

Programmable Temperature Controller (Digital Controller)

E5CC-T (48 × 48 mm)

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

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



* CSA conformance evaluation by UL.

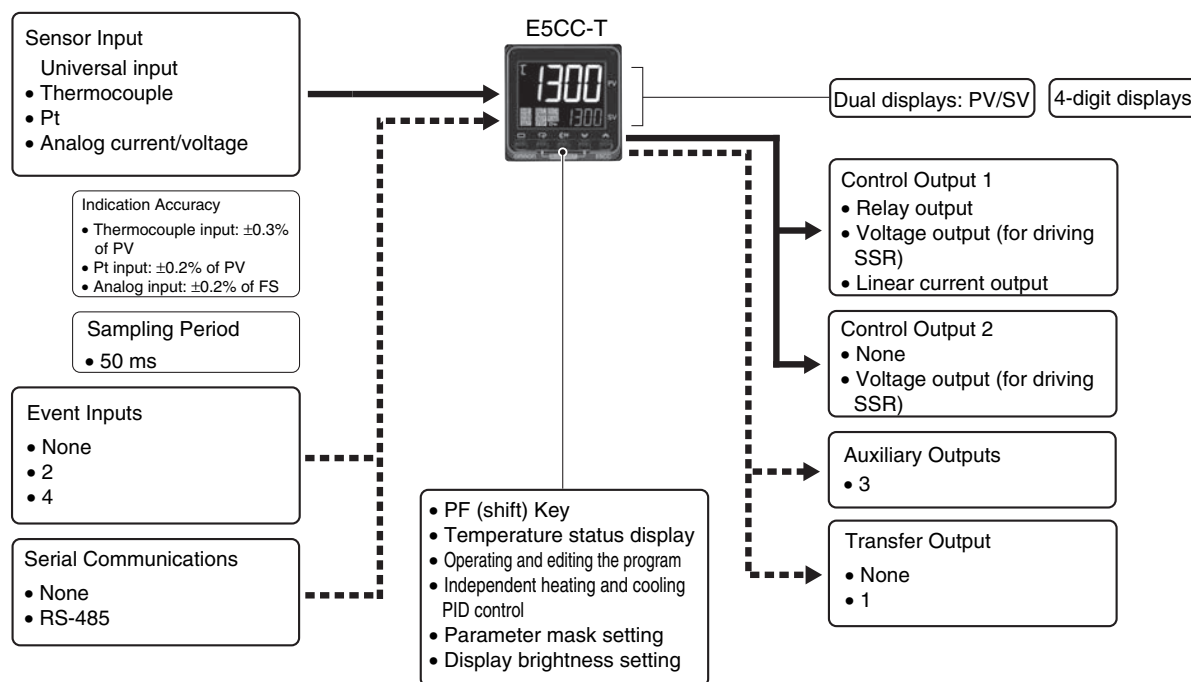


48 × 48 mm
E5CC-T

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

Refer to Safety Precautions on page 122.

Main I/O Functions



This datasheet is provided as a guideline for selecting products.

Be sure to refer to the following manuals for application precautions and other information required for operation before attempting to use the product.

E5□C-T Digital Temperature Controllers Programmable Type User's Manual (Cat. No. H185)

E5□C-T Digital Temperature Controllers Programmable Type Communications Manual (Cat. No. H186)

Model Number Legend and Standard Models

Model Number Legend

Models with Screw Terminal Blocks

E5CC-T □□3 □5 M -□□□ (Example: E5CC-TRX3A5M-000)

① ②③④⑤ ⑥

| Model | A | B | C | D | E | F | Meaning | | | | |
|--------|-------------------------|--------------------------|----------------------|---------------|------------|---------|------------------------------------|-------------------------|----------------------------------|--------------|-----------------|
| | Control outputs 1 and 2 | No. of auxiliary outputs | Power supply voltage | Terminal type | Input type | Options | | | | | |
| E5CC-T | | | | | | | 48 × 48 mm Programmable Type | | | | |
| | | | | | | | Control output 1 | | Control output 2 | | |
| | RX | | | | | | Relay output | | None | | |
| | QX | | | | | | Voltage output (for driving SSR) | | None | | |
| *1 | CX | | | | | | Linear current output *2 | | None | | |
| | QQ | | | | | | Voltage output (for driving SSR) | | Voltage output (for driving SSR) | | |
| | CQ | | | | | | Linear current output *2 | | Voltage output (for driving SSR) | | |
| | | 3 | | | | | 3 (one common) | | | | |
| | | | A | | | | 100 to 240 VAC | | | | |
| | | | D | | | | 24 VAC/DC | | | | |
| | | | | 5 | | | Screw terminal blocks (with cover) | | | | |
| | | | | | M | | Universal input | | | | |
| | | | | | | | | HB alarm and HS alarm | Communications | Event inputs | Transfer output |
| | | | | | | | 000 | --- | --- | --- | --- |
| | | | | | | *1 | 001 | 1 | --- | 2 | --- |
| | | | | | | *1 | 003 | 2 (for 3-phase heaters) | RS-485 | --- | --- |
| | | | | | | *3 | 004 | --- | RS-485 | 2 | --- |
| | | | | | | | 005 | --- | --- | 4 | --- |
| | | | | | | | 006 | --- | --- | 2 | Provided. |

*1. Options with HB and HS alarms (001 and 003) cannot be selected if a linear current output is selected for the control output.

*2. The linear current output cannot be used as a transfer output.

*3. Option 004 can be selected only when "CX" is selected for the control outputs.

Heating and Cooling Control

Using Heating and Cooling Control

① Control Output Assignment

If there is no control output 2, an auxiliary output is used as the cooling control output.

If there is a control output 2, the two control outputs are used for heating and cooling.

(It does not matter which output is used for heating and which output is used for cooling.)

② Control

If PID control is used, you can set PID control separately for heating and cooling.

This allows you to handle control systems with different heating and cooling response characteristics.

Optional Products (Order Separately)

USB-Serial Conversion Cable

| Model |
|-----------|
| E58-CIFQ2 |

Terminal Covers

| Model |
|------------------|
| E53-COV17 |
| E53-COV23 (3pcs) |

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

Waterproof Packing

| Model |
|---------|
| Y92S-P8 |

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

Current Transformers (CTs)

| Hole diameter | Model |
|---------------|-----------|
| 5.8 mm | E54-CT1 |
| 5.8 mm | E54-CT1L* |
| 12.0 mm | E54-CT3 |
| 12.0 mm | E54-CT3L* |

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

Adapter

| Model |
|---------|
| Y92F-45 |

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

Waterproof Cover

| Model |
|----------|
| Y92A-48N |

Mounting Adapter

| Model |
|---------|
| Y92F-49 |

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

DIN Track Mounting Adapter

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

Front Covers

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

CX-Thermo Support Software

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

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

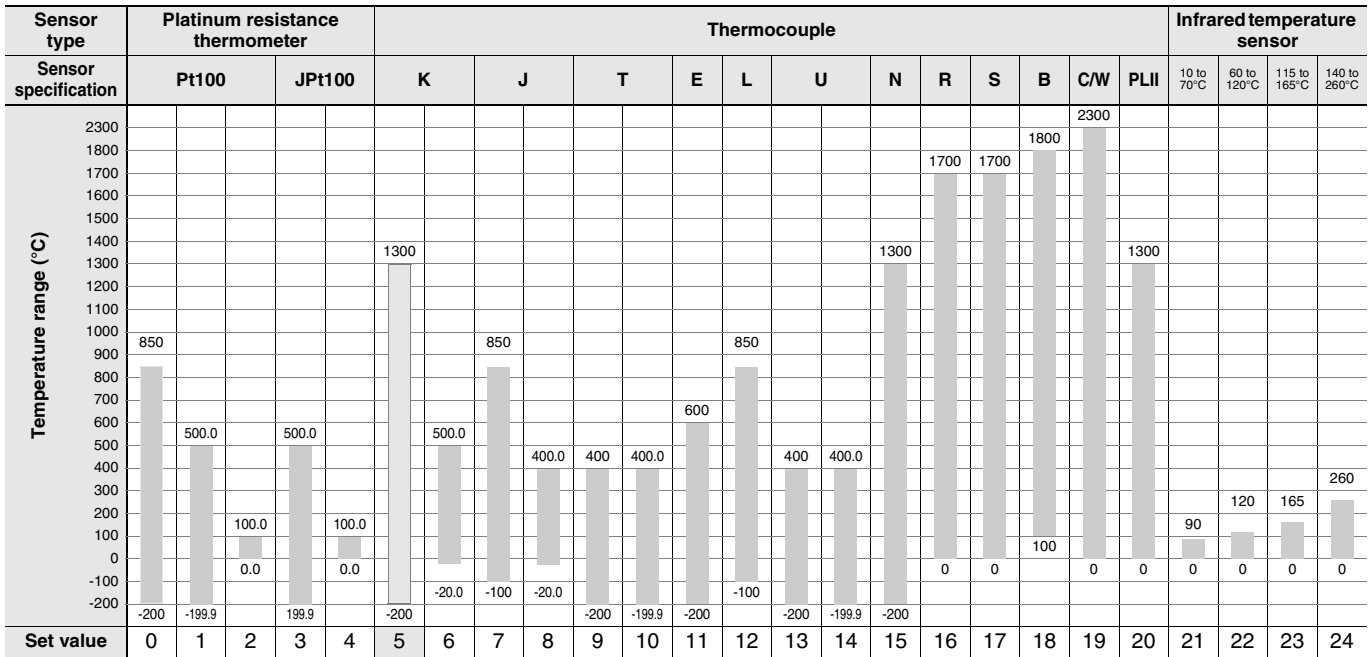
Specifications

Ratings

| | | |
|--------------------------------------|--|---|
| Power supply voltage | | A in model number: 100 to 240 VAC, 50/60 Hz D in model number: 24 VAC, 50/60 Hz; 24 VDC |
| Operating voltage range | | 85 to 110% of rated supply voltage |
| Power consumption | | 7.5 VA max. at 100 to 240 VAC, and 4.1 VA max. at 24 VAC or 2.3 W max. at 24 VDC |
| Sensor input | | Temperature input Thermocouple: K, J, T, E, L, U, N, R, S, B, C/W, or PL II Platinum resistance thermometer: Pt100 or JPt100 Infrared temperature sensor (ES1B): 10 to 70°C, 60 to 120°C, 115 to 165°C, or 140 to 260°C Analog input Current input: 4 to 20 mA or 0 to 20 mA Voltage input: 1 to 5 V, 0 to 5 V, or 0 to 10 V |
| Input impedance | | Current input: 150 Ω max., Voltage input: 1 MΩ min. (Use a 1:1 connection when connecting the ES2-HB-N/THB-N.) |
| Control method | | 2-PID control (with auto-tuning) or ON/OFF control |
| Control output | Relay output | SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA (reference value) |
| | Voltage output (for driving SSR) | Output voltage: 12 VDC ±20% (PNP), max. load current: 21 mA, with short-circuit protection circuit |
| | Linear current output | 4 to 20 mA DC/0 to 20 mA DC, load: 500 Ω max., resolution: approx. 10,000 |
| Auxiliary output | Number of outputs | 3 |
| | Output specifications | SPST-NO relay outputs, 250 VAC, Models with 3 outputs: 2 A (resistive load), Electrical life: 100,000 operations, Minimum applicable load: 10 mA at 5 V (reference value) |
| Event input | Number of inputs | 2 or 4 (depends on model) |
| | External contact input specifications | Contact input: ON: 1 kΩ max., OFF: 100 kΩ min. |
| | | Non-contact input: ON: Residual voltage: 1.5 V max., OFF: Leakage current: 0.1 mA max. Current flow: Approx. 7 mA per contact |
| Transfer output | Number of outputs | 1 (only on models with a transfer output) |
| | Output specifications | Current output: 4 to 20 mA DC, load: 500 Ω max., resolution: approx. 10,000 Linear voltage output: 1 to 5 VDC, load: 1 kΩ min., resolution: Approx. 10,000 |
| Setting method | | Digital setting using front panel keys |
| Indication method | | 11-segment digital display and individual indicators Character height: PV: 15.2 mm, SV: 7.1 mm |
| Bank switching | | None |
| Other functions | | Manual output, heating/cooling control, loop burnout alarm, other alarm functions, heater burnout (HB) alarm (including SSR failure (HS) alarm), 40% AT, 100% AT, MV limiter, input digital filter, robust tuning, PV input shift, protection functions, extraction of square root, MV change rate limit, logic operations, temperature status display, moving average of input value, and display brightness setting |
| Ambient operating temperature | | -10 to 55°C (with no condensation or icing), For 3-year warranty: -10 to 50°C with standard mounting (with no condensation or icing) |
| Ambient operating humidity | | 25 to 85% |
| Storage temperature | | -25 to 65°C (with no condensation or icing) |
| Altitude | | 2,000 m max. |
| Recommended fuse | | T2A, 250 VAC, time-lag, low-breaking capacity |
| Installation environment | | Overvoltage category II, Pollution Degree 2 (EN/IEC/UL 61010-1) |

Input Ranges

Thermocouple/Platinum Resistance Thermometer (Universal inputs)



Shaded settings are the default settings.

