Specifications

Power supply voltage		No D 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	E5CN	100 to 240 VAC: 7.5 VA (max.) (E5CN-R2T at 100 VAC: 3.0 VA) 24 VAC/VDC: 5 VA/3 W (max.) (E5CN-R2TD at 24 VAC: 2.7 VA)
	E5CN-U	100 to 240 VAC: 6 VA (max.) 24 VAC/VDC: 3 VA/2 W (max.) (models with current output: 4 VA/2 W)
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 Voltage input: 0 to 50 mV
		Models with analog inputs 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.)
Control method		ON/OFF control or 2-PID control (with auto-tuning)
Control outputs	Relay output	E5CN	SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA
		E5CN-U	SPDT, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA
	Voltage output (for driving SSR)	E5CN E5CN-U	Output voltage: 12 VDC ± 15% (PNP), max. load current: 21 mA, with short-circuit protection circuit
	Current output	E5CN	4 to 20 mA DC/0 to 20 mA DC, load: 600 Ω max., resolution: approx. 10,000
	Long-life relay output	E5CN	SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 1,000,000 operations, load power supply voltage: 75 to 250 VAC (DC loads cannot be connected.), minimum applicable load: 5 V, 10 mA, leakage current: 5 mA max. (250 VAC, 60 Hz)
Auxiliary outputs	Number of outputs		1 or 2 max. (Depends on the model.)
	Output specifications		Relay output: SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA
Event inputs	Number of inputs		2
	External contact input specifications		Contact input: ON: 1 kΩ max., OFF: 100 kΩ min.
			Non-contact input: ON: Residual voltage: 1.5 V max., OFF: Leakage current: 0.1 mA max.
			Current flow: Approx. 7 mA per contact
External power supply for ES1B		12 VDC ± 10%, 20 mA, short-circuit protection circuit provided
Setting method		Digital setting using front panel keys

Indication method	11-segment digital display and individual indicators (7-segment display also possible) Character height: PV: 11 mm, SV: 6.5 mm
Multi SP	Up to four set points (SP0 to SP3) can be saved and selected using event inputs, key operations, or serial communications.
Bank switching	Not supported
Other functions	Manual output, heating/cooling control, loop burnout alarm, SP ramp, other alarm functions, heater burnout detection (including SSR failure and heater overcurrent detection), 40% AT, 100% AT, MV limiter, input digital filter, self-tuning, temperature input shift, run/stop, protection functions, control output ON/OFF counter, extraction of square root, MV change rate limit, logic operations, PV/SV status display, simple program, automatic cooling coefficient adjustment
Ambient operating temperature	-10 to 55 ° C (with no condensation or icing), for 3-year warranty: -10 to 50 ° C
Ambient operating humidity	25% to 85%
Storage temperature	-25 to 65 ° C (with no condensation or icing)

