td>
<td>Event inputs</td>
<td>E53-CN03N2</td>
</tr>
<tr>
<td>RS-485</td>
<td>Event inputs</td>
<td>E53-CNHB03N2</td>
</tr>
</tbody>
</table>

**Note:** 1. These Option Units are applicable only to models released after January 2008.
2. If the E53-CNQHN2 or E53-CNQHHN2 Option Unit is used together with the E5CN-C Temperature Controller and control output 1 (current output) is assigned to the heating control output, heater burnout detection will be disabled.
Model Number Structure

Model Number Legend (Plug-in-type Controllers)

**E5CN-□□□□U**

1. **Output Type**
   - R: Relay output
   - Q: Voltage output (for driving SSR)
   - C: Current output

2. **Number of Alarms**
   - Blank: No alarm
   - 1: One alarm
   - 2: Two alarms

3. **Input Type**
   - T: Universal thermocouple/platinum resistance thermometer
   - L: Analog Input

4. **Plug-in type**
   - U: Plug-in type

**Ordering Information**

**Plug-in-type Controllers**

<table>
<thead>
<tr>
<th>Size</th>
<th>Case color</th>
<th>Power supply voltage</th>
<th>Input type</th>
<th>Auxiliary outputs</th>
<th>Control output 1</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/16 DIN</td>
<td>Black</td>
<td>100 to 240 VAC</td>
<td>Thermocouple or resistance thermometer</td>
<td>None</td>
<td>Relay output</td>
<td>E5CN-RTU</td>
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<tr>
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<td>Voltage output (for driving SSR)</td>
<td>E5CN-QTU</td>
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<tr>
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<td></td>
<td>Current output</td>
<td>E5CN-CTU</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>Relay output</td>
<td>E5CN-R1TU</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Voltage output (for driving SSR)</td>
<td>E5CN-Q1TU</td>
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<td></td>
<td></td>
<td>Current output</td>
<td>E5CN-C1TU</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>Relay output</td>
<td>E5CN-R2TU</td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Voltage output (for driving SSR)</td>
<td>E5CN-Q2TU</td>
<td></td>
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<tr>
<td></td>
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<td></td>
<td>Current output</td>
<td>E5CN-C2TU</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>24 VAC/VDC</td>
<td>Thermocouple or resistance thermometer</td>
<td>None</td>
<td>Relay output</td>
<td>E5CN-RTDU</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Voltage output (for driving SSR)</td>
<td>E5CN-QTDU</td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
<td>Current output</td>
<td>E5CN-CTDU</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>Relay output</td>
<td>E5CN-R1TDU</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Voltage output (for driving SSR)</td>
<td>E5CN-Q1TDU</td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td>Current output</td>
<td>E5CN-C1TDU</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>Relay output</td>
<td>E5CN-R2TDU</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Voltage output (for driving SSR)</td>
<td>E5CN-Q2TDU</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Current output</td>
<td>E5CN-C2TDU</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Models with analog inputs do not have temperature unit indicators.
Accessories (Order Separately)

USB-Serial Conversion Cable

<table>
<thead>
<tr>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>E58-CIFQ1</td>
</tr>
</tbody>
</table>

Terminal Cover

<table>
<thead>
<tr>
<th>Connectable models</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal block models</td>
<td>E53-COV17</td>
</tr>
</tbody>
</table>

**Note:** The Terminal Cover comes with the E5CN-500 models.

Waterproof Packing

<table>
<thead>
<tr>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y92S-29</td>
</tr>
</tbody>
</table>

**Note:** The Waterproof Packing is included with the Controller only for models with terminal blocks.

Current Transformers (CTs)

<table>
<thead>
<tr>
<th>Hole diameter</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.8 dia.</td>
<td>E54-CT1</td>
</tr>
<tr>
<td>12.0 dia.</td>
<td>E54-CT3</td>
</tr>
</tbody>
</table>

Adapter

<table>
<thead>
<tr>
<th>Connectable models</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal block models</td>
<td>Y92F-45</td>
</tr>
</tbody>
</table>

**Note:** Use this Adapter when the panel has been previously prepared for the E5CN-U.

Sockets (for Plug-in Models)

<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 cover

<table>
<thead>
<tr>
<th>Type</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard Front Cover</td>
<td>Y92A-48B</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>
## Specifications

