

Digital Temperature Controller

E5CC/E5EC/E5AC

The new standard in temperature control is
higher in every respect

E5CC (48 × 48 mm) / E5EC (48 × 96 mm) / E5AC (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.



48 × 48 mm
E5CC

48 × 96 mm
E5EC

96 × 96 mm
E5AC

Digital Temperature Controller

E5CC (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.

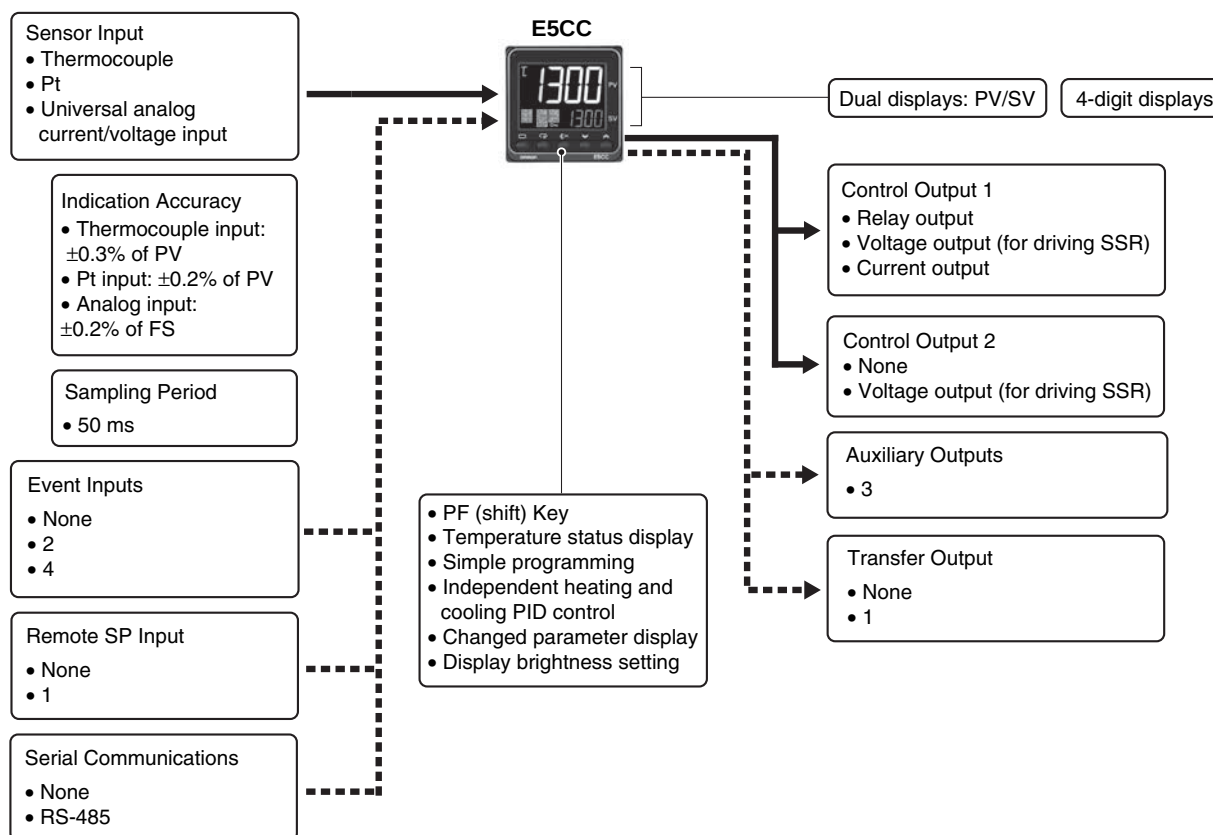
- The white PV display with a height of 15.2 mm improves visibility.
- High-speed sampling at 50 ms.
- Models are available with up to 3 auxiliary outputs, up to 4 event inputs, a transfer output, and a remote SP input to cover a wide range of applications.
- Short body with depth of only 60 mm.
- Set 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.



48 × 48 mm
E5CC

Refer to Safety Precautions on page 34.

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 Digital Controllers User's Manual (Cat. No. H174)

E5□C Digital Controllers Communications Manual (Cat. No. H175)

Model Number Legend and Standard Models

Model Number Legend

E5CC-□□ □□□□-□□□□ (Example: E5CC-RX3A5M-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						
E5CC							48 × 48 mm					
*1 *3							Control output 1			Control output 2		
	RX						Relay output			None		
	QX						Voltage output (for driving SSR)			None		
	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 terminals (with cover)					
					M		Universal input					
								HB alarm and HS alarm	Communications	Event inputs	Remote SP Input	Transfer output
					*1	000	---	---	---	---	---	
						001	1	---	2	---	---	
					*1	003	2 (for 3-phase heaters)	RS-485	---	---	---	
					*3	004	---	RS-485	2	---	---	
						005	---	---	4	---	---	
						006	---	---	2		Provided.	
						007	---	---	2	Provided.	---	

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

*2. The control 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

Note: The E53-COV10 cannot be used.
Refer to page 11 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.

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 4.5 or higher is required for the E5CC.
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

