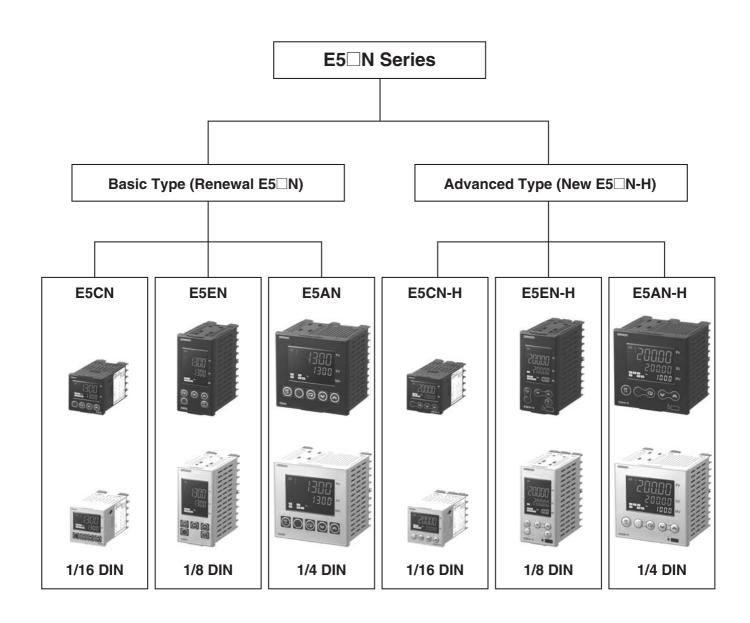


Digital Temperature Controllers/Digital Controllers

Upgraded 1/16, 1/8, and 1/4 DIN Controllers, the Best-selling E5□N Series. Basic Type (Renewal E5□N) and Advanced Type (New E5□N-H).



- Improved indication accuracy and preventive maintenance (Basic Type E5□N).
- New high-performance Controllers (Advanced Type E5□N-H).
- Easy-to-use one-touch operation with PF Key (Only for 1/8 and 1/4 DIN).
- Logic operations.



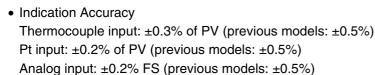
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Basic-type Digital Temperature Controller

E5CN/E5CN-U (48 x 48 mm)

New 48 x 48-mm Basic Temperature Controller with Enhanced Functions and Performance. Improved Indication Accuracy and Preventive Maintenance Function.



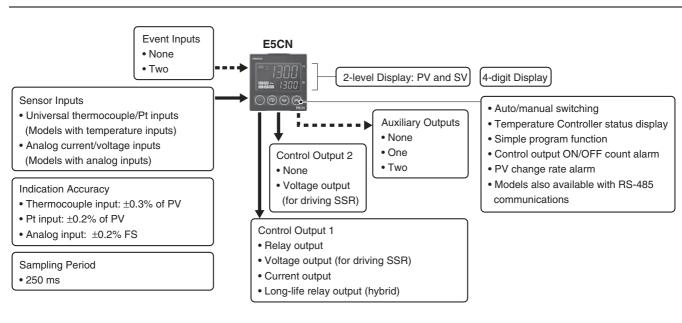
- New E5CN-U Models (Plug-in Models) with analog inputs and current outputs.
- A PV/SV-status display function can be set to automatically alternate between displaying the status of the Temperature Controller (auto/manual, RUN/STOP, and alarms) and the PV or SV.
- Preventive maintenance for relays in the Temperature Controller using a Control Output ON/OFF Counter.



NEW

Refer to Safety Precautions on page 66.

Main I/O Functions



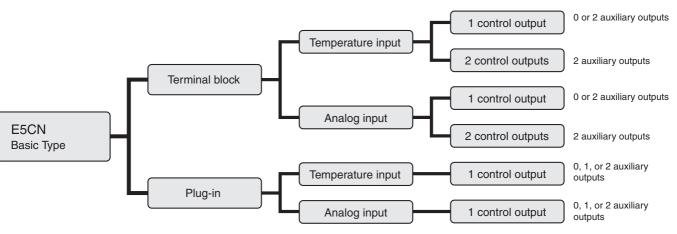
This data sheet is provided as a guideline for selecting products. Be sure to refer to the following user manuals for application precautions and other information required for operation before attempting to use the product.

E5CN/E5AN/E5EN Digital Temperature Controllers User's Manual Basic Type (Cat. No. H156)

E5CN/E5AN/E5EN Digital Temperature Controllers Communications Manual Basic Type (Cat. No. H158)

E5CN/E5CN-U

Lineup



Note: Models with one control output and one or two auxiliary outputs and models with two control outputs can be used for heating/cooling control.

Model Number Structure

Model Number Legend Controllers

E5CN-1 2 3 4 5 6 7

1. Control Output 1

- R: Relay output
- Q: Voltage output (for driving SSR)
- C: Current output
- Y: Long-life relay output (hybrid) *1

2. Auxiliary Outputs *2

Blank: None 2: Two outputs

3. Option

M: Option Unit can be mounted.

4. Input Type

- T: Universal thermocouple/platinum resistance thermometer
- L: Analog current/voltage input

5. Power Supply Voltage

Blank: 100 to 240 VAC D: 24 VAC/VDC

6. Case Color

Blank: Black W: Silver

7. Terminal Cover

-500: With terminal cover

Option Units

1. Applicable Controller

CN: E5CN or E5CN-H

2. Function 1

Blank: None

Q: Control output 2 (voltage for driving SSR)

P: Power supply for sensor

3. Function 2

Blank: None

H: Heater burnout/SSR failure/Heater overcurrent detection (CT1)

HH: Heater burnout/SSR failure/Heater overcurrent detection (CT2)

B: Two event inputs

03: RS-485 communications

H03: Heater burnout/SSR failure/Heater overcurrent detection (CT1) + RS-485 communications

HB: Heater burnout/SSR failure/Heater overcurrent detection (CT1) + Two event inputs

HH03: Heater burnout/SSR failure/Heater overcurrent detection (CT2) + RS-485 communications

4. Version

N2: Applicable only to models released after January 2008

Note: Not all combinations of function 1 and function 2 specifications are possible for Option Units (E53-□□□).

*1. Always connect an AC load to a long-life relay output. The output will not turn OFF if a DC load is connected because a triac is used for switching the circuit. For details, check the conditions in Ratings.

*2. Auxiliary outputs are contact outputs that can be used to output alarms or results of logic operations.

Ordering Information

Controllers with Terminal Blocks

Size	Case color	Power supply voltage	Input type	Auxiliary outputs	Control output 1	Model
					Relay output	E5CN-RMT-500
				None	Voltage output (for driving SSR)	E5CN-QMT-500
			Thermocouple or		Current output	E5CN-CMT-500
		100 to 240 VAC	Resistance		Relay output	E5CN-R2MT-500
			thermometer	2	Voltage output (for driving SSR)	E5CN-Q2MT-500
				2	Current output	E5CN-C2MT-500
					Long-life relay output (hybrid)	E5CN-Y2MT-500
					Relay output	E5CN-RMTD-500
				None	Voltage output (for driving SSR)	E5CN-QMTD-500
		24 VAC/VDC	Thermocouple or Resistance		Current output	E5CN-CMTD-500
		24 VAC/VDC	thermometer		Relay output	E5CN-R2MTD-500
	Black			2	Voltage output (for driving SSR)	E5CN-Q2MTD-500
					Current output	E5CN-C2MTD-500
					Relay output	E5CN-RML-500
				None	Voltage output (for driving SSR)	E5CN-QML-500
1/16 DIN					Current output	E5CN-CML-500
$48 \times 48 \times 78$		100 to 240 VAC	Analog (current/voltage)	2	Relay output	E5CN-R2ML-500
$(W \times H \times D)$					Voltage output (for driving SSR)	E5CN-Q2ML-500
					Current output	E5CN-C2ML-500
					Long-life relay output (hybrid)	E5CN-Y2ML-500
		24 VAC/VDC	Analog (current/voltage)	2	Relay output	E5CN-R2MLD-500
					Voltage output (for driving SSR)	E5CN-Q2MLD-500
					Current output	E5CN-C2MLD-500
				None	Relay output	E5CN-RMT-W-500
					Voltage output (for driving SSR)	E5CN-QMT-W-500
					Current output	E5CN-CMT-W-500
		100 to 240 VAC			Relay output	E5CN-R2MT-W-500
	Oil.		Thermocouple or		Voltage output (for driving SSR)	E5CN-Q2MT-W-500
	Silver		Resistance thermometer	2	Current output	E5CN-C2MT-W-500
					Long-life relay output (hybrid)	E5CN-Y2MT-W-500
					Relay output	E5CN-R2MTD-W-500
		24 VAC/VDC		2	Voltage output (for driving SSR)	E5CN-Q2MTD-W-500
					Current output	E5CN-C2MTD-W-500

Option Units

One of the following Option Units can be mounted to provide the E5CN with additional functions.

		Functions			Model
Communications RS-485	3-phase heater burnout/SSR failure/ Heater overcurrent detection				E53-CNHH03N2
	Heater burnout/SSR failure/Heater overcurrent detection	Event inputs			E53-CNHBN2
Communications RS-485			Control output 2 (Voltage for driving SSR)		E53-CNQ03N2
		Event inputs		External power supply for ES1B	E53-CNPBN2
	Heater burnout/SSR failure/Heater overcurrent detection			External power supply for ES1B	E53-CNPHN2
Communications RS-485				External power supply for ES1B	E53-CNP03N2
Communications RS-485	Heater burnout/SSR failure/Heater overcurrent detection				E53-CNH03N2
Communications RS-485					E53-CN03N2
		Event inputs			E53-CNBN2
	Heater burnout/SSR failure/Heater overcurrent detection		Control output 2 (Voltage for driving SSR)		E53-CNQHN2
	3-phase heater burnout/SSR failure/ Heater overcurrent detection		Control output 2 (Voltage for driving SSR)		E53-CNQHHN2
		Event inputs	Control output 2 (Voltage for driving SSR)		E53-CNQBN2

Note: Option Units cannot be used for plug-in models.

These Option Units are applicable only to models released after January 2008.

E5CN/E5CN-U

Model Number Structure

Model Number Legend (Plug-in-type Controllers)

E5CN- $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$

- 1. Output Type
 - R: Relay output
 - Q: Voltage output (for driving SSR)
 - C: Current output
- 2. Number of Alarms

Blank: No alarm

- 1: One alarm
- 2: Two alarms

- 3. Input Type
 - T: Universal thermocouple/platinum resistance thermometer
 - L: Analog Input
- 4. Plug-in type
 - U: Plug-in type

Ordering Information

Plug-in-type Controllers

Size	Case color	Power supply voltage	Input type	Auxiliary outputs	Control output 1	Model
				None	Relay output	E5CN-RTU
					Voltage output (for driving SSR)	E5CN-QTU
					Current output	E5CN-CTU
			Thermocouple		Relay output	E5CN-R1TU
			or resistance	1	Voltage output (for driving SSR)	E5CN-Q1TU
			thermometer		Current output	E5CN-C1TU
					Relay output	E5CN-R2TU
		100 to 240 VAC		2	Voltage output (for driving SSR)	E5CN-Q2TU
					Current output	E5CN-C2TU
	Black		Analog (current/voltage)	1	Relay output	E5CN-R1LU
					Voltage output (for driving SSR)	E5CN-Q1LU
1/16 DIN					Current output	E5CN-C1LU
1/10 DIN				2	Relay output	E5CN-R2LU
					Voltage output (for driving SSR)	E5CN-Q2LU
					Current output	E5CN-C2LU
		24 VAC/VDC		None	Relay output	E5CN-RTDU
					Voltage output (for driving SSR)	E5CN-QTDU
					Current output	E5CN-CTDU
			Thermocouple	1	Relay output	E5CN-R1TDU
			or resistance thermometer		Voltage output (for driving SSR)	E5CN-Q1TDU
					Current output	E5CN-C1TDU
				2	Relay output	E5CN-R2TDU
					Voltage output (for driving SSR)	E5CN-Q2TDU
					Current output	E5CN-C2TDU

Accessories (Order Separately)

USB-Serial Conversion Cable

Model
E58-CIFQ1

Terminal Cover

Connectable models	Terminal block models
Model	E53-COV17

Note: The Terminal Cover comes with the E5CN- $\square\square$ -500 models.

Waterproof Packing

Model	
Y92S-29	

Note: The Waterproof Packing is included with the Controller only for models with terminal blocks.

Current Transformers (CTs)

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

Adapter

Connectable models	Model
Terminal block models	Y92F-45

Note: Use this Adapter when the panel has been previously prepared for the E5B \square .

Sockets (for Plug-in Models)

Туре	Model
Front-connecting Socket	P2CF-11
Front-connecting Socket with Finger Protection	P2CF-11-E
Back-connecting Socket	P3GA-11
Terminal Cover for Back-connecting socket with Finger Protection	Y92A-48G

CX-Thermo Support Software

Model	
EST2-2C-MV4	

E5CN/E5CN-U

Specifications

Ratings

natings							
Power supply voltage		No D in model number: 100 to 240 VAC, 50/60 Hz D in model number: 24 VAC, 50/60 Hz; 24 VDC					
Operating voltage range		85% to 110% of rated supply voltage					
Power E5CN		100 to 240 VAC: 7.5 VA (max.) (E5CN-R2T at 100 VAC: 3.0 VA) 24 VAC/VDC: 5 VA/3 W (max.) (E5CN-R2TD at 24 VAC: 2.7 VA)					
consump- tion	E5CN-U		00 to 240 VAC: 6 VA (max.) 24 VAC/VDC: 3 VA/2 W (max.) (models with current output: 4 VA/2 W)				
Sensor input		Models with temperature inputs Thermocouple: K, J, T, E, L, U, N, R, S, B, W, or PL II Platinum resistance thermometer: Pt100 or JPt100 Infrared temperature sensor: 10 to 70°C, 60 to 120°C, 115 to 165°C, or 140 to 260°C Voltage input: 0 to 50 mV Models with analog inputs Current input: 4 to 20 mA or 0 to 20 mA					
			input: 1 to 5 V, 0 to 5 V, or 0 to 10 V				
Input imped		<u> </u>	put: 150 Ω max., Voltage input: 1 M Ω min. (Use a 1:1 connection when connecting the ES2-HB.)				
Control met	noa 	ON/OFF C	ontrol or 2-PID control (with auto-tuning)				
	Relay output	E5CN	SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA				
	Ticiay output	E5CN-U	SPDT, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA				
Control outputs	Voltage output (for driving SSR)	E5CN E5CN-U	Output voltage: 12 VDC \pm 15% (PNP), max. load current: 21 mA, with short-circuit protection circuit				
	Current output	E5CN	4 to 20 mA DC/0 to 20 mA DC, load: 600 Ω max., resolution: approx. 10,000				
	Long-life relay output	E5CN	SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 1,000,000 operations, load power supply voltage: 75 to 250 VAC (DC loads cannot be connected.), minimum applicable load: 5 V, 10 mA, leakage current: 5 mA max. (250 VAC, 60 Hz)				
Auviliant	Number of outputs	1 or 2 max	c. (Depends on the model.)				
Auxiliary outputs	Output specifica- tions		out: SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations, minimum load: 5 V, 10 mA				
	Number of inputs	2	2				
Event	External contact	Contact input: ON: 1 k Ω max., OFF: 100 k Ω min.					
inputs	input specifica- tions	Non-contact input: ON: Residual voltage: 1.5 V max., OFF: Leakage current: 0.1 mA max.					
		Current flo	w: Approx. 7 mA per contact				
External pov	wer supply for ES1B	12 VDC ±10%, 20 mA, short-circuit protection circuit provided					
Setting method		Digital setting using front panel keys					
Indication method		11-segment digital display and individual indicators (7-segment display also possible) Character height: PV: 11 mm, SV: 6.5 mm					
Multi SP		Up to four set points (SP0 to SP3) can be saved and selected using event inputs, key operations, or serial communications.					
Bank switching		Not supported					
Other functions		Manual output, heating/cooling control, loop burnout alarm, SP ramp, other alarm functions, heater burnout detection, 40% AT, 100% AT, MV limiter, input digital filter, self-tuning, temperature input shift, run/stop, protection functions, control output ON/OFF counter, extraction of square root, MV change rate limit, logic operations, PV/SV status display, simple program, automatic cooling coefficient adjustment					
•	Ambient operating temperature		C (with no condensation or icing), for 3-year warranty: -10 to 50°C				
Ambient operating humidity		25% to 85%					
Storage tem	Storage temperature		−25 to 65°C (with no condensation or icing)				

Input Ranges

Thermocouple/Platinum Resistance Thermometer (Universal Inputs)

In T	put /pe	PI		m res	istano eter	ce							Tł	nermo	ocoup	le							Infra	red te sen		iture	Analog input
Na	ame		Pt100)	JPt	100	ı	‹	,	J	7	Г	E	L	ι	J	N	R	s	В	w	PL II	10 to 70°C	60 to 120 °C	115 to 165 °C	140 to 260 °C	0 to 50 mV
	2300																				2300						
	1800																			1800							
	1700																	1700	1700								
	1600																										
	1500																										
	1400						1000										1000					1000					
	1300						1300										1300				_	1300					
္ည	1200																-		-								Usable
e	1100																-		-								in the following
ü	1000	850							850					050			-		-								ranges
2	900	850							850					850			-		-		-	-					by
l a	800								-								-		-		-	-					scaling:
rat	700	-					+		-				600	-			-	-	-			-					–1999 to 9999 or
be	600	-	500.0		500.0		+ -	500.0					000	-			-		H	\vdash	+ -	-					-199.9
Temperature range (°C)	500		500.0		500.0		+	300.0	-	400.0	400	400.0			400	400.0	-	-			-	-					to 999.9
F	400	-					+		-	400.0	400	400.0	-	-	400	400.0		-				-				260	
	300	-					1		-		-							-			\vdash			120	165	200	
	200	-		100.0		100.0	1 -		-		-							-					90	120	.00		·
	100	-		100.0		100.0	1													100							
	0			0.0		0.0												0	0		0	0	0	0	0	0	
	-100.0							-20.0	-100	-20.0				-100				-								-	
	-200.0	-200	-199.9		-199.9		-200				-200	-199.9	-200		-200	-199.9	-200										
Set nur	ting nber	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	24	25	19	20	21	22	23

Shaded settings are the default settings.

The applicable standards for the input types are as follows:

K, J, T, E, N, R, S, B: JIS C 1602-1995, IEC 584-1

L: Fe-CuNi, DIN 43710-1985

U: Cu-CuNi, DIN 43710-1985

W: W5Re/W26Re, ASTM E988-1990

JPt100: JIS C 1604-1989, JIS C 1606-1989

Pt100: JIS C 1604-1997, IEC 751

PL II: According to Platinel II electromotive force charts from BASF (previously Engelhard)

Models with Analog Inputs

Input Type	Cur	rent		Voltage			
Input specification	4 to 20mA	0 to 20 mA	1 to 5 V	0 to 5 V	0 to 10 V		
Setting range			nges by scaling: 199.9, –19.99 to 99.99 or –1.999 to 9.999				
Setting number	0	1	2	3	4		

Shaded settings are the default settings.

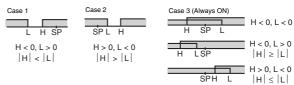
Alarm Outputs

Each alarm can be independently set to one of the following 13 alarm types. The default is 2: Upper limit. Auxiliary outputs are allocated for alarms. ON delays and OFF delays (0 to 999 s) can also be specified.

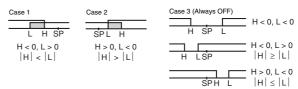
Note: For models with heater burnout, SSR failure, and heater overcurrent detection, alarm 1 will be an OR output of the alarm selected from the following alarm types and the alarms for heater burnout, SSR failure, and heater overcurrent. To output only a heater burnout alarm, SSR failure alarm, and heater overcurrent alarm for alarm 1, set the alarm type to 0 (i.e., no alarm function).

Set value	Alarm type	Alarm outpo	ut operation When X is
value		positive	negative
0	Alarm function OFF	Output OFF	
1 *1	Upper- and lower- limit	ON OFF SP	*2
2	Upper limit	ON OFF SP	ON X ← SP
3	Lower limit	ON X SP	ON X SP
4 *1	Upper- and lower- limit range	ON OFF SP	*3
5 * 1	Upper- and lower- limit with standby sequence	ON → L H ← SP *5	*4
6	Upper-limit with standby sequence	ON X SP	ON OFF SP
7	Lower-limit with standby sequence	ON X SP	ON X SP
8	Absolute-value upper-limit	ON OFF 0	ON OFF 0
9	Absolute-value lower-limit	ON ←X→ OFF 0	ON OFF 0
10	Absolute-value upper-limit with standby sequence	ON OFF 0	ON OFF 0
11	Absolute-value lower-limit with standby sequence	ON OFF 0	ON OFF 0
12	LBA (for alarm 1 only)		
13	PV change rate alarm		

- *1. With set values 1, 4 and 5, the upper and lower limit values can be set independently for each alarm type, and are expressed as "L" and "H."
- *2. Set value: 1, Upper- and lower-limit alarm



*3. Set value: 4, Upper- and lower-limit range



- *4. Set value: 5, Upper- and lower-limit with standby sequence For Upper- and Lower-Limit Alarm Described Above
 - Case 1 and 2
 <u>Always OFE</u> when the upper-limit and lower-limit hysteresis overlaps.
 - Case 3: Always OFF
- *5. Set value: 5, Upper- and lower-limit with standby sequence <u>Always OFF</u> when the upper-limit and lower-limit hysteresis overlaps.

