

Process Controller with DeviceNet E5EK-DRT

Controller Offers Built-in, High-speed DeviceNet Communications

- Provides independent, distributed process control with flexibility to change settings and report status via DeviceNet.
- DeviceNet is over 40 times faster than RS-485 communications, 23 ms vs. 984 ms per controller (using 3 read, 3 write, and 1 execute instructions as a basis).
- Controller can respond to DeviceNet explicit message requests from programmable controllers without special programming.
- High performance range of 0.1% FS (Pt input: -100.0°C to 100.0°C).
- 3-year warranty.



Ordering Information

■ Process Controller

Stock Note: Shaded models are normally stocked.

Description	DIN size	Supply voltage	Model
Controller with DeviceNet slave communications and terminal cover	1/8 DIN, 48 x 96 mm	100-240 VAC	E5EK-AA2-DRT-500 AC100-240
			E5EK-AA2-DRT AC100-240
		24 VAC/VDC	E5EK-AA2-DRT-500 AC/DC24
			E5EK-AA2-DRT AC/DC24

- 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.
 3. Part numbers with -500 available at Omron USA, non -500 numbers available in Omron Canada only. Models with -500 have a terminal cover for finger protection.

■ Optional Output Boards

Stock Note: Shaded models are normally stocked.

Description	Specifications	Max. quantity	Model
Relay	SPST, 5 A, 250 VAC	2	E53-R
SSR (solid state relay)	1 A, 75-250 VAC	2	E53-S
Voltage pulse	NPN, 12 VDC	2	E53-Q
	NPN, 24 VDC	2	E53-Q3
	PNP, 24 VDC	2	E53-Q4
Linear current	4 to 20 mA	2	E53-C3
	0 to 20 mA	2	E53-C3D
Linear voltage	0 to 10 VDC	2	E53-V34
	0 to 5 VDC	2	E53-V35

Note: If the control period is less than 5 seconds, use an SSR (solid state relay) or pulse voltage output.

■ Accessories (Order Separately)

Stock Note: Shaded models are normally stocked.

Description	Specifications	Model
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)	Provides finger protection from terminals (VDE0106 part 100)	E53-COV08
DeviceNet T-branch tap	One-branch line, with three M12 connectors	DCN2-1
DeviceNet shielded connector cordsets	0.5 m (1.64 ft) with one female M12 connector and bare wires	DCA1-5CNC5F1
	1 m (3.28 ft) with one female M12 connector and bare wires	DCA1-5CN01F1
	0.5 m (1.64 ft) with one male M12 connector and bare wires	DCA1-5CNC5H1
	1 m (3.28 ft) with one male M12 connector and bare wires	DCA1-5CN01H1
Terminating resistor	Plug model for M12 female connector, shielded; resistor rated 121 Ω	DRS2-1
	Socket model for M12 male connector, shielded resistor rated 121 Ω	DRS2-2
	Terminal block for bare wires; resistor rated 121 Ω	DRS1-T

Note: Refer to *CompoBus/D Operation Manual (W267)* and *DeviceNet Catalog (P10FAX1)* for details such as ratings and characteristics.

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>) Install up to two output boards (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
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	NEMA 4 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.

- 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.

■ Communication Characteristics

Conforms to DeviceNet communications protocol.

For details, refer to the *CompoBus/D Operation Manual* and *E5EK-DRT DeviceNet Process Controller User's Manual*.

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 kΩ max., resolution: approx. 2,600 0 to 5 VDC, permissible load impedance: 1 kΩ max., resolution: approx. 2,600

■ Current Transformer Ratings

Model	E54-CT1	E54-CT3
Max. continuous heater current	50 amps	120 amps (See Note 1)
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

- Note: 1. Use within the max heater current rating of controller table shown below.

■ Heater Burnout Alarm

Max. heater current	Single-phase 50 A AC (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. 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.
 2. 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.

Temperature Ranges

Platinum Resistance Thermometer

Input (switch selectable)		JPt100		Pt100	
Range	°C	-199.9 to 650.0		-199.9 to 650.0	
	°F	-199.9 to 999.9		-199.9 to 999.9	
				-100.0 to 100.0	
				-150.0 to 250.0	

Thermocouple

Input (switch selectable) (See Note.)	K	J	T	E	L	U	N	R	S	B	W	PLII				
Range	°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
	°F	-328 to 2,372	32 to 932	-148 to 1,562	32 to 752	-327.82 to 752	32 to 1,112	-148 to 2,732	32 to 752	-327.82 to 752	-328 to 2,372	32 to 3,092	32 to 3,092	212 to 3,272	32 to 4,172	32 to 2,372

Note: Setting number is factory-set to 2 (K).
 Thermocouple W is W/Re5-26 (tungsten rhenium 5, tungsten rhenium 26).

