# **Basic-type Digital Temperature Controller**

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

CSM E5AN E5EN DS E 4 1

c(VL)us C E

# 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.

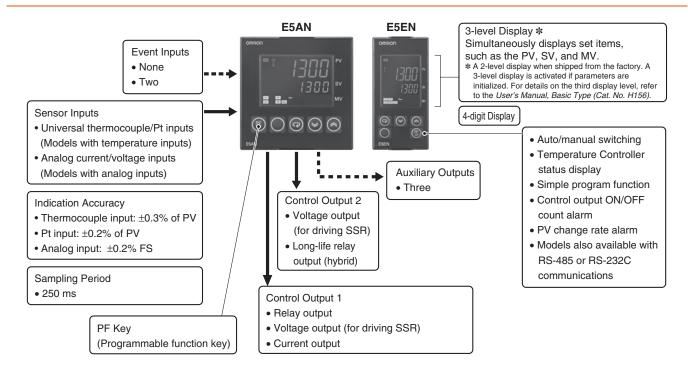
- Indication Accuracy
   Thermocouple input: ±0.3% of PV (previous models: ±0.5%)
   Pt input: ±0.2% of PV (previous models: ±0.5%)
   Analog input: ±0.2% FS (previous models: ±0.5%)
- A PV/SV-status display function can be set to automatically alternate between displaying the status of the Temperature 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.



↑ Refer to Safety Precautions for E5□N/E5□N-H.

Refer to *Operation for E5* N/E5 N-H for operating procedures.

# Main I/O Functions

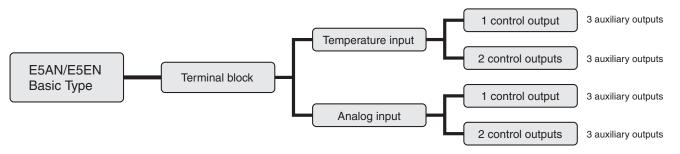


This data sheet is provided as a guideline for selecting products. Be sure to refer to the following user manuals for application precautions and other information required for operation before attempting to use the product.

E5CN/E5AN/E5EN/E5GN Digital Temperature Controllers User's Manual Basic Type (Cat. No. H156)

E5CN/E5AN/E5EN/E5GN Digital Temperature Controllers Communications Manual Basic Type (Cat. No. H158)

# 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** 

E5AN/E5EN-<u>3</u>M\_-----500-N

### 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.

Note: Estimates can be provided for coatings and other specifications that are not given in the datasheet. Ask your OMRON representative for details.

## **Option Units**

**E53-**□

### 1. Function

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

AKB: Event input

# **Ordering Information**

E5AN
Controllers with Terminal Blocks

	Case	Power		Auxiliary			Functions	Model	
Size	color	supply voltage	Input type	outputs	Control output 1	Heater Power supply burnout for Sensor			
					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
			Thermocouple		Voltage output (for driving SSR)	2			E5AN-Q3HHMT-500-N
			or Resistance	3	Relay output			Voltage output	E5AN-R3QMT-500-N
			thermometer		Voltage output (for driving SSR)			Voltage output	E5AN-Q3QMT-500-N
					Current output			Voltage output	E5AN-C3QMT-500-N
		100 to 240 VAC			Relay output				E5AN-R3YMT-500-N
		240 1710			Voltage output (for driving SSR)			Long-life relay output	E5AN-Q3YMT-500-N
			Analog (current/voltage)		Current output			Calput	E5AN-C3YMT-500-N
	<b>D</b>				Relay output		Sensor Power		E5AN-R3PMT-500-N
	Black				Voltage output (for driving SSR)		Sensor Power		E5AN-Q3PMT-500-N
				3	Relay output				E5AN-R3ML-500-N
					Voltage output (for driving SSR)				E5AN-Q3ML-500-N
1/4 DIN					Current output				E5AN-C3ML-500-N
$96 \times 96 \times 78$ W $\times$ H $\times$ D)					Relay output	1			E5AN-R3HML-500-N
					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
		VBO	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
		240 VAC	Thermocouple		Current output				E5AN-C3MT-W-500-N
	Silver		or	3	Relay output Voltage output	1			E5AN-R3HMT-W-500-N
			Resistance thermometer	-	(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
loto: Madala					Current output				E5AN-C3MTD-W-500-N

Note: Models with analog inputs do not have temperature unit indicators.