### Ratings

| Power supply voltage | No D in model number: 100 to 240 VAC, 50/60 Hz  
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<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>
</tbody>
</table>
| Power consumption E5CN | 100 to 240 VAC: 7.5 VA (max.)  
|                      | 24 VAC/VDC: 5 VA/3 W (max.)  
|                      | E5CN-R2T at 100 VAC: 3.0 VA  
|                      | E5CN-R2TD at 24 VAC: 2.7 VA               |
| E5CN-U | 100 to 240 VAC: 6 VA (max.)  
|                      | 24 VAC/VDC: 3 VA/2 W (max.)  
|                      | (models with current output: 4 VA/2 W)          |
| Sensor input | Models with temperature inputs  
|              | Platinum resistance thermometer: Pt100 or JPt100  
|              | Infrared temperature sensor: 10 to 70°C, 60 to 120°C, 115 to 165°C, or 140 to 260°C  
|              | Voltage input: 0 to 50 mV  
| Input impedance | 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    |
| Control method | ON/OFF control or 2-PID control (with auto-tuning)  
| Control outputs | Relay output  
|              | E5CN   | SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA  
|              | E5CN-U | SPDT, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA  
| Voltage output (for driving SSR) | E5CN   | Output voltage: 12 VDC ±15% (PNP), max. load current: 21 mA, with short-circuit protection circuit  
|              | E5CN-U | 4 to 20 mA DC/0 to 20 mA DC, load: 600 Ω max., resolution: approx. 10,000  
| Current output | E5CN | 75 to 250 VAC (DC loads cannot be connected.), minimum applicable load: 5 V, 10 mA  
|              | E5CN-U | 5 mA max. (250 VAC, 60 Hz)  
| Long-life relay output | E5CN | SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 1,000,000 operations, load power supply voltage: 75 to 250 VAC (DC loads cannot be connected.), minimum applicable load: 5 V, 10 mA  
|              | E5CN-U | 5 mA max. (250 VAC, 60 Hz)  
| Auxiliary outputs | Number of outputs | 1 or 2 max. (Depends on the model.)  
|              | Output specifications | Relay output: SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA  
| Event inputs | Number of inputs | 2  
|              | External contact input specifications | Contact input: ON: 1 kHz max., OFF: 100 kHz 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  
| External power supply for ES1B | 12 VDC ±10%, 20 mA, short-circuit protection circuit provided  
| Setting method | Digital setting using front panel keys  
| Indication method | 11-segment digital display and individual indicators (7-segment display also possible)  
|              | Character height: PV: 11 mm, SV: 6.5 mm  
| Multi SP | Up to four set points (SP0 to SP3) can be saved and selected using event inputs, key operations, or serial communications.  
| Bank switching | Not supported  
| Other functions | Manual output, heating/cooling control, loop burnout alarm, SP ramp, other alarm functions, heater burnout detection (including SSR failure and heater overcurrent detection), 40% AT, 100% AT, MV limiter, input digital filter, self-tuning, temperature input shift, run/stop, protection functions, control output ON/OFF counter, extraction of square root, MV change rate limit, logic operations, PV/SV status display, simple program, automatic cooling coefficient adjustment  
| Ambient operating temperature | −10 to 55°C (with no condensation or icing), for 3-year warranty: −10 to 50°C  
| Ambient operating humidity | 25% to 85%  
| Storage temperature | −25 to 65°C (with no condensation or icing)  

---

**Note**: The above specifications and ratings are subject to change without notice. Please refer to the latest version of the product manual for the most current information.
Input Ranges
Thermocouple/Platinum Resistance Thermometer (Universal Inputs)

<table>
<thead>
<tr>
<th>Input Type</th>
<th>Platinum resistance thermometer</th>
<th>Thermocouple</th>
<th>Infrared temperature sensor</th>
<th>Analog input</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Pt100</td>
<td>JPt100</td>
<td>K</td>
<td>0 to 50 mV</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>J</td>
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<td></td>
<td>PL II</td>
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<td></td>
<td>60 to 120 °C</td>
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<td>115 to 165 °C</td>
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<td></td>
<td></td>
<td>140 to 260 °C</td>
<td></td>
</tr>
</tbody>
</table>

Shaded settings are the default settings.

The applicable standards for the input types are as follows:
- L: Fe-CuNi, DIN 43710-1985
- U: Cu-CuNi, DIN 43710-1985
- W: W5Re/W26Re, ASTM E988-1990
- Pt100: JIS C 1604-1997, IEC 751
- PL II: According to Platinel II electromotive force charts from BASF (previously Engelhard)

Models with Analog Inputs

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

Setting range: Usable in the following ranges by scaling:
-1999 to 9999 or -199.9 to 999.9

Setting number: 0 1 2 3 4

Shaded settings are the default settings.
### Alarm Outputs

Each alarm can be independently set to one of the following 13 alarm types. The default is 2: Upper limit.

