# Advanced Digital Temperature Controller

# E5CN-H (48 x 48 mm)

CSM_E5CN-H_DS_E_4_7

## 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: ±0.1% of PV
  Analog input: ±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.

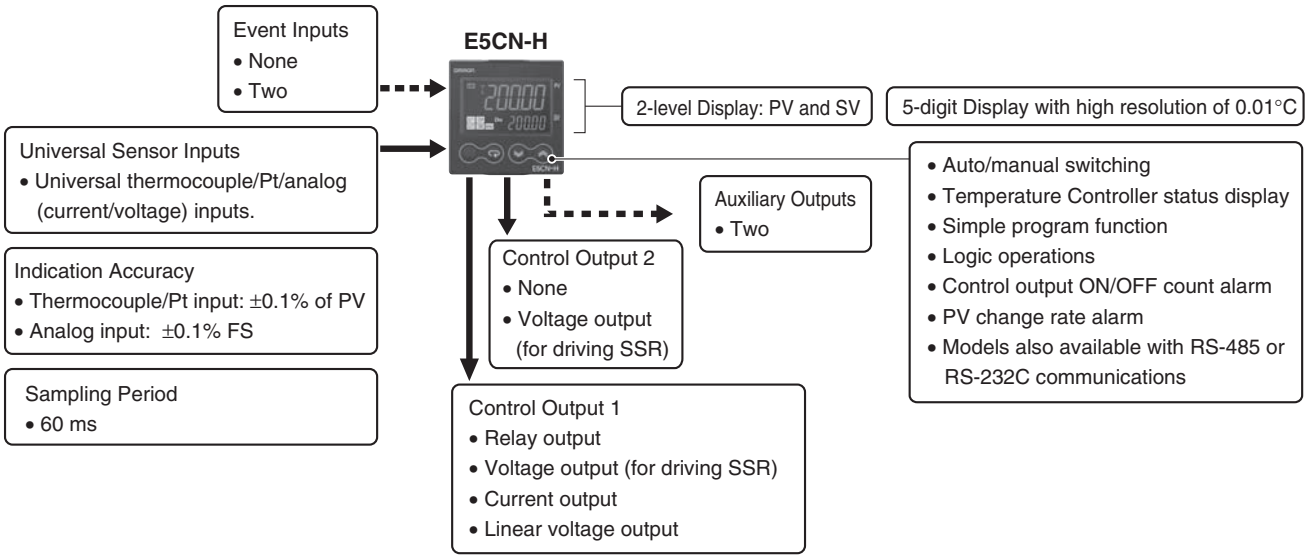
**48 × 48 mm**
**E5CN-H**

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

⚠ 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

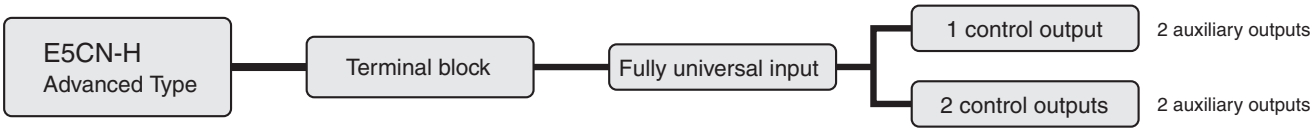



This data sheet is provided as a guideline for selecting products. Be sure to refer to the following user manuals for application precautions and other information required for operation before attempting to use the product.

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 48 × 48 × 78 (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/ Heater overcurrent detection | | | | **E53-CNHH03N2** |
| | | Heater burnout/SSR failure/ Heater overcurrent detection | Event inputs | | | **E53-CNHBN2** |
| Communications RS-485 | | | | Control output 2 (Voltage for driving SSR) | | **E53-CNQ03N2** |
| Communications RS-485 | | Heater burnout/SSR failure/ Heater overcurrent detection | | | | **E53-CNH03N2** |
| Communications RS-485 | | | | | | **E53-CN03N2** |
| | | | Event inputs | | | **E53-CNBN2** |
| | | Heater burnout/SSR failure/ Heater overcurrent detection | | Control output 2 (Voltage for driving SSR) | | **E53-CNQHN2** |
| | | 3-phase heater burnout/SSR failure/ Heater overcurrent detection | | Control output 2 (Voltage for driving SSR) | | **E53-CNQHHN2** |
| | | | Event inputs | Control output 2 (Voltage for driving SSR) | | **E53-CNQBN2** |
| | | | | Control output 2 (Voltage for driving SSR) | Transfer Output | **E53-CNQFN2** |
| | | | Event inputs | | Transfer Output | **E53-CNBFN2** |
| | Communications RS-232C | | | Control output 2 (Voltage for driving SSR) | | **E53-CNQ01N2** |
| | Communications RS-232C | | | | | **E53-CN01N2** |
| | Communications RS-232C | Heater burnout/SSR failure/ 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-P8** |