E5EN
Controllers with Terminal Blocks

	Case	Power		Auxiliary			Functions	<u> </u>	
Size	color	supply voltage	Input type	outputs	Control 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
		400 1-			Current output			Voltage output	E5EN-C3QMT-500-N
		100 to 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
	Black				Current output			Long-life relay output	E5EN-C3YMT-500-N
	Diack				Relay output		Sensor Power		E5EN-R3PMT-500-N
					Voltage output (for driving SSR)		Sensor Power		E5EN-Q3PMT-500-N
			Analog (current/voltage)	3	Relay output				E5EN-R3ML-500-N
1/8 DIN 18 × 96 × 78					Voltage output (for driving SSR)				E5EN-Q3ML-500-N
$(W \times H \times D)$					Current output				E5EN-C3ML-500-N
					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/ VDC	or Resistance	3	Relay output	1			E5EN-R3HMTD-500-N
		VDO	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 240 VAC			Voltage output (for driving SSR)				E5EN-Q3MT-W-500-N
		2.3 1/10	Thormson		Current output				E5EN-C3MT-W-500-N
	Silver		Thermocouple or	3	Relay output	1			E5EN-R3HMT-W-500-N
	Silver		Resistance thermometer	S	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

Note: Models with analog inputs do not have temperature unit indicators.

# **Option Units**

Name	Function	Model
Communications Unit	RS-232C communications	E53-EN01
Communications Unit	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	E93-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	

# **Specifications**

# **Ratings**

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 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 Voltage input: 1 to 5 V, 0 to 5 V, or 0 to 10 V							
Input imp	edance	Current input: 150 $\Omega$ max., Voltage input: 1 M $\Omega$ min. (Use a 1:1 connection when connecting the ES2-HB.)							
Control m	ethod	ON/OFF control or 2-PID control (with auto-tuning)							
	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 $\Omega$ max., resolution: approx. 10,000							
Long-life relay output		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)							
A !!!	Number of outputs	3							
Auxiliary 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 inputs	2							
Event		Contact input: ON: 1 k $\Omega$ max., OFF: 100 k $\Omega$ min.							
input	External contact input specifications	Non-contact input: ON: Residual voltage: 1.5 V max., OFF: Leakage current: 0.1 mA max.							
	mpat opcomeations	Current flow: Approx. 7 mA per contact							
External p	ower supply for ES1B	12 VDC ±10%, 20 mA, short-circuit protection circuit provided							
Setting m	ethod	Digital setting using front panel keys							
Indication	ı 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 switching		Not supported.							
Other functions		Manual output, heating/cooling control, loop burnout alarm, SP ramp, other alarm functions, heater burnout detection (including SSR failure and heater over current 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 o	perating 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 fr	om the factory. A 3-level display is activated if parameters are initialized. For details on the third display level,							

<sup>\*</sup>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 ype	PI		m res	istan eter	ce							Ti	nermo	ocoup	ole							Infra	ared te ser	mpera sor	ture	Analog input
Na	ame		Pt100	)	JPt	100		K	,	J	•	Γ	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																	4700	4700	1800							
	1700																	1700	1700	-							
	1600																			-							
	1500																										
	1400						1300										1300			-		1300					
$\tilde{c}$	1300						1300										1300		+	-	+	1300					
ည	1200						+										+ -		+	H	$\vdash$	-					Usable in the
ge	1100						$\dashv$															-					following
range (°C)	1000	850					+		850					850					+								ranges
e	900																$\vdash$		$\vdash$								by -
₹	800						$\dashv$																				scaling: -1999 to
ra	700						1 1						600														9999 or
ğ	600		500.0		500.0		1	500.0																			-199.9
Temperature	500									400.0	400	400.0			400	400.0											to 999.9
_	400																									260	
	300 200																							120	165		1
	100			100.0		100.0																	90				
	0																			100							
	-100.0			0.0		0.0												0	0		0	0	0	0	0	0	]
	-200.0							-20.0	-100	-20.0				-100													1
		-200	–199.9		-199.9		-200				-200	–199.9	-200		-200	-199.9	-200										
Set nui	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	4 to 20mA  0 to 20 mA  1 to 5 V  0 to 5 V  0 to 7							
Setting range			nges by scaling: 199.9, –19.99 to 99.99 or –1.999 to 9.99						
Setting number	0	1	2	3	4				

Shaded settings are the default settings.

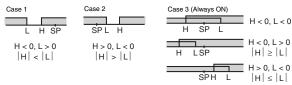
# **Alarm Outputs**

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.

