

Digital Temperature Controllers

E5 N Series



To view data sheets, click on any link below:

[E5AN](#) - 1/4 DIN

[E5EN](#) - 1/8 DIN

[E5CN](#) - 1/16 DIN

[E5GN](#) - 1/32 DIN

Compact 1/4 DIN Size Controllers

- Reduced panel depth of only 78 mm
- Accepts thermocouple, platinum RTD, non-contact temperature sensors 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.

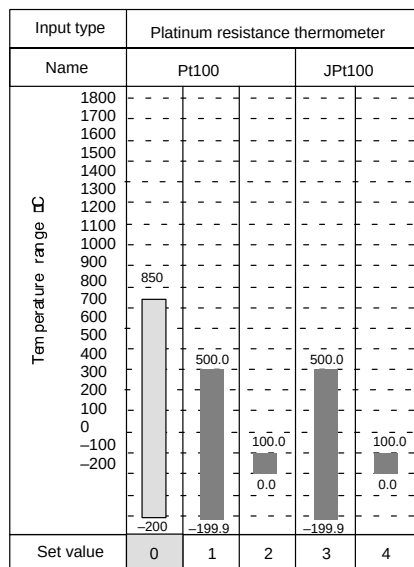
Size	Power supply voltage	Alarm points	Output	Heater burnout alarm	Part number	
					Thermocouple input	Platinum RTD input
1/4 DIN 96(W) x 96(H) x 78(D) mm	100 to 240 VAC	3	Relay	No	E5AN-R3MTC-500 AC100-240	E5AN-R3MP-500 AC100-240
				Yes	E5AN-R3HMTC-500 AC100-240	E5AN-R3HMP-500 AC100-240
			Voltage (for driving SSR)	No	E5AN-Q3MTC-500 AC100-240	E5AN-Q3MP-500 AC100-240
				Yes	E5AN-Q3HMTC-500 AC100-240	E5AN-Q3HMP-500 AC100-240
			Current	No	E5AN-C3MTC-500 AC100-240	E5AN-C3MP-500 AC100-240
	24 V AC/DC	3	Relay	No	E5AN-R3MTC-500 AC/DC24	E5AN-R3MP-500 AC/DC24
				Yes	E5AN-R3HMTC-500 AC/DC24	E5AN-R3HMP-500 AC/DC24
			Voltage (for driving SSR)	No	E5AN-Q3MTC-500 AC/DC24	E5AN-Q3MP-500 AC/DC24
				Yes	E5AN-Q3HMTC-500 AC/DC24	E5AN-Q3HMP-500 AC/DC24
			Current	No	E5AN-C3MTC-500 AC/DC24	E5AN-C3MP-500 AC/DC24

Note: When the heating/cooling function or the heater burnout alarm is used, one of the alarm outputs is disabled for each function used.

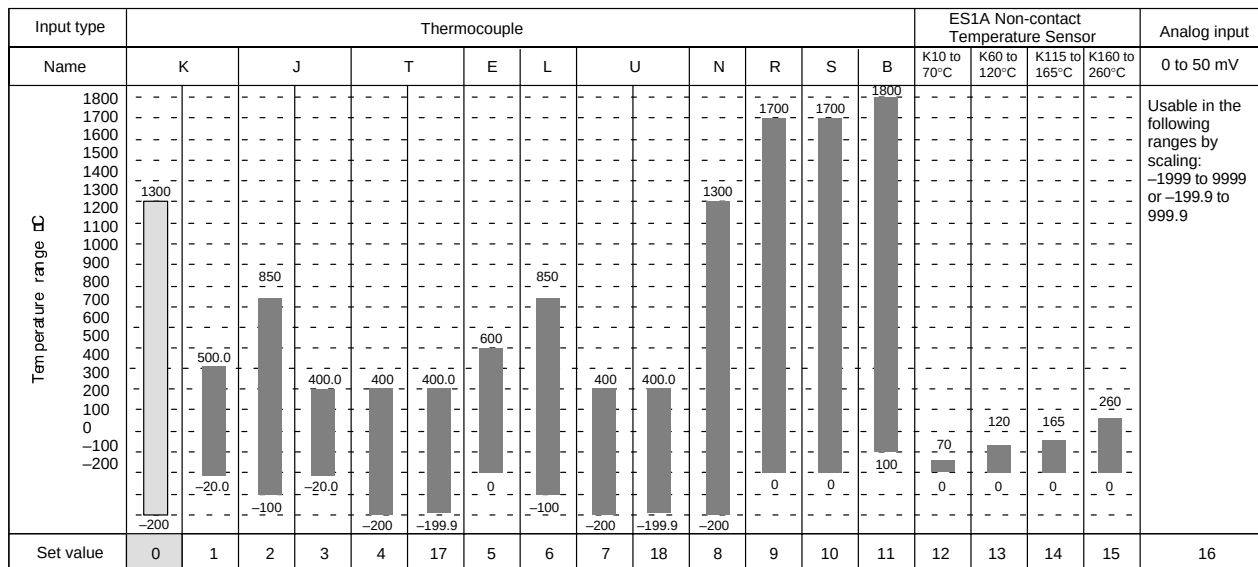
■ ACCESSORIES (ORDER SEPARATELY)

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 $\pm 15\%$ / -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: 15.0 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

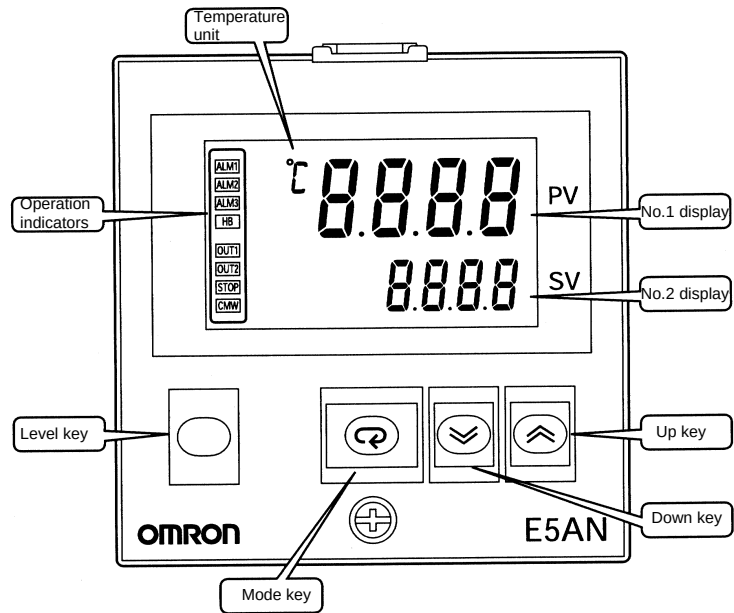
Part number	E54-CT1	E54-CT3
Max. continuous heater current	50 amps	120 amps
Dielectric strength	1,000 VAC (for 1 min)	
Vibration resistance	50 Hz, 98 m/s ² (10G)	
Weight	Approx. 11.5 g	Approx. 50 g
Accessories	—	Armature: 2; Plug: 2

■ 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.)

