

Digital Temperature Controller (Simple Type)

E5CC-800 (48 × 48 mm)

Large White PV Display That's Easier to Read.

Easy to Use, from Model Selection to Setup and Operation.

A Complete Range of I/O Capacities, Functions, and Performance.

Handles More Applications.

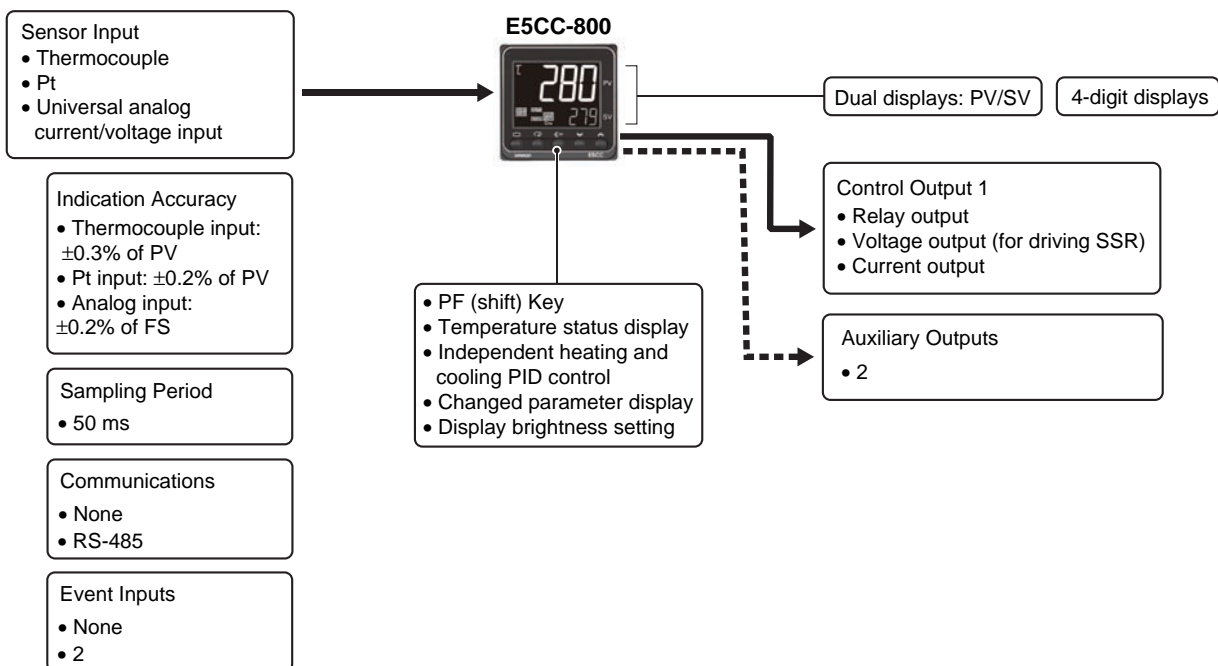
- The white PV display with a height of 15.2 mm improves visibility.
- High-speed sampling at 50 ms.
- Short body with depth of only 60 mm.
- Easy connections to a PLC with programless communications.
Use component communications to link Temperature Controllers to each other.



48 × 48 mm
E5CC-800

⚠ Refer to Safety Precautions on page 33.

Main I/O Functions



Model Number Legend and Standard Models

Model Number Legend

E5CC-800 48x48mm

| Control output 1 | Auxiliary output | Communications | Heater burnout | Event inputs | Power supply voltage | Model | | | | |
|------------------|------------------|-----------------|----------------|----------------|----------------------|-----------------|-----------------|-----------------|---|----------------|
| Relay output | Two | - | - | - | 100 to 240 VAC | E5CC-RX2ASM-800 | | | | |
| Voltage output | | | | | | E5CC-QX2ASM-800 | | | | |
| Current output | | | | | | E5CC-CX2ASM-800 | | | | |
| Relay output | | | | | 24 VAC/VDC | E5CC-RX2DSM-800 | | | | |
| Voltage output | | | | | | E5CC-QX2DSM-800 | | | | |
| Current output | | | | | | E5CC-CX2DSM-800 | | | | |
| Relay output | | - | One | - | Two | 100 to 240 VAC | E5CC-RX2ASM-801 | | | |
| Voltage output | | | | | | | E5CC-QX2ASM-801 | | | |
| Relay output | | | | | | | 24 VAC/VDC | E5CC-RX2DSM-801 | | |
| Voltage output | | | | | | E5CC-QX2DSM-801 | | | | |
| Relay output | | | | | | RS-485 | | - | - | 100 to 240 VAC |
| Voltage output | | | | | | | E5CC-QX2ASM-802 | | | |
| Relay output | 24 VAC/VDC | E5CC-RX2DSM-802 | | | | | | | | |
| Voltage output | | E5CC-QX2DSM-802 | | | | | | | | |
| Current output | | - | Two | 100 to 240 VAC | E5CC-CX2ASM-804 | | | | | |
| Current output | 24 VAC/VDC | | | | E5CC-CX2DSM-804 | | | | | |

Heating and Cooling Control

● Using Heating and Cooling Control

① Control Output Assignment

An auxiliary output is used as the cooling control output.

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)

Terminal Covers

| Model |
|-----------|
| E53-COV17 |
| E53-COV23 |

Note: The E53-COV10 cannot be used.
Refer to page 10 for the mounted dimensions.

Waterproof Packing

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

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

Current Transformers (CTs)

| Hole diameter | Model |
|---------------|---------|
| 5.8 mm | E54-CT1 |
| 12.0 mm | E54-CT3 |

Adapter

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

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

DIN Track Mounting Adapter

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

Waterproof Cover

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

Note: This Cover complies with IP66 and NEMA 4X waterproofing.
Front panel: IP66 protection.

Mounting Adapter

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

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

Front Covers

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

E5CC-800

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 | 5.2 VA max. at 100 to 240 VAC, and 3.1 VA max. at 24 VDC or 1.6 W max. at 24 VDC | |
| Sensor input | Models with temperature inputs Thermocouple: K, J, T, E, L, U, N, R, S, B, 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/THB.) | |
| Control method | ON/OFF control or 2-PID control (with auto-tuning) | |
| Control output | Relay output | SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA |
| | Voltage output (for driving SSR) | Output voltage: 12 VDC ±20% (PNP), max. load current: 21 mA, with short-circuit protection circuit |
| | 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 | 2 |
| | Output specifications | N.O. relay outputs, 250 VAC, Models with 2 outputs: 3 A (resistive load), Electrical life: 100,000 operations, Minimum applicable load: 10 mA at 5 V |
| 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 |
| 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 | |
| Multi SP | Up to eight set points (SP0 to SP7) can be saved and selected using event inputs, key operations, or serial communications. | |
| Other functions | Manual output, heating/cooling control, loop burnout alarm, SP ramp, other alarm functions, 40% AT, 100% AT, MV limiter, input digital filter, self tuning, PV input shift, run/stop, protection functions, extraction of square root, MV change rate limit, 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 no condensation or icing) | |
| Ambient operating humidity | 25% to 85% | |
| Storage temperature | -25 to 65°C (with no condensation or icing) | |

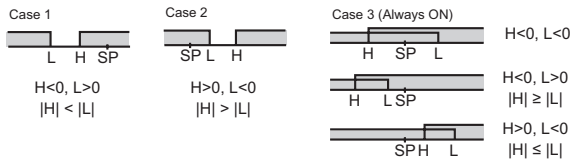
Alarm Outputs

Each alarm can be independently set to one of the following 19 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.

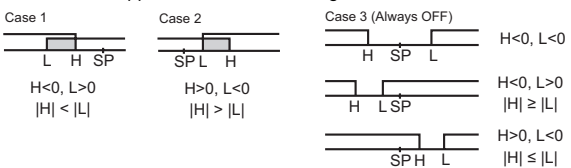
| Set value | Alarm type | Alarm output operation | | Description of function |
|-----------|--|--------------------------------|--------------------------------|---|
| | | When alarm value X is positive | When alarm value X is negative | |
| 0 | Alarm function OFF | Output OFF | | No alarm |
| 1 | Upper- and lower-limit *1 | | *2 | Set the deviation in the set point by setting the alarm upper limit (H) and alarm lower limit (L). The alarm is ON when the PV is outside this deviation range. |
| 2 | 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 deviation in the set point by setting the alarm upper limit (H) and 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 | | | 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 | | | This alarm type turns ON the alarm when the set point (SP) is smaller than the alarm value (X). |
| 16 | MV absolute value upper limit *9 | | | This alarm type turns ON the alarm when the manipulated variable (MV) is higher than the alarm value (X). |
| 17 | MV absolute value lower limit *9 | | | This alarm type turns ON the alarm when the manipulated variable (MV) is smaller than the alarm value (X). |

*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 Digital Controllers User's Manual (Cat. No. H174) for information on the operation of the standby sequence.

*7 Refer to the E5□C Digital Controllers User's Manual (Cat. No. H174) for information on the loop burnout alarm (LBA).

*8 Refer to the E5□C Digital Controllers User's Manual (Cat. No. H174) 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 indicated value or ±1°C, whichever is greater) ±1 digit max. *1 Platinum resistance thermometer: (±0.2% of indicated value or ±0.8°C, whichever is greater) ±1 digit Analog input: ±0.2% FS ±1 digit max. CT input: ±5% FS ±1 digit max. |
| Influence of temperature *2 | Thermocouple input (R, S, B, W, PL II): (±1% of PV or ±10°C, whichever is greater) ±1 digit max. Other thermocouple input: (±1% of PV or ±4°C, whichever is greater) ±1 digit max. *3 Platinum resistance thermometer: (±1% of PV or ±2°C, whichever is greater) ±1 digit max. Analog input: (±1%FS) ±1 digit max. CT input: (±5%FS) ±1 digit max. |
| Influence of voltage *2 | |
| Input sampling period | 50 ms |
| Hysteresis | Temperature input: 0.1 to 999.9°C or °F (in units of 0.1°C or °F) *4 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) *4 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) *5 |
| Derivative time (D) | 0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) *5 |
| Proportional band (P) for cooling | Temperature input: 0.1 to 999.9°C or °F (in units of 0.1°C or °F) *4 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) *5 |
| 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) *5 |
| 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) |
| Affect of signal source resistance | Thermocouple: 0.1°C/Ω max. (100 Ω max.) Platinum resistance thermometer: 0.1°C/Ω max. (10 Ω max.) |
| Insulation resistance | 20 MΩ min. (at 500 VDC) |
| Dielectric strength | 2,300 VAC, 50 or 60 Hz for 1 min (between terminals with different charge) |
| Vibration | resistance 10 to 55 Hz, 20 m/s ² for 10 min each in X, Y, and Z directions Malfunction 10 to 55 Hz, 20 m/s ² for 2 hrs each in X, Y, and Z directions |
| Destruction | Shock resistance 100 m/s ² , 3 times each in X, Y, and Z directions Malfunction 300 m/s ² , 3 times each in X, Y, and Z directions |
| Weight | Controller: Approx. 120 g, Mounting Bracket: Approx. 10 g |
| Degree of protection | Front panel: IP66, Rear case: IP20, Terminals: IP00 |
| Memory protection | Non-volatile memory (number of writes: 1,000,000 times) |
| Standards | Approved standards UL 61010-1, CSA C22.2 No. 611010-1 (evaluated by UL), KOSHA certified (some models) *6, Korean Radio Waves Act (Act 10564) Conformed standards EN 61010-1 (IEC 61010-1): Pollution level 2, overcurrent category II, Lloyd's standards *7 |
| EMC | EMI: EN61326 Radiated Interference Electromagnetic Field Strength: EN 55011 Group 1, class A Noise Terminal Voltage: EN 55011 Group 1, class A EMS: EN 61326 ESD Immunity: EN 61000-4-2 Electromagnetic Field Immunity: EN 61000-4-3 Burst Noise Immunity: EN 61000-4-4 Conducted Disturbance Immunity: EN 61000-4-6 Surge Immunity: EN 61000-4-5 Voltage Dip/Interrupting Immunity: EN 61000-4-11 |

*1 The indication accuracy of K thermocouples in the -200 to 1300°C range, T and N thermocouples at a temperature of -100°C max., and U and L thermocouples at any temperatures is ±2°C ±1 digit max. The indication accuracy of the B thermocouple at a temperature of 400°C max. is not specified. The indication accuracy of B thermocouples in the 400 to 800°C range is ±3°C max. The indication accuracy of the R and S thermocouples at a temperature of 200°C max. is ±3°C ±1 digit max. The indication accuracy of W thermocouples is ±0.3 of PV or ±3°C, whichever is greater, ±1 digit max. The indication accuracy of PL II thermocouples is ±0.3 of PV or ±2°C, whichever is greater, ±1 digit max.

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

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

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

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

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

*7 Refer to information on maritime standards in *Shipping Standards* on page 35 for compliance with Lloyd's Standards.

