

## Programmable Controllers Join the Series!

Program up to 256 segments and take advantage of the high cost performance of the new LCD that improves both the field of view and contrast.

- Set up to 8 programmed patterns with up to 32 segments (steps) each.
- High-resolution display with 5 digits/0.01°C display.
- 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. Models also available with Remote SP.
- A PV/SV-status display function can be set to automatically alternate between displaying the status of the Temperature Controller (auto/manual, RUN/RESET, and alarms) and the PV or SV.
- Flexible contact outputs with logic operations (AND, OR, and delays) set from the Support Software (CX-Thermo version 4.3). Program settings can be managed.
- An infrared ports enables communications from the front panel.
- Preventive maintenance for relays in the Temperature Controller using a Control Output ON/OFF Counter.
- Model available with position-proportional control. \*



96 × 96 mm  
E5AN-HT

48 × 96 mm  
E5EN-HT

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

E5AN-HTPRR2B□-500, E5EN-HTPRR2B□-500 in this catalog have been discontinued at the end of March 2018.

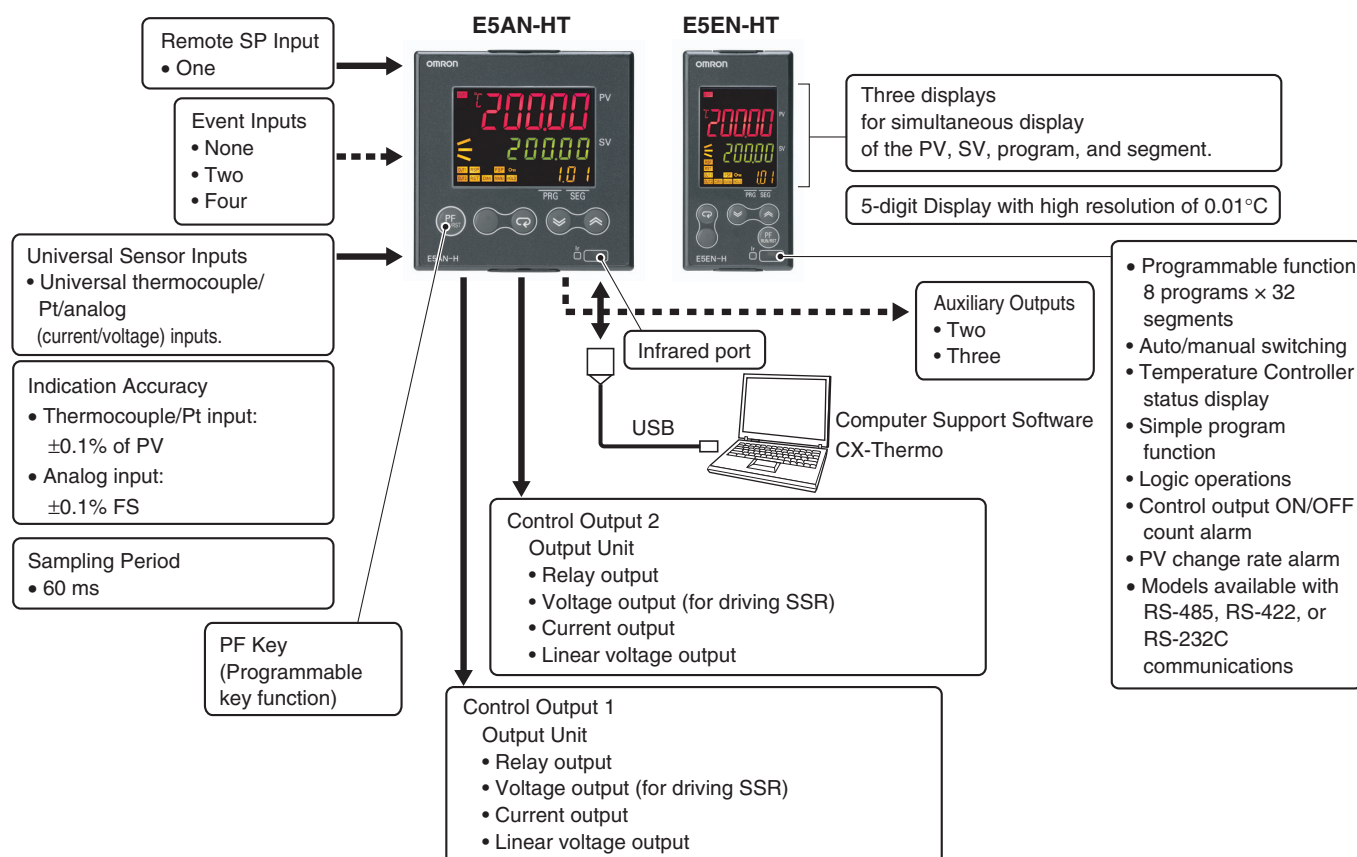


Refer to *Safety Precautions for E5□N/E5□N-H/E5□N-HT*.

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

\* Orders will not be accepted after March 31, 2018.

## Main I/O Functions



## Lineup



**Note:** The Controller can be used for heating/cooling control even if only 1 control output is used.

## Model Number Structure

### Model Number Legend

#### Controllers

**E5AN/E5EN-**             **M** **-** **-500**

1 2 3 4 5 6 7 8 9 10 11

#### 1. Type

HT: Programmable

#### 2. Control Mode

Blank: Standard or heating/cooling control  
P: Position-proportional control \*

#### 3. Control Output 1

A: Control Output Unit  
R: Relay output \*

#### 4. Control Output 2

A: Control Output Unit  
R: Relay output \*

#### 5. Auxiliary Outputs

2: Two outputs  
3: Three outputs

#### 6. Option 1

Blank: None  
H: Heater burnout/SSR failure/Heater overcurrent detection (CT1)  
HH: Heater burnout/SSR failure/Heater overcurrent detection (CT2)

#### 7. Option 2

B: Two event inputs  
BF: Event input + Transfer output

#### 8. Option 3

M: Option Unit can be mounted.

#### 9. Power Supply Voltage

Blank: 100 to 240 VAC  
D: 24 VAC/VDC

#### 10. Case Color

Blank: Black

#### 11. Terminal Cover

-500: With Terminal Cover

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#### Option Units

**E53-** 

1

#### 1. Function

EN01: RS-232C communications  
EN02: RS-422 communications  
EN03: RS-485 communications  
AKB: Event input

#### Output Units

**E53-**  

1 2

#### 1. Control Output

R: Relay output  
Q: Voltage output (for driving SSR)  
Q3: Voltage output (for driving SSR) + 24 VDC (NPN)  
Q4: Voltage output (for driving SSR) + 24 VDC (PNP)  
C3: Current output + 4 to 20 mA DC  
C3D: Current output + 0 to 20 mA DC  
V34: Linear voltage output + 0 to 10 VDC  
V35: Linear voltage output + 0 to 5 VDC

#### 2. Version

Blank: Available for E5AN-H/E5EN-H/E5AN-HT/E5EN-HT.  
N: Available only for E5AN-H/E5EN-H and E5AN-HT/E5EN-HT.