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

**Note:** For models with heater burnout, SSR failure, and heater overcurrent detection, alarm 1 will be an OR output of the alarm selected from the following alarm types and the alarms for heater burnout, SSR failure, and heater overcurrent. To output only a heater burnout alarm, SSR failure alarm, and heater overcurrent alarm for alarm 1, set the alarm type to 0 (i.e., no alarm function).

<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>ON, OFF</td>
<td>*2</td>
</tr>
<tr>
<td>2</td>
<td>Upper-limit</td>
<td>ON, OFF</td>
<td>*2</td>
</tr>
<tr>
<td>3</td>
<td>Lower-limit</td>
<td>ON, OFF</td>
<td>*2</td>
</tr>
<tr>
<td>4</td>
<td>Upper- and lower-limit range</td>
<td>ON, OFF</td>
<td>*3</td>
</tr>
<tr>
<td>5</td>
<td>Upper- and lower-limit with standby sequence</td>
<td>ON, OFF</td>
<td>*4</td>
</tr>
<tr>
<td>6</td>
<td>Upper-limit with standby sequence</td>
<td>ON, OFF</td>
<td>*4</td>
</tr>
<tr>
<td>7</td>
<td>Lower-limit with standby sequence</td>
<td>ON, OFF</td>
<td>*4</td>
</tr>
<tr>
<td>8</td>
<td>Absolute-value upper-limit</td>
<td>ON, OFF</td>
<td>*4</td>
</tr>
<tr>
<td>9</td>
<td>Absolute-value lower-limit</td>
<td>ON, OFF</td>
<td>*4</td>
</tr>
<tr>
<td>10</td>
<td>Absolute-value upper-limit with standby sequence</td>
<td>ON, OFF</td>
<td>*4</td>
</tr>
<tr>
<td>11</td>
<td>Absolute-value lower-limit with standby sequence</td>
<td>ON, OFF</td>
<td>*4</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>
</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**

<table>
<thead>
<tr>
<th>L</th>
<th>H</th>
<th>SP</th>
</tr>
</thead>
<tbody>
<tr>
<td>H &lt; 0, L &gt; 0</td>
<td>[H] &lt; [L]</td>
<td></td>
</tr>
</tbody>
</table>

**Case 2**

<table>
<thead>
<tr>
<th>SP</th>
<th>L</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>H &gt; 0, L &lt; 0</td>
<td>[H] &gt; [L]</td>
<td></td>
</tr>
</tbody>
</table>

**Case 3 (Always ON)**

<table>
<thead>
<tr>
<th>SP</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>H &lt; 0, L &gt; 0</td>
<td>[H] &lt; [L]</td>
</tr>
</tbody>
</table>

**Case 4 (Always OFF)**

<table>
<thead>
<tr>
<th>SP</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>H &gt; 0, L &lt; 0</td>
<td>[H] &gt; [L]</td>
</tr>
</tbody>
</table>

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

**Case 1**

<table>
<thead>
<tr>
<th>L</th>
<th>H</th>
<th>SP</th>
</tr>
</thead>
<tbody>
<tr>
<td>H &lt; 0, L &gt; 0</td>
<td>[H] &lt; [L]</td>
<td></td>
</tr>
</tbody>
</table>

**Case 2**

<table>
<thead>
<tr>
<th>SP</th>
<th>L</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>H &gt; 0, L &lt; 0</td>
<td>[H] &gt; [L]</td>
<td></td>
</tr>
</tbody>
</table>

**Case 3 (Always OFF)**

<table>
<thead>
<tr>
<th>SP</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>H &lt; 0, L &gt; 0</td>
<td>[H] &lt; [L]</td>
</tr>
</tbody>
</table>

**Case 4 (Always OFF)**

<table>
<thead>
<tr>
<th>SP</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>H &gt; 0, L &lt; 0</td>
<td>[H] &gt; [L]</td>
</tr>
</tbody>
</table>

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

For Upper- and Lower-Limit Alarm Described Above

- **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 E5CN/E5AN/E5EN/E5GN Digital Temperature Controllers User’s Manual Basic Type (Cat. No. H156) for information on the operation of the standby sequence.**

