

Process Controller Conforming to DeviceNet

- Conforms to the DeviceNet and connects to a programmable logic controller without any programming
- High performance range of 0.1% FS (Pt input: -100.0°C to 100.0°C)
- 24 V type also available



Ordering Information

■ PROCESS CONTROLLER

| Item | Communications | Size | Part number |
|------------|----------------|------------|--------------|
| Controller | DeviceNet | 48 x 96 mm | E5EK-AA2-DRT |

- Note: 1. The heater burnout alarm function can be used only when an ON/OFF output board is used for the control outputs (heat).
 2. Be sure to specify the current transformer and output board when ordering.

■ OUTPUT BOARD (ORDER SEPARATELY)

| Item | Specification | Part number |
|--------------|---------------------|-------------|
| Output board | Relay | E53-R |
| | SSR | E53-S |
| | Pulse (NPN) 12 VDC | E53-Q |
| | Pulse (NPN) 24 VDC | E53-Q3 |
| | Pulse (PNP) 24 VDC | E53-Q4 |
| | Linear (4 to 20 mA) | E53-C3 |
| | Linear (0 to 20 mA) | E53-C3D |
| | Linear (0 to 10 V) | E53-V34 |
| | Linear (0 to 5 V) | E53-V35 |

- Note: The Process Controller uses a dedicated, high-resolution output board. The E53-C current output board for the E5□X cannot be used with the Process Controller.

■ ACCESSORIES (ORDER SEPARATELY)

Current Transformer

| Item | Hole diameter | Part number |
|---------------------|---------------|-------------|
| Current transformer | 5.8 mm | E54-CT1 |
| | 12.0 mm | E54-CT3 |

Note: No CT is required unless the heater burnout alarm function is used.

Terminal Cover

| Item | Connectable models | Part number |
|----------------|--------------------|-------------|
| Terminal cover | E5EK | E53-COV08 |

Cables/Connections

| Item | Description | Part number |
|-------------------------------------|--------------------------|-------------|
| One-branch T-branch tap | With three connectors | DCN1-1C |
| Two-branch T-branch tap | With five connectors | DCN1-3C |
| Terminal block terminating resistor | Resistance: 121 Ω | DRS1-T |

Note: Refer to *CompoBus/D Operation Manual (W267)* and *CompoBus/D Catalog (Q102)* for details such as ratings and characteristics.

■ RANGES

Platinum Resistance Thermometer

| Input (switch selectable) | | JPt100 | Pt100 | |
|---------------------------|--------------------|-----------------|-----------------|-----------------|
| Range | $^{\circ}\text{C}$ | -199.9 to 650.0 | -199.9 to 650.0 | -100.0 to 100.0 |
| | $^{\circ}\text{F}$ | -199.9 to 999.9 | -199.9 to 999.9 | -150.0 to 250.0 |
| Setting | | 0 | 1 | 22 |

Thermocouple

| Input (switch selectable) (See Note.) | | K | | J | | T | E | L | | U | N | R | S | B | W | PLII |
|--|--------------------|---------------|--------------|---------------|--------------|-----------------|------------|---------------|--------------|-----------------|---------------|------------|------------|--------------|------------|------------|
| Range | $^{\circ}\text{C}$ | -200 to 1,300 | 0.0 to 500.0 | -100 to 850 | 0.0 to 400.0 | -199.9 to 400.0 | 0 to 600 | -100 to 850 | 0.0 to 400.0 | -199.9 to 400.0 | -200 to 1,300 | 0 to 1,700 | 0 to 1,700 | 100 to 1,800 | 0 to 2,300 | 0 to 1,300 |
| | $^{\circ}\text{F}$ | -300 to 2,300 | 0.0 to 900.0 | -100 to 1,500 | 0.0 to 750.0 | -199.9 to 700.0 | 0 to 1,100 | -100 to 1,500 | 0.0 to 750.0 | -199.9 to 700.0 | -300 to 2,300 | 0 to 3,000 | 0 to 3,000 | 300 to 3,200 | 0 to 4,100 | 0 to 2,300 |
| Setting | | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |

Note: Setting number is factory-set to 2 (K).

Thermocouple W is W/Re5-26 (tungsten rhenium 5, tungsten rhenium 26).