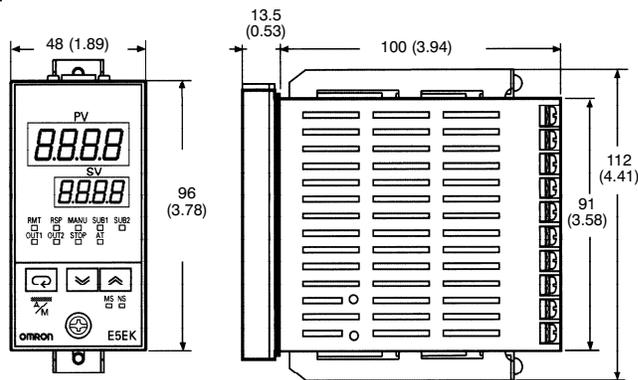
Current/Voltage Ranges

Input (switch selectable)	Current input		Voltage input		
	4 to 20 mA	0 to 20 mA	1 to 5 V	0 to 5 V	0 to 10 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				

Dimensions

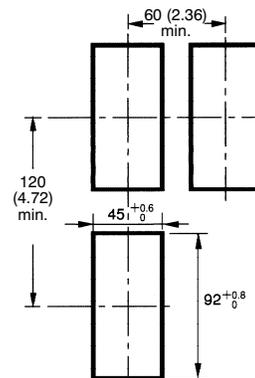
Unit: mm (inch)

E5EK-DRT



Note: Rear case width is 44 mm.

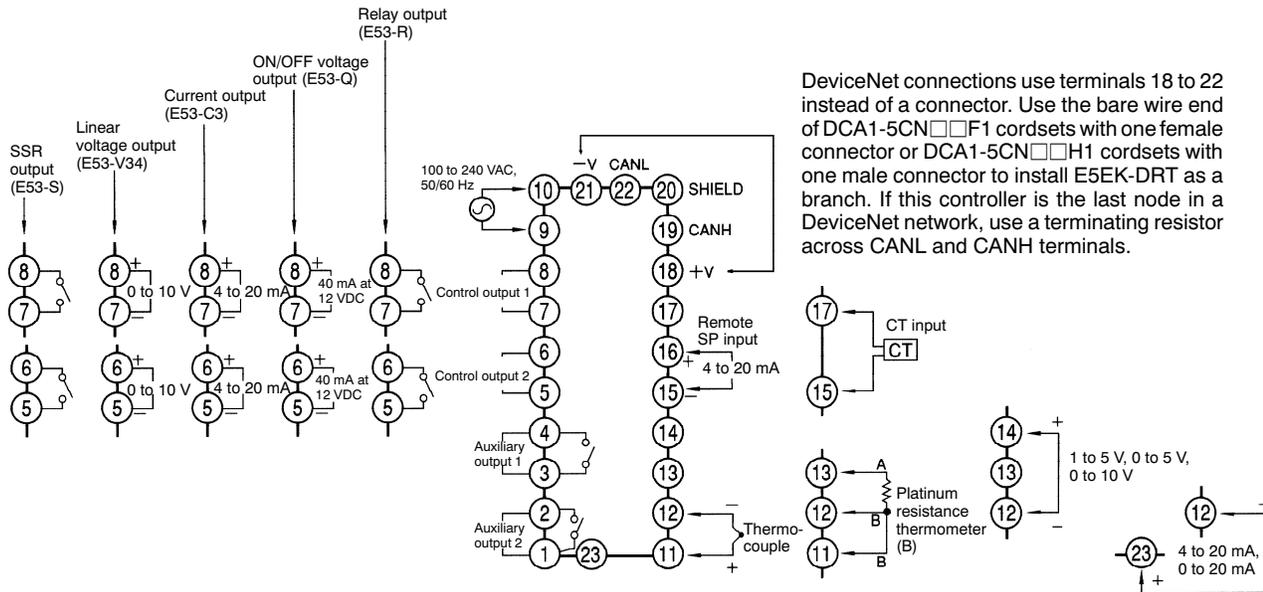
Panel Cutouts



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

Installation

External Connection



DeviceNet connections use terminals 18 to 22 instead of a connector. Use the bare wire end of DCA1-5CN□□F1 cordsets with one female connector or DCA1-5CN□□H1 cordsets with one male connector to install E5EK-DRT as a branch. If this controller is the last node in a DeviceNet network, use a terminating resistor across CANL and CANH terminals.

Precautions

For application precautions, refer to the *CompoBus/D Operation Manual (W267)* and *E5EK-DRT User Manual (H099)*.

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To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

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