

### Intelligent 1/16 DIN Temperature Controller

- Accepts thermocouple, platinum RTD, non-contact temperature sensor, and analog temperature inputs
- Auto-tuning and self-tuning available; functions can be used simultaneously
- Heating or heating/cooling control
- Event input option allows multiple set point selection and Run/Stop function
- Water-resistant construction (NEMA 4X, equivalent to IP66)
- Conforms to UL, CSA, and IEC safety standards as well as CE marking
- 3-year warranty



## Ordering Information

### ■ TEMPERATURE CONTROLLERS

Optional communications and event input boards are shown on the following page.

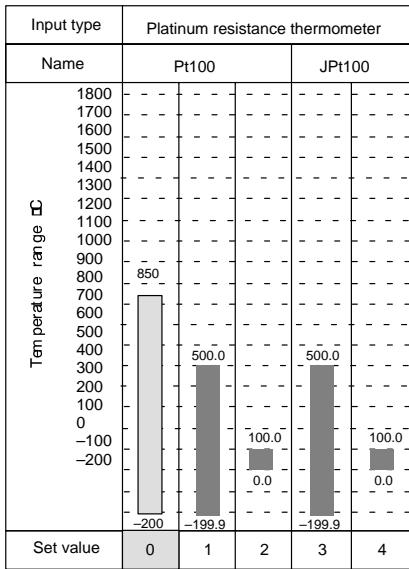
Size	Power supply voltage	Alarm points	Output	Part number	
				Thermocouple input	Platinum RTD input
1/16 DIN 48(W) x 48(H) x 78(D) mm	100 to 240 VAC	—	Relay	<b>E5CN-RMTC-500 AC100-240</b>	<b>E5CN-RMP-500 AC100-240</b>
			Voltage (for driving SSR)	<b>E5CN-QMTC-500 AC100-240</b>	<b>E5CN-QMP-500 AC100-240</b>
			Current	<b>E5CN-CMTC-500 AC100-240</b>	<b>E5CN-CMP-500 AC100-240</b>
		2	Relay	<b>E5CN-R2MTC-500 AC100-240</b>	<b>E5CN-R2MP-500 AC100-240</b>
			Voltage (for driving SSR)	<b>E5CN-Q2MTC-500 AC100-240</b>	<b>E5CN-Q2MP-500 AC100-240</b>
			Current	<b>E5CN-C2MTC-500 AC100-240</b>	<b>E5CN-C2MP-500 AC100-240</b>
	24 V AC/DC	—	Relay	<b>E5CN-RMTC-500 AC/DC24</b>	<b>E5CN-RMP-500 AC/DC24</b>
			Voltage (for driving SSR)	<b>E5CN-QMTC-500 AC/DC24</b>	<b>E5CN-QMP-500 AC/DC24</b>
			Current	<b>E5CN-CMTC-500 AC/DC24</b>	<b>E5CN-CMP-500 AC/DC24</b>
		2	Relay	<b>E5CN-R2MTC-500 AC/DC24</b>	<b>E5CN-R2MP-500 AC/DC24</b>
			Voltage (for driving SSR)	<b>E5CN-Q2MTC-500 AC/DC24</b>	<b>E5CN-Q2MP-500 AC/DC24</b>
			Current	<b>E5CN-C2MTC-500 AC/DC24</b>	<b>E5CN-C2MP-500 AC/DC24</b>

Note: When the heating and cooling function is available on models with two alarm points.