The applicable standards for the input types are as follows:

K, J, T, E, N, R, S, B: JIS C 1602-2015, IEC 60584-1

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

L: Fe-CuNi, DIN 43710-1985

Pt100: JIS C 1604-1997, IEC 60751

U: Cu-CuNi, DIN 43710-1985

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

C/W: W5Re/W26Re, JIS C 1602-2015, ASTM E988-1990

Analog input



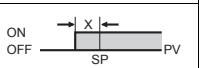
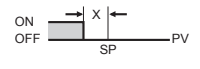

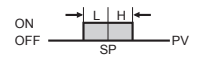

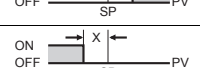
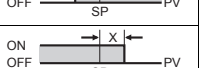
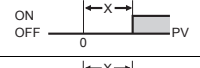

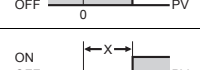
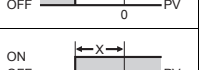
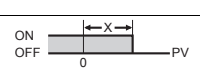
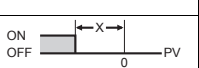
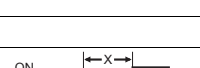
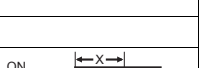
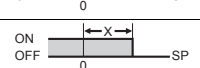
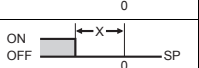
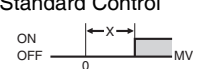

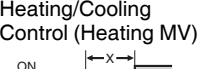
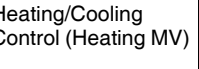
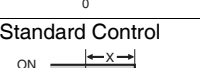
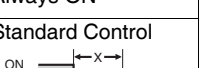
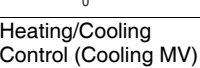
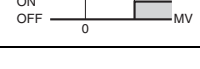
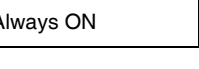

| Input type | Current | | Voltage | | |
|---------------------|---|------------|----------|----------|-----------|
| Input specification | 4 to 20 mA | 0 to 20 mA | 1 to 5 V | 0 to 5 V | 0 to 10 V |
| Setting range | Usable in the following ranges by scaling: -1999 to 9999, -199.9 to 999.9, -19.99 to 99.99 or -1.999 to 9.999 | | | | |
| Set value | 25 | 26 | 27 | 28 | 29 |

Alarm Types

Each alarm can be independently set to one of the following 17 alarm types. The default is 2: Upper limit. (see note.)

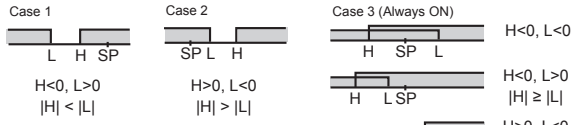
Auxiliary outputs are allocated for alarms. ON delays and OFF delays (0 to 999 s) can also be specified.

Note: In the default settings for models with HB or HS alarms, alarm 1 is set to a heater alarm (HA) and the Alarm Type 1 parameter is not displayed. To use alarm 1, set the output assignment to alarm 1.

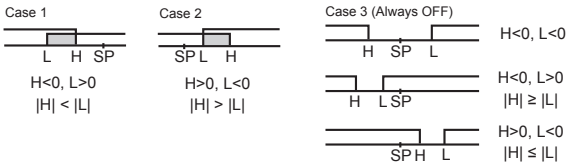
| Set value | Alarm type | Alarm output operation | | Description of function |
|-------------|--|---|---|--|
| | | When alarm value X is positive | When alarm value X is negative | |
| 0 | Alarm function OFF | Output OFF | | No alarm |
| 1 | Upper- and lower-limit *1 |  | *2 | Set the upward deviation in the set point for the alarm upper limit (H) and the lower deviation in the set point for the alarm lower limit (L). The alarm is ON when the PV is outside this deviation range. |
| 2 (default) | Upper-limit |  |  | Set the upward deviation in the set point by setting the alarm value (X). The alarm is ON when the PV is higher than the SP by the deviation or more. |
| 3 | Lower-limit |  |  | Set the downward deviation in the set point by setting the alarm value (X). The alarm is ON when the PV is lower than the SP by the deviation or more. |
| 4 | Upper- and lower-limit range *1 |  | *3 | Set the upward deviation in the set point for the alarm upper limit (H) and the lower deviation in the set point for the alarm lower limit (L). The alarm is ON when the PV is inside this deviation range. |
| 5 | Upper- and lower-limit with standby sequence *1 | *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 |
| 14 | SP absolute-value upper-limit alarm |  |  | This alarm type turns ON the alarm when the set point (SP) is higher than the alarm value (X). |
| 15 | SP absolute-value lower-limit alarm |  |  | This alarm type turns ON the alarm when the set point (SP) is lower than the alarm value (X). |
| 16 | MV absolute-value upper-limit alarm *9 | Standard Control  | Standard Control  | This alarm type turns ON the alarm when the manipulated variable (MV) is higher than the alarm value (X). |
| | | Heating/Cooling Control (Heating MV)  | Heating/Cooling Control (Heating MV) Always ON | |
| 17 | MV absolute-value lower-limit alarm *9 | Standard Control  | Standard Control  | This alarm type turns ON the alarm when the manipulated variable (MV) is lower than the alarm value (X). |
| | | Heating/Cooling Control (Cooling MV)  | Heating/Cooling Control (Cooling MV) Always ON | |

***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 *2

- Case 1 and 2
Always OFF when the upper-limit and lower-limit hysteresis overlaps.
- Case 3: Always OFF

***5.** Set value: 5, Upper- and lower-limit with standby sequence Always OFF when the upper-limit and lower-limit hysteresis overlaps.

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

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

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

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

Characteristics

| | | |
|---|--|---|
| Indication accuracy (at the ambient temperature of 23°C) | Thermocouple: (±0.3% of indication value or ±1°C, whichever is greater) ±1 digit max. *1 Platinum resistance thermometer: (±0.2% of indication value or ±0.8°C, whichever is greater) ±1 digit max. Analog input: ±0.2% FS ±1 digit max. CT input: ±5% FS ±1 digit max. | |
| Transfer output accuracy | ±0.3% FS max. | |
| Influence of temperature *2 | Thermocouple input (R, S, B, C/W, PL II): (±1% of indication value or ±10°C, whichever is greater) ±1 digit max. | |
| Influence of voltage *2 | Other thermocouple input: (±1% of indication value or ±4°C, whichever is greater) ±1 digit max. *3 Platinum resistance thermometer: (±1% of indication value or ±2°C, whichever is greater) ±1 digit max. | |
| Influence of EMS. (at EN 61326-1) | Analog input: ±1%FS ±1 digit max. CT input: ±5% FS ±1 digit max. | |
| Input sampling period | 50 ms | |
| Hysteresis | Temperature input: 0.1 to 999.9°C or °F (in units of 0.1°C or °F) Analog input: 0.01% to 99.99% FS (in units of 0.01% FS) | |
| Proportional band (P) | Temperature input: 0.1 to 999.9°C or °F (in units of 0.1°C or °F) Analog input: 0.1% to 999.9% FS (in units of 0.1% FS) | |
| Integral time (I) | 0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) *4 | |
| Derivative time (D) | 0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) *4 | |
| Proportional band (P) for cooling | Temperature input: 0.1 to 999.9°C or °F (in units of 0.1°C or °F) Analog input: 0.1% to 999.9% FS (in units of 0.1% FS) | |
| Integral time (I) for cooling | 0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) *4 | |
| Derivative time (D) for cooling | 0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) *4 | |
| Control period | 0.1, 0.2, 0.5, 1 to 99 s (in units of 1 s) | |
| Manual reset value | 0.0 to 100.0% (in units of 0.1%) | |
| Alarm setting range | -1999 to 9999 (decimal point position depends on input type) | |
| Influence of signal source resistance | Thermocouple: 0.1°C/Ω max. (100 Ω max.) Platinum resistance thermometer: 0.1°C/Ω max. (10 Ω max.) | |
| Insulation resistance | 20 MΩ min. (at 500 VDC) | |
| Dielectric strength | 3,000 VAC, 50/60 Hz for 1 min between terminals of different charge | |
| Vibration | Malfunction | 10 to 55 Hz, 20 m/s ² for 10 min each in X, Y, and Z directions |
| | Resistance | 10 to 55 Hz, 20 m/s ² for 2 hrs each in X, Y, and Z directions |
| Shock | Malfunction | 100 m/s ² , 3 times each in X, Y, and Z directions |
| | Resistance | 300 m/s ² , 3 times each in X, Y, and Z directions |
| Weight | Controller: Approx. 120 g, Mounting Adapter: 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 4.61 or higher | |
| Setup Tool port | E5CC-T top panel: An E58-CIFQ2 USB-Serial Conversion Cable is used to connect to a USB port on the computer. *5 | |
| Standards | Approved standards | cULus: UL 61010-1/CSA C22.2 No.61010-1, Korean wireless regulations (Radio law: KC Mark) (Some models only.) *6 |
| | Conformed standards | EN 61010-1 (IEC 61010-1), RCM |
| EMC | EMI: Radiated Interference Electromagnetic Field Strength: Noise Terminal Voltage: EMS: ESD Immunity: Electromagnetic Field Immunity: Burst Noise Immunity: Conducted Disturbance Immunity: Surge Immunity: Voltage Dip/Interrupting Immunity: | EN 61326-1 *7 EN 55011 Group 1, class A EN 55011 Group 1, class A EN 61326-1 *7 EN 61000-4-2 EN 61000-4-3 EN 61000-4-4 EN 61000-4-4 EN 61000-4-6 EN 61000-4-5 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 at a temperature of 400 to 800°C is ±3°C max. The indication accuracy of the R and S thermocouples at a temperature of 200°C max. is ±3°C ±1 digit max. The indication accuracy of C/W thermocouples is (±0.3% of PV or ±3°C, whichever is greater) ±1 digit max. The indication accuracy of PL II thermocouples is (±0.3% of PV or ±2°C, whichever is greater) ±1 digit max.

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

*3. K thermocouple at -100°C max.: ±10°C max.

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

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

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

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

Program Control

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

USB-Serial Conversion Cable

| | |
|--------------------------------------|---|
| Applicable OS | Windows XP/Vista/7/8/8.1/10 *1 |
| Applicable software | CX-Thermo version 4.61 or higher |
| Applicable models | E5□C-T Series, E5□C Series, and E5CB Series |
| USB interface standard | Conforms to USB Specification 2.0. |
| DTE speed | 38400 bps |
| Connector specifications | Computer: USB (type A plug) Digital Temperature Controller: Special serial connector |
| Power supply | Bus power (Supplied from USB host controller.) *2 |
| Power supply voltage | 5 VDC |
| Current consumption | 450 mA max. |
| Output voltage | 4.7±0.2 VDC (Supplied from USB-Serial Conversion Cable to the Digital Temperature Controller.) |
| Output current | 250 mA max. (Supplied from USB-Serial Conversion Cable to the Digital Temperature Controller.) |
| Ambient operating temperature | 0 to 55°C (with no condensation or icing) |
| Ambient operating humidity | 10% to 80% |
| Storage temperature | -20 to 60°C (with no condensation or icing) |
| Storage humidity | 10% to 80% |
| Altitude | 2,000 m max. |
| Weight | Approx. 120 g |

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

*1. CX-Thermo version 4.65 or higher runs on Windows 10.

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

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

Communications Specifications

| | |
|--|---|
| Transmission line connection method | RS-485: Multidrop |
| Communications | RS-485 (two-wire, half duplex) |
| Synchronization method | Start-stop synchronization |
| Protocol | CompoWay/F, or Modbus |
| Baud rate * | 9600, 19200, 38400, or 57600 bps |
| Transmission code | ASCII |
| Data bit length * | 7 or 8 bits |
| Stop bit length * | 1 or 2 bits |
| Error detection | Vertical parity (none, even, odd) Block check character (BCC) with CompoWay/F or CRC-16 Modbus |
| Flow control | None |
| Interface | RS-485 |
| Retry function | None |
| Communications buffer | 217 bytes |
| Communications response wait time | 0 to 99 ms Default: 20 ms |

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

Communications Functions

| | |
|-------------------------------------|--|
| Programless communications * | You can use the memory in the PLC to read and write E5□C-T parameters, start and reset operation, etc. The E5□C-T automatically performs communications with PLCs. No communications programming is required. Number of connected Digital Temperature Controllers: 32 max. Applicable PLCs OMRON PLCs CS Series, CJ Series, CP Series, NJ Series, or NX1P Mitsubishi Electric PLCs MELSEC Q Series, L Series, or iQ-R Series |
|-------------------------------------|--|

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

MELSEC is a registered trademark of Mitsubishi Electric Corporation.

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

Current Transformer (Order Separately) Ratings

| | E54-CT1 E54-CT3 | E54-CT1L E54-CT3L |
|-----------------------------|--|--|
| Dielectric strength | 1,000 VAC for 1 min | 1,500 VAC for 1 min |
| Vibration resistance | 50 Hz, 98 m/s ² | |
| Weight | E54-CT1: Approx. 11.5 g E54-CT3: Approx. 50 g | E54-CT1L: Approx. 14 g E54-CT3L: Approx. 57 g |
| Accessories | E54-CT3 Only Armatures (2) Plugs (2) | None |

Heater Burnout Alarms and SSR Failure Alarms

| | |
|--|---|
| CT input (for heater current detection) | Models with detection for single-phase heaters: One input Models with detection for singlephase or three-phase heaters: Two inputs |
| Maximum heater current | 50 A AC |
| Input current indication accuracy | ±5% FS ±1 digit max. |
| Heater burnout alarm setting range *1 | 0.1 to 49.9 A (in units of 0.1 A) Minimum detection ON time: 100 ms *3 |
| SSR failure alarm setting range *2 | 0.1 to 49.9 A (in units of 0.1 A) Minimum detection OFF time: 100 ms *4 |

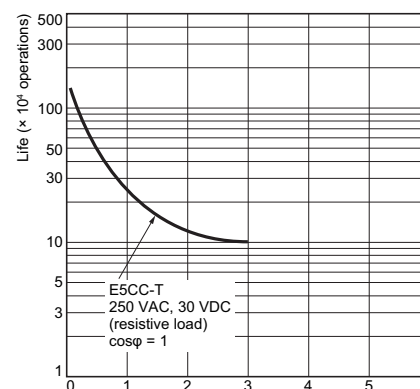
*1. For heater burnout alarms, the heater current will be measured when the control output is ON, and the output will turn ON if the heater current is lower than the set value (i.e., heater burnout detection current value).