**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□.

### DIN Track Mounting Adapter

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

### Front cover

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

### CX-Thermo Support Software

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

# Specifications

## Ratings

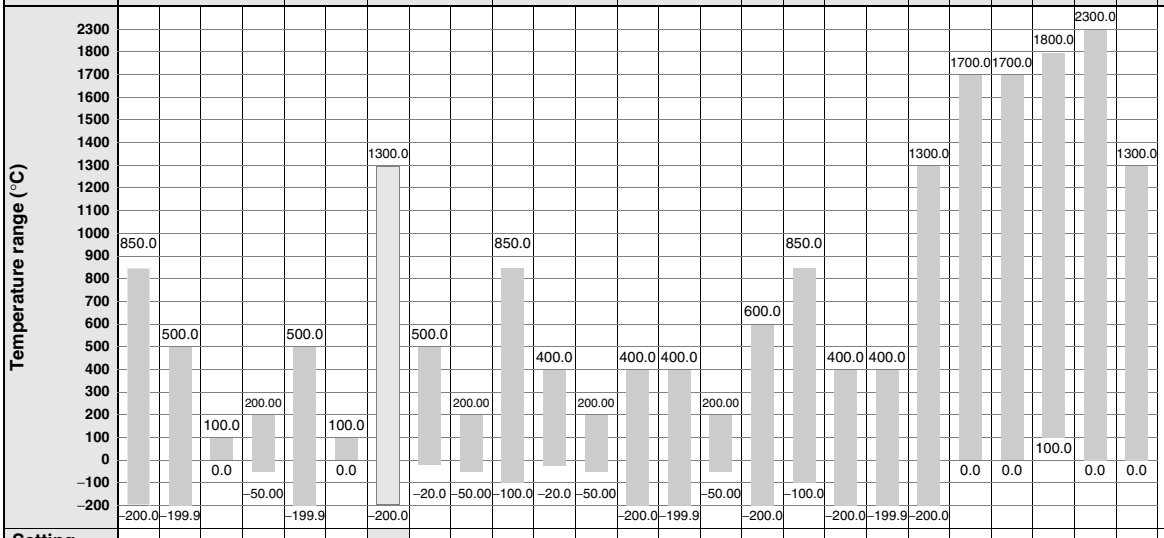
| | | |
|---|---|---|
| **Power supply voltage** | | No D in model number: 100 to 240 VAC, 50/60 Hz<br>D in model number: 24 VAC, 50/60 Hz; 24 VDC |
| **Operating voltage range** | | 85% to 110% of rated supply voltage |
| **Power consumption** | | 100 to 240 VAC: 8.5 VA (max.) (E5CN-HR2 at 100 VAC: 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) |
| **Sensor input** | | 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 |
| **Input impedance** | | Current input: 150 Ω max., Voltage input: 1 MΩ min. (Use a 1:1 connection when connecting the ES2-HB.) |
| **Control method** | | ON/OFF control or 2-PID control (with auto-tuning) |
| **Control output** | **Relay output** | SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA |
| | **Voltage output (for driving SSR)** | Output voltage: 12 VDC ±15% (PNP), max. load current: 21 mA, with short-circuit protection circuit |
| | **Current output** | 4 to 20 mA DC/0 to 20 mA DC, load: 600 Ω max., resolution: approx. 10,000 ✻ |
| | **Linear voltage output** | 0 to 10 VDC (load: 1 kΩ min.), Resolution: Approx. 10,000 |
| **Auxiliary output** | **Number of outputs** | 2 max. |
| | **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 input** | **Number of outputs** | 2 |
| | **External contact input specifications** | Contact input: ON: 1 kΩ max., OFF: 100 kΩ min. |
| | | Non-contact input: ON: Residual voltage: 1.5 V max., OFF: Leakage current: 0.1 mA max. |
| | | Current flow: Approx. 7 mA per contact |
| **Logic operations** | **Number of operations** | 8 max. (Combinations can be made using work bits.) |
| | **Operations** | • Logic operation: Any of the following four patterns can be selected. The input status may be inverted.<br>(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.)<br>• Delay: ON delay or OFF delay for the results of the logic operation given above.<br>Setting time: 0 to 9999 s or 0 to 9999 min<br>• Output inversion: Possible |
| | **Outputs** | One work bit per operation |
| | **Work bit assignments** | Any of the following can be assigned to up to eight work bits (logic operation results): Event input operations, auxiliary outputs, or control outputs. |
| **Transfer outputs** | **Number of outputs** | 1 max. |
| | **Output specifications** | Current output: 4 to 20 mA DC, Load: 600 Ω max., Resolution at 4 to 20 mA: Approx. 10,000 |
| **RSP input** | | Not supported |
| **Setting method** | | Digital setting using front panel keys |
| **Indication method** | | 11-segment digital display and individual indicators (7-segments displays also possible)<br>Character height: PV: 11 mm, SV: 6.5 mm |
| **Bank switching** | | Supported (number of banks: 8)<br>Local SP, alarm settings, PID sets (PID constants, MV upper limit, MV lower limit, etc.) |
| **Other functions** | | 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 |
| **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) |

