

Digital Controller E5EK-AA2-DRT

A Digital Controller That Conforms to DeviceNet

- Conforms to DeviceNet, thus communicates with Programmable Controllers with no program required.
- High-performance range of 0.1% FS (Pt input: -100.0°C to 100.0°C)
- Configurator (sold separately) ensures easy initial settings.



Ordering Information

| Size | Communication | Model |
|--------------------|------------------------|--------------|
| E5EK 48 x 96 mm | DeviceNet (CompoBus/D) | E5EK-AA2-DRT |

- Note:**
1. The heater burnout alarm will be available if the ON/OFF Output Unit is applied to heat control.
 2. If using both control outputs 1 and 2, two Control Output Units are required.
 3. A CT is not provided with the E5EK-AA2-DRT. If using the heater burnout alarm, be sure to order the E5EK-AA2-DRT together with the CT.

Control Output Unit (Sold Separately)

| Item | ON/OFF | | | | | Linear | | | |
|-------|--------|--------------------|---------|--------|--------|---------|---------|---------|---------|
| | Relay | SSR (See note.) | Voltage | | | Current | | Voltage | |
| Model | E53-R | E53-S | E53-Q | E53-Q3 | E53-Q4 | E53-C3 | E53-C3D | E53-V34 | E53-V35 |

Note: The E53-S has no zero-cross function.

Note: Use the High-resolution Output Unit for the E5EK-AA2-DRT. The E53-C Current Output Unit for E5□X cannot be used.

Terminal Cover

| Model | E53-COV08 |
|------------------|-----------|
| Applicable model | E5EK |

Current Transformer (CT) (Sold Separately)

| Model | E54-CT1 | E54-CT3 |
|-----------|----------|-----------|
| Hole dia. | 5.8 dia. | 12.0 dia. |

Note: Be sure to order the CT along with the Control Output Unit if the heater burnout alarm of the E5EK-DRT is required.

Models with Test Result Sheet

If a test result sheet is required for the model, place the order in the following way.

Model Number

Order using the following example.

E5EK-AA2-DRT-K

Add a hyphen and the suffix "K" to the end of the model number.

■ Input Voltage and Current Ranges

Platinum Resistance Thermometer vs. Thermocouple

| Input Factory-set to K (set number 2). | Platinum resistance thermometer | | Thermocouple | | | | | | | | | | | | | Current | | Voltage | | | | | |
|--|---------------------------------|--------|--------------|-------|-------|-------|--------|-------|-------|--------|------|------|--------------|------|------|---------|---------|---------|-------------------------------------|--------|---------|--|--|
| | JPt 100 | Pt 100 | K | J | T | E | L | U | N | R | S | B | W (WR6 5.26) | PLII | (mA) | (V) | | | | | | | |
| | 650.0 | 650.0 | 1300 | 850 | 400.0 | 400.0 | 600 | 850 | 400.0 | 400.0 | 1300 | 1700 | 1700 | 1800 | 2300 | 1300 | 20 to 4 | 20 to 0 | 5 to 1 | 5 to 0 | 10 to 0 | | |
| | -199.9 | -199.9 | -200 | 0.0 | -100 | 0.0 | -199.9 | -100 | 0.0 | -199.9 | -200 | 0.0 | 0.0 | 100 | 0.0 | 0.0 | 17 | 18 | 19 | 20 | 21 | | |
| Set number | 0 | 1 | 22 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | Depends on scaling or decimal point | | | | |
| Minimum setting unit (Target or alarm value) | 0.1°C | | 1°C | 0.1°C | 1°C | 0.1°C | 1°C | 0.1°C | 1°C | 0.1°C | 1°C | | | | | | | | | | | | |