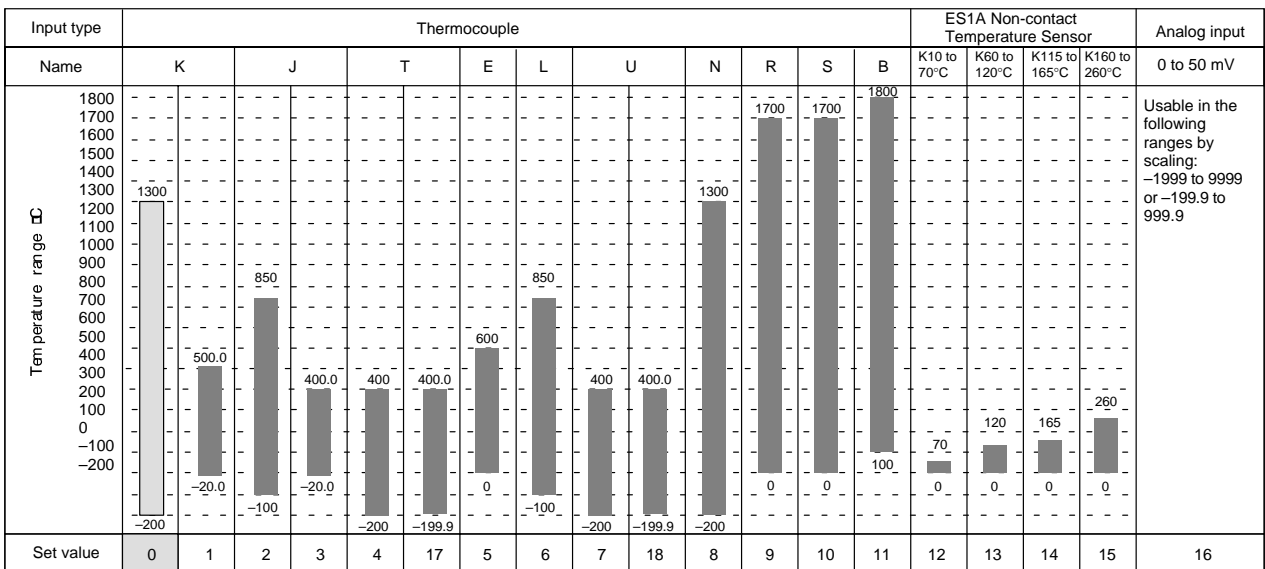
■ ACCESSORIES (ORDER SEPARATELY)

Description	Specifications	Part number
Computer communications boards	RS-485 and heater burnout alarm (for relay and voltage output models)	E53-CNH03
	RS-485 (for current output models)	E53-CN03
Event input board (for remote set point and run/stop functionality)	Event input and heater burnout alarm (for relay and voltage output models)	E53-CNHB
	Event input (for current output models)	E53-CNB
Current transformer; order only if using heater burnout alarm output	50 A load, 5.8 mm hole dia.	E54-CT1
	120 A load, 12 mm hole dia.	E54-CT3
Terminal cover (supplied with controller)	Provides finger protection from terminals (VDE0106 part 100)	E53-COV10
Software	For setup and monitoring; requires computer communications board	SYS-CONFIG V2.0

■ INPUT RANGES



Note: Lightly shaded ranges indicate default settings.



Applicable standards by input type are as follows:

- K, J, T, E, N, R, S, B: JIS C1602-1995
- L: Fe-CuNi, DIN 43710-1985
- U: Cu-CuNi, DIN 43710-1985
- JPt100: JIS C1604-1989, JIS C1606-1989
- Pt100: JIS C1604-1997, IEC751

# Specifications

## ■ RATINGS

Supply voltage	100 to 240 VAC, 50/60 Hz	24 VAC, 50/60 Hz/24 VDC
Operating voltage range	85% to 110% of rated supply voltage	
Power consumption	7 VA	4 VA/3 W
Sensor input	Thermocouple: K, J, T, E, L, U, N, R, S, B Platinum resistance thermometer: Pt100, JPt100 Non-contact temperature sensor: 10 to 70°C, 60 to 120°C, 115 to 165°C, 160 to 260°C Voltage input: 0 to 50 mV	
Control output	Relay output	SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations
	Voltage output	12 VDC $+15\%/-20\%$ (PNP), max. load current: 21 mA, with short-circuit protection circuit
	Current output	4 to 20 mA DC, load: 600 $\Omega$ max., resolution: approx. 2,600
Alarm output	SPST-NO, 250 VAC, 1 A (resistive load), electrical life: 100,000 operations	
Control method	PID or ON/OFF control	
Setting method	Digital setting using front panel keys	
Indication method	7-segment digital display and single-lighting indicator Character height: PV: 9.9 mm; SV: 6.4 mm	
Ambient operating temperature	-10°C to 55°C (14°F to 131°F) with no condensation or icing	
Storage temperature	-25°C to 65°C (-13°F to 149°F) with no condensation or icing	
Ambient humidity	25% to 85% RH	