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

# Input Ranges

## Thermocouple/Platinum Resistance Thermometer/Analog Input (Fully Universal Inputs)

| Input type | Platinum resistance thermometer | | | | | | Thermocouple | | | | | | | | | | | | | | | | | | Analog input | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Name | Pt100 | | | | JPt100 | | K | | | J | | | T | | | E | L | U | | N | R | S | B | W | PL II | 4 to 20 mA | 0 to 20 mA | 1 to 5 V | 0 to 5 V | 0 to 10 V |
| Setting number | 0 | 1 | 2 | 24 | 3 | 4 | 5 | 6 | 21 | 7 | 8 | 22 | 9 | 10 | 23 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 25 | 26 | 27 | 28 | 29 |




Shaded settings are the default settings.

The applicable standards for the input types are as follows:

K, J, T, E, N, R, S, B: JIS C 1602-1995, IEC 584-1

L: Fe-CuNi, DIN 43710-1985

U: Cu-CuNi, DIN 43710-1985

W: W5Re/W26Re, ASTM E988-1990

JPt100: JIS C 1604-1989, JIS C 1606-1989

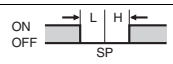
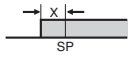
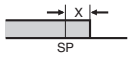
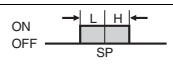
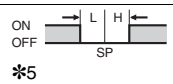
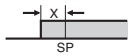
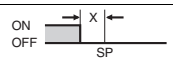
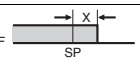
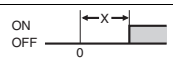
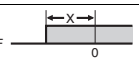
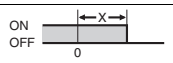
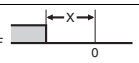
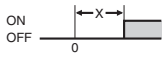
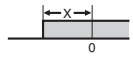
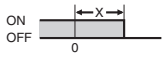
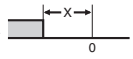
Pt100: JIS C 1604-1997, IEC 751

PL II: According to Platinel II electromotive force charts from BASF (previously Engelhard)

## Alarm Outputs

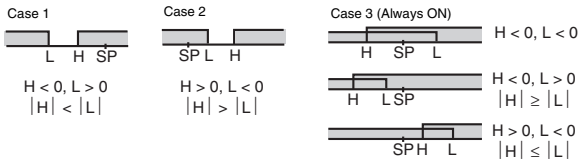
Each alarm can be independently set to one of the following 13 alarm types. The default is *2: Upper limit*.
Auxiliary outputs are allocated for alarms. ON delays and OFF delays (0 to 999 s) can also be specified.

**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).

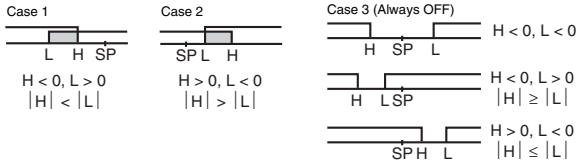
| Set value | Alarm type | Alarm output operation | | Description of function |
|---|---|---|---|---|
| | | When alarm value X is positive | When alarm value X is negative | |
| 0 | Alarm function OFF | Output OFF | | No alarm |
| 1 ✻1 | Upper- and lower-limit |   | ✻2 | Set the deviation in the set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