**Note:** Estimates can be provided for coatings and other specifications that are not given in the datasheet. Ask your OMRON representative for details.

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-HT/E5AN-HT/E5EN-HT Digital Controllers User's Manual Programmable Type (Cat. No. H169)

E5CN-HT/E5AN-HT/E5EN-HT Digital Controllers Communications Manual Programmable Type (Cat. No. H170)

## Ordering Information

## E5AN-HT

| Size                                   | Case color | Power supply voltage | Control method | Auxiliary output | Control output 1/2      | Heater burnout | Optional functions |                   |                  | Model                 |
|----------------------------------------|------------|----------------------|----------------|------------------|-------------------------|----------------|--------------------|-------------------|------------------|-----------------------|
|                                        |            |                      |                |                  |                         |                | Event inputs       | Transfer output   | RSP              |                       |
| 1/4 DIN<br>96 × 96 × 78<br>(W × H × D) | Black      | 100 to 240 VAC       | Basic          | 2                | Control Output Unit × 2 | 1              | 2                  |                   | 4 to 20-mA input | E5AN-HTAA2HBM-500     |
|                                        |            |                      |                |                  | Control Output Unit × 2 | 2              | 2                  | 4 to 20-mA output | 4 to 20-mA input | E5AN-HTAA2HHBFM-500   |
|                                        |            |                      |                | 3                | Control Output Unit × 2 |                | 2                  | 4 to 20-mA output | 4 to 20-mA input | E5AN-HTAA3BFM-500     |
|                                        |            |                      | Valve          | 2                | Relay outputs × 2       |                | 2                  |                   | 4 to 20-mA input | E5AN-HTPRR2BM-500 *   |
|                                        |            |                      |                |                  | Relay outputs × 2       |                | 2                  | 4 to 20-mA output | 4 to 20-mA input | E5AN-HTPRR2BFM-500 *  |
|                                        |            |                      |                | 2                | Relay outputs × 2       |                | 2                  |                   | 4 to 20-mA input | E5AN-HTPRR2BFM-500 *  |
|                                        |            | 24 VAC/VDC           | Basic          | 2                | Control Output Unit × 2 | 1              | 2                  |                   | 4 to 20-mA input | E5AN-HTAA2HBMD-500    |
|                                        |            |                      |                |                  | Control Output Unit × 2 | 2              | 2                  | 4 to 20-mA output | 4 to 20-mA input | E5AN-HTAA2HHBFMD-500  |
|                                        |            |                      |                | 3                | Control Output Unit × 2 |                | 2                  | 4 to 20-mA output | 4 to 20-mA input | E5AN-HTAA3BFMD-500    |
|                                        |            |                      | Valve          | 2                | Relay outputs × 2       |                | 2                  |                   | 4 to 20-mA input | E5AN-HTPRR2BMD-500 *  |
|                                        |            |                      |                |                  | Relay outputs × 2       |                | 2                  | 4 to 20-mA output | 4 to 20-mA input | E5AN-HTPRR2BFMD-500 * |

\* Orders will not be accepted after March 31, 2018.

## E5EN-HT

| Size                                   | Case color | Power supply voltage | Control method | Auxiliary output | Control output 1/2      | Heater burnout | Optional Functions |                   |                  | Model                 |
|----------------------------------------|------------|----------------------|----------------|------------------|-------------------------|----------------|--------------------|-------------------|------------------|-----------------------|
|                                        |            |                      |                |                  |                         |                | Event inputs       | Transfer output   | RSP              |                       |
| 1/8 DIN<br>48 × 96 × 78<br>(W × H × D) | Black      | 100 to 240 VAC       | Basic          | 2                | Control Output Unit × 2 | 1              | 2                  |                   | 4 to 20-mA input | E5EN-HTAA2HBM-500     |
|                                        |            |                      |                |                  | Control Output Unit × 2 | 2              | 2                  | 4 to 20-mA output | 4 to 20-mA input | E5EN-HTAA2HHBFM-500   |
|                                        |            |                      |                | 3                | Control Output Unit × 2 |                | 2                  | 4 to 20-mA output | 4 to 20-mA input | E5EN-HTAA3BFM-500     |
|                                        |            |                      | Valve          | 2                | Relay outputs × 2       |                | 2                  |                   | 4 to 20-mA input | E5EN-HTPRR2BM-500 *   |
|                                        |            |                      |                |                  | Relay outputs × 2       |                | 2                  | 4 to 20-mA output | 4 to 20-mA input | E5EN-HTPRR2BFM-500 *  |
|                                        |            |                      |                | 2                | Relay outputs × 2       |                | 2                  |                   | 4 to 20-mA input | E5EN-HTPRR2BFM-500 *  |
|                                        |            | 24 VAC/VDC           | Basic          | 2                | Control Output Unit × 2 | 1              | 2                  |                   | 4 to 20-mA input | E5EN-HTAA2HBMD-500    |
|                                        |            |                      |                |                  | Control Output Unit × 2 | 2              | 2                  | 4 to 20-mA output | 4 to 20-mA input | E5EN-HTAA2HHBFMD-500  |
|                                        |            |                      |                | 3                | Control Output Unit × 2 |                | 2                  | 4 to 20-mA output | 4 to 20-mA input | E5EN-HTAA3BFMD-500    |
|                                        |            |                      | Valve          | 2                | Relay outputs × 2       |                | 2                  |                   | 4 to 20-mA input | E5EN-HTPRR2BMD-500 *  |
|                                        |            |                      |                |                  | Relay outputs × 2       |                | 2                  | 4 to 20-mA output | 4 to 20-mA input | E5EN-HTPRR2BFMD-500 * |

\* Orders will not be accepted after March 31, 2018.