Communications Specifications

| | |
|-------------------------------------|---|
| Transmission line connection method | RS-485: Multipoint |
| Communications | RS-485 (two-wire, half duplex) |
| Synchronization method | Start-stop synchronization |
| Protocol | CompoWay/F, or Modbus |
| Baud rate | 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* | <ul style="list-style-type: none"> You can use the memory in the PLC to read and write E5□C parameters, start and stop operation, etc. The E5□C automatically performs communications with PLCs. No communications programming is required. Number of connected Temperature Controllers: 16 max. Applicable PLCs <ul style="list-style-type: none"> OMRON PLCs <ul style="list-style-type: none"> SYSMAC CS Series, CJ Series, or CP Series Mitsubishi Electric PLCs <ul style="list-style-type: none"> MELSEC Q Series or L Series |
| Communications between components* | <ul style="list-style-type: none"> When Temperature Controllers are connected, the parameters can be copied from the Temperature Controller that is set as the master to Temperature Controllers that are set as slaves. Number of connected Temperature Controllers: 16 max. (including master) When Temperature Controllers are connected, set points and RUN/STOP commands can be sent from the Temperature Controller that is set as the master to Temperature Controllers that are set as slaves. Ratio and offsets can be set for the set point. Number of connected Temperature Controllers: 16 max. (including master) |

* A Temperature Controller with version 1.1 or higher is required.

Current Transformer (Order Separately) Ratings

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

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 single-phase or three-phase heaters: Two inputs |
| Maximum heater current | 50 A AC |
| Input current indication accuracy | ±5% FS ±1 digit max. |
| Heater burnout alarm setting range *1 | 0.1 to 49.9 A (in units of 0.1 A) Minimum detection ON time: 100 ms *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 |

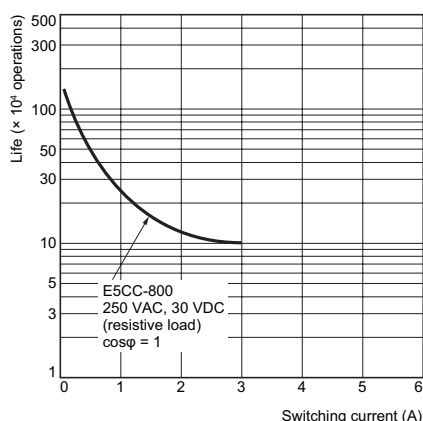
*1 For heater burnout alarms, the heater current will be measured when the control output is ON, and the output will turn ON if the heater current is lower than the set value (i.e., heater burnout detection current value).

*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)



External Connections

E5CC-800

Control output 1

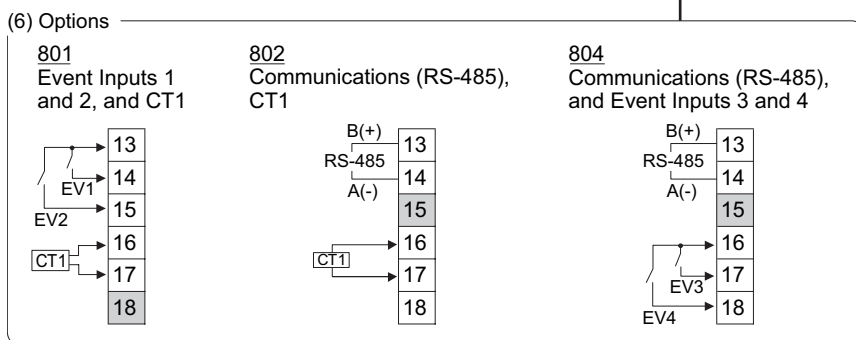
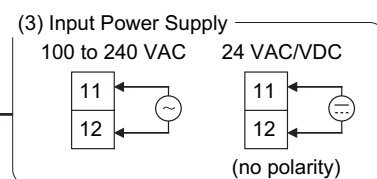
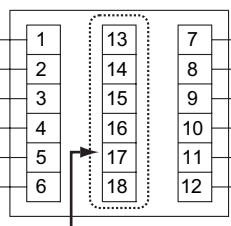
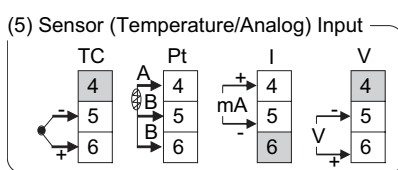
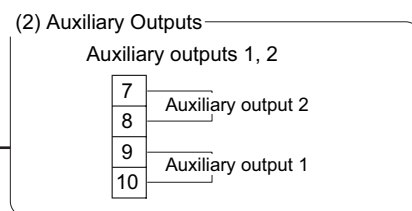
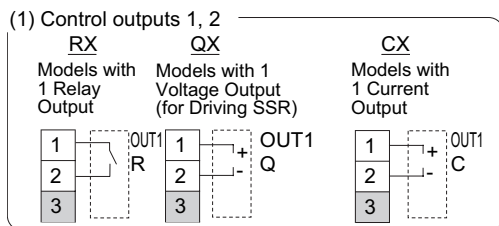
Relay output
250 VAC, 3A
(resistive load)
Voltage output
(for driving SSR)
12 VDC, 21 mA
Current output
0 to 20 mA DC
4 to 20 mA DC
Load: 500 Ω max.

Auxiliary outputs 1, 2

Relay outputs
Models with 2 auxiliary
outputs: 250 VAC, 3 A
(resistive load)

E5CC-□□ 2 □ S M - 8□□
 (1) (2) (3) (4) (5) (6)
 ↑
 Terminal type

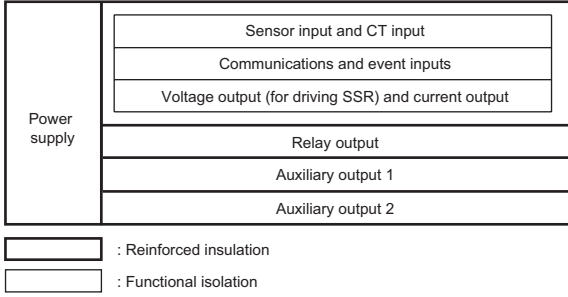
The E5CC-800 is set for a K-type thermocouple (input type = 5) by default. An input error (s.err) will occur if the input type setting does not agree with the temperature sensor. Check the input type.



- 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.

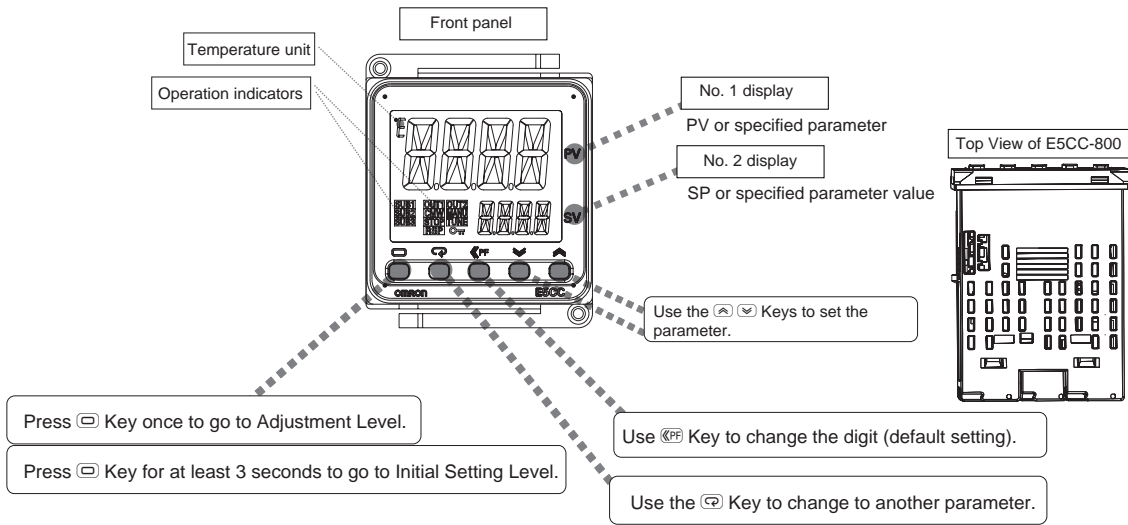
E5CC-800

Isolation/Insulation Block Diagrams



Nomenclature

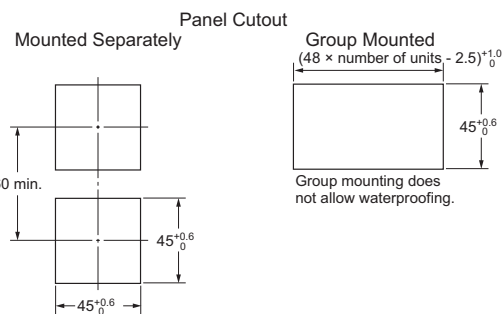
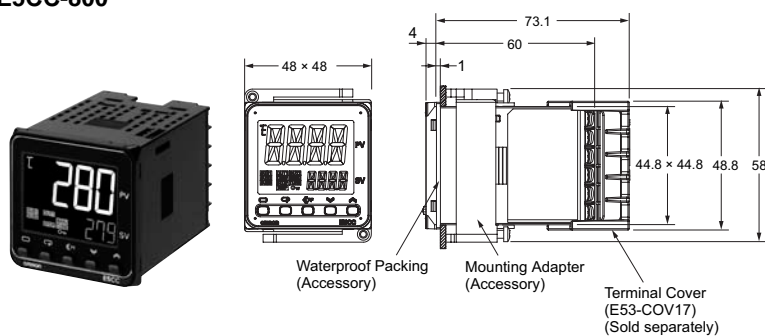
E5CC-800



Dimensions

Controllers

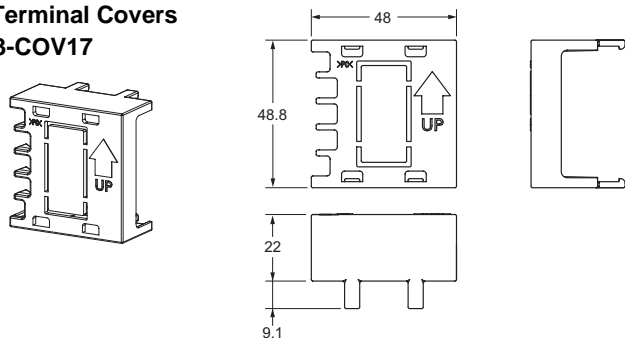
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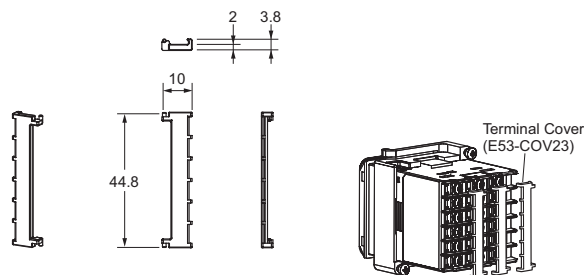
- Recommended panel thickness is 1 to 5 mm.
- Group mounting is not possible in the vertical direction. (Maintain the specified mounting space between Controllers.)
- To mount the Controller so that it is waterproof, insert the waterproof packing onto the Controller.
- When two or more Controllers are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

Accessories (Order Separately)

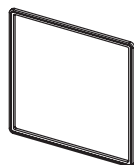
● Terminal Covers E53-COV17



● Terminal Covers E53-COV23 (Three Covers provided.)



● Waterproof Packing Y92S-P8 (for DIN 48 × 48) (Provided with the Controller.)



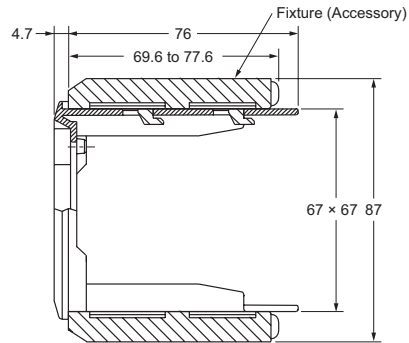
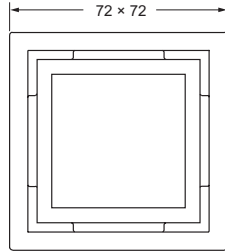
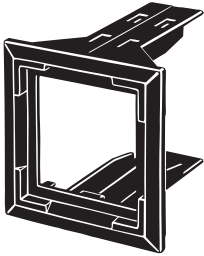
The Waterproof Packing is provided with the Temperature Controller. Order the Waterproof Packing separately if it becomes lost or damaged. The Waterproof Packing can be used to achieve an IP66 degree of protection. (Deterioration, shrinking, or hardening of the waterproof packing may occur depending 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 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.

E5CC-800

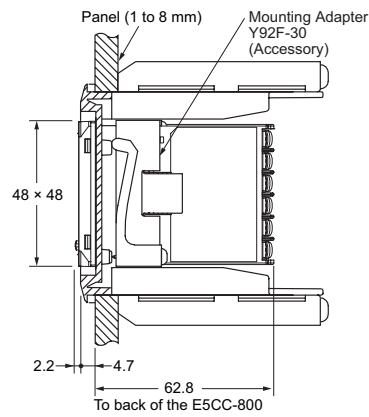
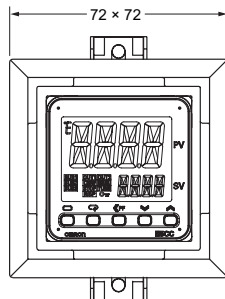
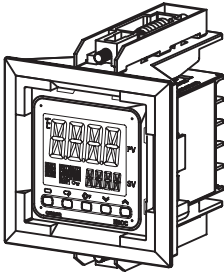
● Adapter

Y92F-45

Note: 1. Use this Adapter when the Front Panel has already been prepared for the E5B□.
2. Only black is available.