## ■ CHARACTERISTICS

Indication accuracy	Thermocouple: $\pm 0.5\%$ of indicated value or $\pm 1^\circ\text{C}$ , whichever greater, $\pm 1$ digit max. (See Note) Platinum resistance thermometer: $\pm 0.5\%$ of indicated value or $\pm 1^\circ\text{C}$ , whichever greater, $\pm 1$ digit max. Analog input: $\pm 0.5\%$ FS $\pm 1$ digit max. CT input: $\pm 5\%$ FS $\pm 1$ digit max.
Hysteresis	0.1 to 999.9 EU (in units of 0.1 EU)
Proportional band (P)	0.1 to 999.9 EU (in units of 0.1 EU)
Integral time (I)	0 to 3999 s (in units of 1 s)
Derivative time (D)	0 to 3999 s (in units of 1 s)
Control period	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)
Sampling period	500 ms
Insulation resistance	20 M $\Omega$ min. at 500 VDC
Dielectric strength	2000 VAC, 50 or 60 Hz for 1 min between different charging terminals
Vibration resistance	10 to 55 Hz, 10 m/s <sup>2</sup> for 2 hours each in X, Y and Z directions
Shock resistance	300 m/s <sup>2</sup> , 3 times each in 3 axes, 6 directions (relay: 100 m/s <sup>2</sup> )
Weight	Approx. 150 g; mounting bracket: Approx. 10 g
Protective structure	Front panel: NEMA 4X for indoor use (equivalent to IP66), rear case: IP20, terminals: IP00
Memory protection	EEPROM non-volatile memory (number of writes: 100,000)

**Note:** The indication of K thermocouples in the -200 to 1300°C range, and T and N thermocouples at a temperature of -100°C or less, and U and L thermocouples at any temperature is  $\pm 2^\circ\text{C} \pm 1$  digit maximum. The indication of B thermocouples at a temperature of 400°C or less is unrestricted.

The indication of R and S thermocouples at a temperature of 200°C or less is  $\pm 3^\circ\text{C} \pm 1$  digit maximum.

(This table continues on the next page.)

Specifications Table – continued from previous page

EMC	Emission Enclosure:	EN55011 Group 1 class A
	Emission AC Mains:	EN55011 Group 1 class A
	Immunity ESD:	EN61000-4-2: 4 kV contact discharge (level 2) 8 kV air discharge (level 3)
	Immunity RF-interference:	ENV50140: 10 V/m (amplitude modulated, 80 MHz to 1 GHz) (level 3) 10 V/m (pulse modulated, 900 MHz)
	Immunity Conducted Disturbance:	ENV50141: 10 V (0.15 to 80 MHz) (level 3)
	Immunity Burst:	EN61000-4-4: 2 kV power-line (level 3) 2 kV I/O signal-line (level 4)
Approved standards	UL3121-1, CSA22.2 No. 14, E.B.1402C Conforms to EN50081-2, EN50082-2, EN61010-1 (IEC61010-1) Conforms to VDE0106/part 100 (Finger Protection) when the terminal cover is mounted.	

## ■ COMMUNICATIONS SPECIFICATIONS

Transmission path connection	Multiple points
Communications method (See Note)	RS-485 (two-wire, half duplex)
Synchronization method	Start-stop synchronization
Baud rate	1,200/2,400/4,800/9,600/19,200 bps
Transmission code	ASCII
Data bit length (See Note)	7 or 8 bits
Stop bit length (See Note)	1 or 2 bits
Error detection	Vertical parity (none, even, odd) Frame check sequence (FCS): with SYSMAC WAY Block check character (BCC): with CompoWay/F
Flow control	Not available
Interface (See Note 1)	RS-485
Retry function	Not available
Communications buffer	40 bytes

Note: The baud rate, data bit length, stop bit length, or vertical parity can be individually set using the communications setting level.

## ■ CURRENT TRANSFORMER RATINGS

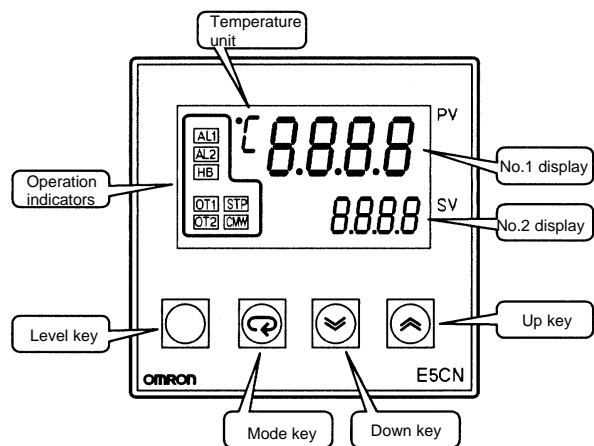
Part number	E54-CT1	E54-CT3
Max. continuous heater current	50 amps	120 amps
Dielectric strength	1,000 VAC (for 1 min)	
Vibration resistance	50 Hz, 98 m/s <sup>2</sup> (10G)	
Weight	Approx. 11.5 g	Approx. 50 g
Accessories	—	Armature: 2; Plug: 2