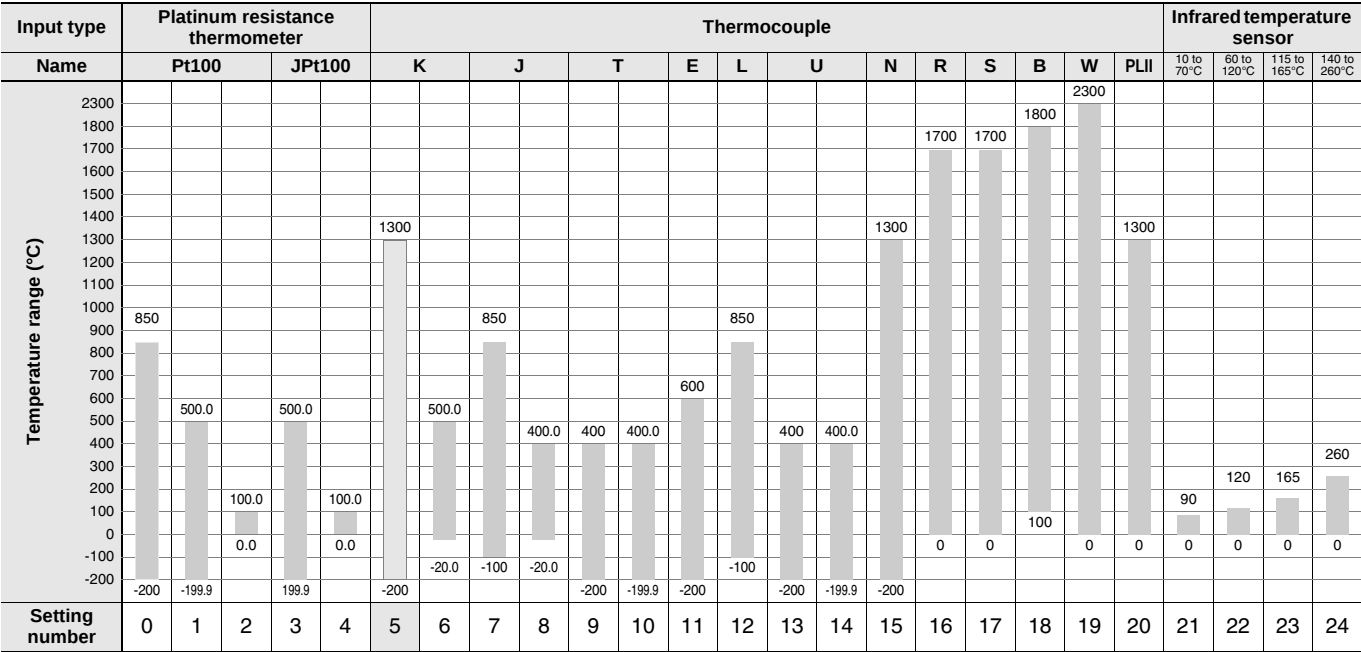
Ratings

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		Models with option selection of 000: 5.2 VA max. at 100 to 240 VAC, and 3.1 VA max. at 24 VAC or 1.6 W max. at 24 VDC All other models: 6.5 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		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 M Ω 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 $\pm$ 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	3
	Output specifications	N.O. 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
Event input	Number of inputs	2 or 4 (depends on model)
	External contact input specifications	Contact input: ON: 1 k Ω max., OFF: 100 k Ω 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	Contact output: 4 to 20 mA DC, load: 500 Ω max., resolution: approx. 10,000 Linear voltage output: 1 to 5 VDC, load: 1 k Ω max, resolution: Approx. 10,000
Setting method		Digital setting using front panel keys
Remote SP input		Current input: 4 to 20 mA DC or 0 to 20 mA DC (input impedance: 150 Ω max.) Voltage input: 1 to 5 V, 0 to 5 V, or 0 to 10 V (input impedance: 1 M Ω min.)
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, heater burnout (HB) alarm (including SSR failure (HS) alarm), 40% AT, 100% AT, MV limiter, input digital filter, self tuning, robust tuning, PV input shift, run/stop, protection functions, extraction of square root, MV change rate limit, simple calculations, temperature status display, simple programming, 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)

* You cannot select a relay output or current output for control output 2.

Input Ranges

●Thermocouple/Platinum Resistance Thermometer (Universal inputs)



The applicable standards for the input types are as follows:
K, J, T, E, N, R, S, B: JIS C 1602-1995, IEC 60584-1
L: Fe-CuNi, DIN 43710-1985
U: Cu-CuNi, DIN 43710-1985
W: W5Re/W26Re, ASTM E988-1990

JPt100: JIS C 1604-1989, JIS C 1606-1989
Pt100: JIS C 1604-1997, IEC 60751
PL II: According to Platinel II electromotive force charts from BASF (previously Engelhard)

●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				
Setting number	25	26	27	28	29

Alarm Outputs

Each alarm can be independently set to one of the following 19 alarm types. The default is 2: Upper limit. (see note.)

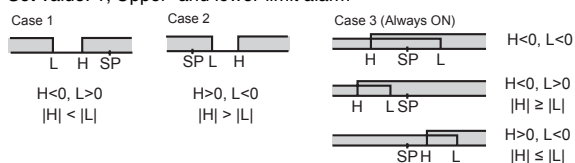
Auxiliary outputs are allocated for alarms. ON delays and OFF delays (0 to 999 s) can also be specified.

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.

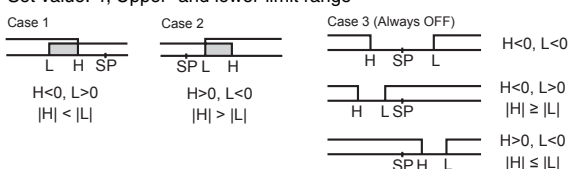
Set value	Alarm type	Alarm output operation		Description of function
		When alarm value X is positive	When alarm value X is negative	
0	Alarm function OFF	Output OFF		No alarm
1	Upper- and lower-limit *1		*2	Set the deviation in the set point by setting the alarm upper limit (H) and alarm lower limit (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).
18	RSP absolute value upper limit *10			The alarm will turn ON when the remote SP (RSP) is larger than the alarm value (X).
19	RSP absolute value lower limit *10			The alarm will turn ON when the remote SP (RSP) 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.

*10 This value is displayed only when a remote SP input is used. It functions in both Local SP Mode and Remote SP Mode.

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 max. Analog input: ±0.2% FS ±1 digit max. CT input: ±5% FS ±1 digit max.
Transfer output accuracy		±0.3% FS max.
Remote SP Input Type		±0.2% 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.
Influence of voltage *2		Analog input: (±1%FS) ±1 digit max. CT input: (±5% FS) ±1 digit max. Remote SP input: (±1% 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)
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)
Setup Tool		CX-Thermo version 4.5 or higher
Setup Tool port		E5CC top panel: An E58-CIFQ2 USB-Serial Conversion Cable is used to connect to a USB port on the computer. *5
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 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 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 36 for compliance with Lloyd's Standards.

USB-Serial Conversion Cable

Applicable OS	Windows 2000, XP, Vista, or 7
Applicable software	CX-Thermo version 4.5 or higher
Applicable models	E5CC/E5EC/E5AC and E5CB
USB interface standard	Conforms to USB Specification 1.1.
DTE speed	38400 bps
Connector specifications	Computer: USB (type A plug) Digital Temperature Controller: Setup Tool port
Power supply	Bus power (Supplied from USB host controller.)*
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.

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

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

Communications Specifications

Transmission line connection method	RS-485: Multipoint
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*	- 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*	- 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. Slope 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 singlephase 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

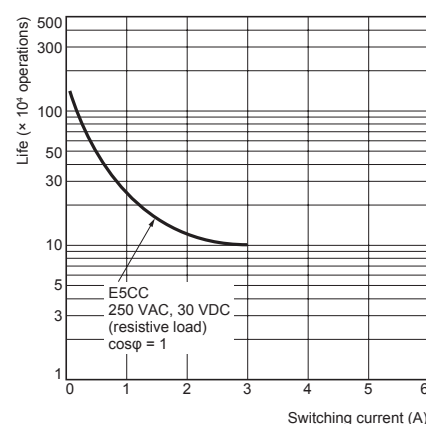
*1 For heater burnout alarms, the heater current will be measured when the control output is ON, and the output will turn ON if the heater current is lower than the set value (i.e., heater burnout detection current value).

*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.

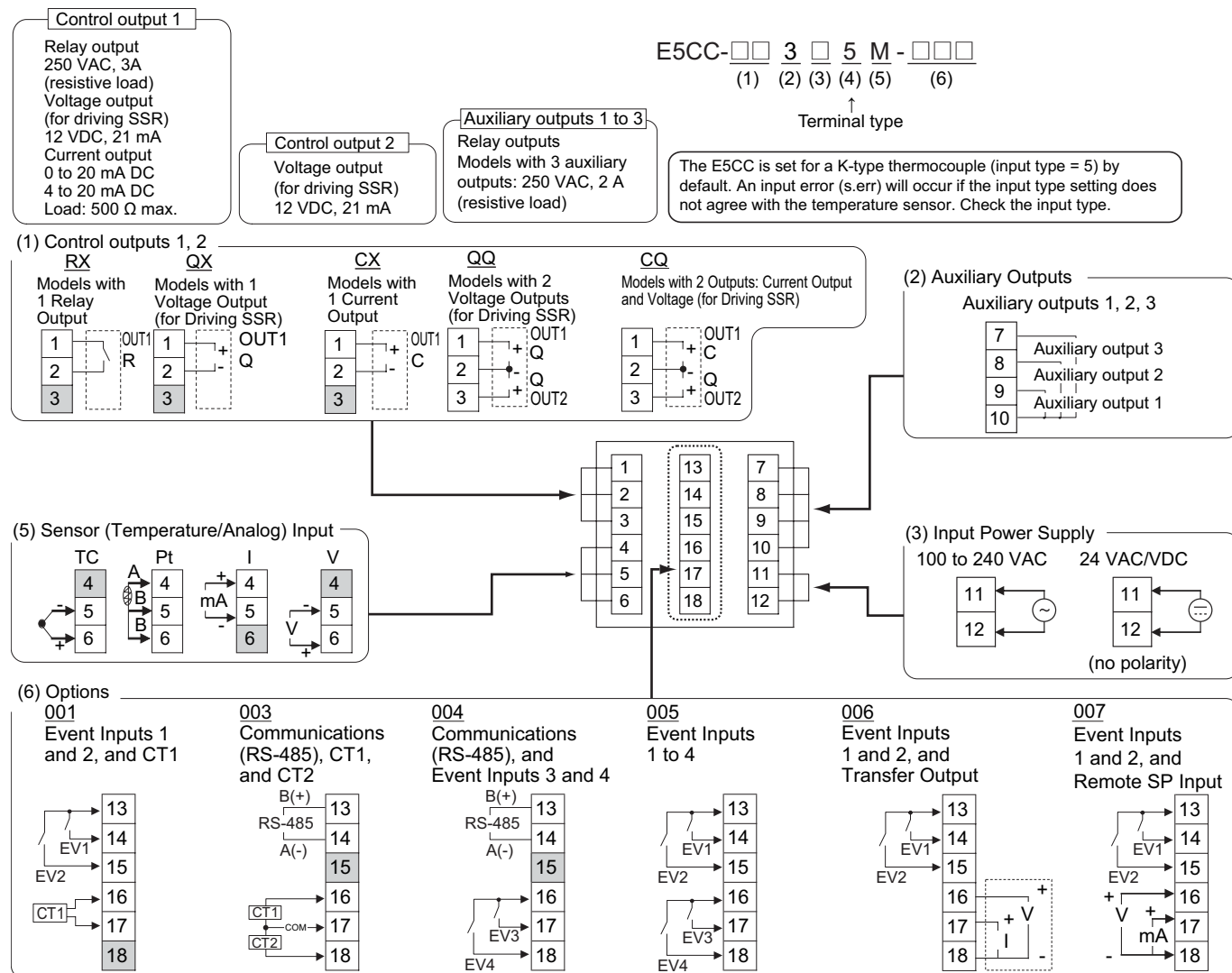
*4 The value is 35 ms for a control period of 0.1 s or 0.2 s.

