

## A New High-performance Controller: High Resolution, High Speed, and High Input Accuracy.

### Logic Operations and Preventive Maintenance Function.



- High-resolution display with 5 digits/0.01°C display in a compact Controller (48 x 48 mm).
- High-speed sampling cycle of 60 ms.
- High Accuracy  
Thermocouple/Pt input:  $\pm 0.1\%$  of PV  
Analog input:  $\pm 0.1\%$  FS
- Universal inputs on all models (thermocouple, PT, or analog input) to handle various sensors with one Controller.
- 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.
- Flexible contact outputs with logic operations (AND, OR, and delays) set from the Support Software (CX-Thermo Ver. 4.0)
- Preventive maintenance for relays in the Temperature Controller using a Control Output ON/OFF Counter.

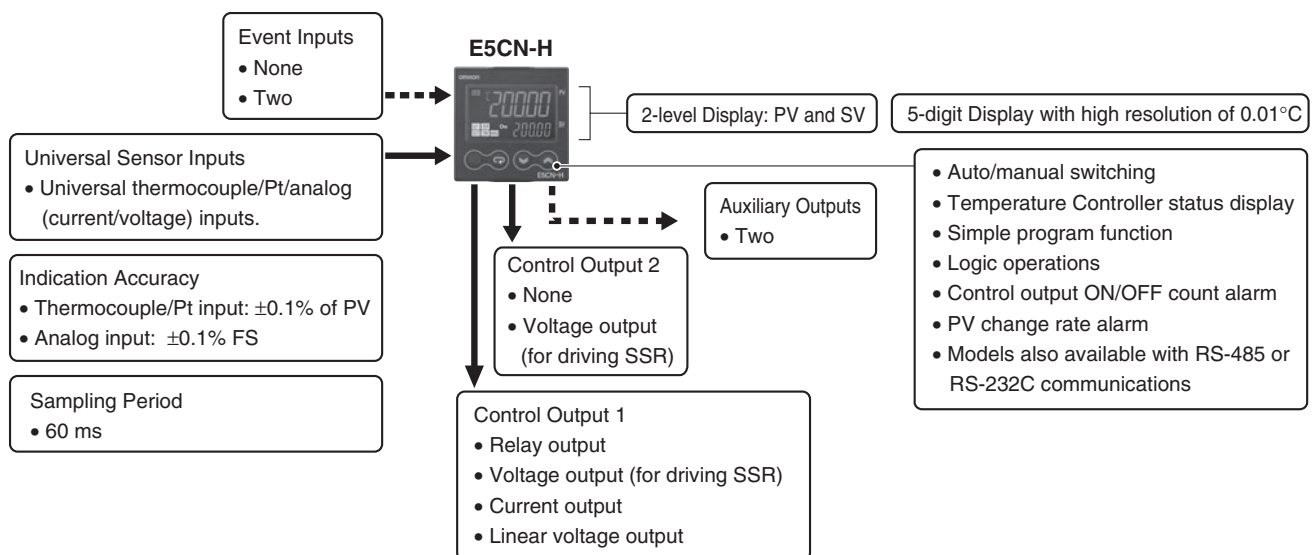


48 × 48 mm  
E5CN-H

Refer to *Safety Precautions for E5□N/E5□N-H*.

Refer to *Operation for E5□N/ E5□N-H* for operating procedures.

## Main I/O Functions

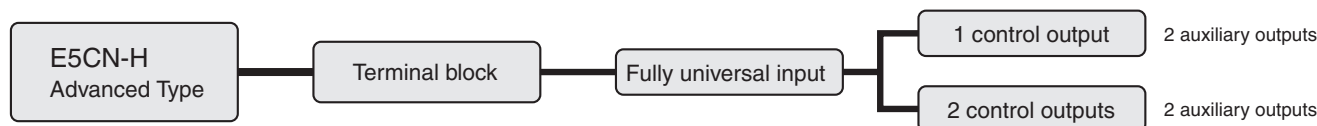


This data sheet is provided as a guideline for selecting products. Be sure to refer to the following user manuals for application precautions and other information required for operation before attempting to use the product.

E5CN-H/E5AN-H/E5EN-H Digital Controllers User's Manual Advanced Type (Cat. No. H157)

E5CN-H/E5AN-H/E5EN-H Digital Controllers Communications Manual Advanced Type (Cat. No. H159)

## Lineup



**Note:** Models with one control output and models with two control outputs can be used for heating/cooling control.

## Model Number Structure

### Model Number Legend

#### Controllers

E5CN-        M  -  -500

1 2 3 4 5 6 7

#### 1. Type

H: Advanced

#### 2. Control Output 1

R: Relay output  
 Q: Voltage output (for driving SSR)  
 C: Current output  
 V: Linear voltage output

#### 3. Auxiliary Outputs

2: Two outputs

#### 4. Option 1

M: Option Unit can be mounted.