*2. For SSR failure alarms, the heater current will be measured when the control output is OFF, and the output will turn ON if the heater current is higher than the set value (i.e., SSR failure detection current value).

*3. The value is 30 ms for a control period of 0.1 s or 0.2 s.

*4. The value is 35 ms for a control period of 0.1 s or 0.2 s.

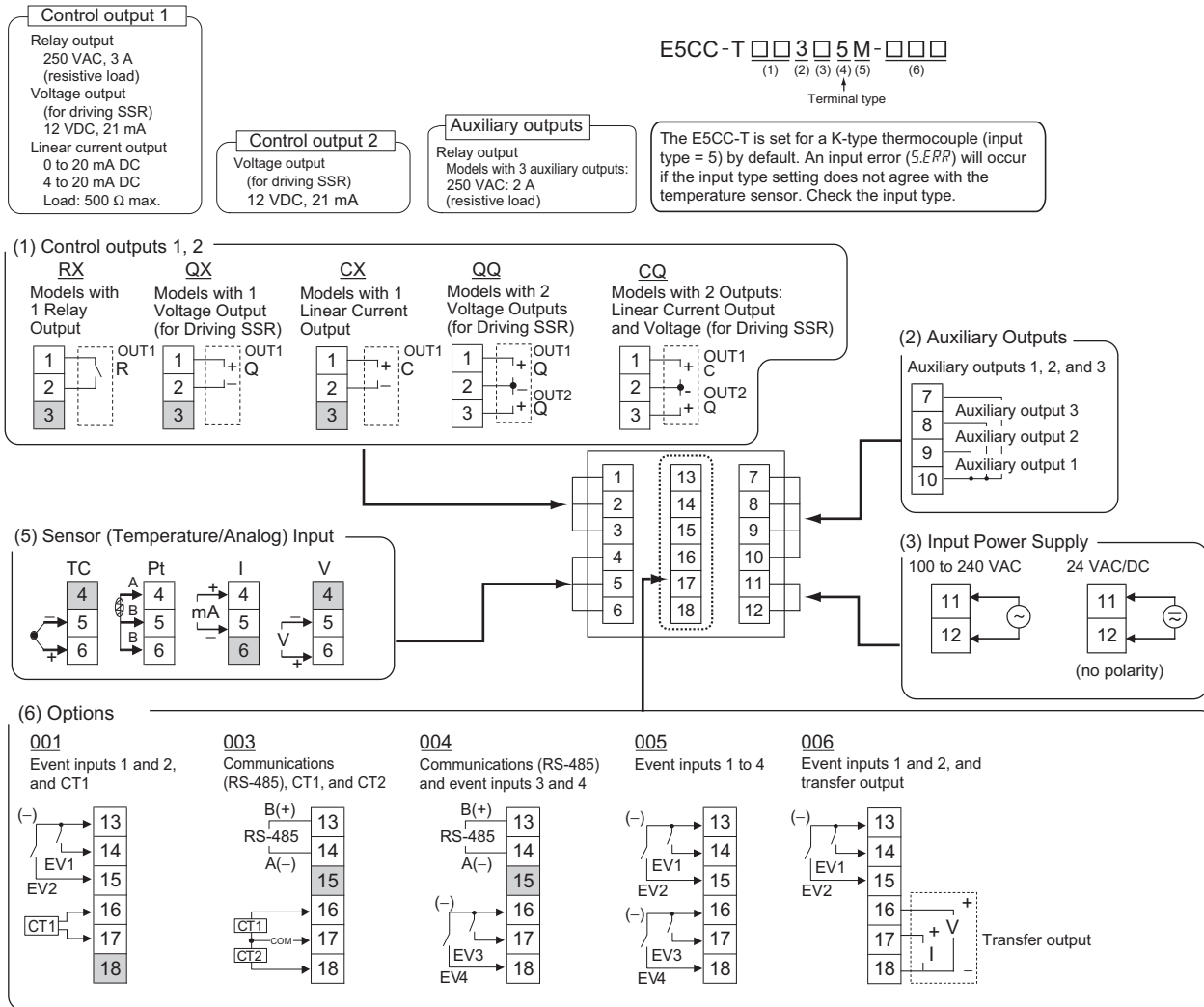
Electrical Life Expectancy Curve for Relays (Reference Values)



E5CC-T

External Connections

E5CC-T

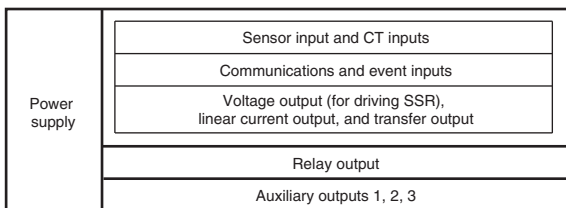


Use no-voltage inputs for the event inputs.
The polarity for non-contact inputs is given in parentheses.

- Note:**
- The application of the terminals depends on the model.
 - Do not wire the terminals that are shown with a gray background.
 - When complying with EMC standards, the cable that connects the sensor must be 30 m or less. If the cable length exceeds 30 m, compliance with EMC standards will not be possible.
 - Connect M3 crimped terminals.
 - Due to UL Listing requirements, use the E54-CT1L or E54-CT3L Current Transformer with the factory wiring (internal wiring). Use a UL category XOBA or XOBA7 current transformer that is UL Listed for field wiring (external wiring) and not the factory wiring (internal wiring).

Isolation/Insulation Block Diagrams

Models with 3 Auxiliary Outputs

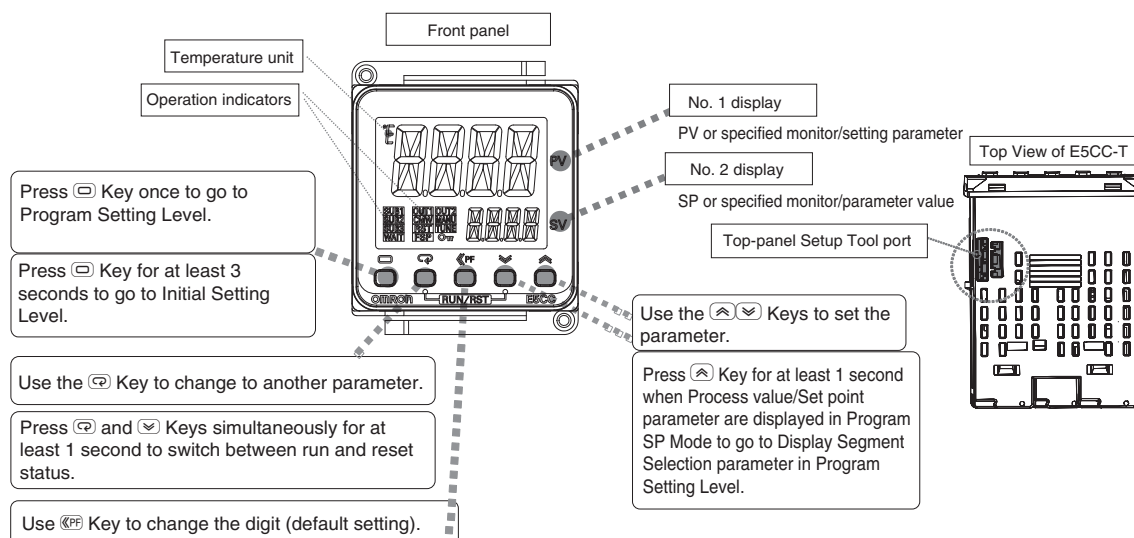


□ : Reinforced insulation
□ : Functional isolation

Note: Auxiliary outputs 1 to 3 are not insulated.

Nomenclature

E5CC-T

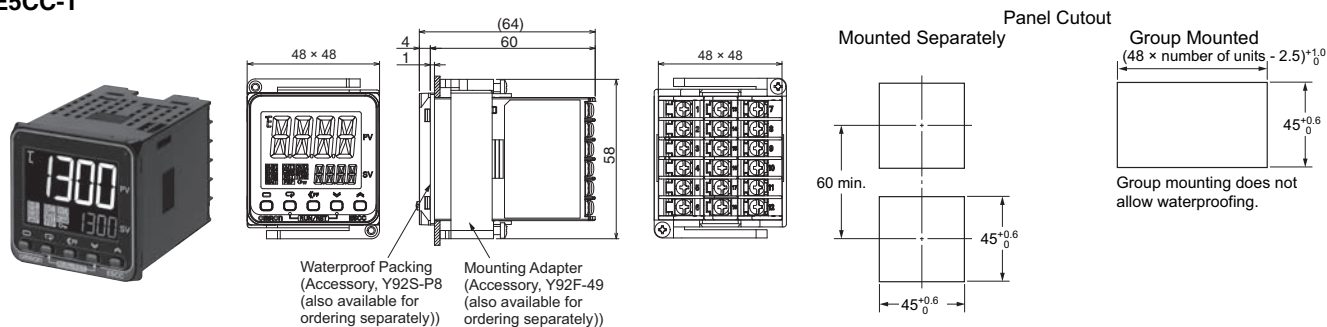


Dimensions

(Unit: mm)

Controllers

E5CC-T



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

The E58-CIFQ2 USB-Serial Conversion Cable is required to make the connection.

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

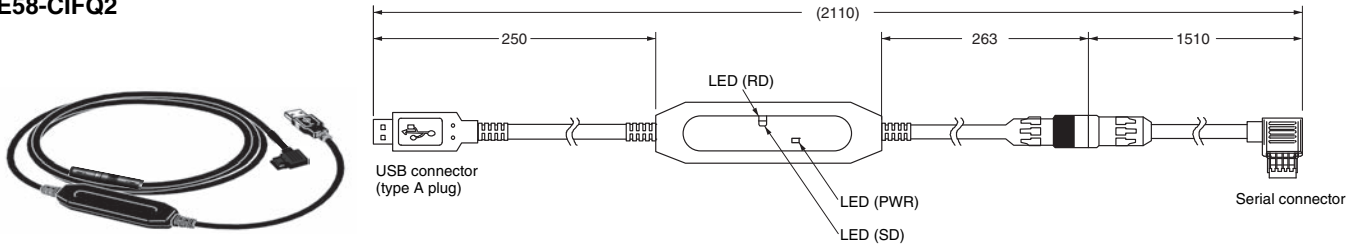
Note: Do not leave the USB-Serial Conversion Cable connected when you use the Temperature Controller.

- Recommended panel thickness is 1 to 5 mm.
- Group mounting is not possible in the vertical direction. (Maintain the specified mounting space between Controllers.)
- To mount the Controller so that it is waterproof, insert the waterproof packing onto the Controller.
- When two or more Controllers are mounted, make sure that the surrounding temperature does not exceed the allowable operating temperature specified in the specifications.
- Use a control panel thickness of 1 to 3 mm if the Y92A-48N and a USB-Serial Conversion Cable are used together.

Accessories (Order Separately)

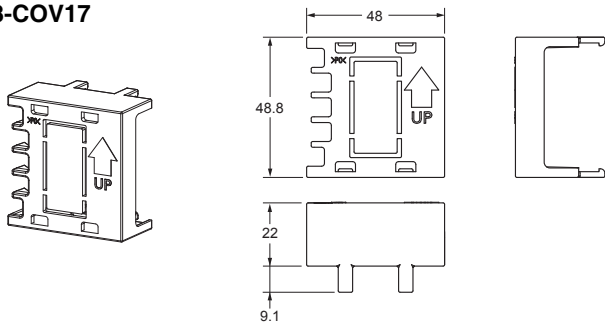
USB-Serial Conversion Cable

E58-CIFQ2

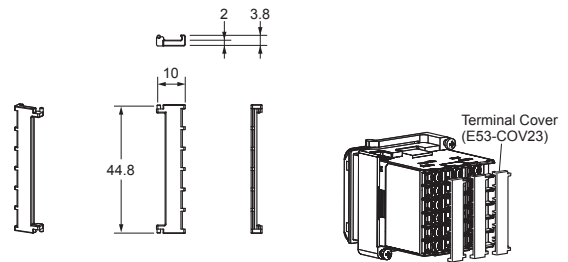


Terminal Covers

E53-COV17

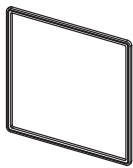


E53-COV23 (Three Covers provided.)



