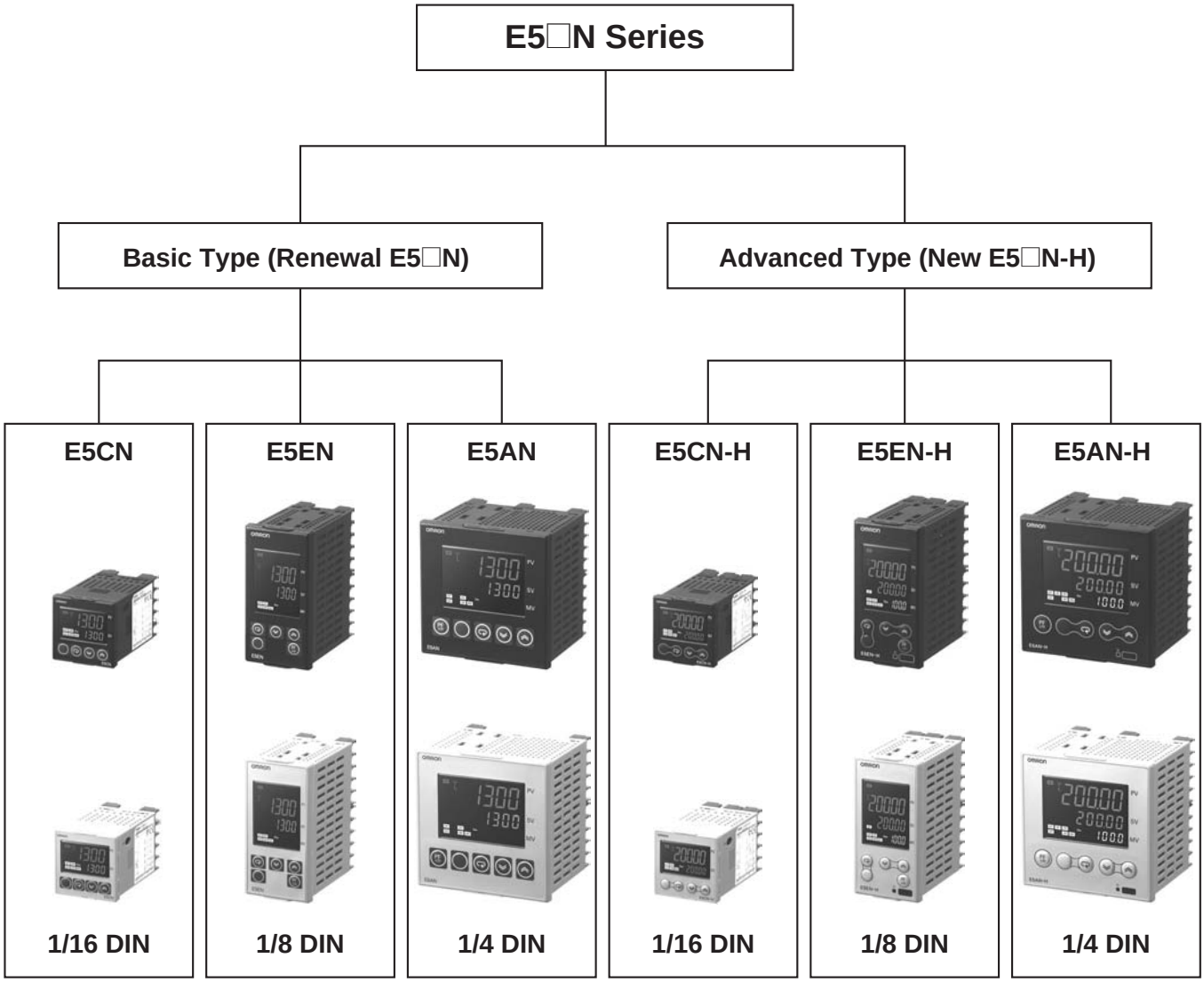
Digital Temperature Controllers/Digital Controllers
E5□N/E5□N-H

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.



Contents

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.

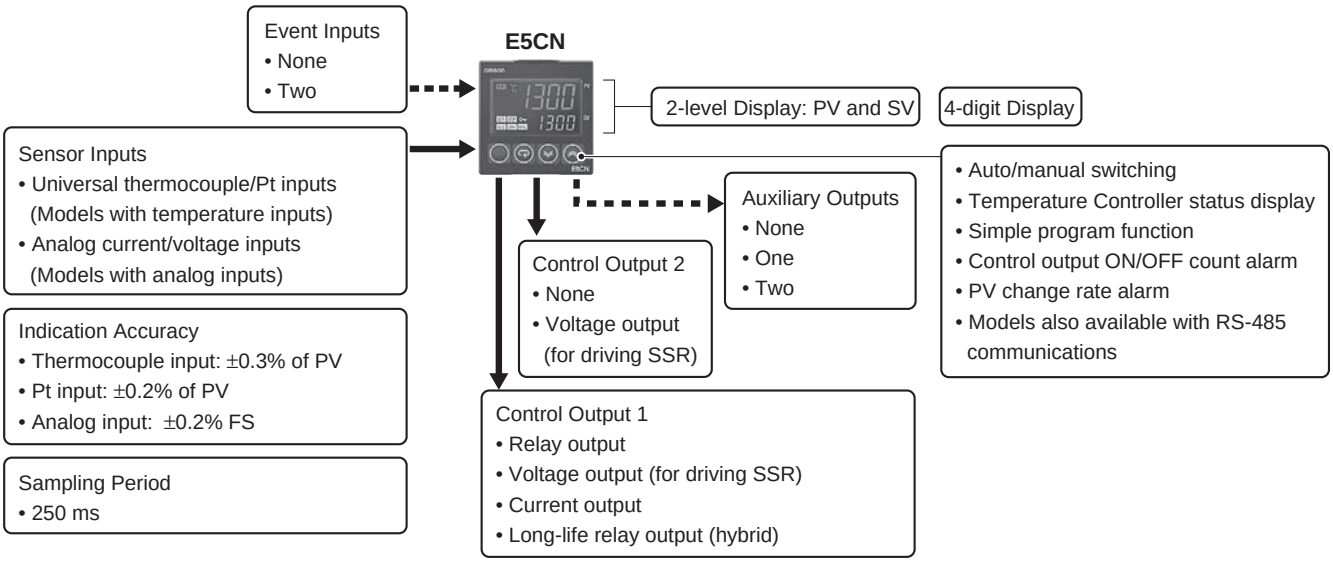
- Indication Accuracy
  Thermocouple input: ±0.3% of PV (previous models: ±0.5%)
  Pt input: ±0.2% of PV (previous models: ±0.5%)
  Analog input: ±0.2% FS (previous models: ±0.5%)
- New E5CN-U Models (Plug-in Models) with analog inputs and current outputs.
- A PV/SV-status display function can be set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

48 × 48-mm E5CN **48 × 48-mm E5CN-U**

NEW

⚠ Refer to *Safety Precautions* on page 66.

Main I/O Functions

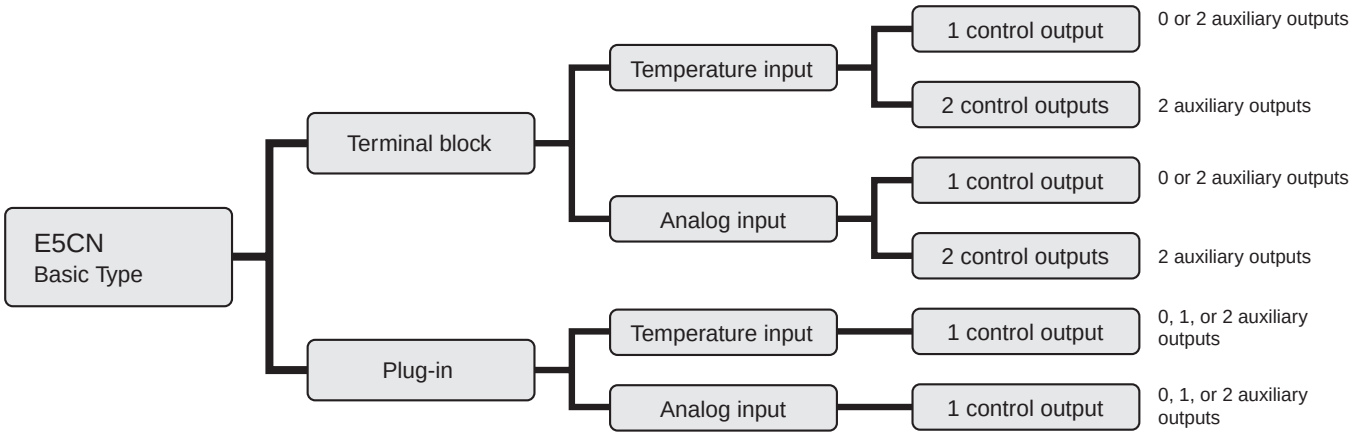


This data sheet is provided as a guideline for selecting products. Be sure to refer to the following user manuals for application precautions and other information required for operation before attempting to use the product.

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)

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.

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

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

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)	

Input Ranges

Thermocouple/Platinum Resistance Thermometer (Universal Inputs)

Input Type	Platinum resistance thermometer					Thermocouple															Infrared temperature sensor				Analog input
Name	Pt100			JPt100		K		J		T		E	L	U		N	R	S	B	W	PL II	10 to 70°C	60 to 120 °C	115 to 165 °C	140 to 260 °C	0 to 50 mV
Temperature range (°C)	850	500.0	100.0	500.0	100.0	1300	500.0	850	400.0	400	400.0	600	850	400	400.0	1300	1700	1700	1800	2300	1300	90	120	165	260	Usable in the following ranges by scaling: –1999 to 9999 or –199.9 to 999.9
	–200	–199.9	0.0	–199.9	0.0	–200	–20.0	–100	–20.0	–200	–199.9	–200	–100	–200	–199.9	–200	0	0	100	0	0	0	0	0	0	
Setting number	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

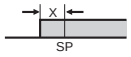
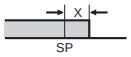
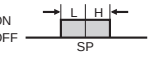
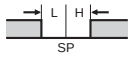
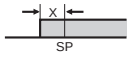
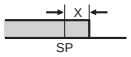
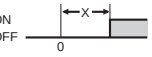
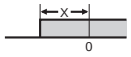
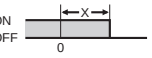
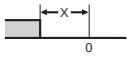
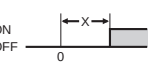
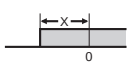
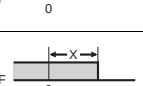
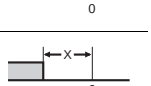
Input Type	Current		Voltage		
Input specification	4 to 20mA	0 to 20 mA	1 to 5 V	0 to 5 V	0 to 10 V
Setting range	Usable in the following ranges by scaling: –1999 to 9999, –199.9 to 999.9, –19.99 to 99.99 or –1.999 to 9.999				
Setting number	0	1	2	3	4

Shaded settings are the default settings.

Alarm Outputs

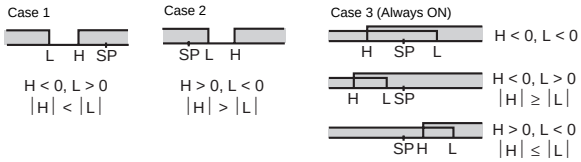
Each alarm can be independently set to one of the following 13 alarm types. The default is *2: Upper limit*.
Auxiliary outputs are allocated for alarms. ON delays and OFF delays (0 to 999 s) can also be specified.

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).

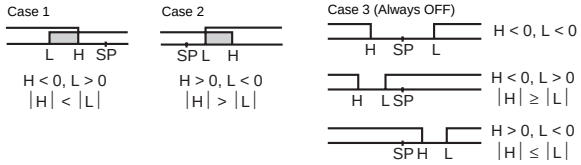
Set value	Alarm type	Alarm output operation	
		When X is positive	When X is negative
0	Alarm function OFF	Output OFF	
1 ✻1	Upper- and lower-limit		✻2
2	Upper limit		
3	Lower limit		
4 ✻1	Upper- and lower-limit range		✻3
5 ✻1	Upper- and lower-limit with standby sequence	 ✻5	✻4
6	Upper-limit with standby sequence		
7	Lower-limit with standby sequence		
8	Absolute-value upper-limit		
9	Absolute-value lower-limit		
10	Absolute-value upper-limit with standby sequence		
11	Absolute-value lower-limit with standby sequence		
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
  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. 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.
Influence of voltage ✻2		
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.

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

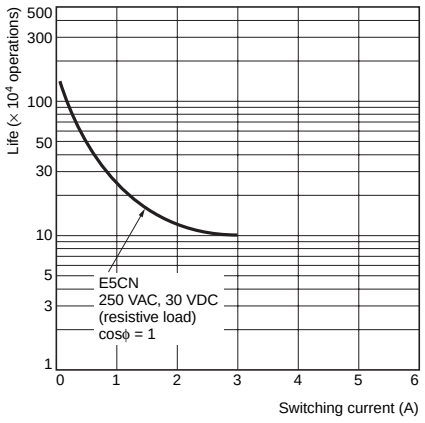
CT input (for heater current detection)	Models with detection for single-phase heaters: One input Models with detection for single-phase or three-phase heaters: Two inputs
Maximum heater current	50 A AC
Input current indication accuracy	±5% FS ±1 digit max.
Heater burnout alarm setting range ✻1	0.1 to 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)



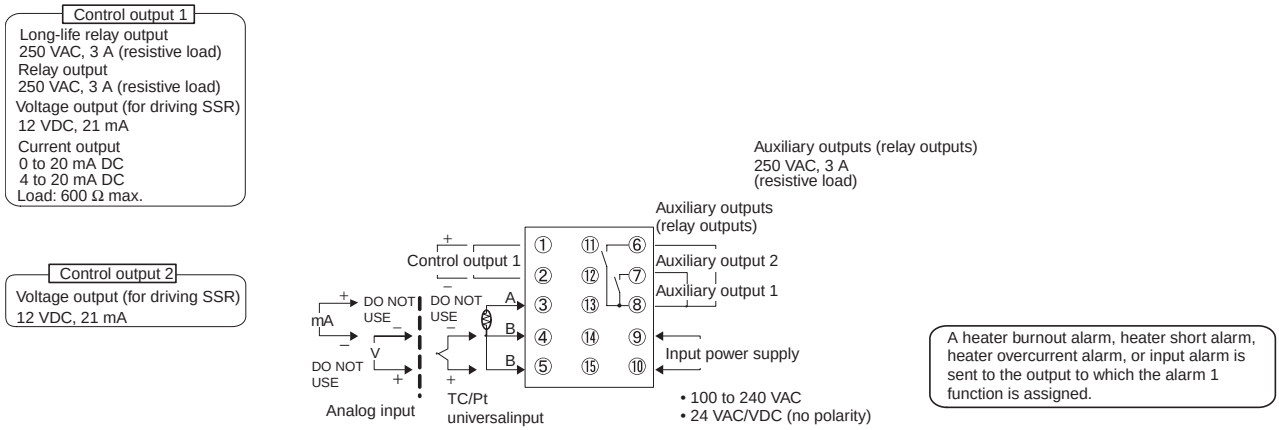
Note: Do not connect a DC load to a Controller with a Long-life Relay Output.

External Connections

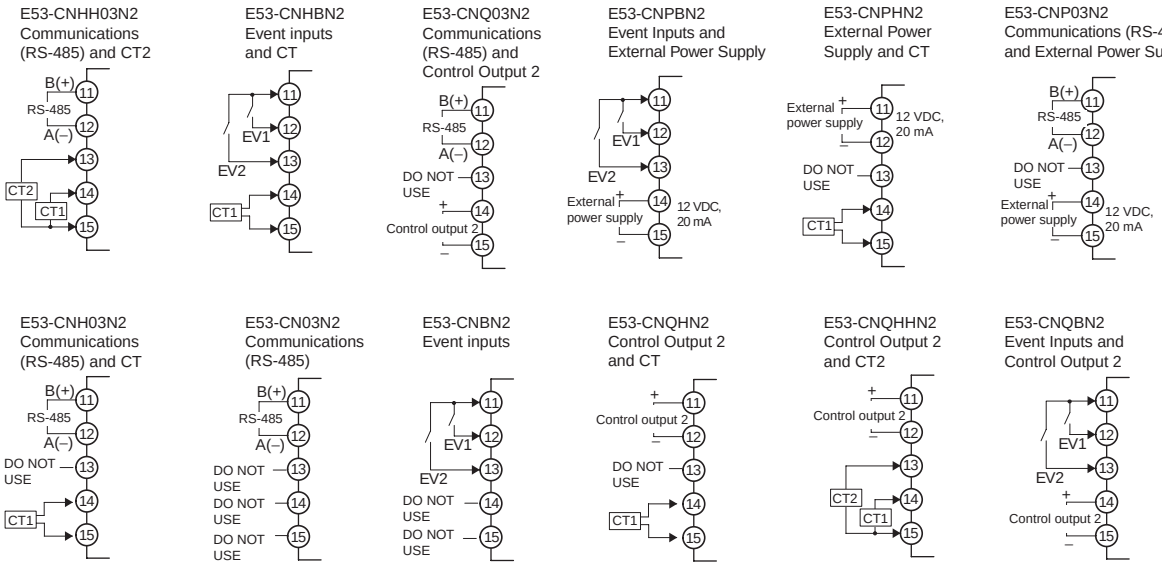
- A voltage output (control output, for driving SSR) is not electrically insulated from the internal circuits. When using a grounding thermocouple, do not connect any of the control output terminals to ground. (If the control output terminals are connected to ground, errors will occur in the measured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

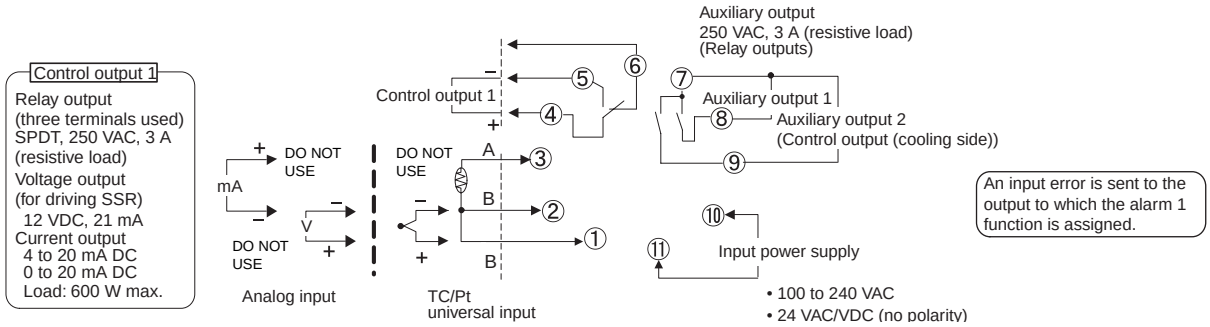
Controllers



Option Units



E5CN-U

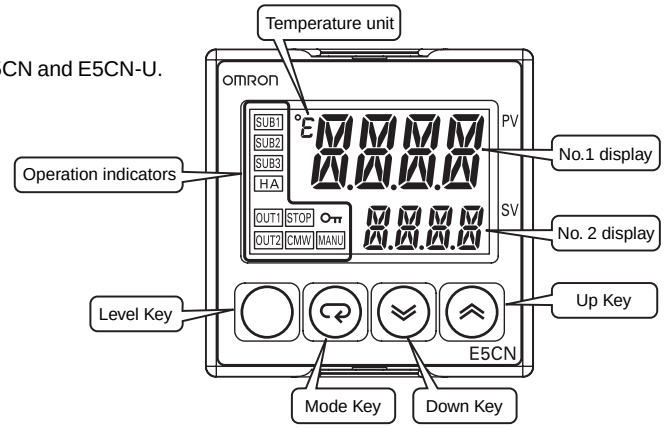


Note: For the Wiring Socket, purchase the P2CF-11 or PG3A-11 separately.

E5CN/E5CN-U

Nomenclature

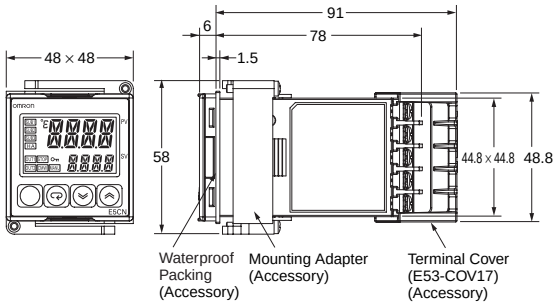
E5CN
E5CN-U
The front panel is the same for the E5CN and E5CN-U.



