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.
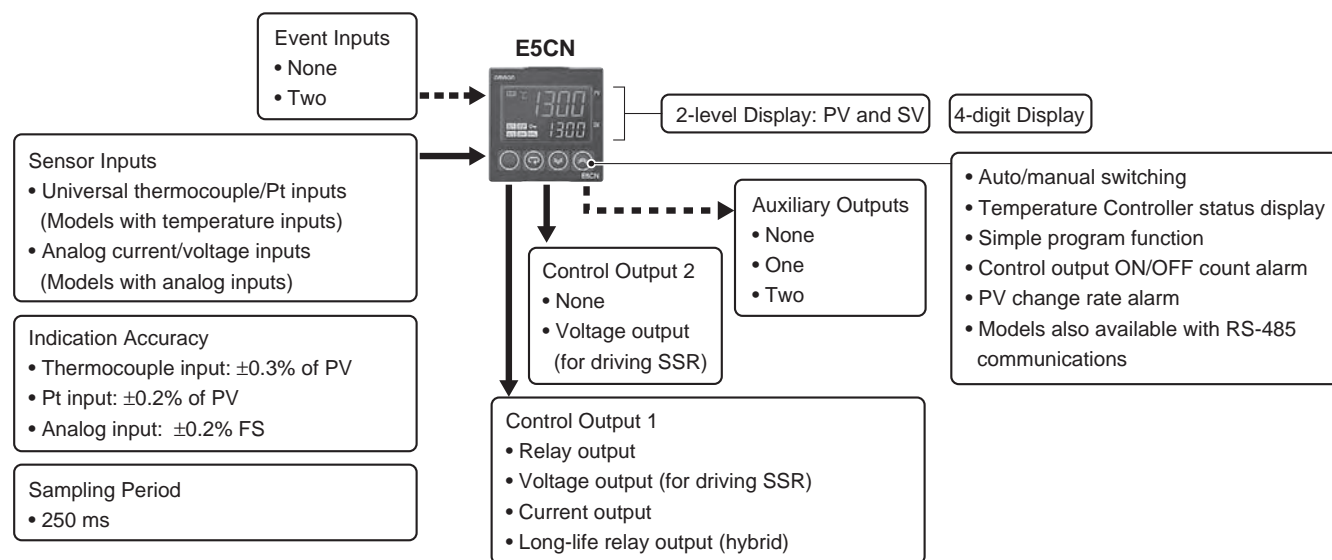
- Indication Accuracy
  Thermocouple input: ±0.3% of PV (previous models: ±0.5%)
  Pt input: ±0.2% of PV (previous models: ±0.5%)
  Analog input: ±0.2% FS (previous models: ±0.5%)
- New E5CN-U Models (Plug-in Models) with analog inputs and current outputs.
- A PV/SV-status display function can be set 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.

c $_{\text{US}}$ CE

48 × 48-mm E5CN   **48 × 48-mm E5CN-U**

NEW

⚠ Refer to *Safety Precautions* on page 66.

Main I/O Functions

Event Inputs
- None
- Two

E5CN

2-level Display: PV and SV   4-digit Display

Sensor Inputs
- Universal thermocouple/Pt inputs (Models with temperature inputs)
- Analog current/voltage inputs (Models with analog inputs)

Auxiliary Outputs
- None
- One
- Two

- Auto/manual switching
- Temperature Controller status display
- Simple program function
- Control output ON/OFF count alarm
- PV change rate alarm
- Models also available with RS-485 communications

Indication Accuracy
- Thermocouple input: ±0.3% of PV
- Pt input: ±0.2% of PV
- Analog input: ±0.2% FS

Control Output 2
- None
- Voltage output (for driving SSR)

Sampling Period
- 250 ms

Control Output 1
- Relay output
- Voltage output (for driving SSR)
- Current output
- Long-life relay output (hybrid)

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 (48 x 48 mm)

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

E5CN-H (48 x 48 mm)

E5AN-H (96 x 96 mm) E5EN-H (48 x 48 mm)

Operation

Safety Precautions

E5CN
E5CN-U (48 x 48 mm)