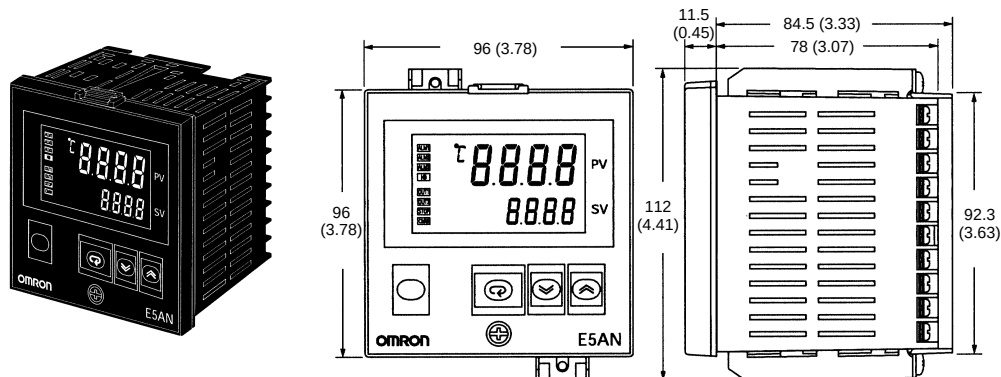
- Note: 1. Use the K2CU-F□□A-□GS (with gate input terminals) for the detection of three-phase heater burnout.
2. The heater burnout alarm is always OFF if the alarm is set to 0.0 A and always ON if the alarm is set to 50.0 A.
3. No heater burnout detection or heater current value measurement is possible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

Nomenclature

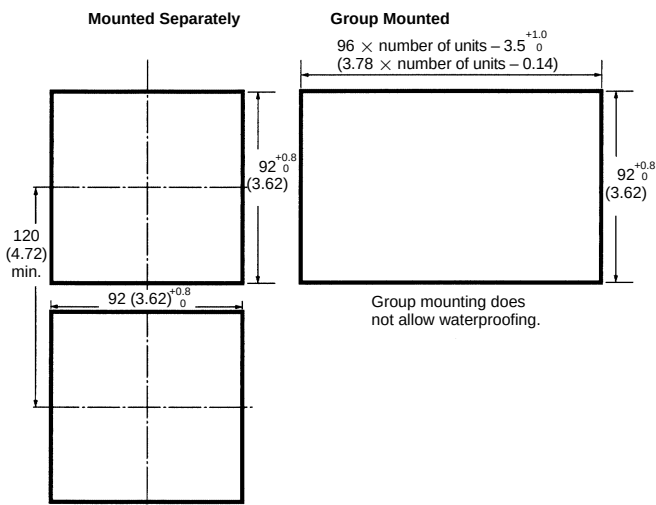


Dimensions

Unit: mm (inch)



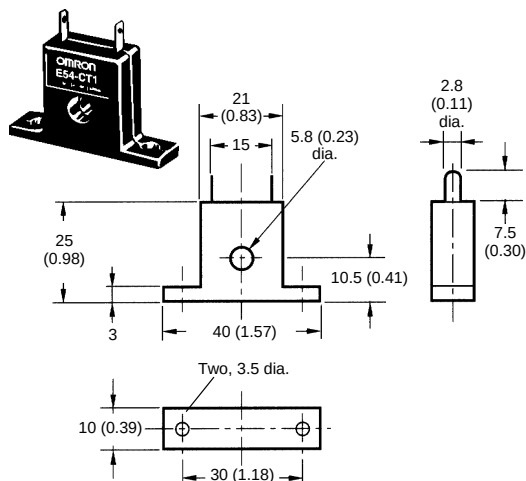
Panel Cutouts



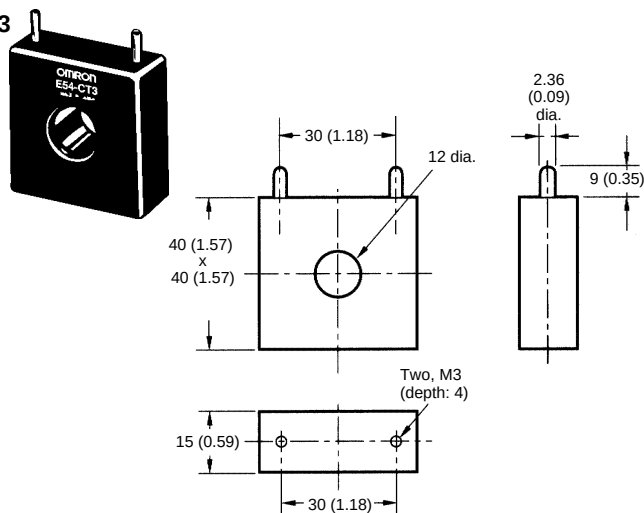
- Recommended panel thickness is 1 to 8 mm (0.04 to 0.31 inch).
- Group mounting is not possible in the vertical direction. (Maintain the specified mounting space between Controllers when they are group mounted.)
- To mount the E5AN so that it is waterproof, apply the waterproof packing to the E5AN.
- When two or more E5ANs 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