■ CURRENT/VOLTAGE

| Input (switch selectable) | Current input | | Voltage input | | |
|---------------------------|---|------------|---------------|----------|----------|
| | | 4 to 20 mA | 0 to 20 mA | 1 to 5 V | 0 to 5 V |
| Range | One of following ranges depending on results of scaling -1999 to 9999 -199.9 to 999.9 -19.99 to 99.99 -1.999 to 9.999 | | | | |
| Setting | 17 | 18 | 19 | 20 | 21 |

Specifications

■ RATINGS

| | | |
|---------------------------|---------------|---|
| Supply voltage | | 100 to 240 VAC, 50/60 Hz, 24 VAC/DC |
| Operating voltage range | | 85% to 110% of rated 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, PLII Platinum resistance thermometer: JPt100, Pt100 Current input: 4 to 20 mA, 0 to 20 mA (input impedance: 150 Ω) Voltage input: 1 to 5 V, 0 to 5 V, 0 to 10 V (input impedance: 1 MΩ) |
| Input impedance | Current input | 150 Ω |
| | Voltage input | 1 MΩ min. |
| Auxiliary output | | SPST-NO, 3 A at 250 VAC (resistive load) |
| Control method | | ON/OFF or advanced PID control (with auto-tuning) |
| Setting method | | Digital setting using front panel keys |
| Indication method | | 7-segment digital display and LEDs (character height: PV: 14 mm, SV: 9.5 mm) |
| Control output | | According to output board (see <i>Output Board Ratings and Characteristics</i>) Attach an output board that is sold separately. |
| Remote SP input | | Current input: 4 to 20 mA (input impedance: 150 Ω) |
| Current transformer input | | Connect an exclusive current transformer (E54-CT1 or E54-CT3) |
| Additional functions | Standard | Manual output, heating/cooling control, SP limiter, loop burnout alarm, SP ramp, MV limiter, MV change rate limiter, input digital filter, input shift, run/stop, protect functions |
| | Option | Run/Stop selection, etc. |

- Note: 1. To conform to EN50081-2 (FCC Class A) for ratings of noise terminal voltages, attach a noise filter (TDK ZCB2206-11 or equivalent) to the AC power supply line.
2. Fuzzy self-tuning is not provided with the E5EK-DRT.

■ CHARACTERISTICS

| | | |
|-------------------------------|-------------------|---|
| Indication accuracy | | Thermocouple (See Note 1.): (±0.3% of indication value or ±1°C, whichever greater) ±1 digit max. Platinum resistance thermometer (See Note 2.): (±0.2% of indication value or ±0.8°C, whichever greater) ±1 digit max. Analog input: ±0.2% FS ±1 digit max. |
| Hysteresis | | 0.01% to 99.99% FS (in units of 0.01% FS) |
| Proportional band (P) | | 0.1% to 999.9% FS (in units of 0.1% FS) |
| Integral (reset) time (I) | | 0 to 3,999 s (in units of 1 s) |
| Derivative (rate) time (D) | | 0 to 3,999 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 | | -1,999 to 9,999 or -199.9 or 999.9 (decimal point position dependent on input type) |
| Sampling period (See Note 3.) | Temperature input | 250 ms |
| | Analog input | 100 ms |
| Insulation resistance | | 20 MΩ min. (at 500 VDC) |
| Dielectric strength | | 2,000 VAC, 50/60 Hz for 1 min between terminals of different polarities |

(This table continues on the next page.)

- Note: 1. The indication accuracy of the K, T, and N thermocouples at a temperature of -100°C or less is ±2°C ±1 digit maximum. The indication accuracy of the B thermocouple at a temperature of 400°C or less is unrestricted. The indication accuracy of the R and S thermocouples at a temperature of 200°C or less is ±3°C ±1 digit maximum. The indication accuracy of the W thermocouple at any temperature is (±0.3% of the indicated value or ±3°C, whichever is greater) ±1 digit maximum. The indication accuracy of the PLII thermocouple at any temperature is (±0.3% or ±2°C, whichever is greater) ±1 digit maximum.
2. The indication accuracy of the Pt at -100.0°C to 100.0°C is ±0.1% FS ±1 digit maximum.
3. The sampling period of the standard model with CT and remote SP inputs is 250 ms.