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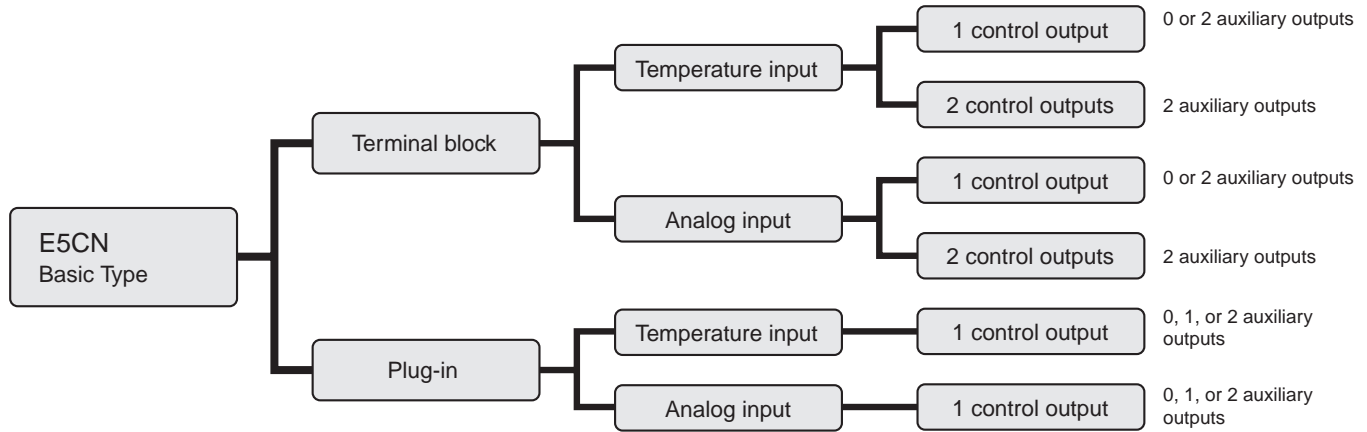E5EN (48 x 96 mm)

E5CN-H (48 x 48 mm)

E5AN-H (96 x 96 mm)
E5EN-H (48 x 96 mm)

Operation

Safety Precautions

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-☐☐M☐☐-☐-500
  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

E53-CN☐☐☐
  1 2 3 4

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
1/16 DIN 48 × 48 × 78 (W × H × D)	Black	100 to 240 VAC	Thermocouple or Resistance thermometer	None	Relay output		E5CN-RMT-500
					Voltage output (for driving SSR)		E5CN-QMT-500
					Current output		E5CN-CMT-500
				2	Relay output		E5CN-R2MT-500
					Voltage output (for driving SSR)		E5CN-Q2MT-500
					Current output		E5CN-C2MT-500
					Long-life relay output (hybrid)		E5CN-Y2MT-500
		24 VAC/VDC	Thermocouple or Resistance thermometer	None	Relay output		E5CN-RMTD-500
					Voltage output (for driving SSR)		E5CN-QMTD-500
					Current output		E5CN-CMTD-500
				2	Relay output		E5CN-R2MTD-500
					Voltage output (for driving SSR)		E5CN-Q2MTD-500
					Current output		E5CN-C2MTD-500
		100 to 240 VAC	Analog (current/voltage)	None	Relay output		E5CN-RML-500
					Voltage output (for driving SSR)		E5CN-QML-500
					Current output		E5CN-CML-500
				2	Relay output		E5CN-R2ML-500
					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
	Silver	100 to 240 VAC	Thermocouple or Resistance thermometer	None	Relay output		E5CN-RMT-W-500
					Voltage output (for driving SSR)		E5CN-QMT-W-500
					Current output		E5CN-CMT-W-500
				2	Relay output		E5CN-R2MT-W-500
					Voltage output (for driving SSR)		E5CN-Q2MT-W-500
					Current output		E5CN-C2MT-W-500
					Long-life relay output (hybrid)		E5CN-Y2MT-W-500
		24 VAC/VDC		2	Relay output		E5CN-R2MTD-W-500
					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 (48 × 48 mm)

E5AN (96 × 96 mm) **E5EN** (48 × 48 mm)

E5CN-H (48 × 48 mm)

E5AN-H (96 × 96 mm) **E5EN-H** (48 × 48 mm)

Operation

Safety Precautions

E5CN/E5CN-U

Model Number Structure

Model Number Legend (Plug-in-type Controllers)