Waterproof Packing

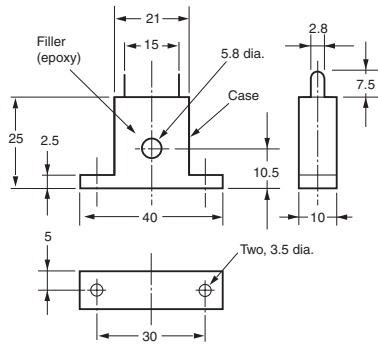
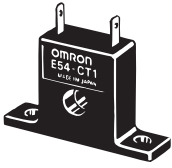
Y92S-P8 (for DIN 48 × 48)



The Waterproof Packing is provided with the Temperature Controller. Order the Waterproof Packing separately if it becomes lost or damaged. The Waterproof Packing can be used to achieve an IP66 degree of protection. (Deterioration, shrinking, or hardening of the waterproof packing may occur depending on the operating environment. Therefore, periodic replacement is recommended to ensure the level of waterproofing specified in IP66. The time for periodic replacement depends on the operating environment. Be sure to confirm this point at your site. Consider three years as a rough standard.)

Current Transformers

E54-CT1



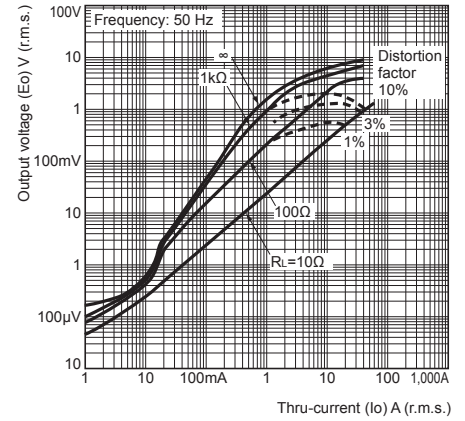
Thru-current (I_o) vs. Output Voltage (E_o)
(Reference Values)

E54-CT1 or E54-CT1L

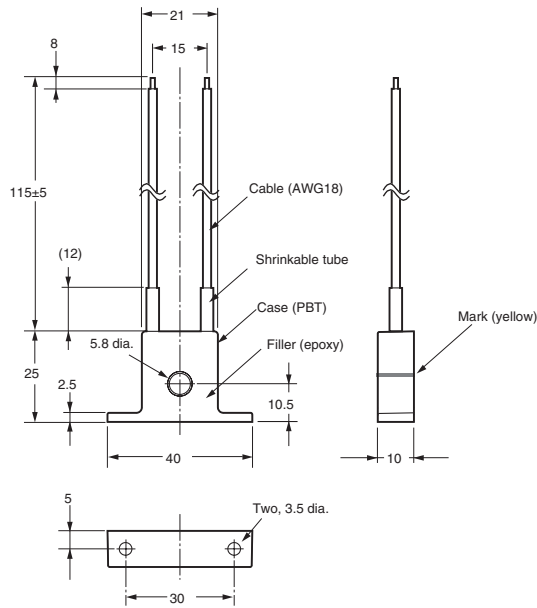
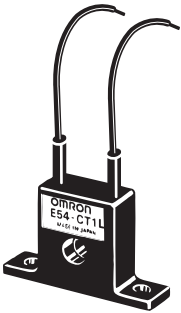
Maximum continuous heater current: 50 A (50/60 Hz)

Number of windings: 400±2

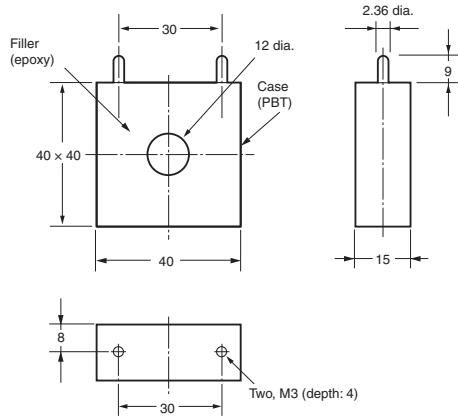
Winding resistance: 18±2 Ω



E54-CT1L

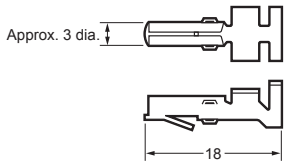


E54-CT3

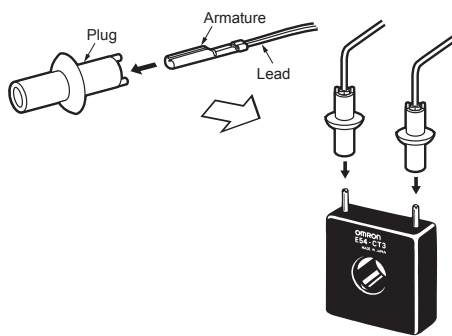


E54-CT3 Accessories

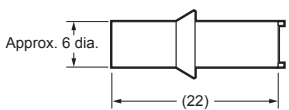
• Armature



Connection Example



• Plug

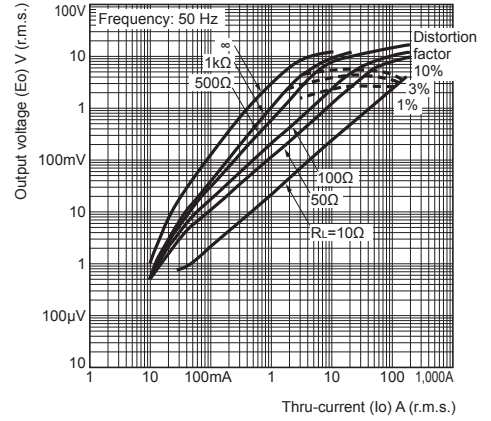


Thru-current (I_o) vs. Output Voltage (E_o) (Reference Values) E54-CT3 or E54-CT3L

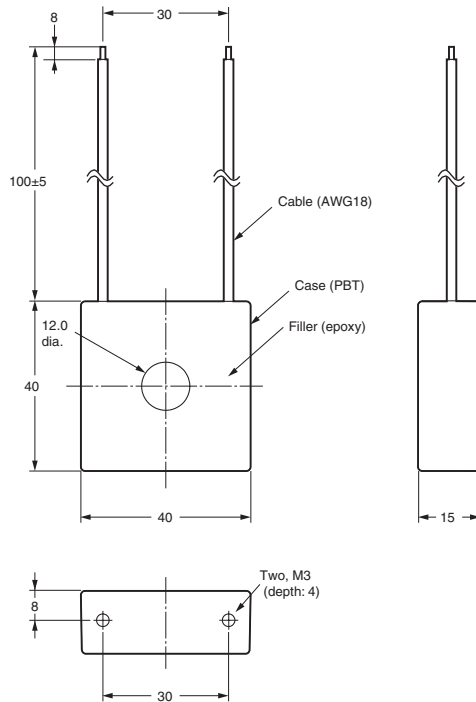
Maximum continuous heater current: 120 A (50/60 Hz)
(Maximum continuous heater current for an OMRON Digital Temperature Controller is 50 A.)

Number of windings: 400 ± 2

Winding resistance: $8 \pm 0.8 \Omega$



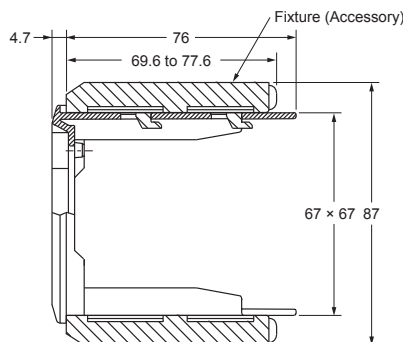
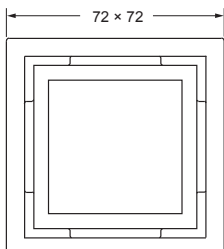
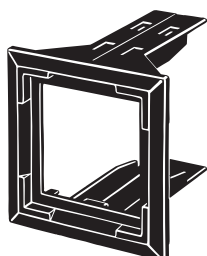
E54-CT3L



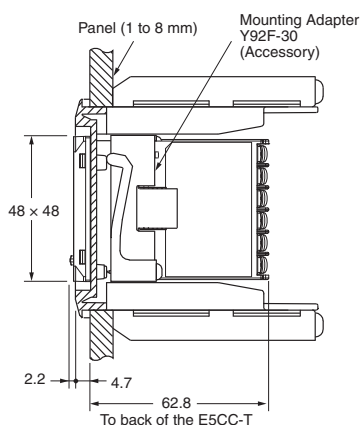
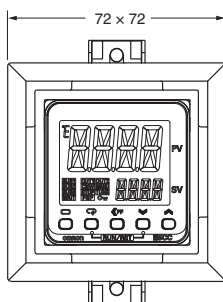
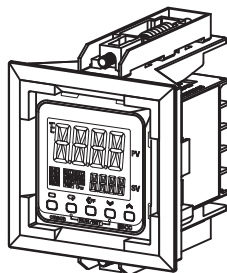
Adapter

Y92F-45

- Note:**
1. Use this Adapter when the Front Panel has already been prepared for the E5B□.
 2. Only black is available.
 3. You cannot use the E58-CIFQ2 USB-Serial Conversion Cable if you use the Y92F-45 Adapter. To use the USB-Serial Conversion Cable to make the settings, do so before you mount the Temperature Controller in the panel.
 4. You cannot use this Adapter together with the Y92F-49 Adapter that is provided with the E5CC-T Temperature Controller.



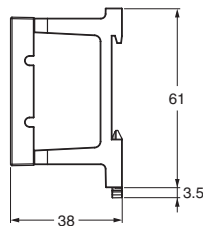
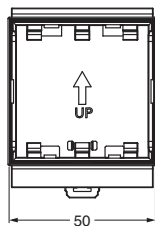
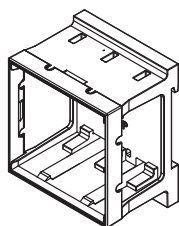
Mounted to E5CC-T



DIN Track Mounting Adapter

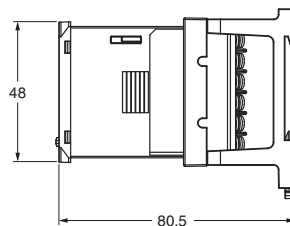
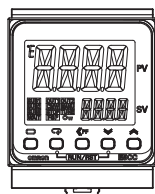
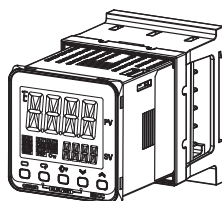
Y92F-52

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

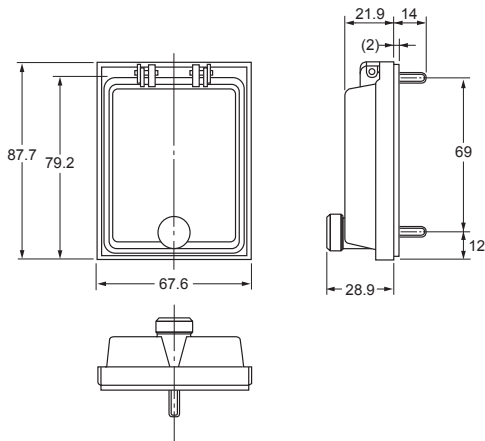


This Adapter is used to mount the E5CC-T to a DIN Track. If you use the Adapter, there is no need for a plate to mount in the panel or to drill mounting holes in the panel.

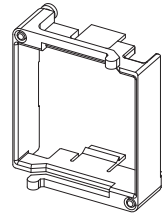
Mounted to E5CC-T



Watertight Cover Y92A-48N



Mounting Adapter Y92F-49



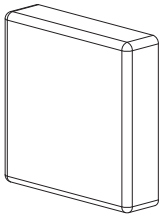
The Mounting Adapter is provided with the Temperature Controller. Order the Mounting Adapter separately if it becomes lost or damaged.

Protective Cover Y92A-48D

Y92A-48D

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

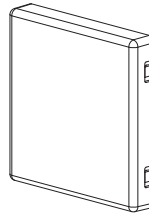
This Protective Cover is soft type. It is able to operate the controller with using this cover.



Protective Cover Y92A-48H

Y92A-48H

This Protective Cover is hard type. Please use it for the mis-operation prevention etc.



MEMO

Programmable Temperature Controller (Digital Controller)

E5EC-T/E5AC-T

(48 × 96 mm/96 × 96 mm)

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



* CSA conformance evaluation by UL.