Electrical Life Expectancy Curve for Relays (Reference Values)



External Connections

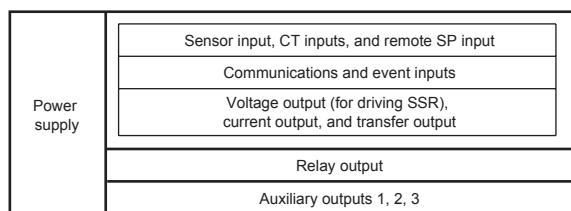
E5CC



- 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

Models with 3 Auxiliary Outputs

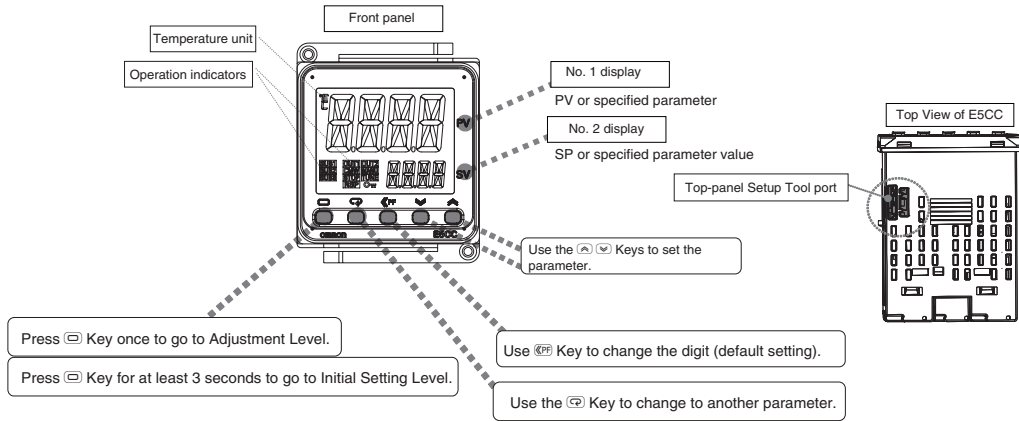


- : Reinforced insulation
□ : Functional isolation

Note: Auxiliary outputs 1 to 3 are not isolated.

Nomenclature

E5CC

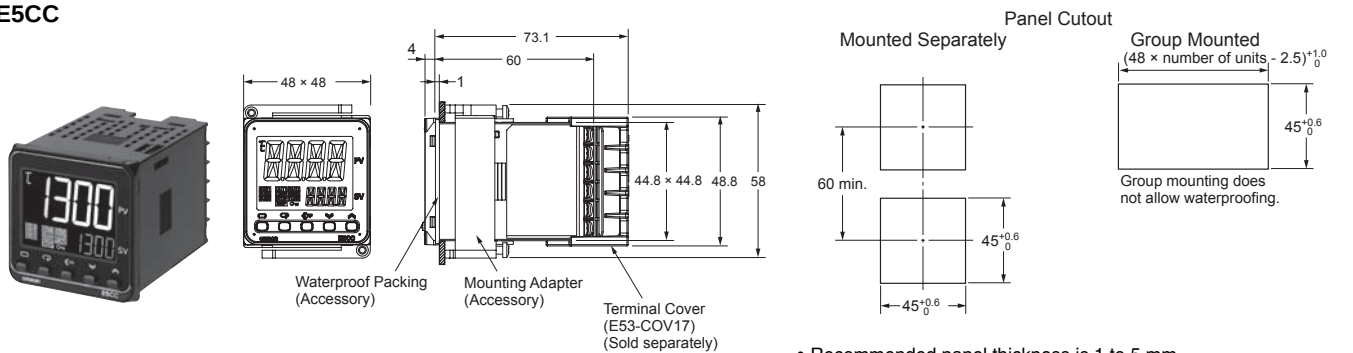


Dimensions

(Unit: mm)

Controllers

E5CC



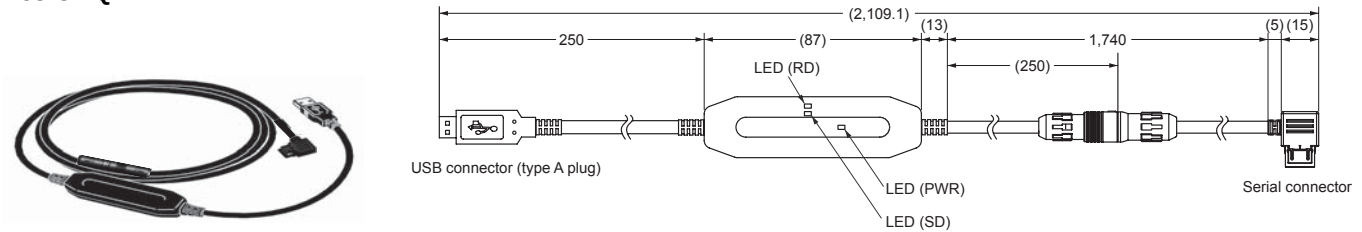
The Setup Tool port is on the top of the Temperature Controller. It is used to connect the Temperature Controller to the computer to use the Setup Tool. The E58-CIFQ2 USB-Serial Conversion Cable is required to make the connection. Refer to the instructions that are provided with the USB-Serial Conversion Cable for the connection procedure.

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

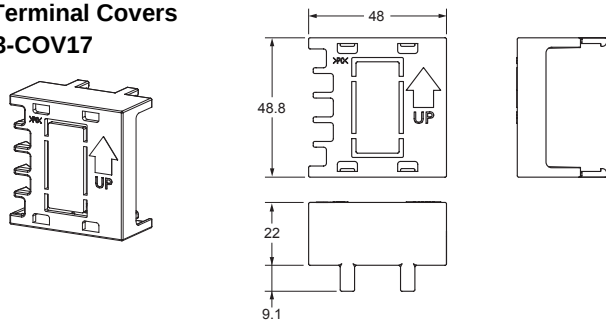
- Recommended panel thickness is 1 to 5 mm.
- Group mounting is not possible in the vertical direction. (Maintain the specified mounting space between Controllers.)
- To mount the Controller so that it is waterproof, insert the waterproof packing onto the Controller.
- When two or more Controllers are mounted, make sure that the surrounding temperature does not exceed the allowable operating temperature specified in the specifications.
- To attach the USB-Serial Conversion Cable to the control panel, use a panel thickness of 1 to 2.5 mm.