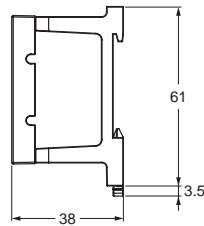
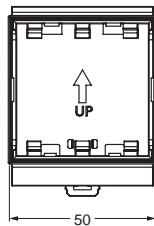
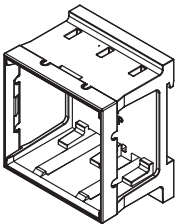
Mounted to E5CC-800



● DIN Track Mounting Adapter

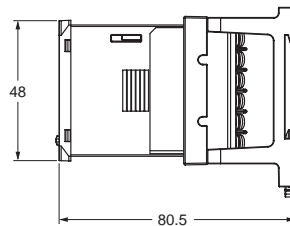
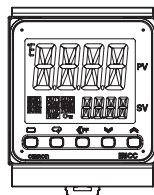
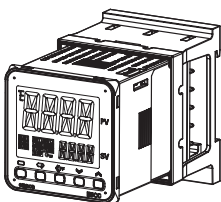
Y92F-52

Note: 1. This Adapter cannot be used together with the Terminal Cover.
2. Remove the Terminal Cover to use the Adapter.



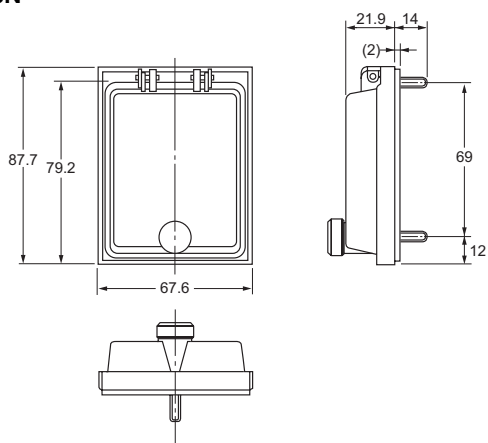
This Adapter is used to mount the E5CC-800 to a DIN Track. If you use the Adapter, there is no need for a plate to mount in the panel or to drill mounting holes in the panel.

Mounted to E5CC-800



● **Watertight Cover**

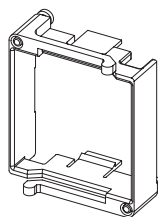
Y92A-48N



● **Mounting Adapter**

Y92F-49

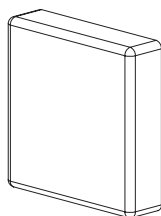
(Provided with the Controller.)



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

● **Protective Cover**

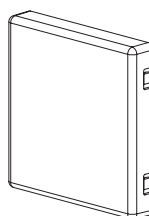
Y92A-48D



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

● **Protective Cover**

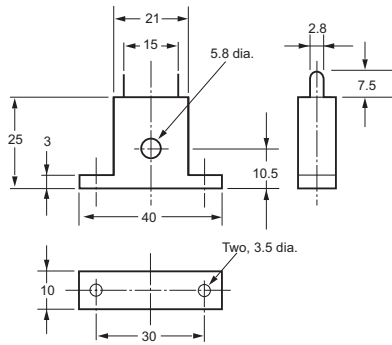
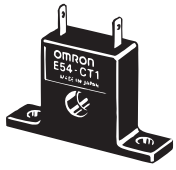
Y92A-48H



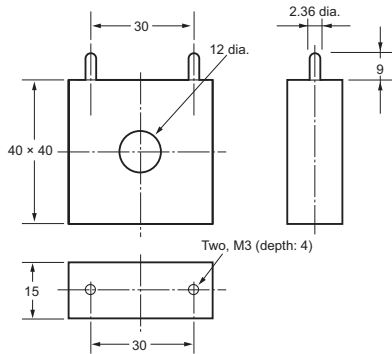
This Protective Cover is hard type. Please use it for the mis-operation prevention etc.

● Current Transformers

E54-CT1

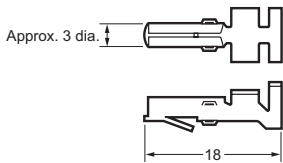


E54-CT3

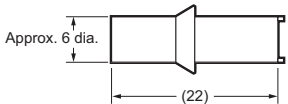


E54-CT3 Accessory

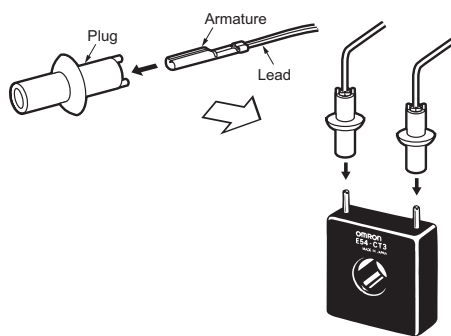
● Armature



● Plug



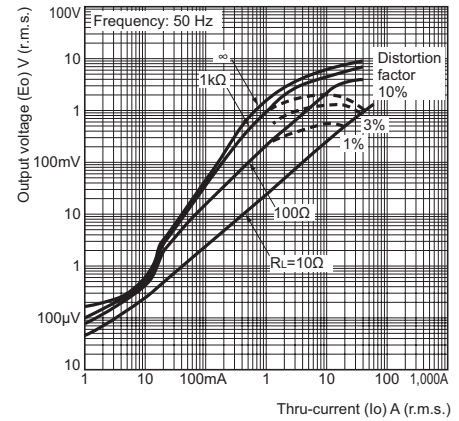
Connection Example



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

E54-CT1

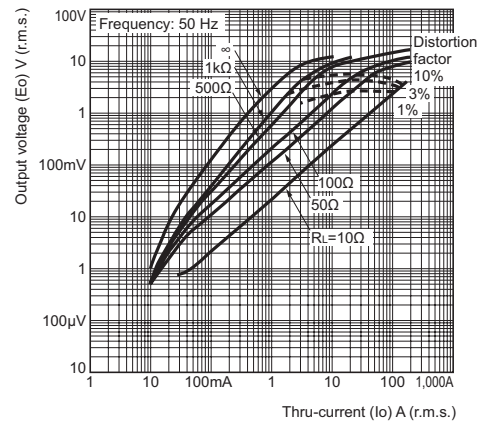
Maximum continuous heater current: 50 A (50/60 Hz)
 Number of windings: 400±2
 Winding resistance: 18±2 Ω



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

E54-CT3

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



E5EC/E5AC-800

(48 × 96 mm/96 × 96 mm)

Large White PV Display That's Easier to Read.
Easy to Use, from Model Selection to
Setup and Operation.

A Complete Range of I/O Capacities,
Functions, and Performance.

Handles More Applications.

- A white LCD PV display with a height of approx. 18 mm for the E5EC-800 and 25 mm for the E5AC-800 improves visibility.
- High-speed sampling at 50 ms.
- 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.

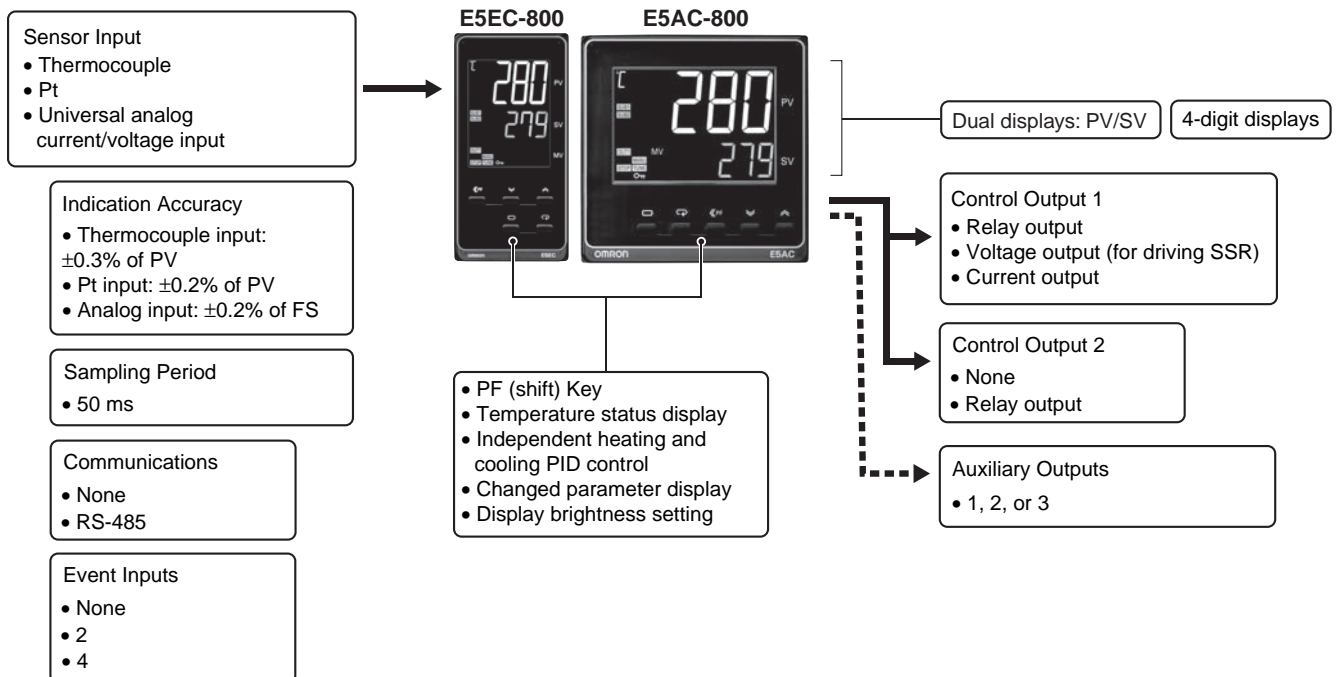


48 × 96 mm
E5EC-800

96 × 96 mm
E5AC-800

Refer to Safety Precautions on page 33.

Main I/O Functions



Model Number Legend and Standard Models

Model Number Legend

E5EC-800 48x96 mm

| Control output 1 | Control output 2 | Auxiliary output | Communications | Heater burnout | Event inputs | Power supply voltage | Model |
|----------------------|-----------------------|------------------|----------------|----------------|--------------|----------------------|-----------------|
| Relay output | - | Two | - | - | - | 100 to 240 VAC | E5EC-RX2ASM-800 |
| Voltage output | - | | | | | | E5EC-QX2ASM-800 |
| Current output | - | | | | | | E5EC-CX2ASM-800 |
| Relay output | Relay output | | | | | | E5EC-RR2ASM-800 |
| Voltage output | Relay output | | | | | | E5EC-QR2ASM-800 |
| Current output | Relay output | | | | | | E5EC-CR2ASM-800 |
| Relay output | - | | | | | 24 VAC/VDC | E5EC-RX2DSM-800 |
| Voltage output | - | | | | | | E5EC-QX2DSM-800 |
| Current output | - | | | | | | E5EC-CX2DSM-800 |
| Relay output | Relay output | | | | | | E5EC-RR2DSM-800 |
| Voltage output | Relay output | | | | | | E5EC-QR2DSM-800 |
| Current output | Relay output | | | | | | E5EC-CR2DSM-800 |
| Relay output | Relay output | | RS-485 | One | Two | 100 to 240 VAC | E5EC-RR2ASM-808 |
| Voltage output | Relay output | | | | | | E5EC-QR2ASM-808 |
| Relay output | Relay output | | | | | E5EC-RR2DSM-808 | |
| Voltage output | Relay output | | | - | Four | 100 to 240 VAC | E5EC-RR2ASM-810 |
| Relay output | Relay output | | | | | | E5EC-QR2ASM-810 |
| Voltage output | Relay output | | | | | E5EC-RR2DSM-810 | |
| Current output | Relay output | | RS-485 | - | Two | 100 to 240 VAC | E5EC-CR2ASM-804 |
| Current output | Relay output | | | | | 24 VAC/VDC | E5EC-CR2DSM-804 |
| Relay output (Open)* | Relay output (Close)* | | - | - | - | 100 to 240 VAC | E5EC-PR0ASM-800 |
| Relay output (Open)* | Relay output (Close)* | | Two | - | - | | E5EC-PR2ASM-800 |
| Relay output (Open)* | Relay output (Close)* | | | RS-485 | - | | Two |

* Position proportional control model.