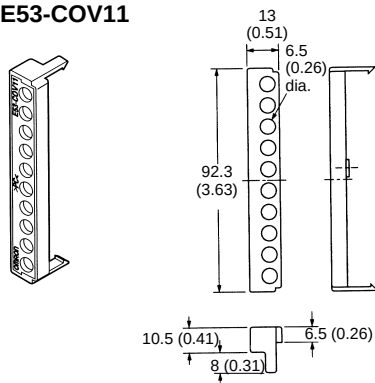


E54-CT3



■ TERMINAL COVER

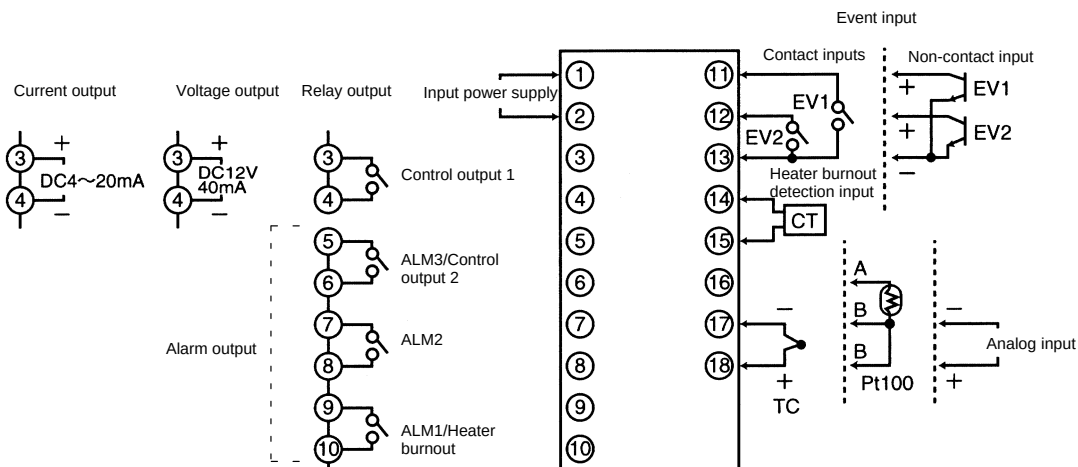
E53-COV11



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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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

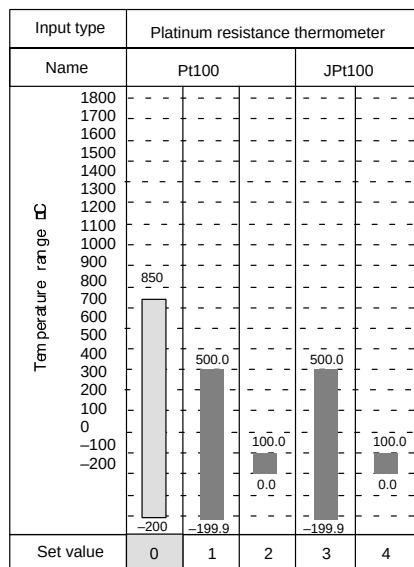
Note: 1. When the heating and cooling function is used, the number of alarm outputs will be reduced to 2.

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

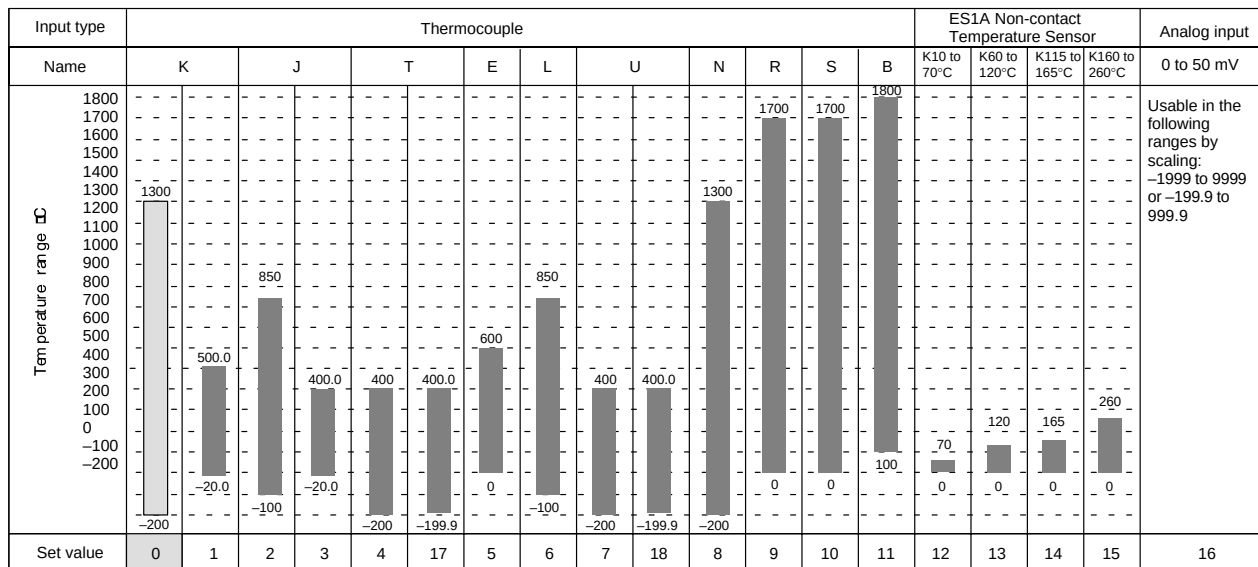
■ ACCESSORIES (ORDER SEPARATELY)

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

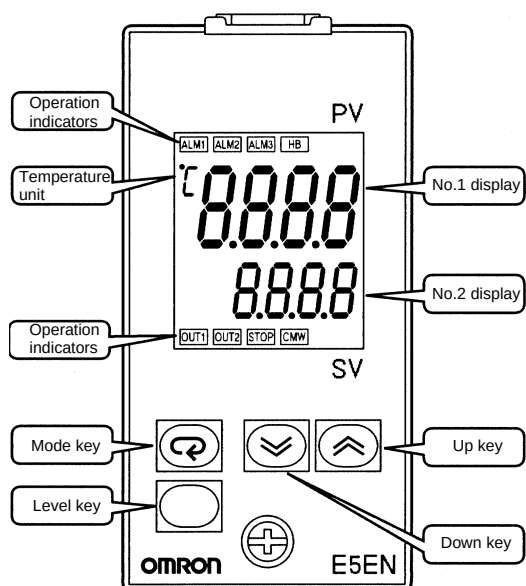
Part number	E54-CT1	E54-CT3
Max. continuous heater current	50 amps	120 amps
Dielectric strength	1,000 VAC (for 1 min)	
Vibration resistance	50 Hz, 98 m/s ² (10G)	
Weight	Approx. 11.5 g	Approx. 50 g
Accessories	—	Armature: 2; Plug: 2

■ 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.)