## Accessories (Order Separately)

| Output unit                      | Model    | Specifications                                                              |
|----------------------------------|----------|-----------------------------------------------------------------------------|
| Relay output                     | E53-RN   | SPST-NO, 250 VAC, 5 A (resistive load), electrical life: 100,000 operations |
| Voltage output (for driving SSR) | E53-QN   | 12 VDC (PNP), max. load current: 40-mA, with short-circuit protection       |
|                                  | E53-Q3   | 24 VDC (NPN), max. load current: 20-mA, with short-circuit protection       |
|                                  | E53-Q4   | 24 VDC (PNP), max. load current: 20-mA, with short-circuit protection       |
| Current output                   | E53-C3N  | 4 to 20-mA DC, load: 600 $\Omega$ max., resolution: approx. 10,000          |
|                                  | E53-C3DN | 0 to 20-mA DC, load: 600 $\Omega$ max., resolution: approx. 10,000          |
| Linear voltage output            | E53-V34N | 0 to 10 VDC, load: 1 k $\Omega$ min., resolution: approx. 10,000            |
|                                  | E53-V35N | 0 to 5 VDC, load: 1 k $\Omega$ min., resolution: approx. 10,000             |

### USB-infrared Conversion Cable

| Model     |
|-----------|
| E58-CIFIR |

### USB-Serial Conversion Cable

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

### Terminal Cover

| Connectable models | Model     |
|--------------------|-----------|
| E5AN-HT            | E53-COV16 |
| E5EN-HT            |           |

**Note:** The Terminal Cover comes with the E5AN/E5EN-□□□-500 models.

### Mounting Brackets

| Model  |
|--------|
| Y92H-9 |

**Note:** These Mounting Brackets are provided with the Digital Controller.

### Waterproof Packing

| Connectable models | Model   |
|--------------------|---------|
| E5AN-HT            | Y92S-P4 |
| E5EN-HT            | Y92S-P5 |

**Note:** The Waterproof Packing is included with the Controller.

### Current Transformers (CTs)

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

### CX-Thermo Support Software

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

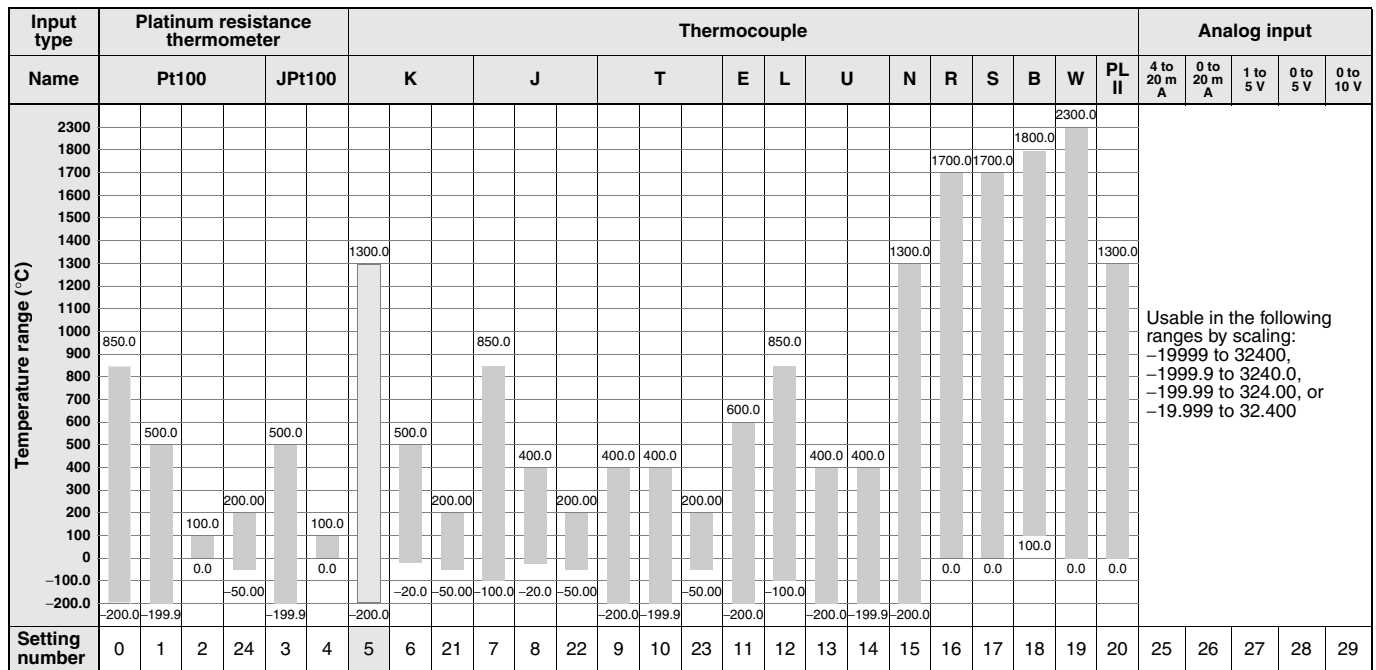
## Specifications

### 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: 12 VA<br>24 VAC/VDC: 8.5 VA (24 VAC)/5.5 W (24 VDC)                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Sensor input</b>                  |                                              | Any of the following can be selected.<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 $\Omega$ max., Voltage input: 1 M $\Omega$ min. (Use a 1:1 connection when connecting the ES2-HB-N.)                                                                                                                                                                                                                                                                                                                                            |
| <b>Control method</b>                |                                              | ON/OFF control or 2-PID control (with auto-tuning)                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Control output</b>                | <b>Relay output</b>                          | Output Unit (Install the Output Unit (sold separately).)                                                                                                                                                                                                                                                                                                                                                                                                           |
|                                      | <b>Voltage output (for driving SSR)</b>      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|                                      | <b>Current output</b>                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|                                      | <b>Linear voltage output</b>                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Auxiliary output</b>              | <b>Number of outputs</b>                     | 2 or 3 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 or 4 (with an E53-AKB)                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                                      | <b>External contact input specifications</b> | Contact input: ON: 1 k $\Omega$ max., OFF: 100 k $\Omega$ 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.                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                                      | <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>Output</b>                                | One work bit per operation                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                                      | <b>Work bit assignment</b>                   | Any of The following can be assigned to up to eight work bits (logic operation results): operation commands (assigned to event inputs) *, auxiliary outputs, or control outputs.<br>* Application is possible with models that do not have event inputs by using an internal assignment.                                                                                                                                                                           |
| <b>Transfer outputs</b>              | <b>Number of outputs</b>                     | 1 max. (Depends on model. Models with transfer output (F in model number)                                                                                                                                                                                                                                                                                                                                                                                          |
|                                      | <b>Output specifications</b>                 | Current output: 4 to 20 mA DC, Load: 600 $\Omega$ max., Resolution at 4 to 20 mA: Approx. 10,000                                                                                                                                                                                                                                                                                                                                                                   |
| <b>RSP input</b>                     | <b>Number of inputs</b>                      | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                                      | <b>Signal type</b>                           | Current input: 4 to 20 mA (input impedance: 150 $\Omega$ $\pm$ 10%)                                                                                                                                                                                                                                                                                                                                                                                                |
|                                      | <b>Analog input scaling</b>                  | Scaling of signal to engineering units (EU)<br>–19,999 to 30,000 (display: 30,000 max.)                                                                                                                                                                                                                                                                                                                                                                            |
|                                      | <b>Accuracy</b>                              | ( $\pm$ 0.2% of FS) $\pm$ 1 digit max.                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                                      | <b>Input sampling period</b>                 | 60 ms                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Setting method</b>                |                                              | Set digitally using keys on the front panel or by using the RSP input.                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Indication method</b>             |                                              | 11-segment digital display and individual indicators (7-segments displays also possible)<br>Character height: E5AN-HT: PV: 15.8 mm, SV: 9.5 mm, MV: 6.8 mm; E5EN-HT: PV: 11.8 mm, SV: 8.1 mm, MV: 5.8 mm<br>Three displays: PV/SV/Program number/Segment number, PV/SV/MV, or PV/SV/Remaining segment time.<br>Number of digits: 5 for PV and SV, 4 for MV                                                                                                         |
| <b>Other functions</b>               |                                              | Manual output, heating/cooling control, loop burnout alarm, other alarm functions, heater burnout detection (including SSR failure and heater overcurrent detection), 40% AT, 100% AT, MV limiter, input digital filter, temperature input shift, run/reset, protection functions, control output ON/OFF counter, extraction of square root, MV change rate limit, PV/SV status display, automatic cooling coefficient adjustment, program control functions, etc. |
| <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)                                                                                                                                                                                                                                                                                                                                                                                                                        |