Characteristics

Models with thermocouple/platinum resistance thermometer input (universal input): 0.1 to 999.9 EU (in units of 0.1 EU) *4 Models with analog input: 0.1 to 999.9% FS (in units of 0.1% FS)			
Terminal block models (ESCN): 15% FS ±1 digit max. Forminal block models (ESCN): (±1% of PV or ±10°C, whichever is greater) ±1 digit max. Forminal block models (ESCN): (±1% of PV or ±10°C, whichever is greater) ±1 digit max. Forminal block models (ESCN): (±1% of PV or ±10°C, whichever is greater) ±1 digit max. Forminal block models (ESCN): (±1% of PV or ±10°C, whichever is greater) ±1 digit max. Forminal block models (ESCN): (±1% of PV or ±10°C, whichever is greater) ±1 digit max. Forminal block models (ESCN): (±1% of PV or ±10°C, whichever is greater) ±1 digit max. Forminal block models (ESCN): (±1% of PV or ±10°C, whichever is greater) ±1 digit max. Forminal block models (ESCN): (±1% of PV or ±10°C, whichever is greater) ±1 digit max. Forminal block models (ESCN): (±1% of PV or ±10°C, whichever is greater) ±1 digit max. Forminal block models (ESCN): (±1% of PV or ±10°C, whichever is greater) ±1 digit max. Forminal block models (ESCN): (±1% of PV or ±10°C, whichever is greater) ±1 digit max. Forminal block models (ESCN): (±1% of PV or ±10°C, whichever is greater) ±1 digit max. Forminal block models (ESCN): (±1% of PV or ±10°C, whichever is greater) ±1 digit max. Forminal block models (ESCN): (±1% of PV or ±10°C, whichever is greater) ±1 digit max. Forminal block models (ESCN): (±10°C): (±	Indication acc	curacy	Terminal block models (E5CN): (±0.3% of indicated value or ±1°C, whichever is greater) ±1 digit max. Plug-in models (E5CN-U): (±1% of indicated value or ±2°C, whichever is greater) ±1 digit max. Platinum resistance thermometer input: Terminal block models (E5CN) and plug-in models (E5CN-U): (±0.2% of indicated value or ±0.8°C, whichever is greater) ±1 digit max. Analog input: Terminal block models (E5CN) and plug-in models (E5CN-U): ±0.2% FS ±1 digit max.
Inference of temperature 2 Preference of temperature 2 Preference of temperature 2 Preference of temperature 2 Preference of temperature 3 Preference 3			
Figure 1 in the control per 2 in the control per 3 in the control per 4	Influence of to	emperature *2	Thermocouple input (R, S, B, W, PL II): Terminal block models (E5CN): (±1% of PV or ±10°C, whichever is greater) ±1 digit max. Plug-in models (E5CN-U): (±2% of PV or ±10°C, whichever is greater) ±1 digit max. Other thermocouple input: *3 Terminal block models (E5CN): (+1% of PV or +4°C, whichever is greater) ±1 digit max.
Models with thermocouple/platinum resistance thermometer input (universal input): 0.1 to 999.9 EU (in units of 0.1 EU) #4 Models with thermocouple/platinum resistance thermometer input (universal input): 0.1 to 999.9 EU (in units of 0.1 EU) #4 Models with thermocouple/platinum resistance thermometer input (universal input): 0.1 to 999.9 EU (in units of 0.1 EU) #4 Models with analog input: 0.1 to 999.9% FS (in units of 0.1% FS) tegral time (i)	Influence of v	oltage *2	Platinum resistance thermometer input: Terminal block models (E5CN) and plug-in models (E5CN-U): (±1% of PV or ±2°C, whichever is greater) ±1 digit max. Analog input:
Models with thermocouple/platinum resistance thermometer input (universal input): 0.1 to 999.9 EU (in units of 0.1 EU) #4 Models with thermocouple/platinum resistance thermometer input (universal input): 0.1 to 999.9 EU (in units of 0.1 EU) #4 Models with thermocouple/platinum resistance thermometer input (universal input): 0.1 to 999.9 EU (in units of 0.1 EU) #4 Models with analog input: 0.1 to 999.9% FS (in units of 0.1% FS) tegral time (i)	Input samplin	ng period	
Models with analog input: 0.1 to 999.9% FS (in units of 0.1% FS)	Hysteresis		Models with thermocouple/platinum resistance thermometer input (universal input): 0.1 to 999.9 EU (in units of 0.1 EU) *4 Models with analog input: 0.01 to 99.99% FS (in units of 0.01% FS)
Perivative time (D)		. ,	Models with analog input: 0.1 to 999.9% FS (in units of 0.1% FS)
Introl period		•	, ,
Annual reset value 0.0 to 100.0% (in units of 0.1%)		` '	
The process of the	Control period	d	0.5, 1 to 99 s (in units of 1 s)
### Thermocouple: 0.1°C/Ω max. (100 Ω max.) Platinum resistance thermometer: 0.1°C/Ω max. (10 Ω max.) Platinum resistance thermometer: 0.1°C/Ω max. (10 Ω max.) Platinum resistance thermometer: 0.1°C/Ω max. (10 Ω max.) ### Sulation resistance ### 2,300 VAC, 50 or 60 Hz for 1 min (between terminals with different charge) ### 10 to 55 Hz, 20 m/s² for 10 min each in X, Y, and Z directions ### 10 to 55 Hz, 20 m/s² for 10 min each in X, Y, and Z directions ### Destruction ### 10 to 55 Hz, 20 m/s² for 10 min each in X, Y, and Z directions ### Destruction ### 10 to 55 Hz, 20 m/s² for 10 min each in X, Y, and Z directions ### 10 bestruction ### 10 controller: Approx. 110 g, Mounting Bracket: Approx. 10 g ### 10 controller: Approx. 110 g, Mounting Bracket: Approx. 10 g ### 10 controller: Approx. 110 g, Mounting Bracket: Approx. 10 g ### 10 controller: Approx. 110 g, Mounting Bracket: Approx. 10 g ### 10 controller: Approx. 110 g, Mounting Bracket: Approx. 10 g ### 10 controller: Approx. 110 g, Mounting Bracket: Approx. 10 g ### 10 controller: Approx. 110 g, Mounting Bracket: Approx. 10 g ### 10 controller: Approx. 110 g, Mounting Bracket: Approx. 10 g ### 10 controller: Approx. 110 g, Mounting Bracket: Approx. 10 g ### 10 controller: Approx. 110 g, Mounting Bracket: Approx. 10 g ### 10 controller: Approx. 110 g, Mounting Bracket: Approx. 10 g ### 10 controller: Approx. 110 g, Mounting Bracket: Approx. 10 g ### 10 controller: Approx. 110 g, Mounting Bracket: Approx. 10 g ### 10 controller: Approx. 110 g, Mounting Bracket: Approx. 10 g ### 10 controller: Approx. 110 g, Mounting Bracket: Approx. 10 g ### 10 controller: Approx. 110 g, Mounting Bracket: Approx. 10 g ### 10 controller: Approx. 110 g, Mounting Bracket: Approx. 10 g ### 10 controller: Approx. 110 g, Mounting Bracket: Approx. 10 g ### 10 controller: Approx. 110 g, Mounting Bracket: Approx. 10 g ### 10 controller: A	Manual reset value		0.0 to 100.0% (in units of 0.1%)
Platinum resistance thermometer: 0.1°C/\(\Omega\) max.\() (10 \Omega\)		, ,	
Second Protection Seco	tance		
Malfunction Destruction Destruction Destruction 10 to 55 Hz, 20 m/s² for 10 min each in X, Y, and Z directions 10 to 55 Hz, 0.75-mm single amplitude for 2 hrs each in X, Y, and Z directions 100 m/s², 3 times each in X, Y, and Z directions 100 m/s², 2 times each in X, Y, and Z directions 100 m/s², 2 times each in X, Y, and Z directions 100 m/s², 2 times each in X, Y, and Z directions 100 m/s², 2 times each in X, Y, and Z directions 100 m/s², 2 times each in X, Y, and Z directions 100 m/s², 2 times each in X, Y, and Z directions 100 m/s², 2 times each in X, Y, and Z directions 100 m/s², 2 times each in X, Y, and Z directions 100 m/	Insulation res	sistance	
Destruction 10 to 55 Hz, 0.75-mm single amplitude for 2 hrs each in X, Y, and Z directions	Dielectric stre		
Malfunction 100 m/s², 3 times each in X, Y, and Z directions	Vibration		
Destruction 300 m/s², 3 times each in X, Y, and Z directions	resistance		
Feight E5CN Controller: Approx. 150 g, Mounting Bracket: Approx. 10 g	Shock		
ESCN-U Controller: Approx. 110 g, Mounting Bracket: Approx. 10 g	resistance		
rotection ESCN-U ESCN Front panel: IP66, Rear case: IP20, Terminals: IP00 ESCN-U Front panel: IP50, Rear case: IP20, Terminals: IP00 Remory protection Non-volatile memory (number of writes: 1,000,000 times) Etup Tool CX-Thermo version 4.0 or higher Provided on the bottom of the ESCN. Use this port to connect a computer to the ESCN when using the Setup Tool. An E58-CIFQ1 USB-Serial Conversion Cable is required to connect the computer to the ESCN. *6 UL 61010-1, CSA C22.2 No. 1010-1 Conformed standards ENI: Radiated Interference Electromagnetic Field Strength: EN 55011 Group 1, class A Noise Terminal Voltage: EN 55011 Group 1, class A EN 55011 Group 1, class A EN 61326 ESD Immunity: EN 61000-4-2 Electromagnetic Field Immunity: EN 61000-4-2 Electromagnetic Field Immunity: EN 61000-4-2 Surge Immunity: EN 61000-4-4 Conducted Disturbance Immunity: EN 61000-4-6 Surge Immunity: EN 61000-4-6 Power Frequency Magnetic Field Immunity: EN 61000-4-8 Voltage Dip/Interrupting Immunity: EN 61000-4-1	Weight		Controller: Approx. 150 g, Mounting Bracket: Approx. 10 g
ESCN Front panel: IP66, Rear case: IP20, Terminals: IP00	Weight	E5CN-U	Controller: Approx. 110 g, Mounting Bracket: Approx. 10 g
Front panel: IP50, Rear case: IP20, Terminals: IP00	Degree of	E5CN	· · · · · · · · · · · · · · · · · · ·
Non-volatile memory (number of writes: 1,000,000 times) Etup Tool CX-Thermo version 4.0 or higher	protection	E5CN-U	Front panel: IP50, Rear case: IP20, Terminals: IP00
tandards Approved standards *7 Conformed standards EMI: Radiated Interference Electromagnetic Field Strength: Rose Terminal Voltage: ESD Immunity: Electromagnetic Field Immunity: Electromagnetic Field Immunity: EN 61000-4-6 Surge Immunity: Conducted Disturbance Immunity: EVA 1000-4-8 EVA 1000-4-11 CX-Thermo version 4.0 or higher Provided on the bottom of the E5CN. Use this port to connect a computer to the E5CN when using the Setup Tool. An E58-CIFQ1 USB-Serial Conversion Cable is required to connect the computer to the E5CN. *6 EN 61010-1, CSA C22.2 No. 1010-1 EN 61010-1 EN 61010-1, CSA C22.2 No. 1010-1 EN 61000-1 EN 61326 EN 61326 EN 61326 EN 61326 EN 61000-4-2 EN 61000-4-2 EN 61000-4-3 EN 61000-4-3 EN 61000-4-6 EN 61000-4-6 EN 61000-4-6 EN 61000-4-6 EN 61000-4-6 EN 61000-4-8 Voltage Dip/Interrupting Immunity: EN 61000-4-8 EN 61000-4-11	Memory prote	ection	
Provided on the bottom of the E5CN. Use this port to connect a computer to the E5CN when using the Setup Tool. An E58-CIFQ1 USB-Serial Conversion Cable is required to connect the computer to the E5CN. *6 Approved standards *7	Setup Tool		
tandards Approved standards *7 Conformed standards EN 61010-1 (IEC 61010-1): Pollution level 2, overcurrent category II EMI: Radiated Interference Electromagnetic Field Strength: EN 55011 Group 1, class A Noise Terminal Voltage: EM 55011 Group 1, class A EN 55011 Group 1, class A EN 61326 ESD Immunity: EN 61000-4-2 Electromagnetic Field Immunity: EN 61000-4-3 Burst Noise Immunity: EN 61000-4-4 Conducted Disturbance Immunity: EN 61000-4-6 Surge Immunity: EN 61000-4-5 Power Frequency Magnetic Field Immunity: EN 61000-4-8 Voltage Dip/Interrupting Immunity: EN 61000-4-11		ort	Provided on the bottom of the E5CN. Use this port to connect a computer to the E5CN when using the Setup Tool. An
Conformed standards EN 61010-1 (IEC 61010-1): Pollution level 2, overcurrent category II EMI: Radiated Interference Electromagnetic Field Strength: EN 55011 Group 1, class A Noise Terminal Voltage: EN 55011 Group 1, class A EN 61326 ESD Immunity: EN 61000-4-2 Electromagnetic Field Immunity: EN 61000-4-3 Burst Noise Immunity: EN 61000-4-4 Conducted Disturbance Immunity: EN 61000-4-6 Surge Immunity: EN 61000-4-5 Power Frequency Magnetic Field Immunity: EN 61000-4-8 Voltage Dip/Interrupting Immunity: EN 61000-4-11	Standards		<u> </u>
Radiated Interference Electromagnetic Field Strength: EN 55011 Group 1, class A Noise Terminal Voltage: EN 55011 Group 1, class A EMS: EN 61326 ESD Immunity: EN 61000-4-2 Electromagnetic Field Immunity: EN 61000-4-3 Burst Noise Immunity: EN 61000-4-4 Conducted Disturbance Immunity: EN 61000-4-6 Surge Immunity: EN 61000-4-6 Surge Immunity: EN 61000-4-5 Power Frequency Magnetic Field Immunity: EN 61000-4-8 Voltage Dip/Interrupting Immunity: EN 61000-4-11	mirual US		
	ЕМС		Radiated Interference Electromagnetic Field Strength: EN 55011 Group 1, class A Noise Terminal Voltage: EN 55011 Group 1, class A EMS: EN 61326 ESD Immunity: EN 61000-4-2 Electromagnetic Field Immunity: EN 61000-4-3 Burst Noise Immunity: EN 61000-4-4 Conducted Disturbance Immunity: EN 61000-4-6 Surge Immunity: EN 61000-4-5 Power Frequency Magnetic Field Immunity: EN 61000-4-8
FILE INDICATION GOVERNO OF A DECEMBER OF THE EXPLORE FOUND FOR THE INDICATION OF AN A SECOND OF AN A SECOND OF A S	k1. The indicati	on accuracy of K	K thermocouples in the –200 to 1300°C range. T and N thermocouples at a temperature of –100°C max., and U and L

^{*1.} The indication accuracy of K thermocouples in the –200 to 1300°C range, T and N thermocouples at a temperature of –100°C max., and U and L thermocouples at any temperatures is ±2°C ±1 digit max. The indication accuracy of the B thermocouple at a temperature of 400°C max. is not specified. The indication accuracy of B thermocouples in the 400 to 800°C range is ±3°C max. The indication accuracy of the R and S thermocouples at a temperature of 200°C max. is ±3°C ±1 digit max. The indication accuracy of W thermocouples is ±0.3 of PV or ±3°C, whichever is greater, ±1 digit max. The indication accuracy of PL II thermocouples is ±0.3 of PV or ±2°C, whichever is greater, ±1 digit max.

^{*2.} Ambient temperature: −10°C to 23°C to 55°C, Voltage range: −15% to 10% of rated voltage

^{★3}. K thermocouple at −100°C max.: ±10° max.

^{*4. &}quot;EU" stands for Engineering Unit and is used as the unit after scaling. For a temperature sensor, the EU is °C or °F.

^{\$5.} When robust tuning (RT) is ON, the differential time is 0.0 to 999.9 (in units of 0.1 s).

^{*6.} External communications (RS-485) and cable communications for the Setup Tool can be used at the same time.

^{*7.} The E5CN-U plug-in model is certified for UL listing only when used together with the OMRON P2CF-11 or P2CF-11-E Socket. The P3GA-11 is not certified for UL listing.

USB-Serial Conversion Cable

Applicable OS	Windows 2000, XP, or Vista
Applicable software	Thermo Mini, CX-Thermo version 4.0 or higher
Applicable models	E5AN/E5EN/E5CN/E5CN-U/E5AN-H/ E5EN-H/E5CN-H
USB interface standard	Conforms to USB Specification 1.1.
DTE speed	38400 bps
Connector specifications	Computer: USB (type A plug) Temperature Controller: Setup Tool port (on bottom of Controller)
Power supply	Bus power (Supplied from USB host controller.)
Power supply voltage	5 VDC
Current consumption	70 mA
Ambient operating temperature	0 to 55°C (with no condensation or icing)
Ambient operating humidity	10% to 80%
Storage temperature	-20 to 60°C (with no condensation or icing)
Storage humidity	10% to 80%
Altitude	2,000 m max.
Weight	Approx. 100 g
·	

Note: A driver must be installed in the personal computer. Refer to installation information in the operation manual for the Conversion Cable.

Communications Specifications

Transmission line connection method	RS-485: Multipoint
Communications	RS-485 (two-wire, half duplex)
Synchronization method	Start-stop synchronization
Protocol	CompoWay/F, SYSWAY, or Modbus
Baud rate	1200, 2400, 4800, 9600, 19200, 38400, or 57600 bps
Transmission code	ASCII
Data bit length *	7 or 8 bits
Stop bit length *	1 or 2 bits
Error detection	Vertical parity (none, even, odd) Frame check sequence (FCS) with SYSWAY Block check character (BCC) with CompoWay/F or CRC-16 Modbus
Flow control	None
Interface	RS-485
Retry function	None
Communications buffer	217 bytes
Communications response wait time	0 to 99 ms Default: 20 ms

*The baud rate, data bit length, stop bit length, and vertical parity can be individually set using the Communications Setting Level.

Current Transformer (Order Separately) Ratings

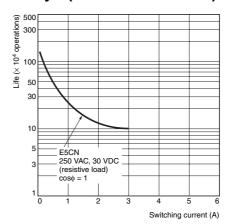
Dielectric strength	1,000 VAC for 1 min
Vibration resistance	50 Hz, 98 m/s ²
Weight	E54-CT1: Approx. 11.5 g, E54-CT3: Approx. 50 g
Accessories (E54-CT3 only)	Armatures (2) Plugs (2)

Heater Burnout Alarms, SSR Failure Alarms, and Heater Overcurrent Alarms

CT input (for heater current detection)	Models with detection for single-phase heaters: One input Models with detection for single-phase or three-phase heaters: Two inputs
Maximum heater current	50 A AC
Input current indication accuracy	±5% FS ±1 digit max.
Heater burnout alarm setting range *1	0.1 to 49.9 A (in units of 0.1 A) Minimum detection ON time: 100 ms
SSR failure alarm set- ting range *2	0.1 to 49.9 A (in units of 0.1 A) Minimum detection OFF time: 100 ms
Heater overcurrent alarm setting range *3	0.1 to 49.9 A (in units of 0.1 A) Minimum detection ON time: 100 ms

- *1. For heater burnout alarms, the heater current will be measured when the control output is ON, and the output assigned to the alarm 1 function will turn ON if the heater current is lower than the set value (i.e., heater burnout detection current value).
- *2. For SSR failure alarms, the heater current will be measured when the control output is OFF, and the output assigned to the alarm 1 function will turn ON if the heater current is higher than the set value (i.e., SSR failure detection current value).
- *3. For heater overcurrent alarms, the heater current will be measured when the control output is ON, and the output assigned to the alarm 1 function will turn ON if the heater current is higher than the set value (i.e., heater overcurrent detection current value).

Electrical Life Expectancy Curve for Relays (Reference Values)



Note: Do not connect a DC load to a Controller with a Long-life Relay

External Connections

- A voltage output (control output, for driving SSR) is not electrically insulated from the internal circuits. When using a grounding thermocouple, do not connect any of the control output terminals to ground. (If the control output terminals are connected to ground, errors will occur in the measured temperature values as a result of leakage current.)
- Consult with your OMRON representative before using the external power supply for the ES1B for any other purpose.

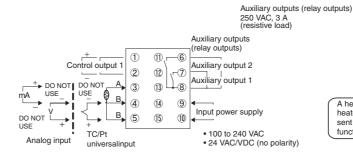
E5CN

Controllers

Control output 1
Long-life relay output
250 VAC, 3 A (resistive load)
Relay output
250 VAC, 3 A (resistive load)
Voltage output (for driving SSR)
12 VDC, 21 mA
Current output
0 to 20 mA DC
4 to 20 mA DC
Load: 600 Ω max.

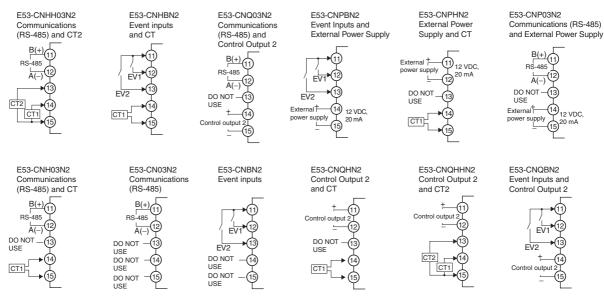
Control output 2

Voltage output (for driving SSR)
12 VDC, 21 mA

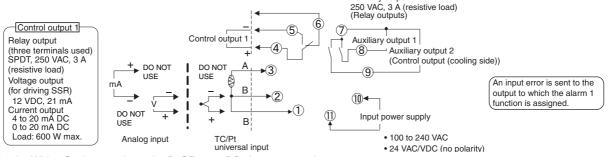


A heater burnout alarm, heater short alarm, heater overcurrent alarm, or input alarm is sent to the output to which the alarm 1 function is assigned.

Option Units



E5CN-U

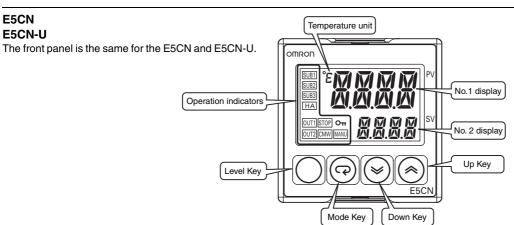


Auxiliary output

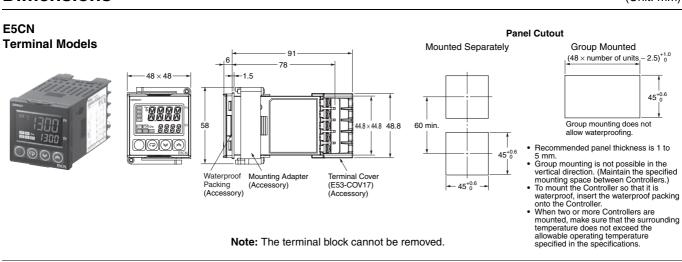
Note: For the Wiring Socket, purchase the P2CF-11 or PG3A-11 separately.

E5CN/E5CN-U

Nomenclature

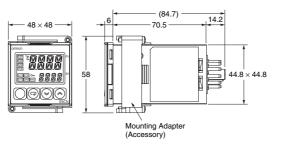


Dimensions (Unit: mm)

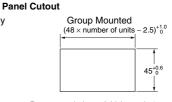








Mounted Separately 60 min $45^{+0.6}_{0}$ 45^{+0.6} →



- Recommended panel thickness is 1 to 5
- Hecommended panel thickness is 1 to 5 mm.

 Group mounting is not possible in the vertical direction. (Maintain the specified mounting space between Controllers.)

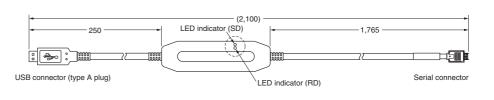
 When two or more Controllers are mounted, make sure that the surrounding temperature does not exceed the allowable operating temperature specified in the specifications.

Accessories (Order Separately)

USB-Serial Conversion Cable

E58-CIFQ1

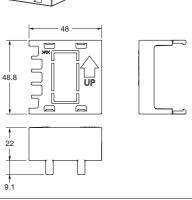




Terminal Cover E53-COV17



Note: The E53-COV10 cannot be used.



Waterproof Packing Y92S-29 (for DIN 48×48)



Order the Waterproof Packing separately if it becomes lost or damaged.

The Waterproof Packing can be used to achieve an IP66 degree of protection.

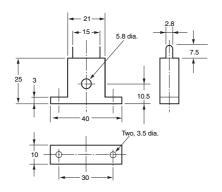
(Deterioration, shrinking, or hardening of the waterproof packing may occur depending on the operating environment. Therefore, periodic replacement is recommended to ensure the level of waterproofing specified in IP66. The time for periodic replacement depends on the operating environment. Be sure to confirm this point at your site. Consider one year a rough standard. OMRON shall not be liable for the level of water resistance if the customer does not perform periodic replacement.)

The Waterproof Packing does not need to be attached if a waterproof structure is not required.

Current Transformers

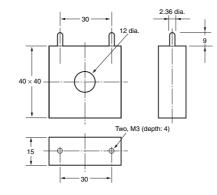
E54-CT1





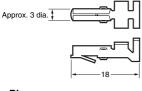
E54-CT3



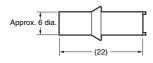


E54-CT3 Accessory

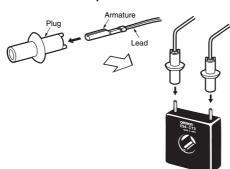
Armature



• Plug



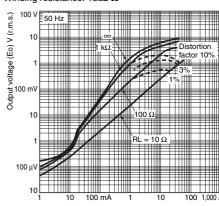
Connection Example



E54-CT1

Thru-current (Io) vs. Output Voltage (Eo) (Reference Values)

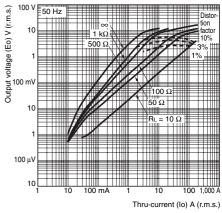
Maximum continuous heater current: 50 A (50/60 Hz) Number of windings: 400 \pm 2 Winding resistance: 18 \pm 2 Ω



Thru-current (Io) A (r.m.s.)

E54-CT3 Thru-current (lo) vs. Output Voltage (Eo) (Reference Values)

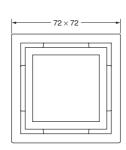
Maximum continuous heater current: 120 A (50/60 Hz) (Maximum continuous heater current for the Temperature Controller is 50 A.) Number of windings: 400±2 Winding resistance: 8±0.8 Ω

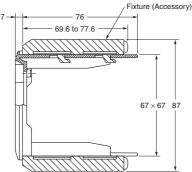


Adapter

Y92F-45 Note: Use this Adapter when the panel has already been prepared for the E5B.