48 × 96 mm
E5EC-T

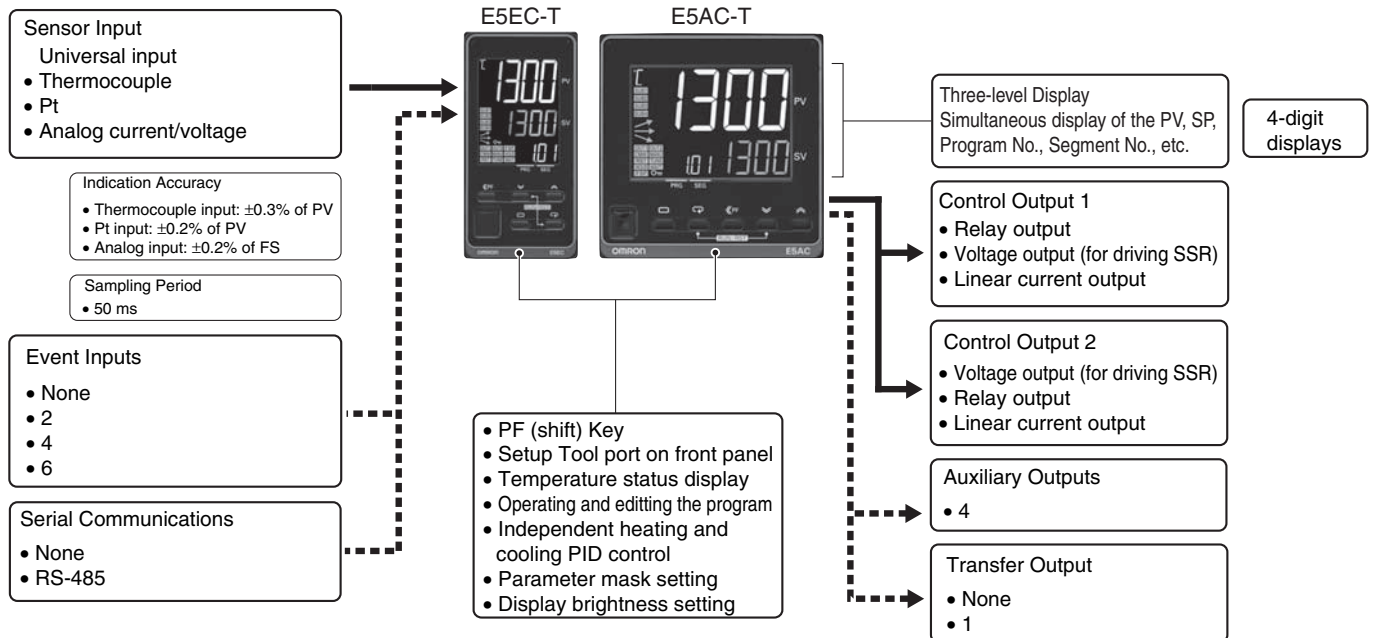
96 × 96 mm
E5AC-T

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

Refer to Safety Precautions on page 122.

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

Main I/O Functions



This datasheet is provided as a guideline for selecting products.

Be sure to refer to the following manuals for application precautions and other information required for operation before attempting to use the product.

E5□C-T Digital Temperature Controllers Programmable Type User's Manual (Cat. No. H185)

E5□C-T Digital Temperature Controllers Programmable Type Communications Manual (Cat. No. H186)

Model Number Legend and Standard Models

Model Number Legend

Models with Screw Terminal Blocks

E5EC-T□□ 4 □ 5 M-□□□ (Example: E5EC-TRX4A5M-000)

① ② ③ ④ ⑤ ⑥

E5AC-T□□ 4 □ 5 M-□□□ (Example: E5AC-TRX4A5M-000)

① ② ③ ④ ⑤ ⑥

| Model | ① | ② | ③ | ④ | ⑤ | ⑥ | Meaning | |
|--------|-------------------------|--------------------------|----------------------|---------------|------------|---------|---|------------------------------------|
| | Control outputs 1 and 2 | No. of auxiliary outputs | Power supply voltage | Terminal type | Input type | Options | Control output 1 | Control output 2 |
| E5EC-T | | | | | | | 48 × 96 mm Programmable Type | |
| E5AC-T | | | | | | | 96 × 96 mm Programmable Type | |
| | | | | | | | Control output 1 | Control output 2 |
| | RX | | | | | | Relay output | None |
| | QX | | | | | | Voltage output (for driving SSR) | None |
| *2 | CX | | | | | | Linear current output | None |
| | QQ | | | | | | Voltage output (for driving SSR) | Voltage output (for driving SSR) |
| | QR | | | | | | Voltage output (for driving SSR) | Relay output |
| | RR | | | | | | Relay output | Relay output |
| *2 | CC | | | | | | Linear current output | Linear current output |
| *2 | CQ | | | | | | Linear current output | Voltage output (for driving SSR) |
| | PR | | | | | | Position-proportional relay output | Position-proportional relay output |
| | | 4 | | | | | 4 (auxiliary outputs 1 and 2 with same common and auxiliary outputs 3 and 4 with same common) | |
| | | | A | | | | 100 to 240 VAC | |
| | | | D | | | | 24 VAC/DC | |
| | | | | 5 | | | Screw terminal blocks (with cover) | |
| | | | | | M | | Universal input | |

| Option selection conditions *1 | Control outputs 1 and 2 | | | | | HB alarm and HS alarm | Communications | Event inputs | Transfer output |
|--------------------------------|-------------------------------|--------------|------------|--|-----|-----------------------|----------------|--------------|-----------------|
| | For RX, QX, QQ, QR, RR, or CQ | For CX or CC | For PR | | | | | | |
| | Selectable | Selectable | Selectable | | 000 | --- | --- | --- | --- |
| | | Selectable | Selectable | | 004 | --- | RS-485 | 2 | --- |
| | | Selectable | | | 005 | --- | --- | 4 | --- |
| | Selectable | | | | 008 | 1 | RS-485 | 2 | --- |
| | Selectable | | | | 010 | 1 | --- | 4 | --- |
| | Selectable | | | | 019 | 1 | --- | 6 | Provided. |
| | | Selectable | | | 021 | --- | --- | 6 | Provided. |
| | | Selectable | Selectable | | 022 | --- | RS-485 | 4 | Provided. |

*1. The options that can be selected depend on the type of control output.

*2. The linear current output cannot be used as a transfer output.

Heating and Cooling Control

Using Heating and Cooling Control

① Control Output Assignment

If there is no control output 2, an auxiliary output is used as the cooling control output.

If there is a control output 2, the two control outputs are used for heating and cooling.

(It does not matter which output is used for heating and which output is used for cooling.)

② Control

If PID control is used, you can set PID control separately for heating and cooling.

This allows you to handle control systems with different heating and cooling response characteristics.

Optional Products (Order Separately)

USB-Serial Conversion Cable

| Model |
|-----------|
| E58-CIFQ2 |

Communications Conversion Cable

| Model |
|-------------|
| E58-CIFQ2-E |

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

Terminal Covers

| Model |
|------------------|
| E53-COV24 (3pcs) |

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

Waterproof Packing

| Applicable Controller | Model |
|-----------------------|----------|
| E5EC-T | Y92S-P9 |
| E5AC-T | Y92S-P10 |

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

Waterproof Cover

| Applicable Controller | Model |
|-----------------------|----------|
| E5EC-T | Y92A-49N |
| E5AC-T | Y92A-96N |

Front Port Cover

| Model |
|---------|
| Y92S-P7 |

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

Mounting Adapter

| Model |
|----------------|
| Y92F-51 (2pcs) |

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

Current Transformers (CTs)

| Hole diameter | Model |
|---------------|-----------|
| 5.8 mm | E54-CT1 |
| 5.8 mm | E54-CT1L* |
| 12.0 mm | E54-CT3 |
| 12.0 mm | E54-CT3L* |

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

CX-Thermo Support Software

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

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

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

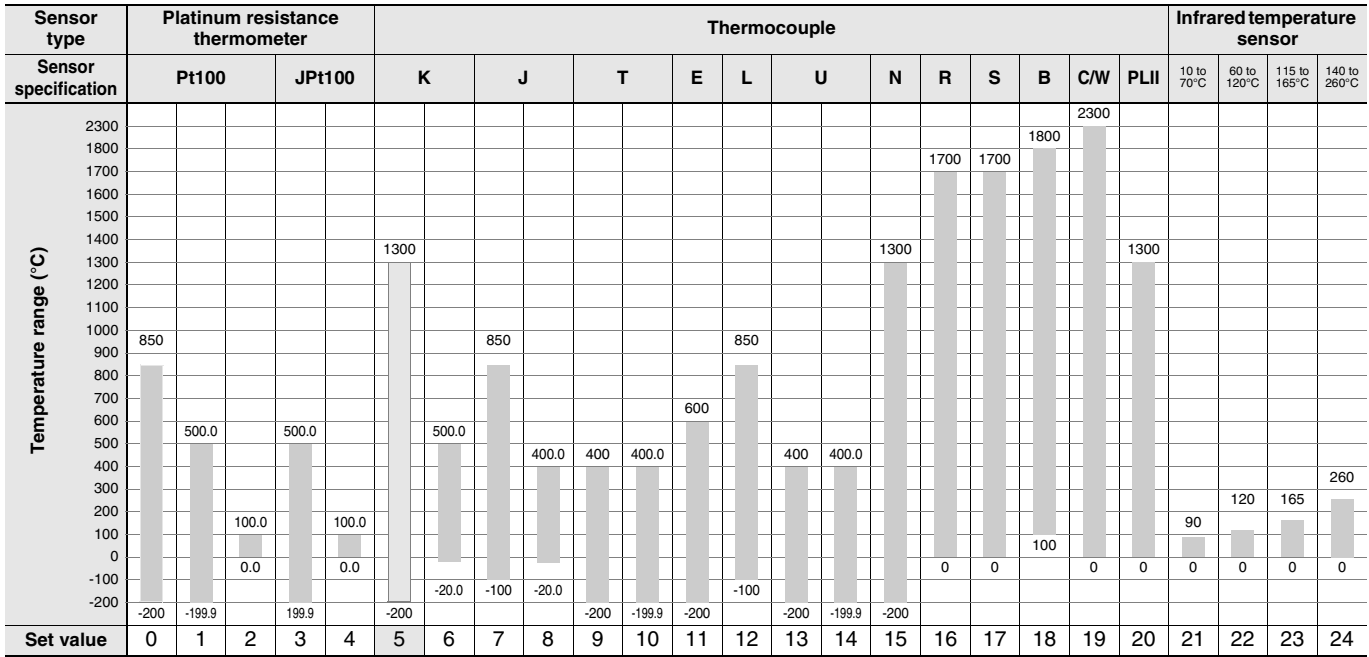
Specifications

Ratings

| | | |
|--------------------------------------|--|---|
| Power supply voltage | | A in model number: 100 to 240 VAC, 50/60 Hz D in model number: 24 VAC, 50/60 Hz; 24 VDC |
| Operating voltage range | | 85 to 110% of rated supply voltage |
| Power consumption | E5EC-T | 8.7 VA max. at 100 to 240 VAC, and 5.5 VA max. at 24 VAC or 3.2 W max. at 24 VDC |
| | E5AC-T | 9.0 VA max. at 100 to 240 VAC, and 5.6 VA max. at 24 VAC or 3.4 W max. at 24 VDC |
| Sensor input | | Temperature input Thermocouple: K, J, T, E, L, U, N, R, S, B, C/W, or PL II Platinum resistance thermometer: Pt100 or JPt100 Infrared temperature sensor (ES1B): 10 to 70°C, 60 to 120°C, 115 to 165°C, or 140 to 260°C Analog input Current input: 4 to 20 mA or 0 to 20 mA Voltage input: 1 to 5 V, 0 to 5 V, or 0 to 10 V |
| Input impedance | | Current input: 150 Ω max., Voltage input: 1 MΩ min. (Use a 1:1 connection when connecting the ES2-HB-N/THB-N.) |
| Control method | | 2-PID control (with auto-tuning) or ON/OFF control |
| Control output | Relay output | SPST-NO, 250 VAC, 5 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA (reference value) |
| | Voltage output (for driving SSR) | Output voltage: 12 VDC ±20% (PNP), max. load current: 40 mA, with short-circuit protection circuit (The maximum load current is 21 mA for models with two control outputs.) |
| | Linear current output | 4 to 20 mA DC/0 to 20 mA DC, load: 500 Ω max., resolution: approx. 10,000 |
| Auxiliary output | Number of outputs | 4 |
| | Output specifications | SPST-NO. relay outputs, 250 VAC, Models with 4 outputs: 2 A (resistive load), Electrical life: 100,000 operations, Minimum applicable load: 10 mA at 5 V (reference value) |
| Event input | Number of inputs | 2, 4 or 6 (depends on model) |
| | External contact input specifications | Contact input: ON: 1 kΩ max., OFF: 100 kΩ min. |
| | | Non-contact input: ON: Residual voltage: 1.5 V max., OFF: Leakage current: 0.1 mA max. Current flow: Approx. 7 mA per contact |
| Transfer output | Number of outputs | 1 (only on models with a transfer output) |
| | Output specifications | Current output: 4 to 20 mA DC, Load: 500 Ω max., Resolution: Approx. 10,000 Linear voltage output: 1 to 5 VDC, load: 1 kΩ min., Resolution: Approx. 10,000 |
| Potentiometer input | | 100 Ω to 10 kΩ |
| Setting method | | Digital setting using front panel keys |
| Indication method | | 11-segment digital display and individual indicators Character height: E5EC-T: PV: 18.0 mm, SV: 11.0 mm, MV: 7.8 mm E5AC-T: PV: 25.0 mm, SV: 15.0 mm, MV: 9.5 mm Three displays. Contents: PV, SP, program No. and segment No., remaining segment time, or MV (valve opening) Numbers of digits: 4 digits |
| Bank switching | | None |
| Other functions | | Manual output, heating/cooling control, loop burnout alarm, other alarm functions, heater burnout (HB) alarm (including SSR failure (HS) alarm), 40% AT, 100% AT, MV limiter, input digital filter, robust tuning, PV input shift, protection functions, extraction of square root, MV change rate limit, logic operations, temperature status display, moving average of input value, and display brightness setting |
| Ambient operating temperature | | -10 to 55°C (with no condensation or icing), For 3-year warranty: -10 to 50°C with standard mounting (with no condensation or icing) |
| Ambient operating humidity | | 25 to 85% |
| Storage temperature | | -25 to 65°C (with no condensation or icing) |
| Altitude | | 2,000 m max. |
| Recommended fuse | | T2A, 250 VAC, time-lag, low-breaking capacity |
| Installation environment | | Overvoltage category II, Pollution Degree 2 (EN/IEC/UL 61010-1) |

Input Ranges

Thermocouple/Platinum Resistance Thermometer (Universal inputs)



Shaded settings are the default settings.