E5AC-800 96x96 mm

| Control output 1 | Control output 2 | Auxiliary output | Communications | Heater burnout | Event inputs | Power supply voltage | Model | | | | |
|----------------------|-----------------------|------------------|----------------|-----------------|-----------------|----------------------|-----------------|-----|-----------------|----------------|-----------------|
| Relay output | - | One | - | - | - | 100 to 240 VAC | E5AC-RX1ASM-800 | | | | |
| Voltage output | - | | | | | | E5AC-QX1ASM-800 | | | | |
| Current output | - | | | | | | E5AC-CX1ASM-800 | | | | |
| Relay output | - | Three | | | | | E5AC-RX3ASM-800 | | | | |
| Voltage output | - | | | | | | E5AC-QX3ASM-800 | | | | |
| Current output | - | | | | | | E5AC-CX3ASM-800 | | | | |
| Relay output | - | One | | | | 24 VAC/VDC | E5AC-RX1DSM-800 | | | | |
| Voltage output | - | | | | | | E5AC-QX1DSM-800 | | | | |
| Current output | - | | | | | | E5AC-CX1DSM-800 | | | | |
| Relay output | - | Three | | | | | RS-485 | One | Two | 100 to 240 VAC | E5AC-RX3ASM-808 |
| Voltage output | - | | | | | | | | | 24 VAC/VDC | E5AC-QX3ASM-808 |
| Relay output | - | | | | | | | | E5AC-RX3DSM-808 | | |
| Voltage output | - | - | Four | 100 to 240 VAC | E5AC-RX3ASM-810 | | | | | | |
| Relay output | - | | | | E5AC-QX3ASM-810 | | | | | | |
| Voltage output | - | | | E5AC-RX3DSM-810 | | | | | | | |
| Current output | - | RS-485 | - | Two | 100 to 240 VAC | E5AC-CX3ASM-804 | | | | | |
| Current output | - | | | | 24 VAC/VDC | E5AC-CX3DSM-804 | | | | | |
| Relay output (Open)* | Relay output (Close)* | - | - | - | 100 to 240 VAC | E5AC-PR0ASM-800 | | | | | |
| Relay output (Open)* | Relay output (Close)* | Two | - | - | | E5AC-PR2ASM-800 | | | | | |
| Relay output (Open)* | Relay output (Close)* | | RS-485 | - | | Two | E5AC-PR2ASM-804 | | | | |

* Position proportional control model.

E5EC/E5AC-800

Heating and Cooling Control

I 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)

Terminal Covers

| Model |
|-----------|
| E53-COV24 |

Waterproof Packing

| Applicable Controller | Model |
|-----------------------|----------|
| E5EC-800 | Y92S-P9 |
| E5AC-800 | Y92S-P10 |

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

Waterproof Cover

| Applicable Controller | Model |
|-----------------------|----------|
| E5EC-800 | Y92A-49N |
| E5AC-800 | Y92A-96N |

Note: This Cover complies with IP66 and NEMA 4X waterproofing.
Front panel: IP66 protection.

Front Port Cover

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

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

Mounting Adapter

| Model |
|---------|
| Y92F-51 |

(Two Adapters are included.)

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

Current Transformers (CTs)

| Hole diameter | Model |
|---------------|---------|
| 5.8 mm | E54-CT1 |
| 12.0 mm | E54-CT3 |

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-800 | 6.6 VA max. at 100 to 240 VAC, and 4.1 VA max. at 24 VDC or 2.3 W max. at 24 VDC |
| | E5AC-800 | 7.0 VA max. at 100 to 240 VAC, and 4.2 VA max. at 24 VDC or 2.4 W max. at 24 VDC |
| Sensor input | | Models with temperature inputs Thermocouple: K, J, T, E, L, U, N, R, S, B, 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/THB.) |
| Control method | | ON/OFF control or 2-PID control (with auto-tuning) |
| Control output | Relay output | SPST-NO, 250 VAC, 5 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA |
| | 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.) |
| | 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 | 1, 2, or 3 (depends on model) |
| | Output specifications | N.O. relay outputs, 250 VAC, Models with 2 outputs: 3 A (resistive load), Electrical life: 100,000 operations, Minimum applicable load: 10 mA at 5 V |
| Event input | Number of inputs | 1, 2, or 3 (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 |
| Setting method | | Digital setting using front panel keys |
| Indication method | | 11-segment digital display and individual indicators Character height: E5EC-800: PV: 18.0 mm, SV: 11.0 mm E5AC-800: PV: 25.0 mm, SV: 15.0 mm |
| Multi SP | | Up to eight set points (SP0 to SP7) can be saved and selected using event inputs, key operations, or serial communications. |
| Bank switching | | None |
| Other functions | | Manual output, heating/cooling control, loop burnout alarm, SP ramp, other alarm functions, 40% AT, 100% AT, MV limiter, input digital filter, self tuning, PV input shift, run/stop, protection functions, extraction of square root, MV change rate limit, 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 no condensation or icing) |
| Ambient operating humidity | | 25% to 85% |
| Storage temperature | | -25 to 65°C (with no condensation or icing) |

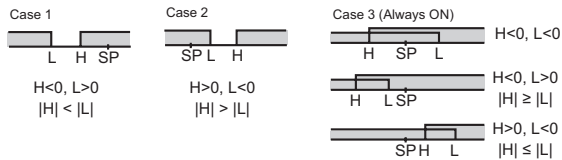
Alarm type

Each alarm can be independently set to one of the following 19 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.

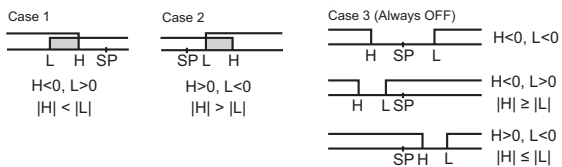
| Set value | Alarm type | Alarm output operation | | Description of function |
|-----------|--|--------------------------------|--------------------------------|---|
| | | When alarm value X is positive | When alarm value X is negative | |
| 0 | Alarm function OFF | Output OFF | | No alarm |
| 1 | Upper- and lower-limit *1 | | *2 | Set the deviation in the set point by setting the alarm upper limit (H) and alarm lower limit (L). The alarm is ON when the PV is outside this deviation range. |
| 2 | 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 deviation in the set point by setting the alarm upper limit (H) and 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 | | | 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 | | | This alarm type turns ON the alarm when the set point (SP) is smaller than the alarm value (X). |
| 16 | MV absolute value upper limit *9 | | | This alarm type turns ON the alarm when the manipulated variable (MV) is higher than the alarm value (X). |
| 17 | MV absolute value lower limit *9 | | | This alarm type turns ON the alarm when the manipulated variable (MV) is smaller than the alarm value (X). |

*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 Digital Controllers User's Manual (Cat. No. H174) for information on the operation of the standby sequence.
- *7. Refer to the E5□C Digital Controllers User's Manual (Cat. No. H174) for information on the PV change rate alarm. This setting cannot be used with a position-proportional model.
- *8. Refer to the E5□C Digital Controllers User's Manual (Cat. No. H174) 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: ($\pm 0.3\%$ of indicated value or $\pm 1^\circ\text{C}$, whichever is greater) ± 1 digit max. *1 Platinum resistance thermometer: ($\pm 0.2\%$ of indicated value or $\pm 0.8^\circ\text{C}$, whichever is greater) ± 1 digit max. Analog input: $\pm 0.2\%$ FS ± 1 digit max. CT input: $\pm 5\%$ FS ± 1 digit max. Potentiometer input: $\pm 5\%$ FS ± 1 digit max. |
| Influence of temperature *2 | | Thermocouple input (R, S, B, W, PL II): ($\pm 1\%$ of PV or $\pm 10^\circ\text{C}$, whichever is greater) ± 1 digit max. Other thermocouple input: ($\pm 1\%$ of PV or $\pm 4^\circ\text{C}$, whichever is greater) ± 1 digit max. *3 Platinum resistance thermometer: ($\pm 1\%$ of PV or $\pm 2^\circ\text{C}$, whichever is greater) ± 1 digit max. |
| Influence of voltage *2 | | Analog input: ($\pm 1\%$ FS) ± 1 digit max. CT input: ($\pm 5\%$ 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) *4 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) *4 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) |
| Derivative time (D) | | 0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) *5 |
| Proportional band (P) for cooling | | Temperature input: 0.1 to 999.9°C or °F (in units of 0.1°C or °F) *4 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) *5 |
| 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) *5 |
| 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) |
| Affect of signal source resistance | | Thermocouple: 0.1°C/ Ω max. (100 Ω max.) Platinum resistance thermometer: 0.1°C/ Ω max. (10 Ω max.) |
| Insulation resistance | | 20 M Ω min. (at 500 VDC) |
| Dielectric strength | | 2,300 VAC, 50 or 60 Hz for 1 min (between terminals with different charge) |
| Vibration | resistance | 10 to 55 Hz, 20 m/s ² for 10 min each in X, Y, and Z directions |
| | Malfunction | 10 to 55 Hz, 20 m/s ² for 2 hrs each in X, Y, and Z directions |
| Destruction | resistance | 100 m/s ² , 3 times each in X, Y, and Z directions |
| | Malfunction | 300 m/s ² , 3 times each in X, Y, and Z directions |
| Weight | E5EC-800 | Controller: Approx. 210 g, Mounting Brackets: Approx. 4 g \times 2 |
| | E5AC-800 | Controller: Approx. 250 g, Mounting Brackets: Approx. 4 g \times 2 |
| Degree of protection | | Front panel: IP66, Rear case: IP20, Terminals: IP00 |
| Memory protection | | Non-volatile memory (number of writes: 1,000,000 times) |
| Standards | Approved standards | UL 61010-1, CSA C22.2 No. 611010-1 (evaluated by UL), Korean Radio Waves Act (Act 10564) |
| | Conformed standards | EN 61010-1 (IEC 61010-1): Pollution level 2, overcurrent category II, Lloyd's standards *6 |
| EMC | EMI | EN61326 |
| | Radiated Interference Electromagnetic Field Strength: | EN 55011 Group 1, class A |
| | Noise Terminal Voltage: | EN 55011 Group 1, class A |
| | EMS: | EN 61326 |
| | ESD Immunity: | EN 61000-4-2 |
| | Electromagnetic Field Immunity: | EN 61000-4-3 |
| | Burst Noise Immunity: | EN 61000-4-4 |
| | Conducted Disturbance Immunity: | EN 61000-4-6 |
| Surge Immunity: | EN 61000-4-5 | |
| Voltage Dip/Interrupting Immunity: | EN 61000-4-11 | |

*1. The indication accuracy of K thermocouples in the -200 to 1300°C range, T and N thermocouples at a temperature of -100°C max., and U and L thermocouples at any temperatures is $\pm 2^\circ\text{C} \pm 1$ digit max. The indication accuracy of the B thermocouple at a temperature of 400°C max. is not specified. The indication accuracy of B thermocouples in the 400 to 800°C range is $\pm 3^\circ\text{C}$ max. The indication accuracy of the R and S thermocouples at a temperature of 200°C max. is $\pm 3^\circ\text{C} \pm 1$ digit max. The indication accuracy of W thermocouples is ± 0.3 of PV or $\pm 3^\circ\text{C}$, whichever is greater, ± 1 digit max. The indication accuracy of PL II thermocouples is ± 0.3 of PV or $\pm 2^\circ\text{C}$, 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.: $\pm 10^\circ\text{C}$ max.

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

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

*6. Refer to information on maritime standards in *Shipping Standards* on page 35 for compliance with Lloyd's Standards.

Communications Specifications

| | |
|-------------------------------------|---|
| Transmission line connection method | RS-485: Multipoint |
| Communications | RS-485 (two-wire, half duplex) |
| Synchronization method | Start-stop synchronization |
| Protocol | CompoWay/F, or Modbus |
| Baud rate | 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* | <ul style="list-style-type: none"> You can use the memory in the PLC to read and write E5□C parameters, start and stop operation, etc. The E5□C automatically performs communications with PLCs. No communications programming is required. Number of connected Temperature Controllers: 16 max. Applicable PLCs OMRON PLCs SYSMAC CS Series, CJ Series, or CP Series Mitsubishi Electric PLCs MELSEC Q Series or L Series |
| Communications between components* | <ul style="list-style-type: none"> When Temperature Controllers are connected, the parameters can be copied from the Temperature Controller that is set as the master to Temperature Controllers that are set as slaves. Number of connected Temperature Controllers: 16 max. (including master) When Temperature Controllers are connected, set points and RUN/STOP commands can be sent from the Temperature Controller that is set as the master to Temperature Controllers that are set as slaves. Ratio and offsets can be set for the set point. Number of connected Temperature Controllers: 16 max. (including master) |

* A Temperature Controller with version 1.1 or higher is required.