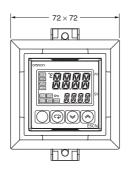


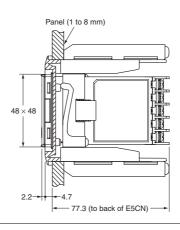




Mounted to E5CN



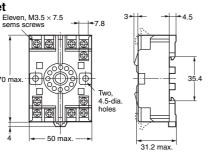




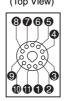
E5CN-U Wiring Socket







Terminal Layout/Internal Connections (Top View)



Mounting Holes Two, 4.5 dia. mounting holes

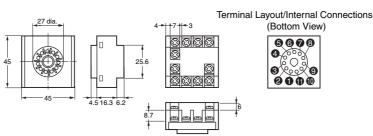
Note: Can also be mounted to a DIN track.

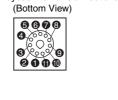
Note: A model with finger protection (P2CF-11-E) is also available.

Back-connecting Socket









- Note: 1. Using any other sockets will adversely affect accuracy. Use only the specified sockets.2. A Protective Cover for finger protection (Y92A-48G) is also available.

Basic-type Digital Temperature Controller

E5AN/E5EN (96 x 96 mm and 48 x 96 mm)

New 96 x 96-mm and 48 x 96-mm Basic Temperature Controllers with Enhanced Functions and Performance.

Improved Indication Accuracy and Preventive Maintenance Function.

- Indication Accuracy
 - Thermocouple input: $\pm 0.3\%$ of PV (previous models: $\pm 0.5\%$) Pt input: $\pm 0.2\%$ of PV (previous models: $\pm 0.5\%$)
 - Analog input: ±0.2% FS (previous models: ±0.5%)
- A PV/SV-status display function can be set to automatically alternate between displaying the status of the Temperature Controller (auto/manual, RUN/STOP, and alarms) and the PV or SV.
- Preventive maintenance for relays in the Temperature Controller using a Control Output ON/OFF Counter.
- Three-level display that simultaneously displays the PV, SV, and MV.
- One-touch operation with PF Key that can be assigned to auto/manual, RUN/ STOP, or other functions.



E5AN



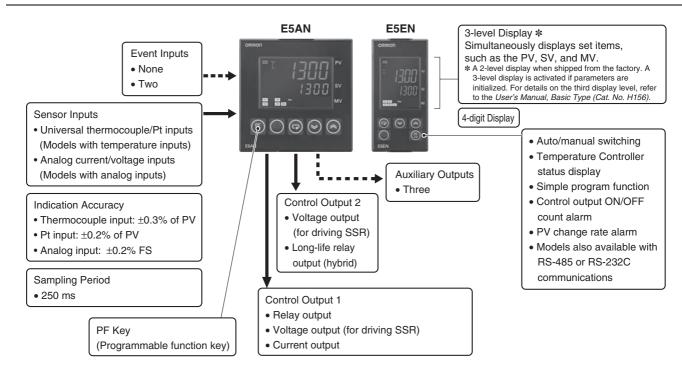
c(V)us C €

48 × 96 mm E5EN

<u>NEW</u>

↑ Refer to Safety Precautions on page 66.

Main I/O Functions



This data sheet is provided as a guideline for selecting products. Be sure to refer to the following user manuals for application precautions and other information required for operation before attempting to use the product.

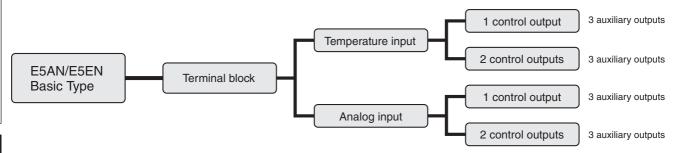
E5CN/E5AN/E5EN Digital Temperature Controllers User's Manual Basic Type (Cat. No. H156)

E5CN/E5AN/E5EN Digital Temperature Controllers Communications Manual Basic Type (Cat. No. H158)

17

E5CN-H (48 x 48 mm)

Lineup



Note: Models with one control output or two control outputs can be used for heating/cooling control.

Model Number Structure

Model Number Legend

Controllers

1 2 3 4 5 6 7

1. Control Output 1

- R: Relay output
- Q: Voltage output (for driving SSR)
- C: Current output

2. Auxiliary Outputs

3: Three outputs

3. Heater Burnout/SSR Failure, Control Output 2, or External Power Supply for ES1B

Blank: None

Q: Control output 2 (voltage output for driving SSR)

Y: Long-life relay output (hybrid)

H: Heater burnout/SSR failure/Heater overcurrent detection (CT1)

HH: Heater burnout/SSR failure/Heater overcurrent detection (CT2)

P: Power supply for sensor

4. Option

M: Option Unit can be mounted.

5. Input Type

T: Universal thermocouple/platinum resistance thermometer input

L: Analog current/voltage input

6. Power Supply Voltage

Blank: 100 to 240 VAC D: 24 VAC/VDC

7. Case Color

Blank: Black W: Silver

8. Terminal Cover

-500: With terminal cover

9. Version

N: Available only to models released after January 2008.

Option Units

E53-

1. Function

EN01: RS-232C communications EN03: RS-485 communications

AKB: Event input

Ordering Information

E5AN Controllers with Terminal Blocks

		Power Auxilia- Functions		Functions					
Size	Case	supply voltage	Input type	ry outputs	Control output 1	Heater burnout	Power supply for Sensor	Control output 2	Model
					Relay output				E5AN-R3MT-500-N
					Voltage output (for driving SSR)				E5AN-Q3MT-500-N
					Current output				E5AN-C3MT-500-N
					Relay output	1			E5AN-R3HMT-500-N
					Voltage output for driving SSR)	1			E5AN-Q3HMT-500-N
					Relay output	2			E5AN-R3HHMT-500-N
			Thermoseunle		Voltage output for driving SSR)	2			E5AN-Q3HHMT-500-N
			Thermocouple or Resistance	3	Relay output			Voltage output	E5AN-R3QMT-500-N
			thermometer		Voltage output (for driving SSR)			Voltage output	E5AN-Q3QMT-500-N
		100.			Current output			Voltage output	E5AN-C3QMT-500-N
1/4 DIN 96 × 96 × 78 (W × H × D)		100 to 240 VAC			Relay output			Long life	E5AN-R3YMT-500-N
					Voltage output (for driving SSR)			Long-life relay output	E5AN-Q3YMT-500-N
					Current output			carpar	E5AN-C3YMT-500-N
					Relay output		Sensor Power		E5AN-R3PMT-500-N
	Black				Voltage output (for driving SSR)		Sensor Power		E5AN-Q3PMT-500-N
					Relay output				E5AN-R3ML-500-N
					Voltage output (for driving SSR)				E5AN-Q3ML-500-N
					Current output				E5AN-C3ML-500-N
$(W \times H \times D)$			Analog (current/voltage)	3	Relay output	1			E5AN-R3HML-500-N
			(ourroing voilage)		Voltage output (for driving SSR)	1			E5AN-Q3HML-500-N
					Voltage output (for driving SSR)			Long-life relay output	E5AN-Q3YML-500-N
					Relay output				E5AN-R3MTD-500-N
					Voltage output (for driving SSR)				E5AN-Q3MTD-500-N
			Thermocouple		Current output				E5AN-C3MTD-500-N
		24 VAC/ VDC	or Resistance	3	Relay output	1			E5AN-R3HMTD-500-N
		VDO	thermometer		Voltage output (for driving SSR)	1			E5AN-Q3HMTD-500-N
					Relay output	2			E5AN-R3HHMTD-500-N
					Voltage output (for driving SSR)	2			E5AN-Q3HHMTD-500-N
					Relay output				E5AN-R3MT-W-500-N
		100 to			Voltage output (for driving SSR)				E5AN-Q3MT-W-500-N
		100 to 240 VAC			Current output				E5AN-C3MT-W-500-N
	Cilva		Thermocouple or	2	Relay output	1			E5AN-R3HMT-W-500-N
	Silver		Resistance thermometer	3	Voltage output (for driving SSR)	1			E5AN-Q3HMT-W-500-N
					Relay output				E5AN-R3MTD-W-500-N
		24 VAC/ VDC			Voltage output (for driving SSR)				E5AN-Q3MTD-W-500-N
					Current output				E5AN-C3MTD-W-500-N

E5EN Controllers with Terminal Blocks

	Casa	Power		Auxilia-	Control		Functions		
Size	Case	supply voltage	Input type	ry outputs	output 1	Heater burnout	Power supply for Sensor	Control output 2	Model
					Relay output				E5EN-R3MT-500-N
					Voltage output (for driving SSR)				E5EN-Q3MT-500-N
					Current output				E5EN-C3MT-500-N
					Relay output	1			E5EN-R3HMT-500-N
					Voltage output (for driving SSR)	1			E5EN-Q3HMT-500-N
					Relay output	2			E5EN-R3HHMT-500-N
					Voltage output (for driving SSR)	2			E5EN-Q3HHMT-500-N
			Thermocouple or		Relay output			Voltage output	E5EN-R3QMT-500-N
			Resistance thermometer	3	Voltage output (for driving SSR)			Voltage output	E5EN-Q3QMT-500-N
		100 to			Current output			Voltage output	E5EN-C3QMT-500-N
		240 VAC			Relay output			Long-life relay output	E5EN-R3YMT-500-N
					Voltage output (for driving SSR)			Long-life relay output	E5EN-Q3YMT-500-N
	Disale				Current output			Long-life relay output	E5EN-C3YMT-500-N
	Black				Relay output		Sensor Power		E5EN-R3PMT-500-N
					Voltage output (for driving SSR)		Sensor Power		E5EN-Q3PMT-500-N
					Relay output				E5EN-R3ML-500-N
1/8 DIN 48 × 96 × 78					Voltage output (for driving SSR)				E5EN-Q3ML-500-N
$(W\timesH\timesD)$			Analog (current/volt-	3	Current output				E5EN-C3ML-500-N
			age)		Relay output	1			E5EN-R3HML-500-N
					Voltage output	1			E5EN-Q3HML-500-N
					(for driving SSR)			Long-life relay output	E5EN-Q3YML-500-N
					Relay output				E5EN-R3MTD-500-N
					Voltage output (for driving SSR)				E5EN-Q3MTD-500-N
			Thermocouple		Current output				E5EN-C3MTD-500-N
		24 VAC/	or	3	Relay output	1			E5EN-R3HMTD-500-N
		VDC	Resistance thermometer		Voltage output (for driving SSR)	1			E5EN-Q3HMTD-500-N
					Relay output	2			E5EN-R3HHMTD-500-N
					Voltage output (for driving SSR)	2			E5EN-Q3HHMTD-500-N
					Relay output				E5EN-R3MT-W-500-N
		100 to			Voltage output (for driving SSR)				E5EN-Q3MT-W-500-N
		240 VAC			Current output				E5EN-C3MT-W-500-N
			Thrmocouple or		Relay output	1			E5EN-R3HMT-W-500-N
	Silver		Resistance thermometer	3	Voltage output (for driving SSR)	1			E5EN-Q3HMT-W-500-N
		24 VAC/			Relay output				E5EN-R3MTD-W-500-N
		VDC			Voltage output (for driving SSR)				E5EN-Q3MTD-W-500-N
					Current output				E5EN-C3MTD-W-500-N

Option Units

Name	Function	Model
Communications Unit	RS-232C communications	E53-EN01
Communications offic	RS-485 communications	E53-EN03
Event Input Unit	Event inputs	E53-AKB

Accessories (Order Separately)USB-Serial Conversion Cable

Model	
E58-CIFQ1	

Terminal Cover

Connectable models	Model			
E5AN	E53-COV16			
E5EN	E33-COV 16			

Note: The Terminal Cover comes with the E5CN-□□□-500 models.

Waterproof Packing

Connectable models	Model
E5AN	Y92S-P4
E5EN	Y92S-P5

Note: The Waterproof Packing is included with the Controller.

Current Transformers (CTs)

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

CX-Thermo Support Software

Model
EST2-2C-MV4

E5AN/E5EN

Specifications

Ratings

natilig	S						
Power su	pply voltage	No D in model number: 100 to 240 VAC, 50/60 Hz D in model number: 24 VAC, 50/60 Hz; 24 VDC					
Operating voltage range		85% to 110% of rated supply voltage					
Power consump	tion	100 to 240 VAC: 10 VA 24 VAC/VDC: 5.5 VA (24 VAC)/4 W (24 VDC)					
Sensor input		Models with temperature inputs Thermocouple: K, J, T, E, L, U, N, R, S, B, W, or PL II Platinum resistance thermometer: Pt100 or JPt100 Infrared temperature sensor: 10 to 70°C, 60 to 120°C, 115 to 165°C, or 140 to 260°C Voltage input: 0 to 50 mV Models with analog inputs Current input: 4 to 20 mA or 0 to 20 mA					
Innest inco	-d-m	Voltage input: 1 to 5 V, 0 to 5 V, or 0 to 10 V Current input: 150 Ω max., Voltage input: 1 M Ω min. (Use a 1:1 connection when connecting the ES2-HB.)					
Input imp		ON/OFF control or 2-PID control (with auto-tuning)					
Control II	Relay output	SPST-NO, 250 VAC, 5 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA					
Control	Voltage output (for driving SSR)	Output voltage: 12 VDC ±15% (PNP), max. load current: 40 mA, With short-circuit protection circuit: Max. load current of 21 mA for control output 2					
output	Current output	4 to 20 mA DC/0 to 20 mA DC, load: 600 Ω max., resolution: approx. 10,000					
	Long-life relay out- put	SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 1,000,000 operations, load power supply voltage: 75 to 250 VAC (DC loads cannot be connected.), minimum applicable load: 5 V, 10 mA, leakage current: 5 mA max. (250 VAC, 60 Hz)					
Auxiliary	Number of outputs	3					
output	Output specifica- tions	Relay output: SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA					
	Number of inputs	2					
Event	External contact in	Contact input: ON: 1 k Ω max., OFF: 100 k Ω min.					
input	External contact in- put specifications	Non-contact input: ON: Residual voltage: 1.5 V max., OFF: Leakage current: 0.1 mA max.					
	put opcomoditions	Current flow: Approx. 7 mA per contact					
External p	oower supply for ES1B	12 VDC ±10%, 20 mA, short-circuit protection circuit provided					
Setting m	ethod	Digital setting using front panel keys					
Indication	n method	11-segment digital display and individual indicators (7-segments displays also possible) Character height: E5AN: PV: 15.8 mm, SV: 9.5 mm, MV: 6.8 mm; E5EN: PV: 11.8 mm, SV: 8.1 mm, MV: 5.8 mm Content of 3-level display: PV/SV/MV, PV/SV/multi-SP, or soak time remain ★ Number of digits: 4 for PV, SV, and MV					
Multi SP		Up to four set points (SP0 to SP3) can be saved and selected using event inputs, key operations, or serial communications.					
Bank swit	tching	Not supported.					
Other fun	ctions	Manual output, heating/cooling control, loop burnout alarm, SP ramp, other alarm functions, heater burnout detection, 40% AT, 100% AT, MV limiter, input digital filter, self-tuning, temperature input shift, run/stop, protection functions, control output ON/OFF counter, extraction of square root, MV change rate limit, logic operations, PV/SV status display, simple program, automatic cooling coefficient adjustment					
Ambient of	operating temperature	-10 to 55°C (with no condensation or icing), for 3-year warranty: −10 to 50°C					
Ambient o	perating humidity	25% to 85%					
Storage to	emperature	−25 to 65°C (with no condensation or icing)					

^{*}A 2-level display when shipped from the factory. A 3-level display is activated if parameters are initialized. For details on the third display level, refer to the *User's Manual, Basic Type* (Cat. No. H156).

Input Ranges

Thermocouple/Platinum Resistance Thermometer (Universal inputs)

In ty	put /pe	PI		m res	istano eter	ce	Thermocouple											Infra	Analog input								
Na	ame		Pt100)	JPt	100	ı	‹	,	J	7	Г	E	L	ı	J	N	R	s	В	w	PL II	10 to 70°C	60 to 120 °C	115 to 165 °C	140 to 260 °C	0 to 50 mV
	2300																				2300						
	1800																			1800	_						
	1700																	1700	1700								
	1600																				_						
	1500																				_						
	1400						1000										1000				_	1000					
	1300						1300										1300				_	1300					
္ည	1200																-		\vdash		-	-					Usable
<u>e</u>	1100																-		\vdash		-	-					in the following
шč	1000	850							850					850			-		- 1	-	-	-					ranges
20	900	650					+		000					000			-		-			-					by
2	800						+		-					-			-		-			-					scaling:
rat	700	-					+		-				600	-			-		-			-					–1999 to 9999 or
Б	600	-	500.0		500.0		+ -	500.0					000	-			-	-	-	\vdash	+ -	-					-199.9
Temperature range (°C)	500		500.0		500.0		+	300.0	-	400.0	400	400.0			400	400.0	-		\vdash		-	-					to 999.9
Ĕ	400	-					1 -		-	400.0	400	400.0		-	400	400.0						-				260	}
	300	-					1		-		-								\vdash		\vdash			120	165	200	
	200	-		100.0		100.0	1 -		-		-												90	120	.00		ł
	100	-		100.0		100.0	1													100							
	0			0.0		0.0												0	0		0	0	0	0	0	0	1
	-100.0							-20.0	-100	-20.0				-100													1
	-200.0	-200	-199.9		-199.9		-200				-200	-199.9	-200		-200	-199.9	-200										
Set	ting nber	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	24	25	19	20	21	22	23

Shaded settings are the default settings.

The applicable standards for the input types are as follows:

K, J, T, E, N, R, S, B: JIS C 1602-1995, IEC 584-1

L: Fe-CuNi, DIN 43710-1985

U: Cu-CuNi, DIN 43710-1985

W: W5Re/W26Re, ASTM E988-1990

JPt100: JIS C 1604-1989, JIS C 1606-1989

Pt100: JIS C 1604-1997, IEC 751

PL II: According to Platinel II electromotive force charts from BASF (previously Engelhard)

Models with Analog Inputs

Input type	Cur	rent					
Input specification	4 to 20mA	0 to 20 mA	1 to 5 V	0 to 5 V	0 to 10 V		
Setting range	Usable in the following ranges by scaling: -1999 to 9999, -199.9 to 999.9, -19.99 to 99.99 or -1.999 to 9.89						
Setting number	0	1	2	3	4		

Shaded settings are the default settings.

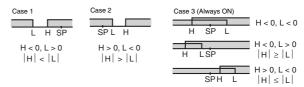
Alarm Outputs

Each alarm can be independently set to one of the following 13 alarm types. The default is 2: Upper limit. Auxiliary outputs are allocated for alarms. ON delays and OFF delays (0 to 999 s) can also be specified.

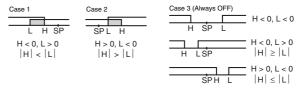
Note: For models with heater burnout, SSR failure, and heater overcurrent detection, alarm 1 will be an OR output of the alarm selected from the following alarm types and the alarms for heater burnout, SSR failure, and heater overcurrent. To output only a heater burnout alarm, SSR failure alarm, and heater overcurrent alarm for alarm 1, set the alarm type to 0 (i.e., no alarm function).

		Alarm outp	ut operation
Set value	Alarm type	When X is positive	When X is negative
0	Alarm function OFF	Output OFF	
1 *1	Upper- and lower-limit	ON L H SP	*2
2	Upper limit	ON X SP	ON X - SP
3	Lower limit	ON X SP	ON X SP
4 *1	Upper- and lower-limit range	ON L H SP	*3
5 *1	Upper- and lower-limit with standby sequence	ON → L H ← OFF SP *5	*4
6	Upper-limit with standby sequence	ON X SP	ON X - SP
7	Lower-limit with standby sequence	ON X ← SP	ON → X ← SP
8	Absolute-value upper-limit	ON OFF 0	ON OFF 0
9	Absolute-value lower-limit	ON ←X→ OFF 0	ON OFF 0
10	Absolute-value upper-limit with standby sequence	ON OFF 0	ON OFF 0
11	Absolute-value lower-limit with standby sequence	ON OFF 0	ON OFF 0
12	LBA (for alarm 1 only)		
13	PV change rate		

- *1. With set values 1, 4 and 5, the upper and lower limit values can be set independently for each alarm type, and are expressed as "L" and "H."
- *2. Set value: 1, Upper- and lower-limit alarm



*3. Set value: 4, Upper- and lower-limit range



- *4. Set value: 5, Upper- and lower-limit with standby sequence For Upper- and Lower-Limit Alarm Described Above
 - Case 1 and 2
 <u>Always OFF</u> when the upper-limit and lower-limit hysteresis overlaps.
 - Case 3: Always OFF
- *5. Set value: 5, Upper- and lower-limit with standby sequence <u>Always OFF</u> when the upper-limit and lower-limit hysteresis overlaps.

Characteristics

	CHOLICS					
Indication a	occuracy	Thermocouple: (±0.3% of indicated value or ±1°C, whichever is greater) ±1 digit max. *1 Platinum resistance thermometer: (±0.2% of indicated value or ±0.8°C, whichever is greater) ±1 digit max. Analog input: ±0.2% FS ±1 digit max. CT input: ±5% FS ±1 digit max.				
Transfer ou	tput accuracy	±0.3% FS max.				
Influence o *2	f temperature	Thermocouple input (R, S, B, W, PL II): $(\pm 1\%$ of PV or $\pm 10^{\circ}$ C, whichever is greater) ± 1 digit max. Other thermocouple input: $(\pm 1\%$ of PV or $\pm 4^{\circ}$ C, whichever is greater) ± 1 digit max. *3				
	f voltage *2	Platinum resistance thermometer: (\pm 1% of PV or \pm 2°C, whichever is greater) \pm 1 digit max. Analog input: (\pm 1%FS) \pm 1 digit max.				
Input samp	ling period	250 ms				
Hysteresis		Models with thermocouple/platinum resistance thermometer input (universal input): 0.1 to 999.9 EU (in units of 0.1 EU) *4 Models with analog input: 0.01 to 99.99% FS (in units of 0.01% FS)				
Proportiona	al band (P)	Models with thermocouple/platinum resistance thermometer input (universal input): 0.1 to 999.9 EU (in units of 0.1 EU) *4 Models with analog input: 0.1 to 999.9% FS (in units of 0.1% FS)				
Integral tim	e (I)	0 to 3999 s (in units of 1 s)				
Derivative t		0 to 3999 s (in units of 1 s) *5				
Control per	iod	0.5, 1 to 99 s (in units of 1 s)				
Manual res	et value	0.0 to 100.0% (in units of 0.1%)				
Alarm setti	ng range	-1999 to 9999 (decimal point position depends on input type)				
Affect of signessistance	gnal source	Thermocouple: $0.1^{\circ}\text{C}/\Omega$ max. (100 Ω max.) Platinum resistance thermometer: $0.1^{\circ}\text{C}/\Omega$ max. (10 Ω max.)				
Insulation r	esistance	20 MΩ min. (at 500 VDC)				
Dielectric s	trength	2,300 VAC, 50 or 60 Hz for 1 min (between terminals with different charge)				
Vibration	Malfunction	10 to 55 Hz, 20 m/s² for 10 min each in X, Y, and Z directions				
resistance	Destruction	10 to 55 Hz, 0.75-mm single amplitude for 2 hrs each in X, Y, and Z directions				
Shock	Malfunction	100 m/s², 3 times each in X, Y, and Z directions				
resistance	Destruction	300 m/s², 3 times each in X, Y, and Z directions				
	E5AN	Controller: Approx. 310 g, Mounting Bracket: Approx. 100 g				
Weight	E5EN	Controller: Approx. 260 g, Mounting Bracket: Approx. 100 g				
Degree of p	rotection	Front panel: IP66, Rear case: IP20, Terminals: IP00				
Memory pro	otection	Non-volatile memory (number of writes: 1,000,000 times)				
Setup Tool		CX-Thermo version 4.0 or higher				
Setup Tool	port	Provided on the bottom of the E5AN and E5EN. An E58-CIFQ1 USB-Serial Conversion Cable is required to connect the computer to the E5AN and E5EN *6				
Approved standards		UL 61010-1, CSA C22.2 No. 1010-1				
Conformed standards		EN 61010-1 (IEC 61010-1): Pollution level 2, overcurrent category II				
EMC		EMI: EN 61326 Radiated Interference Electromagnetic Field Strength: EN 55011 Group 1, class A Noise Terminal Voltage: EN 55011 Group 1, class A EMS: EN 61326 ESD Immunity: EN 61000-4-2 Electromagnetic Field Immunity: EN 61000-4-3 Burst Noise Immunity: EN 61000-4-4 Conducted Disturbance Immunity: EN 61000-4-6 Surge Immunity: EN 61000-4-5 Power Frequency Magnetic Field Immunity: EN 61000-4-8 Voltage Dip/Interrupting Immunity: EN 61000-4-11				

^{*1.} The indication accuracy of K thermocouples in the –200 to 1300°C range, T and N thermocouples at a temperature of –100°C max., and U and L thermocouples at any temperatures is ±2°C ±1 digit max. The indication accuracy of the B thermocouple at a temperature of 400°C max. is not specified. The indication accuracy of B thermocouples in the 400 to 800°C range is ±3°C max. The indication accuracy of the R and S thermocouples at a temperature of 200°C max. is ±3°C ±1 digit max. The indication accuracy of W thermocouples is ±0.3 of PV or ±3°C, whichever is greater, ±1 digit max. The indication accuracy of PL II thermocouples is ±0.3 of PV or ±2°C, whichever is greater, ±1 digit max.