**#7. Refer to the E5CN/E5AN/E5EN/E5GN Digital Temperature Controllers User’s Manual Basic Type (Cat. No. H156) for information on the loop burnout alarm (LBA).**

**#8. Refer to the E5CN/E5AN/E5EN/E5GN Digital Temperature Controllers User’s Manual Basic Type (Cat. No. H156) for information on the PV change rate alarm.**
## Characteristics

### Indication accuracy

| Thermocouple | Terminal block models (ESCN): (±0.3% of indicated value or ±1°C, whichever is greater) ±1 digit max. Plug-in models (ESCNU-U): (±1% of indicated value or ±2°C, whichever is greater) ±1 digit max. Platinum resistance thermometer input: Terminal block models (ESCNU) and plug-in models (ESCNU-U): (±0.2% of indicated value or ±0.8°C, whichever is greater) ±1 digit max. Analog input: Terminal block models (ESCNU) and plug-in models (ESCNU-U): ±0.2% FS ±1 digit max. CT input: Terminal block models (ESCNU): ±5% FS ±1 digit max. |

### Influence of temperature #2

| Thermocouple input (R, S, B, W, PL II): Terminal block models (ESCNU): (±1% of PV or ±10°C, whichever is greater) ±1 digit max. Plug-in models (ESCNU-U): (±2% of PV or ±10°C, whichever is greater) ±1 digit max. Other thermocouple input: Terminal block models (ESCNU): (±1% of PV or ±4°C, whichever is greater) ±1 digit max. Plug-in models (ESCNU-U): (±1% of PV or ±2°C, whichever is greater) ±1 digit max. Analog input: Terminal block models (ESCNU) and plug-in models (ESCNU-U): (±1% FS) ±1 digit max. |

### Influence of voltage #2

| Models with thermocouple/platinum resistance thermometer input (universal input): 0.1 to 999.9 EU (in units of 0.1 EU) #4 Models with analog input: 0.01 to 999.99% FS (in units of 0.01% FS) |

### Input sampling period

250 ms

### Hysteresis

| Models with thermocouple/platinum resistance thermometer input (universal input): 0.1 to 999.9 EU (in units of 0.1 EU) #4 Models with analog input: 0.1 to 999.99% FS (in units of 0.1% FS) |

### Integral time (I)

0 to 3999 s (in units of 1 s)

### Derivative time (D)

0 to 3999 s (in units of 1 s) #6

### Control period

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)

### Affect 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

2,300 VAC, 50 or 60 Hz for 1 min (between terminals with different charge)

### Vibration resistance

Malfuction 10 to 55 Hz, 20 m/s² for 10 min each in X, Y, and Z directions

Destruction 10 to 55 Hz, 0.75-mm single amplitude for 2 hrs each in X, Y, and Z directions

### Shock resistance

Malfuction 100 m/s², 3 times each in X, Y, and Z directions

Destruction 300 m/s², 3 times each in X, Y, and Z directions

### Weight

ESCNU Controller: Approx. 150 g, Mounting Bracket: Approx. 10 g

ESCNU-U Controller: Approx. 110 g, Mounting Bracket: Approx. 10 g

### Degree of protection

ESCNU Front panel: IP66, Rear case: IP20, Terminals: IP00

ESCNU-U Front panel: IP50, Rear case: IP20, Terminals: IP00

### Memory protection

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

### Setup Tool

CX-Thermo version 4.0 or higher

### Setup Tool port

Provided on the bottom of the ESCNU. Use this port to connect a computer to the ESCNU when using the Setup Tool. An E58-CIFQ1 USB-Serial Conversion Cable is required to connect the computer to the ESCNU. #6

### Standards

Approved standards #7 UL 61010-1, CSA C22.2 No. 1010-1, KOSHA certified (some models) #8

Conformed standards EN 61010-1 (IEC 61010-1): Pollution level 2, overcurrent category II, Lloyd's Standards #9

### EMC

- EN 61326
- EN 61000-4-2
- EN 61000-4-3
- EN 61000-4-4
- EN 61000-4-5
- EN 61000-4-8
- EN 61326

---

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 in the 400 to 800°C range 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 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 55°C, Voltage range: −15% to 10% of rated voltage

3. K thermocouple at −100°C max.; ±10°C max.

4. "EU" stands for Engineering Unit and is used as the unit after scaling. For a temperature sensor, the EU is °C or °F.