E5CN-□□□U
  1 2 3 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
1/16 DIN	Black	100 to 240 VAC	Thermocouple or resistance thermometer	None	Relay output	E5CN-RTU
					Voltage output (for driving SSR)	E5CN-QTU
					Current output	E5CN-CTU
				1	Relay output	E5CN-R1TU
					Voltage output (for driving SSR)	E5CN-Q1TU
					Current output	E5CN-C1TU
				2	Relay output	E5CN-R2TU
					Voltage output (for driving SSR)	E5CN-Q2TU
					Current output	E5CN-C2TU
			Analog (current/voltage)	1	Relay output	E5CN-R1LU
					Voltage output (for driving SSR)	E5CN-Q1LU
					Current output	E5CN-C1LU
				2	Relay output	E5CN-R2LU
					Voltage output (for driving SSR)	E5CN-Q2LU
					Current output	E5CN-C2LU
		24 VAC/VDC	Thermocouple or resistance thermometer	None	Relay output	E5CN-RTDU
					Voltage output (for driving SSR)	E5CN-QTDU
					Current output	E5CN-CTDU
				1	Relay output	E5CN-R1TDU
					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

E5CN
E5CN-U (48 x 48 mm)

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

E5CN-H (48 x 48 mm)

E5AN-H (96 x 96 mm)
E5EN-H (48 x 48 mm)

Operation

Safety Precautions

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-☐☐☐-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☐.

Sockets (for Plug-in Models)

Type	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 (48 x 48 mm)

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

E5CN-H (48 x 48 mm)

E5AN-H (96 x 96 mm)
E5EN-H (48 x 96 mm)
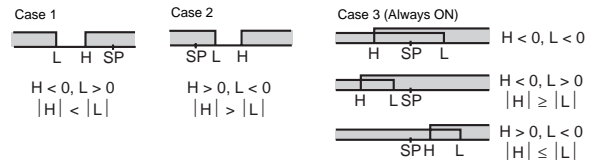
Operation

Safety Precautions

E5CN/E5CN-U

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 consumption	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)
	E5CN-U	100 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
		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 MΩ min. (Use a 1:1 connection when connecting the ES2-HB.)
Control method		ON/OFF control or 2-PID control (with auto-tuning)

Control outputs	Relay output	E5CN	SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA
		E5CN-U	SPDT, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA
	Voltage output (for driving SSR)	E5CN E5CN-U	Output voltage: 12 VDC ±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)
Auxiliary outputs	Number of outputs		1 or 2 max. (Depends on the model.)
	Output specifications		Relay output: SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA
Event inputs	Number of inputs		2
	External contact input specifications		Contact input: ON: 1 kΩ max., OFF: 100 kΩ min.
			Non-contact input: ON: Residual voltage: 1.5 V max., OFF: Leakage current: 0.1 mA max.
			Current flow: Approx. 7 mA per contact
External power 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			−10 to 55°C (with no condensation or icing), for 3-year warranty: −10 to 50°C
Ambient operating humidity			25% to 85%
Storage temperature			−25 to 65°C (with no condensation or icing)

OMRON

E5CN/E5CN-U

Input Ranges

Thermocouple/Platinum Resistance Thermometer (Universal Inputs)

Temperature range (°C) shown by input type. Shaded settings are the default settings.

Input Type	Name	Setting number	Range (°C)
Platinum resistance thermometer	Pt100	0	−200 to 850
	Pt100	1	−199.9 to 500.0
	Pt100	2	0.0 to 100.0
	JPt100	3	−199.9 to 500.0
	JPt100	4	0.0 to 100.0
Thermocouple	K	5 (default)	−200 to 1300
	K	6	−20.0 to 500.0
	J	7	−100 to 850
	J	8	−20.0 to 400.0
	T	9	−200 to 400
	T	10	−199.9 to 400.0
	E	11	0 to 600
	L	12	−100 to 850
	U	13	−200 to 400
	U	14	−199.9 to 400.0
	N	15	−200 to 1300
	R	16	0 to 1700
	S	17	0 to 1700
	B	18	100 to 1800
	W	24	0 to 2300
	PL II	25	0 to 1300
Infrared temperature sensor	10 to 70°C	19	0 to 90
	60 to 120°C	20	0 to 120
	115 to 165°C	21	0 to 165
	140 to 260°C	22	0 to 260
Analog input	0 to 50 mV	23	Usable in the following ranges by scaling: −1999 to 9999 or −199.9 to 999.9

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	Current		Voltage		
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 9.999				
Setting number	0	1	2	3	4

Shaded settings are the default settings.