## Input Ranges

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



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

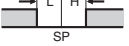
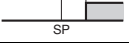
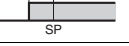
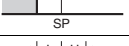
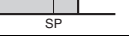
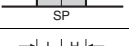
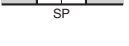
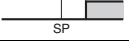
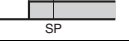
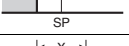
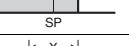
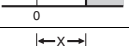
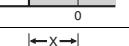
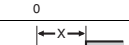
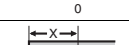
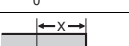
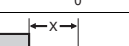
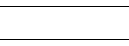
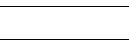
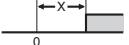
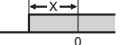
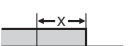
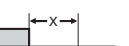
PL II: According to Platinel II electromotive force charts from BASF (previously Engelhard)

## Alarm Outputs

Each alarm can be independently set to one of the following 15 alarm types. The default is 2: *Upper limit*.

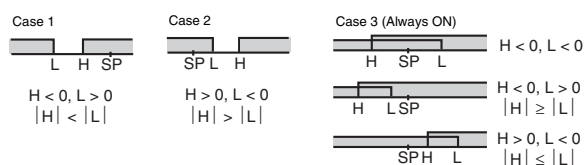
Auxiliary outputs are allocated for alarms. ON delays and OFF delays (0 to 999 s) can also be specified.

**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).

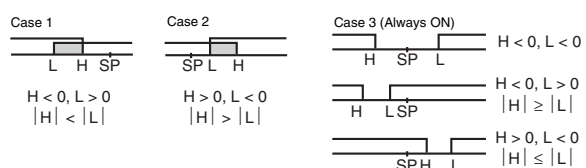
| Set value | Alarm type                                       | Alarm output operation                                                                     |                                                                                            | Description of function                                                                                                                     |
|-----------|--------------------------------------------------|--------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
|           |                                                  | When alarm value X is positive                                                             | When alarm value X is negative                                                             |                                                                                                                                             |
| 0         | Alarm function OFF                               | Output OFF                                                                                 |                                                                                            | No alarm                                                                                                                                    |
| 1         | Upper- and lower-limit *1                        | 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         | Upper- and lower-limit range *1                  | ON OFF    | *3                                                                                         | Set the deviation in the set point by setting the alarm upper limit (H) and alarm lower limit (L).                                          |
| 5         | Upper- and lower-limit with standby sequence *1  | ON OFF    | *4                                                                                         | A standby sequence is added to the upper- and lower-limit alarm (1). *7                                                                     |
| 6         | Upper-limit with standby sequence                | ON OFF    | ON OFF    | A standby sequence is added to the upper-limit alarm (2). *7                                                                                |
| 7         | Lower-limit with standby sequence                | ON OFF    | ON OFF    | A standby sequence is added to the lower-limit alarm (3). *7                                                                                |
| 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). *7                                                                 |
| 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). *7                                                                 |
| 12        | LBA (alarm 1 type only)                          | ---                                                                                        |                                                                                            | *8                                                                                                                                          |
| 13        | PV change rate alarm                             | ---                                                                                        |                                                                                            | *9                                                                                                                                          |
| 14        | RSP absolute value upper limit *6                | ON OFF  | ON OFF  | The alarm turns ON when the remote SP (RSP) is larger than the alarm value (X). This alarm functions in both Local SP and Remote SP Modes.  |
| 15        | RSP absolute value lower limit *6                | ON OFF  | ON OFF  | The alarm turns ON when the remote SP (RSP) is smaller than the alarm value (X). This alarm functions in both Local SP and Remote SP Modes. |

\*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. Displayed when there is a remote SP input.

\*7. Refer to the *E5CN-HT/E5AN-HT/E5EN-HT Digital Controllers User's Manual* (Cat. No. H169) for information on the operation of the standby sequence.

\*8. Refer to the *E5CN-HT/E5AN-HT/E5EN-HT Digital Controllers User's Manual* (Cat. No. H169) for information on the loop burnout alarm (LBA).