Accessories (Order Separately)

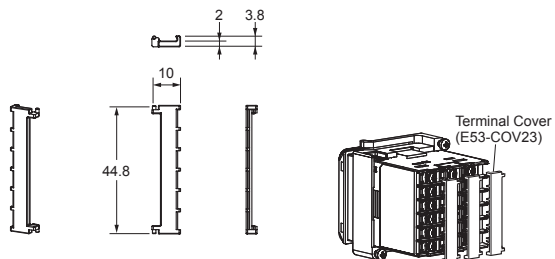
● USB-Serial Conversion Cable E58-CIFQ2



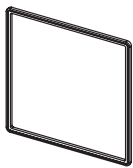
● Terminal Covers E53-COV17



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



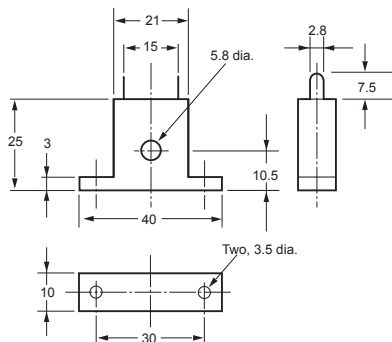
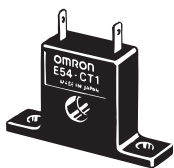
● Waterproof Packing
Y92S-P8 (for DIN 48 × 48)



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 a rough standard.)
The Waterproof Packing does not need to be attached if a waterproof structure is not required.

● Current Transformers

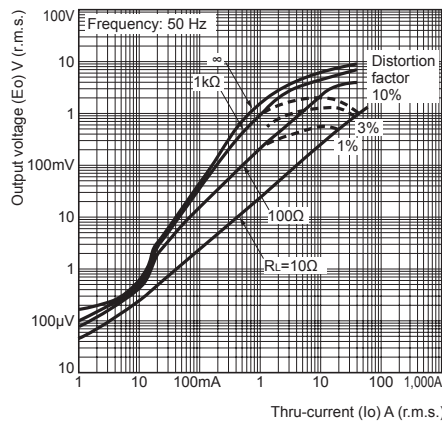
E54-CT1



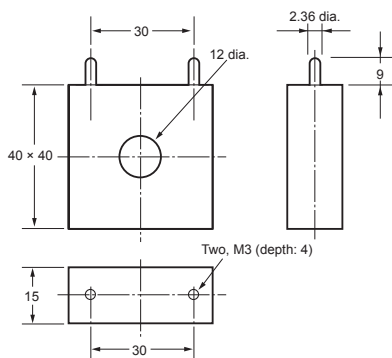
Thru-current (Io) vs. Output Voltage (Eo)
(Reference Values)

E54-CT1

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



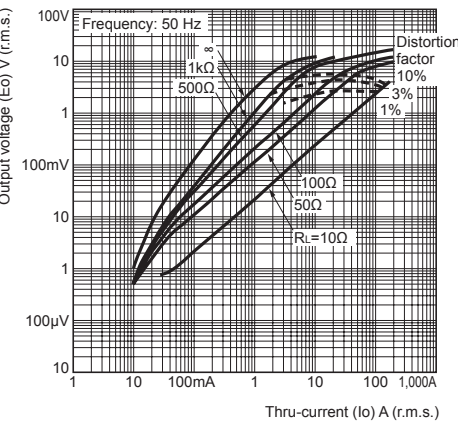
E54-CT3



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

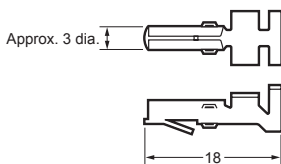
E54-CT3

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

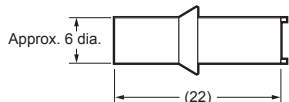


E54-CT3 Accessory

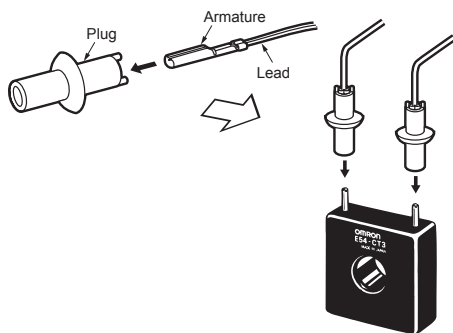
• Armature



• Plug



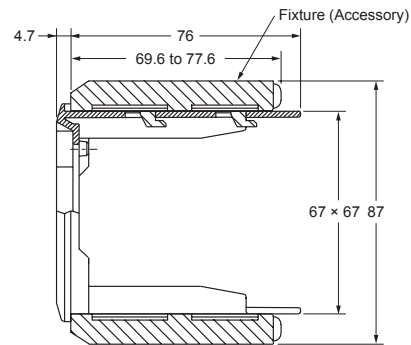
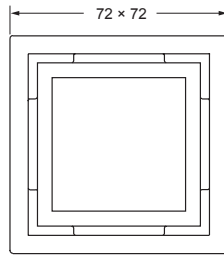
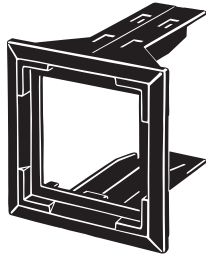
Connection Example



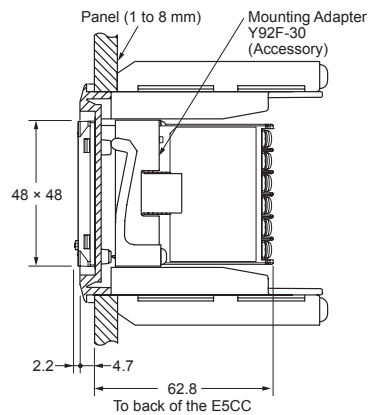
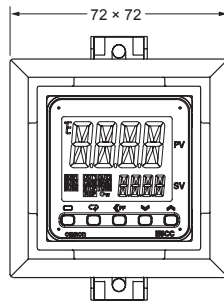
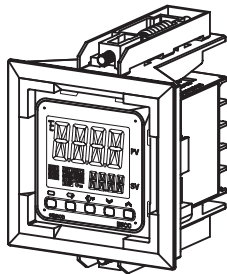
● Adapter

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.



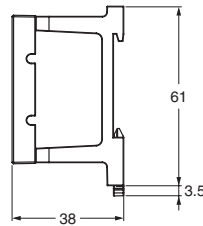
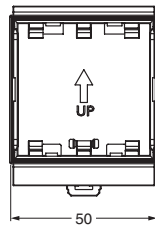
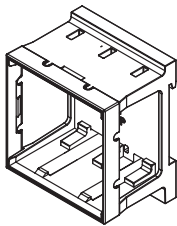
Mounted to E5CC



● DIN Track Mounting Adapter

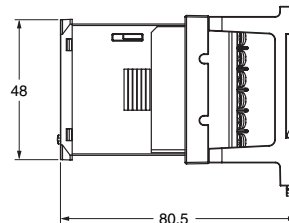
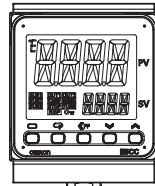
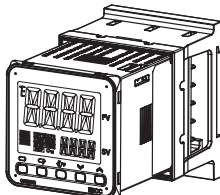
Y92F-52

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

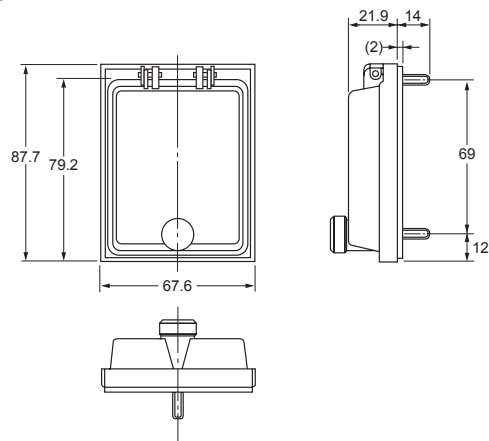


This Adapter is used to mount the E5CC to a DIN Track.
 If you use the Adapter, there is no need for a plate to mount in the panel or to drill mounting holes in the panel.