E5CN
E5CN-U (48 x 48 mm)

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

E5CN-H (48 x 48 mm)

E5AN-H (96 x 96 mm)
E5EN-H (48 x 48 mm)

Operation

Safety Precautions

E5CN/E5CN-U

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 output operation	
		When X is positive	When X is negative
0	Alarm function OFF	Output OFF	
1 *1	Upper- and lower-limit	ON OFF — L H — SP	*2
2	Upper limit	ON OFF — X — SP	ON OFF — X — SP
3	Lower limit	ON OFF — X — SP	ON OFF — X — SP
4 *1	Upper- and lower-limit range	ON OFF — L H — SP	*3
5 *1	Upper- and lower-limit with standby sequence	ON OFF — L H — SP *5	*4
6	Upper-limit with standby sequence	ON OFF — X — SP	ON OFF — X — SP
7	Lower-limit with standby sequence	ON OFF — X — SP	ON OFF — X — SP
8	Absolute-value upper-limit	ON OFF ←X→ 0	ON OFF ←X→ 0
9	Absolute-value lower-limit	ON OFF ←X→ 0	ON OFF ←X→ 0
10	Absolute-value upper-limit with standby sequence	ON OFF ←X→ 0	ON OFF ←X→ 0
11	Absolute-value lower-limit with standby sequence	ON OFF ←X→ 0	ON OFF ←X→ 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

Case 1	Case 2	Case 3 (Always ON)	
L H SP	SP L H	H SP L	H < 0, L < 0
H < 0, L > 0	H > 0, L < 0	H L SP	H < 0, L > 0
|H| < |L|	|H| > |L|		|H| ≥ |L|
		SP H L	H > 0, L < 0
			|H| ≤ |L|

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

Case 1	Case 2	Case 3 (Always OFF)	
L H SP	SP L H	H SP L	H < 0, L < 0
H < 0, L > 0	H > 0, L < 0	H L SP	H < 0, L > 0
|H| < |L|	|H| > |L|		|H| ≥ |L|
		SP H L	H > 0, L < 0
			|H| ≤ |L|
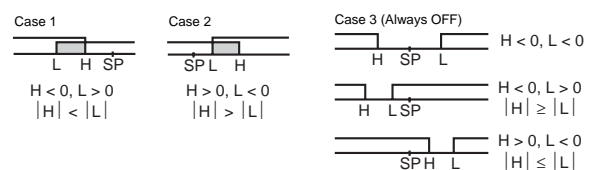
*4. Set value: 5, Upper- and lower-limit with standby sequence
For Upper- and Lower-Limit Alarm Described Above
- Case 1 and 2
  Always OFF when the upper-limit and lower-limit hysteresis overlaps.
- Case 3: Always OFF

*5. Set value: 5, Upper- and lower-limit with standby sequence
Always OFF when the upper-limit and lower-limit hysteresis overlaps.

Characteristics

Indication accuracy		Thermocouple: *1
		   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.
		CT input:
		   Terminal block models (E5CN): ±5% FS ±1 digit max.

Influence of temperature *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.
		   Plug-in models (E5CN-U): (±2% of PV or ±4°C, whichever is greater) ±1 digit max.

Influence of voltage *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:
		   Terminal block models (E5CN) and plug-in models (E5CN-U): (±1%FS) ±1 digit max.

Input sampling 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)
Proportional 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 time (I)		0 to 3999 s (in units of 1 s)
Derivative time (D)		0 to 3999 s (in units of 1 s) *5
Control period		0.5, 1 to 99 s (in units of 1 s)
Manual reset value		0.0 to 100.0% (in units of 0.1%)
Alarm setting range		−1999 to 9999 (decimal point position depends on input type)
Affect of signal source resistance		Thermocouple: 0.1°C/Ω max. (100 Ω max.) Platinum resistance thermometer: 0.1°C/Ω max. (10 Ω max.)
Insulation resistance		20 MΩ min. (at 500 VDC)
Dielectric strength		2,300 VAC, 50 or 60 Hz for 1 min (between terminals with different charge)
Vibration resistance	**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
Shock resistance	**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
Weight	**E5CN**	Controller: Approx. 150 g, Mounting Bracket: Approx. 10 g
	E5CN-U	Controller: Approx. 110 g, Mounting Bracket: Approx. 10 g
Degree of protection	**E5CN**	Front panel: IP66, Rear case: IP20, Terminals: IP00
	E5CN-U	Front panel: IP50, Rear case: IP20, Terminals: IP00
Memory protection		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 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
Standards	**Approved standards** *7	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°C, Voltage range: −15% to 10% of rated voltage
*3. K thermocouple at −100°C max.: ±10° max.
*4. "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.