Input Ranges

Thermocouple/Platinum Resistance Thermometer (Universal Inputs)
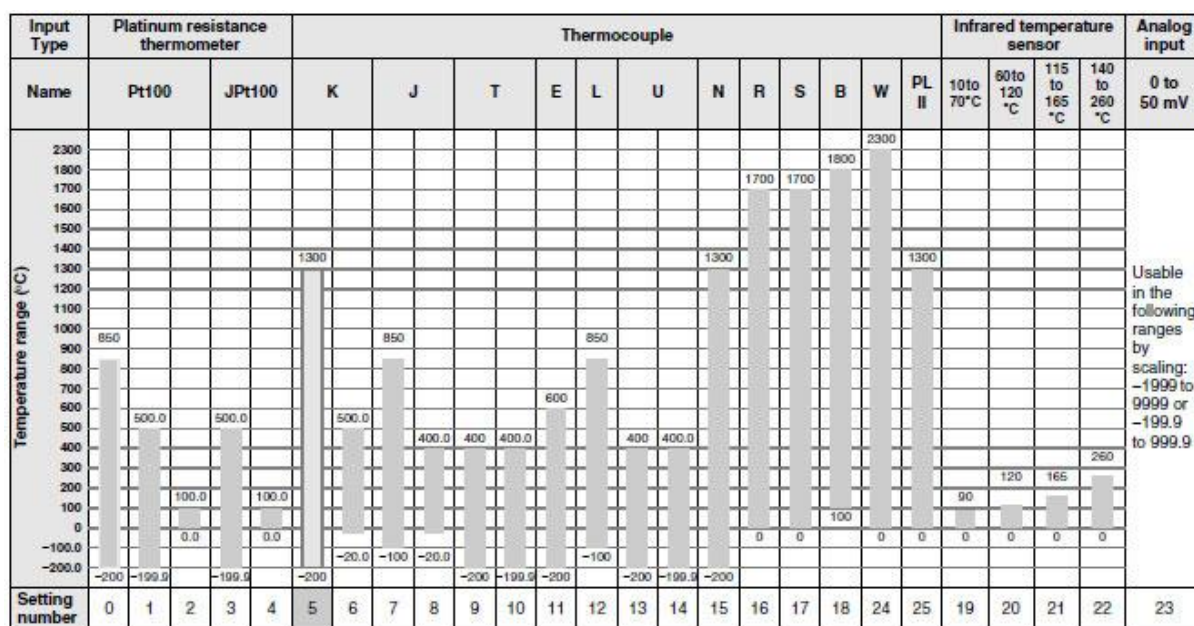
Shaded settings are the default settings.
The applicable standards for the input types are as follows:
K, J, T, E, N, R, S, B: JIS C 1602-1995, IEC 584-1
L: Fe-CuNi, DIN 43710-1985
U: Cu-CuNi, DIN 43710-1985
W: W5Re/W26Re, ASTM E988-1990
JPt100: JIS C 1604-1989, JIS C 1606-1989
Pt100: JIS C 1604-1997, IEC 751
PL II: According to Platinel II electromotive force charts from BASF (previously Engelhard)
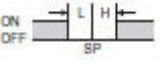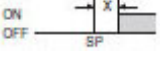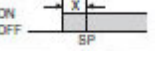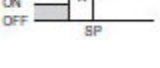
Models with Analog Inputs
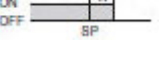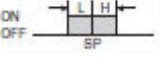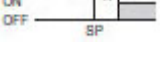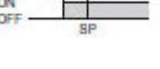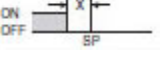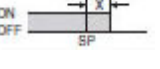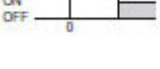
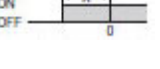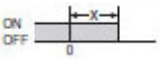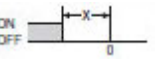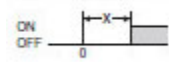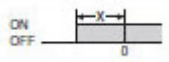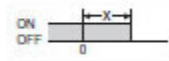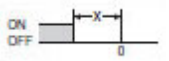| Input Type	Current		Voltage		
Input specification	4 to 20mA	0 to 20 mA	1 to 5 V	0 to 5 V	0 to 10 V
Setting range	Usable in the following ranges by scaling: -1999 to 9999, -199.9 to 999.9, -19.99 to 99.99 or -1.999 to 9.999				
Setting number	0	1	2	3	4

Alarm Outputs

Each alarm can be independently set to one of the following 13 alarm types. The default is 2: Upper limit.
Auxiliary outputs are allocated for alarms. ON delays and OFF delays (0 to 999 s) can also be specified.
Note: For models with heater burnout, SSR failure, and heater overcurrent detection, alarm 1 will be an OR output of the
    alarm selected from the following alarm types and the alarms for heater burnout, SSR failure, and heater
    overcurrent. To output only a heater burnout alarm, SSR failure alarm, and heater overcurrent alarm for alarm 1,
   set the alarm type to 0 (i.e., no alarm function).