#### 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-        

1 2 3 4

#### 1. Applicable Controller

CN: E5CN-H or E5CN

#### 2. Function 1

Blank: None  
 Q: Control output 2 (voltage output for driving SSR)  
 P: Power supply for sensor  
 C: Current output

#### 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  
 H01: Heater burnout/SSR failure/Heater overcurrent detection (CT1)/RS-232C communications  
 F: Transfer output  
 BF: Two event inputs/Transfer output

#### 4. Version

N2: Available only to models released after January 2008

**Note:** Not all combinations of function 1 and function 2 specifications are possible for Option Units (E53-        ).

## Ordering Information

### Controllers

| Size                                    | Case Color            | Power supply voltage | Auxiliary output | Control output 1                 | Model            |
|---|-----------------------|----------------------|------------------|----------------------------------|------------------|
| 1/16 DIN<br>48 × 48 × 78<br>(W × H × D) | Black                 | 100 to 240 VAC       | 2                | Relay output                     | E5CN-HR2M-500    |
|   |                       |                      |                  | Voltage output (for driving SSR) | E5CN-HQ2M-500    |
|   |                       |                      |                  | Current output                   | E5CN-HC2M-500    |
|   |                       |                      |                  | Linear voltage output            | E5CN-HV2M-500    |
|   |                       | 24 VAC/VDC           | 2                | Relay output                     | E5CN-HR2MD-500   |
|   |                       |                      |                  | Voltage output (for driving SSR) | E5CN-HQ2MD-500   |
|   | Current output        |                      |                  | E5CN-HC2MD-500                   |                  |
|   | Linear voltage output |                      |                  | E5CN-HV2MD-500                   |                  |
|   | Silver                | 100 to 240 VAC       | 2                | Relay output                     | E5CN-HR2M-W-500  |
|   |                       |                      |                  | Voltage output (for driving SSR) | E5CN-HQ2M-W-500  |
|   |                       |                      |                  | Current output                   | E5CN-HC2M-W-500  |
|   |                       | 24 VAC/VDC           | 2                | Relay output                     | E5CN-HR2MD-W-500 |
| Voltage output (for driving SSR)        |                       |                      |                  | E5CN-HQ2MD-W-500                 |                  |
| Current output                          |                       |                      |                  | E5CN-HC2MD-W-500                 |                  |

### Option Units

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

| Functions             |                        |   |              |   | Model                         |
|-----------------------|------------------------|---|--------------|---|-------------------------------|
| Communications RS-485 |                        | 3-phase heater burnout/SSR failure/<br>Heater overcurrent detection |              |   | E53-CNHH03N2                  |
|                       |                        | Heater burnout/SSR failure/<br>Heater overcurrent detection         | Event inputs |   | E53-CNHBN2                    |
| Communications RS-485 |                        |   |              | Control output 2<br>(Voltage for driving SSR) | E53-CNQ03N2                   |
| Communications RS-485 |                        | Heater burnout/SSR failure/<br>Heater overcurrent detection         |              |   | E53-CNH03N2                   |
| Communications RS-485 |                        |   |              |   | E53-CN03N2                    |
|                       |                        |   | Event inputs |   | E53-CNBN2                     |
|                       |                        | Heater burnout/SSR failure/<br>Heater overcurrent detection         |              | Control output 2<br>(Voltage for driving SSR) | E53-CNQHN2                    |
|                       |                        | 3-phase heater burnout/SSR failure/<br>Heater overcurrent detection |              | Control output 2<br>(Voltage for driving SSR) | E53-CNQHHN2                   |
|                       |                        |   | Event inputs | Control output 2<br>(Voltage for driving SSR) | E53-CNQBN2                    |
|                       |                        |   |              | Control output 2<br>(Voltage for driving SSR) | Transfer Output<br>E53-CNQFN2 |
|                       |                        |   | Event inputs |   | Transfer Output<br>E53-CNBFN2 |
|                       | Communications RS-232C |   |              | Control output 2<br>(Voltage for driving SSR) | E53-CNQ01N2                   |
|                       | Communications RS-232C |   |              |   | E53-CN01N2                    |
|                       | Communications RS-232C | Heater burnout/SSR failure/<br>Heater overcurrent detection         |              |   | E53-CNH01N2                   |

**Note:** These Option Units are applicable only to models released after January 2008.

### Accessories (Order Separately)

#### USB-Serial Conversion Cable

| Model     |
|-----------|
| E58-CIFQ1 |

#### Terminal Cover

| Model     |
|-----------|
| E53-COV17 |

**Note:** 1. The Terminal Cover comes with the E5CN-□□□-500 models.

2. The E53-COV10 cannot be used.

#### Waterproof Packing

| Model   |
|---------|
| Y92S-29 |

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

#### Current Transformers (CTs)

| Hole diameter | Model   |
|---------------|---------|
| 5.8 dia.      | E54-CT1 |
| 12.0 dia.     | E54-CT3 |

#### Adapter

| Connectable models | Model   |
|--------------------|---------|
| Terminal type      | Y92F-45 |