Specifications

■ Ratings

| | |
|--|--|
| Power supply voltage (See note 2.) | 100 to 240 VAC 50/60 Hz, 24 VAC/VDC |
| Permissible voltage fluctuation range | 85 to 110% of power supply voltage |
| Power consumption | 15 VA (100 to 240 VAC), 12 VA (24 VAC), 8 W (24 VDC) |
| Input | Thermocouple: K, J, T, E, L, U, N, R, S, B, W, and PL II Platinum resistance thermometer: JPt 100, Pt 100 Current input ranges: 4 to 20 mA and 0 to 20 mA Voltage input ranges: 1 to 5 V, 0 to 5 V, and 0 to 10 V |
| Input impedance | Current input: 150 Ω Voltage input: 1 MΩ min. (When connecting the ES2-HB, use a 1-to-1 configuration.) |
| Auxiliary output | SPST-NO, 3 A at 250 VAC (resistive load) |
| Control method | ON/OFF or 2-PID (with auto-tuning) (See note 3.) |
| Setting method | Digital setting with front panel keys |
| Indicator | 7-segment digital LED indicators with a height of 14 mm for PV and a height of 9.5 mm for SV |
| Control output | Output Unit: Refer to <i>Characteristics</i> . Be sure to connect the Output Unit (sold separately) when using these control outputs. |
| Relay output | |
| Voltage output | |
| Linear voltage output | |
| Current output | |
| Remote SP input | Current input: 4 to 20 mA (at input impedance of 150 Ω) |
| CT input | Connect the E54-CT1 or E54-CT3 |
| Other functions | Manual output, heating and cooling control, SP limiter, loop break alarm, SP ramp, MV limit, MV change rate limit, input digital filter, input shift, RUN/STOP, and protector |
| Ambient temperature | Operating: -10°C to 55°C (with no icing) Under three-year guarantee terms: -10°C to 50°C Storage: -25°C to 65°C (with no icing) |
| Ambient humidity | Operating: 35% to 85% |

- Note:**
- In order to satisfy FCC Class A, which conforms to EN50081-2 standards for terminal noise voltage, apply TDK's ZCB2206-11, ZCB2203-M, or an equivalent noise filter to the AC power line.
 - There is a model with 100 to 240 VAC specifications and a model with 24 VAC/VDC specifications. Unless the required model is specified, the model with 100 to 240 VAC specifications will be ordered.
 - The E5EK-AA2-DRT is not equipped with a fuzzy self-tuning function.

■ Characteristics

| | |
|-----------------------|---|
| Indication accuracy | Thermocouple: $\pm 0.3\%$ of $\pm 1^\circ\text{C}$ of the indicated value, whichever is larger, ± 1 digit max. (See note 1.) Platinum resistance thermometer: $\pm 0.2\%$ or $\pm 0.8\%$ of the indicated value, whichever is larger, ± 1 digit max. (See note 2.) Analog input: $\pm 0.2\% \pm 1$ digit max. |
| Hysteresis | 0.01% to 99.99% FS (0.01% increments) |
| Proportional band | 0.1% to 999.9% FS (0.1% increments) |
| Integral time | 0 to 3,999 s (1-s increments) |
| Derivative time | 0 to 3,999 s (1-s increments) |
| Control period | 1 to 99 s (1-s increments) |
| Manual reset value | 0.0 to 100.0% (0.1% increments) |
| Alarm set range | -1,999 to 9,999 or -199.9 to 999.9 (Decimal position varies with the type of input and decimal point position setting.) |
| Sampling period | Temperature input: 250 ms Current or voltage input: 100 ms (See note 3.) Auxiliary input: 1 s (See note 4.) |
| Insulation resistance | 20 M Ω at 500 VDC |
| Dielectric strength | 2,000 VAC at 50/60 Hz for 1 min between charged terminals different in polarity. |
| Vibration resistance | Malfunction: 10 to 55 Hz with 20 m/s ² in X, Y, and Z directions for 10 min. Destruction: 10 to 55 Hz with a single amplitude of 0.75 mm in X, Y, and Z directions for 2 h. |
| 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 | Approx. 300 g Mounting Bracket: Approx. 65 g |
| Degree of protection | Front: NEMA4 for indoor use (conforming to IP66) Rear casing: IP20 Terminal block: IP00 |
| Memory protection | Nonvolatile memory (Data can be written 1,100,000 times) |