Dimensions

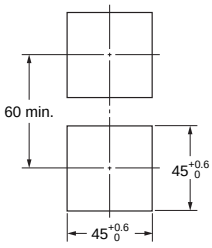
(Unit: mm)

E5CN
Terminal Models

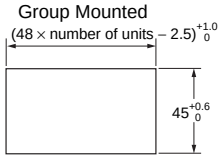


Panel Cutout

Mounted Separately



Group Mounted

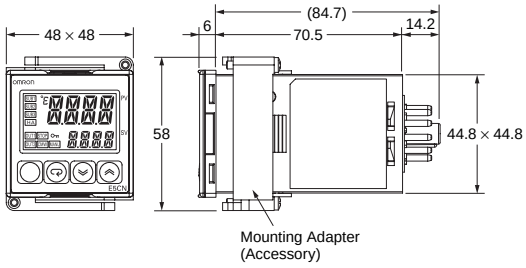


Group mounting does not allow waterproofing.

- 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.

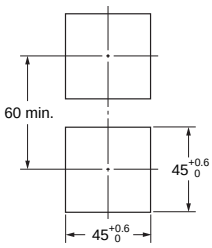
Note: The terminal block cannot be removed.

E5CN-U
Plug-in Models

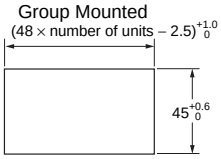


Panel Cutout

Mounted Separately



Group Mounted

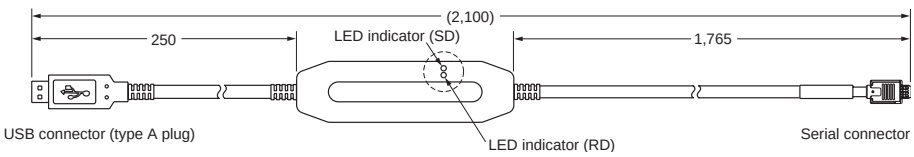


- Recommended panel thickness is 1 to 5 mm.
- Group mounting is not possible in the vertical direction. (Maintain the specified mounting space between Controllers.)
- When two or more Controllers are mounted, make sure that the surrounding temperature does not exceed the allowable operating temperature specified in the specifications.

Accessories (Order Separately)

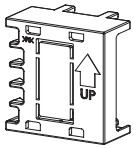
USB-Serial Conversion Cable

E58-CIFQ1

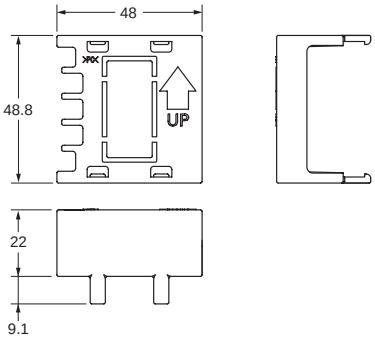


Terminal Cover

E53-COV17

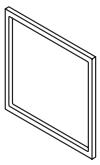


Note: The E53-COV10 cannot be used.



Waterproof Packing

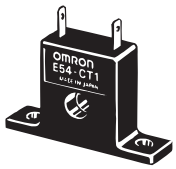
Y92S-29 (for DIN 48 × 48)

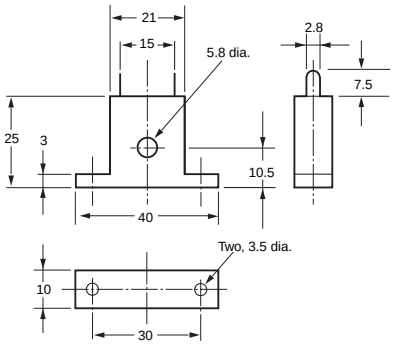


Order the Waterproof Packing separately if it becomes lost or damaged.
The Waterproof Packing can be used to achieve an IP66 degree of protection.
(Deterioration, shrinking, or hardening of the waterproof packing may occur depending on the operating environment. Therefore, periodic replacement is recommended 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.

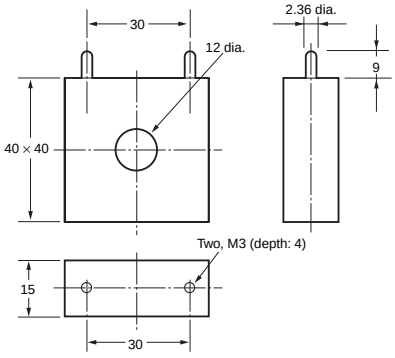
Current Transformers

E54-CT1



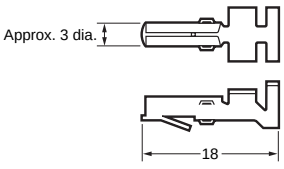


E54-CT3

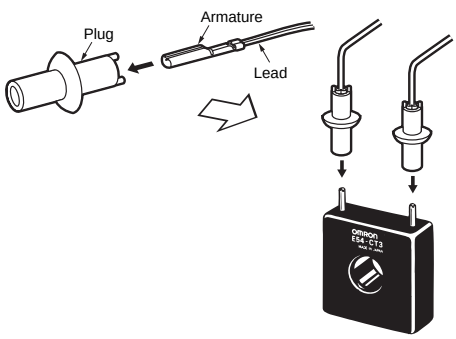


E54-CT3 Accessory

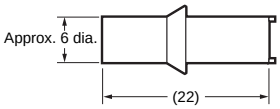
- **Armature**



Connection Example

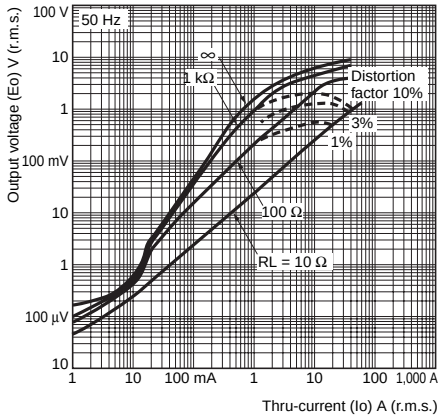


- **Plug**



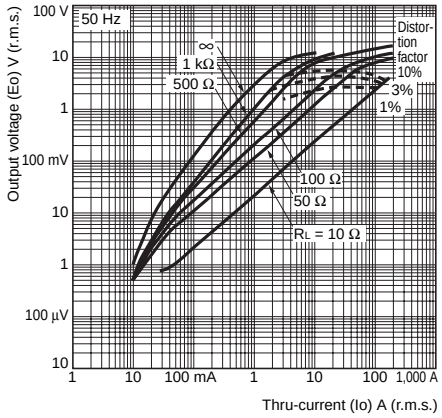
E54-CT1
Thru-current (Io) vs. Output Voltage (Eo) (Reference Values)

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



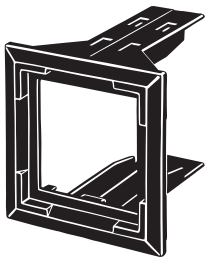
E54-CT3
Thru-current (Io) vs. Output Voltage (Eo) (Reference Values)

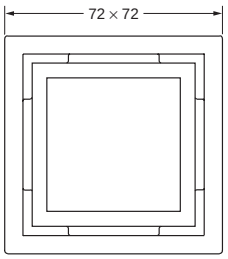
Maximum continuous heater current: 120 A (50/60 Hz)
(Maximum continuous heater current for the Temperature Controller is 50 A.)
Number of windings: 400±2
Winding resistance: 8±0.8 Ω

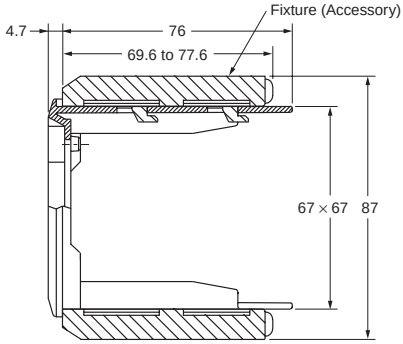


Adapter

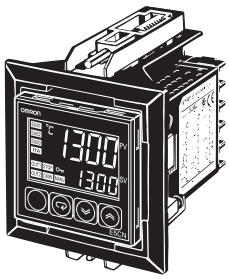
Y92F-45 **Note:** Use this Adapter when the panel has already been prepared for the E5B□.

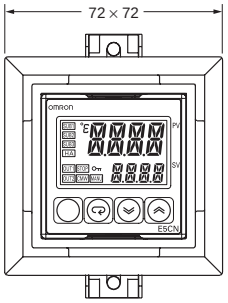


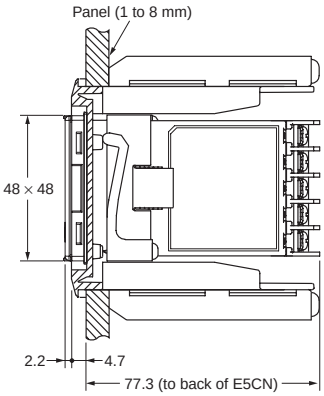




Mounted to E5CN



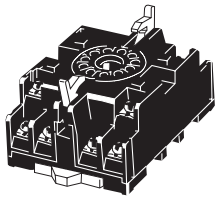


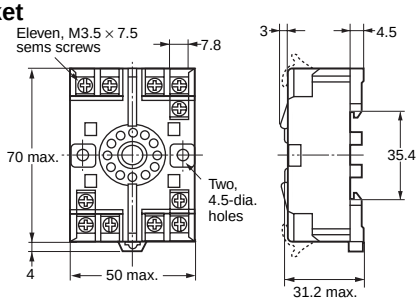


E5CN-U Wiring Socket

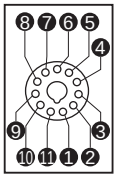
Front-connecting Socket

P2CF-11

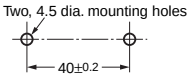




Terminal Layout/Internal Connections (Top View)



Mounting Holes

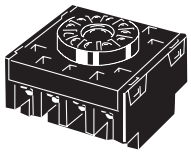


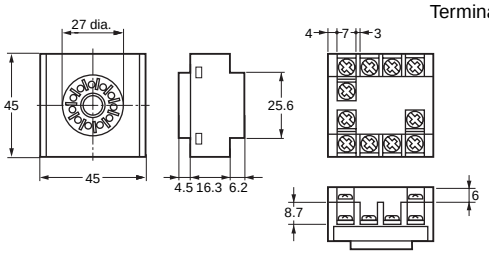
Note: Can also be mounted to a DIN track.

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

Back-connecting Socket

P3GA-11





Terminal Layout/Internal Connections (Bottom View)

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: ±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.

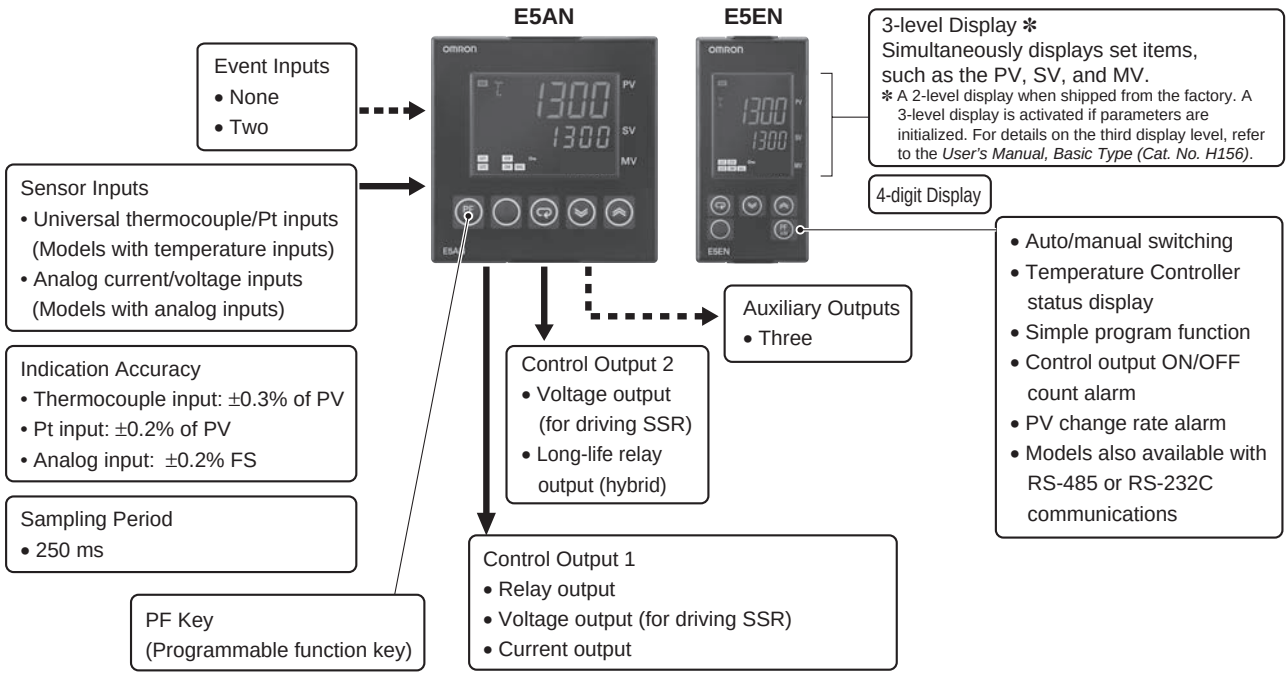
96 × 96 mm
E5AN

48 × 96 mm
E5EN

NEW

⚠ Refer to *Safety Precautions* on page 66.

Main I/O Functions

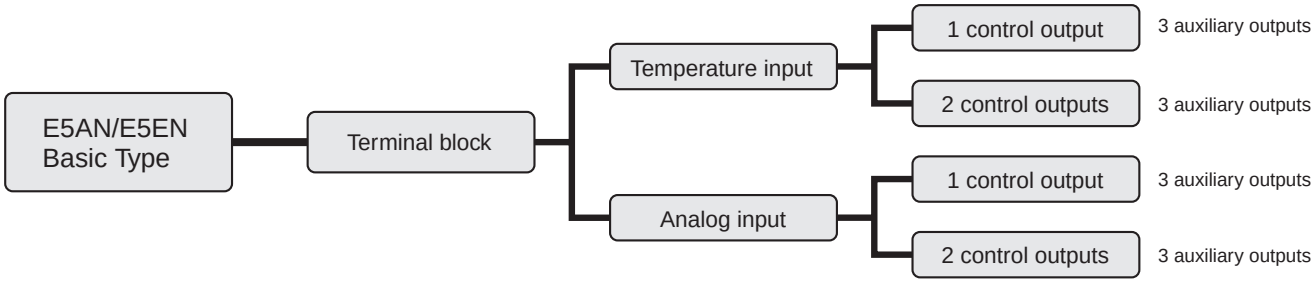


This data sheet is provided as a guideline for selecting products. Be sure to refer to the following user manuals for application precautions and other information required for operation before attempting to use the product.

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)

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-□3□M□□-□-500-N
1 2 3 4 5 6 7 8 9

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

1. **Function**
   EN01: RS-232C communications
   EN03: RS-485 communications
   AKB: Event input

Ordering Information

E5AN
Controllers with Terminal Blocks

Size	Case color	Power supply voltage	Input type	Auxiliary outputs	Control output 1	Functions			Model
						Heater burnout	Power supply for Sensor	Control output 2	
1/4 DIN 96 × 96 × 78 (W × H × D)	Black	100 to 240 VAC	Thermocouple or Resistance thermometer	3	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
					Voltage output for driving SSR)	2			E5AN-Q3HHMT-500-N
					Relay output			Voltage output	E5AN-R3QMT-500-N
					Voltage output (for driving SSR)			Voltage output	E5AN-Q3QMT-500-N
					Current output			Voltage output	E5AN-C3QMT-500-N
					Relay output			Long-life relay output	E5AN-R3YMT-500-N
					Voltage output (for driving SSR)				E5AN-Q3YMT-500-N
					Current output				E5AN-C3YMT-500-N
					Relay output		Sensor Power		E5AN-R3PMT-500-N
					Voltage output (for driving SSR)		Sensor Power		E5AN-Q3PMT-500-N
			Analog (current/voltage)	3	Relay output				E5AN-R3ML-500-N
					Voltage output (for driving SSR)				E5AN-Q3ML-500-N
					Current output				E5AN-C3ML-500-N
					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
		24 VAC/ VDC	Thermocouple or Resistance thermometer	3	Relay output				E5AN-R3MTD-500-N
					Voltage output (for driving SSR)				E5AN-Q3MTD-500-N
					Current output				E5AN-C3MTD-500-N
					Relay output	1			E5AN-R3HMTD-500-N
					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
	Silver	100 to 240 VAC	Thermocouple or Resistance thermometer	3	Relay output				E5AN-R3MT-W-500-N
					Voltage output (for driving SSR)				E5AN-Q3MT-W-500-N
					Current output				E5AN-C3MT-W-500-N
					Relay output	1			E5AN-R3HMT-W-500-N
					Voltage output (for driving SSR)	1			E5AN-Q3HMT-W-500-N
		24 VAC/ VDC			Relay output				E5AN-R3MTD-W-500-N
					Voltage output (for driving SSR)				E5AN-Q3MTD-W-500-N
					Current output				E5AN-C3MTD-W-500-N

E5EN
Controllers with Terminal Blocks

Size	Case color	Power supply voltage	Input type	Auxiliary outputs	Control output 1	Functions			Model
						Heater burnout	Power supply for Sensor	Control output 2	
1/8 DIN 48 × 96 × 78 (W × H × D)	Black	100 to 240 VAC	Thermocouple or Resistance thermometer	3	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
					Relay output			Voltage output	E5EN-R3QMT-500-N
					Voltage output (for driving SSR)			Voltage output	E5EN-Q3QMT-500-N
					Current output			Voltage output	E5EN-C3QMT-500-N
					Relay output			Long-life relay output	E5EN-R3YMT-500-N
					Voltage output (for driving SSR)			Long-life relay output	E5EN-Q3YMT-500-N
					Current output			Long-life relay output	E5EN-C3YMT-500-N
					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
					Voltage output (for driving SSR)				E5EN-Q3ML-500-N
					Current output				E5EN-C3ML-500-N
					Relay output	1			E5EN-R3HML-500-N
					Voltage output (for driving SSR)	1			E5EN-Q3HML-500-N
								Long-life relay output	E5EN-Q3YML-500-N
		24 VAC/ VDC	Thermocouple or Resistance thermometer	3	Relay output				E5EN-R3MTD-500-N
					Voltage output (for driving SSR)				E5EN-Q3MTD-500-N
					Current output				E5EN-C3MTD-500-N
					Relay output	1			E5EN-R3HMTD-500-N
					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
	Silver	100 to 240 VAC	Thrmocouple or Resistance thermometer	3	Relay output				E5EN-R3MT-W-500-N
					Voltage output (for driving SSR)				E5EN-Q3MT-W-500-N
					Current output				E5EN-C3MT-W-500-N
					Relay output	1			E5EN-R3HMT-W-500-N
		24 VAC/ VDC			Voltage output (for driving SSR)	1			E5EN-Q3HMT-W-500-N
					Relay output				E5EN-R3MTD-W-500-N
					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**
	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	

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 consumption		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 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 output	**Relay output**	SPST-NO, 250 VAC, 5 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA
	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
	Current output	4 to 20 mA DC/0 to 20 mA DC, load: 600 Ω 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)
Auxiliary output	**Number of outputs**	3
	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 input	**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-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, 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)

✻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)

Input type	Platinum resistance thermometer					Thermocouple															Infrared temperature sensor				Analog input
Name	Pt100			JPt100		K		J		T		E	L	U		N	R	S	B	W	PL II	10 to 70°C	60 to 120 °C	115 to 165 °C	140 to 260 °C	0 to 50 mV
Temperature range (°C)	850	500.0	100.0	500.0	100.0	1300	500.0	850	400.0	400	400.0	600	850	400	400.0	1300	1700	1700	1800	2300	1300	90	120	165	260	Usable in the following ranges by scaling: –1999 to 9999 or –199.9 to 999.9
	–200	–199.9	0.0	–199.9	0.0	–200	–20.0	–100	–20.0	–200	–199.9	–200	–100	–200	–199.9	–200	0	0	100	0	0	0	0	0	0	
Setting number	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

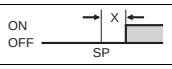
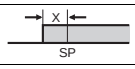
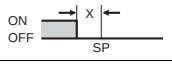
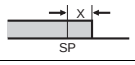
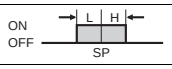
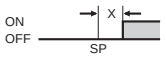
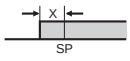
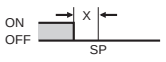
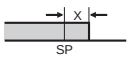
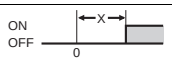
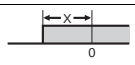
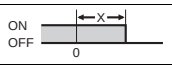
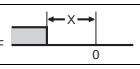
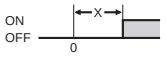
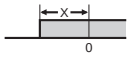
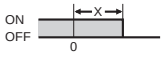
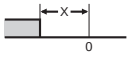
Input type	Current		Voltage		
Input specification	4 to 20mA	0 to 20 mA	1 to 5 V	0 to 5 V	0 to 10 V
Setting range	Usable in the following ranges by scaling: –1999 to 9999, –199.9 to 999.9, –19.99 to 99.99 or –1.999 to 9.999				
Setting number	0	1	2	3	4

Shaded settings are the default settings.