The applicable standards for the input types are as follows:

K, J, T, E, N, R, S, B: JIS C 1602-2015, IEC 60584-1

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

L: Fe-CuNi, DIN 43710-1985

Pt100: JIS C 1604-1997, IEC 60751

U: Cu-CuNi, DIN 43710-1985

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

C/W: W5Re/W26Re, JIS C 1602-2015, ASTM E988-1990

Analog input

| Input type | Current | | Voltage | | |
|---------------------|---|------------|----------|----------|-----------|
| Input specification | 4 to 20 mA | 0 to 20 mA | 1 to 5 V | 0 to 5 V | 0 to 10 V |
| Setting range | Usable in the following ranges by scaling: -1999 to 9999, -199.9 to 999.9, -19.99 to 99.99 or -1.999 to 9.999 | | | | |
| Set value | 25 | 26 | 27 | 28 | 29 |

Alarm Types

Each alarm can be independently set to one of the following 17 alarm types. The default is 2: Upper limit. (see note.)

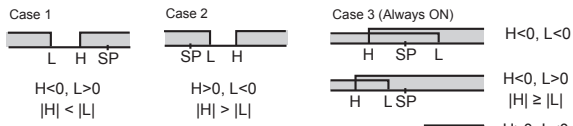
Auxiliary outputs are allocated for alarms. ON delays and OFF delays (0 to 999 s) can also be specified.

Note: In the default settings for models with HB or HS alarms, alarm 1 is set to a heater alarm (HA) and the Alarm Type 1 parameter is not displayed. To use alarm 1, set the output assignment to alarm 1.

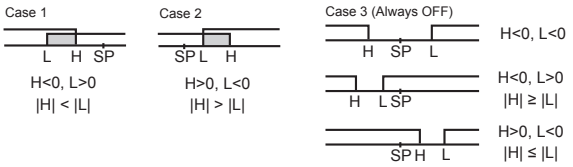
| Set value | Alarm type | Alarm output operation | | Description of function |
|-------------|--|--|---|--|
| | | When alarm value X is positive | When alarm value X is negative | |
| 0 | Alarm function OFF | Output OFF | | No alarm |
| 1 | Upper- and lower-limit *1 | | *2 | Set the upward deviation in the set point for the alarm upper limit (H) and the lower deviation in the set point for the alarm lower limit (L). The alarm is ON when the PV is outside this deviation range. |
| 2 (default) | Upper-limit | | | Set the upward deviation in the set point by setting the alarm value (X). The alarm is ON when the PV is higher than the SP by the deviation or more. |
| 3 | Lower-limit | | | Set the downward deviation in the set point by setting the alarm value (X). The alarm is ON when the PV is lower than the SP by the deviation or more. |
| 4 | Upper- and lower-limit range *1 | | *3 | Set the upward deviation in the set point for the alarm upper limit (H) and the lower deviation in the set point for the alarm lower limit (L). The alarm is ON when the PV is inside this deviation range. |
| 5 | Upper- and lower-limit with standby sequence *1 | | *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 |
| 14 | SP absolute-value upper-limit alarm | | | This alarm type turns ON the alarm when the set point (SP) is higher than the alarm value (X). |
| 15 | SP absolute-value lower-limit alarm | | | This alarm type turns ON the alarm when the set point (SP) is lower than the alarm value (X). |
| 16 | MV absolute-value upper-limit alarm *9 | Standard Control | Standard Control | This alarm type turns ON the alarm when the manipulated variable (MV) is higher than the alarm value (X). |
| | | Heating/Cooling Control (Heating MV) | Heating/Cooling Control (Heating MV) Always ON | |
| 17 | MV absolute-value lower-limit alarm *9 | Standard Control | Standard Control | This alarm type turns ON the alarm when the manipulated variable (MV) is lower than the alarm value (X). |
| | | Heating/Cooling Control (Cooling MV) | Heating/Cooling Control (Cooling MV) Always ON | |

***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 *2

- Case 1 and 2
Always OFF when the upper-limit and lower-limit hysteresis overlaps.
- Case 3: Always OFF

***5.** Set value: 5, Upper- and lower-limit with standby sequence
Always OFF when the upper-limit and lower-limit hysteresis overlaps.

***6.** Refer to the *E5□C-T Digital Temperature Controllers Programmable Type User's Manual* (Cat. No. H185) for information on the operation of the standby sequence.

***7.** Refer to the *E5□C-T Digital Temperature Controllers Programmable Type User's Manual* (Cat. No. H185) for information on the loop burnout alarm (LBA). This setting cannot be used with a position-proportional model.

***8.** Refer to the *E5□C-T Digital Temperature Controllers Programmable Type User's Manual* (Cat. No. H185) for information on the PV change rate alarm.

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

Characteristics

| | | |
|---|--|---|
| Indication accuracy (at the ambient temperature of 23°C) | | Thermocouple: (±0.3% of indication value or ±1°C, whichever is greater) ±1 digit max. *1 Platinum resistance thermometer: (±0.2% of indication value or ±0.8°C, whichever is greater) ±1 digit max. Analog input: ±0.2% FS ±1 digit max. CT input: ±5% FS ±1 digit max. Potentiometer input: ±5% FS ±1 digit max. |
| Transfer output accuracy | | ±0.3% FS max. |
| Influence of temperature *2 | | Thermocouple input (R, S, B, C/W, PL II): (±1% of indication value or ±10°C, whichever is greater) ±1 digit max. |
| Influence of voltage *2 | | Other thermocouple input: (±1% of indication value or ±4°C, whichever is greater) ±1 digit max. *3 Platinum resistance thermometer: (±1% of indication value or ±2°C, whichever is greater) ±1 digit max. |
| Influence of EMS. (at EN 61326-1) | | Analog input: ±1%FS ±1 digit max. CT input: ±5% FS ±1 digit max. |
| Input sampling period | | 50ms |
| Hysteresis | | Temperature input: 0.1 to 999.9°C or °F (in units of 0.1°C or °F) Analog input: 0.01% to 99.99% FS (in units of 0.01% FS) |
| Proportional band (P) | | Temperature input: 0.1 to 999.9°C or °F (in units of 0.1°C or °F) Analog input: 0.1 to 999.9% FS (in units of 0.1% FS) |
| Integral time (I) | | Standard, heating/cooling, or Position-proportional (Close): 0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) Position-proportional (Floating): 1 to 9999 s (in units of 1 s), 0.1 to 999.9 s (in units of 0.1 s) *4 |
| Derivative time (D) | | 0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) *4 |
| Proportional band (P) for cooling | | Temperature input: 0.1 to 999.9°C or °F (in units of 0.1°C or °F) Analog input: 0.1 to 999.9% FS (in units of 0.1% FS) |
| Integral time (I) for cooling | | 0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) *4 |
| Derivative time (D) for cooling | | 0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) *4 |
| Control period | | 0.1, 0.2, 0.5, 1 to 99 s (in units of 1 s) |
| Manual reset value | | 0.0 to 100.0% (in units of 0.1%) |
| Alarm setting range | | -1999 to 9999 (decimal point position depends on input type) |
| Influence of signal source resistance | | Thermocouple: 0.1°C/Ω max. (100 Ω max.) Platinum resistance thermometer: 0.1°C/Ω max. (10 Ω max.) |
| Insulation resistance | | 20 MΩ min. (at 500 VDC) |
| Dielectric strength | | 3,000 VAC, 50/60 Hz for 1 min between terminals of different charge |
| Vibration | Malfunction | 10 to 55 Hz, 20 m/s ² for 10 min each in X, Y, and Z directions |
| | Resistance | 10 to 55 Hz, 20 m/s ² for 2 hrs each in X, Y, and Z directions |
| Shock | Malfunction | 100 m/s ² , 3 times each in X, Y, and Z directions |
| | Resistance | 300 m/s ² , 3 times each in X, Y, and Z directions |
| Weight | E5EC-T | Controller: Approx. 210 g, Mounting Adapter: Approx. 4 g × 2 |
| | E5AC-T | Controller: Approx. 250 g, Mounting Adapter: Approx. 4 g × 2 |
| Degree of protection | | Front panel: IP66, Rear case: IP20, Terminals: IP00 |
| Memory protection | | Non-volatile memory (number of writes: 1,000,000 times) |
| Setup Tool | | CX-Thermo version 4.61 or higher |
| Setup Tool port | | E5EC-T/E5AC-T top panel: An E58-CIFQ2 USB-Serial Conversion Cable is used to connect to a USB port on the computer.*5 E5EC-T/E5AC-T front panel: An E58-CIFQ2 USB-Serial Conversion Cable and E58-CIFQ2-E Conversion Cable are used together to connect to a USB port on the computer.*5 |
| Standards | Approved standards | cULus: UL 61010-1/CSA C22.2 No.61010-1, Korean wireless regulations (Radio law: KC Mark) (Some models only.) *6 |
| | Conformed standards | EN 61010-1 (IEC 61010-1), RCM |
| EMC | EMI Radiated Interference Electromagnetic Field Strength: Noise Terminal Voltage: EMS: ESD Immunity: Electromagnetic Field Immunity: Burst Noise Immunity: Conducted Disturbance Immunity: Surge Immunity: Voltage Dip/Interrupting Immunity: | EN 61326-1 *7 EN 55011 Group 1, class A EN 55011 Group 1, class A EN 61326-1 *7 EN 61000-4-2 EN 61000-4-3 EN 61000-4-4 EN 61000-4-6 EN 61000-4-5 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 at a temperature of 400 to 800°C is ±3°C max. The indication accuracy of the R and S thermocouples at a temperature of 200°C max. is ±3°C ±1 digit max. The indication accuracy of C/W thermocouples is (±0.3% of PV or ±3°C, whichever is greater) ±1 digit max. The indication accuracy of PL II thermocouples is (±0.3% of PV or ±2°C, whichever is greater) ±1 digit max.

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

*3. K thermocouple at -100°C max.: ±10°C max.

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

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

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

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

Program Control

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

USB-Serial Conversion Cable

| | |
|--------------------------------------|---|
| Applicable OS | Windows XP/Vista/7/8/8.1/10 *1 |
| Applicable software | CX-Thermo version 4.61 or higher |
| Applicable models | E5□C-T Series, E5□C Series, and E5CB Series |
| USB interface standard | Conforms to USB Specification 2.0. |
| DTE speed | 38400 bps |
| Connector specifications | Computer: USB (type A plug) Digital Temperature Controller: Special serial connector |
| Power supply | Bus power (Supplied from USB host controller.) *2 |
| Power supply voltage | 5 VDC |
| Current consumption | 450 mA max. |
| Output voltage | 4.7±0.2 VDC (Supplied from USB-Serial Conversion Cable to the Digital Temperature Controller.) |
| Output current | 250 mA max. (Supplied from USB-Serial Conversion Cable to the Digital Temperature Controller.) |
| Ambient operating temperature | 0 to 55°C (with no condensation or icing) |
| Ambient operating humidity | 10% to 80% |
| Storage temperature | -20 to 60°C (with no condensation or icing) |
| Storage humidity | 10% to 80% |
| Altitude | 2,000 m max. |
| Weight | Approx. 120 g |

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

*1. CX-Thermo version 4.65 or higher runs on Windows 10.

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

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

Communications Specifications

| | |
|--|---|
| Transmission line connection method | RS-485: Multidrop |
| Communications | RS-485 (two-wire, half duplex) |
| Synchronization method | Start-stop synchronization |
| Protocol | CompoWay/F, or Modbus |
| Baud rate * | 9600, 19200, 38400, or 57600 bps |
| Transmission code | ASCII |
| Data bit length * | 7 or 8 bits |
| Stop bit length * | 1 or 2 bits |
| Error detection | Vertical parity (none, even, odd) Block check character (BCC) with CompoWay/F or CRC-16 Modbus |
| Flow control | None |
| Interface | RS-485 |
| Retry function | None |
| Communications buffer | 217 bytes |
| Communications response wait time | 0 to 99 ms Default: 20 ms |

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

Communications Functions

| | |
|-------------------------------------|--|
| Programless communications * | You can use the memory in the PLC to read and write E5□C-T parameters, start and reset operation, etc. The E5□C-T automatically performs communications with PLCs. No communications programming is required. Number of connected Digital Temperature Controllers: 32 max. Applicable PLCs OMRON PLCs Mitsubishi Electric PLCs |
| | CS Series, CJ Series, CP Series, NJ Series, or NX1P MELSEC Q Series, L Series, or iQ-R Series |

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

MELSEC is a registered trademark of Mitsubishi Electric Corporation.

