

## Digital Controller

## E5CK-T

### Advanced, Compact Programmable Digital Controllers Ideal for Worldwide Use

- Offers up to four patterns of simple programming control (16 steps per pattern).
- IP66/NEMA4 (indoor use) front face.
- Modular structure, one-stock type.
- Heat/Cool control.
- Serial communications (RS-232C and RS-485).
- Temperature and analog inputs.
- High-accuracy: 100-ms sampling (for analog input).
- Conforms to international EMC and safety standards.
- 24 VAC/DC types are also available.

### Ordering Information

Description	Model	Specification
Base Unit	E5CK-TAA1 AC100-240	Standard model
	E5CK-TAA1-500 AC100-240	Standard model with terminal cover
	E5CK-TAA1 AC/DC24	Standard model
	E5CK-TAA1-500 AC/DC24	Standard model with terminal cover

**Note:** A single Output Unit and Option Unit can be mounted to each Base Unit.

Description	Model	Specification
Output Unit	E53-R4R4	Relay/Relay
	E53-Q4R4	Pulse (NPN)/Relay
	E53-Q4HR4	Pulse (PNP)/Relay
	E53-C4R4	Linear (4 to 20 mA)/Relay
	E53-C4DR4	Linear (0 to 20 mA)/Relay
	E53-V44R4	Linear (0 to 10 V)/Relay
	E53-Q4Q4	Pulse (NPN)/Pulse (NPN)
	E53-Q4HQ4H	Pulse (PNP)/Pulse (PNP)

Description	Model	Specification
Option Unit	E53-CK01	RS-232C
	E53-CK03	RS-485
	E53-CKB	Event input: 1 point
	E53-CKF	Transfer output (4 to 20 mA)

#### Inspection Report

The Digital Controller can be provided together with an inspection report.

Refer to the following legend with the suffix "K" when ordering a model provided together with an inspection report.

E5CK-TAA1-K

#### ■ Accessories (Order Separately)

Name	Model
Terminal Cover	E53-COV07

## ■ 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
Resolution (°C/°F) (main setting and alarm)		0	1

### Thermocouple

Input (switch selectable) (see note)		K1	K2	J1	J2	T	E	L1	L2	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	−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
Resolution (°C/°F) (main setting and alarm)		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

**Note:** Setting number is factory-set to 2 (K1).

### 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	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				
Resolution (°C/°F) (main setting and alarm)	17	18	19	20	21

## Specifications

### ■ Ratings

Item	100- to 240-VAC type	24-VAC/VDC type
Supply voltage	100 to 240 VAC, 50/60 Hz	24 VAC/VDC, 50/60 Hz
Power consumption	15 VA	6 VA, 3.5 W
Operating voltage range	85% to 110% of rated supply voltage	
Sensor 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 Voltage input: 1 to 5 V, 0 to 5 V, 1 to 10 V	
Input impedance	Current input: 150 Ω Voltage input: 1 MΩ min.	
Control output	According to Output Unit (see <i>Output Unit Ratings and Characteristics</i> )	
Auxiliary output	SPST-NO, 3 A at 250 VAC (resistive load)	
Control method	ON/OFF or 2-PID control	
Setting method	Digital setting using front panel keys	
Indication method	7-segment digital display and LEDs	
Other functions	Standard Manual output, heating/cooling control, SP limiter, loop burnout alarm, MV limiter, MV change rate limiter, input digital filter, input shift, run/reset, protect functions, scaling function	