5. When robust tuning (RT) is ON, the differential time is 0.0 to 999.9 (in units of 0.1 s).

6. External communications (RS-485) and cable communications for the Setup Tool can be used at the same time.

7. The E5CN-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.

8. Access the following website for information on certified models. http://www.ia.omron.com/support/models/index.html

9. Refer to information on maritime standards in Safety Precautions for E5CN/E5CN-U-H for compliance with Lloyd's Standards.
USB-Serial Conversion Cable

Applicable OS | Windows 2000, XP, or Vista
---|---
Applicable software | CX-Thermo version 4 or higher
Applicable models | E5AN/E5EN/E5CN/E5CN-U/E5AN-H/E5EN-H/E5CN-H/E5GN
USB interface standard | Conforms to USB Specification 1.1.
DTE speed | 38400 bps
Connecter specifications | Computer: USB (type A plug)
| Temperature Controller: Setup Tool port (on bottom of Controller)
Power supply | Bus power (Supplied from USB host controller)
Power supply voltage | 5 VDC
Current consumption | 70 mA
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. 100 g

Note: A driver must be installed in the personal computer. Refer to installation information in the operation manual for the Conversion Cable.

Communications Specifications

| Transmission line connection method | RS-485: Multipoint
| Communications | RS-485 (two-wire, half duplex)
| Synchronization method | Start-stop synchronization
| Protocol | CompoWay/F, SYSWAY, or Modbus
| Baud rate | 1200, 2400, 4800, 9600, 19200, 38400, or 57600 bps
| Data bit length | 7 or 8 bits
| Stop bit length | 1 or 2 bits
| Error detection | Vertical parity (none, even, odd)
| | Frame check sequence (FCS) with SYSWAY
| | 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

Note: 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

| Dielectric strength | 1,000 VAC for 1 min
| Vibration resistance | 50 Hz, 98 m/s²
| Weight | E54-CT1: Approx. 11.5 g,
| | E54-CT3: Approx. 50 g
| Accessories (E54-CT3 only) | Armatures (2)
| | Plugs (2)

Heater Burnout Alarms, SSR Failure Alarms, and Heater Overcurrent 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
| SSR failure alarm setting range #2 | 0.1 to 49.9 A (in units of 0.1 A)
| Minimum detection OFF time: 100 ms
| Heater overcurrent alarm setting range #3 | 0.1 to 49.9 A (in units of 0.1 A)
| Minimum detection ON time: 100 ms

*1. For heater burnout alarms, the heater current will be measured when the control output is ON, and the output assigned to the alarm 1 function 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 assigned to the alarm 1 function will turn ON if the heater current is higher than the set value (i.e., SSR failure detection current value).

*3. For heater overcurrent alarms, the heater current will be measured when the control output is ON, and the output assigned to the alarm 1 function will turn ON if the heater current is higher than the set value (i.e., heater overcurrent detection current value).

Electrical Life Expectancy Curve for Relays (Reference Values)

Note: Do not connect a DC load to a Controller with a Long-life Relay Output.
**External Connections**

- A voltage output (control output, for driving SSR) is not electrically insulated from the internal circuits. When using a grounding thermocouple, do not connect any of the control output terminals to ground. (If the control output terminals are connected to ground, errors will occur in the measured temperature values as a result of leakage current.)
- Consult with your OMRON representative before using the external power supply for the ES1B for any other purpose.

**E5CN**

**Controllers**

- Long-life relay output: 250 VAC, 3 A (resistive load)
- Relay output: 250 VAC, 3 A (resistive load)
- Voltage output (for driving SSR): 12 VDC, 21 mA

**Option Units**

- E53-CNHH03N2 Communications (RS-485) and CT2
- E53-CNHB02N2 Event inputs and CT

- E53-CNQ03N2 Communications (RS-485) and Control Output 2
- E53-CNQPN2 Event Inputs and External Power Supply

- E53-CNPH02N2 External Power Supply and CT

**E5CN-U**

- Relay output (three terminals used): SPDT, 250 VAC, 3 A (resistive load)
- Voltage output (for driving SSR): 12 VDC, 21 mA

**Note:** For the Wiring Socket, purchase the P2CF-11 or PG3A-11 separately.
Nomenclature

E5CN
E5CN-U
The front panel is the same for the E5CN and E5CN-U.

Dimensions

(Unit: mm)

E5CN
Terminal Models

Panel Cutout

Mounting Adapter
(Accessory)
Terminal Cover
(E53-COV17)
(Accessory)

Group Mounted

60 min.

Group mounting does not allow waterproofing.

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.

E5CN-U
Plug-in Models

Panel Cutout

Mounting Adapter
(Accessory)

Group Mounted

60 min.