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

#### Front cover

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

#### CX-Thermo Support Software

| Model       |
|-------------|
| EST2-2C-MV4 |

## Specifications

### Ratings

|                                      |   |  |
|--------------------------------------|---|--|
| <b>Power supply voltage</b>          | No D in model number: 100 to 240 VAC, 50/60 Hz<br>D in model number: 24 VAC, 50/60 Hz; 24 VDC   |  |
| <b>Operating voltage range</b>       | 85% to 110% of rated supply voltage   |  |
| <b>Power consumption</b>             | 100 to 240 VAC: 8.5 VA (max.) (E5CN-HR2 at 100 VAC: 3.0 VA)<br>24 VAC/VDC: 5.5 VA (24 VAC)/3.5 W (24 VDC) (max.) (E5CN-HR2D at 24 VAC: 2.7 VA)  |  |
| <b>Sensor input</b>                  | Any of the following can be selected (i.e., fully universal input).<br>Thermocouple: K, J, T, E, L, U, N, R, S, B, W, or PL II<br>Platinum resistance thermometer: Pt100 or JPt100<br>Current input: 4 to 20 mA or 0 to 20 mA<br>Voltage input: 1 to 5 V, 0 to 5 V, or 0 to 10 V  |  |
| <b>Input impedance</b>               | Current input: 150 Ω max., Voltage input: 1 MΩ min. (Use a 1:1 connection when connecting the ES2-HB.)  |  |
| <b>Control method</b>                | ON/OFF control or 2-PID control (with auto-tuning)  |  |
| <b>Control output</b>                | <b>Relay output</b>   | SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA   |
|                                      | <b>Voltage output (for driving SSR)</b>   | Output voltage: 12 VDC ±15% (PNP), max. load current: 21 mA, with short-circuit protection circuit   |
|                                      | <b>Current output</b>   | 4 to 20 mA DC/0 to 20 mA DC, load: 600 Ω max., resolution: approx. 10,000 *  |
|                                      | <b>Linear voltage output</b>  | 0 to 10 VDC (load: 1 kΩ min.), Resolution: Approx. 10,000  |
| <b>Auxiliary output</b>              | <b>Number of outputs</b>  | 2 max.   |
|                                      | <b>Output specifications</b>  | Relay output: SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA   |
| <b>Event input</b>                   | <b>Number of outputs</b>  | 2  |
|                                      | <b>External contact input specifications</b>  | Contact input: ON: 1 kΩ max., OFF: 100 kΩ min.   |
|                                      |   | Non-contact input: ON: Residual voltage: 1.5 V max., OFF: Leakage current: 0.1 mA max.<br>Current flow: Approx. 7 mA per contact   |
| <b>Logic operations</b>              | <b>Number of operations</b>   | 8 max. (Combinations can be made using work bits.)   |
|                                      | <b>Operations</b>   | <ul style="list-style-type: none"> <li>Logic operation: Any of the following four patterns can be selected. The input status may be inverted. (A and B) or (C and D), (A or C) and (B or D), A or B or C or D, A and B and C and D (A, B, C, and D are four inputs.)</li> <li>Delay: ON delay or OFF delay for the results of the logic operation given above. Setting time: 0 to 9999 s or 0 to 9999 min</li> <li>Output inversion: Possible</li> </ul> |
|                                      | <b>Outputs</b>  | One work bit per operation   |
|                                      | <b>Work bit assignments</b>   | Any of the following can be assigned to up to eight work bits (logic operation results): Event input operations, auxiliary outputs, or control outputs.  |
| <b>Transfer outputs</b>              | <b>Number of outputs</b>  | 1 max.   |
|                                      | <b>Output specifications</b>  | Current output: 4 to 20 mA DC, Load: 600 Ω max., Resolution at 4 to 20 mA: Approx. 10,000  |
| <b>RSP input</b>                     | Not supported   |  |
| <b>Setting method</b>                | Digital setting using front panel keys  |  |
| <b>Indication method</b>             | 11-segment digital display and individual indicators (7-segments displays also possible)<br>Character height: PV: 11 mm, SV: 6.5 mm   |  |
| <b>Bank switching</b>                | Supported (number of banks: 8)<br>Local SP, alarm settings, PID sets (PID constants, MV upper limit, MV lower limit, etc.)  |  |
| <b>Other functions</b>               | Manual output, heating/cooling control, loop burnout alarm, SP ramp, other alarm functions, heater burnout 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, PV/SV status display, logic operations, automatic cooling coefficient adjustment |  |
| <b>Ambient operating temperature</b> | -10 to 55°C (with no condensation or icing), for 3-year warranty: -10 to 50°C   |  |
| <b>Ambient operating humidity</b>    | 25% to 85%  |  |
| <b>Storage temperature</b>           | -25 to 65°C (with no condensation or icing)   |  |

\* For models with current outputs, control output 1 can be used as a transfer output.



## Alarm Outputs

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

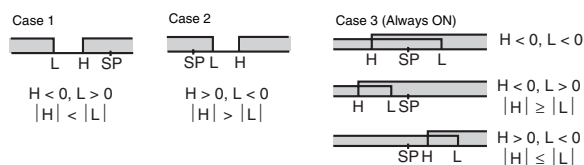
Auxiliary outputs are allocated for alarms. ON delays and OFF delays (0 to 999 s) can also be specified.

**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).

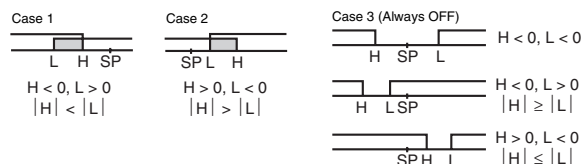
| Set value | Alarm type                                       | Alarm output operation         |                                | Description of function  |
|-----------|--|--------------------------------|--------------------------------|--|
|           |  | When alarm value X is positive | When alarm value X is negative |  |
| 0         | Alarm function OFF                               | Output OFF                     |                                | No alarm   |
| 1 *1      | Upper- and lower-limit                           | ON OFF                         | *2                             | Set the deviation in the set point by setting the alarm upper limit (H) and alarm lower limit (L).           |
| 2         | Upper-limit                                      | ON OFF                         | ON OFF                         | Set the upward deviation in the set point by setting the alarm value (X).                                    |
| 3         | Lower-limit                                      | ON OFF                         | ON OFF                         | Set the downward deviation in the set point by setting the alarm value (X).                                  |
| 4 *1      | Upper- and lower-limit range                     | ON OFF                         | *3                             | Set the deviation in the set point by setting the alarm upper limit (H) and alarm lower limit (L).           |
| 5 *1      | Upper- and lower-limit with standby sequence     | ON OFF                         | *4                             | A standby sequence is added to the upper- and lower-limit alarm (1). *6                                      |
| 6         | Upper-limit with standby sequence                | ON OFF                         | ON OFF                         | A standby sequence is added to the upper-limit alarm (2). *6   |
| 7         | Lower-limit with standby sequence                | ON OFF                         | ON OFF                         | A standby sequence is added to the lower-limit alarm (3). *6   |
| 8         | Absolute-value upper-limit                       | ON OFF                         | ON OFF                         | The alarm will turn ON if the process value is larger than the alarm value (X) regardless of the set point.  |
| 9         | Absolute-value lower-limit                       | ON OFF                         | ON OFF                         | The alarm will turn ON if the process value is smaller than the alarm value (X) regardless of the set point. |
| 10        | Absolute-value upper-limit with standby sequence | ON OFF                         | ON OFF                         | A standby sequence is added to the absolute-value upper-limit alarm (8). *6                                  |
| 11        | Absolute-value lower-limit with standby sequence | ON OFF                         | ON OFF                         | A standby sequence is added to the absolute-value lower-limit alarm (9). *6                                  |
| 12        | LBA (alarm 1 type only)                          |                                | ---                            | *7   |
| 13        | PV change rate alarm                             |                                | ---                            | *8   |