^{*2.} Ambient temperature: −10°C to 23°C to 55°, Voltage range: −15% to 10% of rated voltage

^{★3}. K thermocouple at −100°C max.: ±10°C max.

^{*4. &}quot;EU" stands for Engineering Unit and is used as the unit after scaling. For a temperature sensor, the EU is °C or °F.

^{\$5.} When robust tuning (RT) is ON, the differential time is 0.0 to 999.9 (in units of 0.1 s).

^{*6.} External communications (RS-232C or RS-485) and cable communications for the Setup Tool can be used at the same time.

USB-Serial Conversion Cable

Applicable OS	Windows 2000, XP, or Vista
Applicable software	Thermo Mini, CX-Thermo version 4.0 or higher
Applicable models	E5AN/E5EN/E5CN/E5CN-U/E5AN- H/E5EN-H/E5CN-H
USB interface standard	Conforms to USB Specification 1.1.
DTE speed	38400 bps
Connector specifications	Computer: USB (type A plug) Temperature Controller: Setup Tool port (on bottom of Controller)
Power supply	Bus power (Supplied from USB host controller.)
Power supply voltage	5 VDC
Current consumption	70 mA
Ambient operating temperature	0 to 55°C (with no condensation or icing)
Ambient operating humidity	10% to 80%
Storage temperature	-20 to 60°C (with no condensation or icing)
Storage humidity	10% to 80%
Altitude	2,000 m max.
Weight	Approx. 100 g

Note: A driver must be installed in the personal computer. Refer to installation information in the operation manual for the Conversion Cable.

Communications Specifications

Transmission line	RS-485: Multipoint
connection method	RS-232C: Point-to-point
Communications	RS-485 (two-wire, half duplex) or RS- 232C
Synchronization method	Start-stop synchronization
Protocol	CompoWay/F, SYSWAY, or Modbus
Baud rate	1200, 2400, 4800, 9600, 19200, 38400, or 57600 bps
Transmission code	ASCII
Data bit length *	7 or 8 bits
Stop bit length *	1 or 2 bits
Error detection	Vertical parity (none, even, odd) Frame check sequence (FCS) with SYSWAY Block check character (BCC) with
	CompoWay/F or CRC-16 Modbus
Flow control	None
Interface	RS-485, RS-232C
Retry function	None
Communications buffer	217 bytes
Communications	0 to 99 ms
response wait time	Default: 20 ms

*The baud rate, data bit length, stop bit length, and vertical parity can be individually set using the Communications Setting Level.

Current Transformer (Order Separately) Ratings

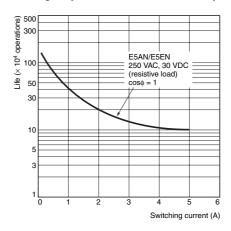
Dielectric strength	1,000 VAC for 1 min
Vibration resistance	50 Hz, 98 m/s ²
Weight	E54-CT1: Approx. 11.5 g, E54-CT3: Approx. 50 g
Accessories (E54-CT3 only)	Armatures (2) Plugs (2)

Heater Burnout Alarms, SSR Failure Alarms, and Heater Overcurrent Alarms

CT input (for heater current detection)	Models with detection for single- phase heaters: One input Models with detection for single- phase or three-phase heaters: Two inputs
Maximum heater current	50 A AC
Input current indication accuracy	±5% FS ±1 digit max.
Heater burnout alarm setting range *1	0.1 to 49.9 A (in units of 0.1 A) Minimum detection ON time: 100 ms
SSR failure alarm setting range *2	0.1 to 49.9 A (in units of 0.1 A) Minimum detection OFF time: 100 ms
Heater overcurrent alarm setting range *3	0.1 to 49.9 A (in units of 0.1 A) Minimum detection ON time: 100 ms

- *1. For heater burnout alarms, the heater current will be measured when the control output is ON, and the output assigned to the alarm 1 function will turn ON if the heater current is lower than the set value (i.e., heater burnout detection current value).
- *2. For SSR failure alarms, the heater current will be measured when the control output is OFF, and the output assigned to the alarm 1 function will turn ON if the heater current is higher than the set value (i.e., SSR failure detection current value).
- *3. For heater overcurrent alarms, the heater current will be measured when the control output is ON, and the output assigned to the alarm 1 function will turn ON if the heater current is higher than the set value (i.e., heater overcurrent detection current value).

Electrical Life Expectancy Curve for Relays (Reference Values)

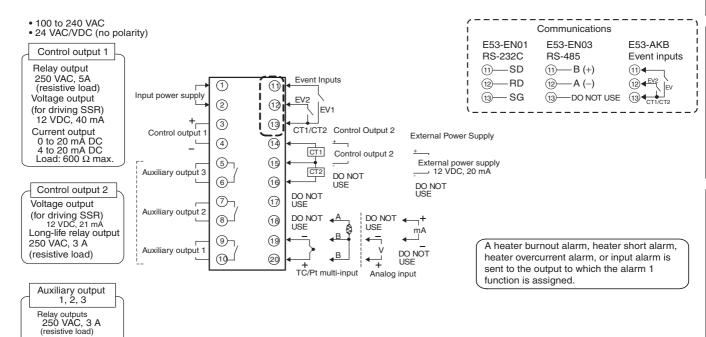


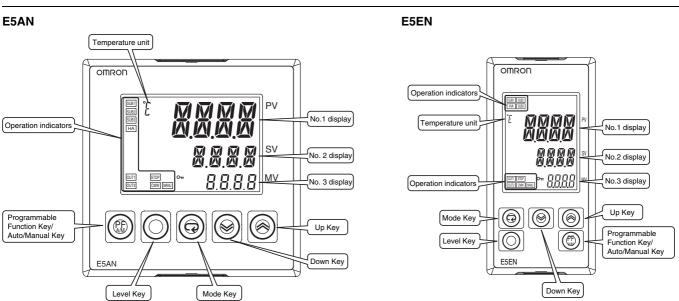
Note: Do not connect a DC load to a Controller with a Long-life Relay Output.

External Connections

- A voltage output (control output 1, for driving SSR) is not electrically insulated from the internal circuits. When using a grounding thermocouple, do not connect any of the control output terminals to ground. If the control output terminals are connected to ground, errors will occur in the measured temperature values as a result of leakage current.
 - The voltage output (control output 2, for driving SSR) has basic insulation provided for the internal circuit.
- Consult with your OMRON representative before using the external power supply for the ES1B for any other purpose.

Controllers Option Units

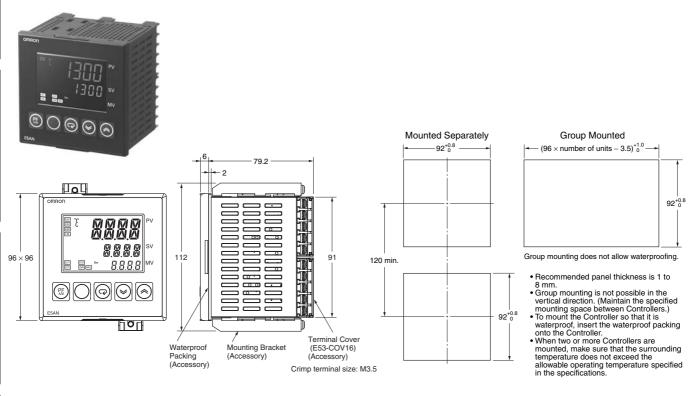




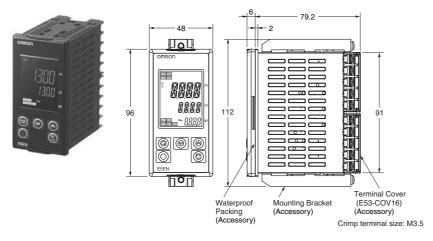
*A 2-level display when shipped from the factory. A 3-level display is activated if parameters are initialized. For details on the third display level, refer to the *User's Manual, Basic Type* (Cat. No. H156).

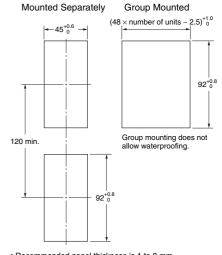
Dimensions (Unit: mm)

E5AN



E5EN





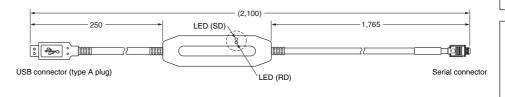
- Recommended panel thickness is 1 to 8 mm.
 Group mounting is not possible in the vertical direction.
 (Maintain the specified mounting space between Controllers.)
 To mount the Controller so that it is waterproof, insert the waterproof packing onto the Controller.

 When two or more Controllers are mounted, make sure that the surrounding temperature does not exceed the allowable operating temperatures specified in the specifications.

Accessories (Order Separately)

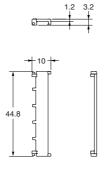
USB-Serial Conversion Cable E58-CIFQ1





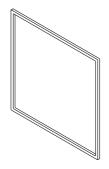






Waterproof Packing Y92S-P4 (for DIN 96 × 96)







Order the Waterproof Packing separately if it becomes lost or damaged.

The Waterproof Packing can be used to achieve an IP66 degree of protection.

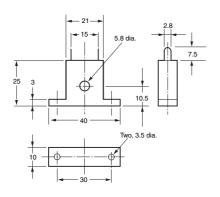
(Deterioration, shrinking, or hardening of the waterproof packing may occur depending on the operating environment. Therefore, periodic replacement is recommended to ensure the level of waterproofing specified in IP66. The time for periodic replacement depends on the operating environment. Be sure to confirm this point at your site. Consider one year a rough standard. OMRON shall not be liable for the level of water resistance if the customer does not perform periodic replacement.)

The Waterproof Packing does not need to be attached if a waterproof structure is not required.

Current Transformers

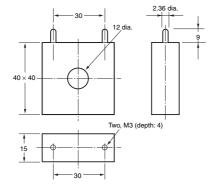
E54-CT1





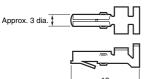
E54-CT3



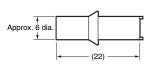


E54-CT3 Accessory

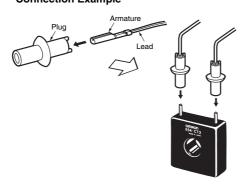
Armature



• Plug



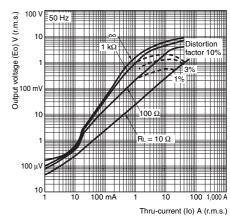
Connection Example



E54-CT1

Thru-current (Io) vs. Output Voltage (Eo) (Reference Values)

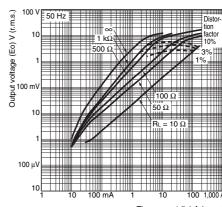
Maximum continuous heater current: 50 A (50/60 Hz) Number of windings: 400±2 Winding resistance: 18±2 Ω



E54-CT3

Thru-current (Io) vs. Output Voltage (Eo) (Reference Values)

Maximum continuous heater current: 120 A (50/60 Hz) (Maximum continuous heater current for an OMRON Temperature Controller is 50 A.) Number of windings: 400±2 Winding resistance: $8\pm0.8~\Omega$



Advanced Digital Temperature Controller

E5CN-H (48 x 48 mm)

A New High-performance Controller: High Resolution, High Speed, and High Input Accuracy.

Logic Operations and Preventive Maintenance Function.

- High-resolution display with 5 digits/0.01°C display in a compact Controller (48 x 48 mm).
- High-speed sampling cycle of 60 ms.
- High Accuracy

Thermocouple/Pt input: ±0.1% of PV

Analog input: ±0.1% FS

- Universal inputs on all models (thermocouple, PT, or analog input) to handle various sensors with one Controller.
- A PV/SV-status display function can be set to automatically alternate between displaying the status of the Temperature Controller (auto/ manual, RUN/STOP, and alarms) and the PV or SV.
- Flexible contact outputs with logic operations (AND, OR, and delays) set from the Support Software (CX-Thermo Ver. 4.0)
- Preventive maintenance for relays in the Temperature Controller using a Control Output ON/OFF Counter.



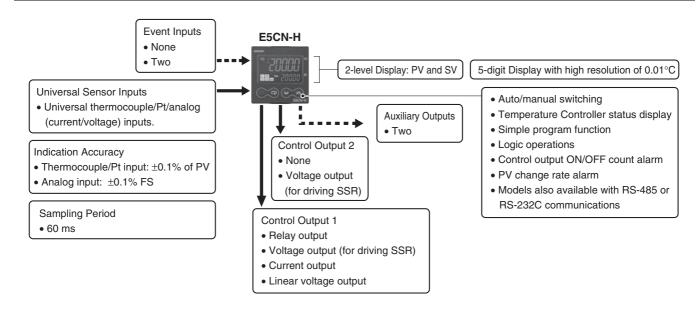
48 × 48 mm E5CN-H

NEW

 \triangle

Refer to Safety Precautions on page 66.

Main I/O Functions



This data sheet is provided as a guideline for selecting products. Be sure to refer to the following user manuals for application precautions and other information required for operation before attempting to use the product.

E5CN-H/E5AN-H/E5EN-H Digital Controllers User's Manual Advanced Type (Cat. No. H157)

E5CN-H/E5AN-H/E5EN-H Digital Controllers Communications Manual Advanced Type (Cat. No. H159)

Lineup



Note: Models with one control output and models with two control outputs can be used for heating/cooling control.

Model Number Structure

Model Number Legend

Controllers

E5CN- M - - - 500 1 2 3 4 5 6

1. Type

H: Advanced

2. Control Output 1

R: Relay output

Q: Voltage output (for driving SSR)

C: Current output

V: Linear voltage output

3. Auxiliary Outputs

2: Two outputs

4. Option 1

M: Option Unit can be mounted.

5. Power Supply Voltage

Blank: 100 to 240 VAC D: 24 VAC/VDC

6. Case Color

Blank: Black W: Silver

7. Terminal Cover

-500: With terminal cover

Option Units

E53-1 2 3 4

1. Applicable Controller

CN: E5CN-H or E5CN

2. Function 1

Blank: None

Q: Control output 2 (voltage output for driving SSR)

P: Power supply for sensor

C: Current output

3. Function 2

Blank: None

H: Heater burnout/SSR failure/Heater overcurrent detection (CT1)

HH: Heater burnout/SSR failure/Heater overcurrent detection (CT2)

B: Two event inputs

03: RS-485 communications

H03: Heater burnout/SSR failure/Heater overcurrent detection (CT1) + RS-485 communications

HB: Heater burnout/SSR failure/Heater overcurrent detection (CT1) + Two event inputs

HH03: Heater burnout/SSR failure/Heater overcurrent detection (CT2) + RS-485 communications

H01: Heater burnout/SSR failure/Heater overcurrent detection (CT1)/RS-232C communications

F: Transfer output

BF: Two event inputs/Transfer output

4. Version

N2: Available only to models released after January 2008

Note: Not all combinations of function 1 and function 2 specifications are possible for Option Units (E53-

Ordering Information

Controllers

Size	Case Color	Power supply voltage	Auxiliary output	Control output 1	Model				
				Relay output	E5CN-HR2M-500				
		100 to 240 VAC	0	Voltage output (for driving SSR)	E5CN-HQ2M-500				
		100 to 240 VAC	2	Current output	E5CN-HC2M-500				
1/16 DIN 48 × 48 × 78 (W × H × D)	Black			Linear voltage output	E5CN-HV2M-500				
	DIACK			Relay output	E5CN-HR2MD-500				
		24 VAC/VDC	0	Voltage output (for driving SSR)	E5CN-HQ2MD-500				
			2	Current output	E5CN-HC2MD-500				
				Linear voltage output	E5CN-HV2MD-500				
				Relay output	E5CN-HR2M-W-500				
		100 to 240 VAC	2	Voltage output (for driving SSR)	E5CN-HQ2M-W-500				
	Silver			Current output	E5CN-HC2M-W-500				
	Sliver			Relay output	E5CN-HR2MD-W-500				
		24 VAC/VDC	2	Voltage output (for driving SSR)	E5CN-HQ2MD-W-500				
				Current output	E5CN-HC2MD-W-500				

Option Units

One of the following Option Units can be mounted to provide the E5CN with additional functions.

		Functio	ns			Model
Communications RS-485		3-phase heater burnout/SSR failure/ Heater overcurrent detection				E53-CNHH03N2
		Heater burnout/SSR failure/ Heater overcurrent detection	Event inputs			E53-CNHBN2
Communications RS-485				Control output 2 (Voltage for driving SSR)		E53-CNQ03N2
Communications RS-485		Heater burnout/SSR failure/ Heater overcurrent detection				E53-CNH03N2
Communications RS-485						E53-CN03N2
			Event inputs			E53-CNBN2
		Heater burnout/SSR failure/ Heater overcurrent detection		Control output 2 (Voltage for driving SSR)		E53-CNQHN2
		3-phase heater burnout/SSR failure/ Heater overcurrent detection		Control output 2 (Voltage for driving SSR)		E53-CNQHHN2
			Event inputs	Control output 2 (Voltage for driving SSR)		E53-CNQBN2
				Control output 2 (Voltage for driving SSR)	Transfer Output	E53-CNQFN2
			Event inputs		Transfer Output	E53-CNBFN2
	Communications RS-232C			Control output 2 (Voltage for driving SSR)		E53-CNQ01N2
	Communications RS-232C					E53-CN01N2
	Communications RS-232C	Heater burnout/SSR failure/ Heater overcurrent detection				E53-CNH01N2

Note: These Option Units are applicable only to models released after January 2008.

Accessories (Order Separately) USB-Serial Conversion Cable

Model	
E58-CIFQ1	

Terminal Cover

Model
E53-COV17

Note: 1. The Terminal Cover comes with the E5CN-_-500 models.
2. The E53-COV10 cannot be used.

Waterproof Packing

Model
Y92S-29

Note: Waterproof Packing is included with the controller only for models with

Current Transformers (CTs)

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

Adapter

Connectable models	Model
Terminal type	Y92F-45

Note: Use this Adapter when the panel has been previously prepared for the E5B□.

CX-Thermo Support Software

Model
FST2-2C-MV4

Rating	s										
Power su	pply voltage	No D in model number: 100 to 240 VAC, 50/60 Hz D in model number: 24 VAC, 50/60 Hz; 24 VDC									
Operating	g voltage range	85% to 110% of rated supply voltage									
Power co	nsumption	00 to 240 VAC: 8.5 VA (max.) (E5CN-HR2 at 100 VAC: 3.0 VA) 4 VAC/VDC: 5.5 VA (24 VAC)/3.5 W (24 VDC) (max.) (E5CN-HR2D at 24 VAC: 2.7 VA)									
Sensor input Input impedance Control method Relay output Voltage output (for driving SSR) Current output Linear voltage output put Number of outputs		Any of the following can be selected (i.e., fully universal input). Thermocouple: K, J, T, E, L, U, N, R, S, B, W, or PL II Platinum resistance thermometer: Pt100 or JPt100 Current input: 4 to 20 mA or 0 to 20 mA Voltage input: 1 to 5 V, 0 to 5 V, or 0 to 10 V									
Input imp	edance	Current input: 150 Ω max., Voltage input: 1 M Ω min. (Use a 1:1 connection when connecting the ES2-HB.)									
Control n	nethod	N/OFF control or 2-PID control (with auto-tuning)									
Relay output		SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA									
Control		Output voltage: 12 VDC ±15% (PNP), max. load current: 21 mA, with short-circuit protection circuit									
output	Current output	4 to 20 mA DC/0 to 20 mA DC, load: 600 Ω max., resolution: approx. 10,000 *									
	•	0 to 10 VDC (load: 1 kΩ min.), Resolution: Approx. 10,000									
Auxilia-	Number of outputs	2 max.									
ry output	Output specifica- tions	Relay output: SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations, minimum applicable oad: 5 V, 10 mA									
	Number of outputs	2									
Event	External contact	Contact input: ON: 1 k Ω max., OFF: 100 k Ω min.									
input	input specifica-	Non-contact input: ON: Residual voltage: 1.5 V max., OFF: Leakage current: 0.1 mA max.									
	tions	Current flow: Approx. 7 mA per contact									
	Number of opera- tions	8 max. (Combinations can be made using work bits.)									
Logic opera- tions	Operations	 Logic operation: Any of the following four patterns can be selected. The input status may be inverted. (A and B) or (C and D), (A or C) and (B or D), A or B or C or D, A and B and C and D (A, B, C, and D are four inputs.) Delay: ON delay or OFF delay for the results of the logic operation given above. Setting time: 0 to 9999 s or 0 to 9999 min Output inversion: Possible 									
	Outputs	One work bit per operation									
	Work bit assign- ments	Any of the following can be assigned to up to eight work bits (logic operation results): Event input operations, auxiliary outputs, or control outputs.									
Transfer	Number of outputs	1 max.									
outputs	Output specifications	Current output: 4 to 20 mA DC, Load: 600 Ω max., Resolution at 4 to 20 mA: Approx. 10,000									
RSP inpu	t	Not supported									
Setting m	nethod	Digital setting using front panel keys									
Indication method Bank switching		11-segment digital display and individual indicators (7-segments displays also possible) Character height: PV: 11 mm, SV: 6.5 mm									
		Supported (number of banks: 8) Local SP, alarm settings, PID sets (PID constants, MV upper limit, MV lower limit, etc.)									
Other fun	nctions	Manual output, heating/cooling control, loop burnout alarm, SP ramp, other alarm functions, heater burnout detection, 40% AT, 100% AT, MV limiter, input digital filter, self-tuning, temperature input shift, run/stop, protection functions, control output ON/OFF counter, extraction of square root, MV change rate limit, PV/SV status display, logic operations, automatic cooling coefficient adjustment									
Ambient ture	operating tempera-	−10 to 55°C (with no condensation or icing), for 3-year warranty: −10 to 50°C									
Ambient	operating humidity	25% to 85%									

 $[\]ensuremath{\,{\star}\,}$ For models with current outputs, control output 1 can be used as a transfer output.

