

Compact, Intelligent Temperature Controller

- Reduced panel depth of only 78 mm
- 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	Heater burnout alarm	Part number	
					Thermocouple input	Platinum RTD input
1/8 DIN 48(W) x 96(H) x 78(D) mm	100 to 240 VAC	3	Relay	No	E5EN-R3MTC-500 AC100-240	E5EN-R3MP-500 AC100-240
				Yes	E5EN-R3HMTC-500 AC100-240	E5EN-R3HMP-500 AC100-240
			Voltage (for driving SSR)	No	E5EN-Q3MTC-500 AC100-240	E5EN-Q3MP-500 AC100-240
				Yes	E5EN-Q3HMTC-500 AC100-240	E5EN-Q3HMP-500 AC100-240
			Current	No	E5EN-C3MTC-500 AC100-240	E5EN-C3MP-500 AC100-240
				Yes	E5EN-C3HMTC-500 AC100-240	E5EN-C3HMP-500 AC100-240
	24 V AC/DC	3	Relay	No	E5EN-R3MTC-500 AC/DC24	E5EN-R3MP-500 AC/DC24
				Yes	E5EN-R3HMTC-500 AC/DC24	E5EN-R3HMP-500 AC/DC24
			Voltage (for driving SSR)	No	E5EN-Q3MTC-500 AC/DC24	E5EN-Q3MP-500 AC/DC24
Yes	E5EN-Q3HMTC-500 AC/DC24	E5EN-Q3HMP-500 AC/DC24				
Current	No	E5EN-C3MTC-500 AC/DC24	E5EN-C3MP-500 AC/DC24			

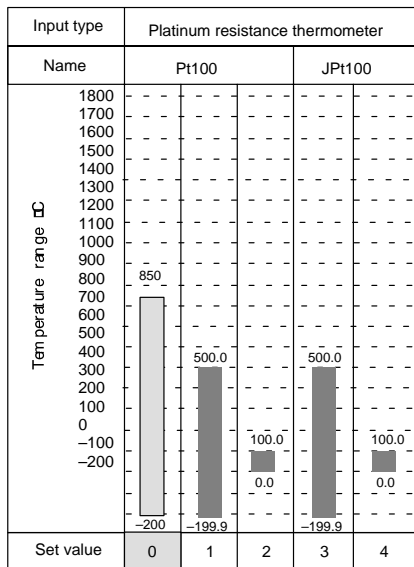
Note: 1. When the heating and cooling function is used, the number of alarm outputs will be reduced to 2.

2. The heating and cooling function and the heater burnout alarm will disable one of the alarm outputs for each function used.

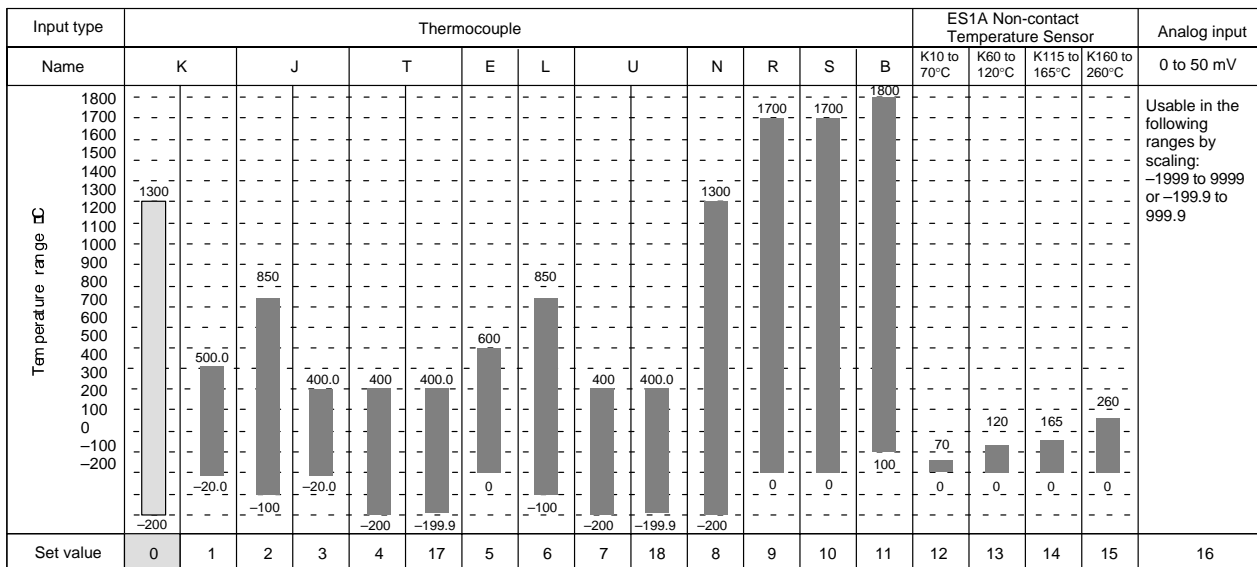
■ ACCESSORIES (ORDER SEPARATELY)