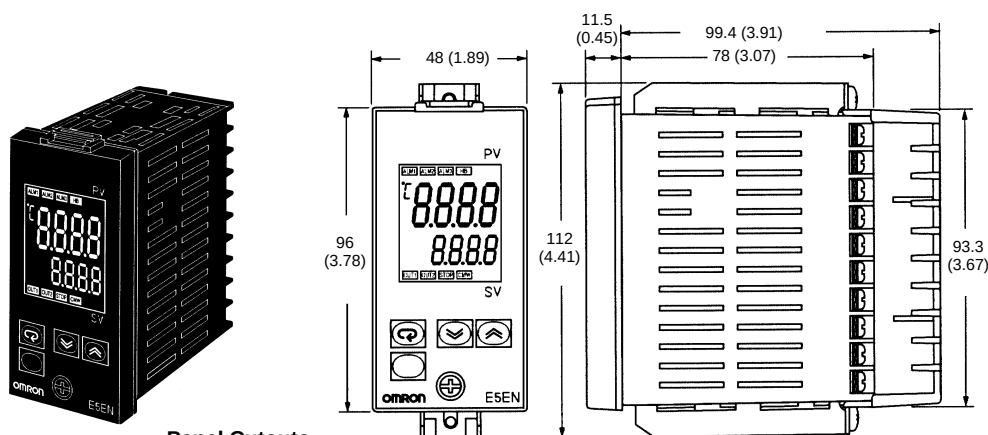
- Note: 1. Use the K2CU-F□□A-□GS (with gate input terminals) for the detection of three-phase heater burnout.
2. The heater burnout alarm is always OFF if the alarm is set to 0.0 A and always ON if the alarm is set to 50.0 A.
3. No heater burnout detection or heater current value measurement is possible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

Nomenclature



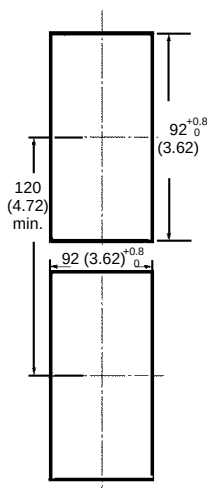
Dimensions

Unit: mm (inch)



Panel Cutouts

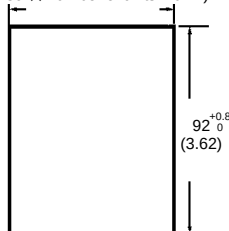
Mounted Separately



Group Mounted

$$48 \times \text{number of units} - 3.5 \begin{smallmatrix} +1.0 \\ 0 \end{smallmatrix}$$

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

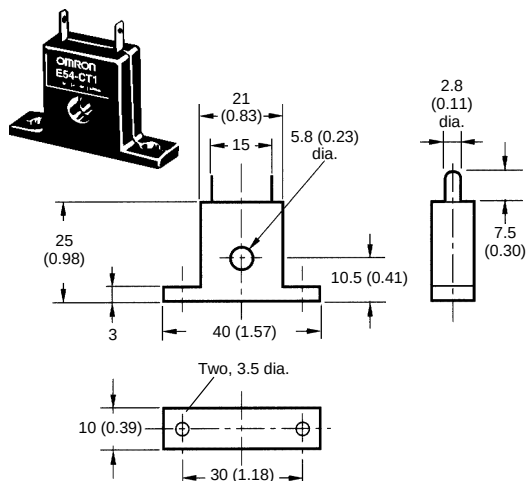


Group mounting does not allow waterproofing.

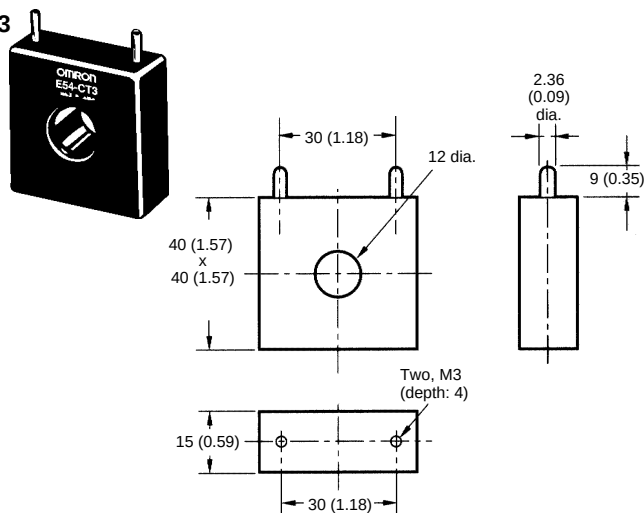
- Recommended panel thickness is 1 to 8 mm (0.04 to 0.31 inch).
- Group mounting is not possible in the vertical direction. (Maintain the specified mounting space between Controllers when they are group mounted.)
- To mount the E5EN so that it is waterproof, apply the waterproof packing to the E5EN.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