E5CN E5CN-U (48 x 48 mm)

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

E5CN-H (48 x 48 mm)

E5AN-H (96 x 96 mm) E5EN-H (48 x 96 mm)

Operation

Safety Precautions

E5CN
E5CN-U (48 x 48 mm)

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

E5CN-H (48 x 48 mm)

E5AN-H (96 x 96 mm)
E5EN-H (48 x 48 mm)

Operation

Safety Precautions

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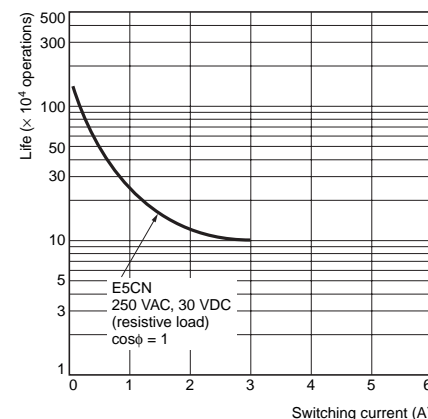
Note: Do not connect a DC load to a Controller with a Long-life Relay Output.
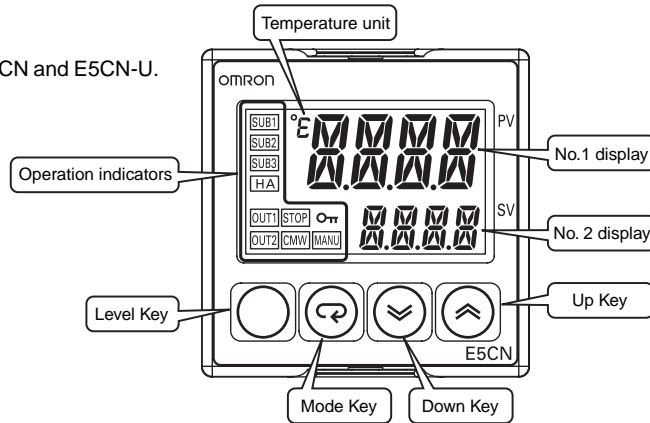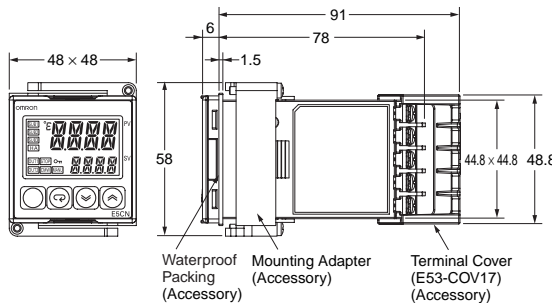
External Connections

- A voltage output (control output, 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

Auxiliary outputs (relay outputs)
250 VAC, 3 A
(resistive load)
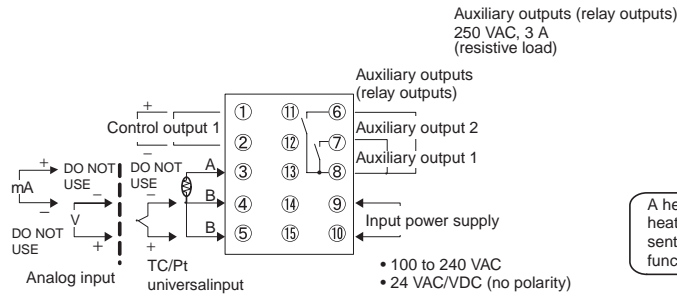
A heater burnout alarm, heater short alarm, heater overcurrent alarm, or input alarm is sent to the output to which the alarm 1 function is assigned.

Option Units

E53-CNHH03N2
Communications (RS-485) and CT2

E53-CNHBN2
Event inputs and CT

E53-CNQ03N2
Communications (RS-485) and Control Output 2

E53-CNPBN2
Event Inputs and External Power Supply

E53-CNPHN2
External Power Supply and CT

E53-CNP03N2
Communications (RS-485) and External Power Supply

E53-CNH03N2
Communications (RS-485) and CT

E53-CN03N2
Communications (RS-485)

E53-CNBN2
Event inputs

E53-CNQHN2
Control Output 2 and CT

E53-CNQHHN2
Control Output 2 and CT2

E53-CNQBN2
Event Inputs and Control Output 2

E5CN-U

Control output 1
Relay output
(three terminals used)
SPDT, 250 VAC, 3 A
(resistive load)
Voltage output
(for driving SSR)
12 VDC, 21 mA
Current output
4 to 20 mA DC
0 to 20 mA DC
Load: 600 W max.