Alarm Outputs

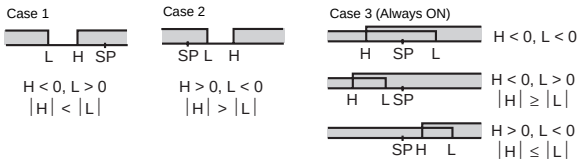
Each alarm can be independently set to one of the following 13 alarm types. The default is *2: Upper limit*.
Auxiliary outputs are allocated for alarms. ON delays and OFF delays (0 to 999 s) can also be specified.

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).

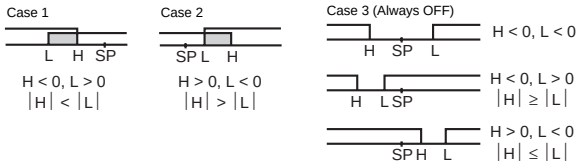
Set value	Alarm type	Alarm output operation	
		When X is positive	When X is negative
0	Alarm function OFF	Output OFF	
1 ✻1	Upper- and lower-limit		✻2
2	Upper limit		
3	Lower limit		
4 ✻1	Upper- and lower-limit range		✻3
5 ✻1	Upper- and lower-limit with standby sequence	 ✻5	✻4
6	Upper-limit with standby sequence		
7	Lower-limit with standby sequence		
8	Absolute-value upper-limit		
9	Absolute-value lower-limit		
10	Absolute-value upper-limit with standby sequence		
11	Absolute-value lower-limit with standby sequence		
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
  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: (±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 output accuracy		±0.3% FS max.
Influence of temperature ✻2		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 Platinum resistance thermometer: (±1% of PV or ±2°C, whichever is greater) ±1 digit max. Analog input: (±1%FS) ±1 digit max.
Influence of voltage ✻2		
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/s^2 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/s^2, 3 times each in X, Y, and Z directions
	Destruction	300 m/s^2, 3 times each in X, Y, and Z directions
Weight	**E5AN**	Controller: Approx. 310 g, Mounting Bracket: Approx. 100 g
	E5EN	Controller: Approx. 260 g, Mounting Bracket: Approx. 100 g
Degree of protection		Front panel: IP66, 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 E5AN and E5EN. An E58-CIFQ1 USB-Serial Conversion Cable is required to connect the computer to the E5AN and E5EN ✻6
Standards	**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. "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 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

✻ 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

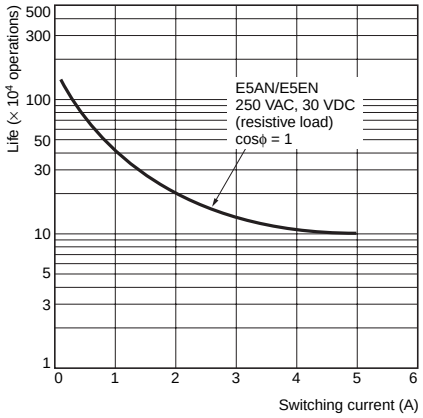
CT input (for heater current detection)	Models with detection for single-phase heaters: One input Models with detection for single-phase or three-phase heaters: Two inputs
Maximum heater current	50 A AC
Input current indication accuracy	±5% FS ±1 digit max.
Heater burnout alarm setting range ✻1	0.1 to 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.

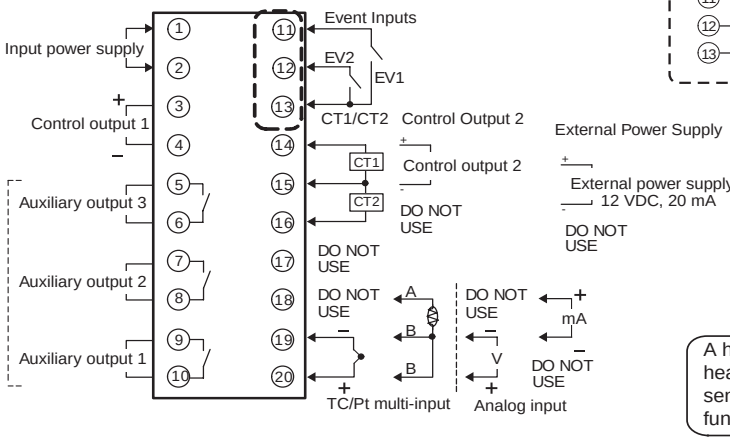
Controllers

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

Control output 1
Relay output
250 VAC, 5A
(resistive load)
Voltage output
(for driving SSR)
12 VDC, 40 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
Long-life relay output
250 VAC, 3 A
(resistive load)

Auxiliary output 1, 2, 3
Relay outputs
250 VAC, 3 A
(resistive load)



Option Units

Communications

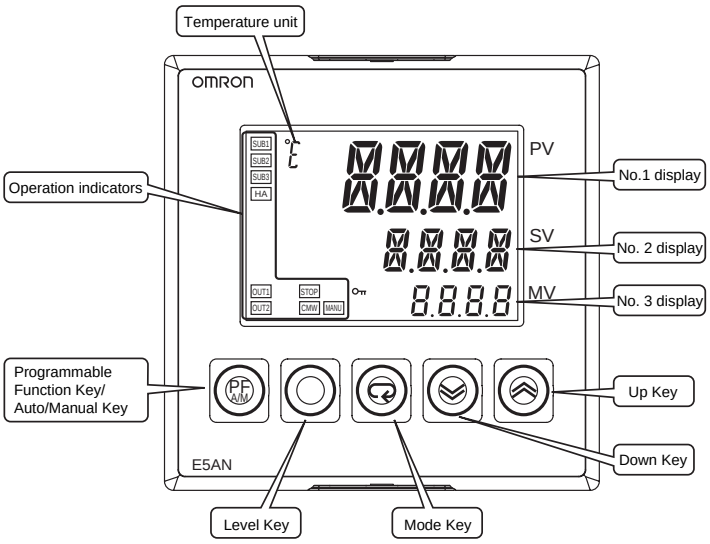
E53-EN01 RS-232C	E53-EN03 RS-485	E53-AKB Event inputs
11 — SD	11 — B (+)	11 — EV2 / EV
12 — RD	12 — A (–)	12 — CT1/CT2
13 — SG	13 — DO NOT USE	13

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.

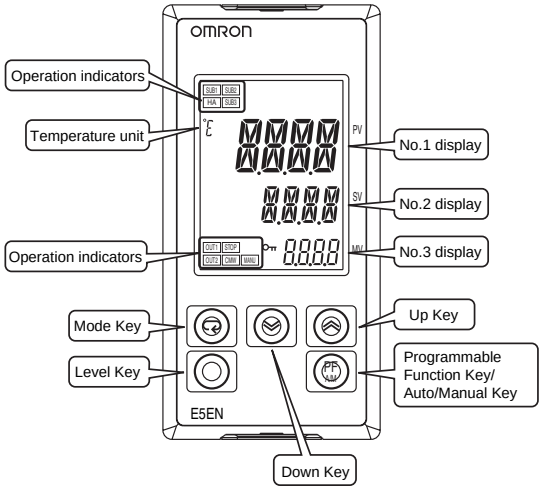
E5AN/E5EN

Nomenclature

E5AN



E5EN

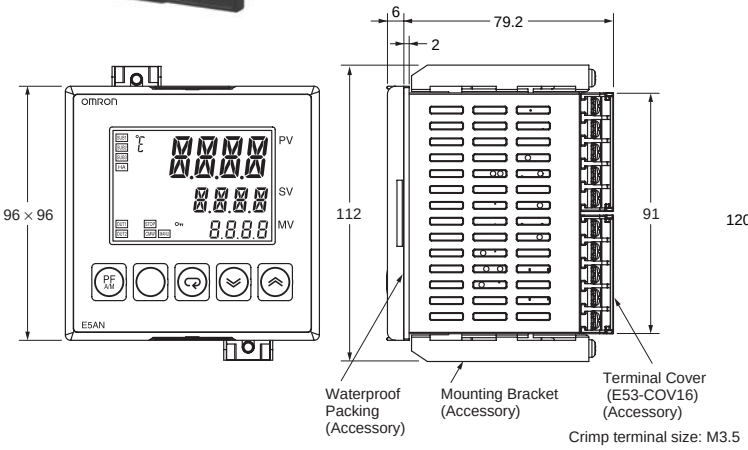


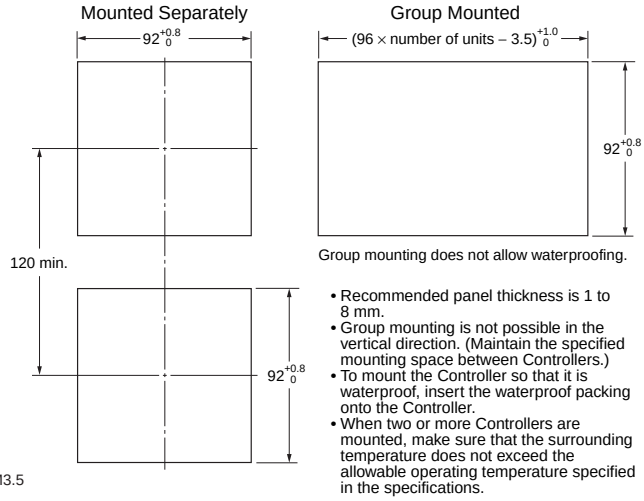
✻A 2-level display when shipped from the factory. A 3-level display is activated if parameters are initialized. For details on the third display level, refer to the *User's Manual, Basic Type* (Cat. No. H156).

Dimensions

(Unit: mm)

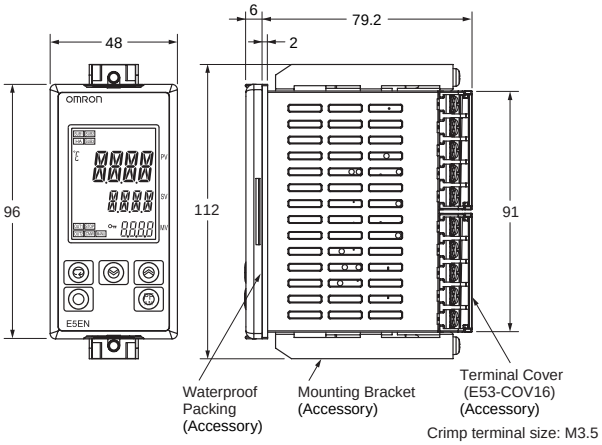
E5AN

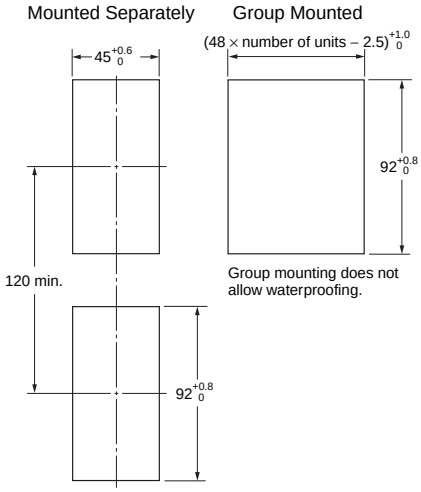




- Recommended panel thickness is 1 to 8 mm.
- Group mounting is not possible in the vertical direction. (Maintain the specified mounting space between Controllers.)
- To mount the Controller so that it is waterproof, insert the waterproof packing onto the Controller.
- When two or more Controllers are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

E5EN



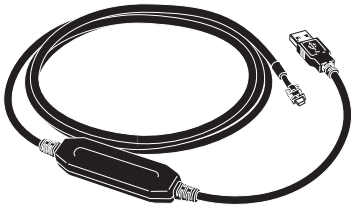


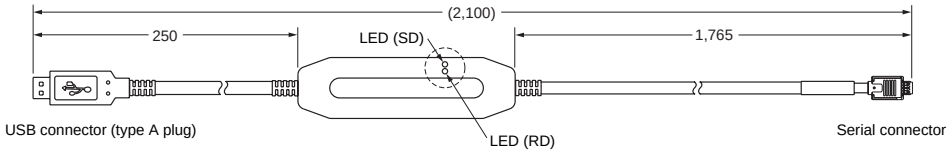
- Recommended panel thickness is 1 to 8 mm.
- Group mounting is not possible in the vertical direction. (Maintain the specified mounting space between Controllers.)
- To mount the Controller so that it is waterproof, insert the waterproof packing onto the Controller.
- When two or more Controllers are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

Accessories (Order Separately)

USB-Serial Conversion Cable

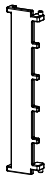
E58-CIFQ1

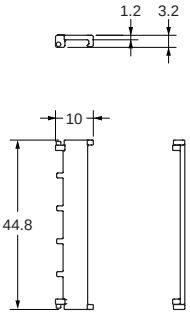




Terminal Covers

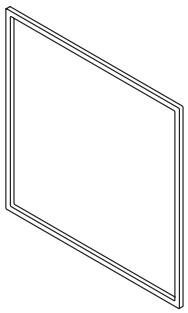
E53-COV16 (Six Covers provided.)



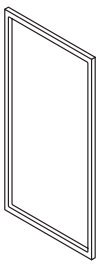


Waterproof Packing

Y92S-P4 (for DIN 96 × 96)



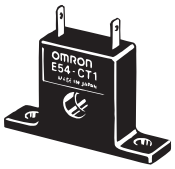
Y92S-P5 (for DIN 48 × 96)

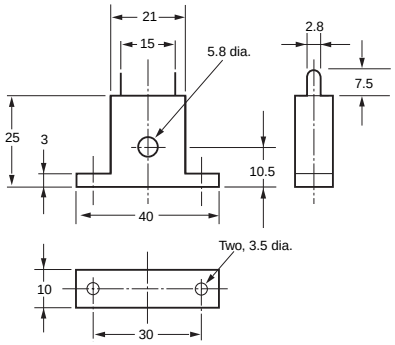


Order the Waterproof Packing separately if it becomes lost or damaged.
The Waterproof Packing can be used to achieve an IP66 degree of protection.
(Deterioration, shrinking, or hardening of the waterproof packing may occur depending on the operating environment. Therefore, periodic replacement is recommended 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.

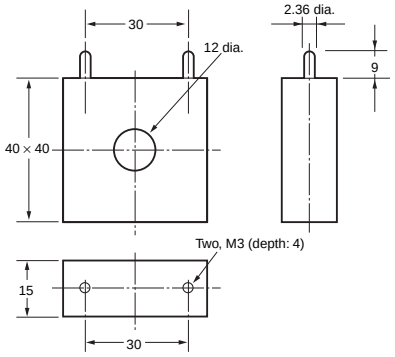
Current Transformers

E54-CT1



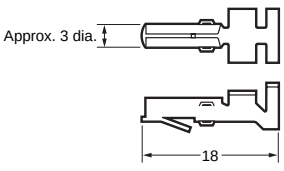


E54-CT3

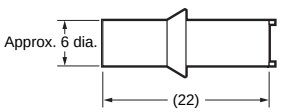


E54-CT3 Accessory

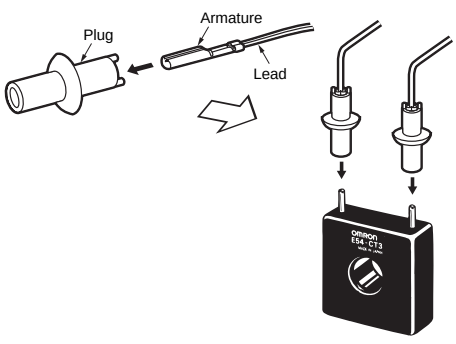
- **Armature**



- **Plug**

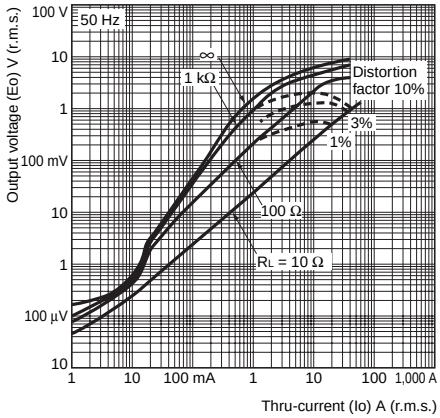


Connection Example



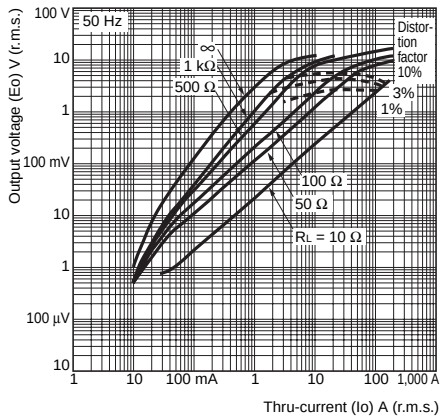
E54-CT1
Thru-current (Io) vs. Output Voltage (Eo) (Reference Values)

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±0.8 Ω



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.

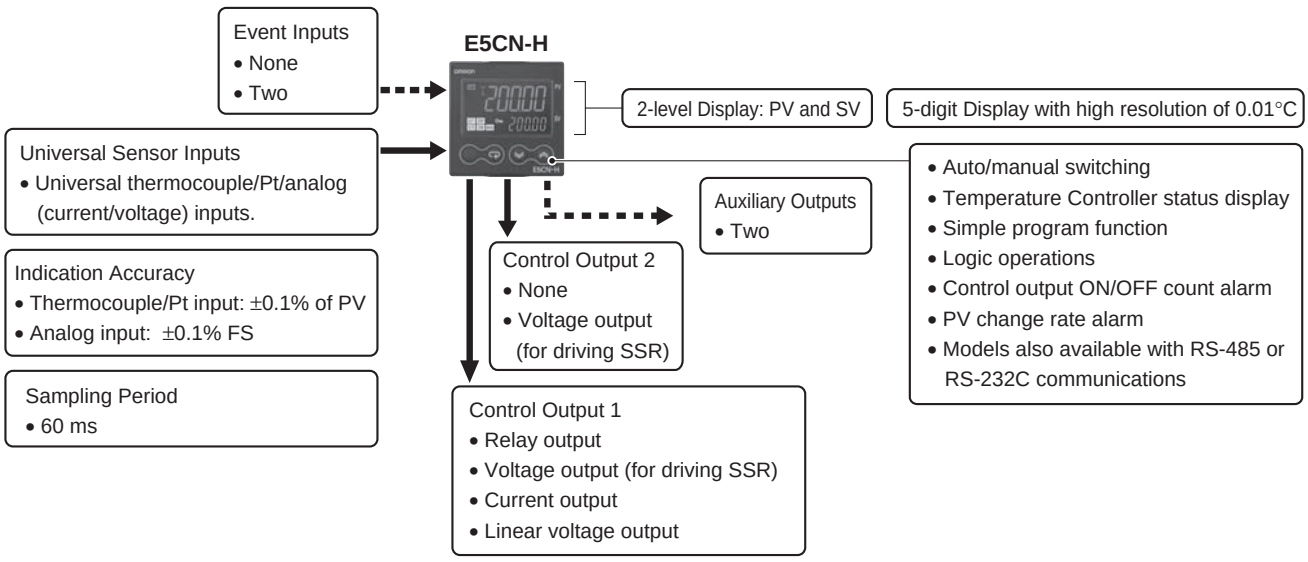
- High-resolution display with 5 digits/0.01°C display in a compact Controller (48 x 48 mm).
- High-speed sampling cycle of 60 ms.
- High Accuracy
  Thermocouple/Pt input: ±0.1% of PV
  Analog input: ±0.1% FS
- Universal inputs on all models (thermocouple, PT, or analog input) to handle various sensors 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

⚠ Refer to *Safety Precautions* on page 66.

Main I/O Functions

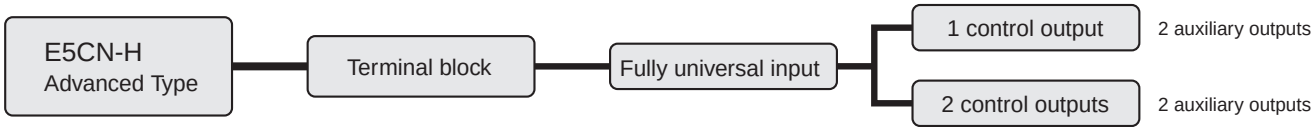


This data sheet is provided as a guideline for selecting products. Be sure to refer to the following user manuals for application precautions and other information required for operation before attempting to use the product.

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 7

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
1/16 DIN 48 × 48 × 78 (W × H × D)	Black	100 to 240 VAC	2	Relay output	E5CN-HR2M-500
				Voltage output (for driving SSR)	E5CN-HQ2M-500
				Current output	E5CN-HC2M-500
				Linear voltage output	E5CN-HV2M-500
		24 VAC/VDC	2	Relay output	E5CN-HR2MD-500
				Voltage output (for driving SSR)	E5CN-HQ2MD-500
				Current output	E5CN-HC2MD-500
				Linear voltage output	E5CN-HV2MD-500
	Silver	100 to 240 VAC	2	Relay output	E5CN-HR2M-W-500
				Voltage output (for driving SSR)	E5CN-HQ2M-W-500
				Current output	E5CN-HC2M-W-500
		24 VAC/VDC	2	Relay output	E5CN-HR2MD-W-500
				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.