**✻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

| | | |
|---|---|---|
| **Indication accuracy** | | Thermocouple: (±0.1% of indicated value or ±1°C, whichever is greater) ±1 digit max. ✻1<br>Platinum resistance thermometer: (±0.1% of indicated value or ±0.5°C, whichever is greater) ±1 digit max.<br>Analog input: ±0.1% FS ±1 digit max.<br>CT input: ±5% FS ±1 digit max. |
| **Transfer output accuracy** | | ±0.3% FS max. |
| **Influence of temperature ✻2** | | Thermocouple input (R, S, B, W, PLII): (±1% of PV or ±10°C, whichever is greater) ±1 digit max.<br>Other thermocouple input: (±1% of PV or ±4°C, whichever is greater) ±1 digit max. ✻3<br>Platinum resistance thermometer: (±1% of PV or ±2°C, whichever is greater) ±1 digit max.<br>Analog input: (±1%FS) ±1 digit max. |
| **Influence of voltage ✻2** | | |
| **Influence of EMS. (at EN 61326-1)** | | |
| **Input sampling period** | | 60 ms |
| **Hysteresis** | | 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) |
| **Proportional band (P)** | | 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) |
| **Integral time (I)** | | 0.0 to 3240.0 s (in units of 0.1 s) |
| **Derivative time (D)** | | 0.0 to 3240.0 s (in units of 0.1 s) |
| **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** | | −19999 to 32400 (decimal point position depends on input type) |
| **Affect of signal source resistance** | | Thermocouple: 0.1°C/Ω max. (100 Ω max.)<br>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** | **Malfunction** | 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** | **Malfunction** | 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** | | Controller: Approx. 150 g, Mounting Bracket: Approx. 10 g |
| **Degree of protection** | | Front panel: IP66, Rear case: IP20, Terminals: IP00 |
| **Memory protection** | | Non-volatile memory (number of writes: 1,000,000 times) |
| **Setup Tool** | | CX-Thermo version 4.0 or higher |
| **Setup Tool port** | | Provided on the bottom of the E5CN-H. Use this port to connect a computer to the E5CN-H.<br>An E58-CIFQ1 USB-Serial Conversion Cable is required to connect the computer to the E5CN-H. ✻4 |
| **Standards** | **Approved standards** | UL 61010-1, CSA C22.2 No. 1010-1 |
| | **Conformed standards** | EN 61010-1 (IEC 61010-1): Pollution level 2, overcurrent category II, Lloyd's standards ✻5 |
| **EMC** | | EMI: EN 61326-1 ✻6<br>Radiated Interference Electromagnetic Field Strength: EN 55011 Group 1, class A<br>Noise Terminal Voltage: EN 55011 Group 1, class A<br>EMS: EN 61326-1 ✻6<br>ESD Immunity: EN 61000-4-2<br>Electromagnetic Field Immunity: EN 61000-4-3<br>Burst Noise Immunity: EN 61000-4-4<br>Conducted Disturbance Immunity: EN 61000-4-6<br>Surge Immunity: EN 61000-4-5<br>Power Frequency Magnetic Field Immunity: EN 61000-4-8<br>Voltage Dip/Interrupting Immunity: 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 ±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 23°C to 55°C, Voltage range: −15% to 10% of rated voltage
**✻3.** K thermocouple at −100°C max.: ±10°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.
**✻6.** Industrial electromagnetic environment (EN/IEC 61326-1 Table 2)

## USB-Serial Conversion Cable

| | |
|---|---|
| **Applicable OS** | Windows XP/Vista/7/8 |
| **Applicable software** | CX-Thermo version 4 or higher |
| **Applicable models** | E5AN/E5EN/E5CN/E5CN-U/ E5AN-H/E5EN-H/E5CN-H |
| **USB interface standard** | Conforms to USB Specification 1.1. |
| **DTE speed** | 38400 bps |
| **Connector 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<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$^2$ |
| **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

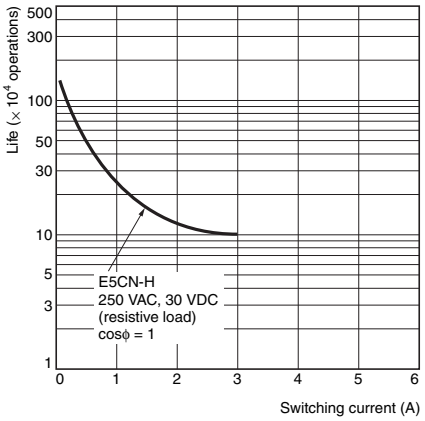
| | |
|---|---|
| **CT input (for heater current detection)** | Models with detection for single-phase heaters: One input<br>Models with detection for single-phase or three-phase heaters: Two inputs |
| **Maximum heater current** | 50 A AC |
| **Input current indication accuracy** | ±5% FS ±1 digit max. |
| **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).