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

An input error is sent to the output to which the alarm 1 function is assigned.

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

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

E5CN
E5CN-U (48 x 48 mm)

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

E5CN-H (48 x 48 mm)

E5AN-H (96 x 96 mm)
E5EN-H (48 x 96 mm)

Operation

Safety Precautions

E5CN
E5CN-U (48 x 48 mm)

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

E5CN-H (48 x 48 mm)

E5AN-H (96 x 96 mm)
E5EN-H (48 x 96 mm)

Operation

Safety Precautions

E5CN/E5CN-U

Nomenclature

E5CN
E5CN-U
The front panel is the same for the E5CN and E5CN-U.

Temperature unit

Operation indicators

Level Key

Mode Key

Down Key

No.1 display

No. 2 display

Up Key

Dimensions

(Unit: mm)

E5CN
Terminal Models
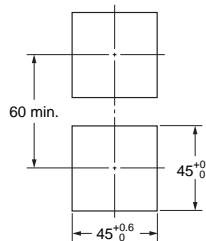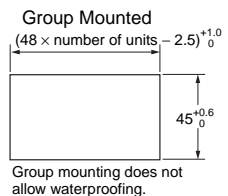
91
78
6
1.5
48 × 48
58
44.8 × 44.8 48.8

Waterproof Packing (Accessory)

Mounting Adapter (Accessory)

Terminal Cover (E53-COV17) (Accessory)

Note: The terminal block cannot be removed.

Panel Cutout

Mounted Separately

Group Mounted

$(48 \times \text{number of units} - 2.5)^{+1.0}_{0}$

$45^{+0.6}_{0}$

Group mounting does not allow waterproofing.

60 min.

$45^{+0.6}_{0}$

$45^{+0.6}_{0}$

- Recommended panel thickness is 1 to 5 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 temperature specified in the specifications.

E5CN-U
Plug-in Models

(84.7)
70.5
14.2
6
48 × 48
58
44.8 × 44.8

Mounting Adapter (Accessory)

Panel Cutout

Mounted Separately

Group Mounted

$(48 \times \text{number of units} - 2.5)^{+1.0}_{0}$

$45^{+0.6}_{0}$

60 min.

$45^{+0.6}_{0}$

$45^{+0.6}_{0}$

- Recommended 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
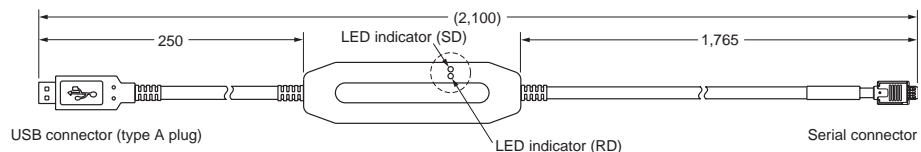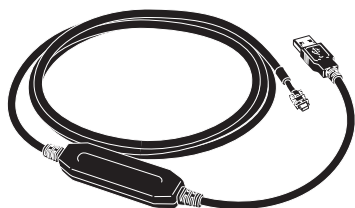
(2,100)
250
LED indicator (SD)
1,765

USB connector (type A plug)

LED indicator (RD)

Serial connector

E5CN E5CN-U (48 x 48 mm)

E5AN (96 x 96 mm) **E5EN** (48 x 96 mm)

E5CN-H (48 x 48 mm)

E5AN-H (96 x 96 mm) **E5EN-H** (48 x 96 mm)

Operation

Safety Precautions

Terminal Cover
E53-COV17
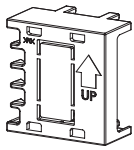
Note: The E53-COV10 cannot be used.

48
48.8
UP
22
9.1
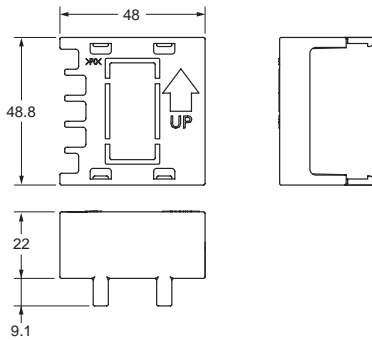
Waterproof Packing
Y92S-29 (for DIN 48 × 48)
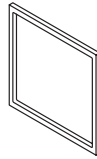
Order the Waterproof Packing separately if it becomes lost or damaged.
The Waterproof Packing can be used to achieve an IP66 degree of protection.
(Deterioration, shrinking, or hardening of the waterproof packing may occur depending on the operating environment. Therefore, periodic replacement is recommended 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