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

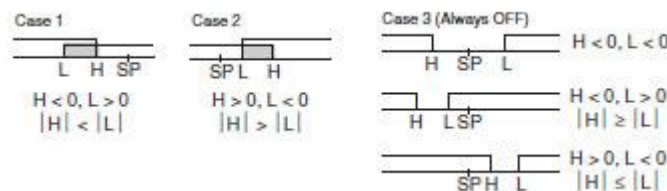| 10	Absolute-value upper-limit with standby sequence			A standby sequence is added to the absolute-value upper-limit alarm (8). *6
11	Absolute-value lower-limit with standby sequence			A standby sequence is added to the absolute-value lower-limit alarm (9). *6
12	LBA (alarm 1 type only)	---		*7
13	PV change rate alarm	---		*8

*1. With set values 1, 4 and 5, the upper and lower limit values can be set independently for each alarm type, and are
    expressed as "L" and "H."
*2. Set value: 1, Upper- and lower-limit alarm
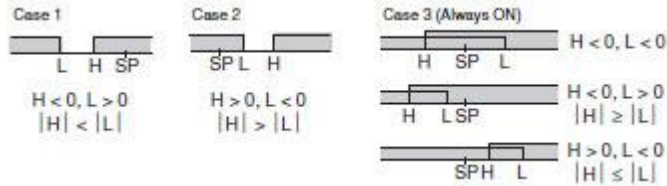
*3. Set value: 4, Upper- and lower-limit range

*4. Set value: 5, Upper- and lower-limit with standby sequence For Upper- and Lower-Limit Alarm Described Above
    • Case 1 and 2
      Always OFF when the upper-limit and lower-limit hysteresis overlaps.
    • Case 3: Always OFF
*5. Set value: 5, Upper- and lower-limit with standby sequence Always OFF when the upper-limit and lower-limit hysteresis
    overlaps.
*6. Refer to the E5CN/E5AN/E5EN/E5GN Digital Temperature Controllers User's Manual Basic Type (Cat. No. H156) for
    information on the operation of the standby sequence.
*7. Refer to the E5CN/E5AN/E5EN/E5GN Digital Temperature Controllers User's Manual Basic Type (Cat. No. H156) for
    information on the loop burnout alarm (LBA).
*8. Refer to the E5CN/E5AN/E5EN/E5GN Digital Temperature Controllers User's Manual Basic Type (Cat. No. H156) for
    information on the PV change rate alarm.

Characteristics

Indication accuracy	Thermocouple: *1 Terminal block models (E5CN): (± 0.3% of indicated value or ± 1 °C, whichever is greater) ± 1 digit max. Plug-in models (E5CN-U): (± 1% of indicated value or ± 2 °C, whichever is greater) ± 1 digit max. Platinum resistance thermometer input: Terminal block models (E5CN) and plug-in models (E5CN-U): (±0.2% of indicated value or ±0.8°C, whichever is greater) ±1 digit max. Analog input: Terminal block models (E5CN) and plug-in models (E5CN-U): ± 0.2% FS ± 1 digit max. CT input: Terminal block models (E5CN): ± 5% FS ± 1 digit max.