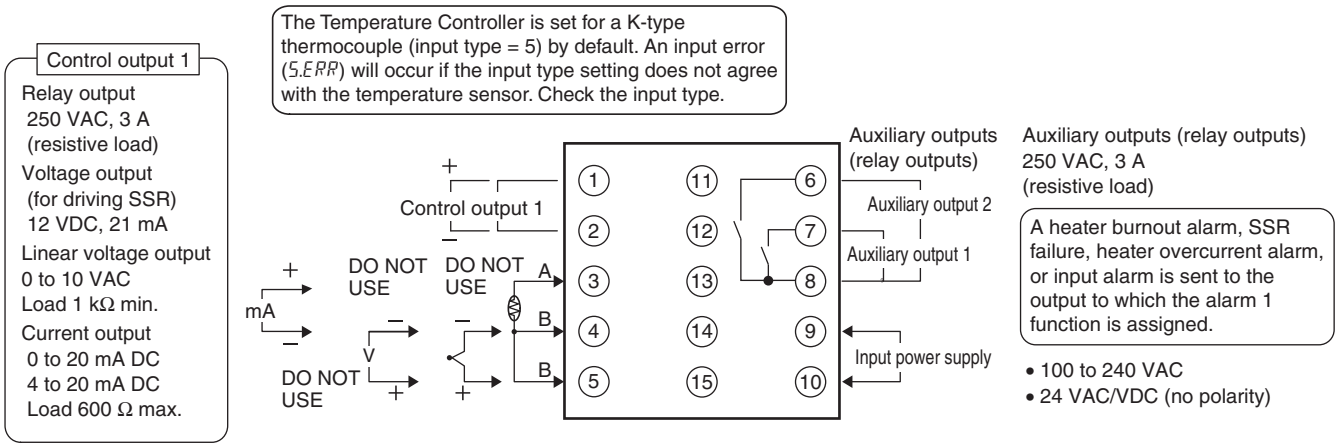
## Electrical Life Expectancy Curve for Relays (Reference Values)



# External Connections

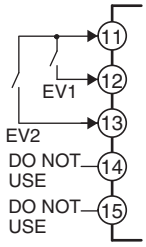
- A voltage output (control output, for driving SSR) is not electrically insulated from the internal circuits. When using a grounding thermocouple, do not connect any of the control output terminals to ground. If the control output terminals are connected to ground, errors will occur in the measured temperature values as a result of leakage current.

## Controllers

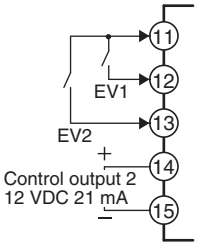



## Option Units

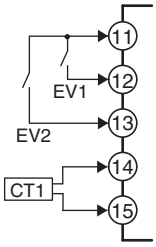
E53-CNBN2
Event Inputs



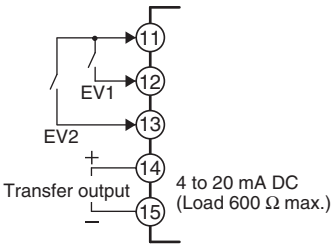

E53-CNQBN2
Event Inputs and Control Output 2



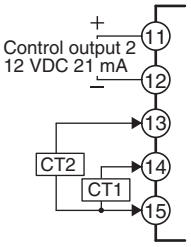

E53-CNHBN2
Event Inputs and CT



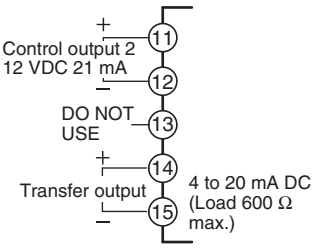

E53-CNBFN2
Event Inputs and Transfer Output



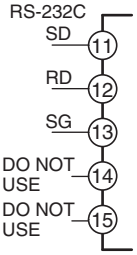

E53-CNQHHN2
Control Output 2 and CT2



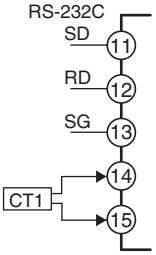

E53-CNQFN2
Control Output 2 and Transfer Output



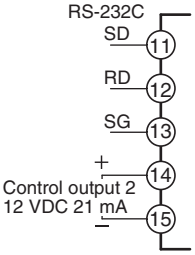

E53-CN01N2
Communications (RS-232)