-25 to 65°C (with no condensation or icing)

Storage temperature

Input Ranges

Thermocouple/Platinum Resistance Thermometer/Analog Input (Fully Universal Inputs)

Inpi	ut type				resis omet		,		Thermocouple													Analog input									
N	ame		Pt	100		JPt ⁻	100		K		J		J		Т		E L		U		N	R	S	В	W	PL II	4 to 20 mA	0 to 20 mA	1 to 5 V	0 to 5 V	0 to 10 V
	2300																								2300.0)					
	1800																							1800.0			ļ				
	1700																					1700.0	1700.0	-	-						
	1600																					-	-	-	-						
	1500																					-	-	-	-						
	1400							1300.0													1300.0		-	-	-	1300.0					
\circ	1300							1300.0													1300.0	-	-	-	-	1300.0					
Temperature range (°C)	1200							H +															-	-							
ge	1100							H +															+	H		+ -	Usal	ole in	the f	ollow	/ina
an	1000	850.0						$H \vdash$			850.0							850.0								+	rang –199	es by	scal	ling:	9
ē	900							H																		+ +	-199	99 to	324	00,	
Ē	800	-						H																			-195	9.9 to	0 324	40.0, 4 00	or
era	700	-															600.0										-19.	999 to	0 32.	400	Oi
ğ	600		500.0			500.0			500.0																						
ē	500 400											400.0		400.0	400.0				400.0	400.0							ĺ				
'	300																														
	200				200.00					200.00			200.00			200.00															
	100			100.0			100.0																								
	0	_																						100.0							
	-100			0.0			0.0	Ш														0.0	0.0		0.0	0.0					
	-200				-50.00					-50.00	-100.0	-20.0	-50.00			-50.00		-100.0													
		-200.0	-199.9			-199.9		-200.0						-200.0	-199.9		-200.0)	-200.0	-199.9	-200.0										
Sett num	ing iber	0	1	2	24	3	4	5	6	21	7	8	22	9	10	23	11	12	13	14	15	16	17	18	19	20	25	26	27	28	29

Shaded settings are the default settings.

The applicable standards for the input types are as follows:

K, J, T, E, N, R, S, B: JIS C 1602-1995, IEC 584-1

L: Fe-CuNi, DIN 43710-1985

U: Cu-CuNi, DIN 43710-1985

W: W5Re/W26Re, ASTM E988-1990

JPt100: JIS C 1604-1989, JIS C 1606-1989

Pt100: JIS C 1604-1997, IEC 751

PL II: According to Platinel II electromotive force charts from BASF (previously Engelhard)

Alarm Outputs

Each alarm can be independently set to one of the following 13 alarm types. The default is 2: Upper limit. Auxiliary outputs are allocated for alarms. ON delays and OFF delays (0 to 999 s) can also be specified.

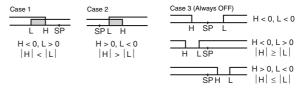
Note: For models with heater burnout, SSR failure, and heater overcurrent detection, alarm 1 will be an OR output of the alarm selected from the following alarm types and the alarms for heater burnout, SSR failure, and heater overcurrent. To output only a heater burnout alarm, SSR failure alarm, and heater overcurrent alarm for alarm 1, set the alarm type to 0 (i.e., no alarm function).

	T		
Set value	Alarm type	Alarm outpo When X is positive	ut operation When X is negative
0	Alarm function OFF	Output OFF	
1 *1	Upper- and lower- limit	ON OFF SP	*2
2	Upper limit	ON OFF SP	ON X - SP
3	Lower limit	ON X SP	ON X SP
4 * 1	Upper- and lower- limit range	ON OFF SP	*3
5 * 1	Upper- and lower- limit with standby sequence	ON OFF SP	*4
6	Upper-limit with standby sequence	ON OFF SP	ON OFF SP
7	Lower-limit with standby sequence	ON X SP	ON X SP
8	Absolute-value upper-limit	ON OFF 0	ON OFF 0
9	Absolute-value lower-limit	ON ←X→ OFF 0	ON OFF 0
10	Absolute-value upper-limit with standby sequence	ON	ON ←X→ O
11	Absolute-value lower-limit with standby sequence	ON OFF 0	ON OFF 0
12	LBA (for alarm 1 only)		
13	PV change rate alarm		

- *1. With set values 1, 4 and 5, the upper and lower limit values can be set independently for each alarm type, and are expressed as "L" and "H."
- *2. Set value: 1, Upper- and lower-limit alarm



*3. Set value: 4, Upper- and lower-limit range



- *4. Set value: 5, Upper- and lower-limit with standby sequence For Upper- and Lower-Limit Alarm Described Above
 - Case 1 and 2
 <u>Always OFF</u> when the upper-limit and lower-limit hysteresis overlaps.
 - Case 3: Always OFF
- *5. Set value: 5, Upper- and lower-limit with standby sequence <u>Always OFF</u> when the upper-limit and lower-limit hysteresis overlaps.

Characteristics

Indication accuracy		Thermocouple: $(\pm 0.1\%$ of indicated value or $\pm 1^{\circ}$ C, whi Platinum resistance thermometer: $(\pm 0.1\%$ of indicated Analog input: $\pm 0.1\%$ FS ± 1 digit max. CT input: $\pm 5\%$ FS ± 1 digit max.					
Transfer out	tput accuracy						
Influence of *2	temperature	Thermocouple input (R, S, B, W, PLII): (±1% of PV or Other thermocouple input: (±1% of PV or ±4°C, whicher	ever is greater) ±1 digit max. *3				
Influence of	voltage *2	Platinum resistance thermometer: $(\pm 1\%$ of PV or $\pm 2^{\circ}$ C Analog input: $(\pm 1\%$ FS) ± 1 digit max.	, whichever is greater) ±1 digit max.				
Input sampl	ing period	60 ms					
Hysteresis		Temperature input: 0.1 to 3240.0°C or °F (in units of 0 Analog input: 0.01% to 99.99% FS (in units of 0.01% F	,				
Proportiona	l band (P)	Temperature input: 0.1 to 3240.0°C or °F (in units of 0 Analog input: 0.1% to 999.9% FS (in units of 0.1% FS)	,				
Integral time	(I)	0.0 to 3240.0 s (in units of 0.1 s)					
Derivative ti	me (D)	0.0 to 3240.0 s (in units of 0.1 s)					
Control peri	od	0.5, 1 to 99 s (in units of 1 s)					
Manual rese	t value	0.0 to 100.0% (in units of 0.1%)					
Alarm settin	g range	-19999 to 32400 (decimal point position depends on ir	nput type)				
Affect of signal source resistance		Thermocouple: $0.1^{\circ}\text{C}/\Omega$ max. (100 Ω max.) Platinum resistance thermometer: $0.1^{\circ}\text{C}/\Omega$ max. (10 Ω max.)					
Insulation re	esistance	20 MΩ min. (at 500 VDC)					
Dielectric st	rength	2,300 VAC, 50 or 60 Hz for 1 min (between terminals with different charge)					
Vibration Malfunction		10 to 55 Hz, 20 m/s² for 10 min each in X, Y, and Z directions					
resistance Destruction		10 to 55 Hz, 0.75-mm single amplitude for 2 hrs each in X, Y, and Z directions					
Shock Malfunction		100 m/s², 3 times each in X, Y, and Z directions					
resistance Destruction		300 m/s ² , 3 times each in X, Y, and Z directions					
Weight		Controller: Approx. 150 g, Mounting Bracket: Approx. 10 g					
Degree of pr	rotection	Front panel: IP66, Rear case: IP20, Terminals: IP00					
Memory pro	tection	Non-volatile memory (number of writes: 1,000,000 times)					
Setup Tool		CX-Thermo version 4.0 or higher					
Setup Tool p	oort	Provided on the bottom of the E5CN-H. Use this port to connect a computer to the E5CN-H. An E58-CIFQ1 USB-Serial Conversion Cable is required to connect the computer to the E5CN-H. *4					
Standards Standards Conformed standards EMC		UL 61010-1, CSA C22.2 No. 1010-1					
		EN 61010-1 (IEC 61010-1): Pollution level 2, overcurrent category II					
		EMI: Radiated Interference Electromagnetic Field Strength: Noise Terminal Voltage: EMS: ESD Immunity: Electromagnetic Field Immunity: Burst Noise Immunity: Conducted Disturbance Immunity: Surge Immunity: Power Frequency Magnetic Field Immunity: Voltage Dip/Interrupting Immunity:	EN 61326 EN 55011 Group 1, class A EN 55011 Group 1, class A EN 61326 EN 61000-4-2 EN 61000-4-3 EN 61000-4-4 EN 61000-4-6 EN 61000-4-5 EN 61000-4-8 EN 61000-4-8				

^{*1.} The indication accuracy of K thermocouples in the -200 to 1300°C range, T and N thermocouples at a temperature of -100°C max., and U and L thermocouples at any temperatures is ±2°C ±1 digit max. The indication accuracy of the B thermocouple at a temperature of 400°C max. is not specified. The indication accuracy of B thermocouples in the 400 to 800°C range is ±3°C max. The indication accuracy of the R and S thermocouples at a temperature of 200°C max. is ±3°C ±1 digit max. The indication accuracy of W thermocouples is ±0.3 of PV or ±3°C, whichever is greater, ±1 digit max. The indication accuracy of PL II thermocouples is ±0.3 of PV or ±2°C, whichever is greater, ±1 digit max.

^{*2.} Ambient temperature: −10°C to 23°C to 55°C, Voltage range: −15% to 10% of rated voltage

^{★3}. K thermocouple at −100°C max.: ±10°C max.

^{\$4}. External communications (RS-232C or RS-485) and cable communications for the Setup Tool can be used at the same time.

USB-Serial Conversion Cable

Applicable OS	Windows 2000, XP, or Vista
Applicable software	Thermo Mini, CX-Thermo version 4.0 or higher
Applicable models	E5AN/E5EN/E5CN/E5CN-U/ E5AN-H/E5EN-H/E5CN-H
USB interface standard	Conforms to USB Specification 1.1.
DTE speed	38400 bps
Connector specifications	Computer: USB (type A plug) Temperature Controller: Setup Tool port (on bottom of Controller)
Power supply	Bus power (Supplied from USB host controller.)
Power supply voltage	5 VDC
Current consumption	70 mA
Ambient operating temperature	0 to 55°C (with no condensation or icing)
Ambient operating humidity	10% to 80%
Storage temperature	-20 to 60°C (with no condensation or icing)
Storage humidity	10% to 80%
Altitude	2,000 m max.
Weight	Approx. 100 g

Note: A driver must be installed in the personal computer. Refer to installation information in the operation manual for the Conversion Cable.

Communications Specifications

Transmission line	RS-485: Multipoint	
connection method	RS-232C: Point-to-point	
Communications	RS-485 (two-wire, half duplex)/RS-232C	
Synchronization method	Start-stop synchronization	
Protocol	CompoWay/F, SYSWAY, or Modbus	
Baud rate	1200, 2400, 4800, 9600, 19200, 38400, or 57600 bps	
Transmission code	ASCII (CompoWay/F, SYSWAY) RTU (Modbus)	
Data bit length *	7 or 8 bits	
Stop bit length *	1 or 2 bits	
Error detection	Vertical parity (none, even, odd) Frame check sequence (FCS) with SYSWAY Block check character (BCC) with CompoWay/F or CRC-16 Modbus	
Flow control	None	
Interface	RS-485, RS-232C	
Retry function	None	
Communications buffer	217 bytes	
Communications response wait time	0 to 99 ms Default: 20 ms	

*The baud rate, data bit length, stop bit length, and vertical parity can be individually set using the Communications Setting Level.

Current Transformer (Order Separately) Ratings

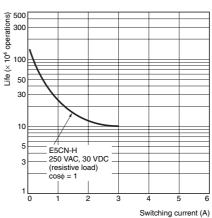
Dielectric strength	1,000 VAC for 1 min
Vibration resistance	50 Hz, 98 m/s ²
Weight	E54-CT1: Approx. 11.5 g, E54-CT3: Approx. 50 g
Accessories (E54-CT3 only)	Armatures (2) Plugs (2)

Heater Burnout Alarms, SSR Failure Alarms, and Heater Overcurrent Alarms

CT input (for heater current detection)	Models with detection for single- phase heaters: One input Models with detection for single- phase or three-phase heaters: Two inputs
Maximum heater current	50 A AC
Input current indication accuracy	±5% FS ±1 digit max.
Heater burnout alarm setting range *1	0.1 to 49.9 A (in units of 0.1 A) Minimum detection ON time: 100 ms
SSR failure alarm setting range *2	0.1 to 49.9 A (in units of 0.1 A) Minimum detection OFF time: 100 ms
Heater overcurrent alarm setting range *3	0.1 to 49.9 A (in units of 0.1 A) Minimum detection ON time: 100 ms

- *1. For heater burnout alarms, the heater current will be measured when the control output is ON, and the output assigned to the alarm 1 function will turn ON if the heater current is lower than the set value (i.e., heater burnout detection current value).
- *2. For SSR failure alarms, the heater current will be measured when the control output is OFF, and the output assigned to the alarm 1 function will turn ON if the heater current is higher than the set value (i.e., SSR failure detection current value).
- *3. For heater overcurrent alarms, the heater current will be measured when the control output is ON, and the output assigned to the alarm 1 function will turn ON if the heater current is higher than the set value (i.e., heater overcurrent detection current value).

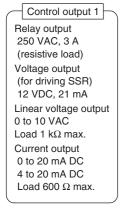
Electrical Life Expectancy Curve for Relays (Reference Values)

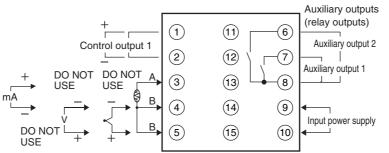


External Connections

A voltage output (control output, for driving SSR) is not electrically insulated from the internal circuits. When using a grounding thermocouple,
do not connect any of the control output terminals to ground. If the control output terminals are connected to ground, errors will occur in the
measured temperature values as a result of leakage current.

Controllers



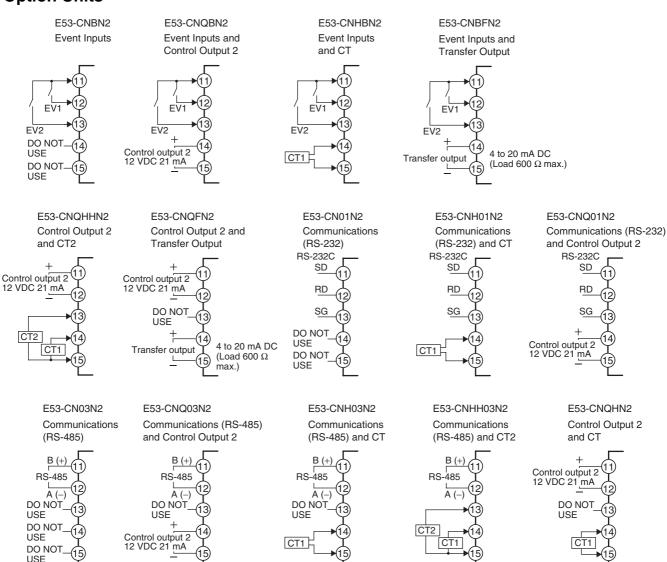


Auxiliary outputs (relay outputs) 250 VAC, 3 A (resistive load)

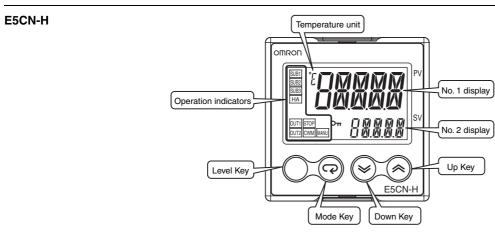
A heater burnout alarm, SSR failure, heater overcurrent alarm, or input alarm is sent to the output to which the alarm 1 function is assigned.

- 100 to 240 VAC
- 24 VAC/VDC (no polarity)

Option Units

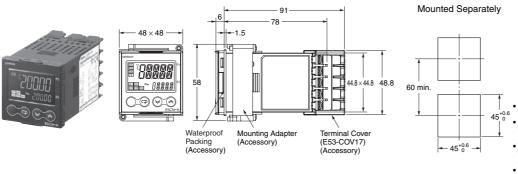


Note: Wire all voltage input terminals correctly. The Controller may fail if voltage input terminals are wired incorrectly.



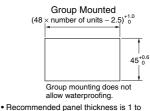
Dimensions (Unit: mm)

E5CN-H



Note: The terminal block cannot be removed.

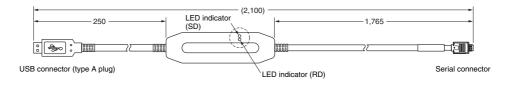
Panel Cutout



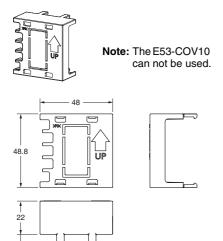
Accessories (Order Separately)

USB-Serial Conversion Cable E58-CIFQ1





Terminal Cover E53-COV17



Waterproof Packing Y92S-29 (for DIN 48×48)



Order the Waterproof Packing separately if it becomes lost or damaged.

The Waterproof Packing can be used to achieve an IP66 degree of protection.

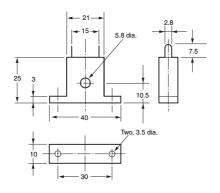
(Deterioration, shrinking, or hardening of the waterproof packing may occur depending on the operating environment. Therefore, periodic replacement is recommended to ensure the level of waterproofing specified in IP66. The time for periodic replacement depends on the operating environment. Be sure to confirm this point at your site. Consider one year a rough standard. OMRON shall not be liable for the level of water resistance if the customer does not perform periodic replacement.)

The Waterproof Packing does not need to be attached if a waterproof structure is not required.

Current Transformers

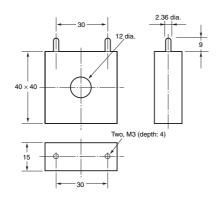
E54-CT1





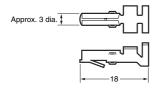
E54-CT3



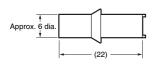


E54-CT3 Accessory

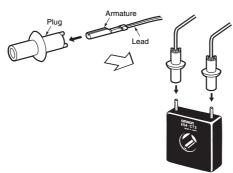
Armature



Plug



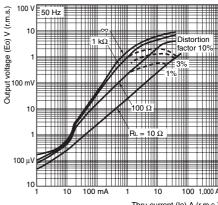
Connection Example



E54-CT1

Thru-current (Io) vs. Output Voltage (Eo) (Reference Values)

Maximum continuous heater current: 50 A (50/60 Hz) Number of windings: 400±2 Winding resistance: 18±2 Ω



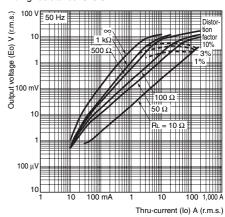
Thru-current (Io) A (r.m.s.)

E54-CT3

Thru-current (Io) vs. Output Voltage (Eo) (Reference Values)

Maximum continuous heater current: 120 A (50/60 Hz) (Maximum continuous heater current for an OMRON Temperature Controller is 50 A.)

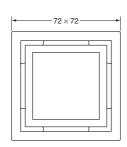
Number of windings: 400±2 Winding resistance: 8±0.8 Ω

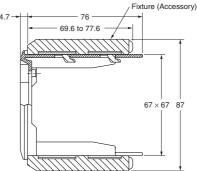


Adapter

Y92F-45 Note: Use this Adapter when the panel has already been prepared for the E5B \square .

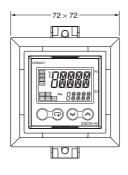


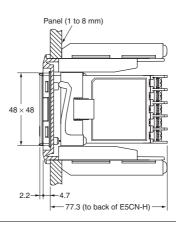




Mounted to E5CN-H







Advanced Digital Temperature Controller

AN-H/E5EN-H (96 x 96 mm and 48 x 96 mm)

A New High-performance Controller: High Resolution, High Speed, and **High Input Accuracy.**

Logic Operations and Preventive Maintenance Function. Plus Infrared Port on Front Panel.

- High-resolution display with 5 digits/0.01×C display.
- High-speed sampling cycle of 60 ms.
- High Accuracy Thermocouple/Pt input: ±0.1% of PV

Analog input: ±0.1% FS

- Universal inputs on all models (thermocouple, PT, or analog input) to handle various sensors with one Controller. Models also available with Remote SP.
- A PV/SV-status display function can be set to automatically alternate between displaying the status of the Temperature Controller (auto/manual, RUN/STOP, and alarms) and the PV or SV.
- Flexible contact outputs with logic operations (AND, OR, and delays) set from the Support Software (CX-Thermo Ver. 4.0)
- Preventive maintenance for relays in the Temperature Controller using a Control Output ON/OFF Counter.
- Model available with position-proportional control

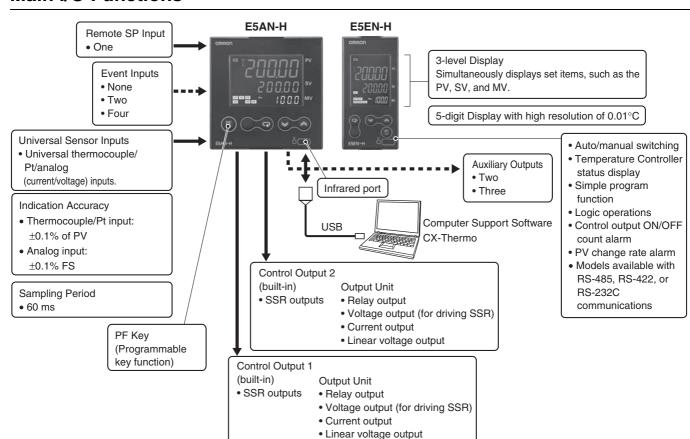


E5AN-H

NEW

Refer to Safety Precautions on page 66.

Main I/O Functions



Lineup



Note: The Controller can be used for heating/cooling control even if only 1 control output is used.

Model Number Structure

Model Number Legend

Controllers

E5AN/E5EN-_____M__-_-500

1. Type

H: Advanced

2. Control Mode

Blank: Standard or heating/cooling control

P: Position-proportional control

3. Control Output 1

A: Control Output Unit

R: Relay output

S: SSR output

4. Control Output 2

A: Control Output Unit

R: Relay output

S: SSR output

5. Auxiliary Outputs

2: Two outputs

3: Three outputs

6. Option 1

Blank: None

H: Heater burnout/SSR failure/Heater overcurrent detection (CT1)

HH: Heater burnout/SSR failure/Heater overcurrent detection (CT2)

7. Option 2

B: Two event inputs

BF: Event input + Transfer output

8. Option 3

M: Option Unit can be mounted.

9. Power Supply Voltage

Blank: 100 to 240 VAC D: 24 VAC/VDC

10.Case Color

Blank: Black W: Silver

11.Terminal Cover

-500: With Terminal Cover

Option Units

E53-_

1. Function

EN01: RS-232C communications EN02: RS-422 communications EN03: RS-485 communications

AKB: Event input

Output Units

E53-

1. Control Output

R: Relay output

Q: Voltage output (for driving SSR)

Q3: Voltage output (for driving SSR) + 24 VDC (NPN)

Q4: Voltage output (for driving SSR) + 24 VDC (PNP)

C3: Current output + 4 to 20 mA DC C3D: Current output + 0 to 20 mA DC

V34: Linear voltage output + 0 to 10 VDC V35: Linear voltage output + 0 to 5 VDC

2. Version

Blank: Available for E5AN-H/E5EN-H and E5AK/E5EK.

N: Available only for E5AN-H/E5EN-H.

This data sheet is provided as a guideline for selecting products. Be sure to refer to the following user manuals for application precautions and other information required for operation before attempting to use the product.