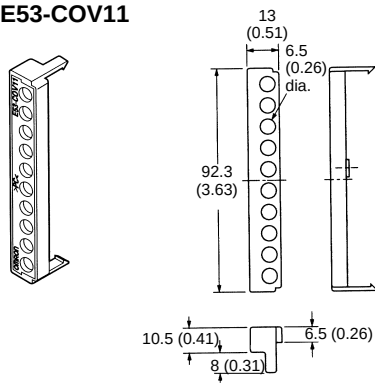


E54-CT3



■ TERMINAL COVER

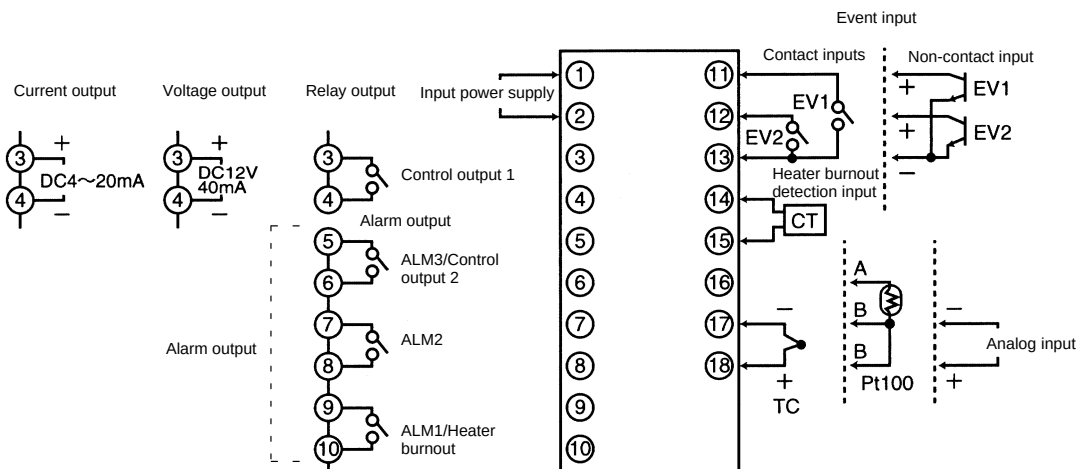
E53-COV11



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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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

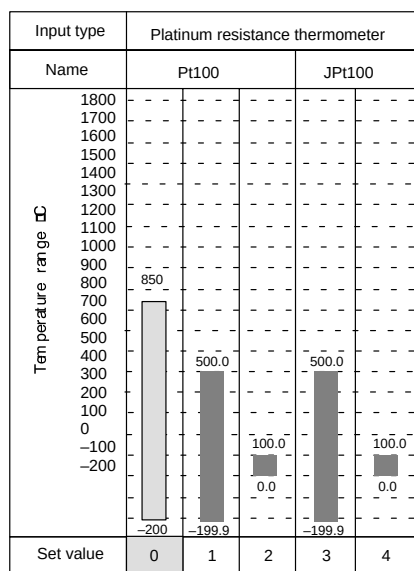
Optional communications and event input boards are shown on the following page.

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	E5CN-RMTC-500 AC100-240	E5CN-RMP-500 AC100-240
			Voltage (for driving SSR)	E5CN-QMTC-500 AC100-240	E5CN-QMP-500 AC100-240
			Current	E5CN-CMTC-500 AC100-240	E5CN-CMP-500 AC100-240
		2	Relay	E5CN-R2MTC-500 AC100-240	E5CN-R2MP-500 AC100-240
			Voltage (for driving SSR)	E5CN-Q2MTC-500 AC100-240	E5CN-Q2MP-500 AC100-240
			Current	E5CN-C2MTC-500 AC100-240	E5CN-C2MP-500 AC100-240
	24 V AC/DC	—	Relay	E5CN-RMTC-500 AC/DC24	E5CN-RMP-500 AC/DC24
			Voltage (for driving SSR)	E5CN-QMTC-500 AC/DC24	E5CN-QMP-500 AC/DC24
			Current	E5CN-CMTC-500 AC/DC24	E5CN-CMP-500 AC/DC24
		2	Relay	E5CN-R2MTC-500 AC/DC24	E5CN-R2MP-500 AC/DC24
			Voltage (for driving SSR)	E5CN-Q2MTC-500 AC/DC24	E5CN-Q2MP-500 AC/DC24
			Current	E5CN-C2MTC-500 AC/DC24	E5CN-C2MP-500 AC/DC24

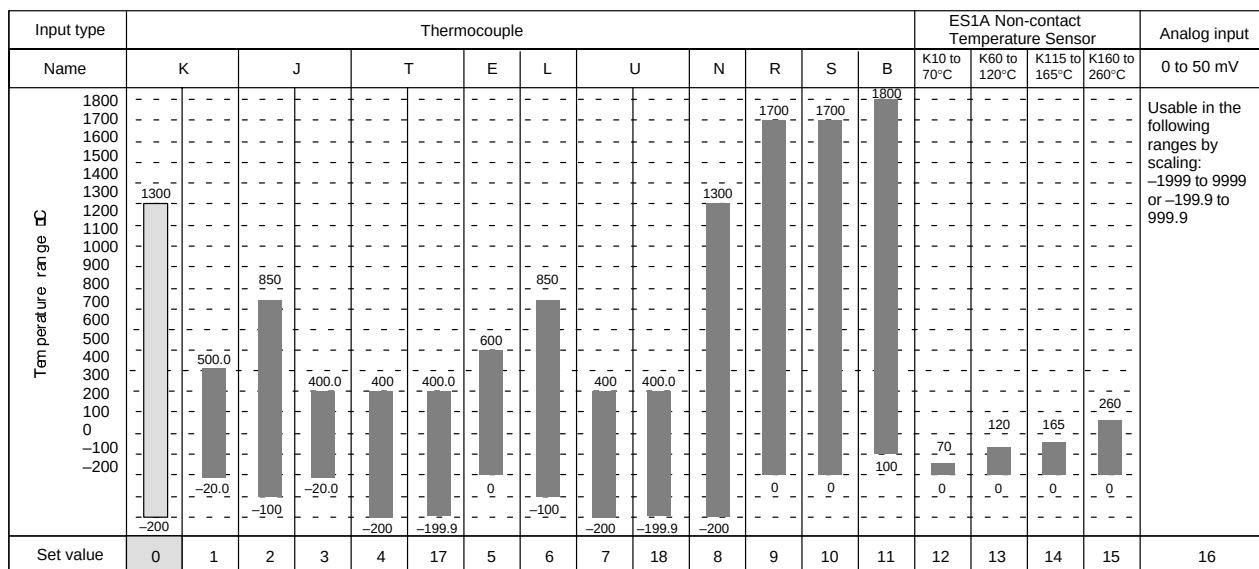
Note: When the heating and cooling function is available on models with two alarm points.