\*9. Refer to the *E5CN-HT/E5AN-HT/E5EN-HT Digital Controllers User's Manual* (Cat. No. H169) 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, PL II): ( $\pm 1\%$ of PV or $\pm 10^\circ\text{C}$ , whichever is greater) $\pm 1$ digit max.                                                                                                                                                                                                                                                                                                                                                         |
| <b>Influence of voltage *2</b>               |                            | Other thermocouple input: ( $\pm 1\%$ of PV or $\pm 4^\circ\text{C}$ , whichever is greater) $\pm 1$ digit max. *3                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Influence of EMS.<br/>(at EN 61326-1)</b> |                            | Platinum resistance thermometer: ( $\pm 1\%$ of PV or $\pm 2^\circ\text{C}$ , whichever is greater) $\pm 1$ digit max.<br>Analog input: ( $\pm 1\%$ FS) $\pm 1$ digit max.                                                                                                                                                                                                                                                                                                             |
| <b>Input sampling period</b>                 |                            | 60 ms                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Hysteresis</b>                            |                            | Temperature input: $0.1$ to $3240.0^\circ\text{C}$ or $^\circ\text{F}$ (in units of $0.1^\circ\text{C}$ or $^\circ\text{F}$ )<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 $3240.0^\circ\text{C}$ or $^\circ\text{F}$ (in units of $0.1^\circ\text{C}$ or $^\circ\text{F}$ )<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: $0.1^\circ\text{C}/\Omega$ max. ( $100\ \Omega$ max.)<br>Platinum resistance thermometer: $0.1^\circ\text{C}/\Omega$ max. ( $10\ \Omega$ max.)                                                                                                                                                                                                                                                                                                                           |
| <b>Insulation resistance</b>                 |                            | $20\ \text{M}\Omega$ min. (at $500\ \text{VDC}$ )                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Dielectric strength</b>                   |                            | $2,300\ \text{VAC}$ , $50$ or $60\ \text{Hz}$ for $1\ \text{min}$ (between terminals with different charge)                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Vibration resistance</b>                  | <b>Malfunction</b>         | $10$ to $55\ \text{Hz}$ , $20\ \text{m/s}^2$ for $10\ \text{min}$ each in X, Y, and Z directions                                                                                                                                                                                                                                                                                                                                                                                       |
|                                              | <b>Destruction</b>         | $10$ to $55\ \text{Hz}$ , $0.75\text{-mm}$ single amplitude for $2\ \text{hrs}$ each in X, Y, and Z directions                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Shock resistance</b>                      | <b>Malfunction</b>         | $100\ \text{m/s}^2$ , $3$ times each in X, Y, and Z directions                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                                              | <b>Destruction</b>         | $300\ \text{m/s}^2$ , $3$ times each in X, Y, and Z directions                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Weight</b>                                | <b>E5AN-HT</b>             | Controller: Approx. $310\ \text{g}$ , Mounting Bracket: Approx. $100\ \text{g}$                                                                                                                                                                                                                                                                                                                                                                                                        |
|                                              | <b>E5EN-HT</b>             | Controller: Approx. $260\ \text{g}$ , Mounting Bracket: Approx. $100\ \text{g}$                                                                                                                                                                                                                                                                                                                                                                                                        |
| <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 E5AN-HT and E5EN-HT.<br>An E58-CIFQ1 USB-Serial Conversion Cable is required to connect the computer to the E5AN-HT and E5EN-HT.<br>Provided on the front of the E5AN-HT and E5EN-HT. An E58-CIFIR USB-infrared Conversion Cable is required to connect the computer to the E5AN-HT or E5EN-HT. *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                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>EMC</b>                                   |                            | EMI:<br>Radiated Interference Electromagnetic Field Strength: EN 55011 Group 1, class A<br>Noise Terminal Voltage: EN 55011 Group 1, class A<br>EMS:<br>ESD Immunity: EN 61326-1 *5<br>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  $1300^\circ\text{C}$  range, T and N thermocouples at a temperature of  $-100^\circ\text{C}$  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  $400^\circ\text{C}$  max. is not specified. The indication accuracy of B thermocouples in the  $400$  to  $800^\circ\text{C}$  range is  $\pm 3^\circ\text{C}$  max. The indication accuracy of the R and S thermocouples at a temperature of  $200^\circ\text{C}$  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:  $-10^\circ\text{C}$  to  $23^\circ\text{C}$  to  $55^\circ\text{C}$ , Voltage range:  $-15\%$  to  $10\%$  of rated voltage

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

\*4. External communications (RS-232C, RS-485, or RS-422) and cable communications for the Setup Tool can be used at the same time.

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



## Program Control

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

## 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/<br>E5EN-H/E5CN-H/E5AN-HT/E5EN-HT/<br>E5CN-HT                          |
| 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<br>(on bottom of Controller) |
| Power supply                  | Bus power (Supplied from USB host<br>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<br>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, RS-422: Multipoint<br>RS-232C: Point-to-point                                                |
| Communications                      | RS-485 (two-wire, half duplex)<br>RS-422 (four-wire, half duplex) or RS-232C                         |
| Synchronization method              | Start-stop synchronization                                                                           |
| Protocol                            | CompoWay/F or Modbus                                                                                 |
| Baud rate                           | 1200, 2400, 4800, 9600, 19200, 38400, or 57600<br>bps                                                |
| Transmission code                   | ASCII (CompoWay/F)<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>Block check character (BCC) with CompoWay/F or<br>CRC-16 Modbus |
| Flow control                        | None                                                                                                 |
| Interface                           | RS-485, RS-422, or 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)                        |

## USB-Infrared Conversion Cable

|                               |                                                                                                  |
|-------------------------------|--------------------------------------------------------------------------------------------------|
| Applicable OS                 | Windows XP/Vista/7/8                                                                             |
| Applicable software           | CX-Thermo version 4.0 or higher                                                                  |
| Applicable models             | E5AN-H/E5EN-H/E5AN-HT/<br>E5EN-HT                                                                |
| USB interface standard        | Conforms to USB Specification 1.1.                                                               |
| DTE speed                     | 38400 bps                                                                                        |
| Connector specifications      | Computer: USB (type A plug)<br>Temperature Controller: Infrared port<br>(on front of Controller) |
| Power supply                  | Bus power (Supplied from USB host<br>controller.)                                                |
| Power supply voltage          | 5 VDC                                                                                            |
| Current consumption           | 80 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<br>icing)                                                   |
| Storage humidity              | 10% to 80%                                                                                       |
| Altitude                      | 2,000 m max.                                                                                     |
| Weight                        | Approx. 130 g (with mounting adaptor)                                                            |

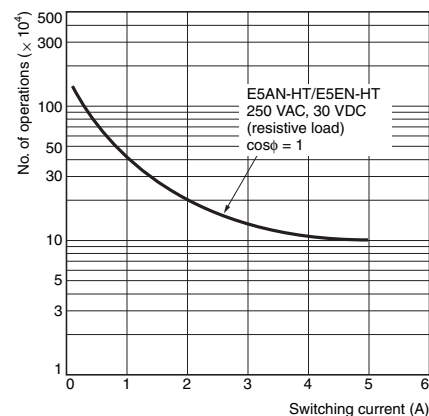
**Note:** A driver must be installed in the personal computer. Refer to installation information in the operation manual for the Conversion Cable.

## Heater Burnout Alarms, SSR Failure Alarms, and Heater Overcurrent Alarms

|                                           |                                                                                                                                              |
|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| CT input (for heater current detection)   | Models with detection for single-phase<br>heaters: One input<br>Models with detection for single-phase or<br>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

Control output 1 and control output 2 are functionally isolated from the internal circuits.