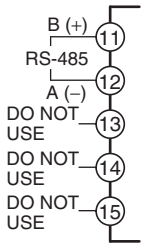

E53-CNH01N2
Communications (RS-232) and CT



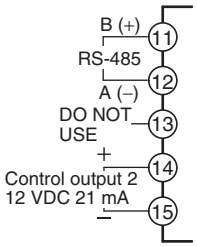

E53-CNQ01N2
Communications (RS-232) and Control Output 2



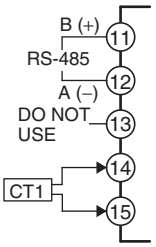

E53-CN03N2
Communications (RS-485)



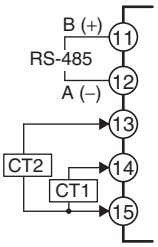

E53-CNQ03N2
Communications (RS-485) and Control Output 2



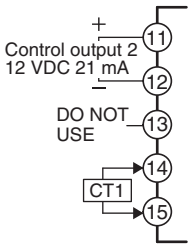

E53-CNH03N2
Communications (RS-485) and CT




E53-CNHH03N2
Communications (RS-485) and CT2

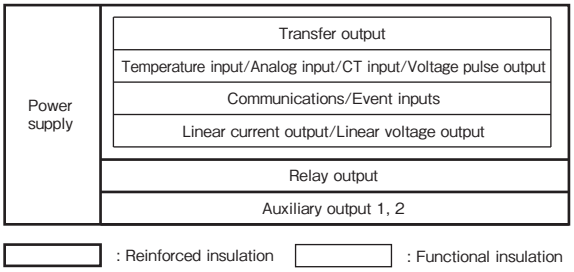



E53-CNQHN2
Control Output 2 and CT



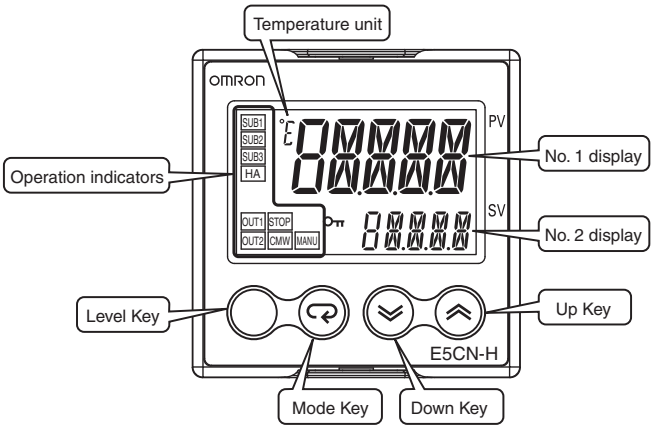

**Note:** Wire all voltage input terminals correctly. The Controller may fail if voltage input terminals are wired incorrectly.

# Isolation/Insulation Block Diagrams




# Nomenclature

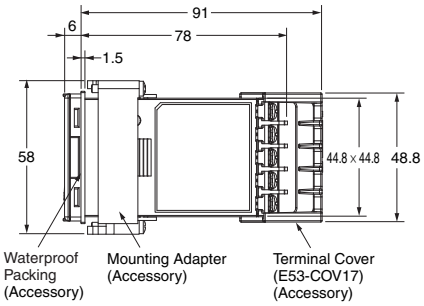
**E5CN-H**



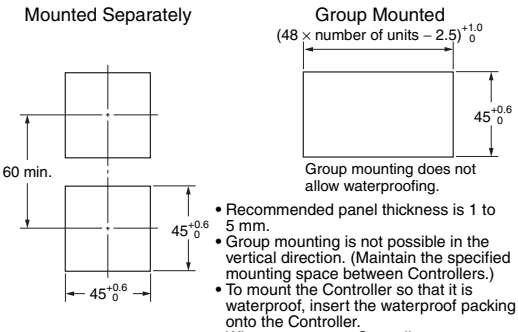

# Dimensions

**(Unit: mm)**

**E5CN-H**




**Panel Cutout**



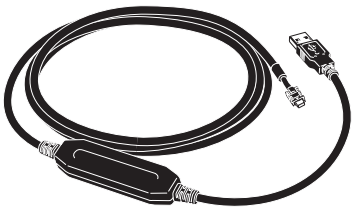

- Recommended panel thickness is 1 to 5 mm.
- Group mounting is not possible in the vertical direction. (Maintain the specified mounting space between Controllers.)
- To mount the Controller so that it is waterproof, insert the waterproof packing onto the Controller.
- When two or more Controllers are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