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

Current Transformer (Order Separately) Ratings

| | E54-CT1 E54-CT3 | E54-CT1L E54-CT3L |
|-----------------------------|--|--|
| Dielectric strength | 1,000 VAC for 1 min | 1,500 VAC for 1 min |
| Vibration resistance | 50 Hz, 98 m/s ² | |
| Weight | E54-CT1: Approx. 11.5 g E54-CT3: Approx. 50 g | E54-CT1L: Approx. 14 g E54-CT3L: Approx. 57 g |
| Accessories | E54-CT3 Only Armatures (2) Plugs (2) | None |

Heater Burnout Alarms and SSR Failure Alarms

| | |
|--|--|
| CT input (for heater current detection) | Models with detection for single-phase heaters: One input |
| Maximum heater current | 50 A AC |
| Input current indication accuracy | ±5% FS ±1 digit max. |
| Heater burnout alarm setting range *1 | 0.1 to 49.9 A (in units of 0.1 A) Minimum detection ON time: 100 ms *3 |
| SSR failure alarm setting range *2 | 0.1 to 49.9 A (in units of 0.1 A) Minimum detection OFF time: 100 ms *4 |

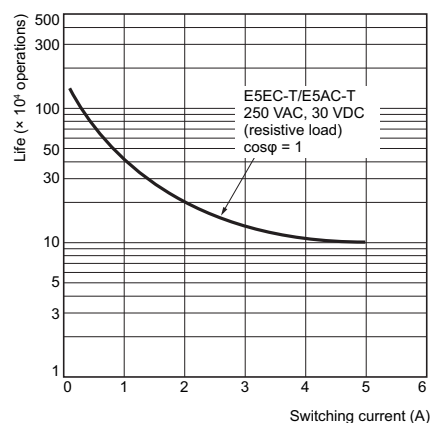
*1. For heater burnout alarms, the heater current will be measured when the control output is ON, and the output will turn ON if the heater current is lower than the set value (i.e., heater burnout detection current value).

*2. For SSR failure alarms, the heater current will be measured when the control output is OFF, and the output will turn ON if the heater current is higher than the set value (i.e., SSR failure detection current value).

*3. The value is 30 ms for a control period of 0.1 s or 0.2 s.

*4. The value is 35 ms for a control period of 0.1 s or 0.2 s.

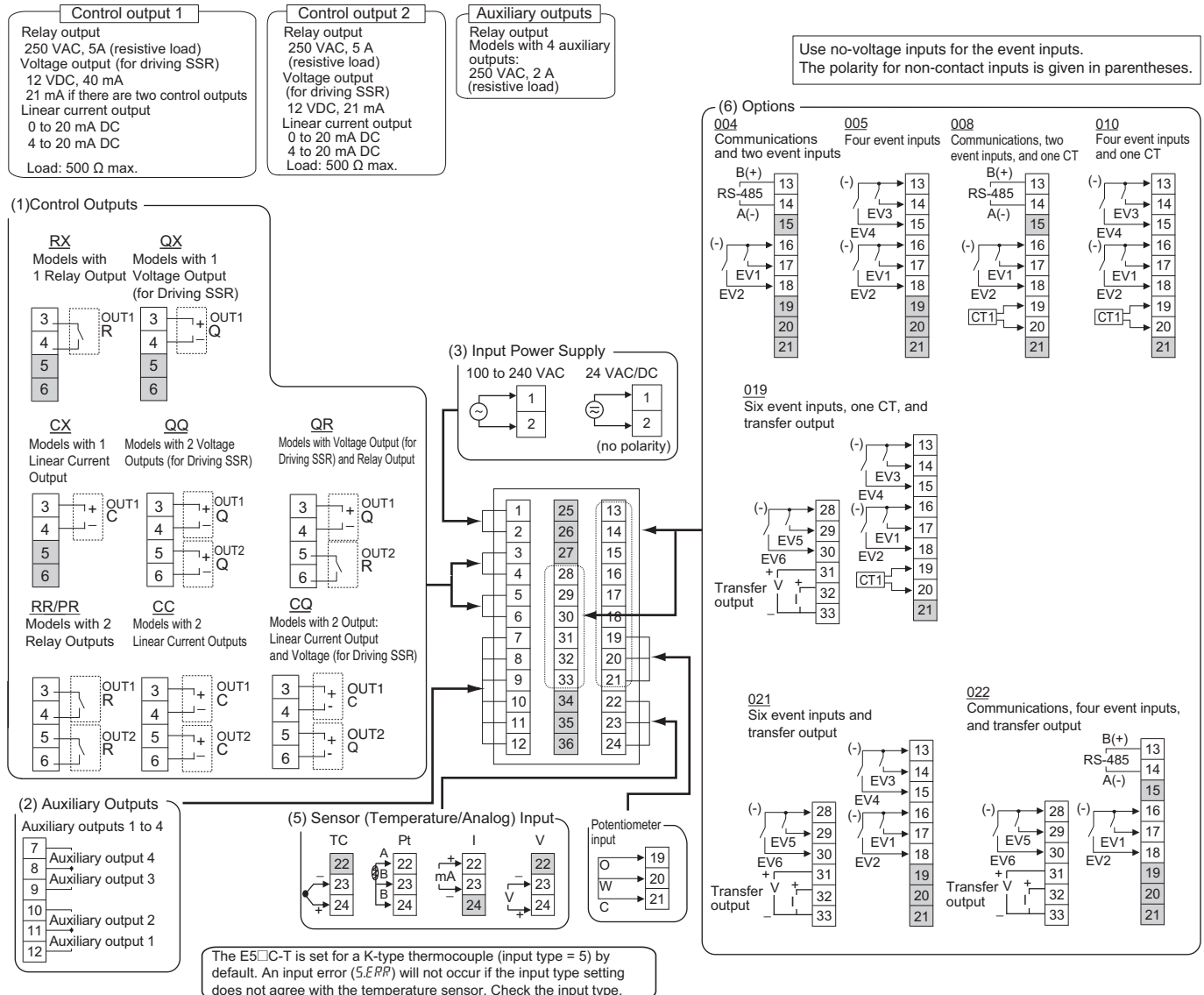
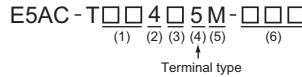
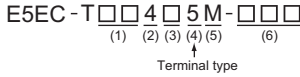
Electrical Life Expectancy Curve for Relays (Reference Values)



E5EC-T/E5AC-T

External Connections

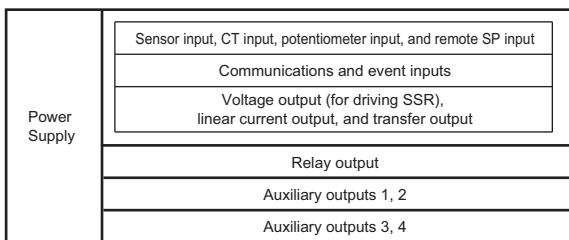
E5EC-T/E5AC-T



- Note:**
- The application of the terminals depends on the model.
 - Do not wire the terminals that are shown with a gray background.
 - When complying with EMC standards, the cable that connects the sensor must be 30 m or less. If the cable length exceeds 30 m, compliance with EMC standards will not be possible.
 - Connect M3 crimped terminals.
 - Due to UL Listing requirements, use the E54-CT1L or E54-CT3L Current Transformer with the factory wiring (internal wiring). Use a UL category XOBA or XOBA7 current transformer that is UL Listed for field wiring (external wiring) and not the factory wiring (internal wiring).

Isolation/Insulation Block Diagrams

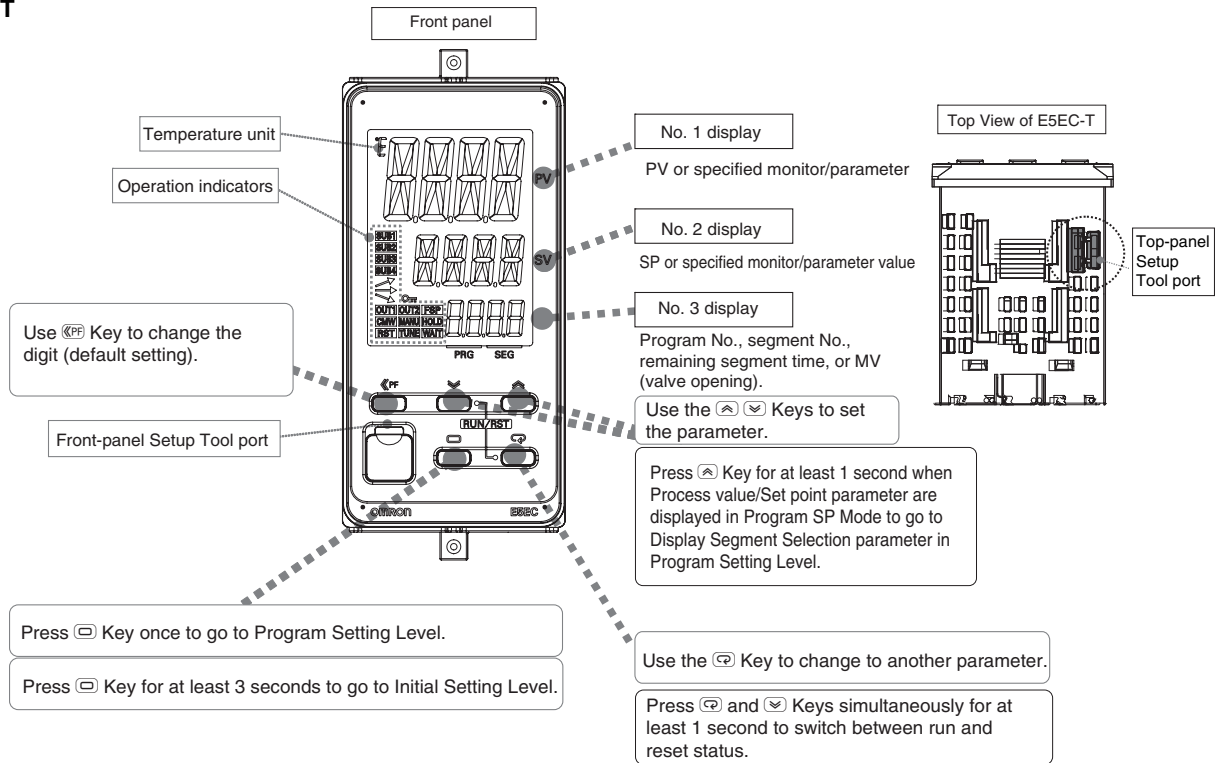
Models with 4 Auxiliary Outputs



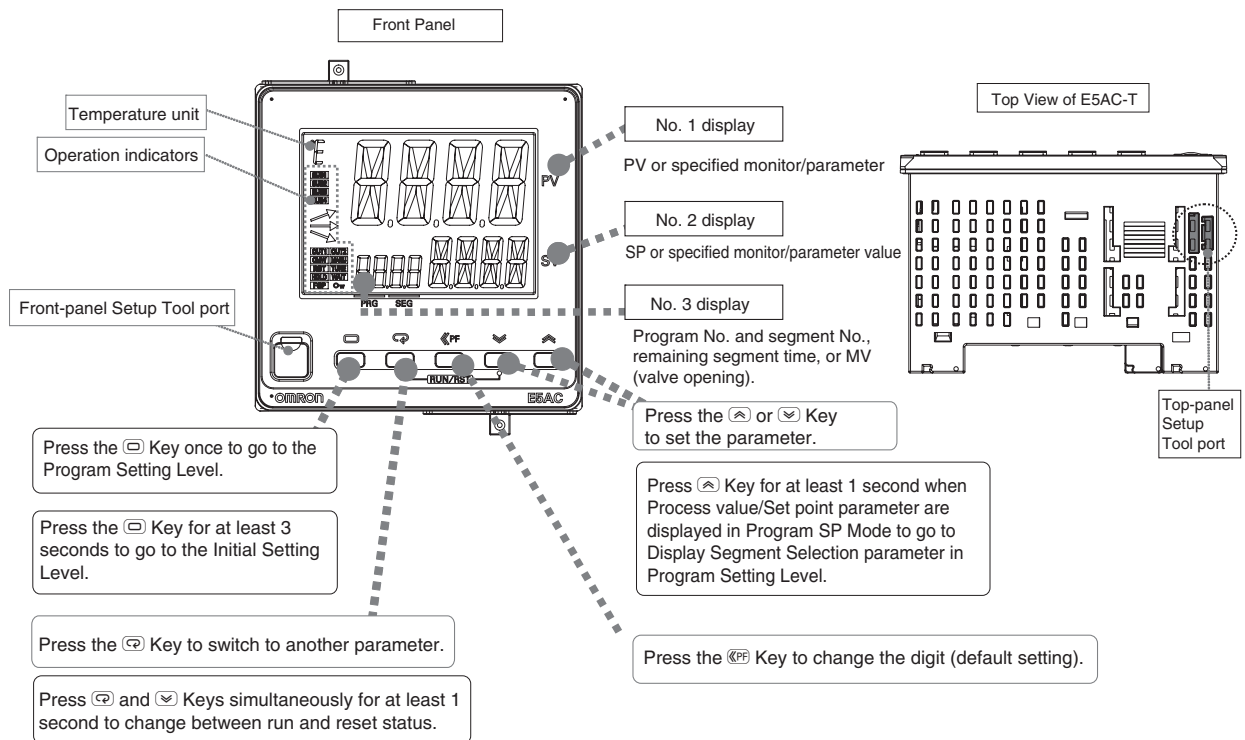
Note: Auxiliary outputs 1 to 2 and 3 to 4 are not insulated.