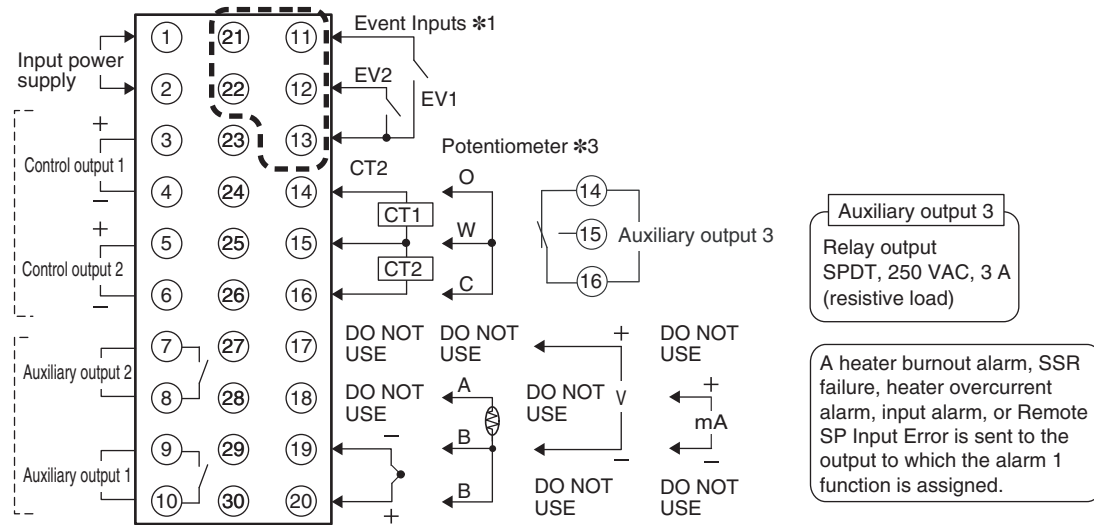
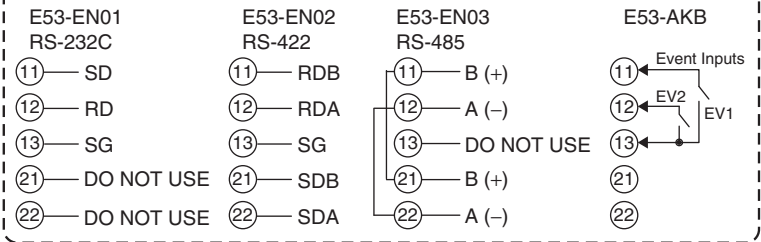
### Controllers

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.

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

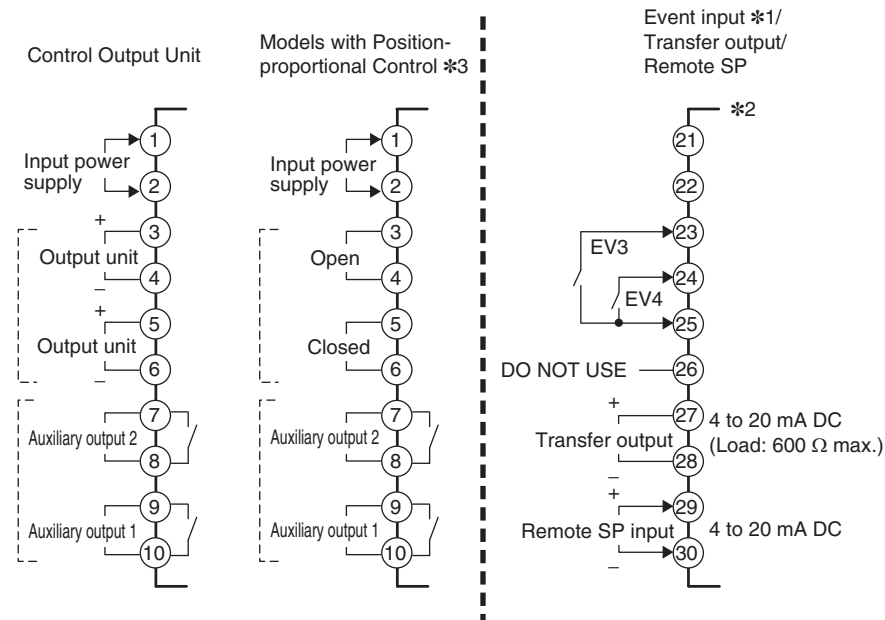
### Option Units

#### Communications



Control outputs 1, 2  
Control Output Unit  
Control outputs 1, 2  
Refer to page 4  
Models with Position-proportional Control  
Relay output \*3  
250 VAC, 1 A  
(including inrush current)

Auxiliary outputs 1, 2, 3  
Relay output  
SPST-NO,  
250 VAC, 3 A  
(resistive load)



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

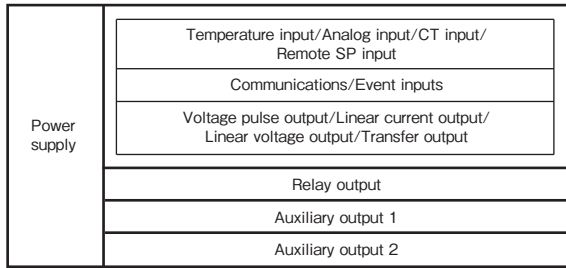
\*1. EV3 and EV4 are assigned to event inputs in controllers with two event inputs.

\*2. Terminals 27 and 28 are open terminals on models without the following functions. Be careful when wiring.

- Models with four event inputs (E5□N-□BB□)
- Models with a transfer output (E5□N-□F□)

\*3. Orders will not be accepted after March 31, 2018.

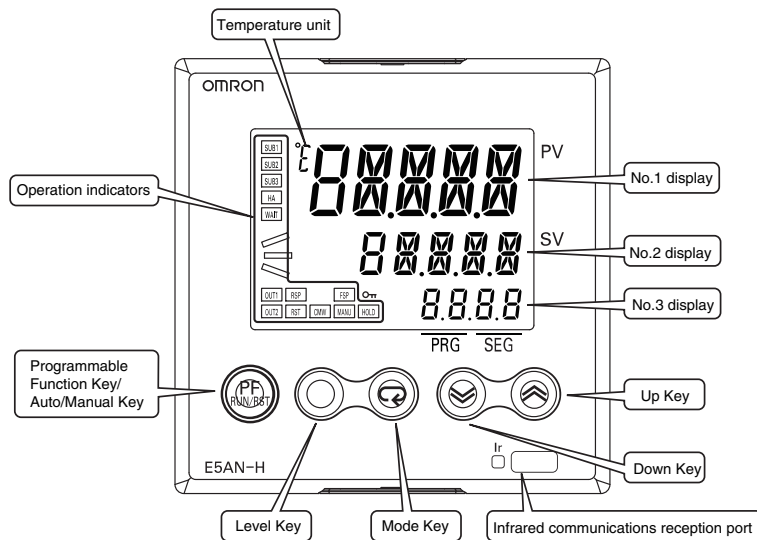
## Isolation/Insulation Block Diagrams



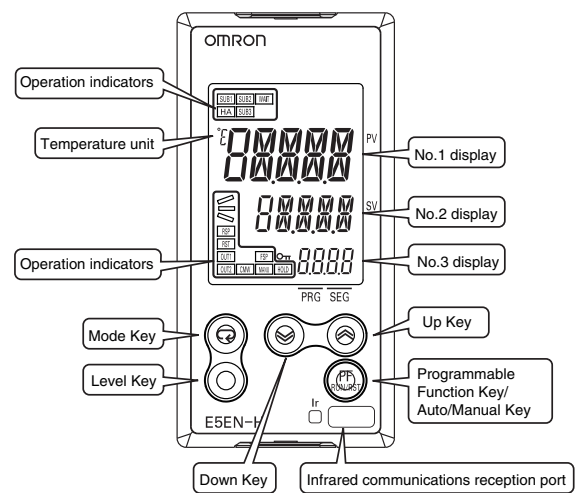
: Reinforced insulation
  : Functional insulation