## ■ HEATER BURNOUT ALARM

Max. heater current	Single-phase 50 A VAC (See Note 1)
Heater current value display accuracy	±5% FS±1 digit max.
Heater burnout alarm setting range	0.1 to 49.9 A (in units of 0.1 A) (See Note 2)
Min. detection ON time	190 ms (See Note 3)

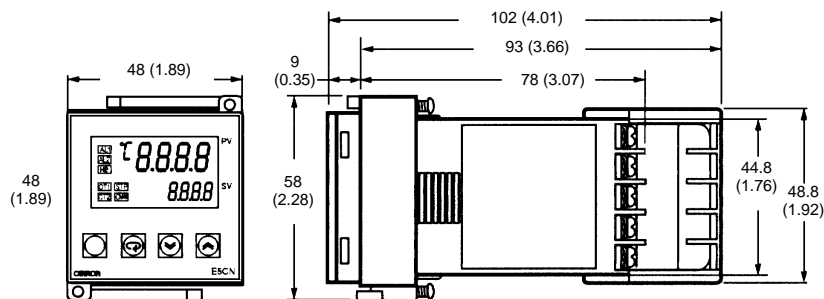
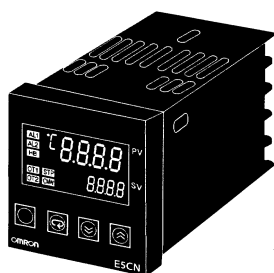
- Note: 1. Use the K2CU-F□□A-□GS (with gate input terminals) for the detection of three-phase heater burnout.  
 2. The heater burnout alarm is always OFF if the alarm is set to 0.0 A and always ON if the alarm is set to 50.0 A.  
 3. No heater burnout detection or heater current value measurement is possible if the control output (heat) is ON for less than 190 ms.

## Nomenclature

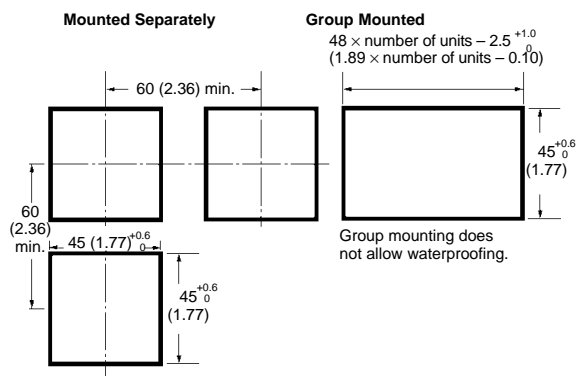


## Dimensions

Unit: mm (inch)



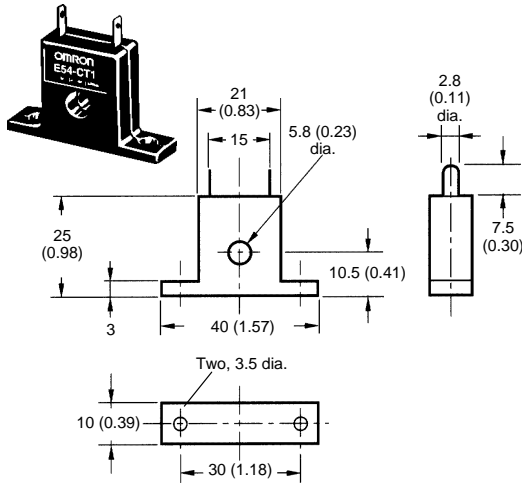
## Panel Cutouts



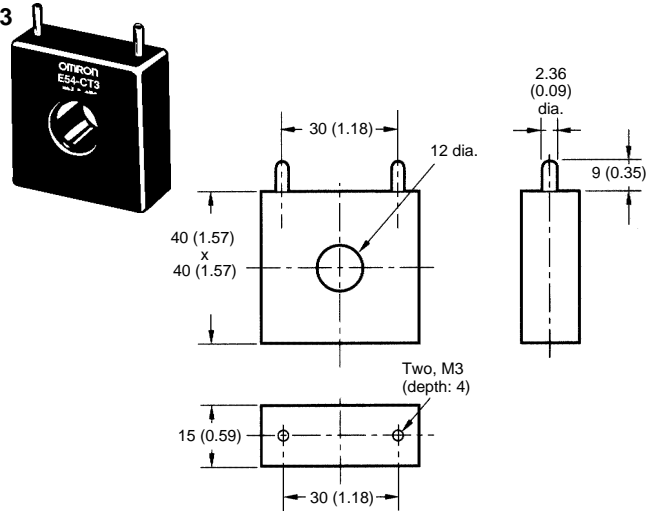
- Recommended panel thickness is 1 to 5 mm (0.04 to 0.20 inch).
- Group mounting is not possible in the vertical direction. (Maintain the specified mounting space between Controllers when they are group mounted.)
- To mount the E5CN so that it is waterproof, apply the waterproof packing to the E5CN.
- When two or more E5CNs are mounted, make sure that the surrounding temperature does not exceed the allowable operating temperature range in the specifications.