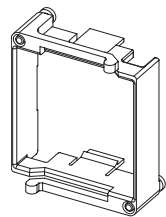
Mounted to E5CC



● Watertight Cover
Y92A-48N

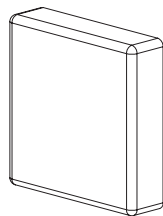


● Mounting Adapter
Y92F-49



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

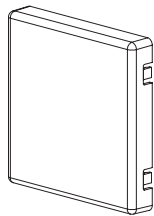
● Protective Cover
Y92A-48D



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



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

This image shows a full page of a blank sheet of white paper designed for writing. It features horizontal ruling lines spaced evenly down the page. A single vertical margin line runs parallel to the left edge, creating a narrow column for notes or a header. The word "MEMO" is printed in a bold, black, sans-serif font at the top center of the page.

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 and 25 mm for the E5AC 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, a transfer output, and a remote SP input 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.

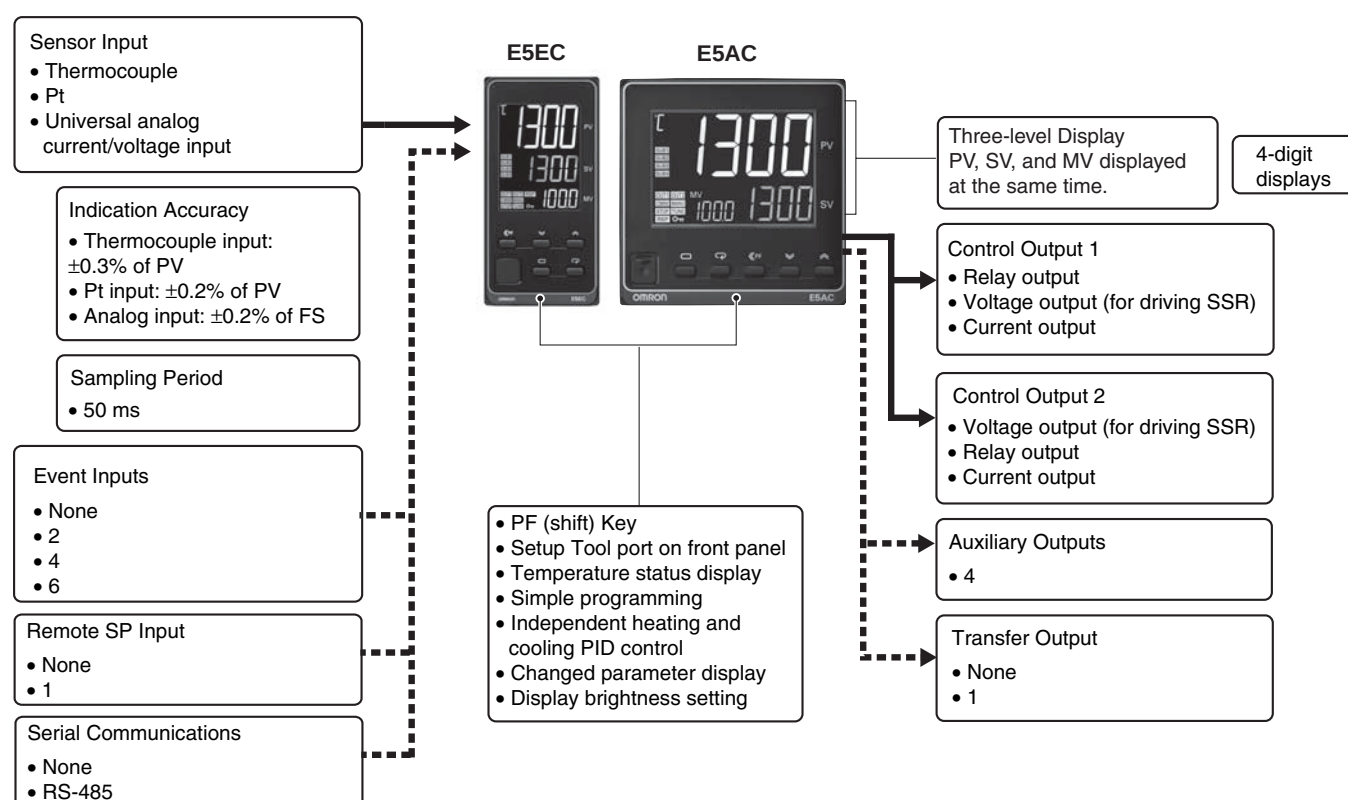


48 × 96 mm
E5EC

96 × 96 mm
E5AC

Refer to Safety Precautions on page 34.

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 Digital Controllers User's Manual (Cat. No. H174)

E5□C Digital Controllers Communications Manual (Cat. No. H175)

Model Number Legend and Standard Models

Model Number Legend

E5EC-□□ □□□□-□□□□ (Example: E5EC-RX4A5M-000)

① ② ③ ④ ⑤ ⑥

E5AC-□□ □□□□-□□□□ (Example: E5AC-RX4A5M-000)

① ② ③ ④ ⑤ ⑥

Model	①		②	③	④	⑤	⑥	Meaning					
	Control outputs 1 and 2		No. of auxiliary out-puts	Power supply voltage	Terminal type	Input type	Options						
E5EC								48 × 96 mm					
E5AC								96 × 96 mm					
*2								Control output 1			Control output 2		
	RX							Relay output			None		
	QX							Voltage output (for driving SSR)			None		
	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 out-put		
	CQ							Linear current output			Voltage output (for driving SSR)		
	PR							Position-proportional relay output			Position-proportion-al relay output		
			*3 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					
			Control outputs 1 and 2			5		Screw terminals (with cover)					
Option selection conditions *1	For RX, QX, QQ, QR, RR, or CQ		For CX or CC	For PR		M		Universal input					
	Selectable	Selectable	Selectable			000	HB alarm and HS alarm	Communications	Event inputs	Remote SP Input	Transfer output		
		Selectable	Selectable			004	---	RS-485	2	---	---		
		Selectable				005	---	---	4	---	---		
	Selectable					009	2 (for 3-phase heaters)	RS-485	2	---	---		
	Selectable					010	1	---	4	---	---		
	Selectable					011	1	---	6	Provided.	Provided.		
		Selectable				013	---	---	6	Provided.	Provided.		
	Selectable	Selectable			014	---	RS-485	4	Provided.	Provided.			

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

*2. The control output cannot be used as a transfer output.

*3. A model with four auxiliary outputs must be selected.

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)

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

Waterproof Packing

Applicable Controller	Model
E5EC	Y92S-P9
E5AC	Y92S-P10

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

Waterproof Cover

Applicable Controller	Model
E5EC	Y92A-49N
E5AC	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

(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

CX-Thermo Support Software

Model
EST2-2C-MV4

Note: CX-Thermo version 4.5 or higher is required for the E5EC.
For the system requirements for the CX-Thermo, refer to information on the EST2-2C-MV4 on the OMRON website (www.ia.omron.com).