■ ACCESSORIES (ORDER SEPARATELY)

Description	Specifications	Part number
Computer communications boards	RS-485 and heater burnout alarm (for relay and voltage output models)	E53-CN03
	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 Ω 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, ± 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. 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

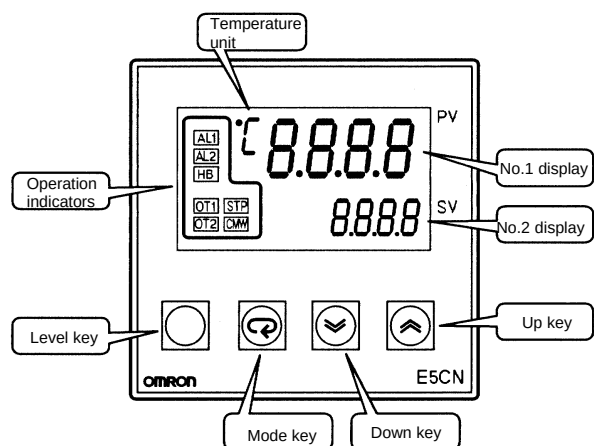
Part number	E54-CT1	E54-CT3
Max. continuous heater current	50 amps	120 amps
Dielectric strength	1,000 VAC (for 1 min)	
Vibration resistance	50 Hz, 98 m/s ² (10G)	
Weight	Approx. 11.5 g	Approx. 50 g
Accessories	—	Armature: 2; Plug: 2

■ 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)

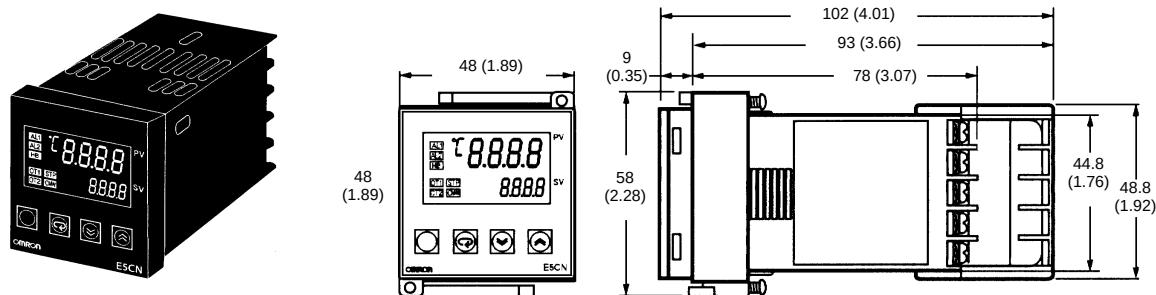
- Note: 1. Use the K2CU-F□□A-□GS (with gate input terminals) for the detection of three-phase heater burnout.
2. The heater burnout alarm is always OFF if the alarm is set to 0.0 A and always ON if the alarm is set to 50.0 A.
3. No heater burnout detection or heater current value measurement is possible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

Nomenclature

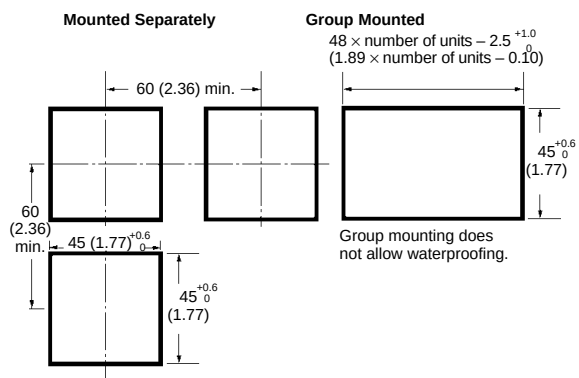


Dimensions

Unit: mm (inch)



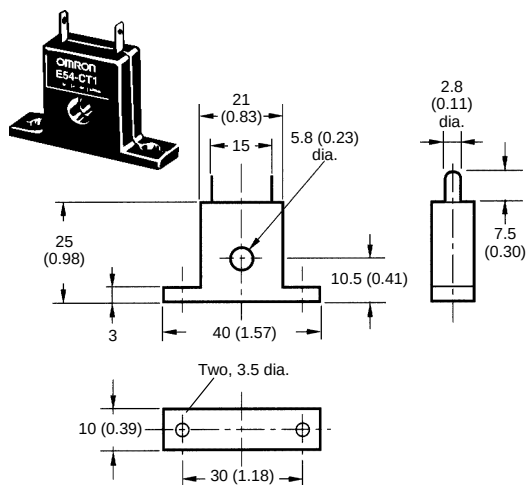
Panel Cutouts



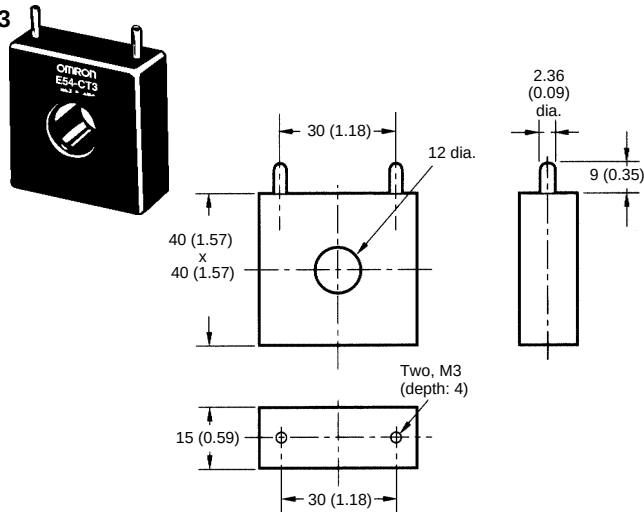
- Recommended panel thickness is 1 to 5 mm (0.04 to 0.20 inch).
- Group mounting is not possible in the vertical direction. (Maintain the specified mounting space between Controllers when they are group mounted.)
- To mount the E5CN so that it is waterproof, apply the waterproof packing to the E5CN.
- 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