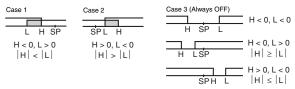
Note: For models with heater burnout, SSR failure, and heater overcurrent detection, alarm 1 will be an OR output of the alarm selected from the following alarm types and the alarms for heater burnout, SSR failure, and heater overcurrent. To output only a heater burnout alarm, SSR failure alarm, and 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 alarm value X is positive	When alarm value X is negative	Description of function				
0	Alarm function OFF	Output OFF		No alarm				
1 *1	Upper- and lower-limit	ON L H SP	*2	Set the deviation in the set point by setting the alarm upper limit (H) and alarm lower limit (L).				
2	Upper-limit	ON X SP	ON X - SP	Set the upward deviation in the set point by setting the alarm value (X).				
3	Lower-limit	ON X SP	ON X SP	Set the downward deviation in the set point by setting the alarm value (X).				
4 *1	Upper- and lower-limit range	ON L H SP	*3	Set the deviation in the set point by setting the alarm upper limit (H) and alarm lower limit (L).				
5 *1	Upper- and lower-limit with standby sequence	ON OFF SP	*4	A standby sequence is added to the upper- and lower-limit alarm (1). *6				
6	Upper-limit with standby sequence	ON X - SP	ON X ← SP	A standby sequence is added to the upper-limit alarm (2). *6				
7	Lower-limit with standby sequence	ON X SP	ON X SP	A standby sequence is added to the lower-limit alarm (3). *6				
8	Absolute-value upper-limit	ON ←X→ O	ON ←X→ 0	The alarm will turn ON if the process value is larger than the alarm value (X) regardless of the set point.				
9	Absolute-value lower-limit	ON ←X→ OFF 0	ON OFF O	The alarm will turn ON if the process value is smaller than the alarm value (X) regardless of the set point.				
10	Absolute-value upper-limit with standby sequence	ON OFF 0	ON ←X→ 0	A standby sequence is added to the absolute-value upper-limit alarm (8). *6				
11	Absolute-value lower-limit with standby sequence	ON ←X→ OFF 0	ON ←X→ 0	A standby sequence is added to the absolute-value lower-limit alarm (9). *6				
12	LBA (alarm 1 type only)	-		*7				
13	PV change rate alarm	-		*8				

- **\*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. Refer to the E5CN/E5AN/E5EN/E5GN Digital Temperature Controllers User's Manual Basic Type (Cat. No. H156) for information on the operation of the standby sequence.
- \*7. Refer to the E5CN/E5AN/E5EN/E5GN Digital Temperature Controllers User's Manual Basic Type (Cat. No. H156) for information on the loop burnout alarm (LBA).
  \*8. Refer to the E5CN/E5AN/E5EN/E5GN Digital Temperature
- \*8. Refer to the E5CN/E5AN/E5EN/E5GN Digital Temperature Controllers User's Manual Basic Type (Cat. No. H156) for information on the PV change rate alarm.

### **Characteristics**

accuracy	Thermocouple: (±0.3% of indicated value or ±1°C, whichever is greater) ±1 digit max. <b>*1</b> 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.		
itmut accuracy	CT input: ±5% FS ±1 digit max. ±0.3% FS max.		
•			
i temperature	Thermocouple input (R, S, B, W, PL II): (±1% of PV or ±10°C, whichever is greater) ±1 digit max.  Other thermocouple input: (±1% of PV or ±4°C, whichever is greater) ±1 digit max. *3		
f voltage *2	Platinum resistance thermometer: (±1% of PV or ±2°C, whichever is greater) ±1 digit max.  Analog input: (±1%FS) ±1 digit max.		
ling period	250 ms		
	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)		
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)		
ne (I)	0 to 3999 s (in units of 1 s)		
time (D)	0 to 3999 s (in units of 1 s) *5		
riod	0.5, 1 to 99 s (in units of 1 s)		
et value	0.0 to 100.0% (in units of 0.1%)		
ng range	-1999 to 9999 (decimal point position depends on input type)		
gnal source	Thermocouple: $0.1^{\circ}$ C/ $\Omega$ max. (100 $\Omega$ max.) Platinum resistance thermometer: $0.1^{\circ}$ C/ $\Omega$ max. (10 $\Omega$ max.)		
resistance	20 MΩ min. (at 500 VDC)		
trength	2,300 VAC, 50 or 60 Hz for 1 min (between terminals with different charge)		
Malfunction	10 to 55 Hz, 20 m/s² for 10 min each in X, Y, and Z directions		
Destruction	10 to 55 Hz, 0.75-mm single amplitude for 2 hrs each in X, Y, and Z directions		
Malfunction	100 m/s², 3 times each in X, Y, and Z directions		
Destruction	300 m/s², 3 times each in X, Y, and Z directions		
E5AN	Controller: Approx. 310 g, Mounting Bracket: Approx. 100 g		
E5EN	Controller: Approx. 260 g, Mounting Bracket: Approx. 100 g		
protection	Front panel: IP66, Rear case: IP20, Terminals: IP00		
otection	Non-volatile memory (number of writes: 1,000,000 times)		
	CX-Thermo version 4.0 or higher		
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 I			
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, Lloyd's standards *7		
	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 61000-4-6 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		
	atput accuracy f temperature f voltage *2 ding period  al band (P) de (I) dime (D) d		