- Note: 1.** An accuracy of $\pm 2^\circ\text{C} \pm 1$ digit applies to K (-200°C to 1,300°C), T, and N at -100°C or below and U and L instead. There are no specifications for B at 400°C or below.
An accuracy of $\pm 3^\circ\text{C} \pm 1$ digit applies to R and S at 200°C or below.
An accuracy of $\pm 0.3\%$ or $\pm 3^\circ\text{C}$ of the indicated value, whichever is larger, ± 1 digit max. applies to W.
An accuracy of $\pm 0.3\%$ or $\pm 2^\circ\text{C}$ of the indicated value, whichever is larger, ± 1 digit max. to PL II.
- 2.** An accuracy of $\pm 0.1\%$ FS ± 1 digit max. applies to Pt at a range between -100.0°C and 100.0°C.
- 3.** A sampling period of 250 ms applies if CT or remote SP input is allocated.
- 4.** The auxiliary input means CT or remote SP input.

■ Output Unit (Sold Separately) Ratings

| Item | Model | Rating/specification | |
|--------|---------|--|--|
| ON/OFF | Relay | E53-R 250 VAC 5 A (resistive load) | |
| | SSR | E53-S 75 to 250 VAC 1 A (resistive load) | |
| | Voltage | E53-Q | 12 VDC, 40 mA, NPN |
| | | E53-Q3 | 24 VDC, 20 mA, NPN |
| E53-Q4 | | 24 VDC, 20 mA, PNP | |
| Linear | Current | E53-C3 | 4 to 20 mA (Load: 600 Ω max.); Resolution: 1/2,600 |
| | | E53-C3D | 0 to 20 mA (Load: 600 Ω max.); Resolution: 1/2,600 |
| | Voltage | E53-V34 | 0 to 10 VDC (Load: 1 k Ω max.); Resolution: 1/2,600 |
| | | E53-V35 | 0 to 5 VDC (Load: 1 k Ω max.); Resolution: 1/2,600 |

■ CT (Sold Separately) Ratings

| | |
|----------------------------|--|
| Dielectric strength | 1,000 VAC for 1 min |
| Vibration resistance | 50 Hz with 98 m/s ² |
| Weight | E54-CT1: Approx. 11.5 g E54-CT3: Approx. 50 g |
| Accessories (only E54-CT3) | Armature (2), plug (2) |

■ DeviceNet Communications Specifications

| | |
|-------------------------------------|---|
| Communications power supply voltage | 11 to 25 VDC |
| Unit power supply voltage | 85 to 264 VDC, 20.4 to 26.4 VAC/VDC |
| Power consumption | Communications: 30 mA max. Internal circuit power supply: 15 VA (100 to 240 VAC) 12 VA (24 VAC) 8 W (24 VDC) |
| Max. number of I/O points | 16 input words (52 bytes); 16 output words (32 bytes); variable |

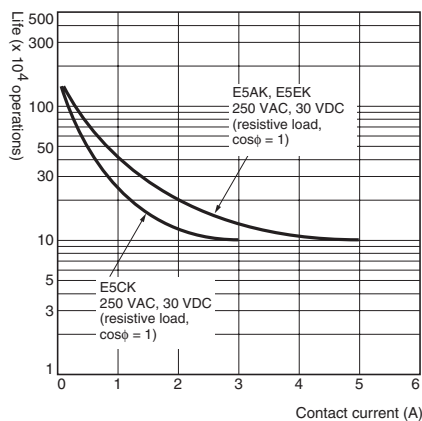
Note: This product has been tested at the test laboratory of a third-party organization authorized by the ODVA and has been certified to conform to the ODVA's conformance software versions 2.0 to 1.00. For details on Object specifications, refer to the *E5EK Digital Controller User's Manual* (H085).