## Nomenclature

E5AN-HT



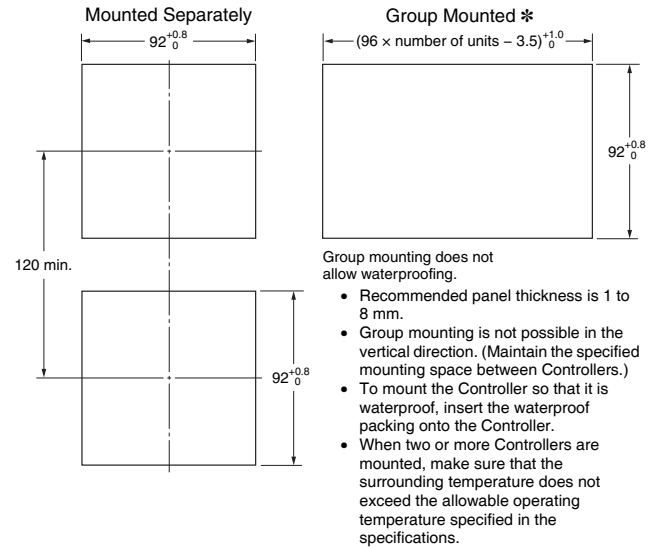
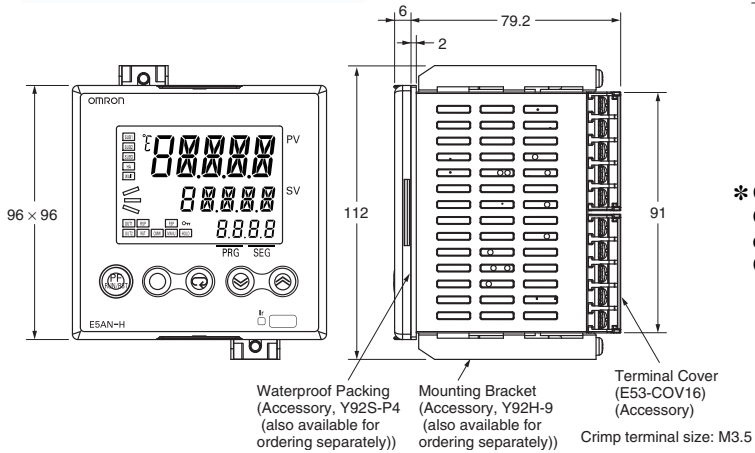
E5EN-HT



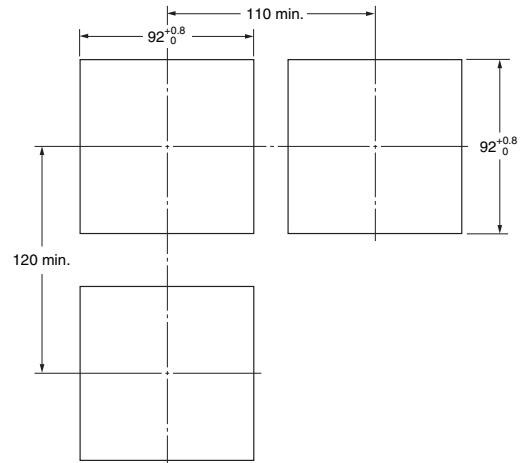
## Dimensions

(Unit: mm)

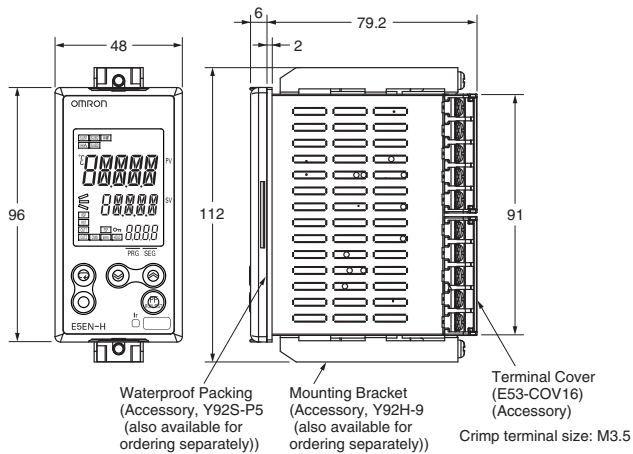
### E5AN-HT



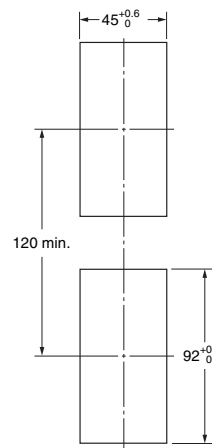
\* Group mounting is not possible if an E53-C3N or E53-C3DN Output Unit is used for control output 1 or 2. For these combinations, maintain the following mounting space between Controllers.



## E5EN-HT

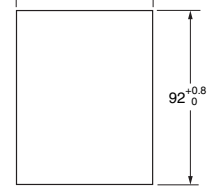


### Mounted Separately



### Group Mounted \*

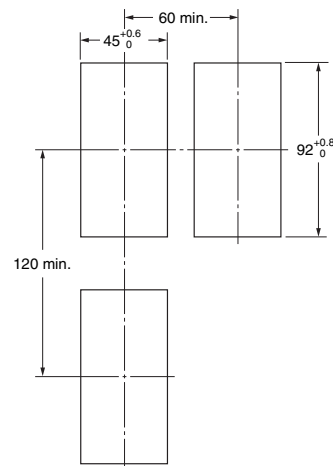
$$(48 \times \text{number of units} - 2.5)^{+1.0}_0$$



Group mounting does not allow waterproofing.

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

\* Group mounting is not possible if an E53-C3N or E53-C3DN Output Unit is used for control output 1 or 2. For these combinations, maintain the following mounting space between Controllers.