<sup>\*1.</sup> 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  $\pm 3$ °C  $\pm 1$  digit max. The indication accuracy of W thermocouples is  $\pm 0.3$  of PV or  $\pm 3$ °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. 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.

<sup>\*4. &</sup>quot;EU" stands for Engineering Unit and is used as the unit after scaling. For a temperature sensor, the EU is °C or °F.

**<sup>\*5.</sup>** When robust tuning (RT) is ON, the differential time is 0.0 to 999.9 (in units of 0.1 s).

<sup>\*6.</sup> External communications (RS-232C or RS-485) and cable communications for the Setup Tool can be used at the same time.

<sup>\*7.</sup> Refer to information on maritime standards in Safety Precautions for E5\_N/E5\_N-H for compliance with Lloyd's Standards.

# **USB-Serial Conversion Cable**

Applicable OS	Windows 2000, XP, or Vista
Applicable software	CX-Thermo version 4 or higher
Applicable models	E5AN/E5EN/E5CN/E5CN-U/E5AN- H/E5EN-H/E5CN-H/E5GN
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**

	<u> </u>
Transmission line connection method	RS-485: Multipoint 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 response wait time	0 to 99 ms Default: 20 ms

<sup>\*</sup>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**

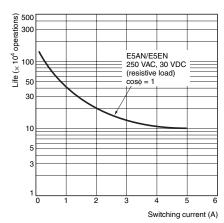
Dielectric strength	1,000 VAC for 1 min
Vibration resistance	50 Hz, 98 m/s <sup>2</sup>
Weight	E54-CT1: Approx. 11.5 g, E54-CT3: Approx. 50 g
Accessories (E54-CT3 only)	Armatures (2) Plugs (2)

# 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).

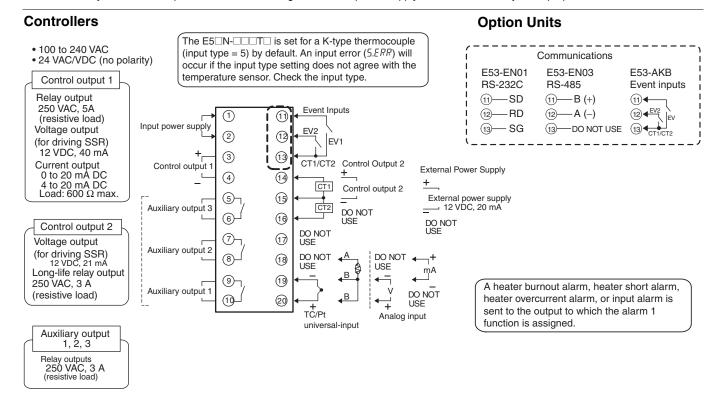
# Electrical Life Expectancy Curve for Relays (Reference Values)



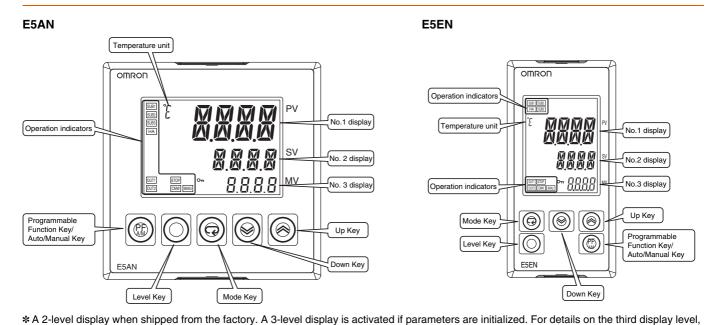
Note: Do not connect a DC load to a Controller with a Long-life Relay Output.