Description	Specifications	Part number
Computer communications boards	RS-232C	E53-AK01
	RS-485	E53-AK03
Event input board	For remote set point and Run/Stop functionality	E53-AKB
Current transformer; order only if using heater burnout alarm function	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-COV11
Software	For setup and monitoring; requires optional 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	9 VA	5 VA/4 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, 5 A (resistive load), electrical life: 100,000 operations
	Voltage output	12 VDC $+15\%/-20\%$ (PNP), max. load current: 40 mA, with short-circuit protection circuit
	Current output	4 to 20 mA DC, load: 600 Ω max., resolution: approx. 2,600
Alarm output	SPST-NO, 250 VAC, 3 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: 14.0 mm; SV: 9.5 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, ± 1 digit max. (See Note) Platinum resistance thermometer: $\pm 0.5\%$ of indicated value or $\pm 1^\circ\text{C}$, whichever greater, ± 1 digit max. Analog input: $\pm 0.5\%$ FS ± 1 digit max. CT input: $\pm 5\%$ FS ± 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 Ω 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 ² for 2 hours each in X, Y and Z directions
Shock resistance	300 m/s ² , 3 times each in 3 axes, 6 directions (relay: 100 m/s ²)
Weight	Approx. 310 g; mounting bracket: Approx. 100 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 1)	RS-485 (two-wire, half duplex)/RS-232C
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 2)	7 or 8 bits
Stop bit length (See Note 2)	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/RS-232C
Retry function	Not available
Communications buffer	40 bytes

Note: 1. RS-232C communications are only supported for the E5AN and E5EN models.

2. 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 ² (10G)	
Weight	Approx. 11.5 g	Approx. 50 g
Accessories	—	Armature: 2; Plug: 2

■ HEATER BURNOUT ALARM

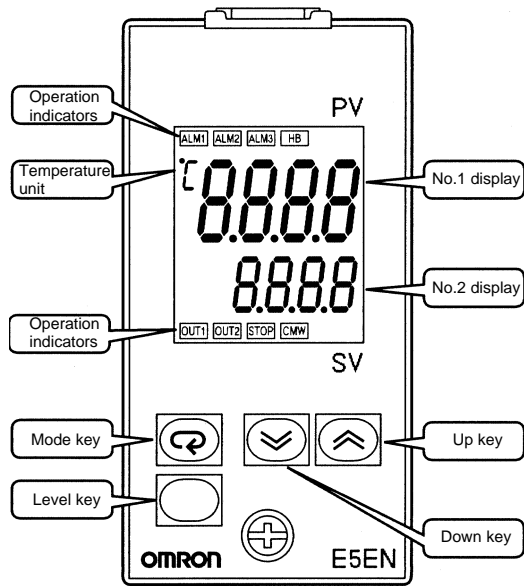
Max. heater current	Single-phase 50 A VAC (See Note 1)
Heater current value display accuracy	±5% FS±1 digit max.
Heater burnout alarm setting range	0.1 to 49.9 A (in units of 0.1 A) (See Note 2)
Min. detection ON time	190 ms (See Note 3.)

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.

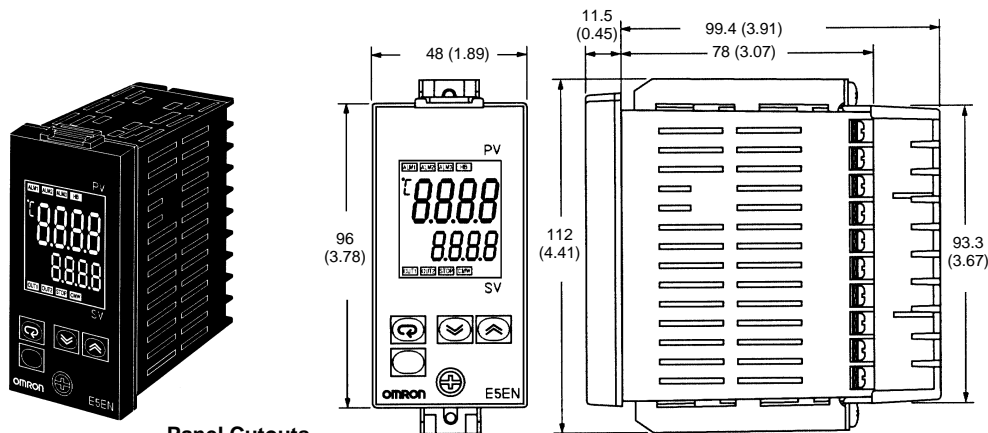
3. No heater burnout detection or heater current value measurement is possible if the control output (heat) is ON for less than 190 ms.

