

Advanced, Compact Digital Controllers

- IP66/NEMA4 (indoor use) front face.
- Modular structure, one-stock type.
- Heating/cooling control.
- Serial communications (RS-232C and RS-485).
- Temperature and analog inputs.
- High-accuracy: 100 ms sampling (for analog input).
- Advanced tuning which includes fuzzy self-tuning.
- Conforms to international EMC and safety standards.



Refer to *Safety Precautions for All Temperature Controllers*.

Refer to *E5CK Operation* for operating procedures.

Model Number Structure

Model Number Legend

Refer to the following when ordering set models.

E5CK-□□□□
1 2 3 4

1. Constant Value/Program

Blank: Constant value

T: Program

2. Control Output 1/Control Output 2

AA: Without Output Unit (field interchangeable)

RR: Relay/Relay

QR: Pulse (NPN)/Relay

CR: Linear (4 to 20 mA)/Relay

VR: Linear (0 to 10 V)/Relay

QQ: Pulse (NPN)/Pulse (NPN)

3. Auxiliary Output

1: Auxiliary output (1 point)

4. Option

01: RS-232C serial communication

03: RS-485 serial communication

B: Event input (1 point)

F: Transfer output (4 to 20 mA)

Note: E5CK-VR1 and E5CK-QQ1 are not available, but with options.

Ordering Information

List of Models

Description	Model	Specification
Base Unit	E5CK-AA1 AC100-240	Base Unit
	E5CK-AA1-500 AC100-240	Base Unit with terminal cover
	E5CK-TAA1 AC100-240	Standard model
	E5CK-TAA1-500 AC100-240	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-AA1-K, E53-CKF-K

■ Accessories (Order Separately)

Name	Model
Terminal Cover	E53-COV07

Name	Model
Rubber Packing	Y92S-29

Note: The Rubber Packing is provided with the Digital Controller.

Specifications

■ Ratings

Item	100 to 240 VAC type
Supply voltage	100 to 240 VAC, 50/60 Hz
Power consumption	15 VA
Operating voltage range	85% to 110% of rated supply voltage
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, 1 A at 250 VAC (resistive load)
Control method	ON/OFF or 2-PID control (with auto-tuning)
Setting method	Digital setting using front panel keys
Indication method	7-segment digital display and LEDs
Other functions	According to Option Unit (see <i>Output Unit Ratings and Characteristics</i>)

Note: 1. Do not use the output from an inverter as the power supply. Refer to *Safety Precautions for All Temperature Controllers*.
2. The E5CK-T does not support fuzzy self-tuning.

■ Input 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).

Thermocouple W is W/Re 5-26 (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	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

■ Characteristics

Indication accuracy (See note.)	Thermocouple: ($\pm 0.3\%$ of indication value or $\pm 1^\circ\text{C}$, whichever greater) ± 1 digit max. Platinum resistance thermometer: ($\pm 0.2\%$ of indication value or $\pm 0.8^\circ\text{C}$, whichever greater) ± 1 digit max. Analog input: $\pm 0.2\%$ 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)	
Set time	0 to 99 hrs 59 min or 0 to 99 min 59 s	
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	$\pm 0.2\%$ (± 500 ms) of the set value	
Sampling period	Temperature input: 250 ms Current/voltage input: 100 ms	
Insulation resistance	20 M Ω 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. (30G), 3 times each in 6 directions	
Ambient temperature	Operating: -10°C to 55°C (with no icing)/3-year warranty period: -10°C to 50°C Storage: -25°C to 65°C (with no icing)	
Ambient humidity	Operating: 35% to 85%	
Degree of protection	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. 170 g; Adapter: approx. 10 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	UL61010C-1, CSA 22.2 No. 61010-1 Conforms to EN61326-1: 2006, EN61010-1 (IEC61010-1) Conforms to VDE0106/part 100 (Finger Protection), when the separately-ordered terminal cover is mounted.	

Note: The indication accuracy of the K1, T, and N thermocouples at a temperature of -100°C or less is $\pm 2^\circ\text{C} \pm 1$ digit maximum. The indication accuracy of the U, L1, and L2 thermocouples at any temperature is $\pm 2^\circ\text{C} \pm 1$ 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 $\pm 3^\circ\text{C} \pm 1$ digit maximum.
The indication accuracy of the W thermocouple at any temperature is ($\pm 0.3\%$ of the indicated value or $\pm 3^\circ\text{C}$, whichever is greater) ± 1 digit maximum.
The indication accuracy of the PLII thermocouple at any temperature is ($\pm 0.3\%$ or $\pm 2^\circ\text{C}$, whichever is greater) ± 1 digit maximum.