# **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.



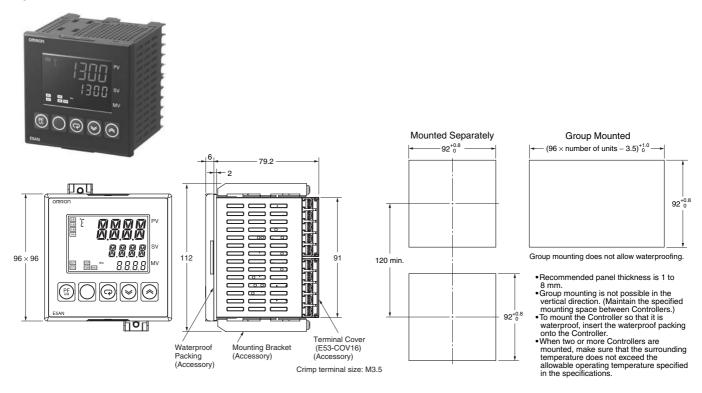
# **Nomenclature**



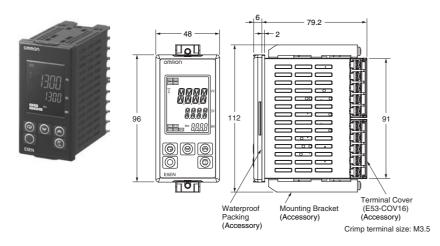
refer to the User's Manual, Basic Type (Cat. No. H156).

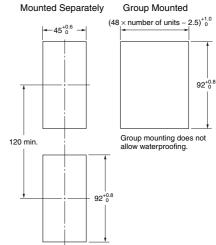
Dimensions (Unit: mm)

### 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)
- Controllers.)

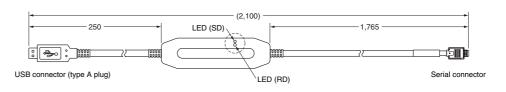
  To mount the Controller so that it is waterproof, insert the waterproof packing onto the Controller.

  When two or more Controllers are mounted, make sure
- 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)**

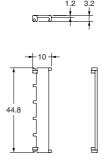
# USB-Serial Conversion Cable E58-CIFQ1











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

## Y92S-P5 (for DIN $48 \times 96$ )

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

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

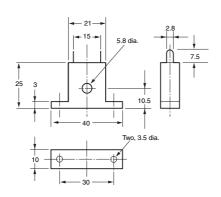
(Deterioration, shrinking, or hardening of the waterproof packing may occur depending on the operating environment. Therefore, periodic replacement is recommended to ensure the level of waterproofing specified in IP66. The time for periodic replacement depends on the operating environment. Be sure to 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**

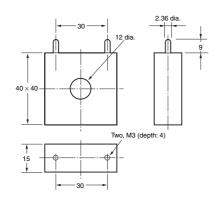
### E54-CT1





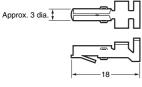
### E54-CT3



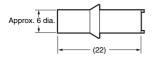


### E54-CT3 Accessory

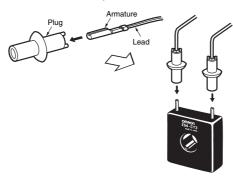
## Armature



### • Plug

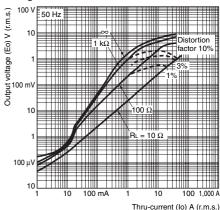


### **Connection Example**



### E54-CT1 Thru-current (Io) vs. Output Voltage (Eo) (Reference Values)

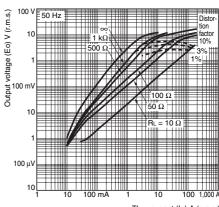
Maximum continuous heater current: 50 A (50/60 Hz) Number of windings: 400 $\pm 2$  Winding resistance: 18 $\pm 2~\Omega$ 



### 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

Number of windings: 400 $\pm$ 2 Winding resistance: 8 $\pm$ 0.8  $\Omega$ 



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

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- Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

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## PROGRAMMABLE PRODUCTS

OMRON shall not be responsible for the user's programming of a programmable product, or any consequence thereof.

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Product specifications and accessories may be changed at any time based on improvements and other reasons.

It is our practice to change model numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the products may be changed without any notice. When in doubt, special model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased products.

### **DIMENSIONS AND WEIGHTS**

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

### PERFORMANCE DATA

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