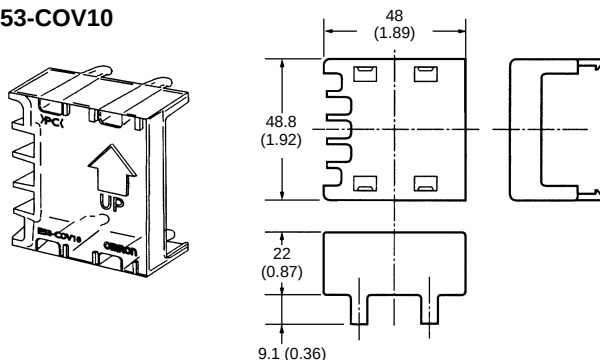


E54-CT3



■ TERMINAL COVER

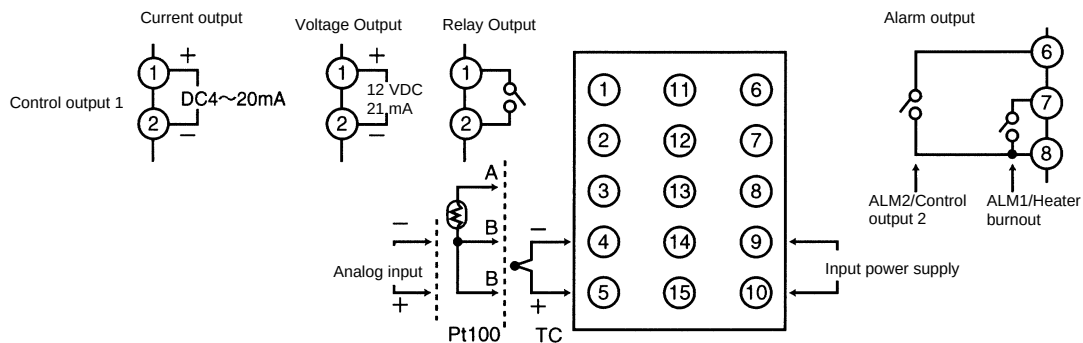
E53-COV10



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.

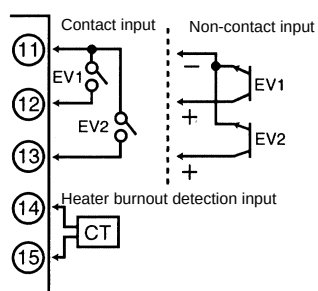
Standard insulation is applied to the power supply I/O sections. If reinforced insulation is required, connect the input and output terminals to a device without any exposed current-carrying parts or to a device with standard insulation suitable for the maximum operating voltage of the power supply I/O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



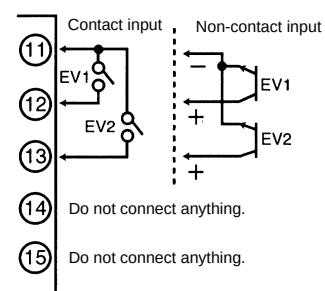
Two input power supplies are available: 100 to 240 VAC or 24 VDC.

E5CN ACCESSORY BOARDS**E53-CNHB Event Input/Heater Burnout Alarm Unit**

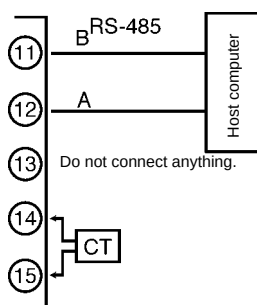
Event Input/Heater Burnout Detection

**E53-CNB Event Input**

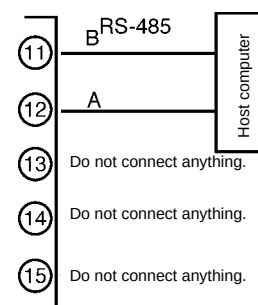
Event Input

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

Communications Specification/Heater Burnout Specification

**E53-CN03 Communications Unit**

Communications Specification



OMRON®
OMRON ELECTRONICS, INC.
One East Commerce Drive
Schaumburg, IL 60173
1-800-55-OMRON

OMRON CANADA, INC.
885 Milner Avenue
Scarborough, Ontario M1B 5V8
416-286-6465

Compact, Intelligent Temperature Controllers

- 1/32 DIN sized controller saves panel space, measures just 100 mm deep
- 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
- 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

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

■ STANDARD TEMPERATURE CONTROLLERS

Size	Power supply voltage	Alarm points	Output	Part number	
				Thermocouple input	Platinum RTD input
1/32 DIN 48(W) x 24 (H) x 100(D) mm	100 to 240 VAC	—	Relay	E5GN-RTC AC100-240	E5GN-RP AC100-240
			Voltage (for driving SSR)	E5GN-QTC AC100-240	E5GN-QP AC100-240
		1 (See Note 1)	Relay	E5GN-R1TC AC100-240	E5GN-R1P AC100-240
			Voltage (for driving SSR)	E5GN-Q1TC AC100-240	E5GN-Q1P AC100-240
	24 V AC/DC	—	Relay	E5GN-RTC AC/DC24	E5GN-RP AC/DC24
			Voltage (for driving SSR)	E5GN-QTC AC/DC24	E5GN-QP AC/DC24
		1 (See Note 1)	Relay	E5GN-R1TC AC/DC24	E5GN-R1P AC/DC24
			Voltage (for driving SSR)	E5GN-Q1TC AC/DC24	E5GN-Q1P AC/DC24

Note: 1. If the heating/cooling function is used, ALM1 will be used for control output; the alarm output will not be available.
2. Control output 2 for heating/cooling control is a relay output

■ TEMPERATURE CONTROLLERS WITH COMMUNICATIONS

Size	Power supply voltage	Communication type	Output	Part number		
				Thermocouple input	Platinum RTD input	
1/32 DIN 48(W) x 24 (H) x 100(D) mm	100 to 240 VAC	RS-485	Relay	E5GN-R03TC-FLK AC100-240	E5GN-R03P-FLK AC100-240	
			Voltage (for driving SSR)	E5GN-Q03TC-FLK AC100-240	E5GN-Q03P-FLK AC100-240	
	24 V AC/DC		Relay	E5GN-R03TC-FLK AC/DC24	E5GN-R03P-FLK AC/DC24	
			Voltage (for driving SSR)	E5GN-Q03TC-FLK AC/DC24	E5GN-Q03P-FLK AC/DC24	

INPUT RANGES

Input type	Platinum resistance thermometer			
Name	Pt100		JPt100	
Temperature range $^{\circ}\text{C}$				
1800				
1700				
1600				
1500				
1400				
1300				
1200				
1100				
1000				
900				
800				
700				
600				
500				
400				
300				
200				
100				
0				
-100				
-200				
Set value	0	1	3	4

Note: Lightly shaded ranges indicate default settings.