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
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 terminal blocks.

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
EST2-2C-MV4

E5CN-H

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		100 to 240 VAC: 8.5 VA (max.) (E5CN-HR2 at 100 VAC: 3.0 VA) 24 VAC/VDC: 5.5 VA (24 VAC)/3.5 W (24 VDC) (max.) (E5CN-HR2D at 24 VAC: 2.7 VA)
Sensor input		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 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 output	**Relay output**	SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA
	Voltage output (for driving SSR)	Output voltage: 12 VDC ±15% (PNP), max. load current: 21 mA, with short-circuit protection circuit
	Current output	4 to 20 mA DC/0 to 20 mA DC, load: 600 Ω max., resolution: approx. 10,000 ✻
	Linear voltage output	0 to 10 VDC (load: 1 kΩ min.), Resolution: Approx. 10,000
Auxiliary output	**Number of outputs**	2 max.
	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 input	**Number of outputs**	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
Logic operations	**Number of operations**	8 max. (Combinations can be made using work bits.)
	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 assignments	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 outputs	**Number of outputs**	1 max.
	Output specifications	Current output: 4 to 20 mA DC, Load: 600 Ω max., Resolution at 4 to 20 mA: Approx. 10,000
RSP input		Not supported
Setting method		Digital setting using front panel keys
Indication method		11-segment digital display and individual indicators (7-segments displays also possible) Character height: PV: 11 mm, SV: 6.5 mm
Bank switching		Supported (number of banks: 8) Local SP, alarm settings, PID sets (PID constants, MV upper limit, MV lower limit, etc.)
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, PV/SV status display, logic operations, 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)

✻For models with current outputs, control output 1 can be used as a transfer output.

Input Ranges

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

Input type	Platinum resistance thermometer						Thermocouple																		Analog input				
Name	Pt100				JPt100		K			J			T			E	L	U		N	R	S	B	W	PL II	4 to 20 mA	0 to 20 mA	1 to 5 V	0 to 5 V	0 to 10 V
Temperature range (°C)																										Usable in the following ranges by scaling: –19999 to 32400, –1999.9 to 3240.0, –199.99 to 324.00, or –19.999 to 32.400				
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

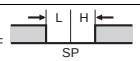
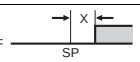
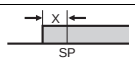
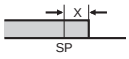
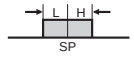
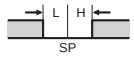
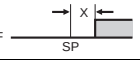
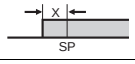
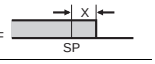
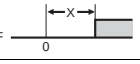
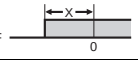
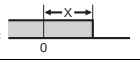
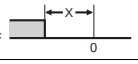
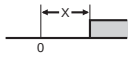
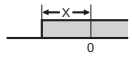
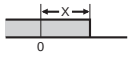
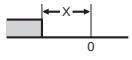
Pt100: JIS C 1604-1997, IEC 751

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

Alarm Outputs

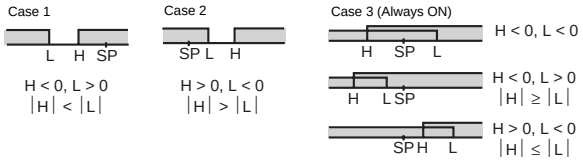
Each alarm can be independently set to one of the following 13 alarm types. The default is *2: Upper limit*.
Auxiliary outputs are allocated for alarms. ON delays and OFF delays (0 to 999 s) can also be specified.

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).

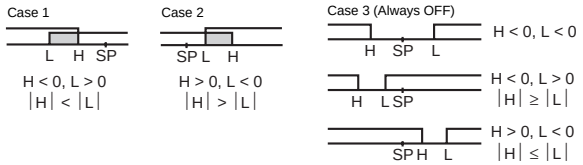
Set value	Alarm type	Alarm output operation	
		When X is positive	When X is negative
0	Alarm function OFF	Output OFF	
1 ✻1	Upper- and lower-limit		✻2
2	Upper limit		
3	Lower limit		
4 ✻1	Upper- and lower-limit range		✻3
5 ✻1	Upper- and lower-limit with standby sequence	 ✻5	✻4
6	Upper-limit with standby sequence		
7	Lower-limit with standby sequence		
8	Absolute-value upper-limit		
9	Absolute-value lower-limit		
10	Absolute-value upper-limit with standby sequence		
11	Absolute-value lower-limit with standby sequence		
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
  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: (±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.
Transfer output accuracy		±0.3% FS max.
Influence of temperature ✻2		Thermocouple input (R, S, B, W, PLII): (±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 Platinum resistance thermometer: (±1% of PV or ±2°C, whichever is greater) ±1 digit max. Analog input: (±1%FS) ±1 digit max.
Influence of voltage ✻2		
Input sampling 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 time (D)		0.0 to 3240.0 s (in units of 0.1 s)
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		–19999 to 32400 (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/s^2 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/s^2, 3 times each in X, Y, and Z directions
	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 protection		Front panel: IP66, 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-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	**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°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 connection method	RS-485: Multipoint 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

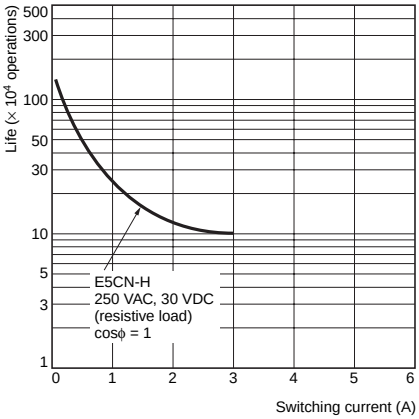
CT input (for heater current detection)	Models with detection for single-phase heaters: One input Models with detection for single-phase or three-phase heaters: Two inputs
Maximum heater current	50 A AC
Input current indication accuracy	±5% FS ±1 digit max.
Heater burnout alarm setting range ✻1	0.1 to 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

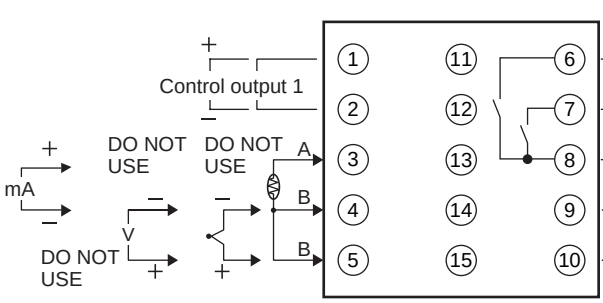
Control output 1

Relay output
250 VAC, 3 A
(resistive load)

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

Linear voltage output
0 to 10 VAC
Load 1 kΩ max.

Current output
0 to 20 mA DC
4 to 20 mA DC
Load 600 Ω max.



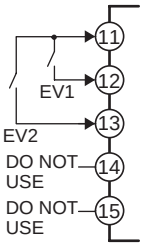
Auxiliary outputs (relay outputs)
250 VAC, 3 A
(resistive load)

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.

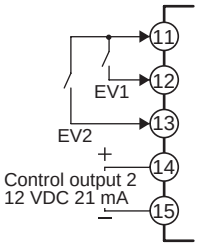
- 100 to 240 VAC
- 24 VAC/VDC (no polarity)

Option Units

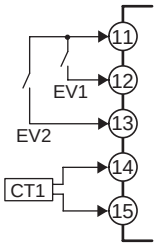
E53-CNBN2
Event Inputs



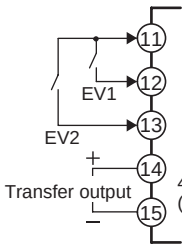
E53-CNQBN2
Event Inputs and Control Output 2



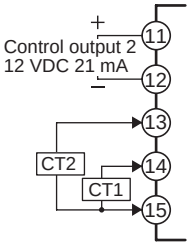
E53-CNHBN2
Event Inputs and CT



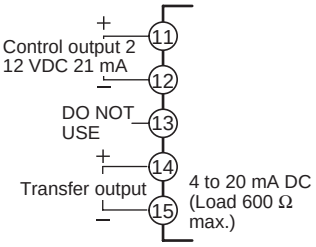
E53-CNBFN2
Event Inputs and Transfer Output



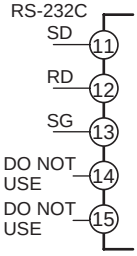
E53-CNQHHN2
Control Output 2 and CT2



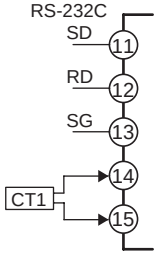
E53-CNQFN2
Control Output 2 and Transfer Output



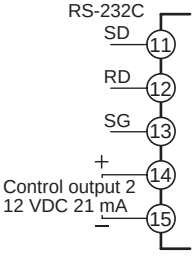
E53-CN01N2
Communications (RS-232)



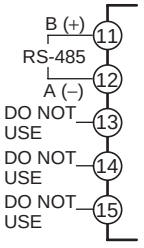
E53-CNH01N2
Communications (RS-232) and CT



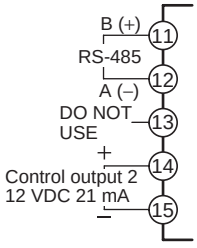
E53-CNQ01N2
Communications (RS-232) and Control Output 2



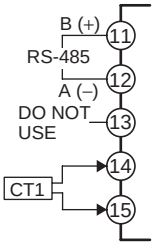
E53-CN03N2
Communications (RS-485)



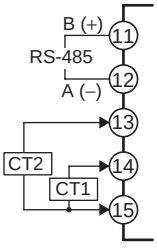
E53-CNQ03N2
Communications (RS-485) and Control Output 2



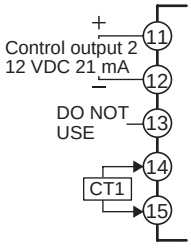
E53-CNH03N2
Communications (RS-485) and CT



E53-CNHH03N2
Communications (RS-485) and CT2



E53-CNQHN2
Control Output 2 and CT

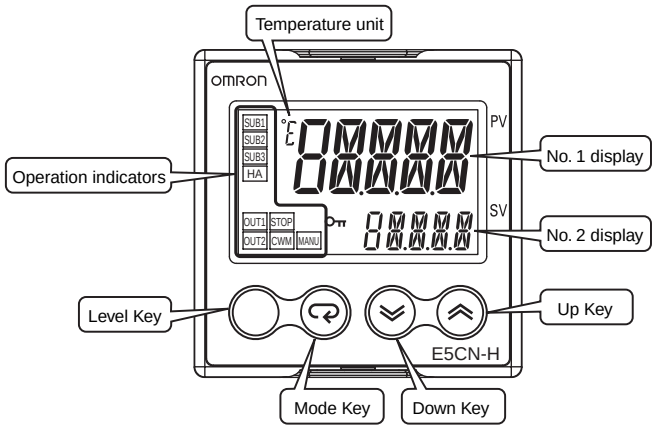


Note: Wire all voltage input terminals correctly. The Controller may fail if voltage input terminals are wired incorrectly.

E5CN-H

Nomenclature

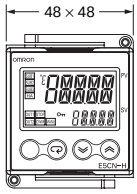
E5CN-H

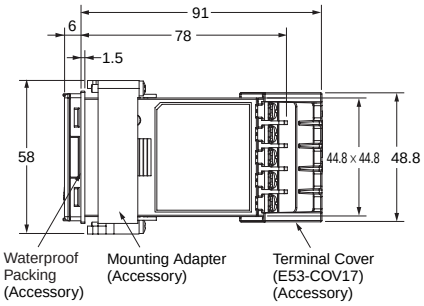


Dimensions

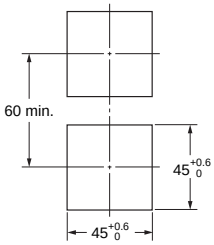
(Unit: mm)

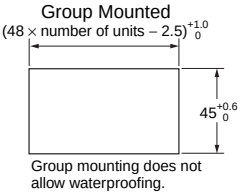
E5CN-H





Panel Cutout





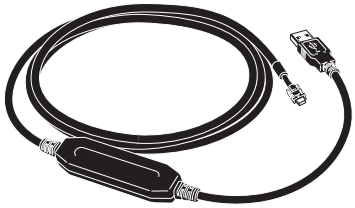
- Recommended panel thickness is 1 to 5 mm.
- Group mounting is not possible in the vertical direction. (Maintain the specified mounting space between Controllers.)
- To mount the Controller so that it is waterproof, insert the waterproof packing onto the Controller.
- When two or more Controllers are mounted, make sure that the surrounding temperature does not exceed the allowable operating temperature specified in the specifications.

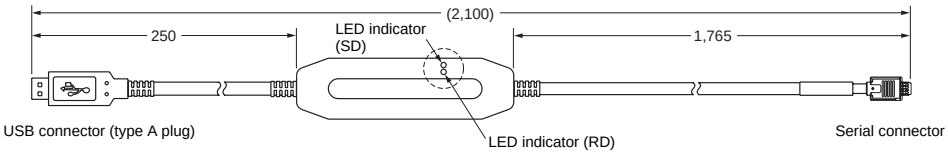
Note: The terminal block cannot be removed.

Accessories (Order Separately)

USB-Serial Conversion Cable

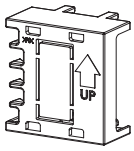
E58-CIFQ1



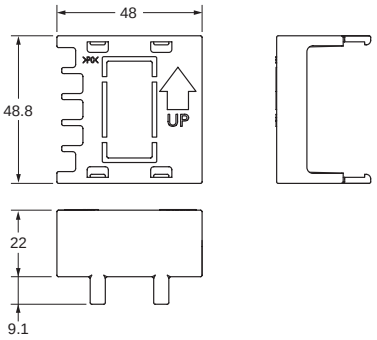


Terminal Cover

E53-COV17

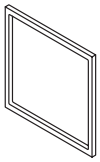


Note: The E53-COV10 can not be used.



Waterproof Packing

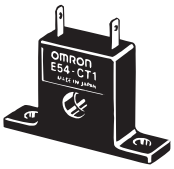
Y92S-29 (for DIN 48 × 48)

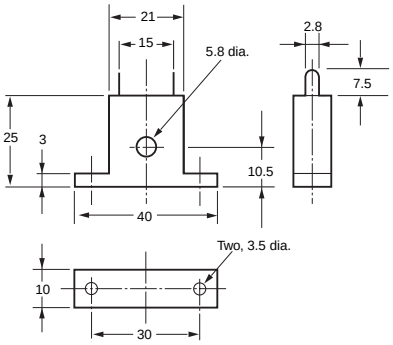


Order the Waterproof Packing separately if it becomes lost or damaged.
The Waterproof Packing can be used to achieve an IP66 degree of protection.
(Deterioration, shrinking, or hardening of the waterproof packing may occur depending on the operating environment. Therefore, periodic replacement is recommended 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.

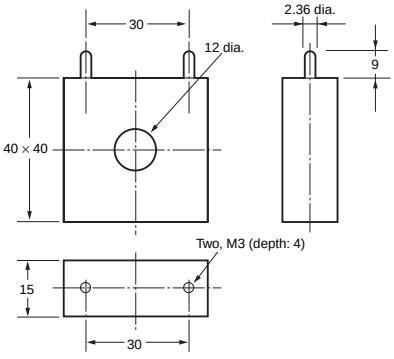
Current Transformers

E54-CT1



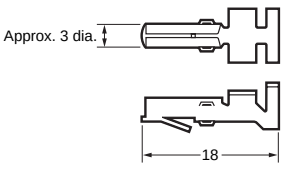


E54-CT3

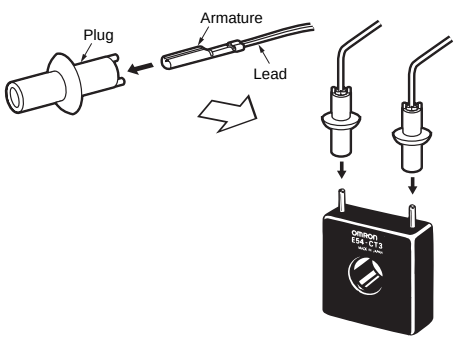


E54-CT3 Accessory

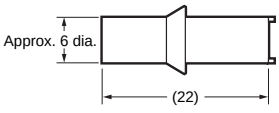
- **Armature**



Connection Example

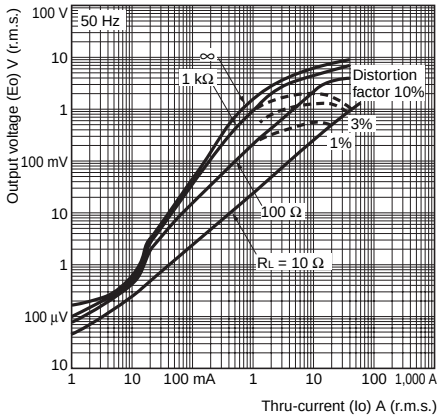


- **Plug**



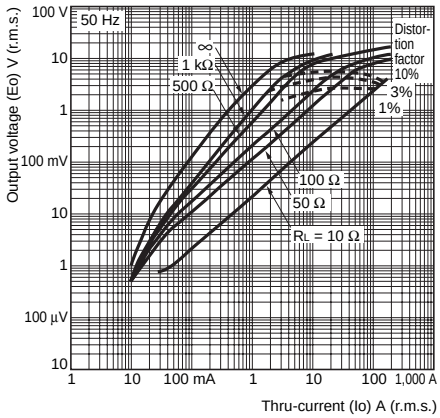
E54-CT1
Thru-current (Io) vs. Output Voltage (Eo) (Reference Values)

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



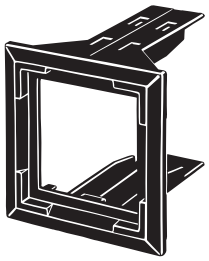
E54-CT3
Thru-current (Io) vs. Output Voltage (Eo) (Reference Values)

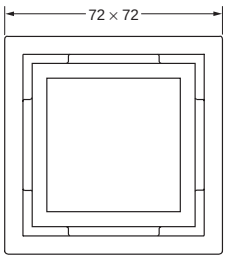
Maximum continuous heater current: 120 A (50/60 Hz)
(Maximum continuous heater current for an OMRON Temperature Controller is 50 A.)
Number of windings: 400±2
Winding resistance: 8±0.8 Ω

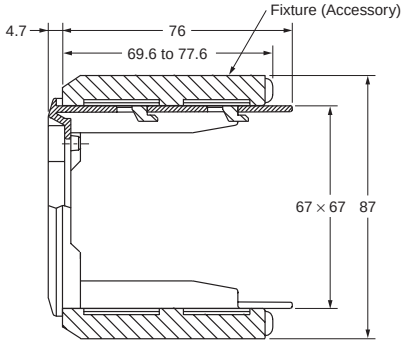


Adapter

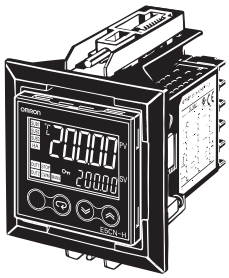
Y92F-45 **Note:** Use this Adapter when the panel has already been prepared for the E5B□.