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

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



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



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

For Upper- and Lower-Limit Alarm Described Above

- 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

|   |   |   |
|---|---|---|
| <b>Indication accuracy</b>                | Thermocouple: ( $\pm 0.1\%$ of indicated value or $\pm 1^\circ\text{C}$ , whichever is greater) $\pm 1$ digit max. *1<br>Platinum resistance thermometer: ( $\pm 0.1\%$ of indicated value or $\pm 0.5^\circ\text{C}$ , whichever is greater) $\pm 1$ digit max.<br>Analog input: $\pm 0.1\%$ FS $\pm 1$ digit max.<br>CT input: $\pm 5\%$ FS $\pm 1$ digit max.              |   |
| <b>Transfer output accuracy</b>           | $\pm 0.3\%$ FS max.   |   |
| <b>Influence of temperature *2</b>        | Thermocouple input (R, S, B, W, PLII): ( $\pm 1\%$ of PV or $\pm 10^\circ\text{C}$ , whichever is greater) $\pm 1$ digit max.<br>Other thermocouple input: ( $\pm 1\%$ of PV or $\pm 4^\circ\text{C}$ , whichever is greater) $\pm 1$ digit max. *3<br>Platinum resistance thermometer: ( $\pm 1\%$ of PV or $\pm 2^\circ\text{C}$ , whichever is greater) $\pm 1$ digit max. |   |
| <b>Influence of voltage *2</b>            | Analog input: ( $\pm 1\%$ FS) $\pm 1$ digit max.  |   |
| <b>Input sampling period</b>              | 60 ms   |   |
| <b>Hysteresis</b>                         | Temperature input: 0.1 to 3240.0°C or °F (in units of 0.1°C or °F)<br>Analog input: 0.01% to 99.99% FS (in units of 0.01% FS)   |   |
| <b>Proportional band (P)</b>              | Temperature input: 0.1 to 3240.0°C or °F (in units of 0.1 °C or °F)<br>Analog input: 0.1% to 999.9% FS (in units of 0.1% FS)  |   |
| <b>Integral time (I)</b>                  | 0.0 to 3240.0 s (in units of 0.1 s)   |   |
| <b>Derivative time (D)</b>                | 0.0 to 3240.0 s (in units of 0.1 s)   |   |
| <b>Control period</b>                     | 0.5, 1 to 99 s (in units of 1 s)  |   |
| <b>Manual reset value</b>                 | 0.0 to 100.0% (in units of 0.1%)  |   |
| <b>Alarm setting range</b>                | -19999 to 32400 (decimal point position depends on input type)  |   |
| <b>Affect of signal source resistance</b> | Thermocouple: 0.1°C/ $\Omega$ max. (100 $\Omega$ max.)<br>Platinum resistance thermometer: 0.1°C/ $\Omega$ max. (10 $\Omega$ max.)  |   |
| <b>Insulation resistance</b>              | 20 M $\Omega$ min. (at 500 VDC)   |   |
| <b>Dielectric strength</b>                | 2,300 VAC, 50 or 60 Hz for 1 min (between terminals with different charge)  |   |
| <b>Vibration resistance</b>               | <b>Malfunction</b>  | 10 to 55 Hz, 20 m/s <sup>2</sup> for 10 min each in X, Y, and Z directions  |
|   | <b>Destruction</b>  | 10 to 55 Hz, 0.75-mm single amplitude for 2 hrs each in X, Y, and Z directions  |
| <b>Shock resistance</b>                   | <b>Malfunction</b>  | 100 m/s <sup>2</sup> , 3 times each in X, Y, and Z directions   |
|   | <b>Destruction</b>  | 300 m/s <sup>2</sup> , 3 times each in X, Y, and Z directions   |
| <b>Weight</b>                             | Controller: Approx. 150 g, Mounting Bracket: Approx. 10 g   |   |
| <b>Degree of protection</b>               | Front panel: IP66, Rear case: IP20, Terminals: IP00   |   |
| <b>Memory protection</b>                  | Non-volatile memory (number of writes: 1,000,000 times)   |   |
| <b>Setup Tool</b>                         | CX-Thermo version 4.0 or higher   |   |
| <b>Setup Tool port</b>                    | Provided on the bottom of the E5CN-H. Use this port to connect a computer to the E5CN-H.<br>An E58-C1FQ1 USB-Serial Conversion Cable is required to connect the computer to the E5CN-H. *4  |   |
| <b>Standards</b>                          | <b>Approved standards</b>   | UL 61010-1, CSA C22.2 No. 1010-1  |
|   | <b>Conformed standards</b>  | EN 61010-1 (IEC 61010-1): Pollution level 2, overcurrent category II, Lloyd's standards *5  |
| <b>EMC</b>                                | EMI:<br>Radiated Interference Electromagnetic Field Strength:<br>Noise Terminal Voltage:<br>EMS:<br>ESD Immunity:<br>Electromagnetic Field Immunity:<br>Burst Noise Immunity:<br>Conducted Disturbance Immunity:<br>Surge Immunity:<br>Power Frequency Magnetic Field Immunity:<br>Voltage Dip/Interrupting Immunity:   | EN 61326<br>EN 55011 Group 1, class A<br>EN 55011 Group 1, class A<br>EN 61326<br>EN 61000-4-2<br>EN 61000-4-3<br>EN 61000-4-4<br>EN 61000-4-6<br>EN 61000-4-5<br>EN 61000-4-8<br>EN 61000-4-11 |