Recommended panel thickness is 1 to 5 mm.

Group mounting is not possible in the vertical direction. (Maintain the specified mounting space between Controllers.)

When two or more Controllers are mounted, make sure that the surrounding temperature does not exceed the allowable operating temperature specified in the specifications.

Accessories (Order Separately)

USB-Serial Conversion Cable
E58-CIFQ1

Note: The terminal block cannot be removed.
Current Transformers

**Terminal Cover**
E53-COV17

**Waterproof Packing**
Y92S-29 (for DIN 48 × 48)

Note: The E53-COV10 cannot be used.

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 one year a rough standard. OMRON shall not be liable for the level of water resistance if the customer does not perform periodic replacement.) The Waterproof Packing does not need to be attached if a waterproof structure is not required.

**E54-CT1**

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

- Maximum continuous heater current: 50 A (50/60 Hz)
- Number of windings: 400±2
- Winding resistance: 18±2 Ω

<table>
<thead>
<tr>
<th>Thru-current (Io) A (r.m.s.)</th>
<th>1</th>
<th>10</th>
<th>100</th>
<th>1</th>
<th>10</th>
<th>100</th>
<th>1,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output voltage (Eo) V (r.m.s.)</td>
<td>100</td>
<td>50</td>
<td>Hz</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distortion factor</td>
<td>10%</td>
<td>3%</td>
<td>1%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RL = 10 Ω</td>
<td>10</td>
<td>∞</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100 Ω</td>
<td>50</td>
<td>Ω</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>Ω</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>kΩ</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>Ω</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>100 mV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>100 µV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**E54-CT3**

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

- Maximum continuous heater current: 120 A (50/60 Hz) (Maximum continuous heater current for the Temperature Controller is 50 A.)
- Number of windings: 400±2
- Winding resistance: 18±0.8 Ω

<table>
<thead>
<tr>
<th>Thru-current (Io) A (r.m.s.)</th>
<th>1</th>
<th>10</th>
<th>100</th>
<th>1</th>
<th>10</th>
<th>100</th>
<th>1,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output voltage (Eo) V (r.m.s.)</td>
<td>100</td>
<td>50</td>
<td>Hz</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distortion factor</td>
<td>10%</td>
<td>3%</td>
<td>1%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RL = 10 Ω</td>
<td>10</td>
<td>∞</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100 Ω</td>
<td>50</td>
<td>Ω</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>Ω</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>kΩ</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>Ω</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>100 mV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>100 µV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**E54-CT3 Accessory**
- Armature
- Plug
Adapter

Y92F-45 Note: 1. Use this Adapter when the panel has already been prepared for the E5B.
2. The Adapter is available only in black.

Mounted to E5CN

E5CN-U Wiring Socket

Front-connecting Socket
P2CF-11

Note: A model with finger protection (P2CF-11-E) is also available.

Back-connecting Socket
P3GA-11

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.
Warranty and Limitations of Liability

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

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY
OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

Application Considerations

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

At the customer's request, OMRON will provide applicable third party certification documents identifying ratings and limitations of use that apply to the products. This information by itself is not sufficient for a complete determination of the suitability of the products in combination with the end product, machine, system, or other application or use.

The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products:

- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this catalog.
- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
- Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

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

PROGRAMMABLE PRODUCTS
OMRON shall not be responsible for the user's programming of a programmable product, or any consequence thereof.

Disclaimers

CHANGE IN SPECIFICATIONS
Product specifications and accessories may be changed at any time based on improvements and other reasons.

It is our practice to change model numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the products may be changed without any notice. When in doubt, special model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased products.

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

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

ERRORS AND OMISSIONS
The information in this document has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical, or proofreading errors, or omissions.
Omron:
E5CN-RMT-500-AC100-240  E5CN-Q2MT-500-AC100-240  E5CN-R2MTD-500-AC/DC24  E5CN-CMT500 AC100-240
E5CNQMT500AC100240  E5CN-Q2M-TD-500 ACDC24  E5CN-C2MLD-500 AC/DC24  E5CN-FR2MT-500 AC100-240
E5CN-FRMT-500 AC100-240  E5CN-HV2M-500 AC100-240  E5CN-Q2ML-500 AC100-240  E5CN-QMTD-500 AC/DC24
E5CN-R1TU AC100-240  E5CN-R2HBT AC100-240  E5CN-QMT-500 AC100-240  E5CN-CMT-500 AC100-240