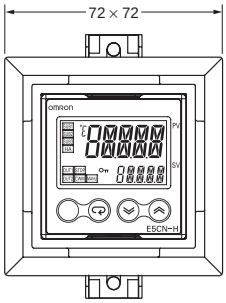


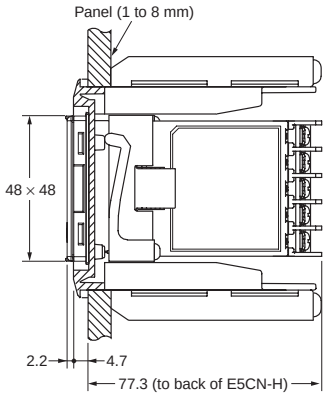




Mounted to E5CN-H







Advanced Digital Temperature Controller

E5AN-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

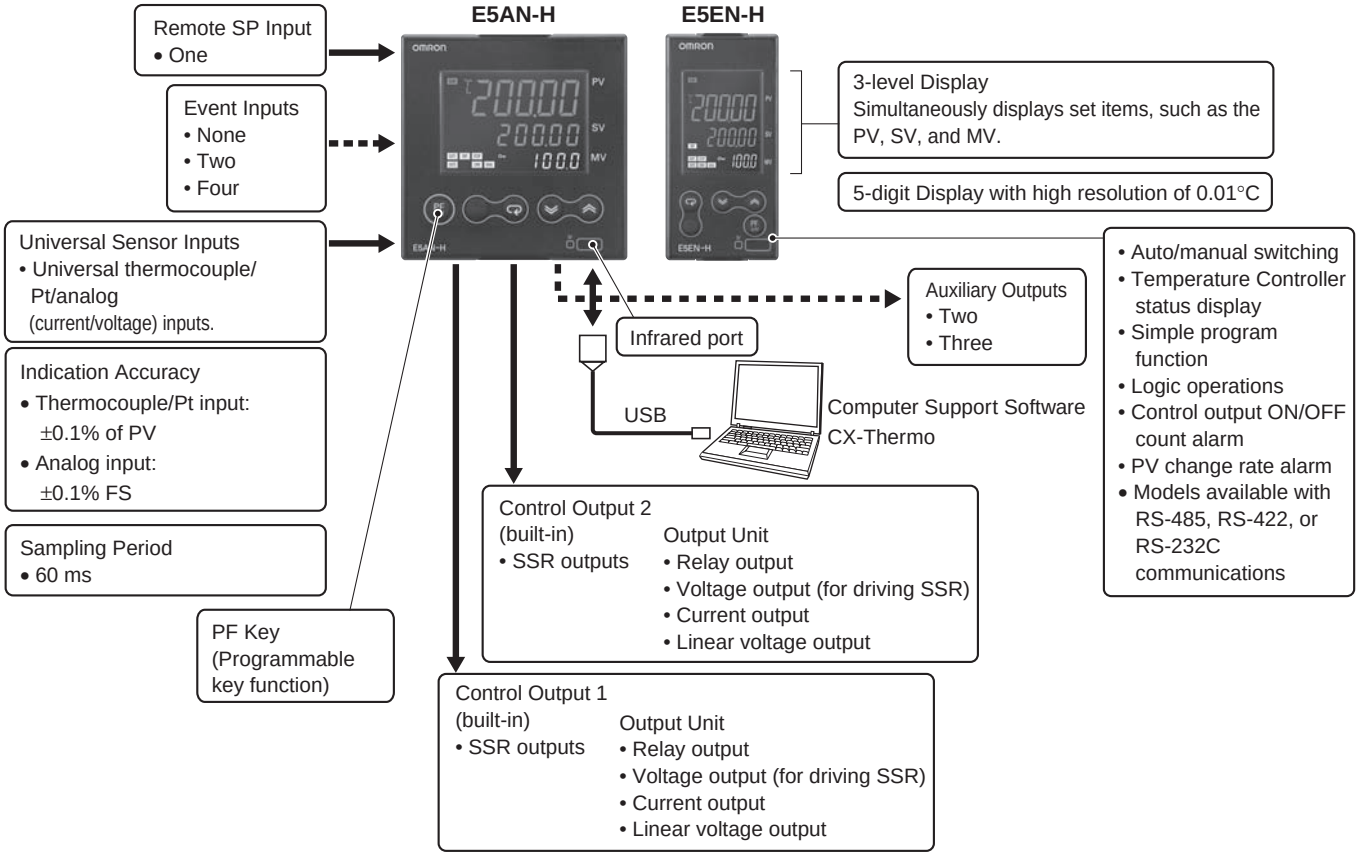
96 × 96 mm
E5AN-H

48 × 96 mm
E5EN-H

NEW

⚠ Refer to *Safety Precautions* on page 66.

Main I/O Functions



E5AN-H/E5EN-H

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 2 3 4 5 6 7 8 9 10 11

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

1. **Function**
   EN01: RS-232C communications
   EN02: RS-422 communications
   EN03: RS-485 communications
   AKB: Event input

Output Units

E53-□□
1 2

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

Size	Case color	Power supply voltage	Control method	Auxiliary output	Control output 1/2	Heater burnout	Optional functions			Model
							Event inputs	Transfer output	RSP	
1/4 DIN 96 × 96 × 78 (W × H × D)	Black	100 to 240 VAC	Basic	2	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
					Control Output Unit × 2	2	2	4 to 20-mA output	4 to 20-mA input	E5AN-HAA2HHBFM-500
					SSR outputs × 2	2	2	4 to 20-mA output	4 to 20-mA input	E5AN-HSS2HHBFM-500
				3	Control Output Unit × 2		2	4 to 20-mA output	4 to 20-mA input	E5AN-HAA3BFM-500
					SSR outputs × 2		2	4 to 20-mA output	4 to 20-mA input	E5AN-HSS3BFM-500
			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	Basic	2	Control Output Unit × 2	1	2		4 to 20-mA input	E5AN-HAA2HBMD-500
					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
				3	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
			Valve	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	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

Size	Case color	Power supply voltage	Control method	Auxiliary output	Control output 1/2	Heater burn-out	Optional Functions			Model
							Event inputs	Transfer output	RSP	
1/8 DIN 48 × 96 × 78 (W × H × D)	Black	100 to 240 VAC	Basic	2	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
					Control Output Unit × 2	2	2	4 to 20-mA output	4 to 20-mA input	E5EN-HAA2HHBFM-500
					SSR outputs × 2	2	2	4 to 20-mA output	4 to 20-mA input	E5EN-HSS2HHBFM-500
				3	Control Output Unit × 2		2	4 to 20-mA output	4 to 20-mA input	E5EN-HAA3BFM-500
					SSR outputs × 2		2	4 to 20-mA output	4 to 20-mA input	E5EN-HSS3BFM-500
			Valve	2	Relay outputs × 2		2		4 to 20-mA input	E5EN-HPRR2BM-500
					Relay outputs × 2		2	4 to 20-mA output	4 to 20-mA input	E5EN-HPRR2BFM-500
		24 VAC/ VDC	Basic	2	Control Output Unit × 2	1	2		4 to 20-mA input	E5EN-HAA2HBMD-500
					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
				3	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
			Valve	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
	Silver	100 to 240 VAC	Basic	2	Control Output Unit × 2	1	2		4 to 20-mA input	E5EN-HAA2HBM-W-500
					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 output (for driving SSR)	E53-QN	12 VDC (PNP), max. load current: 40-mA, with short-circuit protection
	E53-Q3	24 VDC (NPN), max. load current: 20-mA, with short-circuit protection
	E53-Q4	24 VDC (PNP), max. load current: 20-mA, with short-circuit protection
Current output	E53-C3N	4 to 20-mA DC, load: 600 Ω max., resolution: approx. 10,000
	E53-C3DN	0 to 20-mA DC, load: 600 Ω max., resolution: approx. 10,000
Linear voltage output	E53-V34N	0 to 10 VDC, load: 1 kΩ min., resolution: approx. 10,000
	E53-V35N	0 to 5 VDC, load: 1 kΩ 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	

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

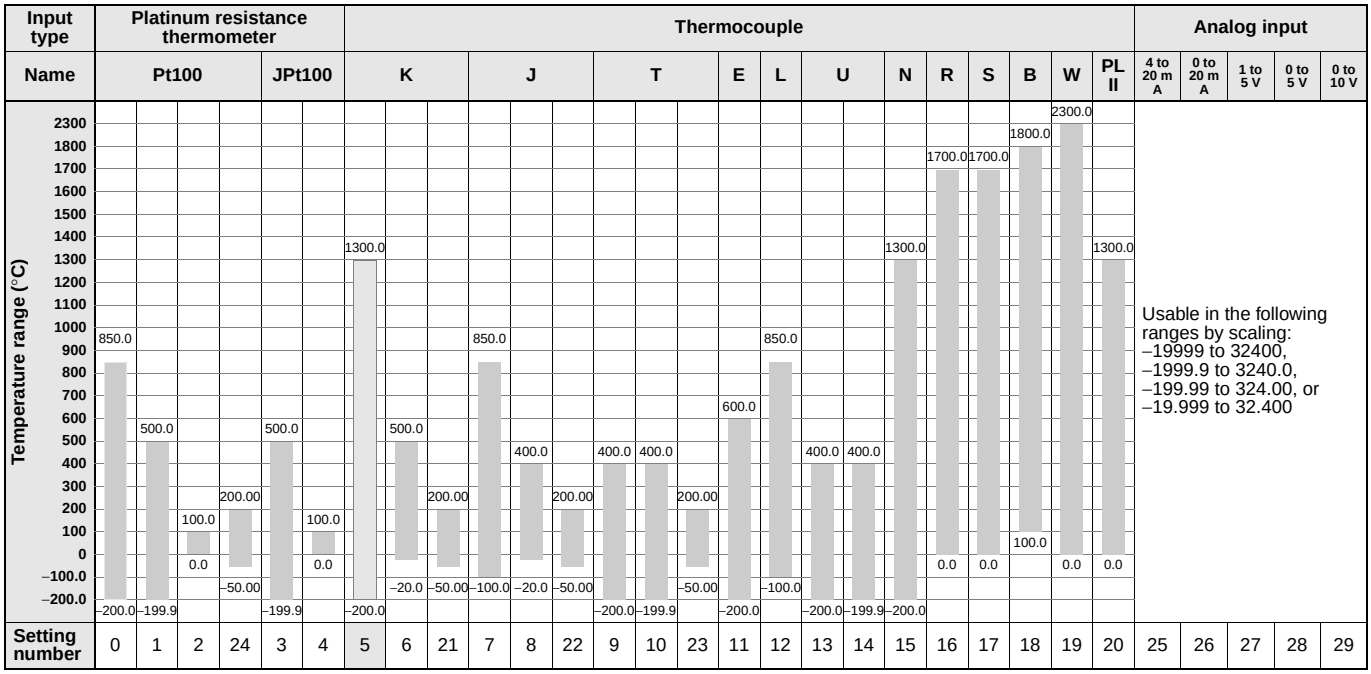
Specifications

Ratings

Power 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		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 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 output	**Relay output**	Output Unit (Install the Output Unit (sold separately).)
	Voltage output (for driving SSR)	
	Current output	
	Linear voltage output	
	Built-in SSR output	75 to 250 VAC, 1 A (resistive load)
	Relay output for position-proportional control	Relay output: Open and close: SPST-NO, 250 VAC, 1 A (including in-rush current), electrical life: 100,000 operations min. Potentiometer input: Must be between 100 Ω and 2.5 kΩ for maximum open position.
Auxiliary output	**Number of outputs**	2 or 3 max.
	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 input	**Number of outputs**	2 or 4 (with an E53-AKB)
	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
Logic operations	**Number of operations**	8 max.
	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 outputs	**Number of outputs**	1 max. (Depends on model. Models with transfer output (F in model number)
	Output specifications	Current output: 4 to 20 mA DC, Load: 600 Ω max., Resolution at 4 to 20 mA: Approx. 10,000
RSP input	**Number of inputs**	1
	Signal type	Current input: 4 to 20 mA (input impedance: 150 Ω ±10%)
	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 method		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 switching		Supported (number of banks: 8) Local SP, alarm settings, PID sets (PID constants, MV upper limit, MV lower limit, etc.)
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, PV/SV status display, logic operations, 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)

Input Ranges

Thermocouple/Platinum Resistance Thermometer (Fully Universal Inputs)



Input type	Platinum resistance thermometer						Thermocouple																		Analog input				
Name	Pt100				JPt100		K			J			T			E	L	U		N	R	S	B	W	PL II	4 to 20 mA	0 to 20 mA	1 to 5 V	0 to 5 V	0 to 10 V
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

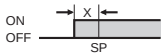
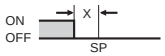
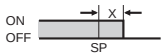
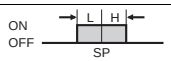
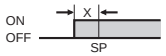
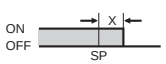
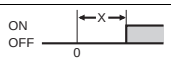
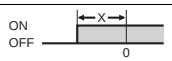
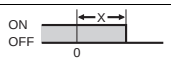
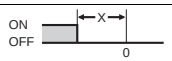
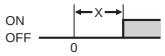
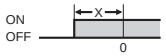
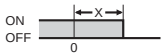
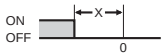
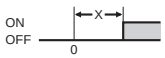
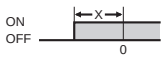
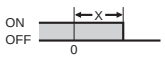
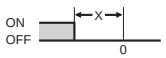
Pt100: JIS C 1604-1997, IEC 751

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

Alarm Outputs

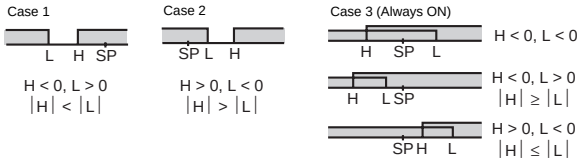
Each alarm can be independently set to one of the following 15 alarm types. The default is *2: Upper limit*.
Auxiliary outputs are allocated for alarms. ON delays and OFF delays (0 to 999 s) can also be specified.

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).

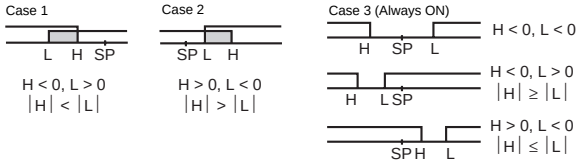
Set value	Alarm type	Alarm output operation	
		When X is positive	When X is negative
0	Alarm function OFF	Output OFF	
1 ✻1	Upper- and lower-limit		✻2
2	Upper limit		
3	Lower limit		
4 ✻1	Upper- and lower-limit range		✻3
5 ✻1	Upper- and lower-limit with standby sequence	 ✻5	✻4
6	Upper-limit with standby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

✻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
  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.

✻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 output accuracy		±0.3% FS max.
Influence of temperature ✻2		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 Platinum resistance thermometer: (±1% of PV or ±2°C, whichever is greater) ±1 digit max. Analog input: (±1%FS) ±1 digit max.
Influence of voltage ✻2		
Input sampling 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 time (D)		0.0 to 3240.0 s (in units of 0.1 s)
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		−19999 to 32400 (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/s^2 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/s^2, 3 times each in X, Y, and Z directions
	Destruction	300 m/s^2, 3 times each in X, Y, and Z directions
Weight	**E5AN-H**	Controller: Approx. 310 g, Mounting Bracket: Approx. 100 g
	E5EN-H	Controller: Approx. 260 g, Mounting Bracket: Approx. 100 g
Degree of protection		Front panel: IP66, 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 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
	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°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

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, RS-422: Multipoint RS-232C: Point-to-point
Communications	RS-485 (two-wire, half duplex) 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) 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-422, or RS-232C
Retry function	None
Communications buffer	217 bytes
Communications response wait time	0 to 99 ms 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

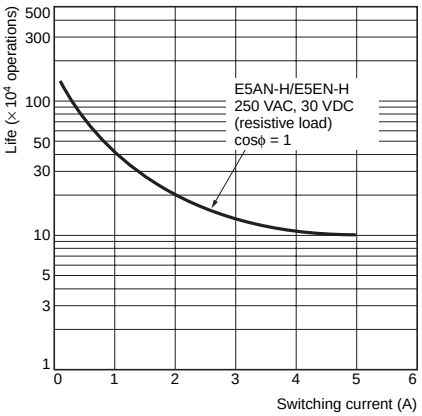
CT input (for heater current detection)	Models with detection for single-phase heaters: One input Models with detection for single-phase or three-phase heaters: Two inputs
Maximum heater current	50 A AC
Input current indication accuracy	±5% FS ±1 digit max.
Heater burnout alarm setting range ✻1	0.1 to 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)

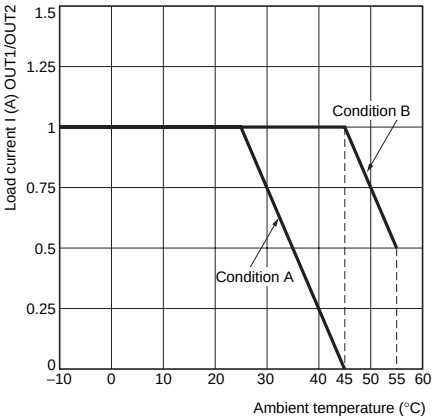


SSR Outputs (OUT1/OUT2) Ratings

- 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)



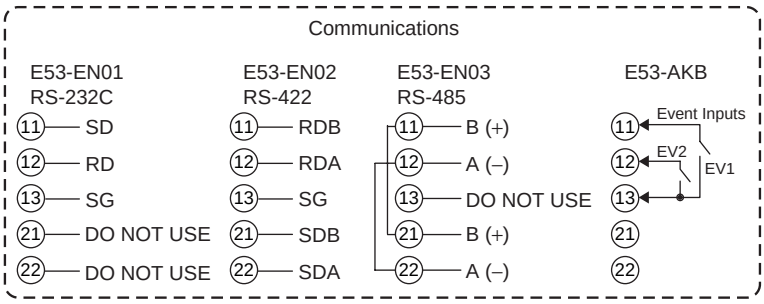
Condition A: SSR outputs 100% ON
Condition B: SSR outputs 50% ON with 2-s control cycle

External Connections

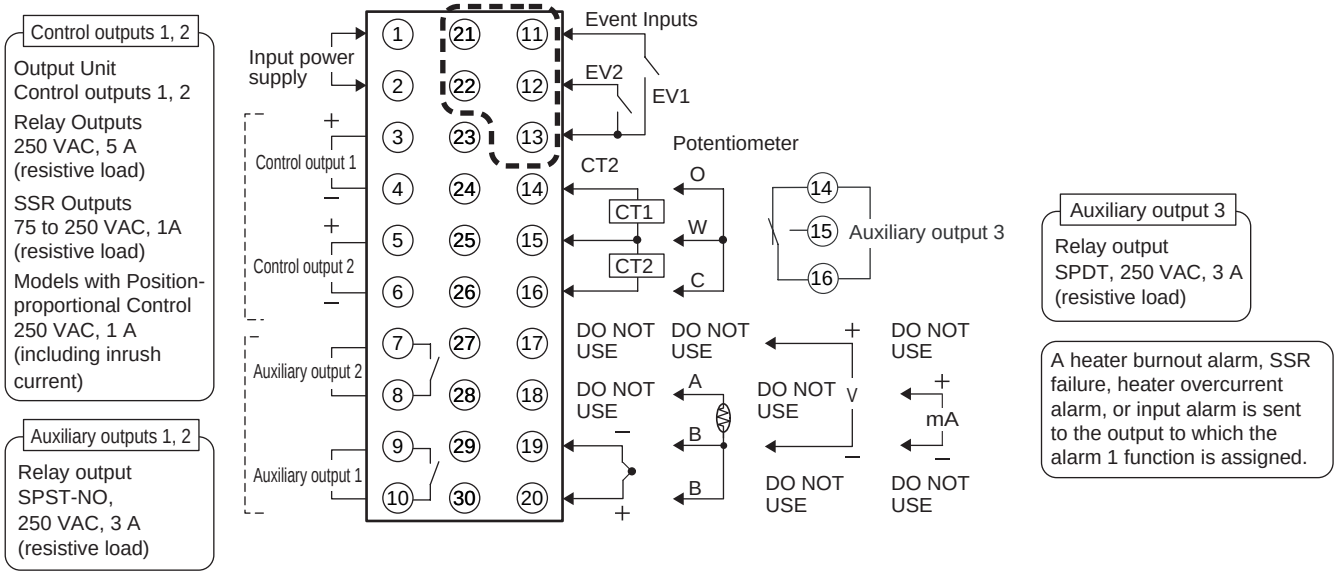
- A voltage output (control output 1, for driving SSR) is not electrically insulated from the internal circuits. When using a grounding thermocouple, do not connect any of the control output terminals to ground. If the control output terminals are connected to ground, errors will occur in the measured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

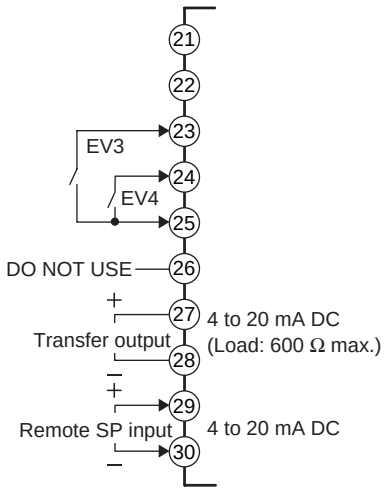
Controllers

Option Units



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



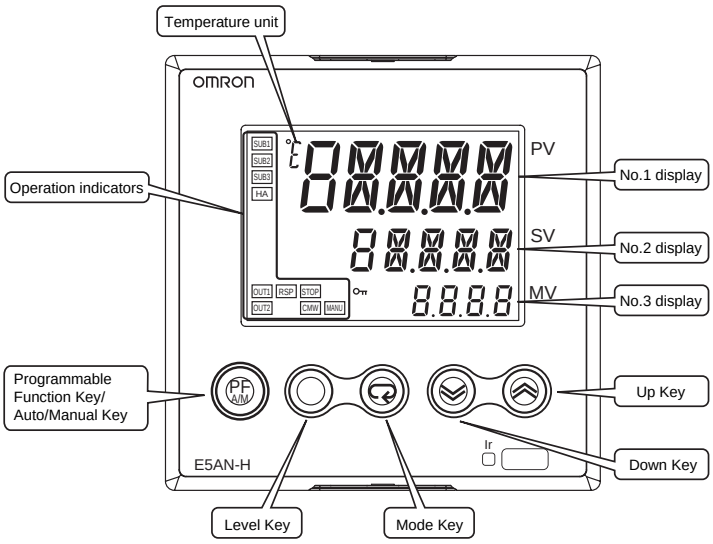


Note: Wire all voltage input terminals correctly. The Controller may fail if voltage input terminals are wired incorrectly.