E5CN-H/E5AN-H/E5EN-H Digital Controllers User's Manual Advanced Type (Cat. No. H157)

E5CN-H/E5AN-H/E5EN-H Digital Controllers Communications Manual Advanced Type (Cat. No. H159)

Ordering Information

E5AN-H

	Case color	Power supply voltage	Control method	Auxiliary output	Control output 1/2		Optional functions			
Size						Heater burnout		Model		
					Control Output Unit × 2	1	2		4 to 20-mA input	E5AN-HAA2HBM-500
					SSR outputs × 2	1	2		4 to 20-mA input	E5AN-HSS2HBM-500
				2	Control Output Unit × 2	2	2	4 to 20-mA output	4 to 20-mA input	E5AN-HAA2HHBFM-500
		100 to	Basic		SSR outputs × 2	2	2	4 to 20-mA output	4 to 20-mA input	E5AN-HSS2HHBFM-500
		240 VAC		3	Control Output Unit × 2		2	4 to 20-mA output	4 to 20-mA input	E5AN-HAA3BFM-500
				3	SSR outputs × 2		2	4 to 20-mA output	4 to 20-mA input	E5AN-HSS3BFM-500
	Black		Valve	2	Relay outputs × 2		2		4 to 20-mA input	E5AN-HPRR2BM-500
					Relay outputs × 2		2	4 to 20-mA output	4 to 20-mA input	E5AN-HPRR2BFM-500
		24 VAC/ VDC		asic 3	Control Output Unit × 2	1	2		4 to 20-mA input	E5AN-HAA2HBMD-500
4 DIN 5 × 96 × 78 V × H × D)					SSR outputs × 2	1	2		4 to 20-mA input	E5AN-HSS2HBMD-500
,					Control Output Unit × 2	2	2	4 to 20-mA output	4 to 20-mA input	E5AN-HAA2HHBFMD-500
					SSR outputs × 2	2	2	4 to 20-mA output	4 to 20-mA input	E5AN-HSS2HHBFMD-500
					Control Output Unit × 2		2	4 to 20-mA output	4 to 20-mA input	E5AN-HAA3BFMD-500
					SSR outputs × 2		2	4 to 20-mA output	4 to 20-mA input	E5AN-HSS3BFMD-500
				alve 2	Relay outputs × 2		2		4 to 20-mA input	E5AN-HPRR2BMD-500
					Relay outputs × 2		2	4 to 20-mA output	4 to 20-mA input	E5AN-HPRR2BFMD-500
	Silver	100 to 240 VAC	Basic VAC/	2	Control Output Unit × 2	1	2		4 to 20-mA input	E5AN-HAA2HBM-W-500
					Control Output Unit × 2	2	2	4 to 20-mA output	4 to 20-mA input	E5AN-HAA2HHBFM-W-500
		24 VAC/ VDC			Control Output Unit × 2	1	2		4 to 20-mA input	E5AN-HAA2HBMD-W-500

E5EN-H

	Case	Power	Control	Auxil-		Heater	Optional Functions				
Size	color	supply voltage	method	iary output	Control output 1/2	burn- out			RSP	Model	
					Control Output Unit × 2	1	2		4 to 20-mA input	E5EN-HAA2HBM-500	
					SSR outputs × 2	1	2		4 to 20-mA input	E5EN-HSS2HBM-500	
			Basic	2	Control Output Unit × 2	2	2	4 to 20-mA output	4 to 20-mA input	E5EN-HAA2HHBFM-500	
		100 to	Dasic		SSR outputs × 2	2	2	4 to 20-mA output	4 to 20-mA input	E5EN-HSS2HHBFM-500	
		240 VAC		2	Control Output Unit × 2		2	4 to 20-mA output	4 to 20-mA input	E5EN-HAA3BFM-500	
				3	SSR outputs × 2		2	4 to 20-mA output	4 to 20-mA input	E5EN-HSS3BFM-500	
				2	Relay outputs × 2		2		4 to 20-mA input	E5EN-HPRR2BM-500	
	Black				Relay outputs × 2		2	4 to 20-mA output	4 to 20-mA input	E5EN-HPRR2BFM-500	
		24 VAC/ VDC		2 sic 3	Control Output Unit × 2	1	2		4 to 20-mA input	E5EN-HAA2HBMD-500	
1/8 DIN 48 × 96 × 78 (W × H × D)					SSR outputs × 2	1	2		4 to 20-mA input	E5EN-HSS2HBMD-500	
					Control Output Unit × 2	2	2	4 to 20-mA output	4 to 20-mA input	E5EN-HAA2HHBFMD-500	
					SSR outputs × 2	2	2	4 to 20-mA output	4 to 20-mA input	E5EN-HSS2HHBFMD-500	
					Control Output Unit × 2		2	4 to 20-mA output	4 to 20-mA input	E5EN-HAA3BFMD-500	
					SSR outputs × 2		2	4 to 20-mA output	4 to 20-mA input	E5EN-HSS3BFMD-500	
				2	Relay outputs × 2		2		4 to 20-mA input	E5EN-HPRR2BMD-500	
					Relay outputs × 2		2	4 to 20-mA output	4 to 20-mA input	E5EN-HPRR2BFMD-500	
		100 to 240 VAC	Basic	2	Control Output Unit × 2	1	2		4 to 20-mA input	E5EN-HAA2HBM-W-500	
	Silver				Control Output Unit × 2	2	2	4 to 20-mA output	4 to 20-mA input	E5EN-HAA2HHBFM-W-500	
		24 VAC/ VDC			Control Output Unit × 2	1	2		4 to 20-mA input	E5EN-HAA2HBMD-W-500	

Accessories (Order Separately)

Output Units

	Output unit	Model	Specifications
	Relay output	E53-RN	SPST-NO, 250 VAC, 5 A (resistive load), electrical life: 100,000 operations
	Voltage	E53-QN	12 VDC (PNP), max. load current: 40-mA, with short-circuit protection
	output (for driving	E53-Q3	24 VDC (NPN), max. load current: 20-mA, with short-circuit protection
	SSR)	E53-Q4	24 VDC (PNP), max. load current: 20-mA, with short-circuit protection
	Current	E53-C3N	4 to 20-mA DC, load: 600 Ω max., resolution: approx. 10,000
(output	E53-C3DN	0 to 20-mA DC, load: 600 Ω max., resolution: approx. 10,000
	Linear voltage	E53-V34N	0 to 10 VDC, load: 1 k Ω min., resolution: approx. 10,000
	output	E53-V35N	0 to 5 VDC, load: 1 k Ω min., resolution: approx. 10,000

USB-infrared Conversion Cable

Model
E58-CIFIR

USB-Serial Conversion Cable

Model	
E58-CIFQ1	

Terminal Cover

Connectable models	Model	
E5AN-H	E53-COV16	
E5EN-H	E93-COV16	

Note: The Terminal Cover comes with the E5CN-□□□-500 models.

Waterproof Packing

Connectable models	Model
E5AN-H	Y92S-P4
E5EN-H	Y92S-P5

Note: The Waterproof Packing is included with the Controller.

Current Transformers (CTs)

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

CX-Thermo Support Software

Model	
EST2-2C-MV4	

Specifications

Ratings

Power su	pply voltage	No D in model number: 100 to 240 VAC, 50/60 Hz D in model number: 24 VAC, 50/60 Hz; 24 VDC						
Operating voltage range		85% to 110% of rated supply voltage						
Power consumption		100 to 240 VAC: 12 VA 24 VAC/VDC: 8.5 VA (24 VAC)/5.5 W (24 VDC)						
Sensor input		Any of the following can be selected. Thermocouple: K, J, T, E, L, U, N, R, S, B, W, or PL II Platinum resistance thermometer: Pt100 or JPt100 Current input: 4 to 20 mA or 0 to 20 mA Voltage input: 1 to 5 V, 0 to 5 V, or 0 to 10 V						
Input impedance		Current input: 150 Ω max., Voltage input: 1 M Ω min. (Use a 1:1 connection when connecting the ES2-HB.)						
Control method		ON/OFF control or 2-PID control (with auto-tuning)						
	Relay output							
	Voltage output (for driving SSR)	Output Unit (Install the Output Unit (sold separately).)						
	Current output	,						
Control output	Linear voltage output							
•	Built-in SSR output	75 to 250 VAC, 1 A (resistive load)						
	Relay output for posi-	Relay output: Open and close: SPST-NO, 250 VAC, 1 A (including in-rush current), electrical life: 100,000 operations						
	tion-proportional con- trol	min. Potentiometer input: Must be between 100 Ω and 2.5 k Ω for maximum open position.						
Auxiliary	Number of outputs	2 or 3 max.						
output	Output specifications	Relay output: SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA						
Number of outputs		2 or 4 (with an E53-AKB)						
Event		Contact input: ON: 1 k Ω max., OFF: 100 k Ω min.						
input	External contact input specifications	Non-contact input: ON: Residual voltage: 1.5 V max., OFF: Leakage current: 0.1 mA max.						
		Current flow: Approx. 7 mA per contact						
	Number of operations	8 max.						
Logic opera- tions	Operations	 Logic operation: Any of the following four patterns can be selected. The input status may be inverted. (A and B) or (C and D), (A or C) and (B or D), A or B or C or D, A and B and C and D (A, B, C, and D are four inputs.) Delay: ON delay or OFF delay for the results of the logic operation given above. Setting time: 0 to 9999 s or 0 to 9999 min Output inversion: Possible 						
	Output	One work bit per operation						
	Work bit assignment	Any of The following can be assigned to up to eight work bits (logic operation results): Event input operations, auxiliary outputs, or control outputs.						
Transfer	Number of outputs	1 max. (Depends on model. Models with transfer output (F in model number)						
outputs	Output specifications	Current output: 4 to 20 mA DC, Load: 600 Ω max., Resolution at 4 to 20 mA: Approx. 10,000						
	Number of inputs	1						
	Signal type	Current input: 4 to 20 mA (input impedance: 150 Ω ±10%)						
RSP input	Analog input scaling	Scaling of signal to engineering units (EU) -19,999 to 30,000 (display: 30,000 max.)						
	Accuracy	(±0.2% of FS) ±1 digit max.						
	Input sampling period	60 ms						
Setting m	ethod	Set digitally using keys on the front panel or by using the RSP input.						
Indication method		11-segment digital display and individual indicators (7-segments displays also possible) Character height: E5AN-H: PV: 15.8 mm, SV: 9.5 mm, MV: 6.8 mm; E5EN-H: PV: 11.8 mm, SV: 8.1 mm, MV: 5.8 mm Content of 3-level display: PV/SV/MV, PV/SV/Bank No., or soak time remain Number of digits: 5 for PV and SV, 4 for MV						
Bank swit	tching	Supported (number of banks: 8) Local SP, alarm settings, PID sets (PID constants, MV upper limit, MV lower limit, etc.)						
Other fun	ctions	Manual output, heating/cooling control, loop burnout alarm, SP ramp, other alarm functions, heater burnout detection, 40% AT, 100% AT, MV limiter, input digital filter, self-tuning, temperature input shift, run/stop, protection functions, control output ON/OFF counter, extraction of square root, MV change rate limit, PV/SV status display, logic operations, automatic cooling coefficient adjustment						
Ambient o	operating temperature	-10 to 55°C (with no condensation or icing), for 3-year warranty: −10 to 50°C						
Ambient o	operating humidity	25% to 85%						
Storage te	emperature	-25 to 65°C (with no condensation or icing)						

Input Ranges

Thermocouple/Platinum Resistance Thermometer (Fully Universal Inputs)

	Input type	Platinum resistance thermometer					!		Thermocouple										Analog input												
	Name		Pt	100		JPt1	100		K			J			т		E	L	ι	J	N	R	s	В	w	PL II	4 to 20 m A	0 to 20 m A	1 to 5 V	0 to 5 V	0 to 10 V
	2300																								2300.0						
	1800																							1800.0							
ч	1700																					1700.0	1700.0								
ıl	1600																														
Ш	1500																														
Ш	1400																														
Ш	1300							1300.0													1300.0					1300.0					
	ပို့ 1200							4																							
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	E 800							4										-									-199	9.9 to	3240	.0,	
Ш	is 700							4													-				-		-199	.99 to	324.0	00, or	•
Ш	6 00							4									600.0				-				-		-19.	999 to	32.40)0	
Ш	E 500	<u> </u>	500.0			500.0		4	500.0																						
Ш	P 400		-									400.0		400.0	400.0				400.0	400.0			-			_					
П	300		-												_								-			_					
, 1	200		-		200.00					200.00	_		200.00		_	200.00					-		-			_					
Ш	100			100.0			100.0		_						-	-				-	-										
	0			0.0			0.0								-	-				-	-			100.0							
	-100.0	-	₽.	0.0	50.00		0.0		00.0	50.00	100.0	00.0	50.00		-	50.00		100.0				0.0	0.0		0.0	0.0					
Ш	-200.0	000.0	199.9		-50.00	-199.9		000.0	-20.0	–5U.UU	-100.0	-20.0	-50.00		100.0	-50.00		-100.0	000.0	100.0	000.0										
-	0	-200.0	199.9	1		-199.9		-200.0						-200.0	-199.9	1	-200.0		-200.0	-199.9	-200.0										
	Setting number	0	1	2	24	3	4	5	6	21	7	8	22	9	10	23	11	12	13	14	15	16	17	18	19	20	25	26	27	28	29

Shaded settings are the default settings.

The applicable standards for the input types are as follows:

K, J, T, E, N, R, S, B: JIS C 1602-1995, IEC 584-1

L: Fe-CuNi, DIN 43710-1985

U: Cu-CuNi, DIN 43710-1985

W: W5Re/W26Re, ASTM E988-1990

JPt100: JIS C 1604-1989, JIS C 1606-1989

Pt100: JIS C 1604-1997, IEC 751

PL II: According to Platinel II electromotive force charts from BASF (previously Engelhard)

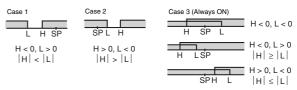
Alarm Outputs

Each alarm can be independently set to one of the following 15 alarm types. The default is 2: Upper limit. Auxiliary outputs are allocated for alarms. ON delays and OFF delays (0 to 999 s) can also be specified.

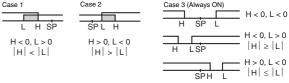
Note: For models with heater burnout, SSR failure, and heater overcurrent detection, alarm 1 will be an OR output of the alarm selected from the following alarm types and the alarms for heater burnout, SSR failure, and heater overcurrent. To output only a heater burnout alarm, SSR failure alarm, and heater overcurrent alarm for alarm 1, set the alarm type to 0 (i.e., no alarm function).

Set		Alarm outp	ut operation
val- ue	Alarm type	When X is positive	When X is negative
0	Alarm function OFF	Output OFF	
1 *1	Upper- and lower- limit	ON OFF SP	*2
2	Upper limit	ON X SP	ON X ←
3	Lower limit	ON X SP	ON X SP
4 *1	Upper- and lower- limit range	ON OFF SP	*3
5 *1	Upper- and lower- limit with standby sequence	ON OFF SP	*4
6	Upper-limit with standby sequence	ON X SP	ON OFF SP
7	Lower-limit with standby sequence	ON X - SP	ON SP
8	Absolute-value upper-limit	ON OFF 0	ON OFF 0
9	Absolute-value lower-limit	ON ←X→	ON OFF
10	Absolute-value upper-limit with standby sequence	ON OFF 0	ON OFF 0
11	Absolute-value lower-limit with standby sequence	ON OFF 0	ON OFF 0
12	LBA (for alarm 1 only)		
13	PV change rate alarm		
14	RSP absolute value upper limit *6	ON OFF 0	ON OFF 0
15	RSP absolute value lower limit *6	ON OFF 0	ON OFF 0

- *1.With set values 1, 4 and 5, the upper and lower limit values can be set independently for each alarm type, and are expressed as "L" and "H."
- *2. Set value: 1, Upper- and lower-limit alarm



*3. Set value: 4, Upper- and lower-limit range



- *4. Set value: 5, Upper- and lower-limit with standby sequence For Upper- and Lower-Limit Alarm Described Above
 - Case 1 and 2
 <u>Always OFF</u> when the upper-limit and lower-limit hysteresis overlaps.
 - Case 3: Always OFF
- *5. Set value: 5, Upper- and lower-limit with standby sequence <u>Always OFF</u> when the upper-limit and lower-limit hysteresis overlaps.
- *6. Displayed when there is a remote SP input.

Characteristics

	Indication accuracy		Thermocouple: (±0.1% of indicated value or ±1°C, whichever is greater) ±1 digit max. * 1 Platinum resistance thermometer: (±0.1% of indicated value or ±0.5°C, whichever is greater) ±1 digit max. Analog input: ±0.1% FS ±1 digit max. CT input: ±5% FS ±1 digit max. Potentiometer input: ±5% FS ±1 digit max.						
	Transfer out	put accuracy	±0.3% FS max.						
	Influence of *2	temperature	Thermocouple input (R, S, B, W, PL II): $(\pm 1\%$ of PV or $\pm 10^{\circ}$ C, whichever is greater) ± 1 digit max. Other thermocouple input: $(\pm 1\%$ of PV or $\pm 4^{\circ}$ C, whichever is greater) ± 1 digit max. *3						
	Influence of	voltage *2	Platinum resistance thermometer: (±1% of PV or ±2°C, whichever is greater) ±1 digit max. Analog input: (±1%FS) ±1 digit max.						
	Input sampli	ng period	60 ms						
	Hysteresis		Temperature input: 0.1 to 3240.0°C or °F (in units of 0.1°C or °F) Analog input: 0.01% to 99.99% FS (in units of 0.01% FS)						
	Proportional	band (P)	Temperature input: 0.1 to 3240.0°C or °F (in units of 0.1°C or °F) Analog input: 0.1% to 999.9% FS (in units of 0.1% FS)						
	Integral time	· (I)	0.0 to 3240.0 s (in units of 0.1 s)						
	Derivative tir	me (D)	0.0 to 3240.0 s (in units of 0.1 s)						
Ī	Control perio	od	0.5, 1 to 99 s (in units of 1 s)						
Ī	Manual reset	t value	0.0 to 100.0% (in units of 0.1%)						
Ī	Alarm setting	g range	-19999 to 32400 (decimal point position depends on input type)						
	Affect of signal source resistance		Thermocouple: $0.1^{\circ}\text{C}/\Omega$ max. (100 Ω max.) Platinum resistance thermometer: $0.1^{\circ}\text{C}/\Omega$ max. (10 Ω max.)						
1	Insulation re	sistance	20 M Ω min. (at 500 VDC)						
	Dielectric str	rength	2,300 VAC, 50 or 60 Hz for 1 min (between terminals with different charge)						
-	Vibration	Malfunction	10 to 55 Hz, 20 m/s² for 10 min each in X, Y, and Z directions						
	resistance	Destruction	10 to 55 Hz, 0.75-mm single amplitude for 2 hrs each in X, Y, and Z directions						
-	Shock	Malfunction	100 m/s², 3 times each in X, Y, and Z directions						
	resistance	Destruction	300 m/s², 3 times each in X, Y, and Z directions						
		E5AN-H	Controller: Approx. 310 g, Mounting Bracket: Approx. 100 g						
	Weight	E5EN-H	Controller: Approx. 260 g, Mounting Bracket: Approx. 100 g						
-	Degree of pr	otection	Front panel: IP66, Rear case: IP20, Terminals: IP00						
-	Memory prot		Non-volatile memory (number of writes: 1,000,000 times)						
-	Setup Tool		CX-Thermo version 4.0 or higher						
	Setup Tool p	oort	Provided on the bottom of the E5AN-H and E5EN-H. An E58-CIFQ1 USB-Serial Conversion Cable is required to connect the computer to the E5AN-H and E5EN-H. Provided on the front of the E5AN-H and E5EN-H. An E58-CIFIR USB-infrared Conversion Cable is required to connect the computer to the E5AN-H or E5EN-H. *4						
	Standards	Approved standards	UL 61010-1, CSA C22.2 No. 1010-1						
	Standards	Conformed standards	EN 61010-1 (IEC 61010-1): Pollution level 2, overcurrent category II						
	EMC		EMI: EN 61326 Radiated Interference Electromagnetic Field Strength: EN 55011 Group 1, class A Noise Terminal Voltage: EN 55011 Group 1, class A EMS: EN 61326 ESD Immunity: EN 61000-4-2 Electromagnetic Field Immunity: EN 61000-4-3 Burst Noise Immunity: EN 61000-4-4 Conducted Disturbance Immunity: EN 61000-4-6 Surge Immunity: EN 61000-4-5 Power Frequency Magnetic Field Immunity: EN 61000-4-8 Voltage Dip/Interrupting Immunity: EN 61000-4-11						

- \$1. The indication accuracy of K thermocouples in the −200 to 1300°C range, T and N thermocouples at a temperature of
 - -100° C max., and U and L thermocouples at any temperatures is $\pm 2^{\circ}$ C ± 1 digit max. The indication accuracy of the B thermocouple at a temperature of 400° C max. is not specified. The indication accuracy of B thermocouples in the 400° C range is $\pm 3^{\circ}$ C max. The indication accuracy of the R and S thermocouples at a temperature of 200° C max. is $\pm 3^{\circ}$ C ± 1 digit max. The indication accuracy of W thermocouples is $\pm 0.3\%$ of PV or $\pm 3^{\circ}$ C, whichever is greater, ± 1 digit max.
 - The indication accuracy of PL II thermocouples is $\pm 0.3\%$ of PV or $\pm 2^{\circ}$ C, whichever is greater, ± 1 digit max.
- *2. Ambient temperature: -10°C to 23°C to 55°C, Voltage range: -15% to 10% of rated voltage
- ***3**. K thermocouple at -100° C max.: $\pm 10^{\circ}$ C max.
- *4. External communications (RS-232C, RS-485, or RS-422) and cable communications for the Setup Tool can be used at the same time.

USB-Serial Conversion Cable

Windows 2000, XP, or Vista				
Thermo Mini, CX-Thermo version 4.0 or higher				
E5AN/E5EN/E5CN/E5CN-U/ E5AN-H/E5EN-H/E5CN-H				
Conforms to USB Specification 1.1.				
38400 bps				
Computer: USB (type A plug) Temperature Controller: Setup Tool port (on bottom of Controller)				
Bus power (Supplied from USB host controller.)				
5 VDC				
70 mA				
0 to 55°C (with no condensation or icing)				
10% to 80%				
-20 to 60°C (with no condensation or icing)				
10% to 80%				
2,000 m max.				
Approx. 100 g				

Note: A driver must be installed in the personal computer. Refer to installation information in the operation manual for the Conversion Cable.

Communications Specifications

	•
Transmission line	RS-485, RS-422: Multipoint
connection method	RS-232C: Point-to-point
Communications	RS-485 (two-wire, half duplex)
Communications	RS-422 (four-wire, half duplex) or RS-232C
Synchronization method	Start-stop synchronization
Protocol	CompoWay/F, SYSWAY, or Modbus
Baud rate	1200, 2400, 4800, 9600, 19200, 38400, or 57600 bps
Transmission code	ASCII (CompoWay/F, SYSWAY)
Transmission code	RTU (Modbus)
Data bit length *	7 or 8 bits
Stop bit length *	1 or 2 bits
	Vertical parity (none, even, odd)
Error detection	Frame check sequence (FCS) with SYSWAY
	Block check character (BCC) with
Flance a section	CompoWay/F or CRC-16 Modbus
Flow control	None
Interface	RS-485, RS-422, or RS-232C
Retry function	None
Communications buffer	217 bytes
Communications	0 to 99 ms
response wait time	Default: 20 ms

Note: The baud rate, data bit length, stop bit length, and vertical parity can be individually set using the Communications Setting Level.

Current Transformer (Order Separately) Ratings

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

USB-Infrared Conversion Cable

Applicable OS	Windows 2000, XP, or Vista				
Applicable software	Thermo Mini, CX-Thermo version 4.0 or higher				
Applicable models	E5AN-H/E5EN-H				
USB interface standard	Conforms to USB Specification 1.1.				
DTE speed	38400 bps				
Connector specifications	Computer: USB (type A plug) Temperature Controller: Infrared port (on front of Controller)				
Power supply	Bus power (Supplied from USB host controller.)				
Power supply voltage	5 VDC				
Current consumption	80 mA				
Ambient operating temperature	0 to 55°C (with no condensation or icing)				
Ambient operating humidity	10% to 80%				
Storage temperature	-20 to 60°C (with no condensation or icing)				
Storage humidity	10% to 80%				
Altitude	2,000 m max.				
Weight	Approx. 130 g (with mounting adaptor)				

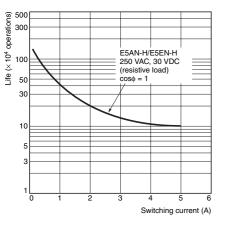
Note: A driver must be installed in the personal computer. Refer to installation information in the operation manual for the Conversion Cable.