21, 15, 5.8 dia., 2.8, 7.5, 25, 3, 10.5, 40, Two, 3.5 dia., 10, 30
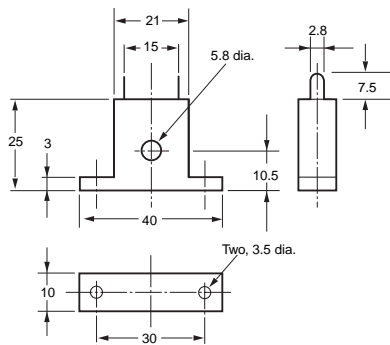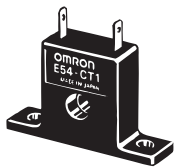
E54-CT1
Thru-current (Io) vs. Output Voltage (Eo) (Reference Values)

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

E54-CT3

30, 2.36 dia., 12 dia., 9, 40 × 40, Two, M3 (depth: 4), 15, 30
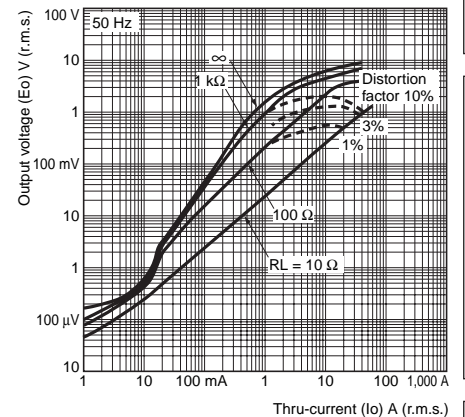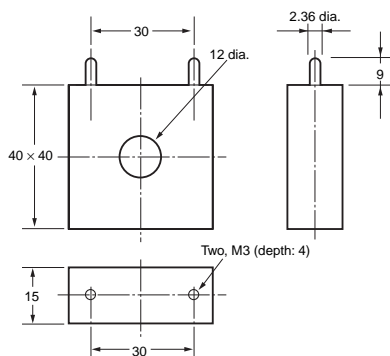
E54-CT3
Thru-current (Io) vs. Output Voltage (Eo) (Reference Values)

Maximum continuous heater current: 120 A (50/60 Hz)
(Maximum continuous heater current for the Temperature Controller is 50 A.)
Number of windings: 400±2
Winding resistance: 8±0.8 Ω
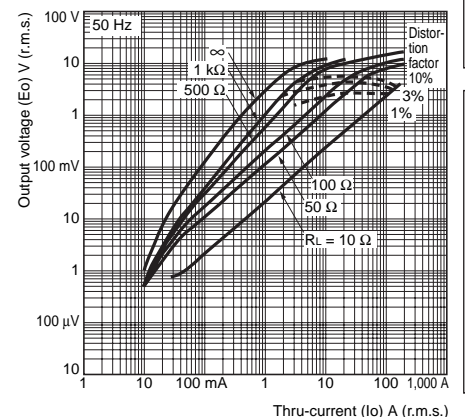
E54-CT3 Accessory
• **Armature**
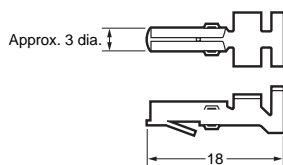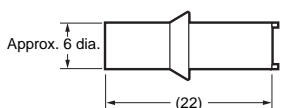
Approx. 3 dia.
18

Connection Example
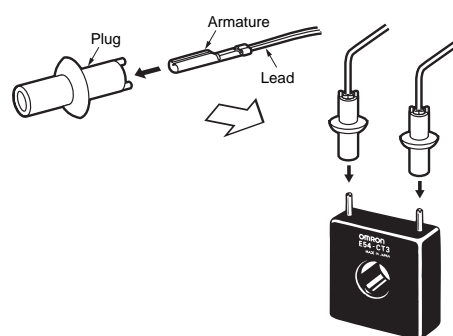
Plug, Armature, Lead

• **Plug**

Approx. 6 dia.
(22)

E5CN/E5CN-U

E5CN
E5CN-U (48 x 48 mm)