Input type	Thermocouple													ES1A Non-contact Temperature Sensor				Analog input	
Name	K		J		T		E	L	U		N	R	S	B	K10 to 70°C	K60 to 120°C	K115 to 165°C	K160 to 260°C	0 to 50 mV
Temperature range $^{\circ}\text{C}$	1800																		Usable in the following ranges by scaling: -1999 to 9999 or -199.9 to 999.9
	1700																		
	1600																		
	1500																		
	1400																		
	1300																		
	1200																		
	1100																		
	1000																		
	900																		
	800																		
	700																		
	600																		
	500																		
	400																		
	300																		
200																			
100																			
0																			
-100																			
-200																			
Set value	0	1	2	3	4	17	5	6	7	18	8	9	10	11	12	13	14	15	16

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/2.5 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, 2 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	
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: 7.0 mm; SV: 3.5 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. 90 g; mounting bracket: Approx. 10 g
Protective structure	Front panel: NEMA4X 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

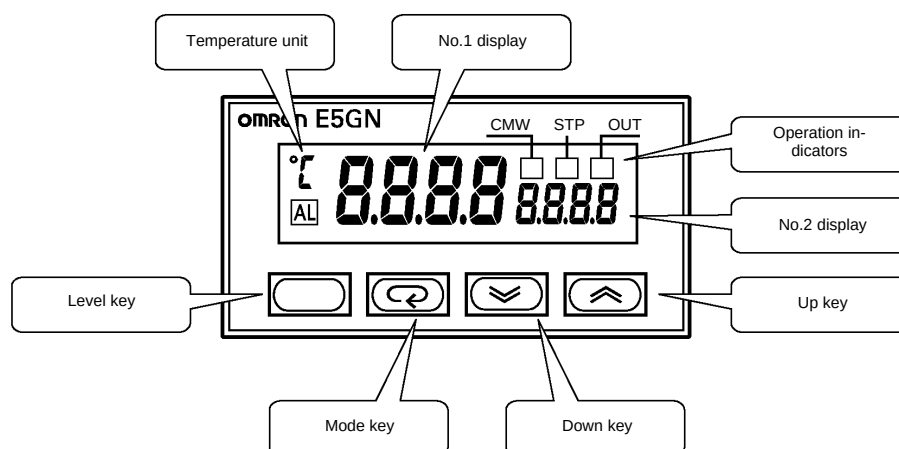
EMC	Emission Enclosure:	EN55011 Group 1 class A
	Emission AC Mains:	EN55011 Group 1 class A
	Immunity ESD:	EN61000-4-2: 4 kV contact discharge (level 2) 8 kV air discharge (level 3)
	Immunity RF-interference:	ENV50140: 10 V/m (amplitude modulated, 80 MHz to 1 GHz) (level 3) 10 V/m (pulse modulated, 900 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)	

■ 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)	RS-485
Retry function	Not available
Communications buffer	40 bytes

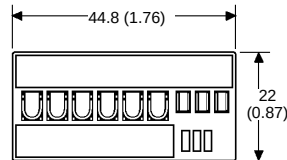
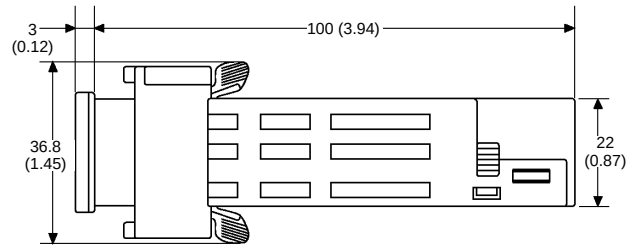
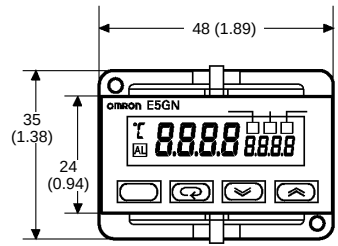
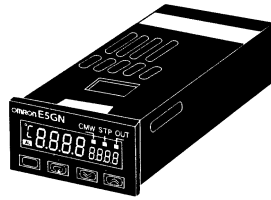
Note: The baud rate, data bit length, stop bit length, or vertical parity can be individually set using the communications setting level.

Nomenclature



Dimensions

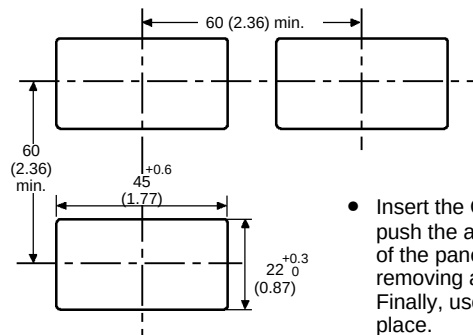
Unit: mm (inch)



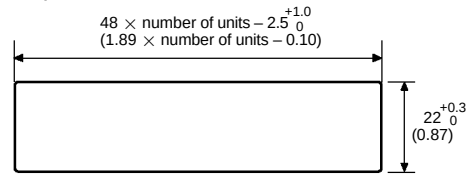
* When carrying out maintenance on the E5GN, only the terminal plate can be drawn out with the terminal leads still attached.

Panel Cutout

Mounted Separately



Group Mounted

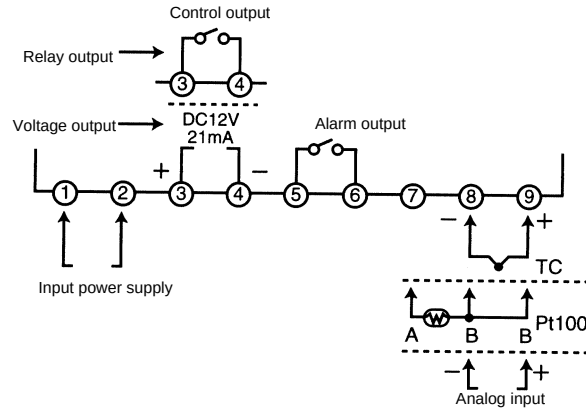


Mounting separately does not allow waterproofing.

- Insert the Controller through the hole in the panel from the front and push the adapter on from the rear. Push the adapter up to the back of the panel ensuring that the controller is pushed all the way in, removing any gap between the Controller, panel, and adapter. Finally, use the two screws on the adapter to secure the unit in place.
- To mount the E5GN so that it is waterproof, insert the waterproof packing onto the E5GN.
- When two or more E5GN Controllers are mounted, make sure that the surrounding temperature does not exceed the allowable operating temperature ranges in the specifications.

Wiring Terminals

- The voltage output (control output) is not electrically insulated from the internal circuits. When using a grounding thermocouple, do not connect the control output terminals to the 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 VAC/VDC (no polarity).

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