# OMRON ®

## Digital Temperature Controllers

## E5AN

### 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.
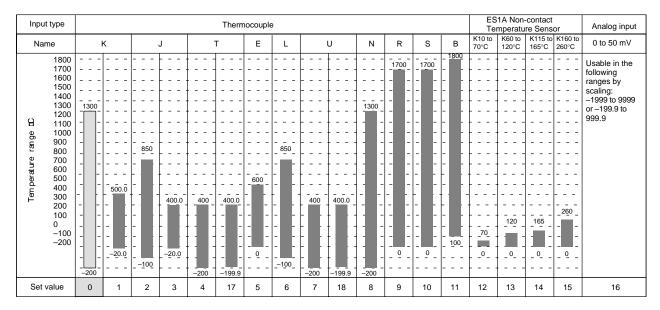
## ■ ACCESSORIES (ORDER SEPARATELY)

| 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.

**Platinum resistance thermometer** (Temperature range °C)

| Input type | Platinum resistance thermometer | | | | |
|---|---|---|---|---|---|
| Name | Pt100 | | | JPt100 | |
| Range | −200 to 850 | −199.9 to 500.0 | 0.0 to 100.0 | −199.9 to 500.0 | 0.0 to 100.0 |
| Set value | 0 | 1 | 2 | 3 | 4 |

**Thermocouple / ES1A Non-contact Temperature Sensor / Analog input** (Temperature range °C)

| Input type | Name | Range | Set value |
|---|---|---|---|
| Thermocouple | K | −200 to 1300 | 0 |
| Thermocouple | J | −20.0 to 500.0 | 1 |
| Thermocouple | J | −100 to 850 | 2 |
| Thermocouple | T | −20.0 to 400.0 | 3 |
| Thermocouple | T | −199.9 to 400.0 | 17 |
| Thermocouple | E | 0 to 600 | 4 |
| Thermocouple | L | −100 to 850 | 5 |
| Thermocouple | U | −200 to 400 | 6 |
| Thermocouple | U | −199.9 to 400.0 | 18 |
| Thermocouple | N | −200 to 1300 | 7 |
| Thermocouple | R | 0 to 1700 | 8 |
| Thermocouple | S | 0 to 1700 | 9 |
| Thermocouple | B | 100 to 1800 | 10 |
| ES1A Non-contact Temperature Sensor | K10 to 70°C | 0 to 70 | 11 |
| ES1A Non-contact Temperature Sensor | K60 to 120°C | 0 to 120 | 12 |
| ES1A Non-contact Temperature Sensor | K115 to 165°C | 0 to 165 | 13 |
| ES1A Non-contact Temperature Sensor | K160 to 260°C | 0 to 260 | 14 |
| | | | 15 |
| Analog input | 0 to 50 mV | Usable in the following ranges by scaling: −1999 to 9999 or −199.9 to 999.9 | 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 | | 9 VA | 5 VA/4 W |
| Sensor input | | Thermocouple: K, J, T, E, L, U, N, R, S, B<br>Platinum resistance thermometer: Pt100, JPt100<br>Non-contact temperature sensor: 10 to 70°C, 60 to 120°C, 115 to 165°C, 160 to 260°C<br>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<br>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: ±0.5% of indicated value or ±1°C, whichever greater, ±1 digit max. (See Note)<br>Platinum resistance thermometer: ±0.5% of indicated value or ±1°C, whichever greater, ±1 digit max.<br>Analog input: ±0.5% FS±1 digit max.<br>CT input: ±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 MΩ 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 ±2°C±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 ±3°C±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<br>Conforms to EN50081-2, EN50082-2, EN61010-1 (IEC61010-1)<br>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)<br>Frame check sequence (FCS): with SYSMAC WAY<br>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

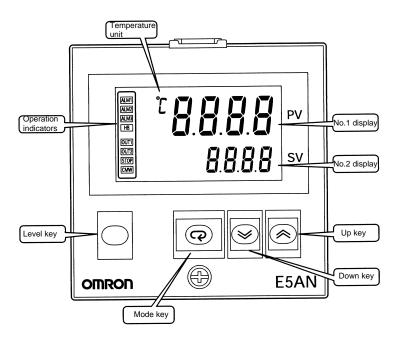| Part number | E54-CT1 | E54-CT3 |
|---|---|---|
| Max. continuous heater current | 50 amps | 120 amps |
| Dielectric strength | 1,000 VAC (for 1 min) | |
| Vibration resistance | 50 Hz, 98 m/s$^2$ (10G) | |
| Weight | Approx. 11.5 g | Approx. 50 g |
| Accessories | — | Armature: 2; Plug: 2 |

## ■ HEATER BURNOUT ALARM

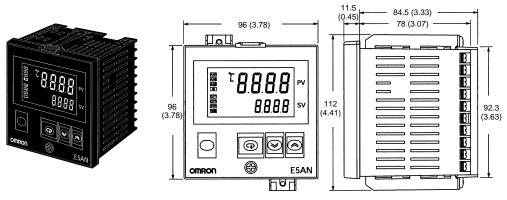| | |
|---|---|
| Max. heater current | Single-phase 50 A VAC (See Note 1.) |
| Heater current value display accuracy | ±5% FS±1 digit max. |
| Heater burnout alarm setting range | 0.1 to 49.9 A (in units of 0.1 A) (See Note 2.) |
| Min. detection ON time | 190 ms (See Note 3.) |

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.
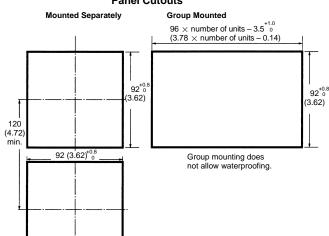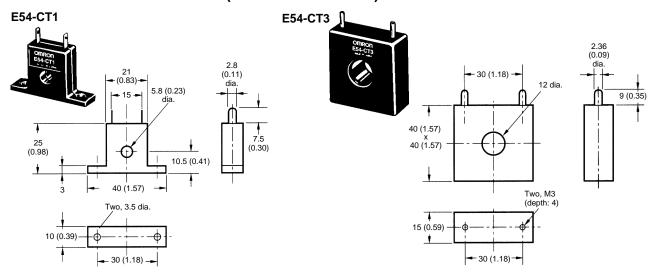
# Nomenclature



# Dimensions

Unit: mm (inch)



**Panel Cutouts**

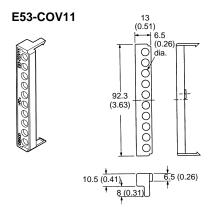**Mounted Separately**  **Group Mounted**



- 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)**

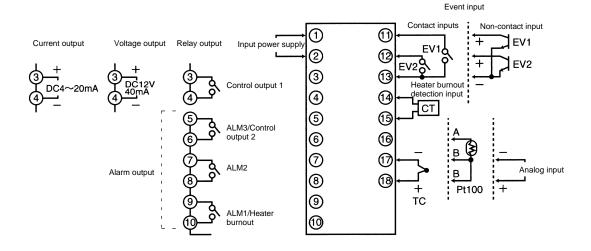**E54-CT1**



**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.