Heater Burnout Alarms, SSR Failure Alarms, and Heater Overcurrent Alarms

,				
CT input (for heater current detection)	Models with detection for single-phase heaters: One input Models with detection for single-phase or three-phase heaters: Two inputs			
Maximum heater current	50 A AC			
Input current indication accuracy	±5% FS ±1 digit max.			
Heater burnout alarm setting range *1	0.1 to 49.9 A (in units of 0.1 A) Minimum detection ON time: 100 ms			
SSR failure alarm setting range *2	0.1 to 49.9 A (in units of 0.1 A) Minimum detection OFF time: 100 ms			
Heater overcurrent alarm setting range *3	0.1 to 49.9 A (in units of 0.1 A) Minimum detection ON time: 100 ms			

- *1. For heater burnout alarms, the heater current will be measured when the control output is ON, and the output assigned to the alarm 1 function will turn ON if the heater current is lower than the set value (i.e., heater burnout detection current value).
- *2. For SSR failure alarms, the heater current will be measured when the control output is OFF, and the output assigned to the alarm 1 function will turn ON if the heater current is higher than the set value (i.e., SSR failure detection current value).
- *3. For heater overcurrent alarms, the heater current will be measured when the control output is ON, and the output assigned to the alarm 1 function will turn ON if the heater current is higher than the set value (i.e., heater overcurrent detection current value).

Electrical Life Expectancy Curve for Relays (Reference Values)



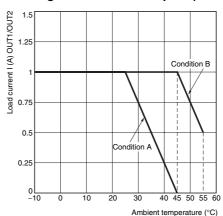
SSR Outputs (OUT1/OUT2) Ratings

Rated load voltage: 75 to 250 VAC
Rated load current: 1 A (resistive load)

Note: 1. The load current must be within the derating curve.

2. There is no zero-cross function.

Derating Curve for SSR Outputs (Reference Values)



Condition A: SSR outputs 100% ON Condition B: SSR outputs 50% ON with 2-s control cycle

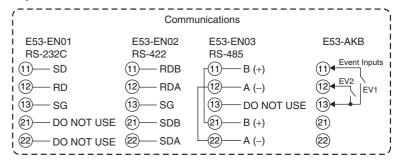
External Connections

A voltage output (control output 1, for driving SSR) is not electrically insulated from the internal circuits. When using a grounding thermocouple,
do not connect any of the control output terminals to ground. If the control output terminals are connected to ground, errors will occur in the
measured temperature values as a result of leakage current.

The voltage output (control output 2, for driving SSR) has basic insulation provided for the internal circuit

Controllers

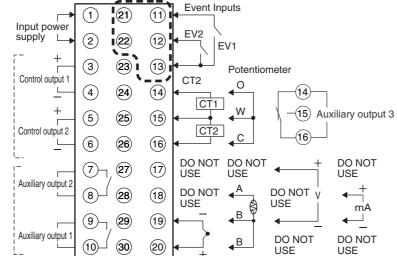
Option Units



- 100 to 240 VAC
- 24 VAC/VDC (no polarity)

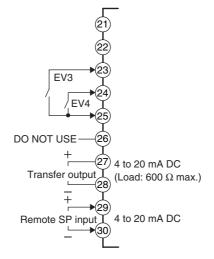
Control outputs 1, 2
Output Unit
Control outputs 1, 2
Relay Outputs
250 VAC, 5 A
(resistive load)
SSR Outputs
75 to 250 VAC, 1A
(resistive load)
Models with Positionproportional Control
250 VAC, 1 A
(including inrush
current)



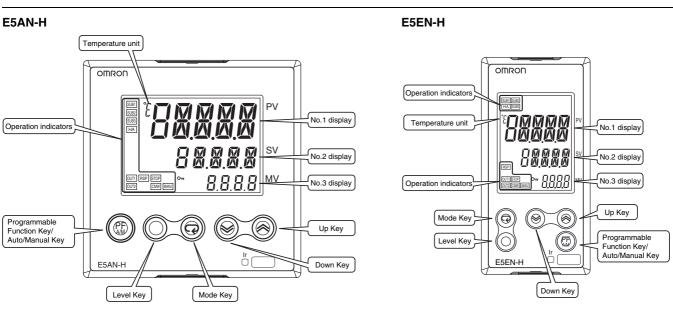


Auxiliary output 3
Relay output
SPDT, 250 VAC, 3 A
(resistive load)

A heater burnout alarm, SSR failure, heater overcurrent alarm, or input alarm is sent to the output to which the alarm 1 function is assigned.

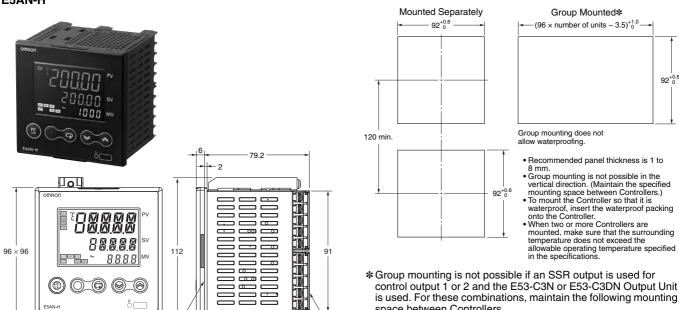


Note: Wire all voltage input terminals correctly. The Controller may fail if voltage input terminals are wired incorrectly.



Dimensions (Unit: mm)

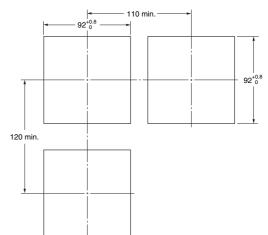
E5AN-H



Terminal Cover (E53-COV16)

Crimp terminal size: M3.5

control output 1 or 2 and the E53-C3N or E53-C3DN Output Unit is used. For these combinations, maintain the following mounting space between Controllers.



Tol

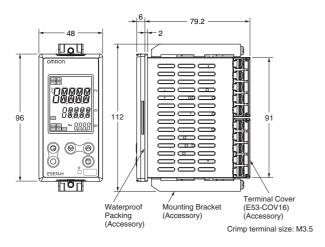
Waterproof

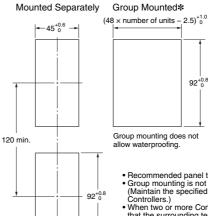
Packing (Accessory)

Mounting Bracket

E5EN-H

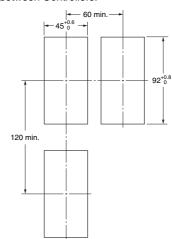






Recommended panel thickness is 1 to 8 mm.
Group mounting is not possible in the vertical direction. (Maintain the specified mounting space between Controllers.)
When two or more Controllers are mounted, make sure that the surrounding temperature does not exceed the allowable operating temperature specified in the specifications.

*Group mounting is not possible if an SSR output is used for control output 1 or 2 and the E53-C3N or E53-C3DN Output Unit is used. For these combinations, maintain the following mounting space between Controllers.

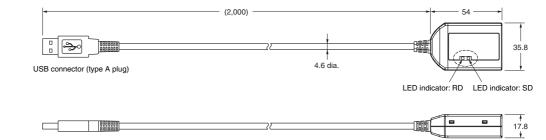


USB-Infrared Conversion Cable

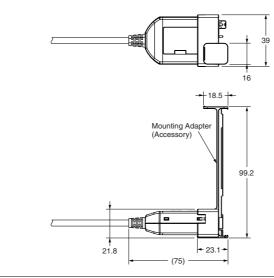
E58-CIFIR

USB-Infrared Conversion Cable





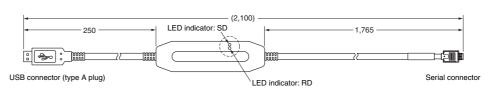
With Mounting Adapter Connected





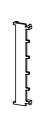
USB-Serial Conversion Cable E58-CIFQ1

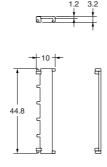




Terminal Covers

E53-COV16 (Six Covers provided.)

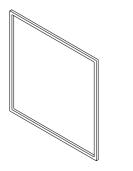




Waterproof Packing

Y92S-P4 (for DIN 96×96)

Y92S-P5 (for DIN 48×96)





Order the Waterproof Packing separately if it becomes lost or damaged.

The Waterproof Packing can be used to achieve an IP66 degree of protection.

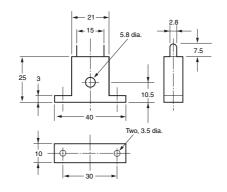
(Deterioration, shrinking, or hardening of the waterproof packing may occur depending on the operating environment. Therefore, periodic replacement is recommended to ensure the level of waterproofing specified in IP66. The time for periodic replacement depends on the operating environment. Be sure to confirm this point at your site. Consider one year a rough standard. OMRON shall not be liable for the level of water resistance if the customer does not perform periodic replacement.)

The Waterproof Packing does not need to be attached if a waterproof structure is not required.

Current Transformers

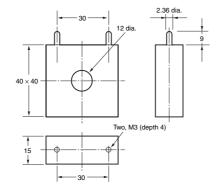
E54-CT1





E54-CT3

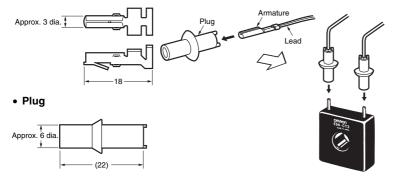




E54-CT3 Accessory

• Armature

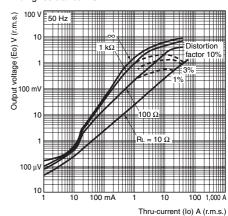
Connection Example



E54-CT1

Thru-current (Io) vs. Output Voltage (Eo) (Reference Values)

Maximum continuous heater current: 50 A (50/60 Hz) Number of windings: 400 \pm 2 Winding resistance: 18 \pm 2 Ω

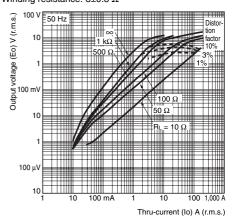


E54-CT3

Thru-current (lo) vs. Output Voltage (Eo) (Reference Values)

Maximum continuous heater current: 120 A (50/60 Hz) (Maximum continuous heater current for an OMRON Temperature Controller is 50 A.)

Number of windings: 400 ± 2 Winding resistance: $8\pm0.8~\Omega$

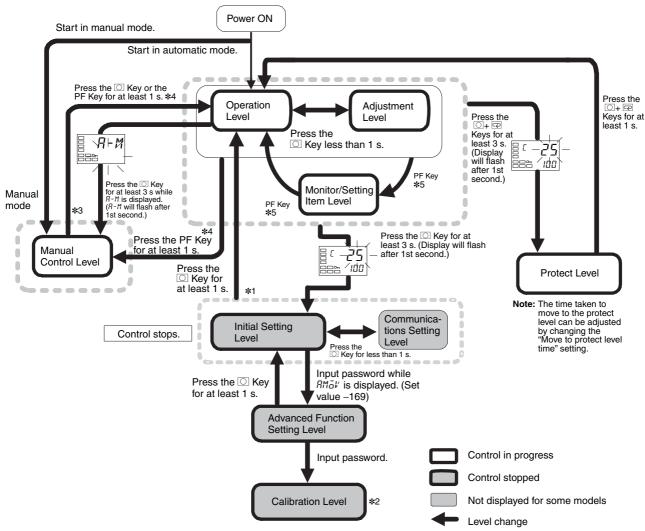


Operation

Setting Levels Diagram

This diagram shows all of the setting levels. To move to the advanced function setting level and calibration level, you must enter passwords. Some parameters are not displayed depending on the protect level setting and the conditions of use. Control stops when you move from the operation level to the initial setting level.

Basic Type



- *1. You can return to the operation level by executing a software reset.
- *2. It is not possible to move to other levels from the calibration level by operating the keys on the front panel. It can be done only by first turning OFF the power.
- *3. From the manual control level, key operations can be used to move to the operation level only.
- *4. When the PF Setting parameter is set to A-M for a Controller with a PF Key (E5AN/E5EN).
- *5. When the PF Setting parameter is set to PFDP for a Controller with a PF Key (E5AN/E5EN)

Error Displays (Troubleshooting)

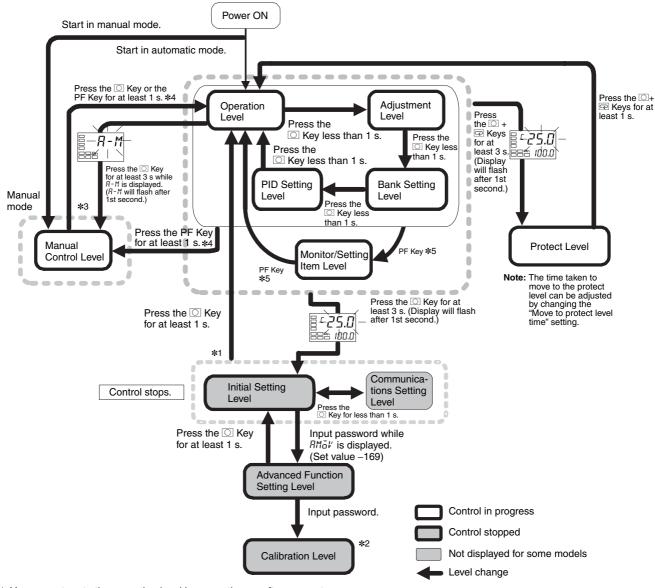
When an error occurs, the No.1 display shows the error code. Take necessary measure according to the error code, referring the table below.

No.1 display	Meaning	Action	Status at error			
No.1 display	wearing	Action	Control output	Alarm output		
5, E R R (S. Err)	Input error	Check the wiring of inputs for miswiring, disconnections, and short-circuits and check the input type.	OFF	Operates as above the upper limit.		
[]]] (E333)	A/D converter error	Turn the power OFF then back ON again. If the display remains the same, the controller must be repaired. If the display is restored to normal, then a probable cause can be external noise affecting the control system. Check for external noise.	OFF	OFF		
E (E111)	Memory error	Turn the power OFF then back ON again. If the display remains the same, the controller must be repaired. If the display is restored to normal, then a probable cause can be external noise affecting the control system. Check for external noise.	OFF	OFF		

Note: If the input value exceeds the display limit (-1999 to 9999), though it is within the control range, CCCC will be displayed under -1999 and above 9999. Under these conditions, control output and alarm output will operate normally.

For details on the control range, refer to the E5CN/E5AN/E5EN Digital Temperature Controllers User's Manual Basic Type (Cat. No. H156). *These errors are displayed only when the PV/SP is displayed. Errors are not displayed for other displays.

Advanced Type



- *1. You can return to the operation level by executing a software reset.
- *2. It is not possible to move to other levels from the calibration level by operating the keys on the front panel. It can be done only by first turning OFF the power.
- *3. From the manual control level, key operations can be used to move to the operation level only.
- *4. When the PF Setting parameter is set to A-M for a Controller with a PF Key (E5AN-H/E5EN-H).
- *5. When the PF Setting parameter is set to PFDP for a Controller with a PF Key (E5AN-H/E5EN-H)

Error Displays (Troubleshooting)

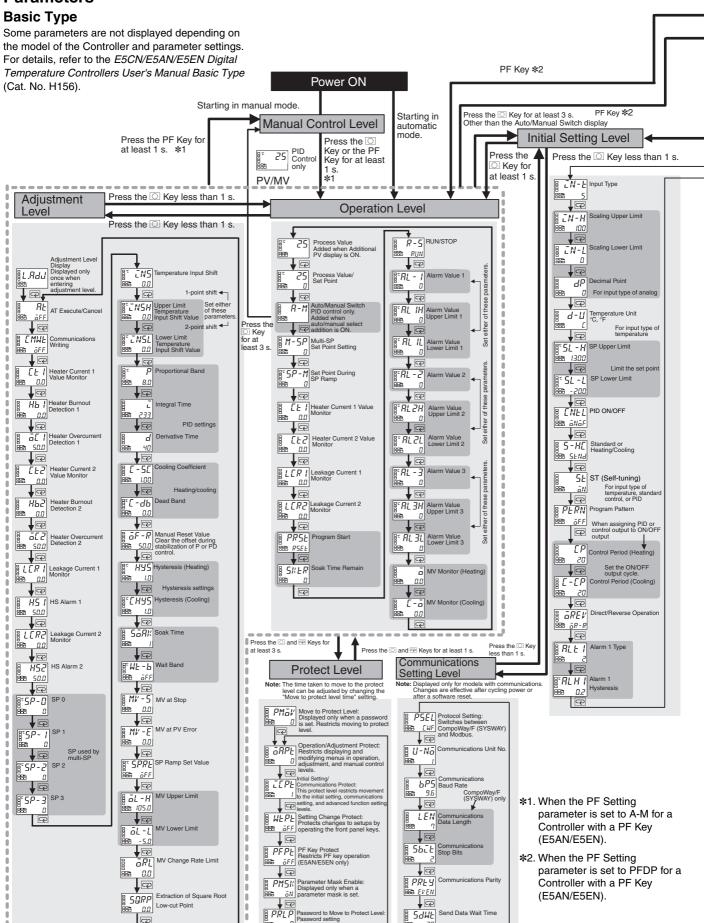
When an error occurs, the No.1 display shows the error code. Take necessary measure according to the error code, referring the table below.

No.1 display	Meaning	Action	Status at error	
			Control output	Alarm output
5, E	Input error	Check the wiring of inputs for miswiring, disconnections, and short-circuits and check the input type.	OFF	Operates as above the upper limit.
E333 (E333)	A/D converter error	Turn the power OFF then back ON again. If the display remains the same, the controller must be repaired. If the display is restored to normal, then a probable cause can be external noise affecting the control system. Check for external noise.	OFF	OFF
E (E111)	Memory error	Turn the power OFF then back ON again. If the display remains the same, the controller must be repaired. If the display is restored to normal, then a probable cause can be external noise affecting the control system. Check for external noise.	OFF	OFF

Note: If the input value exceeds the display limit (-19999 to 32400), though it is within the control range, CCCC will be displayed under -19999 and DDDD above 32400. Under these conditions, control output and alarm output will operate normally.

For details on the control range, refer to the E5CN-H/E5AN-H/E5EN-H Digital Controller's User's Manual Advanced Type (Cat. No. H157). *These errors are displayed only when the PV/SP is displayed. Errors are not displayed for other displays.

Parameters



BBB EVEN

₩ 🕶

29MF

20

Send Data Wait Time

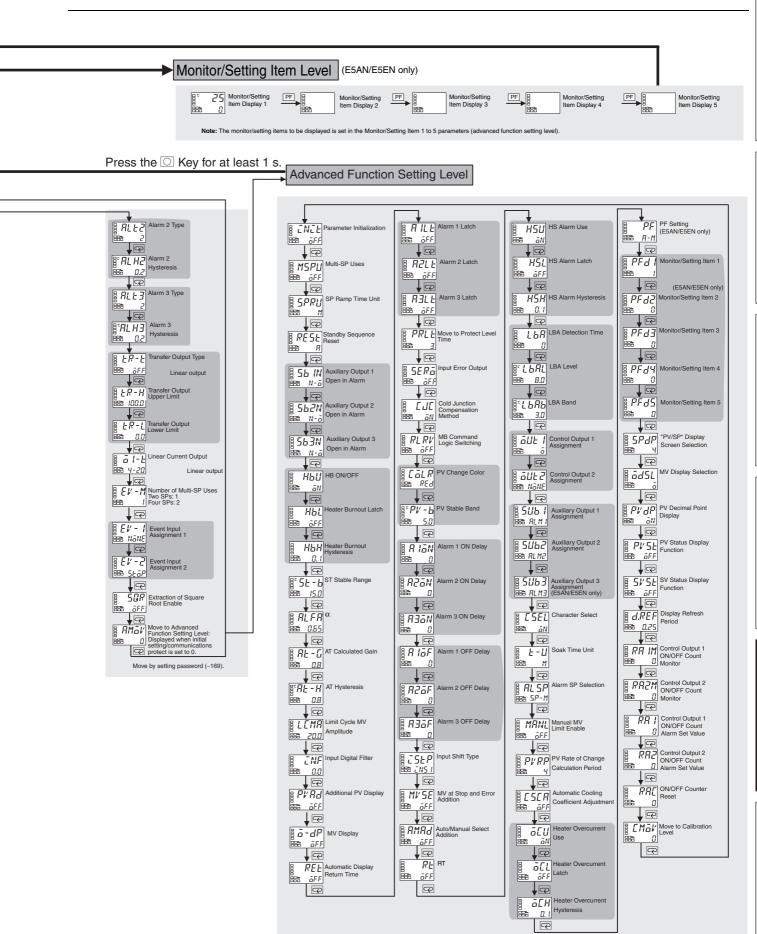
(E5AN/E5EN).

Extraction of Square Root

D.D Low-cut Point

SORP

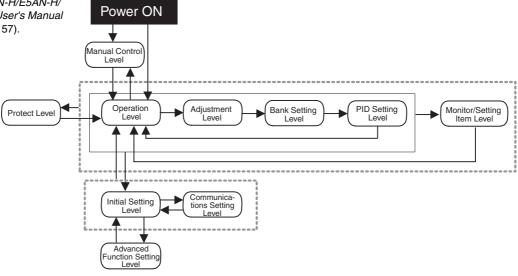
Q

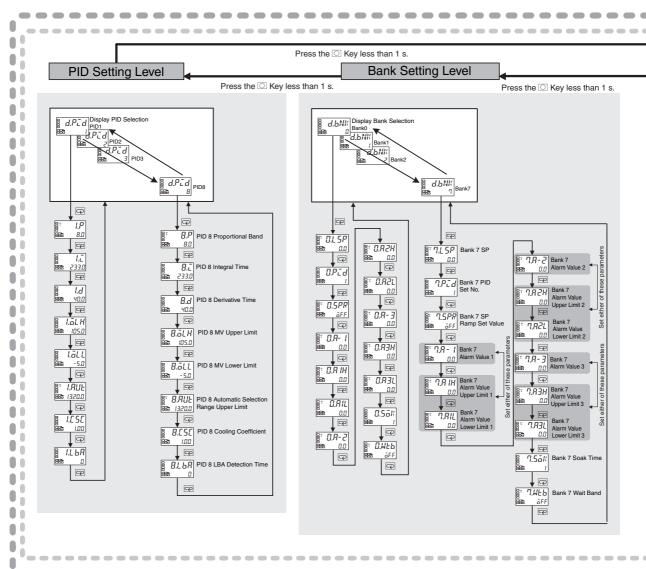


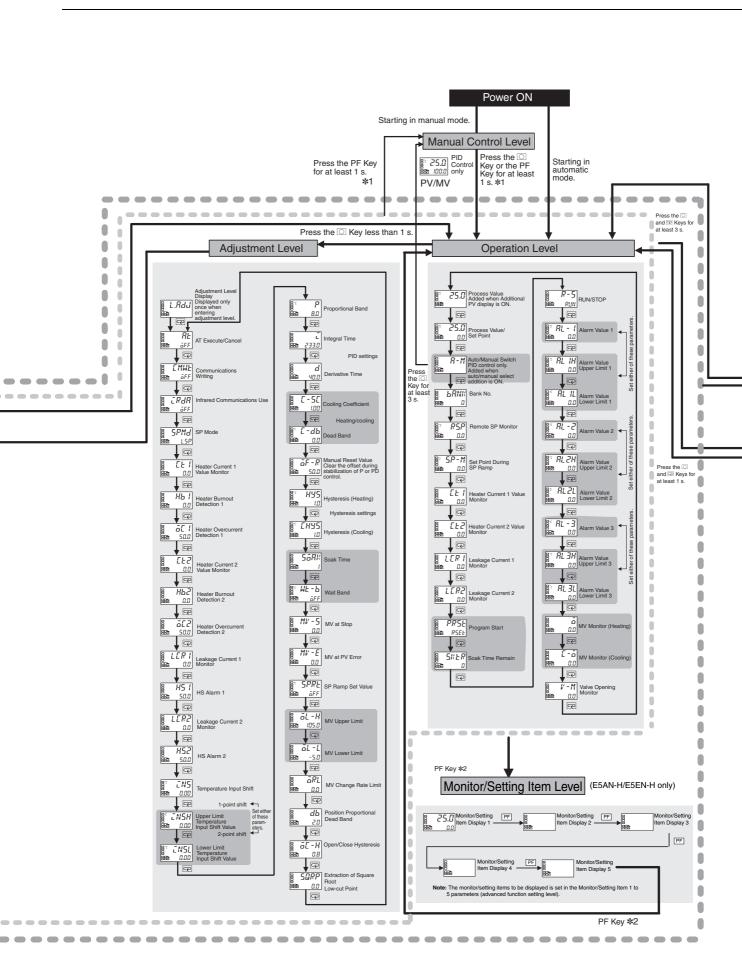
Advanced Type

Some parameters are not displayed depending on the model of the Controller and parameter settings.