■ CURRENT TRANSFORMER (SOLD SEPARATELY)

E54-CT1

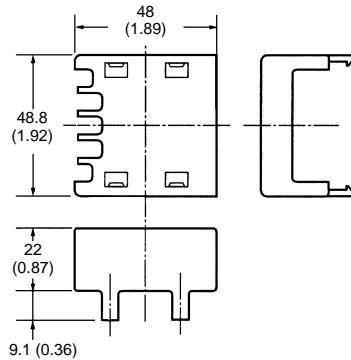
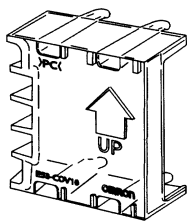


E54-CT3



■ TERMINAL COVER

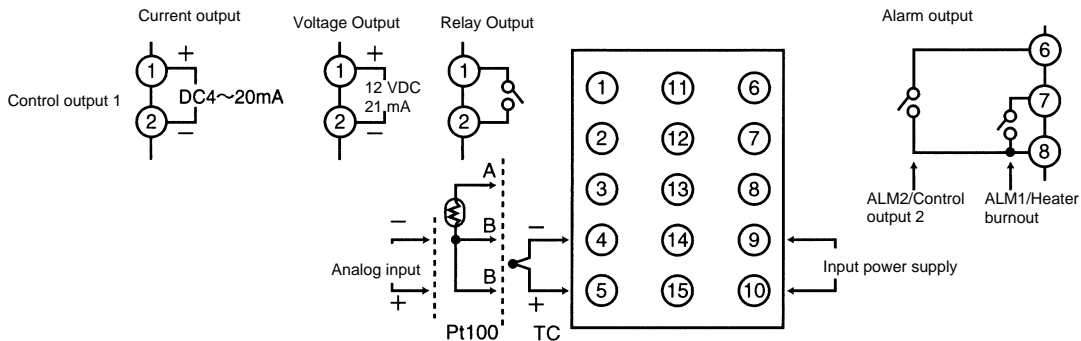
E53-COV10



Wiring Terminals

The voltage output (control output) is not electrically isolated from the internal circuits. When using a grounded thermocouple, do not connect the control output terminals to ground. If the control output terminals are connected to the ground, errors will occur in the measured temperature values as a result of leakage current.

Standard insulation is applied to the power supply I/O sections. If reinforced insulation is required, connect the input and output terminals to a device without any exposed current-carrying parts or to a device with standard insulation suitable for the maximum operating voltage of the power supply I/O section.

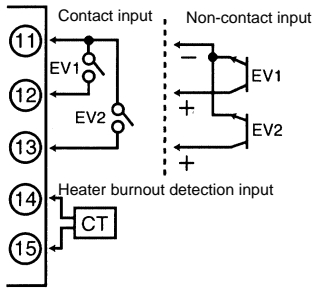


Two input power supplies are available: 100 to 240 VAC or 24 VDC.

■ E5CN ACCESSORY BOARDS

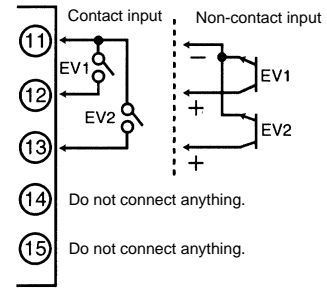
**E53-CNHB Event Input/Heater Burnout Alarm Unit**

Event Input/Heater Burnout Detection



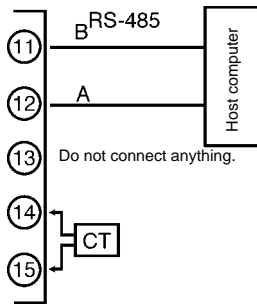
**E53-CNB Event Input**

Event Input



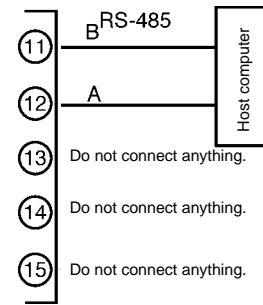
**E53-CNH03 Communications/Heater Burnout Alarm Unit**

Communications Specification/Heater Burnout Specification



**E53-CN03 Communications Unit**

Communications Specification



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