\*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  $\pm 2^\circ\text{C} \pm 1$  digit max. The indication accuracy of the B thermocouple at a temperature of 400°C max. is not specified. The indication accuracy of B thermocouples in the 400 to 800°C range is  $\pm 3^\circ\text{C}$  max. The indication accuracy of the R and S thermocouples at a temperature of 200°C max. is  $\pm 3^\circ\text{C} \pm 1$  digit max. The indication accuracy of W thermocouples is  $\pm 0.3$  of PV or  $\pm 3^\circ\text{C}$ , whichever is greater,  $\pm 1$  digit max. The indication accuracy of PL II thermocouples is  $\pm 0.3$  of PV or  $\pm 2^\circ\text{C}$ , whichever is greater,  $\pm 1$  digit max.

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

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

\*4. External communications (RS-232C or RS-485) and cable communications for the Setup Tool can be used at the same time.

\*5. Refer to information on maritime standards in *Safety Precautions for E5□N/E5□N-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/<br>E5AN-H/E5EN-H/E5CN-H/E5GN  |
| USB interface standard        | Conforms to USB Specification 1.1.   |
| DTE speed                     | 38400 bps  |
| Connector specifications      | Computer: USB (type A plug)<br>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<br>RS-232C: Point-to-point   |
| Communications                      | RS-485 (two-wire, half duplex)/RS-232C  |
| Synchronization method              | Start-stop synchronization  |
| Protocol                            | CompoWay/F, SYSWAY, or Modbus   |
| Baud rate                           | 1200, 2400, 4800, 9600, 19200, 38400, or 57600 bps  |
| Transmission code                   | ASCII (CompoWay/F, SYSWAY)<br>RTU (Modbus)  |
| Data bit length *                   | 7 or 8 bits   |
| Stop bit length *                   | 1 or 2 bits   |
| Error detection                     | Vertical parity (none, even, odd)<br>Frame check sequence (FCS) with SYSWAY<br>Block check character (BCC) with CompoWay/F or CRC-16 Modbus |
| Flow control                        | None  |
| Interface                           | RS-485, RS-232C   |
| Retry function                      | None  |
| Communications buffer               | 217 bytes   |
| Communications response wait time   | 0 to 99 ms<br>Default: 20 ms  |

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

## Current Transformer (Order Separately) Ratings

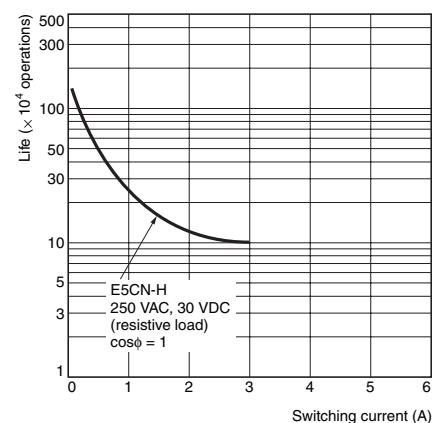
|                            |   |
|----------------------------|---|
| Dielectric strength        | 1,000 VAC for 1 min                               |
| Vibration resistance       | 50 Hz, 98 m/s <sup>2</sup>                        |
| Weight                     | E54-CT1: Approx. 11.5 g,<br>E54-CT3: Approx. 50 g |
| Accessories (E54-CT3 only) | Armatures (2)<br>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<br>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)<br>Minimum detection ON time: 100 ms   |
| SSR failure alarm setting range *2        | 0.1 to 49.9 A (in units of 0.1 A)<br>Minimum detection OFF time: 100 ms  |
| Heater overcurrent alarm setting range *3 | 0.1 to 49.9 A (in units of 0.1 A)<br>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)





## 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.

### Controllers

**Control output 1**

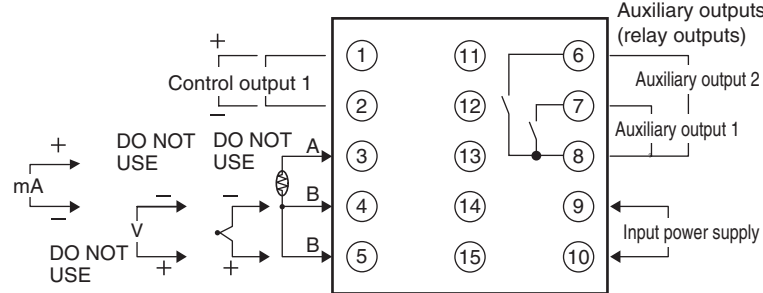
Relay output  
250 VAC, 3 A  
(resistive load)

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

Linear voltage output  
0 to 10 VAC  
Load 1 kΩ min.