Nomenclature



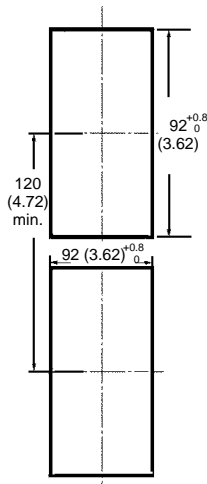
Dimensions

Unit: mm (inch)



Panel Cutouts

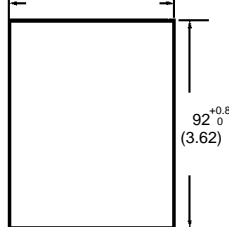
Mounted Separately



Group Mounted

$$48 \times \text{number of units} - 3.5^{+1.0}_0$$

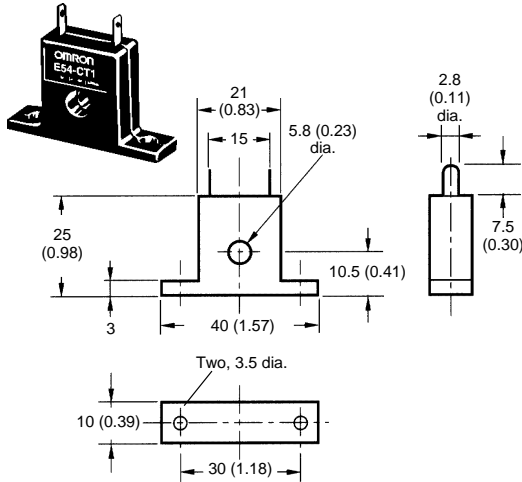
$$(1.89 \times \text{number of units} - 0.14)$$



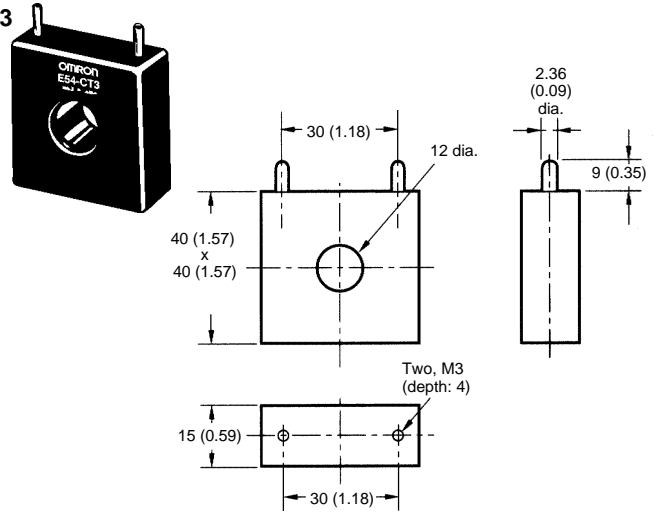
- Recommended panel thickness is 1 to 8 mm (0.04 to 0.31 inch).
- Group mounting is not possible in the vertical direction. (Maintain the specified mounting space between Controllers when they are group mounted.)
- To mount the E5EN so that it is waterproof, apply the waterproof packing to the E5EN.
- When two or more E5ENs 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

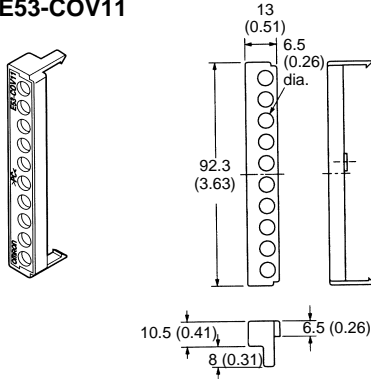


E54-CT3



■ TERMINAL COVER

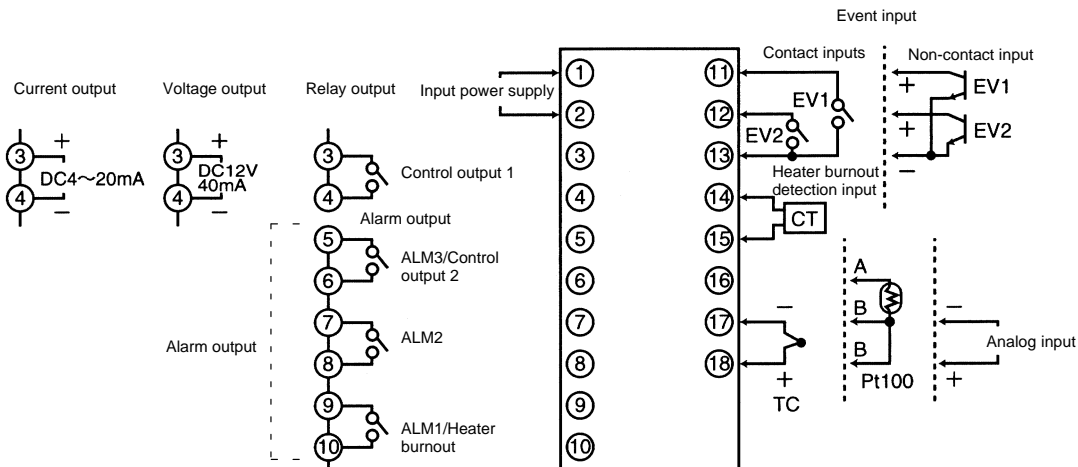
E53-COV11



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.



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