Nomenclature

E5EC-T

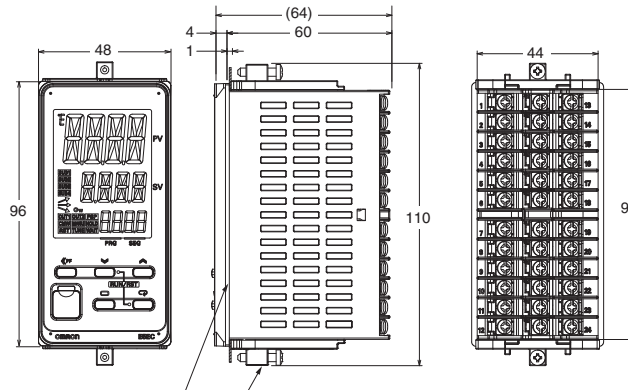


E5AC-T



Controllers

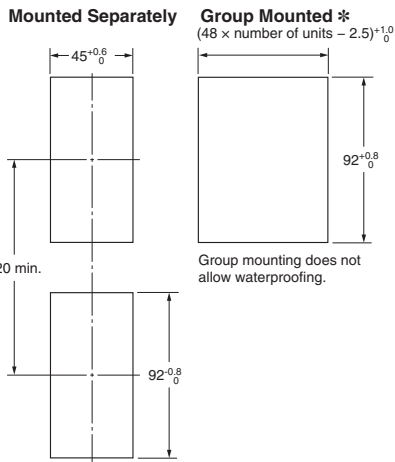
E5EC-T



Waterproof Packing (Accessory, Y92S-P9 (also available for ordering separately))

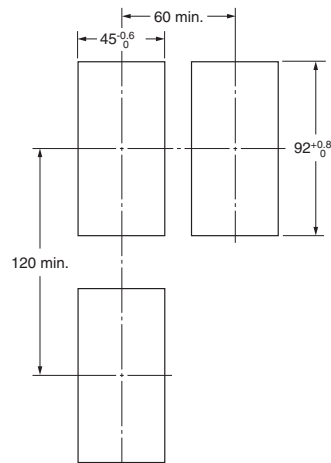
Mounting Adapter (Accessory, Y92F-51 (also available for ordering separately))

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

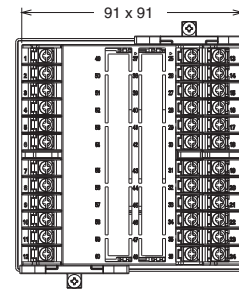
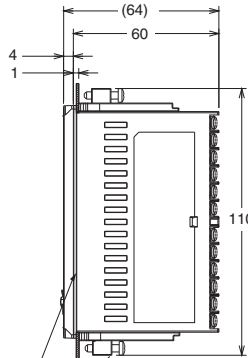
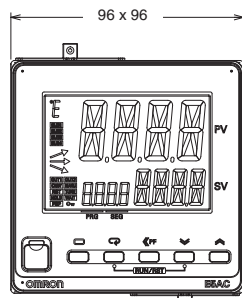


- Recommended panel thickness is 1 to 8 mm.
- Group mounting is not possible in the vertical direction. (Maintain the specified mounting space between Controllers.)
- To mount the Controller so that it is waterproof, insert the waterproof packing onto the Controller.
- When two or more Controllers are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

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



E5AC-T

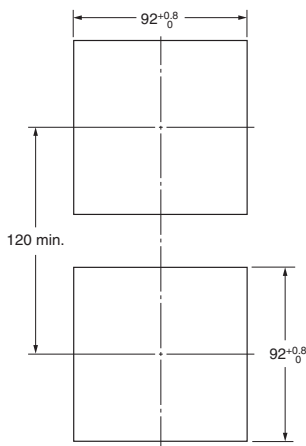


Waterproof Packing (Accessory, Y92S-P10 (also available for ordering separately))

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

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

Mounted Separately



Group Mounted

$$(96 \times \text{number of units} - 3.5)^{+1.0}_0$$



Group mounting does not allow waterproofing.

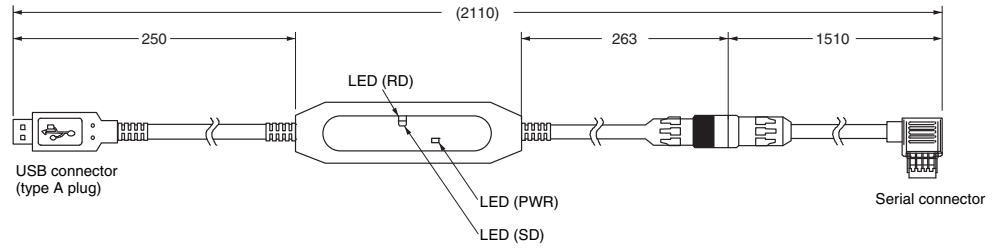
- Recommended panel thickness is 1 to 8 mm.
- Group mounting is not possible in the vertical direction. (Maintain the specified mounting space between Controllers.)
- To mount the Controller so that it is waterproof, insert the waterproof packing onto the Controller.
- When two or more Controllers are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

E5EC-T/E5AC-T

Accessories (Order Separately)

USB-Serial Conversion Cable

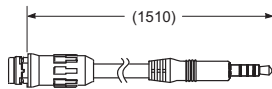
E58-CIFQ2



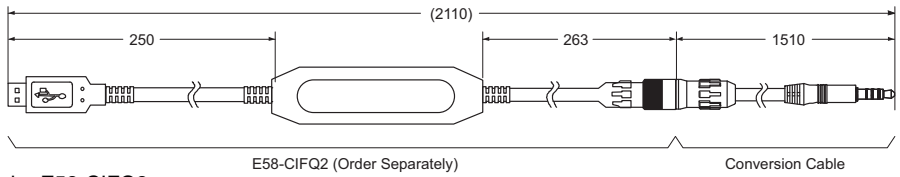
Conversion Cable

E58-CIFQ2-E

Conversion Cable



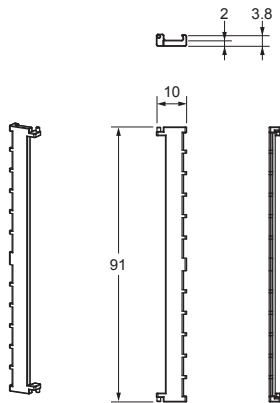
Connecting to the E58-CIFQ2 USB-Serial Conversion Cable



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

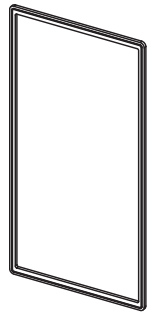
Terminal Covers

E53-COV24 (Three Covers provided.)

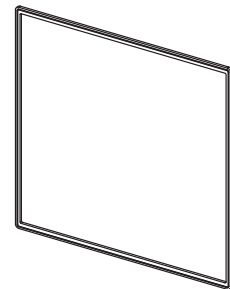


Waterproof Packing

Y92S-P9 (for DIN 48 × 96)



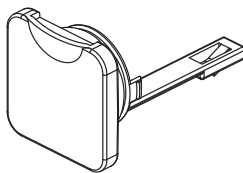
Y92S-P10 (for DIN 96 × 96)



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

Setup Tool Port Cover for top panel

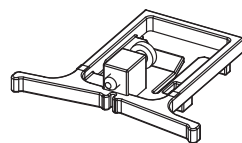
Y92S-P7



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

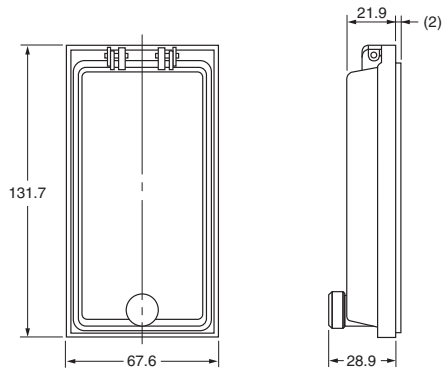
Mounting Adapter

Y92F-51 (Two Adapters provided.)

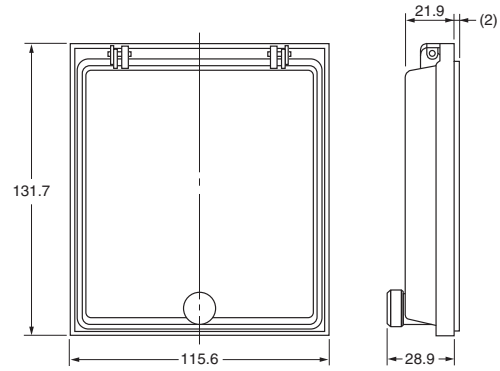


One pair is provided with the Controller.
Order the Mounting Adapter separately if it becomes lost or damaged.

Watertight Cover
Y92A-49N (48 × 96)

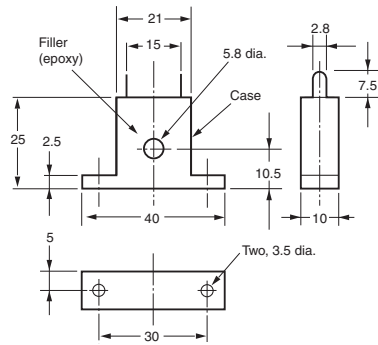
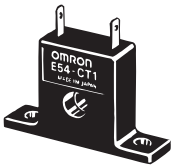


Watertight Cover
Y92A-96N (96 × 96)



Current Transformers

E54-CT1



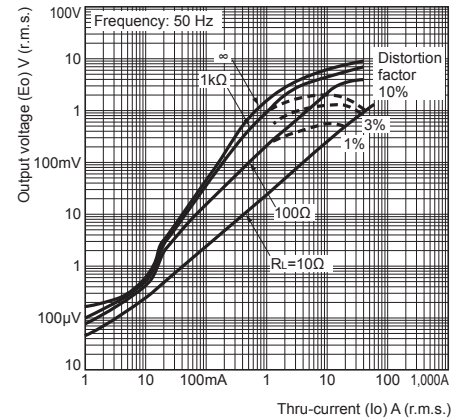
Thru-current (Io) vs. Output Voltage (Eo)
(Reference Values)

E54-CT1 or E54-CT1L

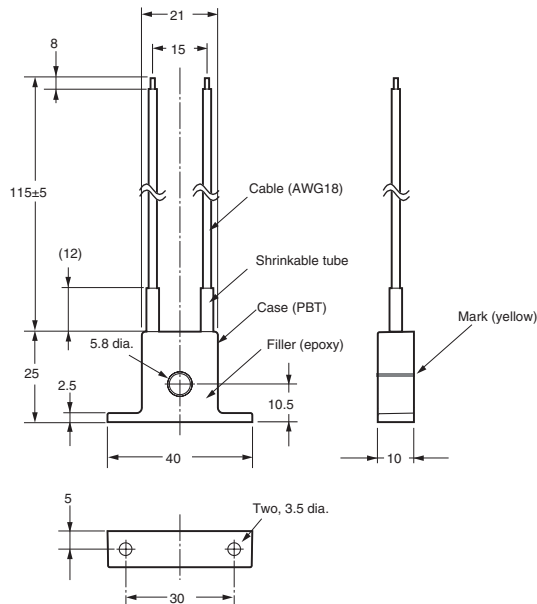
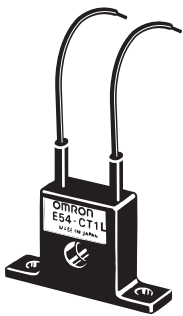
Maximum continuous heater current: 50 A (50/60 Hz)

Number of windings: 400±2

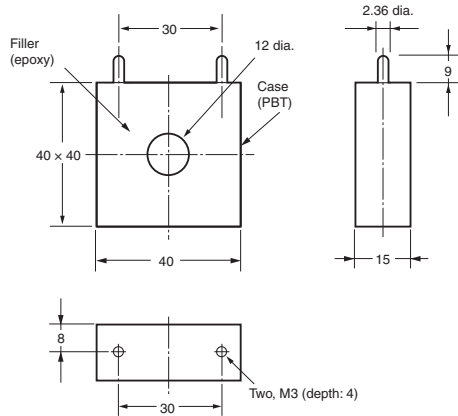
Winding resistance: 18±2 Ω



E54-CT1L

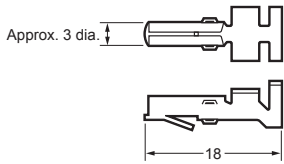


E54-CT3

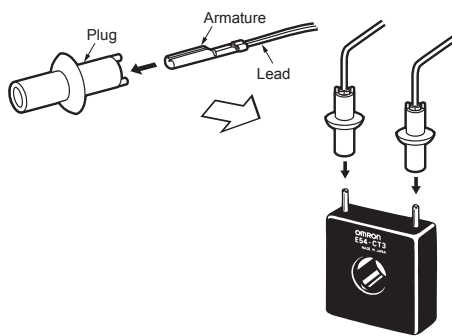


E54-CT3 Accessories

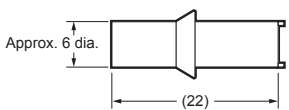
• Armature



Connection Example



• Plug



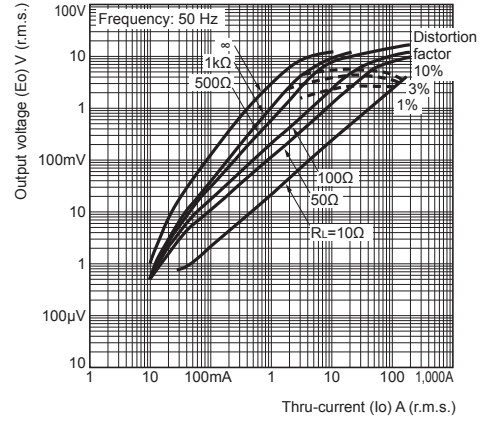
Thru-current (I_o) vs. Output Voltage (E_o) (Reference Values) E54-CT3 or E54-CT3L

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

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

Number of windings: 400±2

Winding resistance: 8±0.8 Ω



E54-CT3L