Current output  
0 to 20 mA DC  
4 to 20 mA DC  
Load 600 Ω max.

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

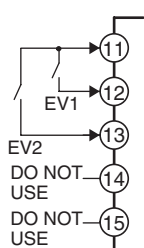
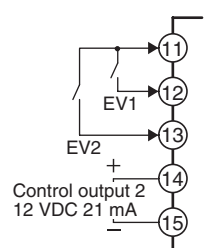
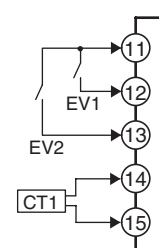
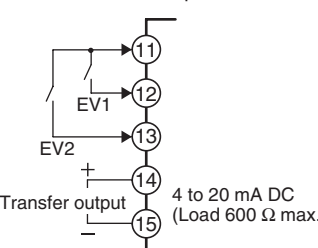
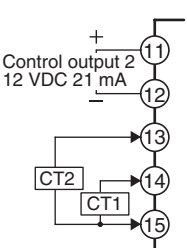
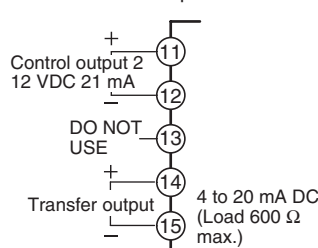
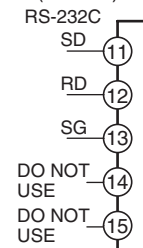
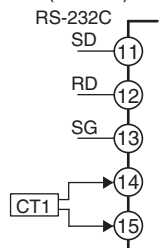
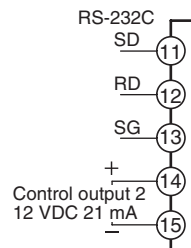
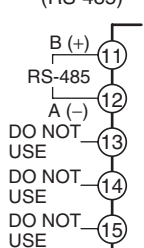
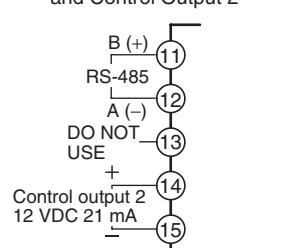
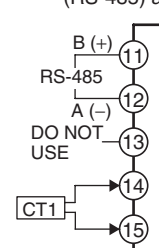
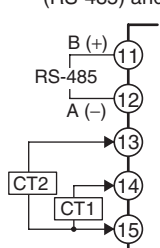
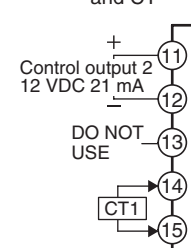


Auxiliary outputs (relay outputs)  
250 VAC, 3 A  
(resistive load)

A heater burnout alarm, SSR failure, heater overcurrent alarm, or input alarm is sent to the output to which the alarm 1 function is assigned.

- 100 to 240 VAC
- 24 VAC/VDC (no polarity)

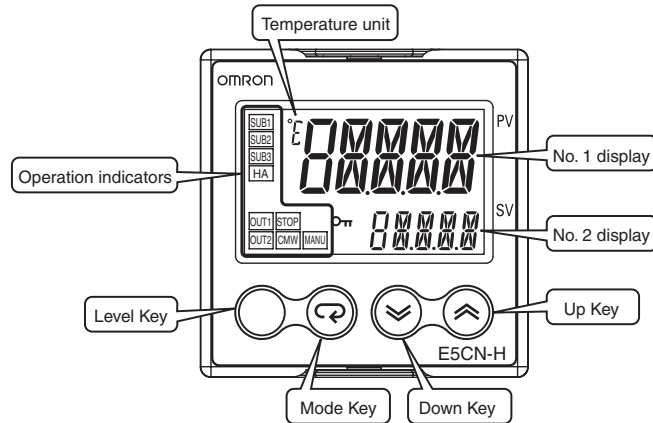
### Option Units

|   |   |   |  |   |
|---|---|---|--|---|
| <p>E53-CNBN2<br/>Event Inputs</p>                 | <p>E53-CNQBN2<br/>Event Inputs and Control Output 2</p>               | <p>E53-CNHBN2<br/>Event Inputs and CT</p>               | <p>E53-CNBFN2<br/>Event Inputs and Transfer Output</p>    |   |
| <p>E53-CNQHNN2<br/>Control Output 2 and CT2</p>  | <p>E53-CNQFN2<br/>Control Output 2 and Transfer Output</p>           | <p>E53-CN01N2<br/>Communications (RS-232)</p>          | <p>E53-CNH01N2<br/>Communications (RS-232) and CT</p>    | <p>E53-CNQ01N2<br/>Communications (RS-232) and Control Output 2</p>  |
| <p>E53-CN03N2<br/>Communications (RS-485)</p>    | <p>E53-CNQ03N2<br/>Communications (RS-485) and Control Output 2</p>  | <p>E53-CNH03N2<br/>Communications (RS-485) and CT</p>  | <p>E53-CNHH03N2<br/>Communications (RS-485) and CT2</p>  | <p>E53-CNQHNN2<br/>Control Output 2 and CT</p>                       |

**Note:** Wire all voltage input terminals correctly. The Controller may fail if voltage input terminals are wired incorrectly.