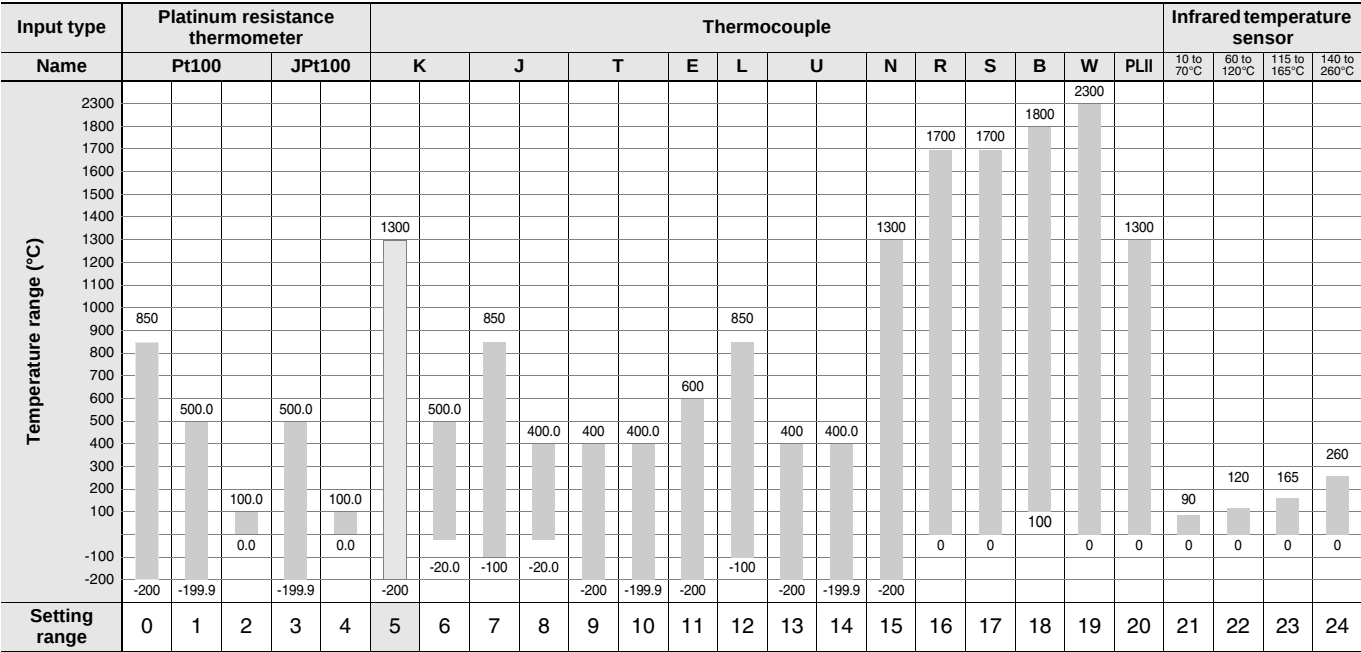
Specifications

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	Models with option selection of 000:6.6 VA max. at 100 to 240 VAC, and 4.1 VA max. at 24 VAC or 2.3 W max. at 24 VDC All other models: 8.3 VA max. at 100 to 240 VAC, and 5.5 VA max. at 24 VAC or 3.2 W max. at 24 VDC
	E5AC	Models with option selection of 000:7.0 VA max. at 100 to 240 VAC, and 4.2 VA max. at 24 VAC or 2.4 W max. at 24 VDC All other models: 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		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 or 2-PID control (with autotuning)
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	4
	Output specifications	N.O. 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
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 max, Resolution: Approx. 10,000
Remote SP input		Current input: 4 to 20 mA DC or 0 to 20 mA DC (input impedance: 150 Ω max.) Voltage input: 1 to 5 V, 0 to 5 V, or 0 to 10 V (input impedance: 1 MΩ min.)
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: PV: 18.0 mm, SV: 11.0 mm, MV: 7.8 mm E5AC: PV: 25.0 mm, SV: 15.0 mm, MV: 9.5 mm Three displays Contents: PV/SV/MV, PV/SV/Multi-SP, or PV/SV/Remaining soak time Numbers of digits: 4 digits each for PM, SV, and MV displays
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, heater burnout (HB) alarm (including SSR failure (HS) alarm), 40% AT, 100% AT, MV limiter, input digital filter, self tuning, robust tuning, PV input shift, run/stop, protection functions, extraction of square root, MV change rate limit, simple calculations, temperature status display, simple programming, 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)

Input Ranges

●Thermocouple/Platinum Resistance Thermometer (Universal inputs)



The applicable standards for the input types are as follows:

K, J, T, E, N, R, S, B: JIS C 1602-1995, IEC 60584-1

L: Fe-CuNi, DIN 43710-1985

U: Cu-CuNi, DIN 43710-1985

W: W5Re/W26Re, ASTM E988-1990

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

Pt100: JIS C 1604-1997, IEC 60751

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

●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				
Setting number	25	26	27	28	29

Alarm type

Each alarm can be independently set to one of the following 19 alarm types. The default is 2: Upper limit. (see note.)

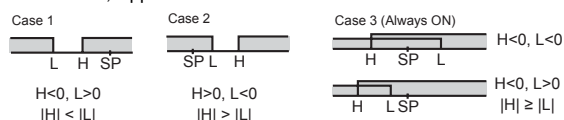
Auxiliary outputs are allocated for alarms. ON delays and OFF delays (0 to 999 s) can also be specified.

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 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).
18	RSP absolute value upper limit *10			The alarm will turn ON when the remote SP (RSP) is larger than the alarm value (X).
19	RSP absolute value lower limit *10			The alarm will turn ON when the remote SP (RSP) 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.

*10 This value is displayed only when a remote SP input is used. It functions in both Local SP Mode and Remote SP Mode.

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 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.
Remote SP Input Type		±0.2% 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.
Influence of voltage *2		Analog input: (±1%FS) ±1 digit max. CT input: (±5% FS) ±1 digit max. Remote SP input: (±1% 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)
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	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	Controller: Approx. 210 g, Mounting Brackets: Approx. 4 g × 2
	E5AC	Controller: Approx. 250 g, Mounting Brackets: 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 4.5 or higher
Setup Tool port		E5EC/E5AC top panel: An E58-CIFQ2 USB-Serial Conversion Cable is used to connect to a USB port on the computer.*5 E5EC/E5AC 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	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 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 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 information on maritime standards in *Shipping Standards* on page 36 for compliance with Lloyd's Standards.

USB-Serial Conversion Cable

Applicable OS	Windows 2000, XP, Vista, or 7
Applicable software	CX-Thermo version 4.5 or higher
Applicable models	E5CC/E5EC/E5AC and E5CB
USB interface standard	Conforms to USB Specification 1.1.
DTE speed	38,400 bps
Connector specifications	Computer: USB (type A plug) Digital Temperature Controller: Setup Tool port
Power supply	Bus power (Supplied from USB host controller.)*
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.

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

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

Communications Specifications

Transmission line connection method	RS-485: Multipoint
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*	- 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*	- 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. Slope 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 singlephase 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

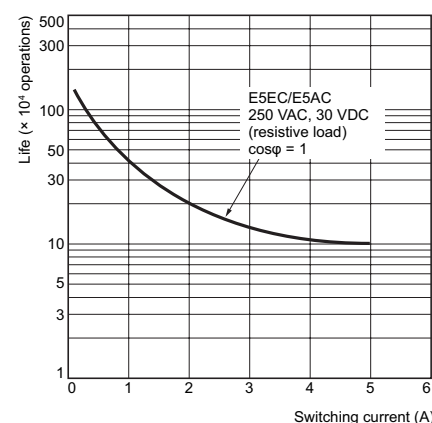
*1. For heater burnout alarms, the heater current will be measured when the control output is ON, and the output will turn ON if the heater current is lower than the set value (i.e., heater burnout detection current value).