Indication accuracy (see note 1)	<p>Thermocouple: (<math>\pm 0.3\%</math> of indication value or <math>\pm 1^{\circ}\text{C}</math>, whichever greater) <math>\pm 1</math> digit max.</p> <p>Platinum resistance thermometer: (<math>\pm 0.2\%</math> of indication value or <math>\pm 0.8^{\circ}\text{C}</math>, whichever greater) <math>\pm 1</math> digit max.</p> <p>Analog input: <math>\pm 0.2\%</math> FS <math>\pm 1</math> digit max.</p>
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)
Program capacity	4 patterns, 16 steps (possible to use up to 4 patterns with the communications function.)
Programming method	Time or ramp setting method
Time accuracy	$\pm 0.2\%$ ( $\pm 500$ ms) of the set value
Sampling period (see note 2)	<p>Temperature input: 250 ms</p> <p>Analog input: 100 ms</p>
Insulation resistance	20 M $\Omega$ min. (at 500 VDC)
Dielectric strength	2,000 VAC, 50/60 Hz for 1 min between terminals of different polarities
Vibration resistance	<p>Malfunction: 10 to 55 Hz, 10 m/s<sup>2</sup> (approx. 1G) for 10 min each in X, Y, and Z directions</p> <p>Destruction: 10 to 55 Hz, 20 m/s<sup>2</sup> (approx. 2G) for 2 hrs each in X, Y, and Z directions</p>
Shock resistance	<p>Malfunction: 200 m/s<sup>2</sup> min. (approx. 20G), 3 times each in 6 directions (100 m/s<sup>2</sup> (approx. 10G) applied to the relay)</p> <p>Destruction: 300 m/s<sup>2</sup> min. (30G), 3 times each in 6 directions</p>
Ambient temperature	<p>Operating: -10°C to 55°C (with no icing)/3-year warranty period: -10°C to 50°C</p> <p>Storage: -25°C to 65°C (with no icing)</p>
Ambient humidity	Operating: 35% to 85%
Enclosure ratings	<p>Front panel: NEMA4 for indoor use (equivalent to IP66)</p> <p>Rear case: IEC standard IP20</p> <p>Terminals: IEC standard IP00</p>
Memory protection	Non-volatile memory (number of writings: 100,000 operations)
Weight	<p>Approx. 170 g;</p> <p>Adapter: approx. 10 g</p>
EMC	<p>Emission Enclosure: EN55011 Group 1 class A</p> <p>Emission AC Mains: EN55011 Group 1 class A</p> <p>Immunity ESD: EN61000-4-2:4kV contact discharge (level 2) 8kV air discharge (level 3)</p> <p>Immunity RF-interference: ENV50140: 10V/m (amplitude modulated, 80 MHz to 1 GHz) (level 3) 10 V/m (pulse modulated, 900 MHz)</p> <p>Immunity Conducted Disturbance: ENV50141: 3 V (47 to 68 MHz) 10 V (0.15 to 47 MHz, 68 to 80 MHz) (level 3)</p> <p>Immunity Burst: EN61000-4-4:2kV power-line (level 3) 2kV I/O signal-line (level 4)</p>
Approved standards	<p>UL1092, CSA22.2 No. 14, CSA C22.2 No. 142</p> <p>Conforms to EN50081-2, EN50082-2, EN61010-1 (IEC1010-1)</p> <p>Conforms to VDE0106/ part 100 (Finger Protection), when the separately-ordered terminal cover is mounted.</p>

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## ■ Output Unit Ratings and Characteristics

Model	Control output 1/Control output 2
E53-R4R4	Relay / Relay
E53-Q4R4	Voltage (NPN) / Relay
E53-Q4HR4	Voltage (PNP) / Relay
E53-C4R4	4 to 20 mA / Relay
E53-C4DR4	0 to 20 mA / Relay
E53-V44R4	0 to 10 mA / Relay
E53-Q4Q4	Voltage (NPN) / Voltage (NPN)
E53-Q4HQ4H	Voltage (PNP) / Voltage (PNP)

Output Type	Specifications
Relay	250 VAC, 3 A
Voltage (NPN)	12 VDC, 20 mA (with short-circuit protection)
Voltage (PNP)	12 VDC, 20 mA (with short-circuit protection)
0 to 10 V	0 to 10 VDC, Permissible load impedance: 1 kΩ min., Resolution: Approx. 2600
4 to 20 mA	4 to 20 mA, Permissible load impedance: 500 Ω max., Resolution: Approx. 2600

## ■ Option Unit Ratings and Characteristics

Model	Specifications	
E53-CKB	Event input	Contact input: ON: 1 kΩ max., OFF: 100 kΩ min. No-contact input: ON: residual voltage 1.5 V max., OFF: leakage current 0.1 mA max.
E53-CK01	Communications	RS-232C
E53-CK03		RS-485
E53-CKF	Transfer output	4 to 20 mA DC: Permissible load impedance: 600 Ω max. Resolution: approx. 2,600

**Note:** Event input is used for switching the target value, run or stop command, or automatic and manual mode with an external signal input.

## Nomenclature