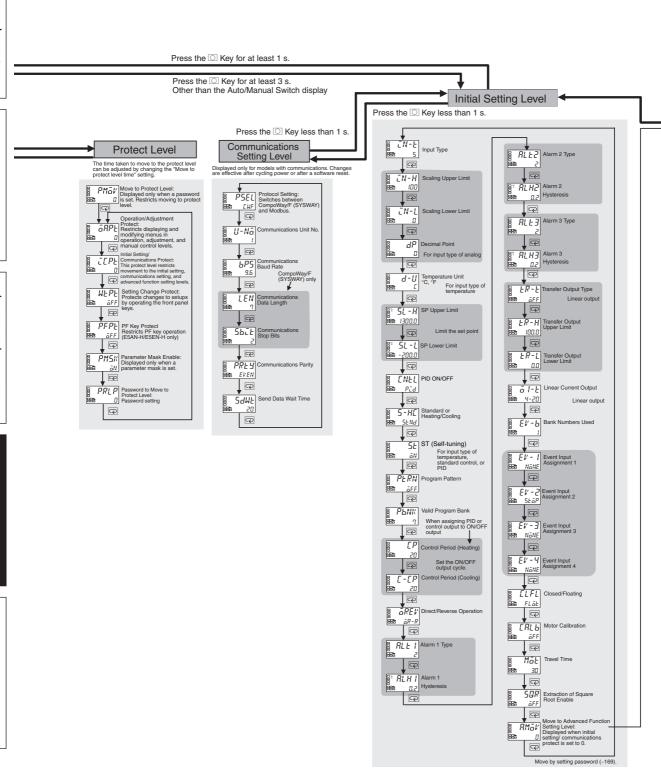
For details, refer to the *E5CN-H/E5AN-H/E5EN-H Digital Controllers User's Manual Advanced Type* (Cat. No. H157).

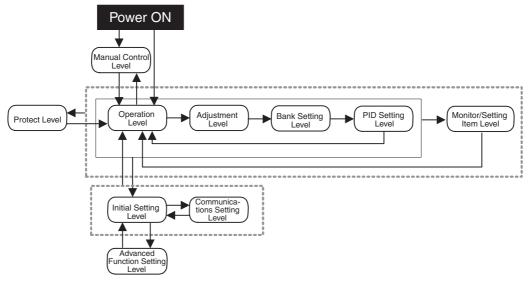




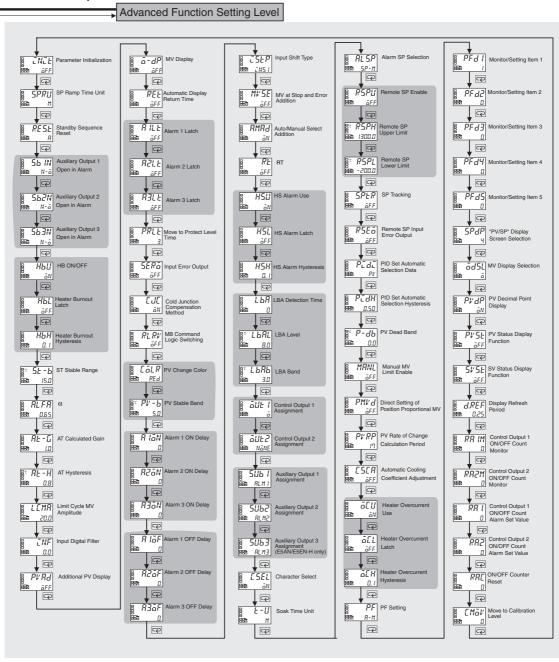


- *1. When the PF Setting parameter is set to A-M for a Controller with a PF Key (E5AN-H/E5EN-H).
- *2. When the PF Setting parameter is set to PFDP for a Controller with a PF Key (E5AN-H/E5EN-H).





Press the O Key for at least 1 s.



Safety Precautions

/!\ CAUTION

Do not touch the terminals while power is being supplied. Doing so may occasionally result in minor injury due to electric shock.



Do not allow pieces of metal, wire clippings, or fine metallic shavings or filings from installation to enter the product. Doing so may occasionally result in electric shock, fire, or malfunction.



Do not use the product where subject to flammable or explosive gas. Otherwise, minor injury from explosion may occasionally occur.



Do not leave the cable for the Support Software connected to the product. Malfunction may occur due to noise in the cable.



Do not use the Temperature Controller or Conversion Cable if it is damaged. Doing so may occasionally result in minor electric shock or fire.



Never disassemble, modify, or repair the product or touch any of the internal parts. Minor electric shock, fire, or malfunction may occasionally occur.



CAUTION - Risk of Fire and Electric Shock

- a) This product is UL listed as Open Type Process Control Equipment. It must be mounted in an enclosure that does not allow fire to escape externally.
- b) More than one disconnect switch may be required to de-energize the equipment before servicing the product.



- c) Signal inputs are SELV, limited energy. *1
- d) Caution: To reduce the risk of fire or electric shock, do not interconnect the outputs of different Class 2 circuits. *2

If the output relays are used past their life expectancy, contact fusing or burning may occasionally occur. Always consider the application conditions and use the output relays within their rated load and electrical life expectancy. The life expectancy of output relays varies considerably with the output load and switching conditions.



Tighten the terminal screws to between 0.74 and 0.90 N·m. *3 Loose screws may occasionally result in fire.



Set the parameters of the product so that they are suitable for the system being controlled. If they are not suitable, unexpected operation may occasionally result in property damage or accidents.



A malfunction in the product may occasionally make control operations impossible or prevent alarm outputs, resulting in property damage. To maintain safety in the event of malfunction of the product, take appropriate safety measures, such as installing a monitoring device on a separate line.



A semiconductor is used in the output section of long-life relays. If excessive noise or surge is impressed on the output terminals, a short-circuit failure is likely to occur. If the output remains shorted, fire will occur due to overheating of the heater or other cause. Take measures in the overall system to prevent excessive temperature increase and to prevent fire from spreading.



Do not allow pieces of metal or wire cuttings to get inside the cable connector for the Support Software. Failure to do so may occasionally result in minor electric shock, fire, or damage to equipment.



Do not allow dust and dirt to collect between the pins in the connector on the Conversion Cable. Failure to do so may occasionally result in fire.



When inserting the body of the Temperature Controller into the case, confirm that the hooks on the top and bottom are securely engaged with the case. If the body of the Temperature Controller is not inserted properly, faulty contact in the terminal section or reduced water resistance may occasionally result in fire or malfunction.



When connecting the Control Output Unit to the socket, press it in until there is no gap between the Control Output Unit and the socket. Otherwise contact faults in the connector pins may occasionally result in fire or



- *1. An SELV circuit is one separated from the power supply with double insulation or reinforced insulation, that does not exceed 30 V r.m.s. and 42.4 V peak or 60 VDC.
- *2. A class 2 power supply is one tested and certified by UL as having the current and voltage of the secondary output restricted to specific levels.
- **★3**. The tightening torque for E5CN-U is 0.5 N·m.

Precautions for Safe Use

Be sure to observe the following precautions to prevent malfunction or adverse affects on the performance or functionality of the product. Not doing so may occasionally result in faulty operation.

- This product is specifically designed for indoor use only. Do not use this product in the following places:
- Places directly subject to heat radiated from heating equipment.
- Places subject to splashing liquid or oil atmosphere.
- · Places subject to direct sunlight.
- Places subject to dust or corrosive gas (in particular, sulfide gas and ammonia gas).
- Places subject to intense temperature change.
- · Places subject to icing and condensation.
- Places subject to vibration and large shocks.
- 2. Use and store the product within the rated ambient temperature and humidity.

Gang-mounting two or more Temperature Controllers, or mounting Temperature Controllers above each other may cause heat to build up inside the Temperature Controllers, which will shorten their service life. In such a case, use forced cooling by fans or other means of air ventilation to cool down the Temperature Controllers.

- 3. To allow heat to escape, do not block the area around the product. Do not block the ventilation holes on the product.
- 4. Be sure to wire properly with correct polarity of terminals.
- 5. Use the specified size (M3.5, width 7.2 mm or less) crimped terminals for wiring. To connect bare wires to the terminal block, use stranded or solid copper wires with a gage of AWG24 to AWG14 (equal to a cross-sectional area of 0.205 to 2.081 mm²). (The stripping length is 5 to 6 mm.) Up to two wires of the same size and type or two crimp terminals can be inserted into a single terminal.
- 6. Do not wire the terminals that are not used.
- 7. To avoid inductive noise, keep the wiring for the product's terminal block away from power cables carry high voltages or large currents. Also, do not wire power lines together with or parallel to product wiring. Using shielded cables and using separate conduits or ducts is recommended.

Attach a surge suppressor or noise filter to peripheral devices that generate noise (in particular, motors, transformers, solenoids, magnetic coils, or other equipment that have an inductance component).

When a noise filter is used at the power supply, first check the voltage or current, and attach the noise filter as close as possible to the product.

Allow as much space as possible between the product and devices that generate powerful high frequencies (high-frequency welders, high-frequency sewing machines, etc.) or surge.

- 8. Use this product within the rated load and power supply.
- 9. Make sure that the rated voltage is attained within two seconds of turning ON the power using a switch or relay contact. If the voltage is applied gradually, the power may not be reset or output malfunctions may occur.
- 10.Make sure that the Temperature Controller has 30 minutes or more to warm up after turning ON the power before starting actual control operations to ensure the correct temperature display.

- 11. When executing self-tuning, turn ON power to the load (e.g., heater) at the same time as or before supplying power to the product. If power is turned ON to the product before turning ON power to the load, self-tuning will not be performed properly and optimum control will not be achieved.
- 12.A switch or circuit breaker must be provided close to the product. The switch or circuit breaker must be within easy reach of the operator, and must be marked as a disconnecting means for this unit
- 13. Always turn OFF the power supply before pulling out the interior of the product, and never touch nor apply shock to the terminals or electronic components. When inserting the interior of the product, do not allow the electronic components to touch the case.
- **14.**Do not use paint thinner or similar chemical to clean with. Use standard grade alcohol.
- 15.Design the system (e.g., control panel) considering the 2 seconds of delay that the product's output to be set after power ON.
- 16. The output may turn OFF when shifting to certain levels. Take this into consideration when performing control.
- 17.The number of EEPROM write operations is limited. Therefore, use RAM write mode when frequently overwriting data during communications or other operations.
- 18.Always touch a grounded piece of metal before touching the Temperature Controller to discharge static electricity from your body.
- 19.Do not remove the terminal block. Doing so may result in failure or malfunction.
- 20.Control outputs (for driving SSR) that are voltage outputs are not isolated from the internal circuits. When using a grounded thermocouple, do not connect any of the control output terminals to ground. (Doing so may result in an unwanted circuit path, causing error in the measured temperature.)
- 21. When replacing the body of the Temperature Controller, check the condition of the terminals. If corroded terminals are used, contact failure in the terminals may cause the temperature inside the Temperature Controller to increase, possibly resulting in fire. If the terminals are corroded, replace the case as well.
- 22.Use suitable tools when taking the Temperature Controller apart for disposal. Sharp parts inside the Temperature Controller may cause injury.
- 23.Before connecting an Output Unit, confirm the specifications and thoroughly read relevant information in the datasheet and manual for the Temperature Controller.
- 24.Check the orientation of the connectors on the Conversion Cable before connecting the Conversion Cable. Do not force a connector if it does not connect smoothly. Using excessive force may damage the connector.
- 25.Do not place heavy object on the Conversion Cable, bend the cable past its natural bending radius, or pull on the cable with undue force.
- **26.**Do not connect or disconnect the Conversion Cable while communications are in progress. Product faults or malfunction may occur.
- 27.Make sure that the Conversion Cable's metal components are not touching the external power terminals.
- 28.Do not touch the connectors on the Conversion Cable with wet hands. Electrical shock may result.
- 29.Before using infrared communications, correctly attach the enclosed Mounting Adapter to the cable for the Support Software. When connecting the infrared port on the cable to the Support Software into the Adapter, insert the connector to the specified line. Communications may not be possible if the connector is not connected properly.

Precautions for Correct Use

Service Life

1. Use the product within the following temperature and humidity ranges:

Temperature: -10 to 55°C (with no icing or condensation) Humidity: 25% to 85%

- If the product is installed inside a control board, the ambient temperature must be kept to under 55° C, including the temperature around the product.
- 2. The service life of electronic devices like Temperature Controllers is determined not only by the number of times the relay is switched but also by the service life of internal electronic components. Component service life is affected by the ambient temperature: the higher the temperature, the shorter the service life and, the lower

- the temperature, the longer the service life. Therefore, the service life can be extended by lowering the temperature of the Temperature Controller.
- 3. When two or more Temperature Controllers are mounted horizontally close to each other or vertically next to one another, the internal temperature will increase due to heat radiated by the Temperature Controllers and the service life will decrease. In such a case, use forced cooling by fans or other means of air ventilation to cool down the Temperature Controllers. When providing forced cooling, however, be careful not to cool down the terminals sections alone to avoid measurement errors.

Measurement Accuracy

- 1. When extending or connecting the thermocouple lead wire, be sure to use compensating wires that match the thermocouple types.
- When extending or connecting the lead wire of the platinum resistance thermometer, be sure to use wires that have low resistance and keep the resistance of the three lead wires the same.
- 3. Mount the product so that it is horizontally level.
- If the measurement accuracy is low, check to see if input shift has been set correctly.

Waterproofing

The degree of protection is as shown below. Sections without any specification on their degree of protection or those with IP \square 0 are not waterproof.

Front panel: IP66

Rear case: IP20, Terminal section: IP00

(E5CN-U: Front panel: IP50, rear case: IP20, terminals: IP00)

Operating Precautions

- It takes approximately two seconds for the outputs to turn ON from after the power supply is turned ON. Due consideration must be given to this time when incorporating Temperature Controllers in a sequence circuit.
- 2. When using self-tuning, turn ON power for the load (e.g., heater) at the same time as or before supplying power to the Temperature Controller. If power is turned ON for the Temperature Controller before turning ON power for the load, self-tuning will not be performed properly and optimum control will not be achieved.
- 3. When starting operation after the Temperature Controller has warmed up, turn OFF the power and then turn it ON again at the same time as turning ON power for the load. (Instead of turning the Temperature Controller OFF and ON again, switching from STOP mode to RUN mode can also be used.)
- 4. Avoid using the Controller in places near a radio, television set, or wireless installing. These devices can cause radio disturbances which adversely affect the performance of the Controller.

Others

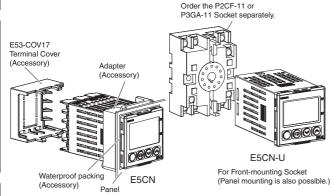
- The disk that is included with the Conversion Cable is designed for a computer CD-ROM driver. Never attempt to play the disk in a general-purpose audio player.
- 2. Do not connect or disconnect the Conversion Cable connector repeatedly over a short period of time. The computer may malfunction
- 3. After connecting the Conversion Cable to the computer, check the COM port number before starting communications. The computer requires time to recognize the cable connection. This delay does not indicate failure.
- 4. Do not connect the Conversion Cable through a USB hub. Doing so may damage the Conversion Cable.
- Do not use an extension cable to extend the Conversion Cable length when connecting to the computer. Doing so may damage the Conversion Cable.
- 6. The E5AN-H/E5EN-H use the same port for communications through the infrared port and the Support Software port. Do not attempt to use communications through the Support Software port when the infrared port is being used.

Mounting

Mounting to a Panel

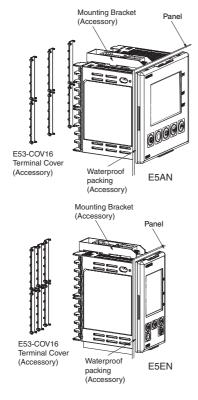
For waterproof mounting, waterproof packing must be installed on the Controller. Waterproofing is not possible when group mounting several Controllers. Waterproof packing is not necessary when there is no need for the waterproofing function.

E5CN



- The Panel Mounting Adapter is also included with the E5CN-U.
 There is no waterproof packing included with the E5CN-U.
- 2. Insert the E5CN/E5CN-U into the mounting hole in the panel.
- **3.** Push the adapter from the terminals up to the panel, and temporarily fasten the E5CN/E5CN-U.
- 4. Tighten the two fastening screws on the adapter. Alternately tighten the two screws little by little to maintain a balance. Tighten the screws to a torque of 0.29 to 0.39 N·m.

E5EN/E5AN



- 1. Insert the E5AN/E5EN into the square mounting hole in the panel (thickness: 1 to 8 mm). Attach the Mounting Brackets provided with the product to the mounting grooves on the top and bottom surfaces of the rear case.
- Use a ratchet to alternately tighten the screws on the top and bottom Mounting Brackets little by little to maintain balance, until the ratchet turns freely.

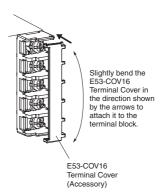
Mounting the Terminal Cover

E5CN

Make sure that the "UP" mark is facing up, and then attach the E53-COV17 Terminal Cover to the holes on the top and bottom of the Temperature Controller.

E5AN/E5EN

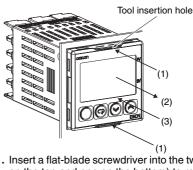
Slightly bend the E53-COV16 Terminal Cover to attach it to the terminal block as shown in the following diagram. The Terminal Cover cannot be attached in the opposite direction.

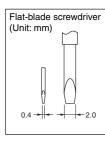


Removing the Temperature Controller from the Case

The Temperature Controller can be removed from the case to perform maintenance without removing the terminal leads. This is possible for only the E5CN, E5AN, and E5EN, and not for the E5CN-U. Check the specifications of the case and Temperature Controller before removing the Temperature Controller from the case.

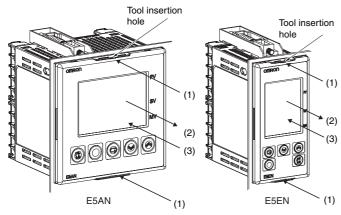
E5CN





- 1. Insert a flat-blade screwdriver into the two tool insertion holes (one on the top and one on the bottom) to release the hooks.
- 2. Insert the flat-blade screwdriver in the gap between the front panel and rear case, and pull out the front panel slightly. Hold the top and bottom of the front panel and carefully pull it out toward you, without applying unnecessary force.
- 3. When inserting the body of the Temperature Controller into the case, make sure the PCBs are parallel to each other, make sure that the sealing rubber is in place, and press the E5CN toward the rear case into position. While pushing the E5CN into place, push down on the hooks on the top and bottom surfaces of the rear case so that the hooks are securely locked in place. Be sure that electronic components do not come into contact with the case.

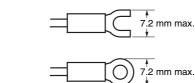
E5AN/E5EN



- Insert a flat-blade screwdriver into the two tool insertion holes (one on the top and one on the bottom) to release the hooks.
- 2. Insert the flat-blade screwdriver in the gap between the front panel and rear case (two on the top and two on the bottom), and use it to pry and pull out the front panel slightly. Then, pull out on the front panel gripping both sides. Be sure not to impose excessive force on the panel.
- 3. When inserting the body of the Temperature Controller into the case, make sure the PCBs are parallel to each other, make sure that the sealing rubber is in place, and press the E5AN/E5EN toward the rear case until it snaps into position. While pressing the E5AN/E5EN into place, press down on the hooks on the top and bottom surfaces of the rear case so that the hooks securely lock in place. Make sure that electronic components do not come into contact with the case.

Precautions when Wiring

- Separate input leads and power lines in order to prevent external noise.
- Use wires with a gage of AWG24 (cross-sectional area: 0.205 mm²) to AWG14 (cross-sectional area: 2.081 mm²) twisted-pair cable (stripping length: 5 to 6 mm).
- Use crimp terminals when wiring the terminals.
- Tighten the terminal screws to a torque of 0.74 to 0.90 N·m, however the terminal screws on the E5CN-U must be tightened to a torque of 0.5 N·m.
- Use the following types of crimp terminals for M3.5 screws.



 Do not remove the terminal block. Doing so will result in malfunction or failure.

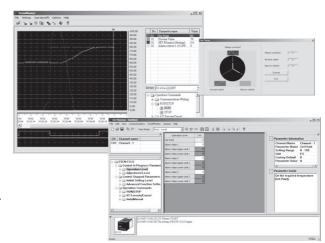
CX-Thermo Support Software Ver. 4.0

EST2-2C-MV4

Monitoring/Setting Support Software for E5CN/CN-H, E5AN/AN-H, E5EN/EN-H, E5ZN, E5□R/□R-T, and EJ1 Temperature Controllers Enabling Faster Parameter Setup, Device Adjustment, and Maintenance

CX-Cne

- Enables editing and batch-downloading parameters from a personal computer, reducing the work required to set parameters.
 Usability is improved with table-formatted parameter editing from version. 4.0.
- Supports Trend Monitoring:
 Monitor data (PV,SP,MV,PID parameter, Alarm ON/OFF, etc.) for
 up to 31 E5□N/□N-H Temperature Controllers.
 Connect up to 64 EJ1N, 17 EJ1G, or 16 E5ZN Temperature
 Controllers. (The Temperature Controllers must be from the same
 series.)
- Supports parameter masks to hide parameters unnecessary to display. (Supported only by the E5□N/□N-H and E5□R/□R-T).
- Logic operations enable setting inputs from external inputs (event inputs) or temperature status, outputs to external outputs (control or auxiliary outputs), and changing operating status with ON/OFF delays.
 - (Supported only by the E5 \square N/ \square N-H).
- Easy adjustment of control performance by fine-tuning.
- * Fine-tuning instructs the CX-Thermo to calculate a PID parameters by directly inputting commands to improve response.





Ordering Information

List of Models

Name	Model
CX-Thermo Support Software	EST2-2C-MV4

Specifications

Compatible devices	Temperature Controllers	E5CN (available from April 2004) E5AN, E5EN (available from Feb 2005), E5CN-H, E5AN-H, E5EN-H E5AR, E5ER E5AR-T, E5ER-T E5ZN EJ1N-TC4, EJ1N-TC2, EJ1N-HFU EJ1G-TC4, EJ1G-TC2, EJ1G-HFU G3ZA (only when connected to EJ1N-TC4, EJ1N-TC2, EJ1G-TC4, EJ1G-TC2) Note: Models with DeviceNet communications are not supported.	
Personal computer system requirements	os	Windows 2000 (service pack 3 or higher), XP, or Vista (Japanese or English version)	
	CPU	300 MHz min.	
	Memory	128 MB min.	
	Harddisk	300 MB min. available space	
	CD-ROM	One CD-ROM drive min.	
	Monitor	SVGA (800 × 600) min.	
	Communications ports	RS-232C port, or USB port, 1 port min.	
Connection method		 An E58-CIFQ1 USB-Serial Conversion Cable is required to connect a computer to the setup tool port the E5 —N, E5 —N-H, or EJ1. A K3SC Interface Converter is used to connect a computer to models with RS-422/RS-485 communications. An E58-CIFIR USB-Infrared Conversion Cable is required to wirelessly connect a computer to models with infrared communications (E5AN-H or E5EN-H). 	

Warranty and Application Considerations

Read and Understand This Catalog

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

Warranty and Limitations of Liability

WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS, OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted. IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

Application Considerations

SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.

Take all necessary steps to determine the suitability of the product for the systems, machines, and equipment with which it will be used.

Know and observe all prohibitions of use applicable to this product.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

Disclaimers

PERFORMANCE DATA

Performance data given in this catalog is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON *Warranty and Limitations of Liability.*

CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons. Consult with your OMRON representative at any time to confirm actual specifications of purchased product.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

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

Cat. No. H160-E1-01A In the interest of product improvement, specifications are subject to change without notice.

OMRON Corporation

Industrial Automation Company

Control Devices Division H.Q. Analog Controller Division Shiokoji Horikawa, Shimogyo-ku, Kyoto, 600-8530 Japan

Tel: (81)75-344-7080/Fax: (81)75-344-7149