Characteristics Table - continued from previous page

| | | |
|----------------------|-------------|---|
| Vibration resistance | | Malfunction: 10 to 55 Hz, 10 m/s ² (approx. 1G) for 10 min each in X, Y, and Z directions Destruction: 10 to 55 Hz, 20 m/s ² (approx. 2G) for 2 hrs each in X, Y, and Z directions |
| Shock resistance | | Malfunction: 200 m/s ² min. (approx. 20G), 3 times each in 6 directions (100 m/s ² (approx. 10G) applied to the relay) Destruction: 300 m/s ² min. (approx. 30G), 3 times each in 6 directions |
| Ambient temperature | Operating | -10 to 55°C (14 to 131°F) with no icing/3-year warranty period: -10 to 50°C (14 to 122°F) |
| | Storage | -25 to 65°C (-13 to 149°F) with no icing |
| Ambient humidity | Operating | 35% to 85% |
| Enclosure ratings | Front panel | NEMA4 for indoor use (equivalent to IP66) |
| | Rear case | IEC standard IP20 |
| | Terminals | IEC standard IP00 |
| Memory protection | | Non-volatile memory (number of writings: 100,000 operations) |
| Weight | | Approx. 320 g Mounting bracket: approx. 65 g |
| 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 | | UL1092, CSA22.2 No. 14, CSA22.2 No. 1010-1 Conforms to EN50081-2, EN50082-2, EN61010-1 (IEC61010-1) Conforms to VDE0106/part 100 (Finger Protection), when the separately-ordered terminal cover is mounted. |

■ COMMUNICATION CHARACTERISTICS

Conforms to DeviceNet communications protocol.

For details, refer to the *CompoBus/D Operation Manual (W267)* and *E5EK CompoBus/D-type Controller Operation Manual (Z119)*.

| | | |
|--------------------------|----------|--|
| Connection forms | | Combination of multi-drop and T-branch connections (See Note 1.) |
| Communications baud rate | | 500 kbps, 250 kbps, or 125 kbps (set using the front panel keys) |
| Communications media | | Special 5-wire cables (2 signal lines, 2 power lines, 1 shield line) |
| Communications distance | 500 kbps | Network length (See Note 2.): 100 m max. (See Note 3.) Drop line length: 6 m max. Total drop line length: 39 m max. |
| | 250 kbps | Network length (See Note 2.): 250 m max. (See Note 3.) Drop line length: 6 m max. Total drop line length: 78 m max. |
| | 125 kbps | Network length (See Note 2.): 500 m max. (See Note 3.) Drop line length: 6 m max. Total drop line length: 156 m max. |
| Max. number of nodes | | 64 nodes (including master) |
| Max. number of slaves | | 63 slaves |
| Error control checks | | CRC error check, duplicate node address check |

Note: 1. External terminating resistor is required.

2. Indicates the maximum distance between nodes.

3. The distance is less than 100 m when thin cables are used for the trunk lines.

■ OUTPUT BOARD RATINGS AND CHARACTERISTICS

| | |
|-----------------------|---|
| Relay output | 5 A at 250 VAC (resistive load) |
| SSR output | 1 A at 75 to 250 VAC (resistive load) |
| Voltage output | NPN: 40 mA at 12 VDC (with short-circuit protection) NPN: 20 mA at 24 VDC (with short-circuit protection) PNP: 20 mA at 24 VDC (with short-circuit protection) |
| Linear current output | 4 to 20 mA, permissible load impedance: 600 Ω max., resolution: approx. 2,600 0 to 20 mA, permissible load impedance: 600 Ω max., resolution: approx. 2,600 |
| Linear voltage output | 0 to 10 VDC, permissible load impedance: 1 k Ω max., resolution: approx. 2,600 0 to 5 VDC, permissible load impedance: 1 k Ω max., resolution: approx. 2,600 |

■ CURRENT TRANSFORMER RATINGS

| | |
|----------------------------|--|
| Dielectric strength | 1,000 VAC (for 1 min) |
| Vibration resistance | 50 Hz, 98 m/s ² (10G) |
| Weight | E54-CT1: approx. 11.5 g; E54-CT3: approx. 50 g |
| Accessories (E54-CT3 only) | Armature: 2; Plug: 2 |

■ HEATER BURNOUT ALARM

| | |
|---------------------------------------|---|
| Max. heater current | Single-phase 50 A AC (See Note 1.) |
| Heater current value display accuracy | $\pm 5\%$ 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.) |