*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)



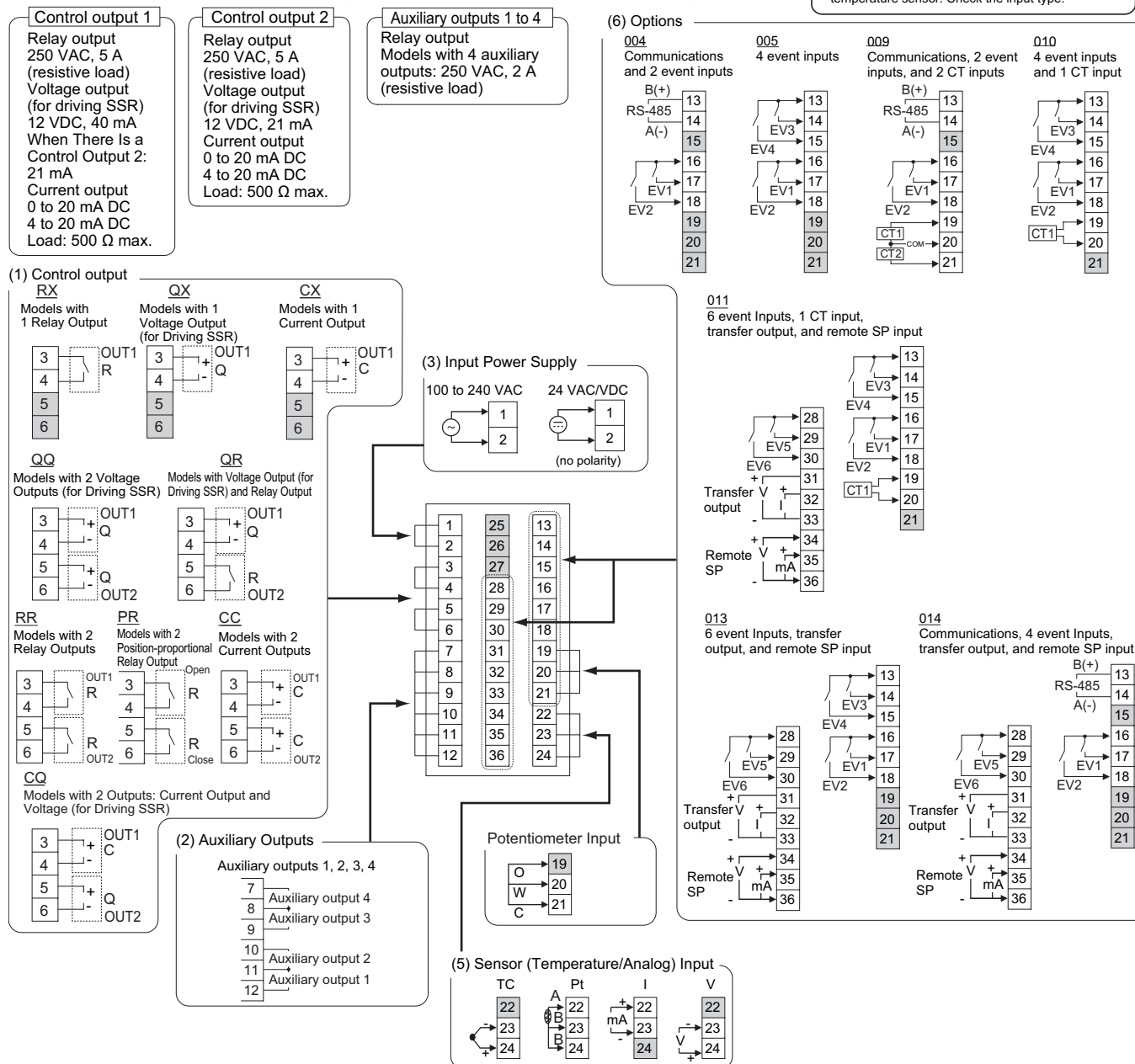
E5EC/E5AC

E5EC-□□ 4 □ 5 M - □□□□ E5AC-□□ 4 □ 5 M - □□□□
 (1) (2) (3) (4) (5) (6) (1) (2) (3) (4) (5) (6)

Terminal type

Terminal type

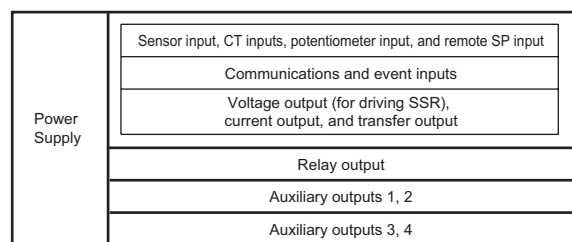
The E5EC is set for a K-type thermocouple (input type = 5) by default. An input error (s.err) will occur if the input type setting does not agree with the temperature sensor. Check the input type.