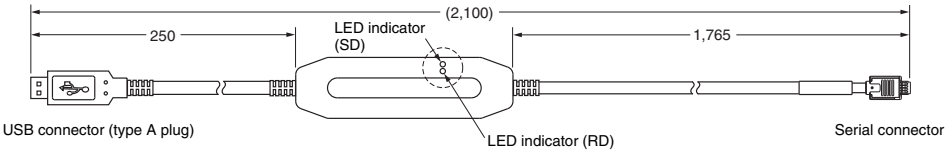
**Note:** The terminal block cannot be removed.

# Accessories (Order Separately)

## USB-Serial Conversion Cable

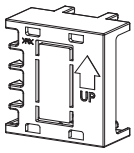
**E58-CIFQ1**



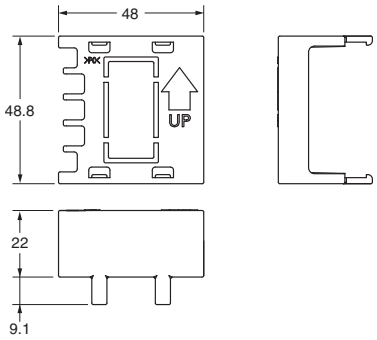


## Terminal Cover

### E53-COV17

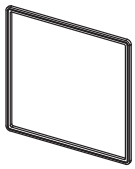



**Note:** The E53-COV10 can not be used.




## Waterproof Packing

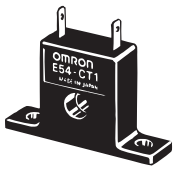
### Y92S-P8 (for DIN 48 × 48)

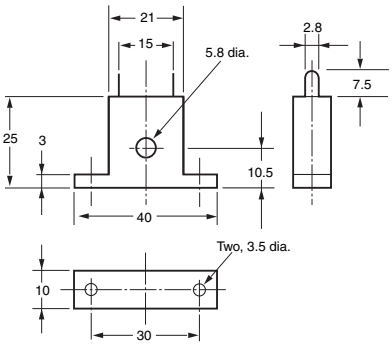


Order the Waterproof Packing separately if it becomes lost or damaged.
The Waterproof Packing can be used to achieve an IP66 degree of protection.
(Deterioration, shrinking, or hardening of the waterproof packing may occur depending on the operating environment. Therefore, periodic replacement is recommended 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.