■ Performance Characteristics of Heater Burnout Alarm

| | |
|--|---|
| Maximum heater current | Single-phase 50 A AC (See note 1.) |
| Indication accuracy for heater current | ±5% FS ±1 digit max. |
| Setting range for heater burnout alarm | 0.1 to 49.9 A (0.1-A units) (See note 2.) |
| Minimum detection ON time | 190 ms (See note 3.) |

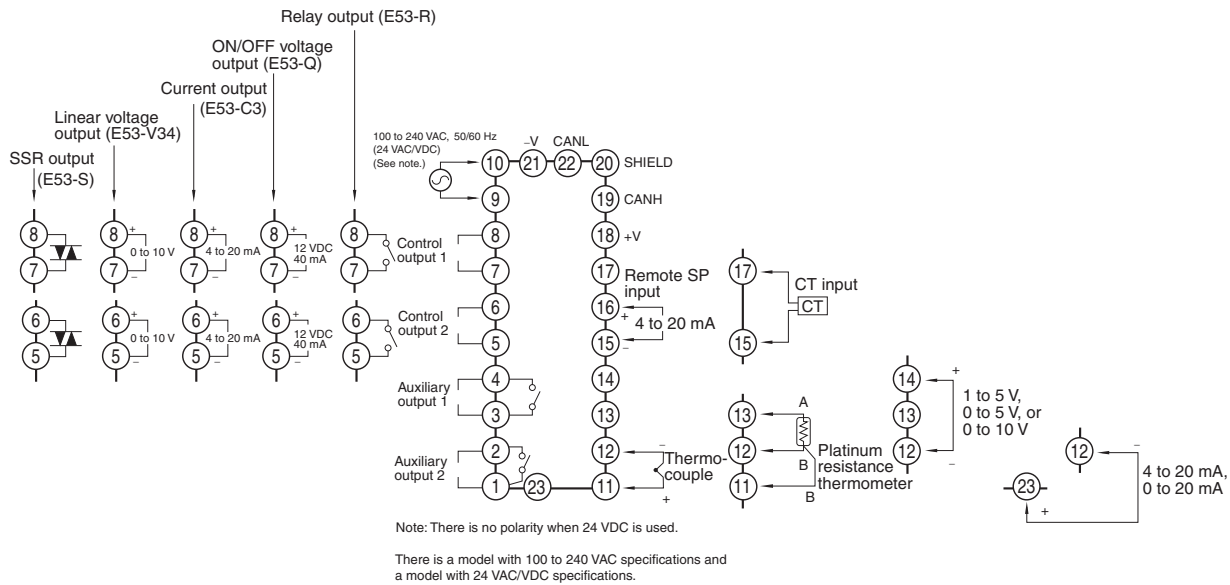
- Note:**
1. For burnout detection of 3-phase heaters, use the K2CU-F□□A-□GS (with gate input terminal).
 2. If the heater burnout alarm is set to 0.0 A, it will always be OFF, and if it is set to 50.0 A, it will always be ON.
 3. If the ON time for control output is less than 190 ms, heater burnout will not be detected and heater current will not be measured.

■ Relay Electrical Life Curve (Reference Values)



Operation

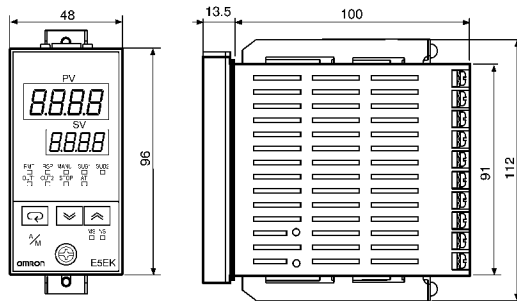
Wiring Terminals



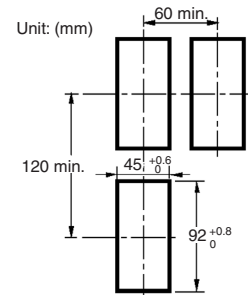
Dimensions

Note: All units are in millimeters unless otherwise indicated.

E5EK-AA2-DRT



Panel Cutout Dimensions



- The panel thickness must be 1 to 8 mm.
- Do not mount the Units closely together horizontally or vertically. Keep the distances between adjacent Units.

Precautions

For details on precautions and other information required to use this product, be sure to refer to the following manuals: *E5EK Digital Controller User's Manual (H085)* and *DeviceNet Operation Manual (W267)*. These manuals are not provided with this product. They must be obtained separately.