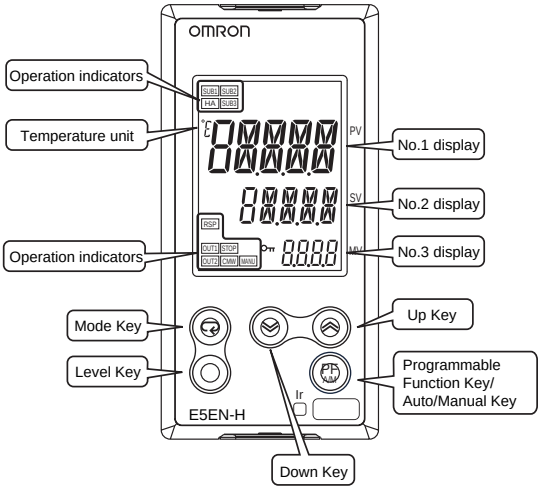
E5AN-H/E5EN-H

Nomenclature

E5AN-H



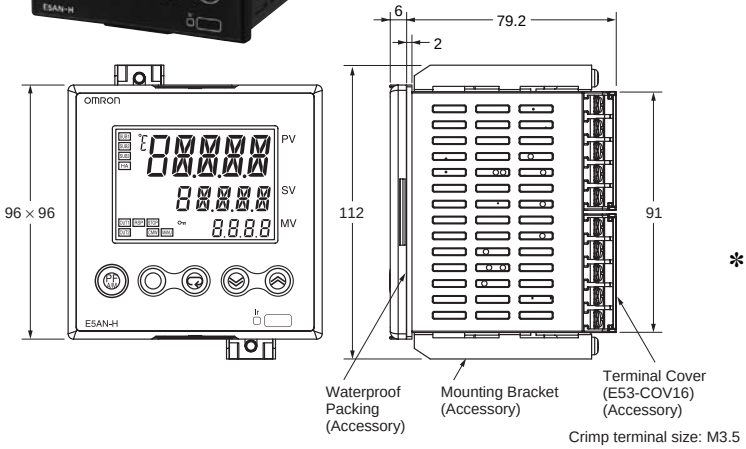
E5EN-H

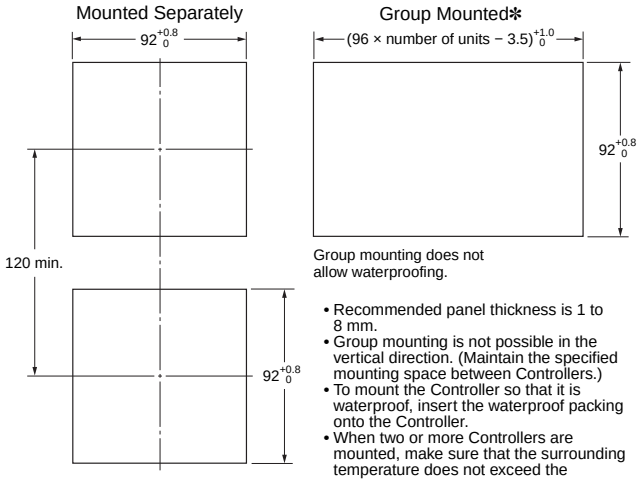


Dimensions

(Unit: mm)

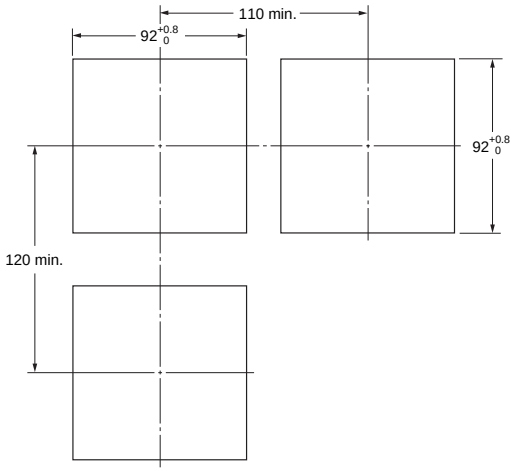
E5AN-H



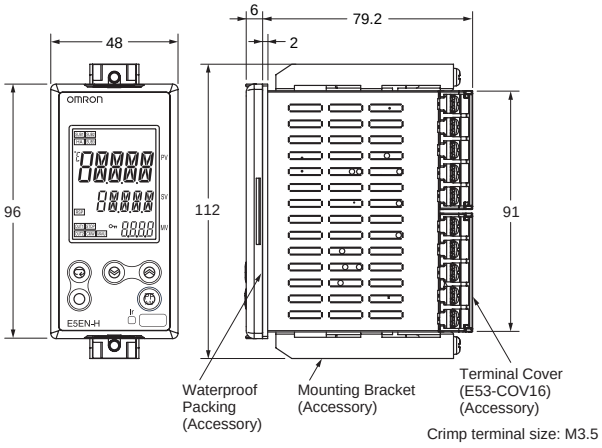


- Recommended panel thickness is 1 to 8 mm.
- Group mounting is not possible in the vertical direction. (Maintain the specified mounting space between Controllers.)
- To mount the Controller so that it is waterproof, insert the waterproof packing onto the Controller.
- When two or more Controllers are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

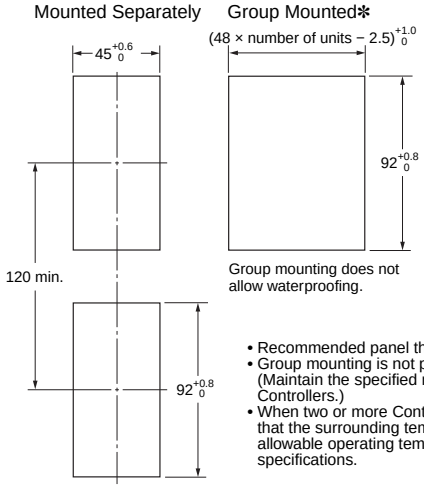
✻Group mounting is not possible if an SSR output is used for control output 1 or 2 and the E53-C3N or E53-C3DN Output Unit is used. For these combinations, maintain the following mounting space between Controllers.



E5EN-H

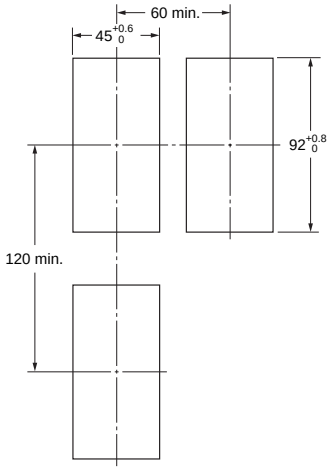


Mounted Separately Group Mounted✻



- 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.

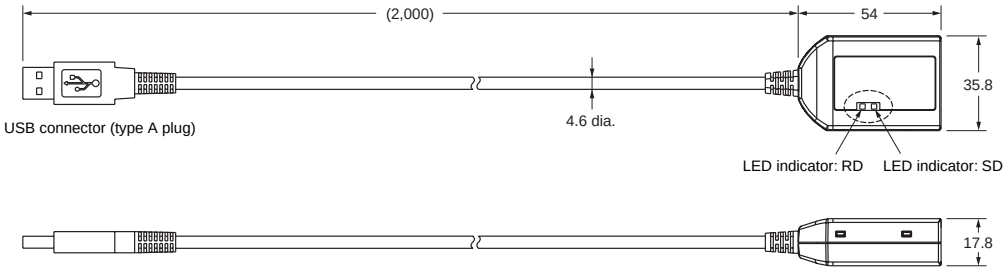


Accessories (Order Separately)

USB-Infrared Conversion Cable

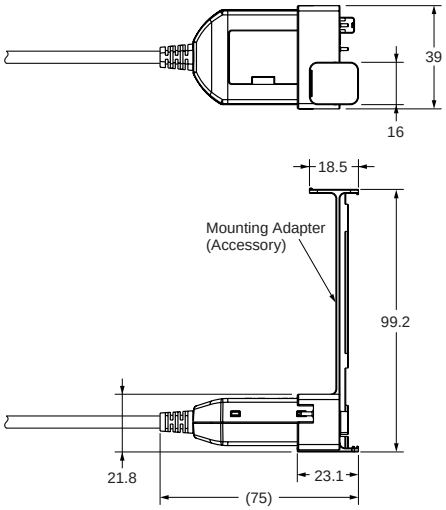
E58-CIFIR

USB-Infrared Conversion Cable



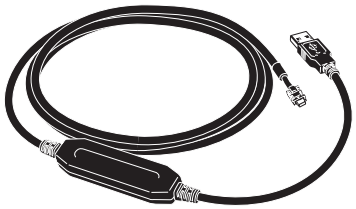
Mounting Adapter

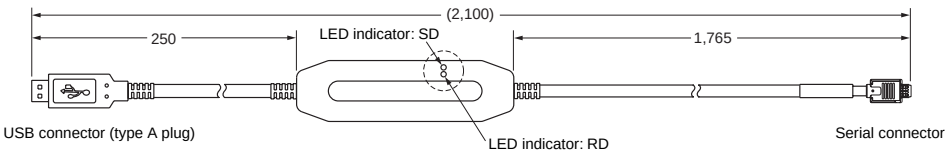
With Mounting Adapter Connected



USB-Serial Conversion Cable

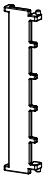
E58-CIFQ1

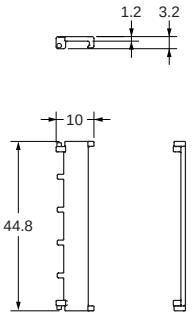




Terminal Covers

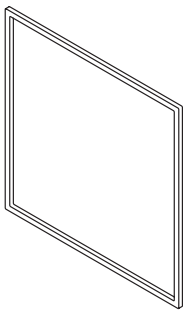
E53-COV16 (Six Covers provided.)



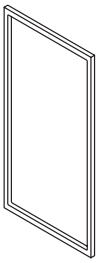


Waterproof Packing

Y92S-P4 (for DIN 96 × 96)



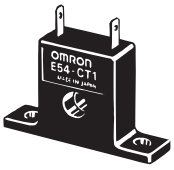
Y92S-P5 (for DIN 48 × 96)

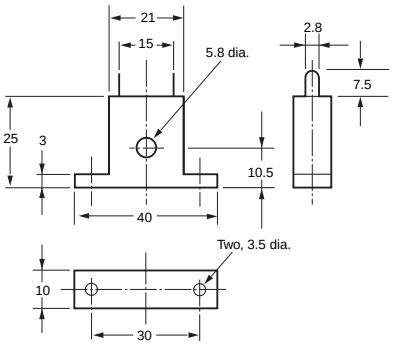


Order the Waterproof Packing separately if it becomes lost or damaged.
The Waterproof Packing can be used to achieve an IP66 degree of protection.
(Deterioration, shrinking, or hardening of the waterproof packing may occur depending on the operating environment. Therefore, periodic replacement is recommended 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.

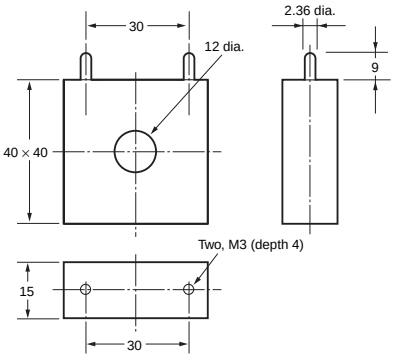
Current Transformers

E54-CT1



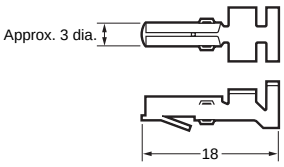


E54-CT3

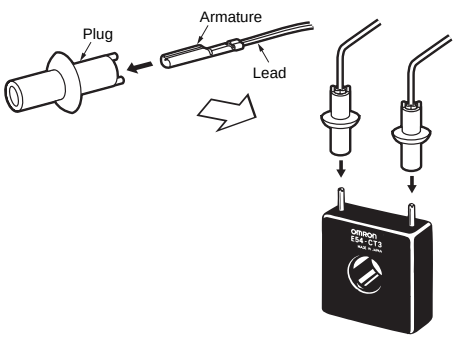


E54-CT3 Accessory

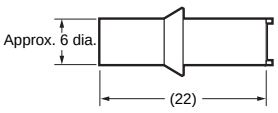
- **Armature**



Connection Example

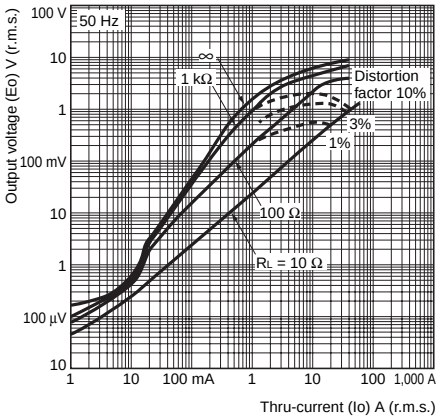


- **Plug**



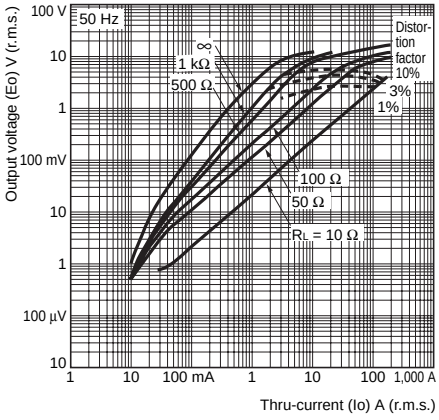
E54-CT1
Thru-current (Io) vs. Output Voltage (Eo) (Reference Values)

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±0.8 Ω

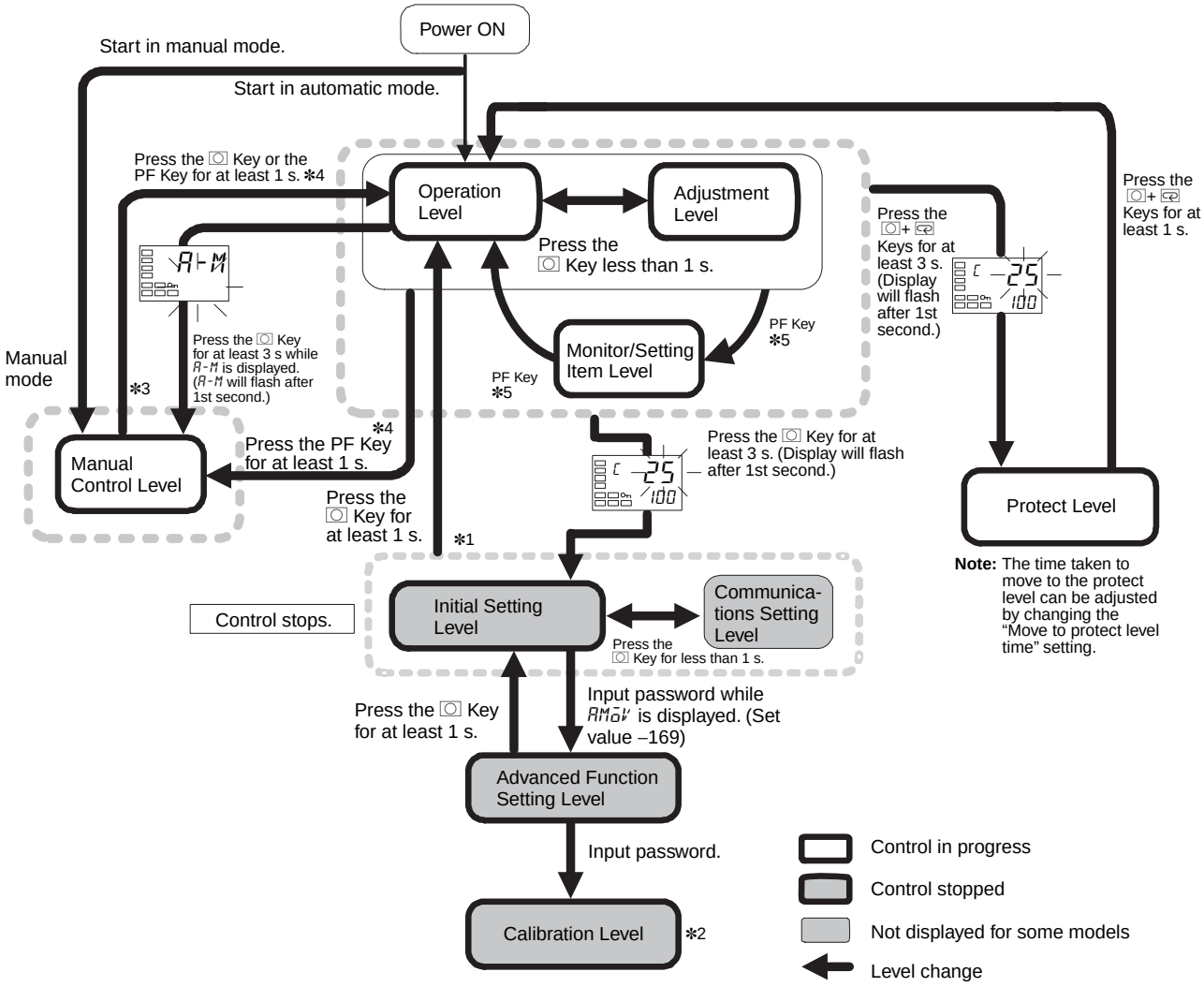


Operation

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)

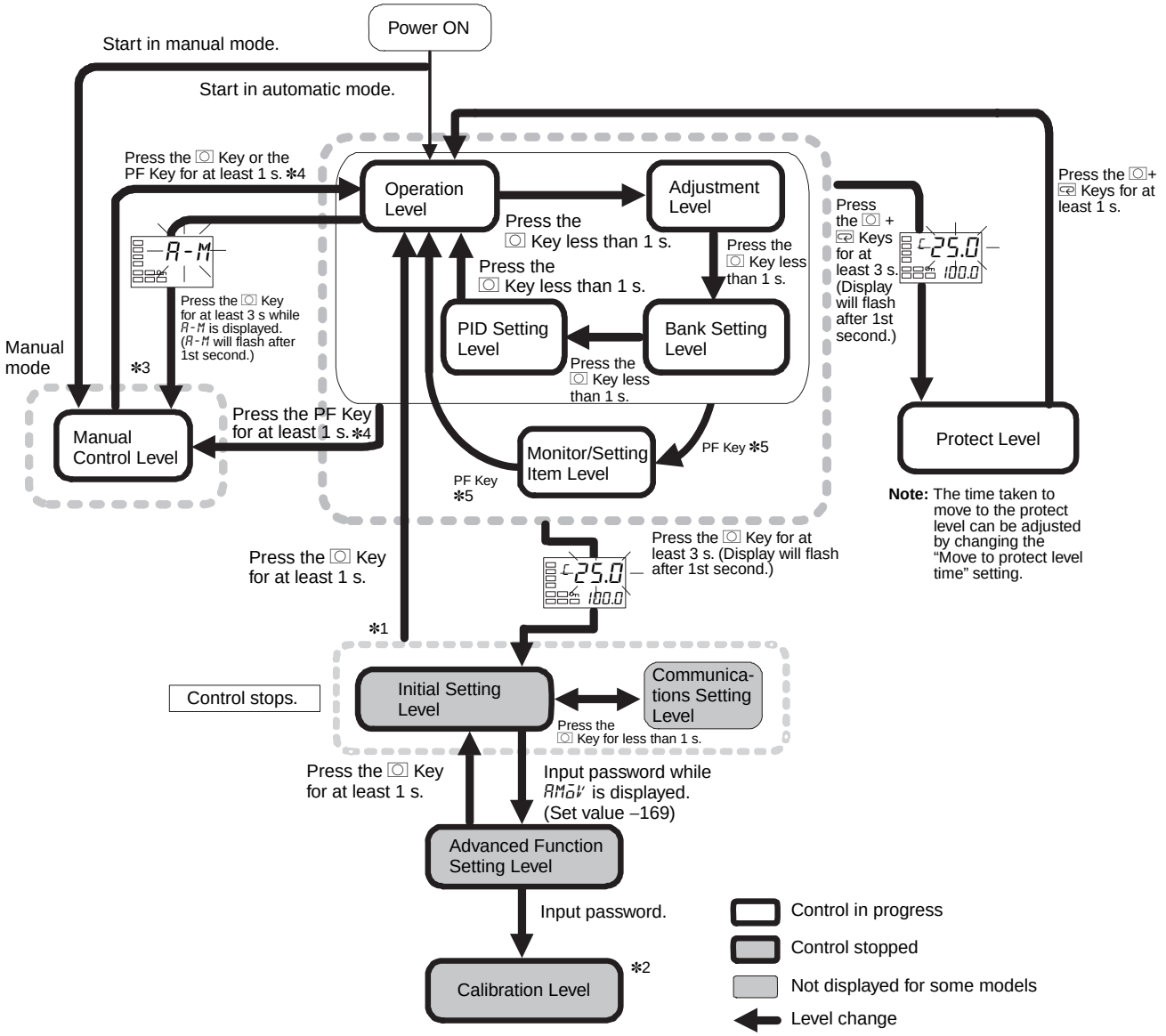
Error Displays (Troubleshooting)

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	
			Control output	Alarm output
S.ERR (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 (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
E111 (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, ▫▫▫▫ 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.