## Accessories (Order Separately)

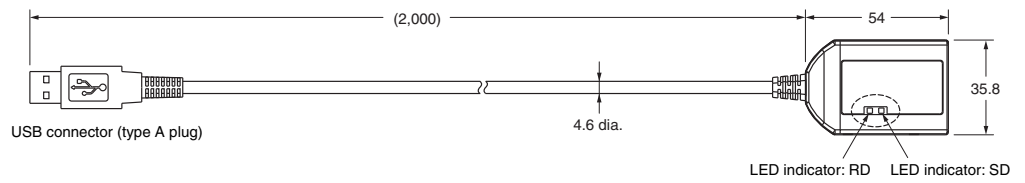
### USB-Infrared Conversion Cable

E58-CIFIR

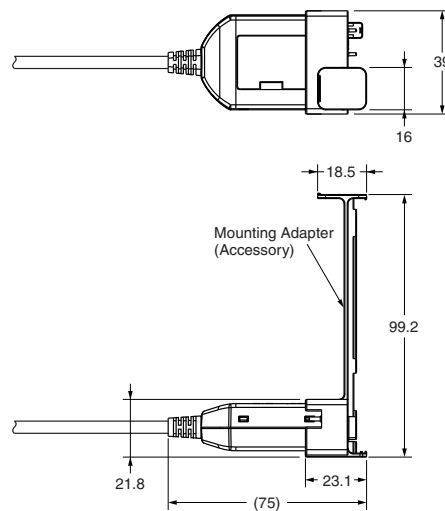
USB-Infrared Conversion Cable



Mounting Adapter

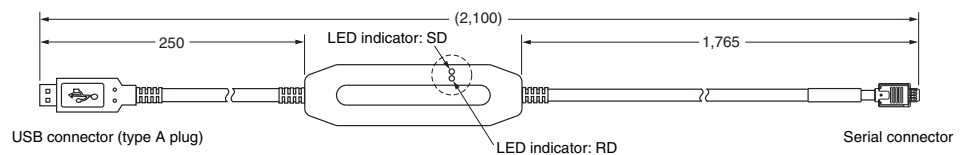
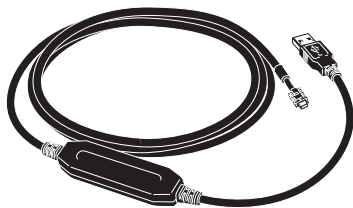


With Mounting Adapter Connected



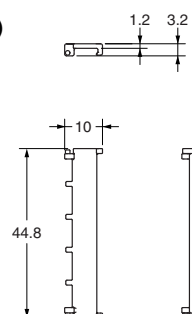
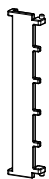
### USB-Serial Conversion Cable

E58-CIFQ1



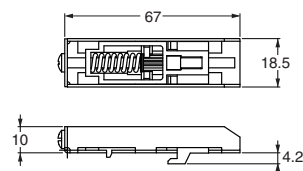
### Terminal Covers

E53-COV16 (Six Covers provided.)



### Mounting Brackets

Y92H-9 (2pcs)



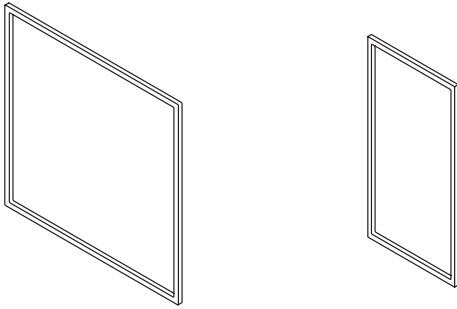
One set is packaged with the product.  
Order Mounting Brackets separately if yours are lost or damaged.



## Waterproof Packing

Y92S-P4 (for DIN 96 × 96)

Y92S-P5 (for DIN 48 × 96)



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

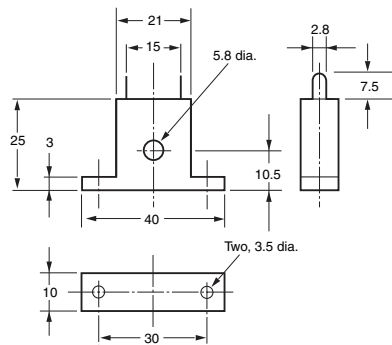
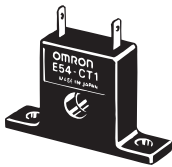
The Waterproof Packing can be used to achieve an IP66 degree of protection.

(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



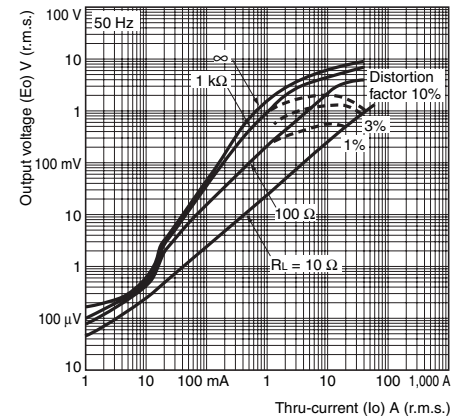
### E54-CT1

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

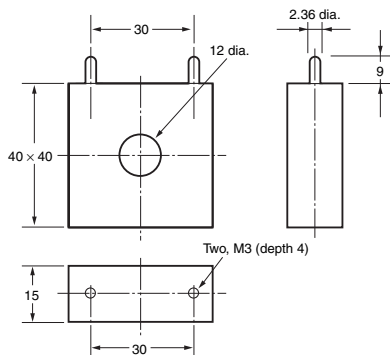
Maximum continuous heater current: 50 A (50/60 Hz)

Number of windings: 400±2

Winding resistance: 18±2 Ω



### E54-CT3



### E54-CT3

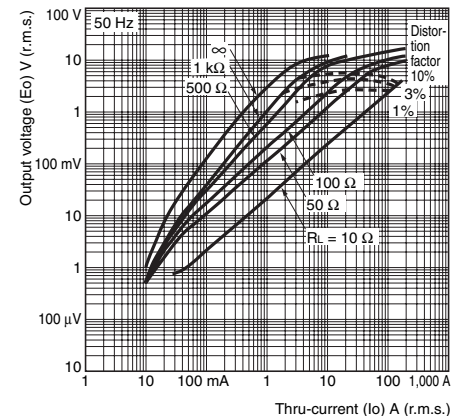
#### Thru-current ( $I_o$ ) vs. Output Voltage ( $E_o$ ) (Reference Values)

Maximum continuous heater current: 120 A (50/60 Hz)

(Maximum continuous heater current for an OMRON Temperature Controller is 50 A.)

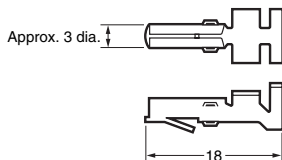
Number of windings: 400±2

Winding resistance: 8±0.8 Ω

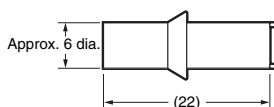


### E54-CT3 Accessory

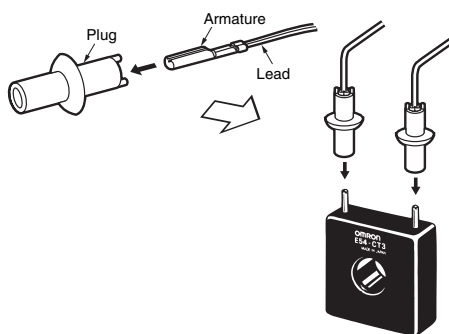
#### • Armature



#### • Plug



#### Connection Example



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