Influence of temperature *2	Thermocouple input (R, S, B, W, PL II): Terminal block models (E5CN): (± 1% of PV or ± 10 °C, whichever is greater) ± 1 digit max. Plug-in models (E5CN-U): (± 2% of PV or ± 10 °C, whichever is greater) ± 1 digit max.	
Influence of voltage *2	Other thermocouple input: * 3 Terminal block models (E5CN): (± 1% of PV or ± 4 °C, whichever is greater) ± 1 digit max. Plug-in models (E5CN-U): (± 2% of PV or ± 4 °C, whichever is greater) ± 1 digit max.	
Influence of EMS. (at EN 61326-1)	Platinum resistance thermometer input: Terminal block models (E5CN) and plug-in models (E5CN-U): (± 1% of PV or ± 2 °C, whichever is greater) ± 1 digit max. Analog input: Terminal block models (E5CN) and plug-in models (E5CN-U): (± 1%FS) ± 1 digit max.	
Input sampling period	250 ms	
Hysteresis	Models with thermocouple/platinum resistance thermometer input (universal input): 0.1 to 999.9 EU (in units of 0.1 EU) *4 Models with analog input: 0.01 to 99.99% FS (in units of 0.01% FS)	
Proportional band (P)	Models with thermocouple/platinum resistance thermometer input (universal input): 0.1 to 999.9 EU (in units of 0.1 EU) *4 Models with analog input: 0.1 to 999.9% FS (in units of 0.1% FS)	
Integral time (I)	0 to 3999 s (in units of 1 s)	
Derivative time (D)	0 to 3999 s (in units of 1 s) *5	
Control period	0.5, 1 to 99 s (in units of 1 s)	
Manual reset value	0.0 to 100.0% (in units of 0.1%)	
Alarm setting range	-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	**Malfunction**	10 to 55 Hz, 20 m/s^2 for 10 min each in X, Y, and Z directions
	Destruction	10 to 55 Hz, 0.75-mm single amplitude for 2 hrs each in X, Y, and Z directions
Shock resistance	**Malfunction**	100 m/s^2, 3 times each in X, Y, and Z directions
	Destruction	300 m/s^2, 3 times each in X, Y, and Z directions
Weight	**E5CN**	Controller: Approx. 150 g, Mounting Bracket: Approx. 10 g
	E5CN-U	Controller: Approx. 110 g, Mounting Bracket: Approx. 10 g
Degree of protection	**E5CN**	Front panel: IP66, Rear case: IP20, Terminals: IP00
	E5CN-U	Front panel: IP50, Rear case: IP20, Terminals: IP00
Memory protection	Non-volatile memory (number of writes: 1,000,000 times)	
Setup Tool	CX-Thermo version 4.0 or higher	
Setup Tool port	Provided on the bottom of the E5CN. Use this port to connect a computer to the E5CN when using the Setup Tool. An E58-CIFQ1 USB-Serial Conversion Cable is required to connect the computer to the E5CN. *6	
Standards	**Approved standards *7**	UL 61010-1, CSA C22.2 No. 1010-1, KOSHA certified (some models) *8
	Conformed standards	EN 61010-1 (IEC 61010-1): Pollution level 2, overcurrent category II, Lloyd's standards *9
EMC	EMI: EN 61326-1 *10 Radiated Interference Electromagnetic Field Strength: EN 55011 Group 1, class A Noise Terminal Voltage: EN 55011 Group 1, class A	

	EMS: EN 61326-1 *10 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 Power Frequency Magnetic Field Immunity: EN 61000-4-8 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° 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. When robust tuning (RT) is ON, the differential time is 0.0 to 999.9 (in units of 0.1 s).
*6. External communications (RS-485) and cable communications for the Setup Tool can be used at the same time.
*7. The E5CN-U plug-in model is certified for UL listing only when used together with the OMRON P2CF-11 or P2CF-11-E
  Socket.
  The P3GA-11 is not certified for UL listing.
*8. Access the following website for information on certified models.
http://www.ia.omron.com/support/models/index.html
*9. Refer to information on maritime standards in Safety Precautions for E5[]N/E5[]N-H for compliance with Lloyd's
  Standards.
*10.Industrial electromagnetic environment (EN/IEC 61326-1 Table 2)

USB-Serial Conversion Cable

Applicable OS	Windows XP/Vista/7/8
Applicable software	CX-Thermo version 4 or higher
Applicable models	E5AN/E5EN/E5CN/E5CN-U/E5AN-H/E5EN-H/E5CN-H
USB interface standard	Conforms to USB Specification 1.1.
DTE speed	38400 bps
Connector specifications	Computer: USB (type A plug) Temperature Controller: Setup Tool port (on bottom of Controller)
Power supply	Bus power (Supplied from USB host controller.)
Power supply voltage	5 VDC
Current consumption	70 mA
Ambient operating temperature	0 to 55°C (with no condensation or icing)
Ambient operating humidity	10% to 80%
Storage temperature	- 20 to 60°C (with no condensation or icing)
Storage humidity	10% to 80%