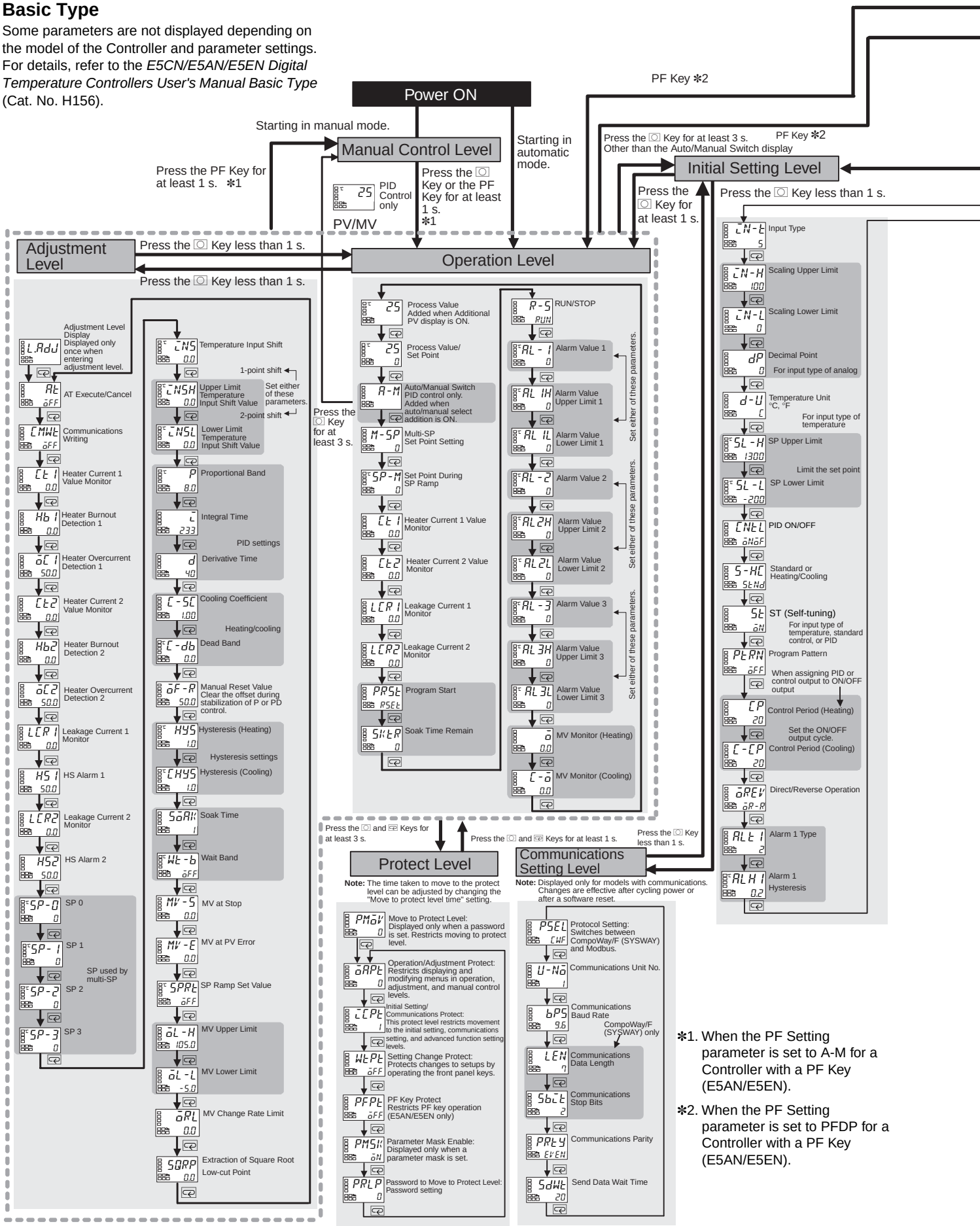
No.1 display	Meaning	Action	Status at error	
			Control output	Alarm output
S.ERR (S. Err)	Input error ✻	Check the wiring of inputs for miswiring, disconnections, and short-circuits and check the input type.	OFF	Operates as above the upper limit.
E333 (E333)	A/D converter error	Turn the power OFF then 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
E111 (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, ⊏⊏⊏⊏ will be displayed under –19999 and ⊐⊐⊐⊐ 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 Controllers 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

Basic Type

Some parameters are not displayed depending on the model of the Controller and parameter settings. For details, refer to the *E5CN/E5AN/E5EN Digital Temperature Controllers User's Manual Basic Type* (Cat. No. H156).



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

✻2. When the PF Setting parameter is set to PFDP for a Controller with a PF Key (E5AN/E5EN).

Monitor/Setting Item Level (E5AN/E5EN only)

Monitor/Setting Item Display 1 → PF → Monitor/Setting Item Display 2 → PF → Monitor/Setting Item Display 3 → PF → Monitor/Setting Item Display 4 → PF → Monitor/Setting Item Display 5

Note: The monitor/setting items to be displayed is set in the Monitor/Setting Item 1 to 5 parameters (advanced function setting level).

Press the ○ Key for at least 1 s.

Advanced Function Setting Level

- Alarm 2 Type
- Alarm 2 Hysteresis
- Alarm 3 Type
- Alarm 3 Hysteresis
- Transfer Output Type (Linear output)
- Transfer Output Upper Limit
- Transfer Output Lower Limit
- Linear Current Output (Linear output)
- Number of Multi-SP Uses (Two SPs: 1, Four SPs: 2)
- Event Input Assignment 1
- Event Input Assignment 2
- Extraction of Square Root Enable
- Move to Advanced Function Setting Level: Displayed when initial setting/communications protect is set to 0.

Move by setting password (–169).

- Parameter Initialization
- Multi-SP Uses
- SP Ramp Time Unit
- Standby Sequence Reset
- Auxiliary Output 1 Open in Alarm
- Auxiliary Output 2 Open in Alarm
- Auxiliary Output 3 Open in Alarm
- HB ON/OFF
- Heater Burnout Latch
- Heater Burnout Hysteresis
- ST Stable Range
- α
- AT Calculated Gain
- AT Hysteresis
- Limit Cycle MV Amplitude
- Input Digital Filter
- Additional PV Display
- MV Display
- Automatic Display Return Time

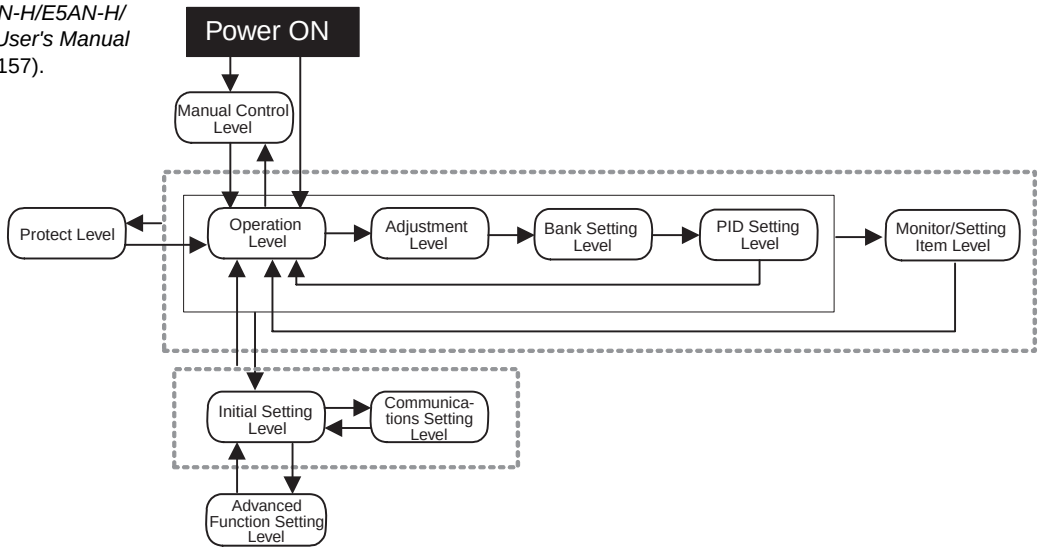
- Alarm 1 Latch
- Alarm 2 Latch
- Alarm 3 Latch
- Move to Protect Level Time
- Input Error Output
- Cold Junction Compensation Method
- MB Command Logic Switching
- PV Change Color
- PV Stable Band
- Alarm 1 ON Delay
- Alarm 2 ON Delay
- Alarm 3 ON Delay
- Alarm 1 OFF Delay
- Alarm 2 OFF Delay
- Alarm 3 OFF Delay
- Input Shift Type
- MV at Stop and Error Addition
- Auto/Manual Select Addition
- RT

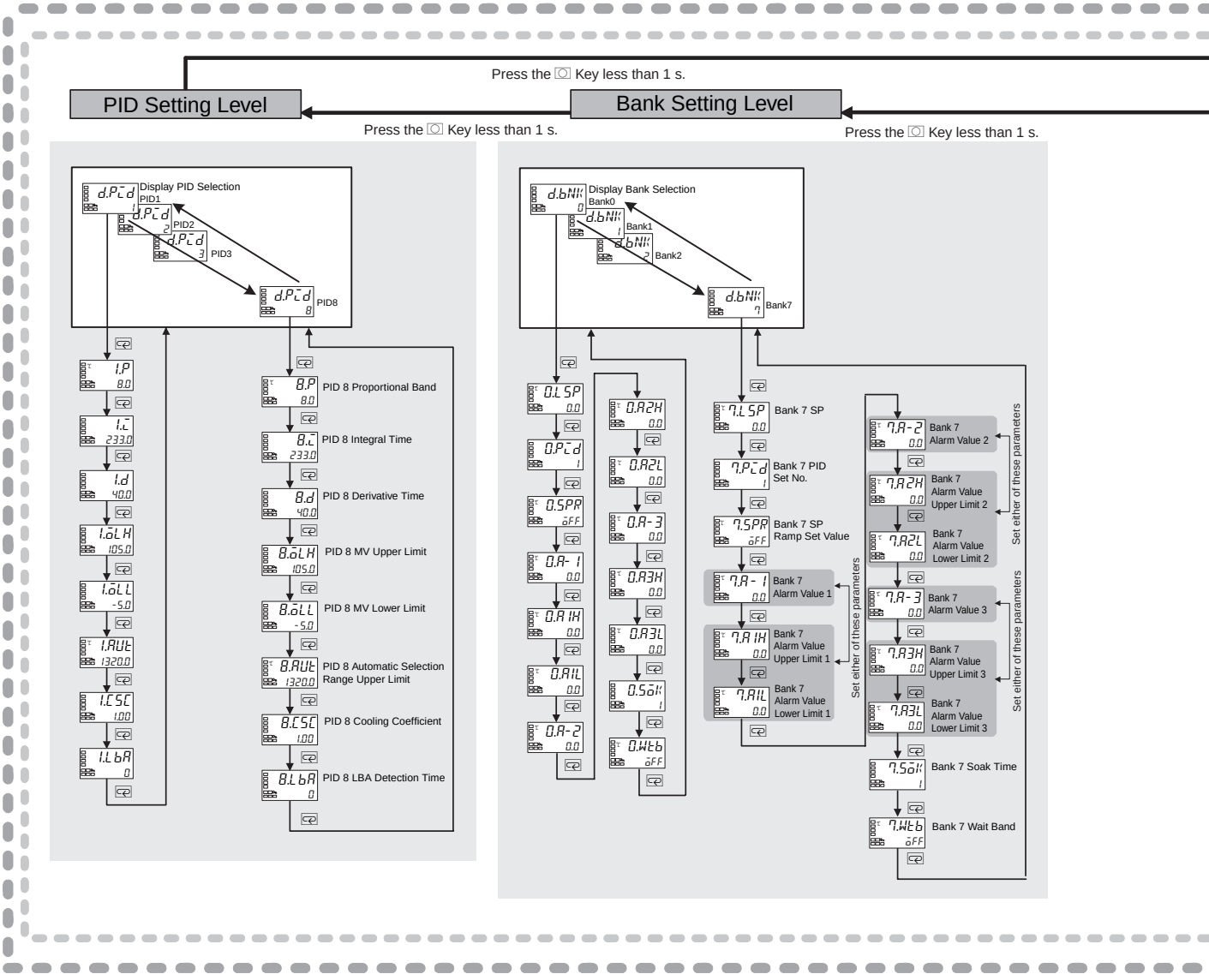
- HS Alarm Use
- HS Alarm Latch
- HS Alarm Hysteresis
- LBA Detection Time
- LBA Level
- LBA Band
- Control Output 1 Assignment
- Control Output 2 Assignment
- Auxiliary Output 1 Assignment
- Auxiliary Output 2 Assignment
- Auxiliary Output 3 Assignment (E5AN/E5EN only)
- Character Select
- Soak Time Unit
- Alarm SP Selection
- Manual MV Limit Enable
- PV Rate of Change Calculation Period
- Automatic Cooling Coefficient Adjustment
- Heater Overcurrent Use
- Heater Overcurrent Latch
- Heater Overcurrent Hysteresis

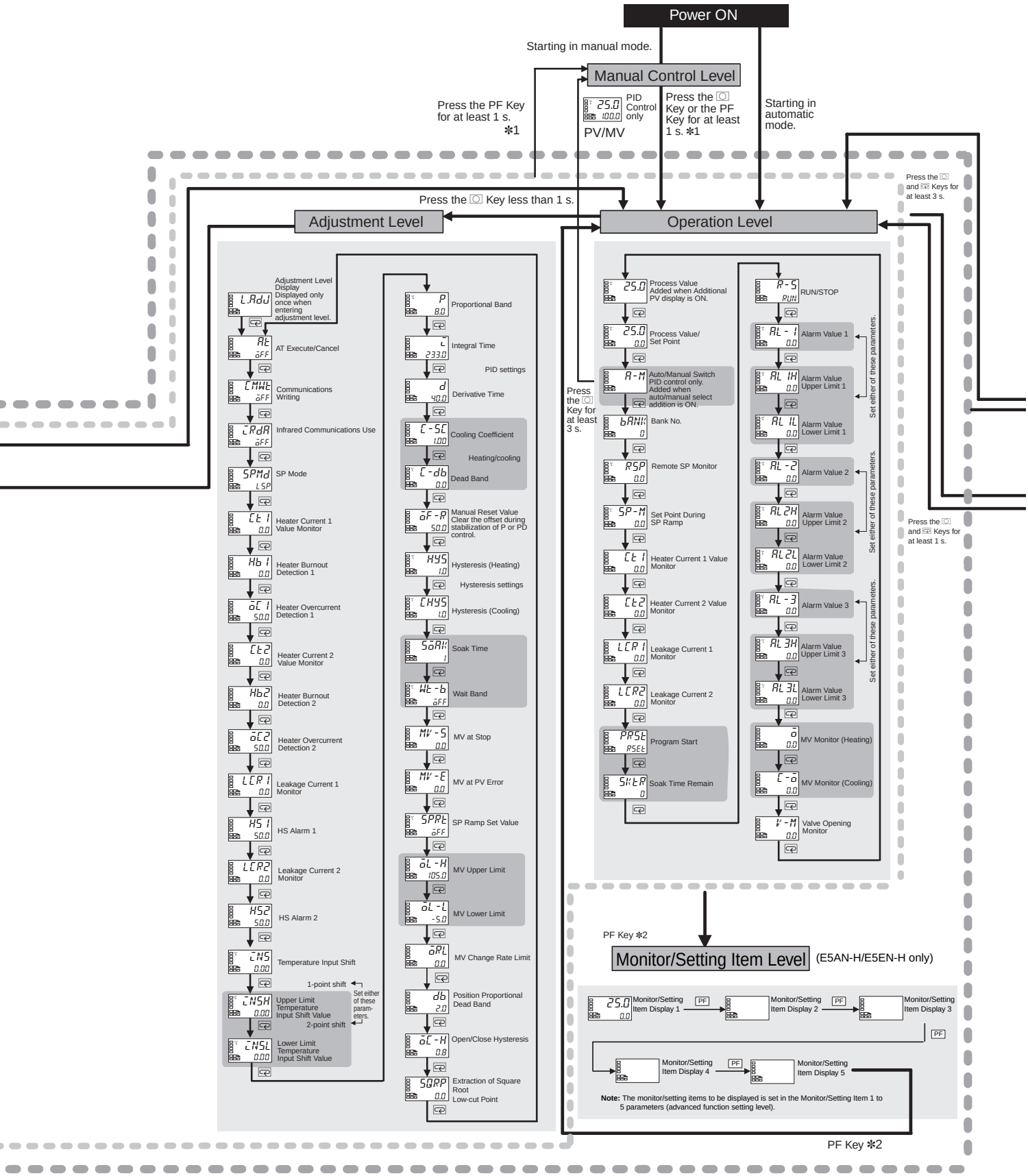
- PF Setting (E5AN/E5EN only)
- Monitor/Setting Item 1 (E5AN/E5EN only)
- Monitor/Setting Item 2
- Monitor/Setting Item 3
- Monitor/Setting Item 4
- Monitor/Setting Item 5
- "PV/SP" Display Screen Selection
- MV Display Selection
- PV Decimal Point Display
- PV Status Display Function
- SV Status Display Function
- Display Refresh Period
- Control Output 1 ON/OFF Count Monitor
- Control Output 2 ON/OFF Count Monitor
- Control Output 1 ON/OFF Count Alarm Set Value
- Control Output 2 ON/OFF Count Alarm Set Value
- ON/OFF Counter Reset
- Move to Calibration Level

Advanced Type

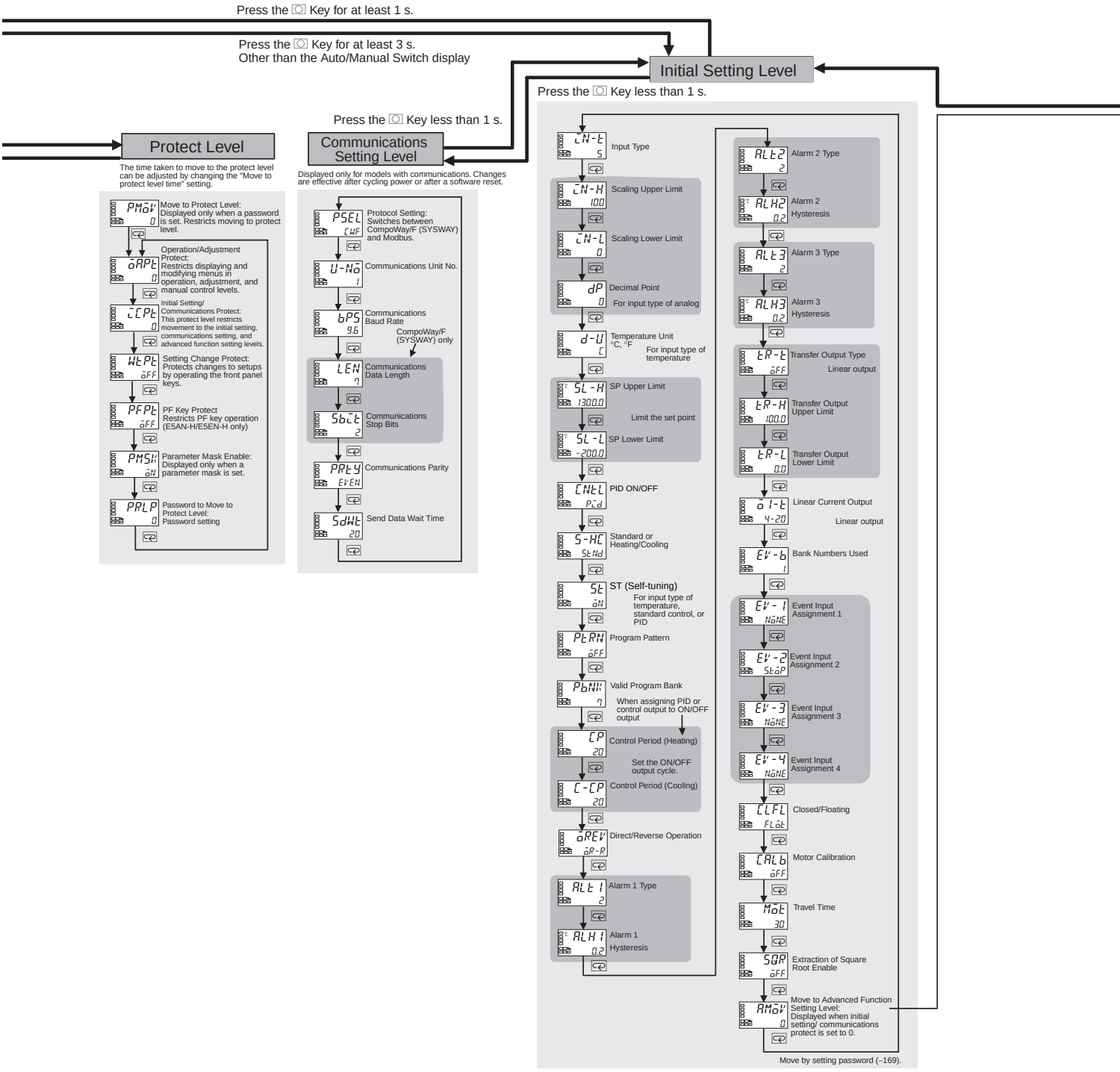
Some parameters are not displayed depending on the model of the Controller and parameter settings.
For details, refer to the *E5CN-H/E5AN-H/ E5EN-H Digital Controllers User's Manual Advanced Type* (Cat. No. H157).