# Nomenclature

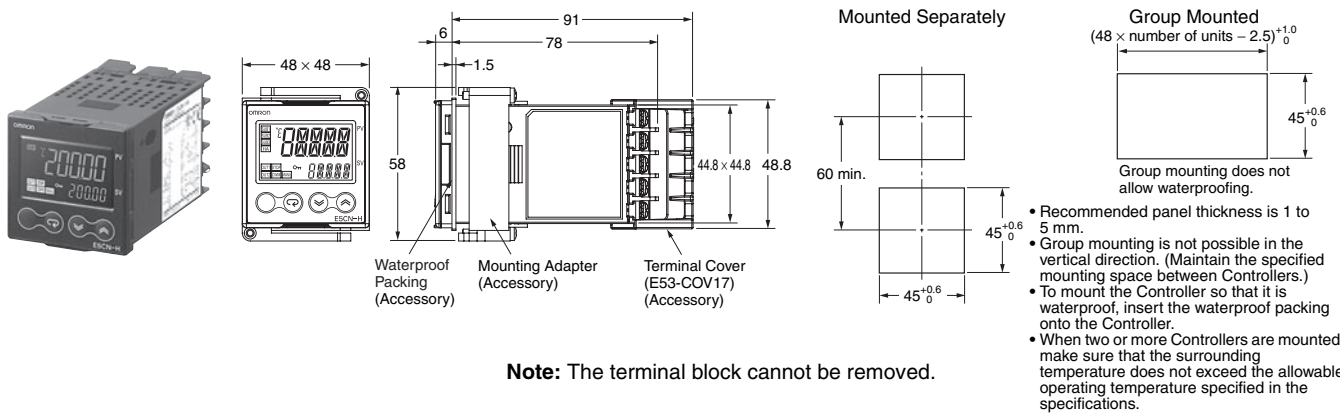
E5CN-H



# Dimensions

(Unit: mm)

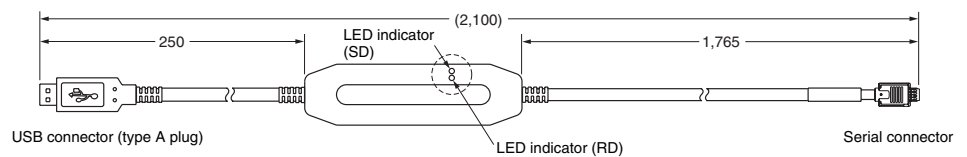
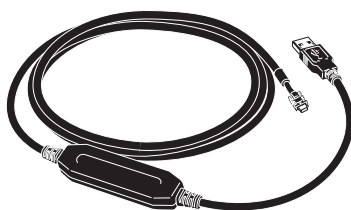
E5CN-H



# Accessories (Order Separately)

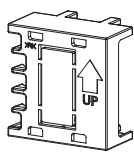
## USB-Serial Conversion Cable

E58-CIFQ1

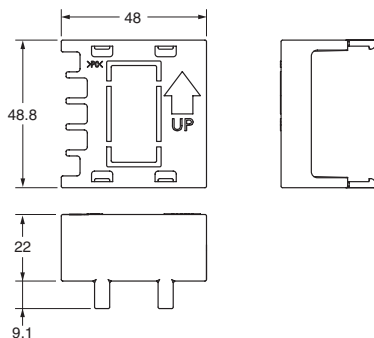


**Terminal Cover**

**E53-COV17**

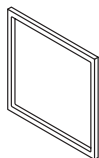


**Note:** The E53-COV10 can not be used.



**Waterproof Packing**

**Y92S-29 (for DIN 48 × 48)**



Order the Waterproof Packing separately if it becomes lost or damaged.

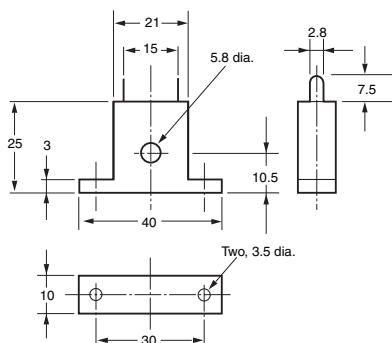
The Waterproof Packing can be used to achieve an IP66 degree of protection.

(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.

**Current Transformers**

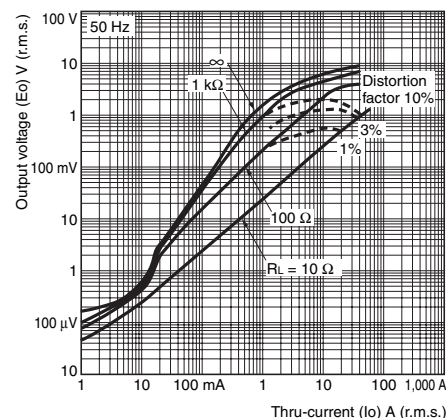
**E54-CT1**



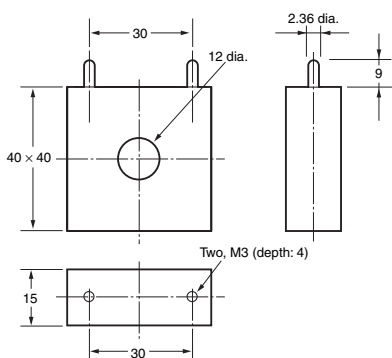
**E54-CT1**

**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



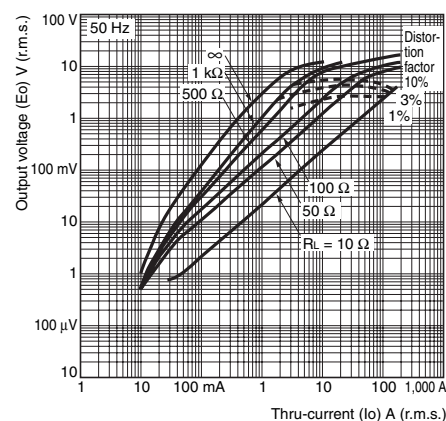
**E54-CT3**



**E54-CT3**

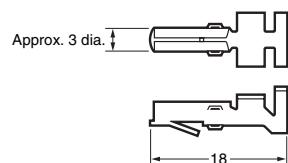
**Thru-current (Io) vs. Output Voltage (Eo) (Reference Values)**