- 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

Models with 4 Auxiliary Outputs

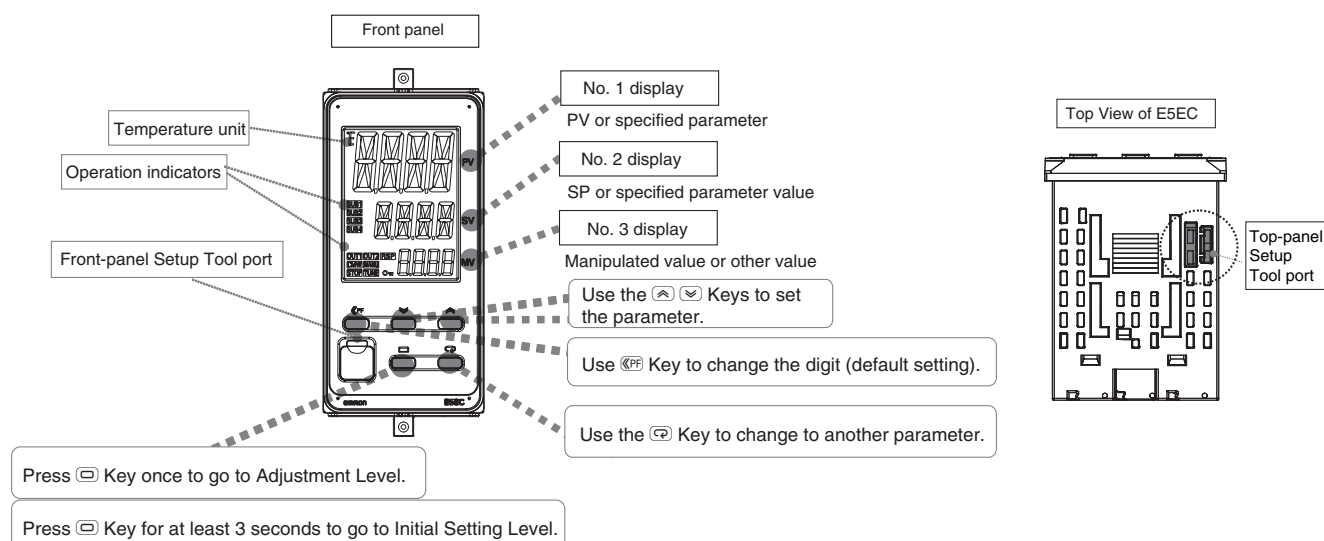


 : Reinforced insulation

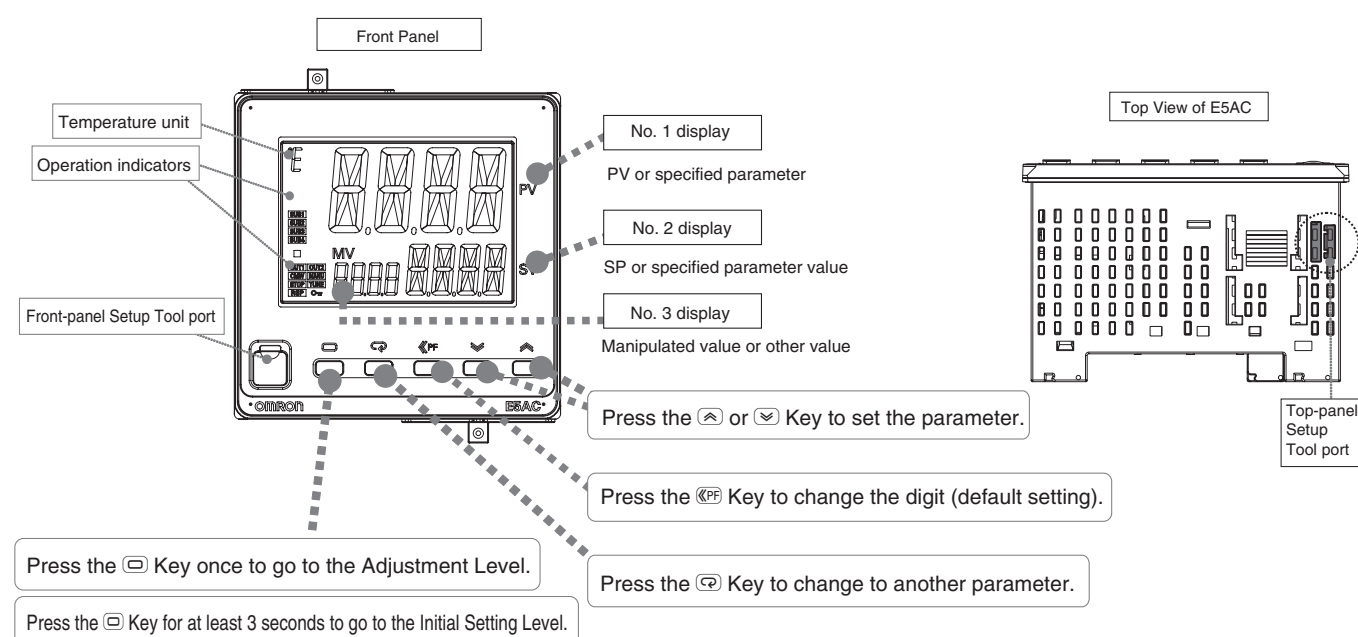
 : Functional isolation

Nomenclature

E5EC



E5AC



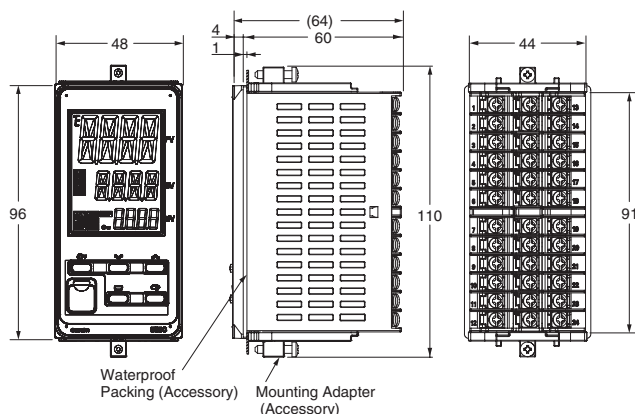
E5EC/E5AC

Dimensions

(Unit: mm)

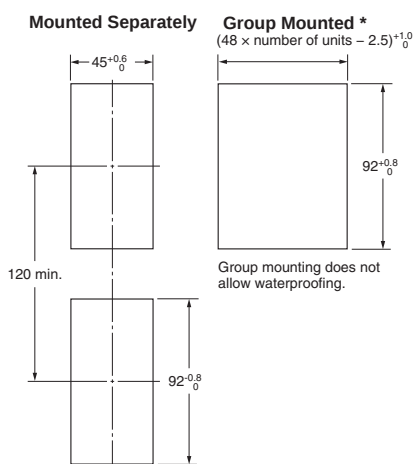
Controllers

E5EC



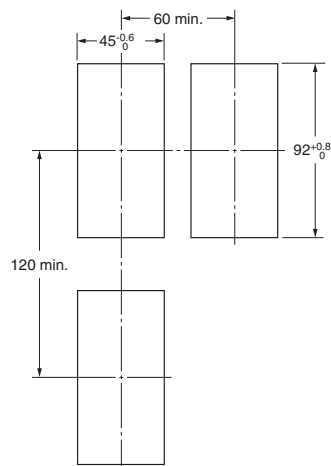
The Setup Tool port is on the top of the Temperature Controller. It is used to connect the Temperature Controller to the computer to use the Setup Tool. The E58-CIFQ2 USB-Serial Conversion Cable is required to make the connection. Refer to the instructions that are provided with the USB-Serial Conversion Cable for the connection procedure.

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

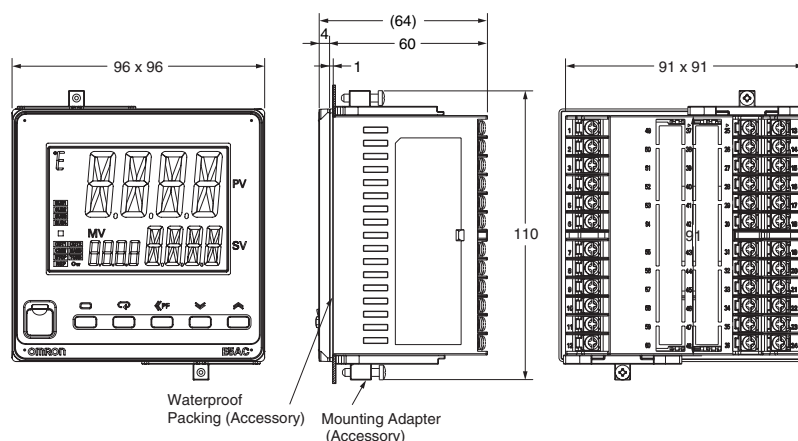


- Recommended panel thickness is 1 to 8 mm.
- Group mounting is not possible in the vertical direction. (Maintain the specified mounting space between Controllers.)
- To mount the Controller so that it is waterproof, insert the waterproof packing onto the Controller.
- When two or more Controllers are mounted, make sure that the surrounding temperature does not exceed the allowable operating temperature specified in the specifications.
- To attach the USB-Serial Conversion Cable to the control panel, use a panel thickness of 1 to 2.5 mm.

* Selections for Control Outputs 1 and 2: QQ, QR, RR, CC, PR, or CQ. If you also specify 011, 013, or 014 for the option selection and use group mounting, the ambient temperature must be 45°C or less. If the ambient temperature is 55°C, maintain the following mounting spaces between Controllers.



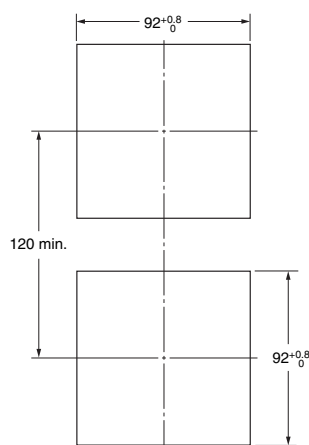
E5AC



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.

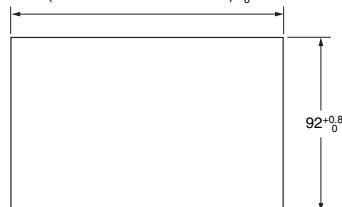
Note: Do not leave the USB-Serial Conversion Cable connected when you use the Temperature Controller.

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.
- To attach the USB-Serial Conversion Cable to the control panel, use a panel thickness of 1 to 2.5 mm.