Current Transformer (Order Separately) Ratings

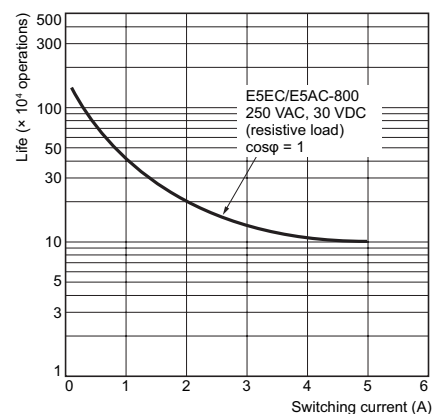
| | |
|----------------------------|---|
| Dielectric strength | 1,000 VAC for 1 min |
| Vibration resistance | 50 Hz, 98 m/s ² |
| Weight | E54-CT1: Approx. 11.5 g, E54-CT3: Approx. 50 g |
| Accessories (E54-CT3 only) | Armatures (2) Plugs (2) |

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 single-phase or three-phase heaters: Two inputs |
| Maximum heater current | 50 A AC |
| Input current indication accuracy | ±5% FS ±1 digit max. |
| Heater burnout alarm setting range *1 | 0.1 to 49.9 A (in units of 0.1 A) Minimum detection ON time: 100 ms *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/E5AC-800

External Connections

E5EC/E5AC-800

E5EC-□□ 2 □ S M - 8□□
 (1) (2) (3) (4) (5) (6)

Terminal type

E5AC-□□ □ □ S M - 8□□
 (1) (2) (3) (4) (5) (6)

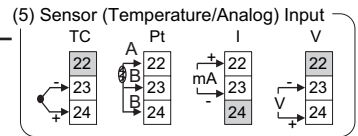
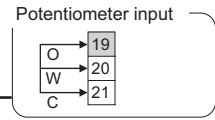
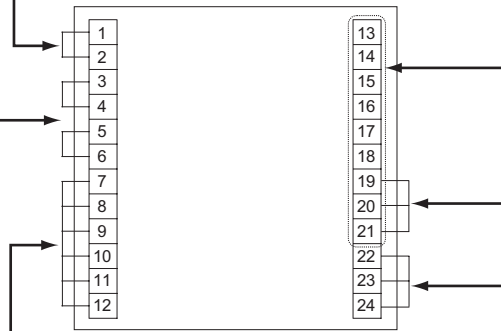
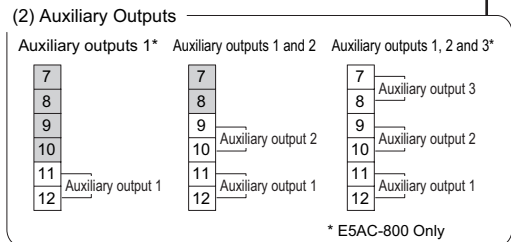
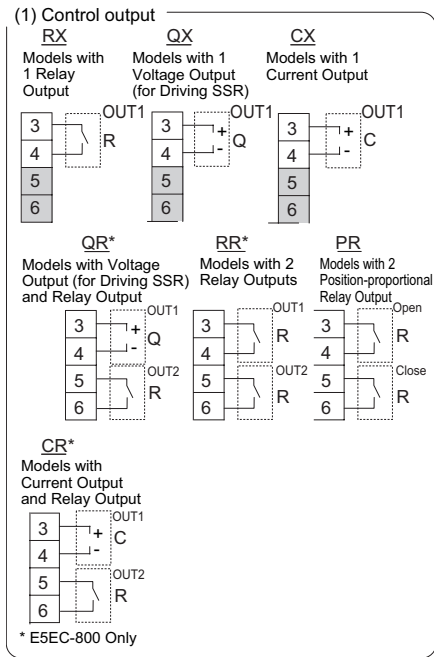
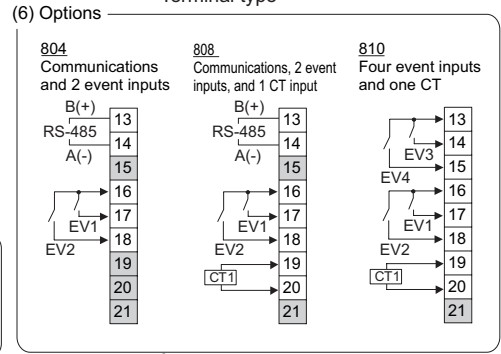
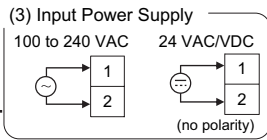
Terminal type

Control output 1
 Relay output
 250 VAC, 5 A
 (resistive load)
 Voltage output
 (for driving SSR)
 12 VDC, 40 mA
 When There Is a
 Control Output 2:
 21 mA
 Current output
 0 to 20 mA DC
 4 to 20 mA DC
 Load: 500 Ω max.

Control output 2
 Relay output
 250 VAC, 5 A
 (resistive load)

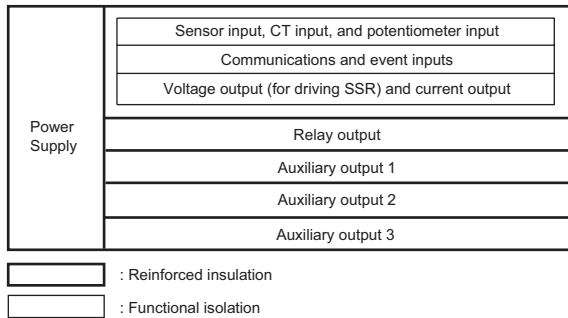
Auxiliary outputs 1, 2
 Relay output
 Model with 2 auxiliary
 outputs: 250 VAC, 3 A
 (resistive load)

The E5EC-800 is set for a K-type thermocouple (input type = 5) by default. An input error (s.err) will occur if the input type setting does not agree with the temperature sensor. Check the input type.



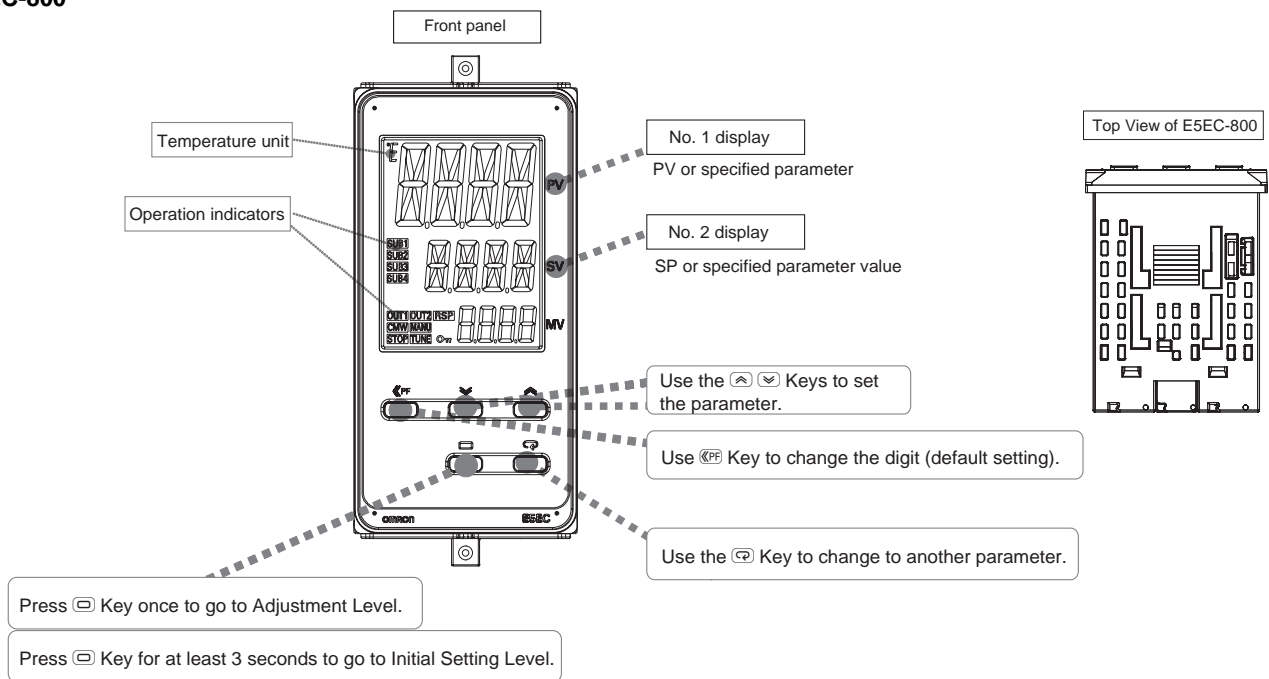
- Note:**
1. The application of the terminals depends on the model.
 2. Do not wire the terminals that are shown with a gray background.
 3. When complying with EMC standards, the cable that connects the sensor must be 30 m or less. If the cable length exceeds 30 m, compliance with EMC standards will not be possible.
 4. Connect M3 crimped terminals.

Isolation/Insulation Block Diagrams

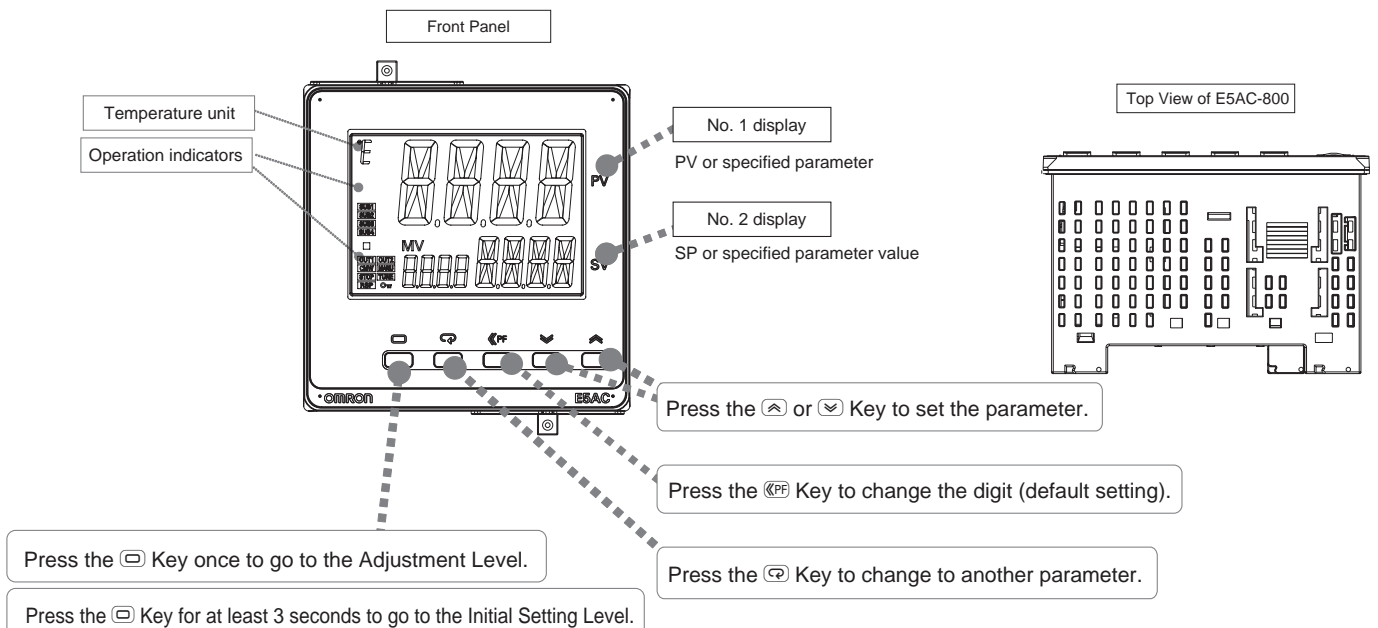


Nomenclature

E5EC-800

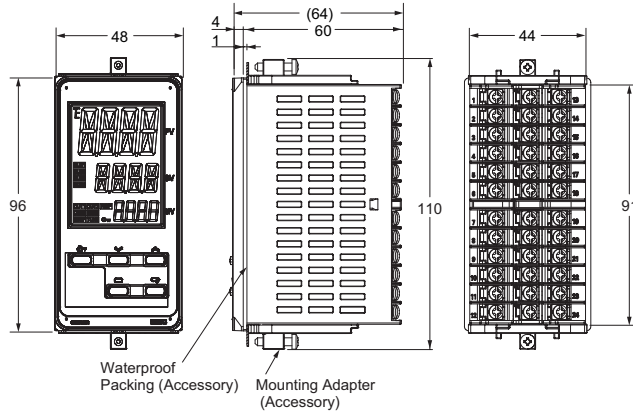


E5AC-800

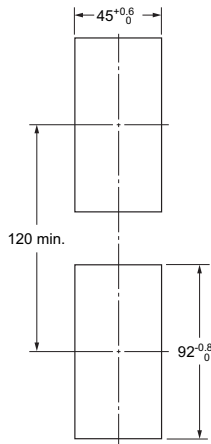


Controllers

E5EC-800

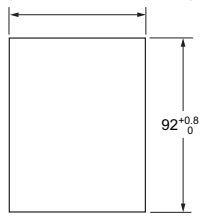


Mounted Separately



Group Mounted

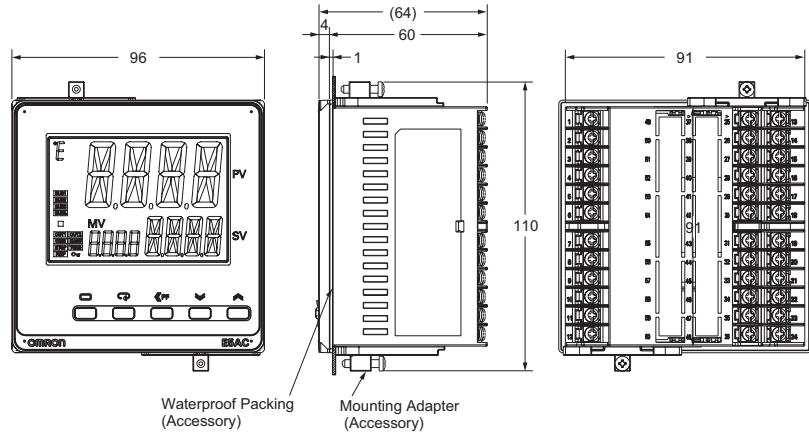
$$(48 \times \text{number of units} - 2.5)^{+1.0}_0$$



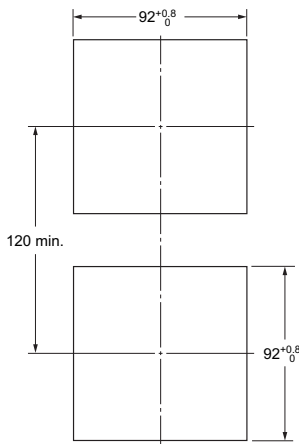
Group mounting does not allow waterproofing.