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

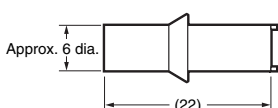


**E54-CT3 Accessory**

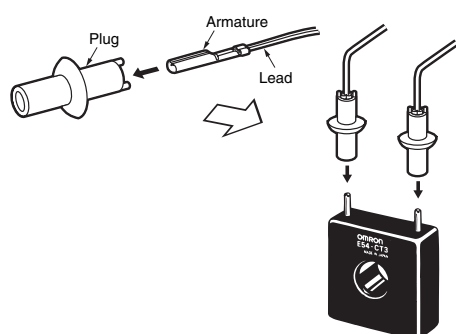
• **Armature**



• **Plug**

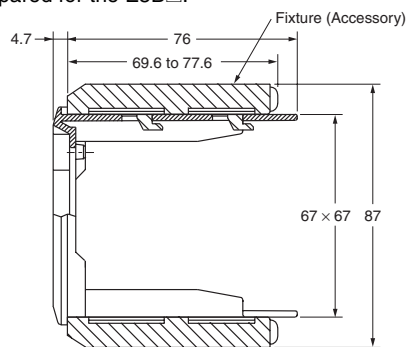
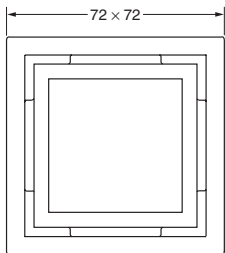
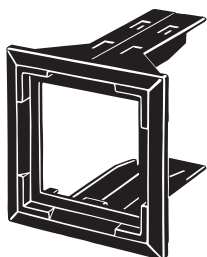


**Connection Example**

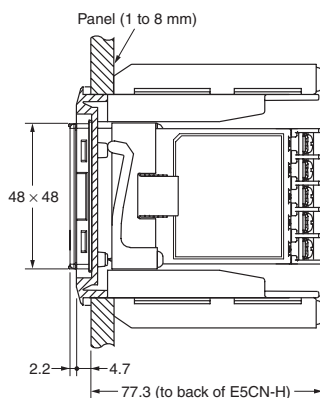
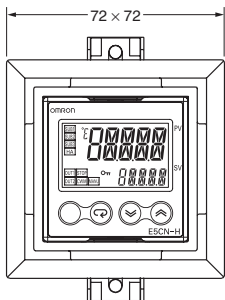
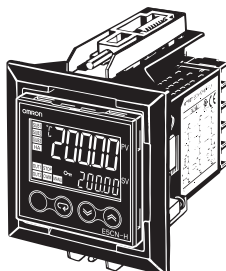


**Adapter**

**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-H**



## Read and Understand This Catalog

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

## Warranty and Limitations of Liability

### WARRANTY

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

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.

2011.2

In the interest of product improvement, specifications are subject to change without notice.

**OMRON Corporation**  
Industrial Automation Company

<http://www.ia.omron.com/>

(c)Copyright OMRON Corporation 2011 All Right Reserved.

## X-ON Electronics

Largest Supplier of Electrical and Electronic Components

*Click to view similar products for [Omron](#) manufacturer:*

Other Similar products are found below :

[S8JX-G01512CD](#) [S8VM-03024C](#) [NS5-SQ10-V2](#) [E2B-M18LS08-M1-B1 OMS](#) [NS5-SQ11B-V2](#) [E2B-M18KS08-M1-B1 OMS](#) [G5PA-28-MC](#)  
[DC24](#) [XM3B-2542-132L](#) [E32-D32 2M](#) [G8P-1A4P-DC48](#) [G5RL-1A-E-HR-5DC](#) [XF2W-1415-1A](#) [LY1D-2-5S-AC120](#) [LY3N-DC24](#) [LY4](#)  
[100/110VDC](#) [M165-JG-12D](#) [M165-TA-24](#) [CS1G-CPU43-E](#) [M22CAT1](#) [61FGPN8DAC120](#) [M7E-01DGN2-B](#) [M7E-08DRN2](#) [M7E-20DRN1](#)  
[M7E-HRN2](#) [M8PHWS](#) [MA15DP21CC](#) [MA6APC4](#) [F03-01 SUS304 BINIL](#) [F03-02 SUS316](#) [F150LTC20](#) [F39-JA1A](#) [F3SJ-A0245P30](#)  
[F3UVHM](#) [F3WD052C5M](#) [MG2-US-AC24](#) [MGN2A-DC24](#) [MK2EP-UA-AC6V](#) [MK2PNIAC240](#) [MK310E-DC24](#) [MM4KPDC125NC](#)  
[MM4XPAC120](#) [PH-1-10M](#) [G2Q-184P-V-DC5](#) [G2R-1114P-V-US-DC5](#) [G2R13SNDDC24](#) [G2R-1-AC240](#) [G2R-1A-T-AC24](#) [G2R-1-H-DC24](#)  
[G2R1SNAC110S](#) [G2R2SDDC12S](#)