Altitude	2,000 m max.
Weight	Approx. 100 g

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

Communications Specifications

Transmission line connection method	RS-485: Multipoint
Communications	RS-485 (two-wire, half duplex)
Synchronization method	Start-stop synchronization
Protocol	CompoWay/F, SYSWAY, or Modbus
Baud rate	1200, 2400, 4800, 9600, 19200, 38400, or 57600 bps
Transmission code	ASCII
Data bit length *	7 or 8 bits
Stop bit length *	1 or 2 bits
Error detection	Vertical parity (none, even, odd) Frame check sequence (FCS) with SYSWAY 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.

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, SSR Failure Alarms, and Heater Overcurrent 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

SSR failure alarm setting range *2	0.1 to 49.9 A (in units of 0.1 A) Minimum detection OFF time: 100 ms
Heater overcurrent alarm setting range *3	0.1 to 49.9 A (in units of 0.1 A) Minimum detection ON time: 100 ms

*1. For heater burnout alarms, the heater current will be measured when the control output is ON, and the output
    assigned to the alarm 1 function will turn ON if the heater current is lower than the set value (i.e., heater burnout
    detection current value).
*2. For SSR failure alarms, the heater current will be measured when the control output is OFF, and the output assigned
    to the alarm 1 function will turn ON if the heater current is higher than the set value (i.e., SSR failure detection
    current value).
*3. For heater overcurrent alarms, the heater current will be measured when the control output is ON, and the output
    assigned to the alarm 1 function will turn ON if the heater current is higher than the set value (i.e., heater
    overcurrent detection current value).

Electrical Life Expectancy Curve for Relays (Reference Values)
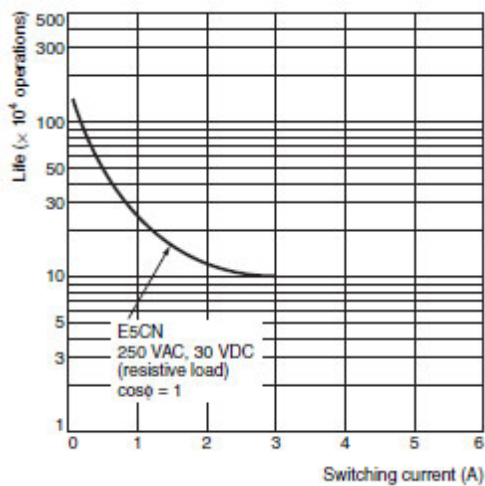
Note: Do not connect a DC load to a Controller with a Long-life Relay Output.

DIMENSIONS

E5CN
Terminal Models
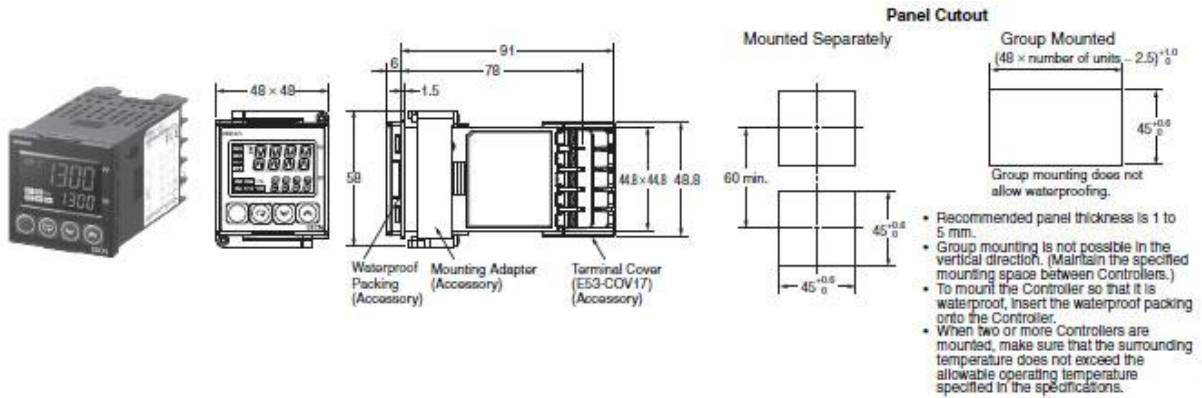
Note: The terminal block cannot be removed.