- Recommended panel thickness is 1 to 8 mm.
- Group mounting is not possible in the vertical direction. (Maintain the specified mounting space between Controllers.)
- 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.

E5AC-800

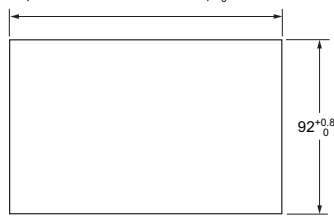


Mounted Separately



Group Mounted

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



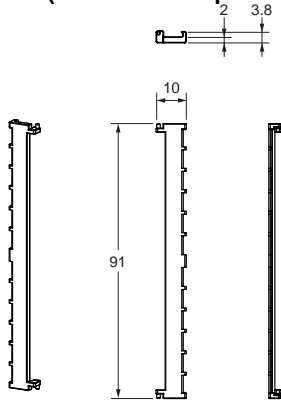
Group mounting does not allow waterproofing.

- 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.

Accessories (Order Separately)

● Terminal Covers

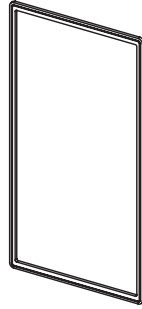
E53-COV24 (Three Covers provided.)



● Waterproof Packing

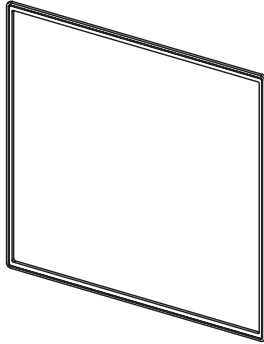
Y92S-P9 (for DIN 48 × 96)

(Provided with the Controller.)



Y92S-P10 (for DIN 96 × 96)

(Provided with the Controller.)



The Waterproof Packing is provided with the Temperature Controller.

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/E5AC-800 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.

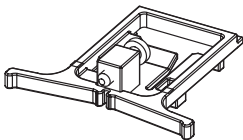
If the Waterproof Packing and Port Cover are not periodically replaced, waterproof performance will not be maintained.

If a waterproof structure is not required, then the Waterproof Packing does not need to be installed.

● Mounting Adapter

Y92F-51 (for DIN 48 × 96)

(Two Adapters provided.)

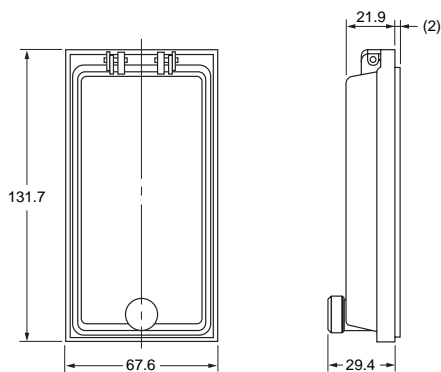


One pair is provided with the Controller.

Order this Adapter separately if it becomes lost or damaged.

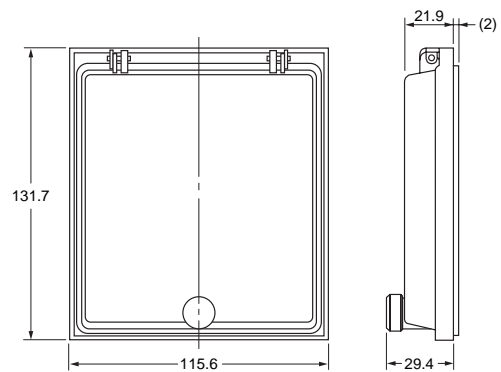
● Watertight Cover

Y92A-49N (48 × 96)



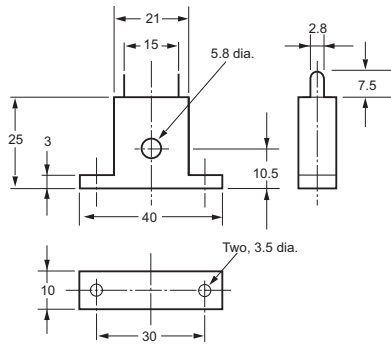
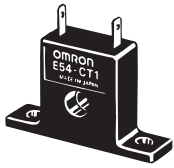
● Watertight Cover

Y92A-96N (96 × 96)

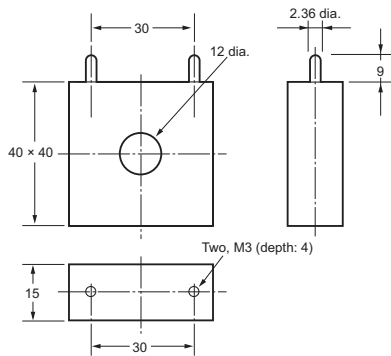


● Current Transformers

E54-CT1

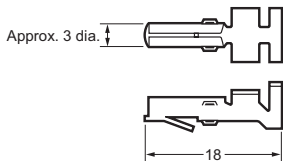


E54-CT3

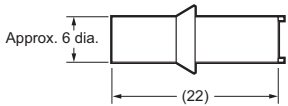


E54-CT3 Accessory

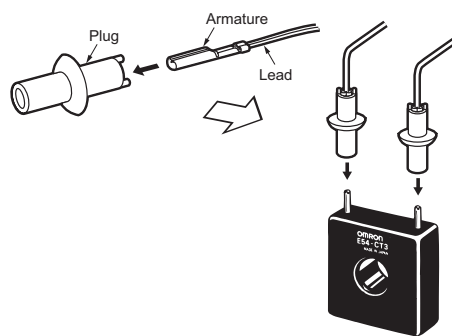
• Armature



• Plug



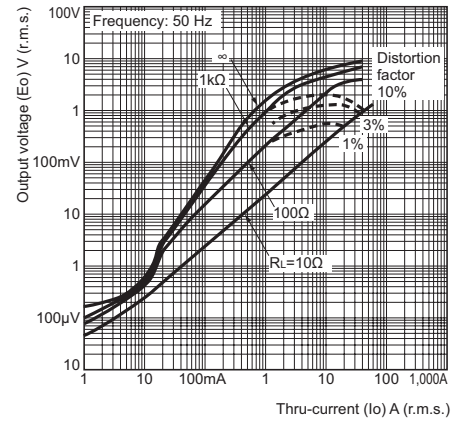
Connection Example



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

E54-CT1

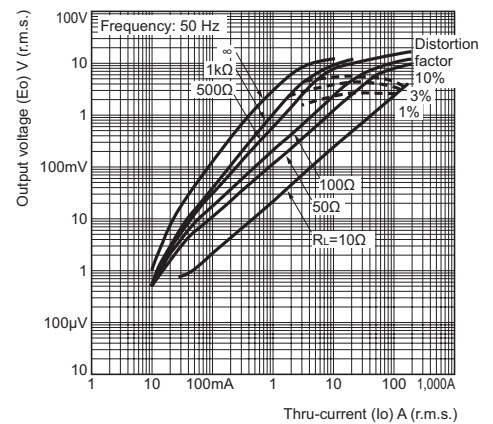
Maximum continuous heater current: 50 A (50/60 Hz)
 Number of windings: 400±2
 Winding resistance: 18±2 Ω



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

E54-CT3

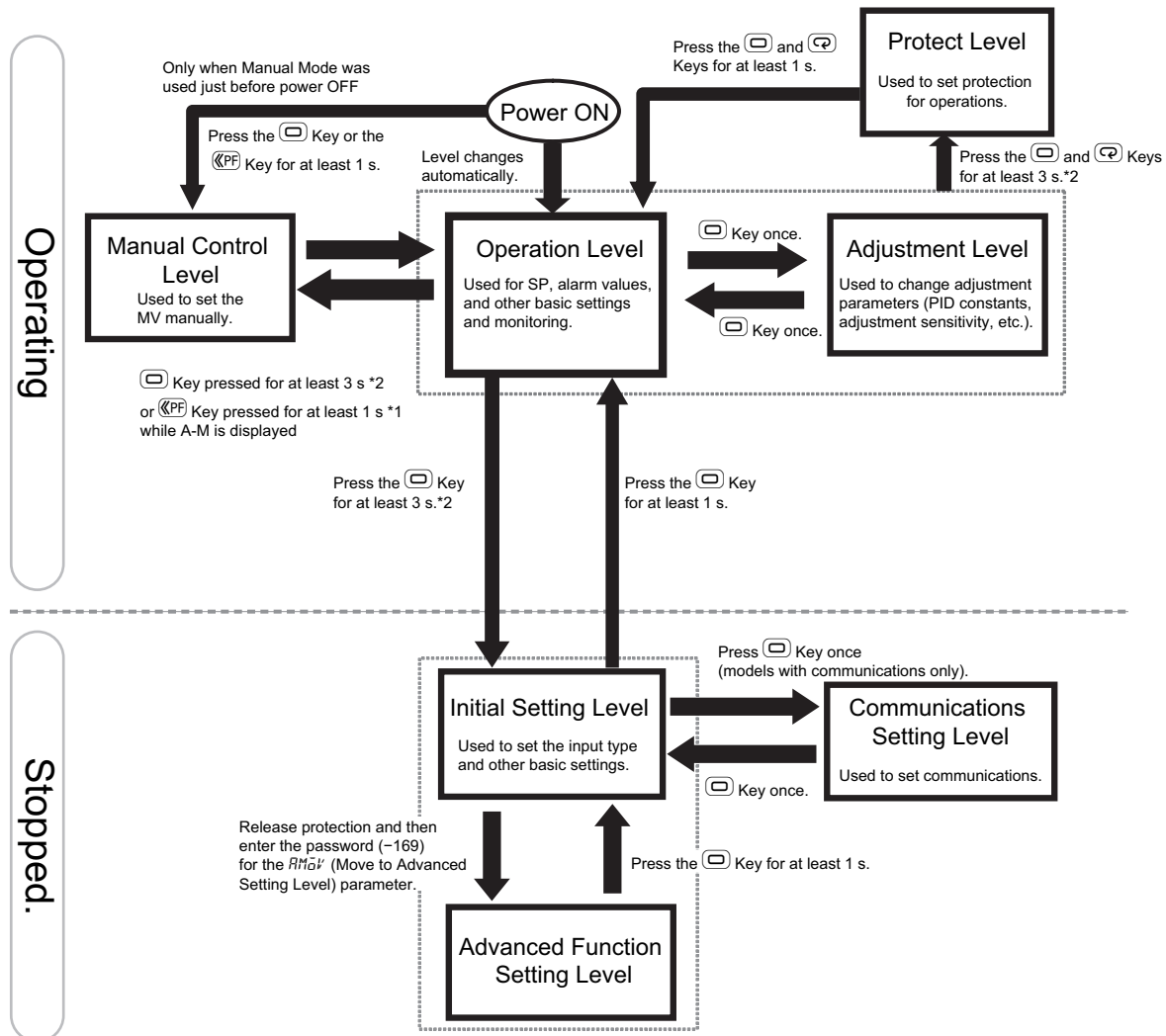
Maximum continuous heater current: 120 A (50/60 Hz)
 (Maximum continuous heater current for an OMRON Digital Temperature Controller is 50 A.)
 Number of windings: 400±2
 Winding resistance: 8±0.8 Ω



Operation

Setting Levels Diagram

This diagram shows all of the setting levels. To move to the advanced function setting level and calibration level, you must enter passwords. Some parameters are not displayed depending on the protect level setting and the conditions of use. Control stops when you move from the operation level to the initial setting level.



*1. To use a key procedure to move to Manual Control Level, set the Auto/Manual Select Addition parameter to ON and set the PF Setting parameter to $\overline{R-M}$ (Auto/Manual).

*2. The No. 1 display will flash in the middle when the keys are pressed for 1 s or longer.