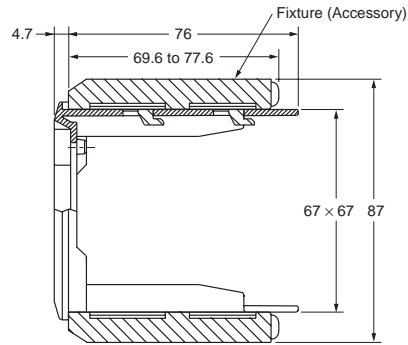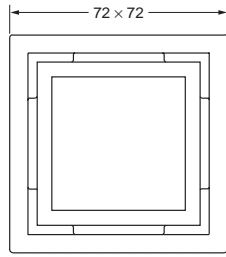E5AN (96 x 96 mm)
E5EN (48 x 96 mm)

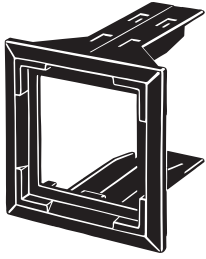E5CN-H (48 x 48 mm)

E5AN-H (96 x 96 mm)
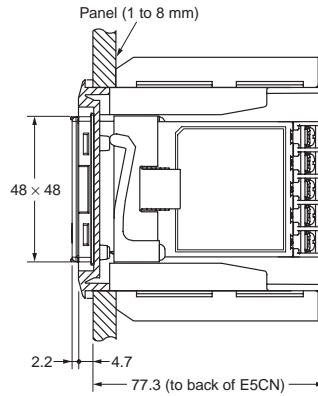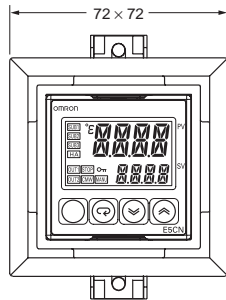E5EN-H (48 x 96 mm)

Operation

Safety Precautions

Adapter

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

72 × 72

4.7 — 76
69.6 to 77.6
Fixture (Accessory)
67 × 67   87

Mounted to E5CN

72 × 72

Panel (1 to 8 mm)

48 × 48

2.2 — 4.7
77.3 (to back of E5CN)
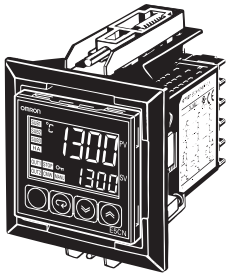
E5CN-U Wiring Socket

Front-connecting Socket
P2CF-11

Eleven, M3.5 × 7.5 sems screws — 7.8

70 max.

Two, 4.5-dia. holes

4 — 50 max.

3 — 4.5

35.4

31.2 max.
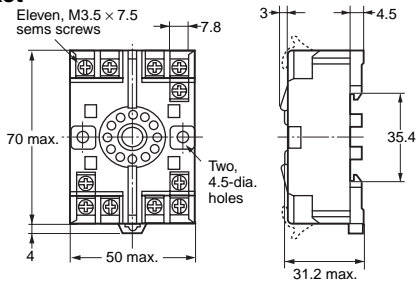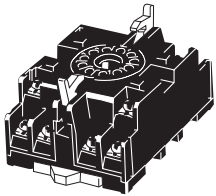
Terminal Layout/Internal Connections
(Top View)

8 7 6 5
4
9
3
10 11 1 2

Mounting Holes
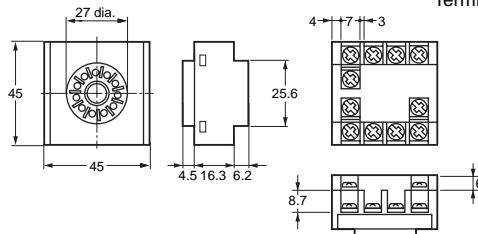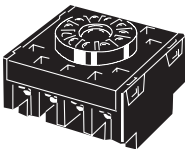
Two, 4.5 dia. mounting holes

40±0.2
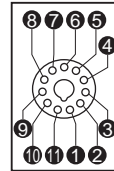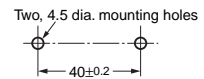
Note: Can also be mounted to a DIN track.

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

Back-connecting Socket
P3GA-11

27 dia.

45

45

4.5 16.3 6.2

25.6

4 — 7 — 3

8.7

6

Terminal Layout/Internal Connections
(Bottom View)

5 6 7 8
4
3   9
2 1 11 10
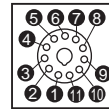
Note: 1. Using any other sockets will adversely affect accuracy. Use only the specified sockets.
2. A Protective Cover for finger protection (Y92A-48G) is also available.