E5CN-U
Plug-in Models
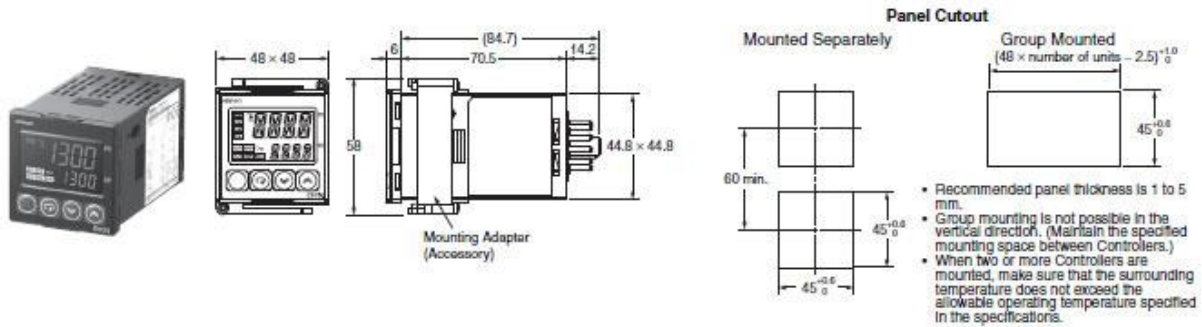
Accessories (Order Separately)

USB-Serial Conversion Cable
E58-CIFQ1
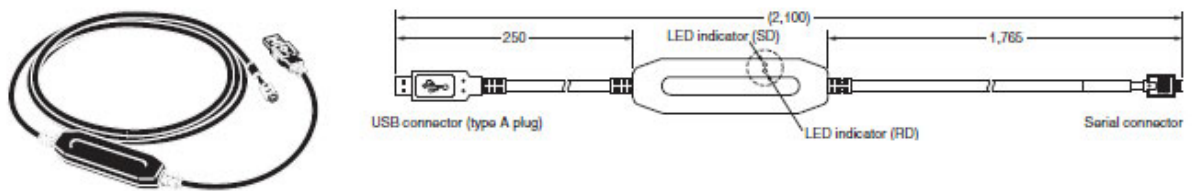
Terminal Cover
E53-COV17
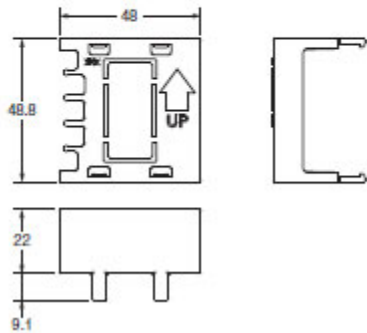
Note: The E53-COV10 cannot be used.
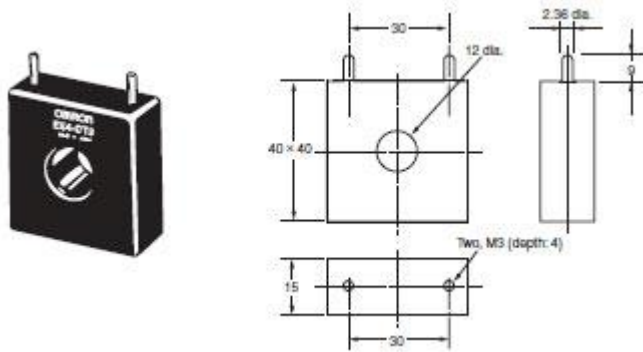
Waterproof Packing
Y92S-P8 (for DIN 48 × 48)

Order the Waterproof Packing separately if it becomes lost or damaged.
The Waterproof Packing can be used to achieve an IP66 degree of protection.
(Deterioration, shrinking, or hardening of the waterproof packing may occur depending on the operating environment. Therefore, periodic replacement is recommended to ensure the level of waterproofing specified in IP66. The time for periodic replacement depends on the operating environment. Be sure to confirm this point at your site. Consider one year a rough standard. OMRON shall not be liable for the level of water resistance if the customer does not perform periodic replacement.)
The Waterproof Packing does not need to be attached if a waterproof structure is not required.