Error Displays (Troubleshooting)

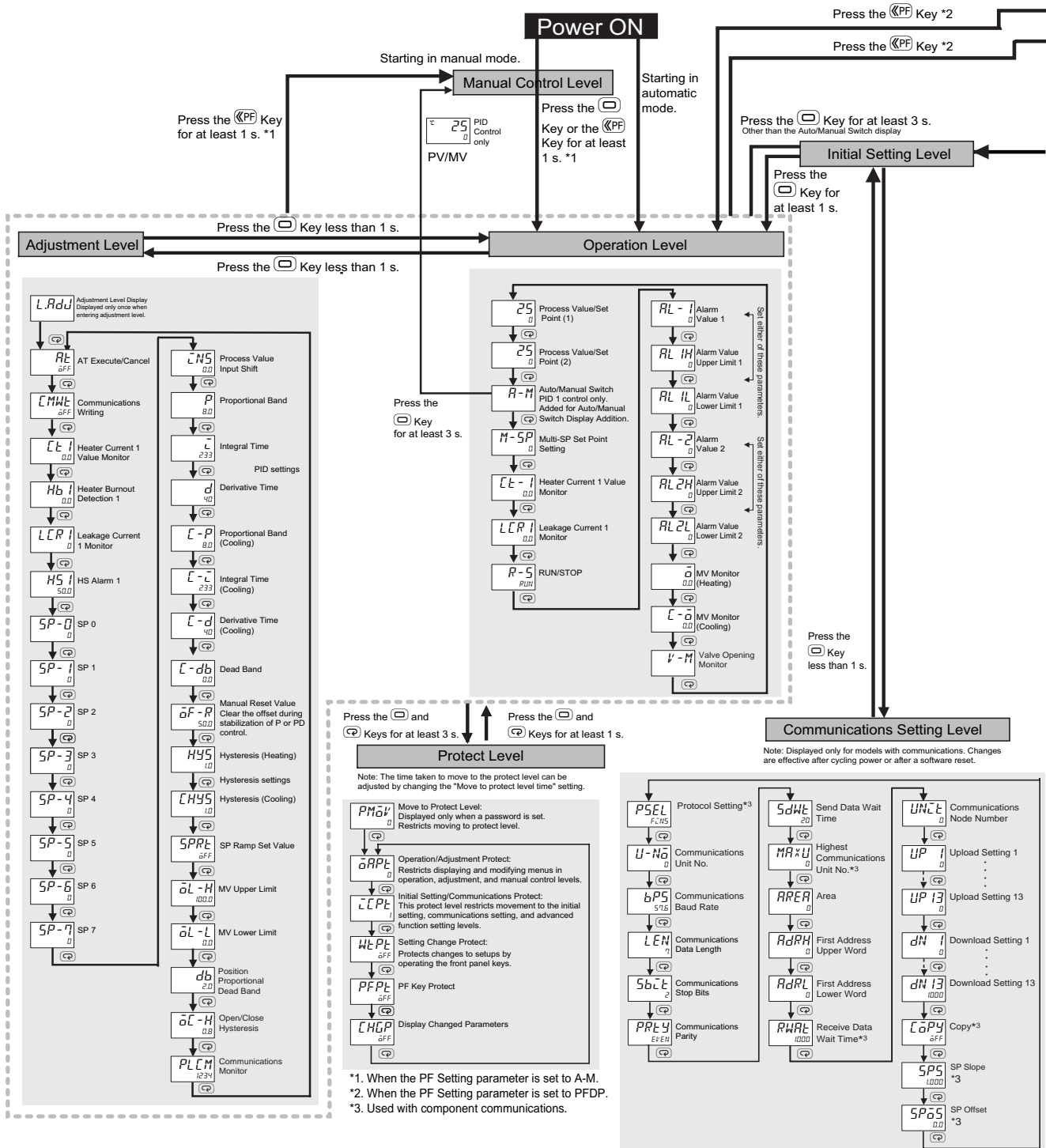
When an error occurs, the No. 1 display or No. 2 display shows the error code.
Take necessary measure according to the error code, referring the following table.

| Display | Name | Meaning | Action | Operation |
|---------------------|---|---|---|---|
| <i>S.ERR</i> | Input error | <p>The input value exceeded the control range.* The input type is not set correctly. The sensor is disconnected or short-circuited. The sensor is not wired correctly. The sensor is not wired.</p> <p>* Control Range Temperature resistance thermometer or thermocouple input: SP Lower Limit - 20°C to SP Upper Limit + 20°C (SP Lower Limit - 40°F to SP Upper Limit + 40°F) ESIB input: Same as specified input range. Analog input: Scaling range -5% to 105%</p> | <p>Check the wiring for input to be sure it is wired correctly, not broken, and not shorted. Also check the input type. If there are no problems in the wiring or input type settings, cycle the power supply. If the display remains the same, replace the Digital Temperature Controller. If the display is restored to normal, then the probable cause is external noise affecting the control system. Check for external noise.</p> <p>Note: For a temperature resistance thermometer, the input is considered disconnected if the A, B, or B' line is broken.</p> | <p>After the error occurs and it is displayed, the alarm output will operate as if the upper limit was exceeded. It will also operate as if transfer output exceeded the upper limit. If an input error is assigned to a control output or auxiliary output, the output will turn ON when the input error occurs. The error message will appear in the display for the PV.</p> <p>Note: 1. The heating and cooling control outputs will turn OFF. 2. When the manual MV, MV at stop, or MV at error is set, the control output is determined by the set value.</p> |
| <i>CCCC</i> | Display range exceeded | Below -1,999 | - | Control continues and operation is normal. The value will appear in the display for the PV. Refer to the E5□C Digital Controllers User's Manual (Cat. No. H174) for information on the controllable range. |
| <i>JJJJ</i> | | Above 9,999 | | |
| <i>E333</i> | A/D converter error | There is an error in the internal circuits. | <p>First, cycle the power supply. If the display remains the same, the controller must be repaired. If the display is restored to normal, then a probable cause can be external noise affecting the control system. Check for external noise.</p> | The control outputs, auxiliary outputs, and transfer outputs turn OFF. (A current output will be approx. 0 mA and a linear voltage output will be approx. 0V.) |
| <i>E111</i> | Memory error | There is an error in the internal memory operation. | <p>First, cycle the power supply. If the display remains the same, the controller must be repaired. If the display is restored to normal, then a probable cause can be external noise affecting the control system. Check for external noise.</p> | The control outputs, auxiliary outputs, and transfer outputs turn OFF. (A current output will be approx. 0 mA and a linear voltage output will be approx. 0V.) |
| <i>FFFF</i> | Overcurrent | This error is displayed when the peak current exceeds 55.0 A. | - | Control continues and operation is normal. The error message will appear for the following displays. Heater Current Value 1 Monitor Leakage Current Value 1 Monitor |
| <i>LE1 LER1</i> | HB or HS alarm | If there is a HB or HS alarm, the No. 1 display will flash in the relevant setting level. | - | The No. 1 display for the following parameter flashes in Operation Level or Adjustment Level. Heater Current Value 1 Monitor Leakage Current Value 1 Monitor However, control continues and operation is normal. |
| <i>----</i> | Potentiometer Input Error (Position-proportional Models Only) | <p>"----" will be displayed for the Valve Opening Monitor parameter if any of the following error occurs.</p> <ul style="list-style-type: none"> • Motor calibration has not been performed. • The wiring of the potentiometer is incorrect or broken. • The potentiometer input value is incorrect (e.g., the input is out of range or the potentiometer has failed). | Check for the above errors. | Close control: The control output is OFF or the value that is set for the MV at PV Error parameter is output. Floating control: Operation will be normal. |

Operation

Parameters

The related setting items in each level are described below. If you press the Mode Key at the last setting item, the display will return to the first setting item in the same level.



Monitor/Setting Item Level

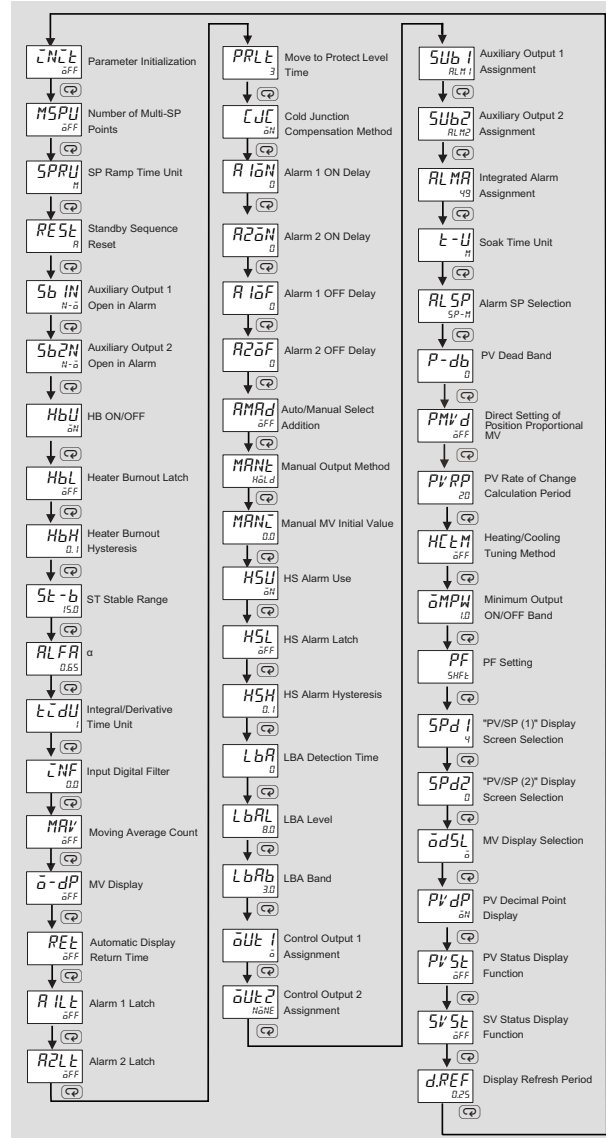
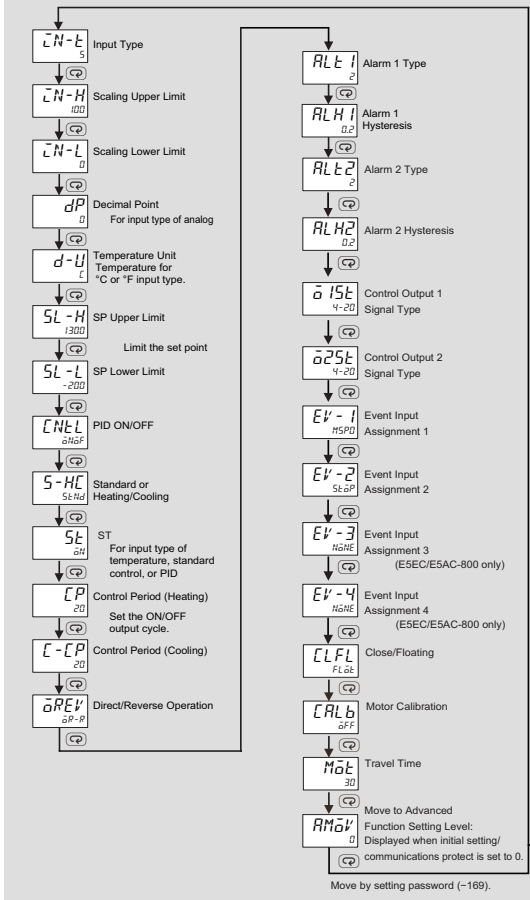


Note: The monitor/setting items to be displayed is set in the Monitor/Setting Item 1 to 5 parameters (advanced function setting level).

Press the Key for at least 1 s.

Advanced Function Setting Level

Press the Key less than 1 s.



Safety Precautions

● Be sure to read the precautions for all E5CC/E5EC/E5AC-800 models in the website at: <http://www.ia.omron.com/>.

CAUTION

Do not touch the terminals while power is being supplied.

Doing so may occasionally result in minor injury due to electric shock.



Electric shock, fire, or malfunction may occasionally occur. Do not allow metal objects, conductors, cuttings from installation work, or moisture to enter the Digital Temperature Controller or the Setup Tool port or ports. Attach the cover to the front-panel Setup Tool port whenever you are not using it to prevent foreign objects from entering the port.



Do not use the Digital Temperature Controller where subject to flammable or explosive gas. Otherwise, minor injury from explosion may occasionally occur.



Not doing so may occasionally result in fire. Do not allow dirt or other foreign objects to enter the Setup Tool port or ports, or between the pins on the connectors on the Setup Tool cable.



Never disassemble, modify, or repair the product or touch any of the internal parts. Minor electric shock, fire, or malfunction may occasionally occur.



CAUTION - Risk of Fire and Electric Shock

- This product is UL recognised as Open Type Process Control Equipment. It must be mounted in an enclosure that does not allow fire to escape externally.
- More than one disconnect switch may be required to de-energize the equipment before servicing the product.
- Signal inputs are SELV, limited energy. *1
- Caution: To reduce the risk of fire or electric shock, do not interconnect the outputs of different Class 2 circuits. *2



If the output relays are used past their life expectancy, contact fusing or burning may occasionally occur.

Always consider the application conditions and use the output relays within their rated load and electrical life expectancy. The life expectancy of output relays varies considerably with the output load and switching conditions.



Tighten the terminal screws to the rated torque of between 0.43 and 0.58 N•m.

Loose screws may occasionally result in fire.



Set the parameters of the product so that they are suitable for the system being controlled. If they are not suitable, unexpected operation may occasionally result in property damage or accidents.