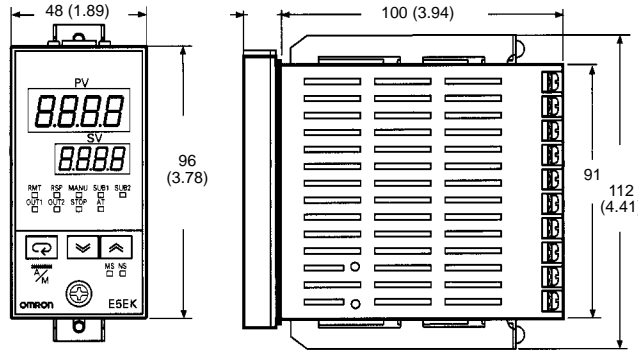
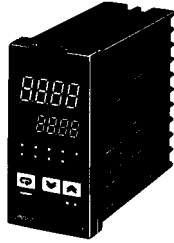
- Note: 1. Use the K2CU-F□□A-□GS (with gate input terminals) for the detection of three-phase heater burnout.
 2. The heater burnout alarm is always OFF if the alarm is set to 0.0 A and always ON if the alarm is set to 50.0 A.
 3. No heater burnout detection or heater current value measurement is possible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

This product has been tested by ODVA's authorized Independent Test Lab and found to comply with ODVA Conformance Test Software Version 2.0-1.00.

Dimensions

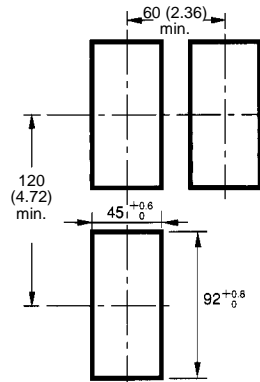
Unit: mm (inch)

E5EK-DRT



Note: Rear case width is 44 mm.

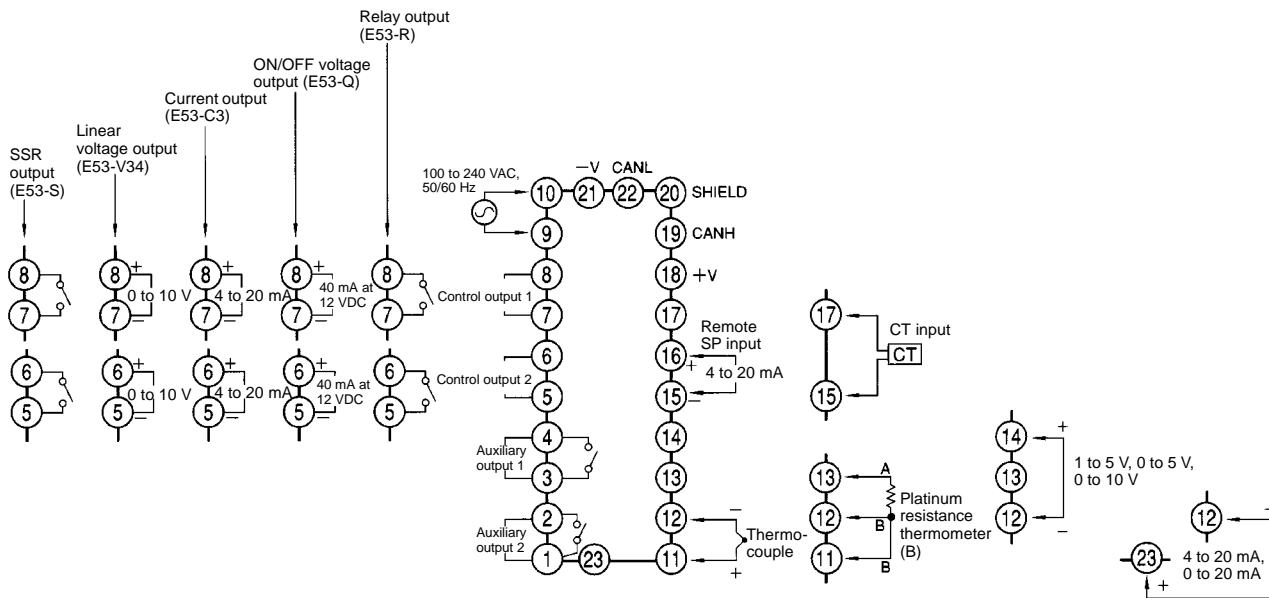
Panel Cutouts



- Note: 1. Recommended panel thickness is 1 to 8 mm.
 2. Maintain the specified vertical and horizontal mounting space between each Unit. Units must not be closely mounted (vertically or horizontally).

Installation

EXTERNAL CONNECTION



Precautions

For application precautions, refer to the *CompoBus/D Operation Manual (W267)* and *E5EK-DRT User Manual*, Cat. No. H099-E3-1.

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