Current Transformers

E54-CT1

E54-CT3

30
12 dia.
2.36 dia.
9
40 × 40
Two, M3 (depth: 4)
15
30

E54-CT3 Accessory

Armature

Approx. 3 dia.

18

Plug

Approx. 6 dia.

(22)

Connection Example

Armature
Plug
Load
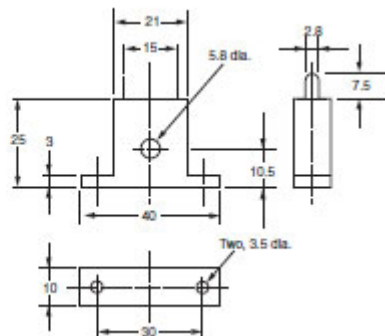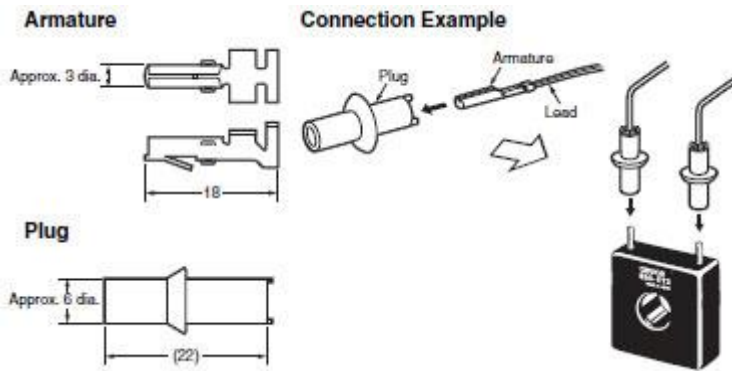
E54-CT1
Thru-current (Io) vs. Output Voltage (Eo) (Reference Values)

100 V
50 Hz
10
∞
1 kΩ
Distortion factor 10%
1
3%
100 mV
1%
10
100 Ω
1
RL = 10 Ω
100 μV
10
1   10   100 mA   1   10   100 1,000 A

Output voltage (Eo)V (r.m.s.)

Thru-current (Io) A (r.m.s.)
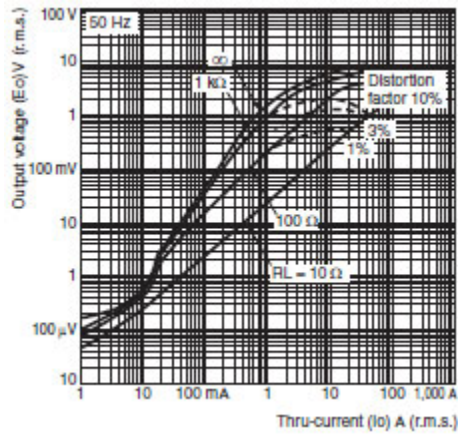
Maximum continuous heater current: 50 A (50/60 Hz)
Number of windings: 400±2
Winding resistance: 18±2 Ω

E54-CT3
Thru-current (Io) vs. Output Voltage (Eo) (Reference Values)
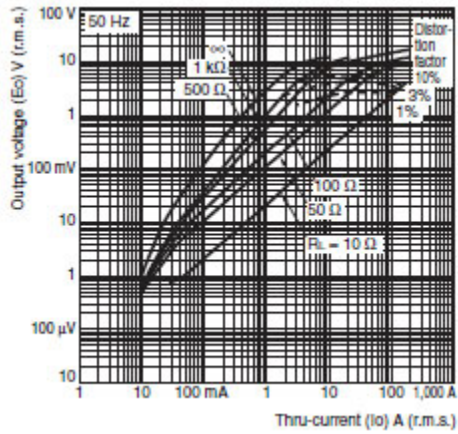
Maximum continuous heater current: 120 A (50/60 Hz)
(Maximum continuous heater current for the Temperature Controller is 50 A.)
Number of windings: 400±2
Winding resistance: 8±0.8 Ω