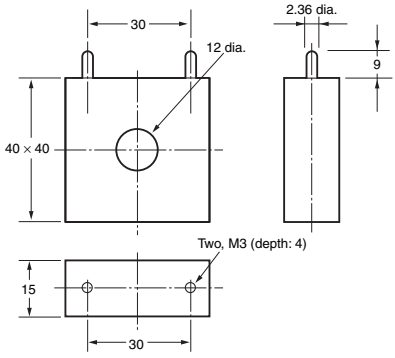
## Current Transformers

### E54-CT1



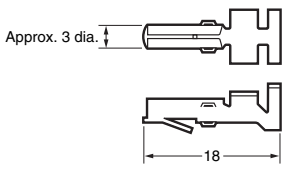




### E54-CT3

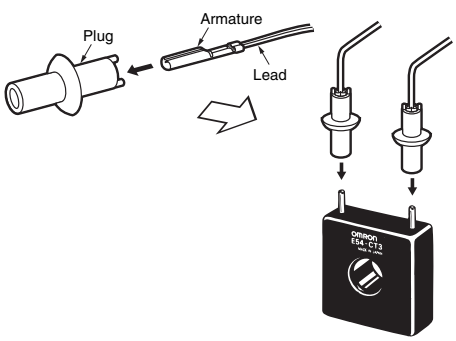



### E54-CT3 Accessory

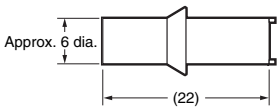
- **Armature**




**Connection Example**

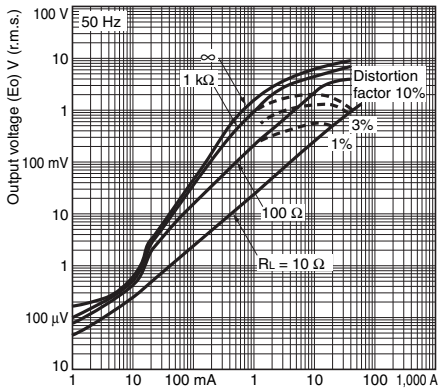



- **Plug**



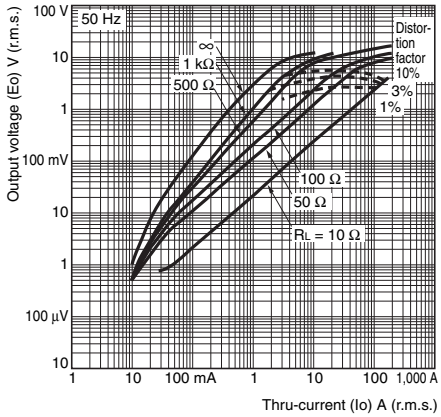

### E54-CT1
### Thru-current (Io) vs. Output Voltage (Eo) (Reference Values)

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



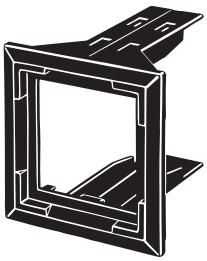

### E54-CT3
### Thru-current (Io) vs. Output Voltage (Eo) (Reference Values)

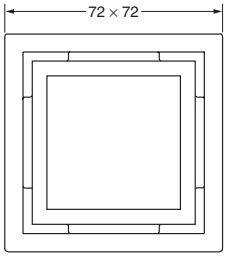
Maximum continuous heater current: 120 A (50/60 Hz)
(Maximum continuous heater current for an OMRON Temperature Controller is 50 A.)
Number of windings: 400±2
Winding resistance: 8±0.8 Ω

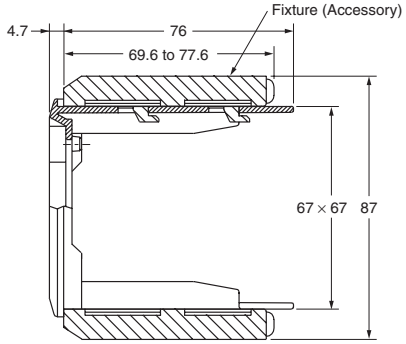


## Adapter

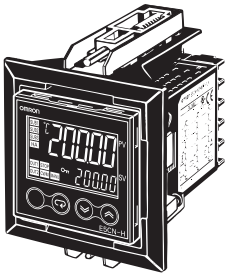
**Y92F-45** **Note: 1.** Use this Adapter when the panel has already been prepared for the E5B□.
**2.** The Adapter is available only in black.

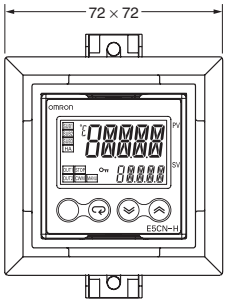


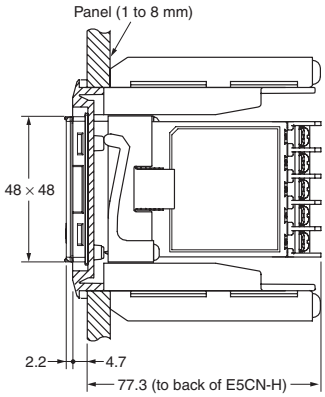



**Mounted to E5CN-H**

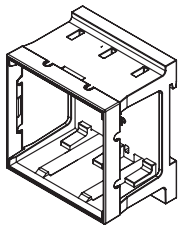


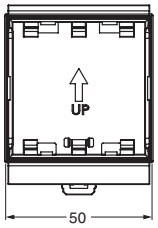


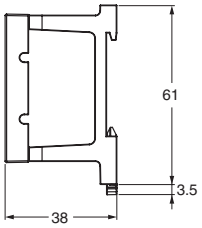




## DIN Track Mounting Adapter

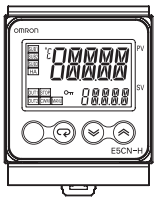
**Y92F-52** **Note:** This Adapter cannot be used together with the Terminal Cover.
Remove the Terminal Cover to use the Adapter.

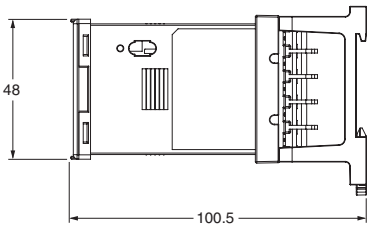





**Mounted to E5CN-H**





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