A malfunction in the product may occasionally make control operations impossible or prevent alarm outputs, resulting in property damage.



To maintain safety in the event of malfunction of the product, take appropriate safety measures, such as installing a monitoring device on a separate line.

*1. An SELV circuit is one separated from the power supply with double insulation or reinforced insulation, that does not exceed 30 V r.m.s. and 42.4 V peak or 60 VDC.

*2. A class 2 power supply is one tested and certified by UL as having the current and voltage of the secondary output restricted to specific levels.

Precautions for Safe Use

Be sure to observe the following precautions to prevent malfunction or adverse affects on the performance or functionality of the product. Not doing so may occasionally result in faulty operation.

1. This product is specifically designed for indoor use only.
Do not use this product in the following places:
 - Places directly subject to heat radiated from heating equipment.
 - Places subject to splashing liquid or oil atmosphere.
 - Places subject to direct sunlight.
 - Places subject to dust or corrosive gas (in particular, sulfide gas and ammonia gas).
 - Places subject to intense temperature change.
 - Places subject to icing and condensation.
 - Places subject to vibration and large shocks.
2. Use and store the product within the rated ambient temperature and humidity.
Gang-mounting two or more Digital Temperature Controllers, or mounting Digital Temperature Controllers above each other may cause heat to build up inside the Digital Temperature Controllers, which will shorten their service life. In such a case, use forced cooling by fans or other means of air ventilation to cool down the Digital Temperature Controllers.
3. To allow heat to escape, do not block the area around the Digital Temperature Controller.
Do not block the ventilation holes on the Digital Temperature Controller.
4. Be sure to wire properly with correct polarity of terminals.
5. Use the specified size of crimp terminals for wiring (M3, width of 5.8 mm or less). For open-wired connections, use stranded or solid copper wires with a gauge of AWG24 to AWG18 (equal to a crosssectional area of 0.205 to 0.823 mm²). (The stripping length is 6 to 8 mm.) Up to two wires of the same size and type or two crimp terminals can be connected to one terminal. Do not connect more than two wires or more than two crimp terminals to the same terminal.
6. Do not wire the terminals that are not used.
7. To avoid inductive noise, keep the wiring for the product's terminal block away from power cables carry high voltages or large currents. Also, do not wire power lines together with or parallel to product wiring. Using shielded cables and using separate conduits or ducts is recommended.
Attach a surge suppressor or noise filter to peripheral devices that generate noise (in particular, motors, transformers, solenoids, magnetic coils, or other equipment that have an inductance component).
When a noise filter is used at the power supply, first check the voltage or current, and attach the noise filter as close as possible to the product.
Allow as much space as possible between the product and devices that generate powerful high frequencies (high-frequency welders, high-frequency sewing machines, etc.) or surge.
8. Use this product within the rated load and power supply.
9. Make sure that the rated voltage is attained within two seconds of turning ON the power using a switch or relay contact. If the voltage is applied gradually, the power may not be reset or output malfunctions may occur.
10. Make sure that the Digital Temperature Controller has 30 minutes or more to warm up after turning ON the power before starting actual control operations to ensure the correct temperature display.
11. When executing self-tuning, turn ON power to the load (e.g., heater) at the same time as or before supplying power to the product. If power is turned ON to the product before turning ON power to the load, self-tuning will not be performed properly and optimum control will not be achieved.
12. A switch or circuit breaker must be provided close to the product. The switch or circuit breaker must be within easy reach of the operator, and must be marked as a disconnecting means for this unit.
13. Use a soft and dry cloth to clean the product carefully. Do not use organic solvent, such as paint thinner, benzine or alcohol to clean the product.
14. Design the system (e.g., control panel) considering the 2 seconds of delay that the product's output to be set after power ON.
15. The output may turn OFF when you move to the initial setting level. Take this into consideration when performing control operations.

16. The number of non-volatile memory write operations is limited. Therefore, use RAM write mode when frequently overwriting data, e.g., through communications.
17. Use suitable tools when taking the Digital Temperature Temperature Controller apart for disposal. Sharp parts inside the Digital Temperature Controller may cause injury.
18. Do not exceed the communications distance that is given in the specifications. Use the specified communications cable. Refer to the E5□C Digital Controllers User's Manual (Cat. No. H174) for information on the communications distances and cables.

Shipping Standards

The E5CC-800, E5EC-800, and E5AC-800 comply with Lloyd's standards. When applying the standards, the following installation and wiring requirements must be met in the application.

Application Conditions

●Installation Location

The E5CC-800, E5EC-800, and E5AC-800 comply with installation category ENV1 and ENV2 of Lloyd's standards. Therefore, they must be installed in a location equipped with air conditioning. They cannot be used on the bridge or decks, or in a location subject to strong vibration.

Precautions for Correct Use

●Service Life

1. Use the product within the following temperature and humidity ranges:
Temperature: -10 to 55°C (with no icing or condensation)
Humidity: 25% to 85%
If the product is installed inside a control board, the ambient temperature must be kept to under 55°C, including the temperature around the product.
2. The service life of electronic devices like Digital Temperature Controllers is determined not only by the number of times the relay is switched but also by the service life of internal electronic components.
Component service life is affected by the ambient temperature: the higher the temperature, the shorter the service life and, the lower the temperature, the longer the service life. Therefore, the service life can be extended by lowering the temperature of the Digital Temperature Controller.
3. When two or more Digital Temperature Controllers are mounted horizontally close to each other or vertically next to one another, the internal temperature will increase due to heat radiated by the Digital Temperature Controllers and the service life will decrease. In such a case, use forced cooling by fans or other means of air ventilation to cool down the Digital Temperature Controllers. When providing forced cooling, however, be careful not to cool down the terminals sections alone to avoid measurement errors.

●Measurement Accuracy

1. When extending or connecting the thermocouple lead wire, be sure to use compensating wires that match the thermocouple types.
2. When extending or connecting the lead wire of the platinum resistance thermometer, be sure to use wires that have low resistance and keep the resistance of the three lead wires the same.
3. Mount the product so that it is horizontally level.
4. If the measurement accuracy is low, check to see if input shift has been set correctly.

●Waterproofing

The degree of protection is as shown below. Sections without any specification on their degree of protection or those with IP□0 are not waterproof.

Front panel: IP66, Rear case: IP20, Terminal section: IP00

When waterproofing is required, insert the Waterproof Packing on the backside of the front panel. Keep the Port Cover on the front-panel Setup Tool port of the E5EC-800 securely closed. The degree of protection when the Waterproof Packing is used is IP66. 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. If the Waterproof Packing and Port Cover are not periodically replaced, waterproof performance may not be maintained. If a waterproof structure is not required, then the Waterproof Packing does not need to be installed.

●Operating Precautions

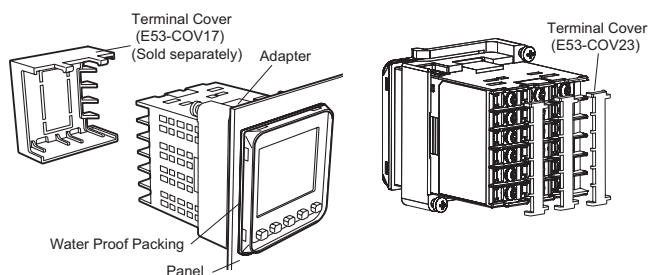
1. It takes approximately two seconds for the outputs to turn ON from after the power supply is turned ON. Due consideration must be given to this time when incorporating Digital Temperature Controllers into a control panel or similar device.
2. Make sure that the Digital Temperature Controller has 30 minutes or more to warm up after turning ON the power before starting actual control operations to ensure the correct temperature display.
3. When using self-tuning, turn ON power for the load (e.g., heater) at the same time as or before supplying power to the Temperature Controller. If power is turned ON for the Temperature Controller before turning ON power for the load, self-tuning will not be performed properly and optimum control will not be achieved.
4. When starting operation after the Digital Temperature Controller has warmed up, turn OFF the power and then turn it ON again at the same time as turning ON power for the load. (Instead of turning the Digital Temperature Controller OFF and ON again, switching from STOP mode to RUN mode can also be used.)
5. Avoid using the Controller in places near a radio, television set, or wireless installing. These devices can cause radio disturbances which adversely affect the performance of the Controller.

●Mounting

Mounting to a Panel

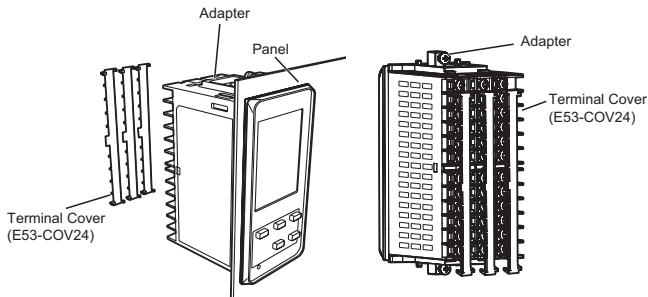
E5CC-800

There are two models of Terminal Covers that you can use with the E5CC-800.



1. For waterproof mounting, waterproof packing must be installed on the Controller. Waterproofing is not possible when group mounting several Controllers. Waterproof packing is not necessary when there is no need for the waterproofing function.
2. Insert the E5CC-800 into the mounting hole in the panel.
3. Push the adapter from the terminals up to the panel, and temporarily fasten the E5CC-800.
4. Tighten the two fastening screws on the adapter. Alternately tighten the two screws little by little to maintain a balance. Tighten the screws to a torque of 0.29 to 0.39 N•m.

E5EC/E5AC-800

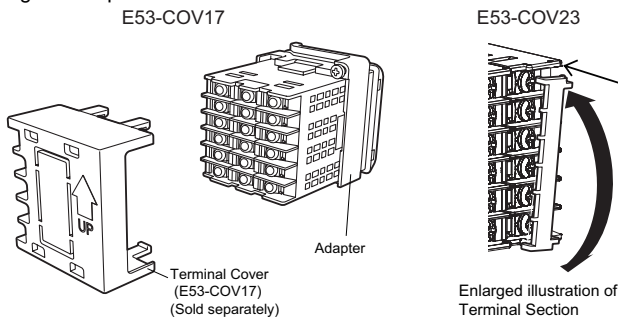


1. For waterproof mounting, waterproof packing must be installed on the Controller. Waterproofing is not possible when group mounting several Controllers. Waterproofing is not necessary when there is no need for the waterproofing function.
2. Insert the E5EC/E5AC-800 into the mounting hole in the panel.
3. Push the adapter from the terminals up to the panel, and temporarily fasten the E5EC/E5AC-800.
4. Tighten the two fastening screws on the adapter. Alternately tighten the two screws little by little to maintain a balance. Tighten the screws to a torque of 0.29 to 0.39 N•m.

Mounting the Terminal Cover E5CC-800

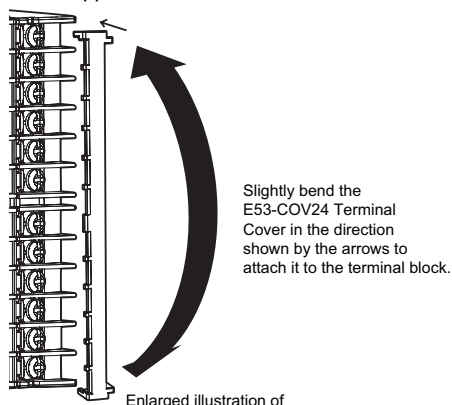
Slightly bend the E53-COV23 Terminal Cover to attach it to the terminal block as shown in the following diagram. The Terminal Cover cannot be attached in the opposite direction. E53-COV17 Terminal Cover can be also attached.

Make sure that the "UP" mark is facing up, and then attach the E53-COV17 Terminal Cover to the holes on the top and bottom of the Digital Temperature Controller.



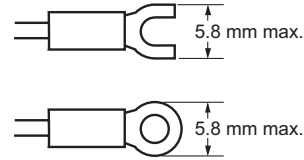
E5EC/E5AC-800

Slightly bend the E53-COV24 Terminal Cover to attach it to the terminal block as shown in the following diagram. The Terminal Cover cannot be attached in the opposite direction.



●Precautions when Wiring

- Separate input leads and power lines in order to prevent external noise.
- Use a shielded, AWG24 to AWG18 (cross-sectional area of 0.205 to 0.8231 mm²) twisted-pair cable.
- Use crimp terminals when wiring the terminals.
- Use the suitable wiring material and crimp tools for crimp terminals.
- Tighten the terminal screws to a torque of 0.43 to 0.58 N•m.
- Use the following types of crimp terminals for M3 screws.



Read and Understand this Catalog

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

Warranty and Limitations of Liability

WARRANTY

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Application Considerations

SUITABILITY FOR USE

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

Take all necessary steps to determine the suitability of the product for the systems, machines, and equipment with which it will be used.

Know and observe all prohibitions of use applicable to this product.

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

PROGRAMMABLE PRODUCTS

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Disclaimers

CHANGE IN SPECIFICATIONS

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DIMENSIONS AND WEIGHTS

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

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Note: Do not use this document to operate the Unit.

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