Adapter

Y92F-45

Note: 1. Use this Adapter when the panel has already been prepared for the E5B[].
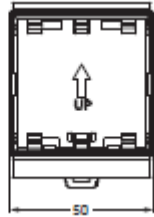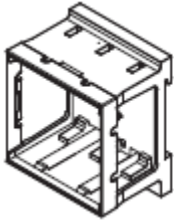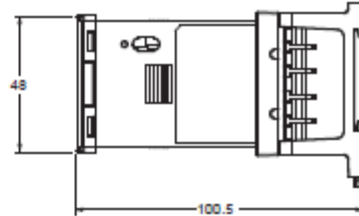2. The Adapter is available only in black.
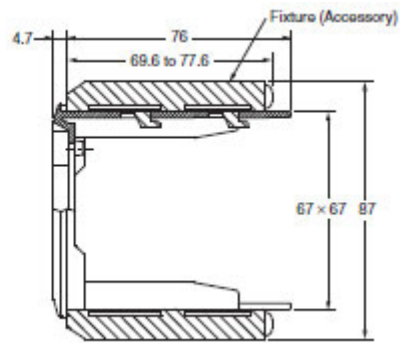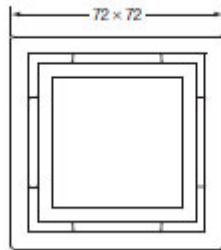
Mounted to E5CN
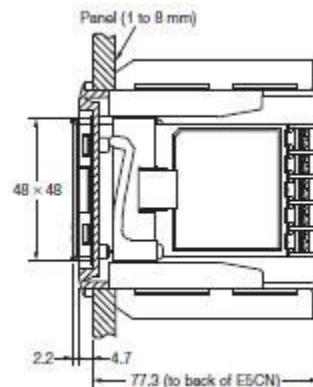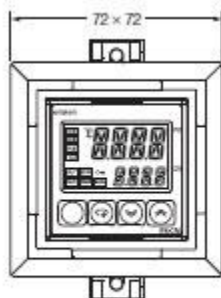
DIN Track Mounting Adapter

Y92F-52

Note: This Adapter cannot be used together with the Terminal Cover.
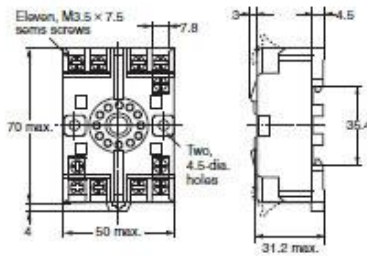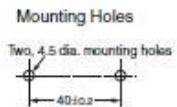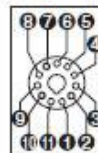Remove the Terminal Cover to use the Adapter.
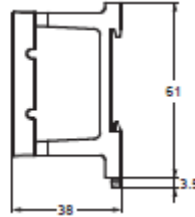
Mounted to E5CN

E5CN-U Wiring Socket

Front-connecting Socket
P2CF-11

Note: A model with finger protection (P2CF-11-E) is also available.

Back-connecting Socket
P3GA-11
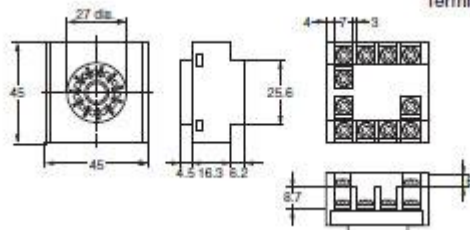
Note: 1. Using any other sockets will adversely affect accuracy. Use only the specified sockets.
2. A Protective Cover for finger protection (Y92A-48G) is also available.