■ 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 k Ω 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 k Ω max., OFF: 100 k Ω 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: 500 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

Operation Indicators

- OUT1
Lights when the pulse output function assigned to control output 1 turns ON.
- OUT2
Lights when the pulse output function assigned to control output 2 turns ON.
- SUB1
Lights when the output function assigned to auxiliary output 1 turns ON.
- MANU
Lights when the manual operation mode.
- STOP
Lights during operation has stopped.
- RMT
Lights during remote operation.
- AT
Flashes during auto-tuning.



No. 1 Display

Displays the process value or parameter symbols.

No. 2 Display

Displays the set point, set point during SP ramp, manipulated variable, or parameter settings.

Up Key/Down Key

Press to increase or decrease the value on the No.2 display.

Display Key

Press for less than 1 s to shift the display to the next parameter. When this key is pressed for 1 s or more, the menu screen will be displayed in any case.

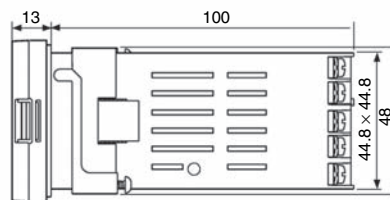
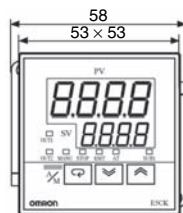
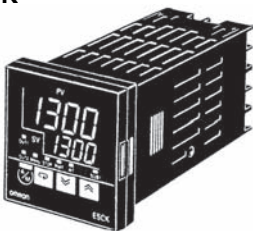
A/M Key

Press to select the auto operation or manual operation.

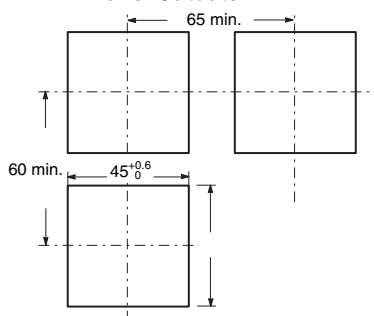
Dimensions

Note: All units are in millimeters unless otherwise indicated.

E5CK



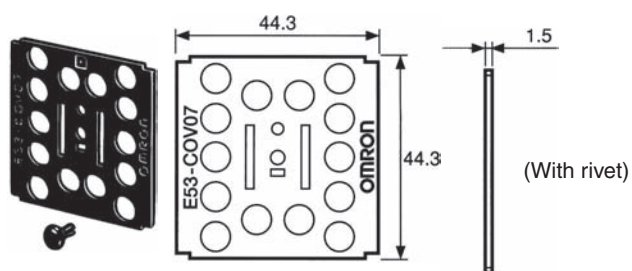
Panel Cutouts



- Note:**
1. Recommended panel thickness is 1 to 5 mm.
 2. Maintain the specified vertical and horizontal mounting space between each Unit. Units must not be closely mounted vertically or horizontally.

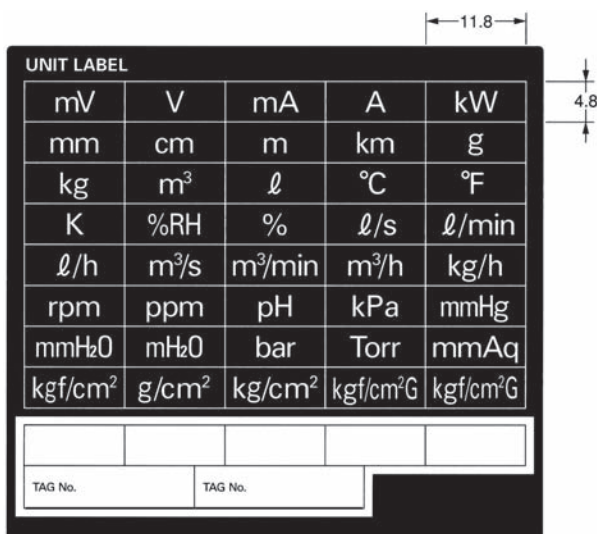
Terminal Cover

E53-COV07



Unit Label (Order Separately)

Y92S-L1



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

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

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