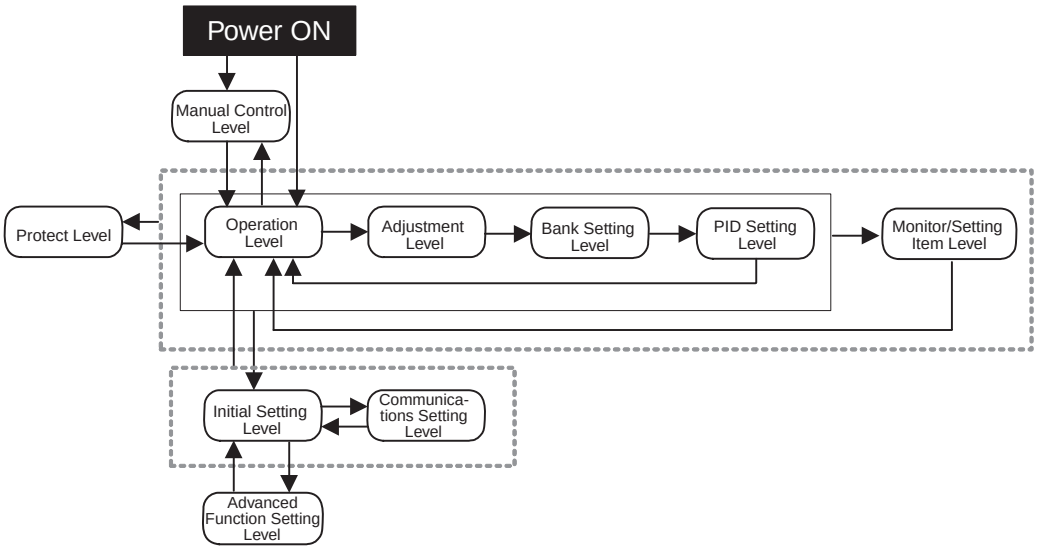






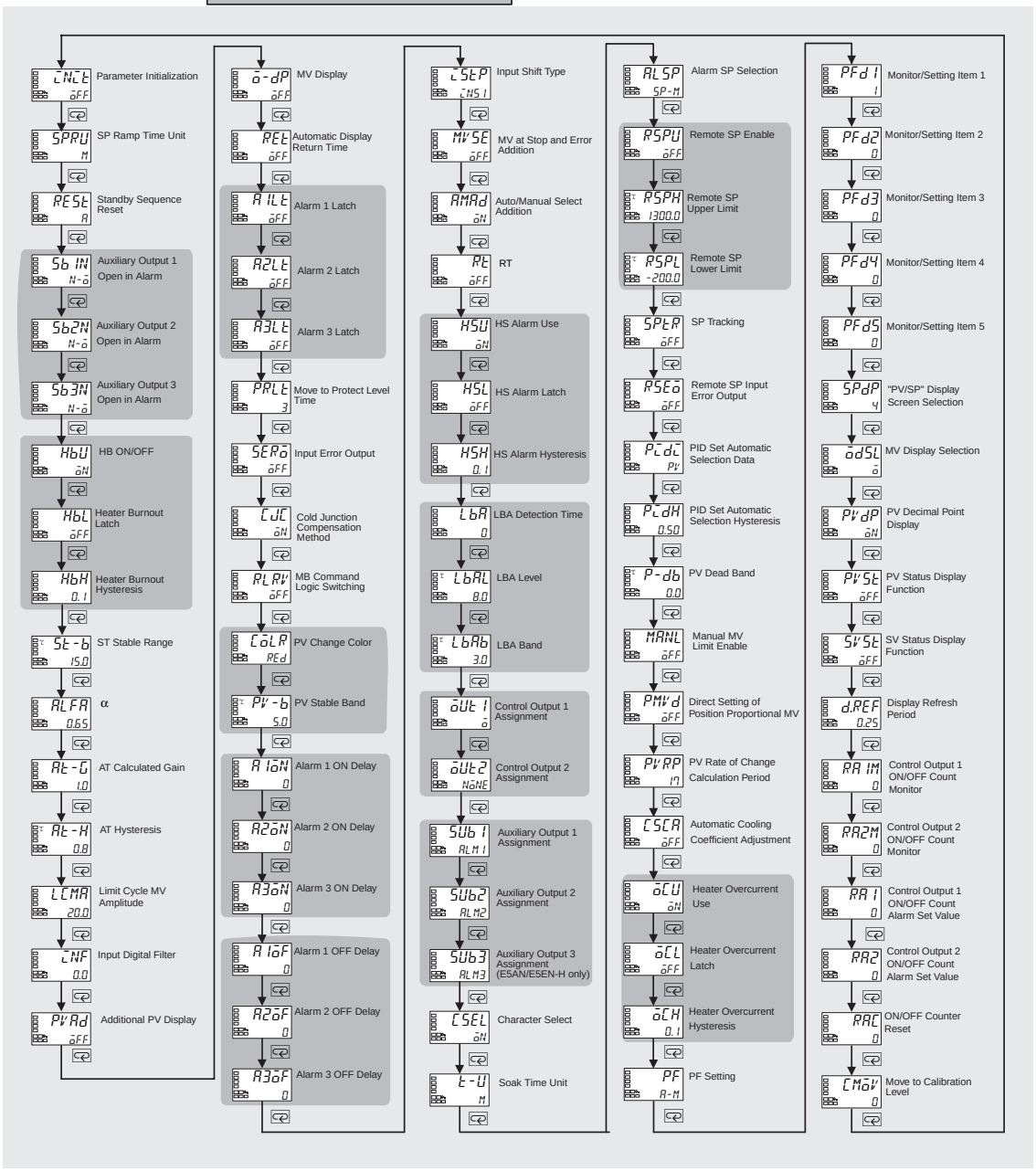
✻1. When the PF Setting parameter is set to A-M for a Controller with a PF Key (E5AN-H/E5EN-H).
✻2. When the PF Setting parameter is set to PFDP for a Controller with a PF Key (E5AN-H/E5EN-H).


Press the Key for at least 1 s.
Press the Key for at least 3 s.
Other than the Auto/Manual Switch display
Initial Setting Level
Press the Key less than 1 s.
Protect Level
The time taken to move to the protect level can be adjusted by changing the "Move to protect level time" setting.
Move to Protect Level: Displayed only when a password is set. Restricts moving to protect level.
Operation/Adjustment Protect: Restricts displaying and modifying menus in operation, adjustment, and manual control levels.
Initial Setting/ Communications Protect: This protect level restricts movement to the initial setting, communications setting, and advanced function setting levels.
Setting Change Protect: Protects changes to setups by operating the front panel keys.
PF Key Protect Restricts PF key operation (E5AN-H/E5EN-H only)
Parameter Mask Enable: Displayed only when a parameter mask is set.
Password to Move to Protect Level: Password setting
Press the Key less than 1 s.
Communications Setting Level
Displayed only for models with communications. Changes are effective after cycling power or after a software reset.
Protocol Setting: Switches between CompoWay/F (SYSWAY) and Modbus.
Communications Unit No.
Communications Baud Rate
CompoWay/F (SYSWAY) only
Communications Data Length
Communications Stop Bits
Communications Parity
Send Data Wait Time
Input Type
Scaling Upper Limit
Scaling Lower Limit
Decimal Point
For input type of analog
Temperature Unit °C, °F
For input type of temperature
SP Upper Limit
Limit the set point
SP Lower Limit
PID ON/OFF
Standard or Heating/Cooling
ST (Self-tuning)
For input type of temperature, standard control, or PID
Program Pattern
Valid Program Bank
When assigning PID or control output to ON/OFF output
Control Period (Heating)
Set the ON/OFF output cycle.
Control Period (Cooling)
Direct/Reverse Operation
Alarm 1 Type
Alarm 1 Hysteresis
Alarm 2 Type
Alarm 2 Hysteresis
Alarm 3 Type
Alarm 3 Hysteresis
Transfer Output Type
Linear output
Transfer Output Upper Limit
Transfer Output Lower Limit
Linear Current Output
Linear output
Bank Numbers Used
Event Input Assignment 1
Event Input Assignment 2
Event Input Assignment 3
Event Input Assignment 4
Closed/Floating
Motor Calibration
Travel Time
Extraction of Square Root Enable
Move to Advanced Function Setting Level: Displayed when initial setting/ communications protect is set to 0.
Move by setting password (–169).



Press the [O] Key for at least 1 s.

Advanced Function Setting Level



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 malfunction.

✻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.

1. 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 mm^2). (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.
2. 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.
4. 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□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

1. 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

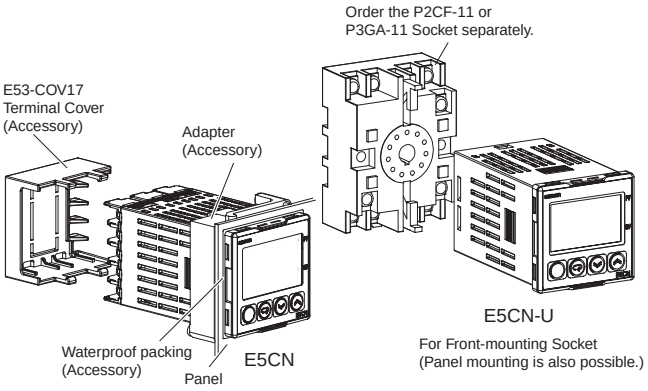
1. The disk that is included with the Conversion Cable is designed for a computer CD-ROM driver. Never attempt to play the disk in a general-purpose audio player.
2. Do not connect or disconnect the Conversion Cable connector repeatedly over a short period of time. The computer may malfunction.
3. After 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.
5. 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

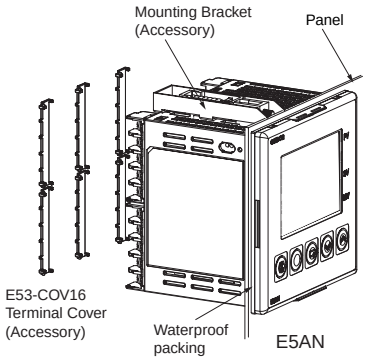
For waterproof mounting, waterproof packing must be installed on the Controller. Waterproofing is not possible when group mounting several Controllers. Waterproof packing is not necessary when there is no need for the waterproofing function.

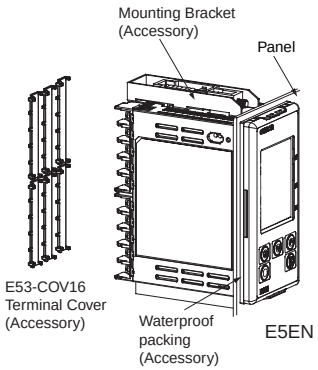
E5CN



1. 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.
2. 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.

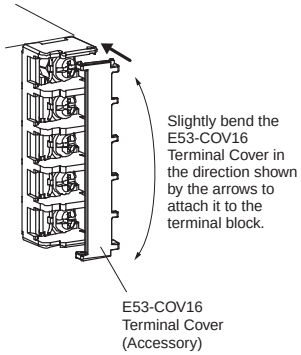
Mounting the Terminal Cover

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

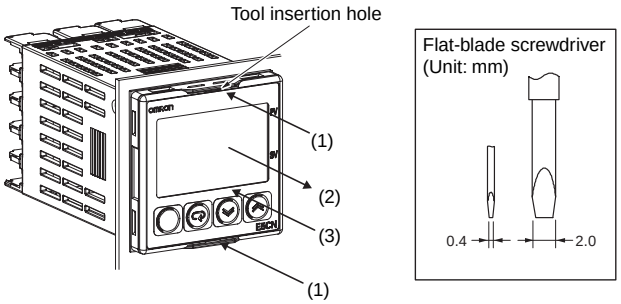
Slightly bend the E53-COV16 Terminal Cover to attach it to the terminal block as shown in the following diagram. The Terminal Cover cannot be attached in the opposite direction.



Removing the Temperature Controller from the Case

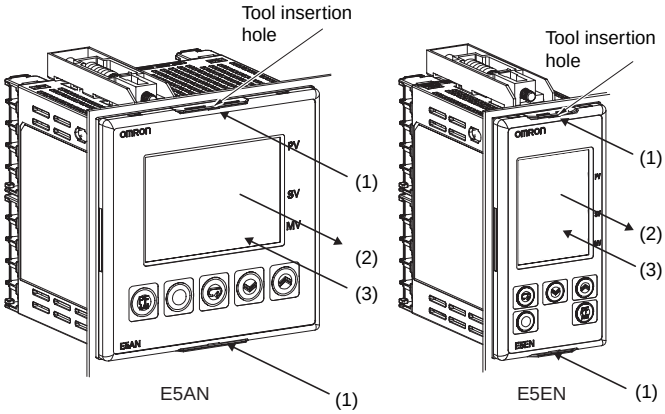
The Temperature Controller can be removed from the case to perform maintenance without removing the terminal leads. This is possible for only the E5CN, E5AN, and E5EN, and not for the E5CN-U. Check the specifications of the case and Temperature Controller before removing the Temperature Controller from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

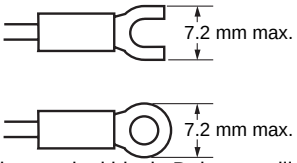
E5AN/E5EN



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 (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 mm^2) to AWG14 (cross-sectional area: 2.081 mm^2) 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.

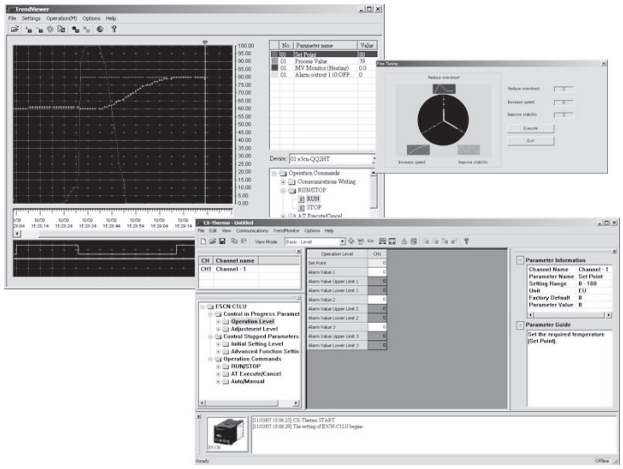
CX-Thermo Support Software Ver. 4.0
EST2-2C-MV4

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-One

- 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□N/□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.



NEW

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).

Terms and Conditions of Sale

1. Offer; Acceptance. These terms and conditions (these "Terms") are deemed part of all quotes, agreements, purchase orders, acknowledgments, price lists, catalogs, manuals, brochures and other documents, whether electronic or in writing, relating to the sale of products or services (collectively, the "Products") by Omron Electronics LLC and its subsidiary companies ("Omron"). Omron objects to any terms or conditions proposed in Buyer's purchase order or other documents which are inconsistent with, or in addition to, these Terms.
2. Prices; Payment Terms. All prices stated are current, subject to change without notice by Omron. Omron reserves the right to increase or decrease prices on any unshipped portions of outstanding orders. Payments for Products are due net 30 days unless otherwise stated in the invoice.
3. Discounts. Cash discounts, if any, will apply only on the net amount of invoices sent to Buyer after deducting transportation charges, taxes and duties, and will be allowed only if (i) the invoice is paid according to Omron's payment terms and (ii) Buyer has no past due amounts.
4. Interest. Omron, at its option, may charge Buyer 1-1/2% interest per month or the maximum legal rate, whichever is less, on any balance not paid within the stated terms.
5. Orders. Omron will accept no order less than $200 net billing.
6. Governmental Approvals. Buyer shall be responsible for, and shall bear all costs involved in, obtaining any government approvals required for the importation or sale of the Products.
7. Taxes. All taxes, duties and other governmental charges (other than general real property and income taxes), including any interest or penalties thereon, imposed directly or indirectly on Omron or required to be collected directly or indirectly by Omron for the manufacture, production, sale, delivery, importation, consumption or use of the Products sold hereunder (including customs duties and sales, excise, use, turnover and license taxes) shall be charged to and remitted by Buyer to Omron.
8. Financial. If the financial position of Buyer at any time becomes unsatisfactory to Omron, Omron reserves the right to stop shipments or require satisfactory security or payment in advance. If Buyer fails to make payment or otherwise comply with these Terms or any related agreement, Omron may (without liability and in addition to other remedies) cancel any unshipped portion of Products sold hereunder and stop any Products in transit until Buyer pays all amounts, including amounts payable hereunder, whether or not then due, which are owing to it by Buyer. Buyer shall in any event remain liable for all unpaid accounts.
9. Cancellation; Etc. Orders are not subject to rescheduling or cancellation unless Buyer indemnifies Omron against all related costs or expenses.
10. Force Majeure. Omron shall not be liable for any delay or failure in delivery resulting from causes beyond its control, including earthquakes, fires, floods, strikes or other labor disputes, shortage of labor or materials, accidents to machinery, acts of sabotage, riots, delay in or lack of transportation or the requirements of any government authority.
11. Shipping; Delivery. Unless otherwise expressly agreed in writing by Omron:
    a. Shipments shall be by a carrier selected by Omron; Omron will not drop ship except in "break down" situations.
    b. Such carrier shall act as the agent of Buyer and delivery to such carrier shall constitute delivery to Buyer;
    c. All sales and shipments of Products shall be FOB shipping point (unless otherwise stated in writing by Omron), at which point title and risk of loss shall pass from Omron to Buyer; provided that Omron shall retain a security interest in the Products until the full purchase price is paid;
    d. Delivery and shipping dates are estimates only; and
    e. Omron will package Products as it deems proper for protection against normal handling and extra charges apply to special conditions.
12. Claims. Any claim by Buyer against Omron for shortage or damage to the Products occurring before delivery to the carrier must be presented in writing to Omron within 30 days of receipt of shipment and include the original transportation bill signed by the carrier noting that the carrier received the Products from Omron in the condition claimed.
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17. Export Controls. Buyer shall comply with all applicable laws, regulations and licenses regarding (i) export of products or information; (iii) sale of products to "forbidden" or other proscribed persons; and (ii) disclosure to non-citizens of regulated technology or information.
18. Miscellaneous. (a) Waiver. No failure or delay by Omron in exercising any right and no course of dealing between Buyer and Omron shall operate as a waiver of rights by Omron. (b) Assignment. Buyer may not assign its rights hereunder without Omron's written consent. (c) Law. These Terms are governed by the law of the jurisdiction of the home office of the Omron company from which Buyer is purchasing the Products (without regard to conflict of law principles). (d) Amendment. These Terms constitute the entire agreement between Buyer and Omron relating to the Products, and no provision may be changed or waived unless in writing signed by the parties. (e) Severability. If any provision hereof is rendered ineffective or invalid, such provision shall not invalidate any other provision. (f) Setoff. Buyer shall have no right to set off any amounts against the amount owing in respect of this invoice. (g) Definitions. As used herein, "including" means "including without limitation"; and "Omron Companies" (or similar words) mean Omron Corporation and any direct or indirect subsidiary or affiliate thereof.

Certain Precautions on Specifications and Use

1. Suitability of Use. Omron Companies shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the Product in the Buyer's application or use of the Product. At Buyer's request, Omron will provide applicable third party certification documents identifying ratings and limitations of use which apply to the Product. This information by itself is not sufficient for a complete determination of the suitability of the Product in combination with the end product, machine, system, or other application or use. Buyer shall be solely responsible for determining appropriateness of the particular Product with respect to Buyer's application, product or system. Buyer shall take application responsibility in all cases but the following is a non-exhaustive list of applications for which particular attention must be given:
   (i) Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this document.
   (ii) Use in consumer products or any use in significant quantities.
   (iii) Energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
   (iv) Systems, machines and equipment that could present a risk to life or property. Please know and observe all prohibitions of use applicable to this Product.
   NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY OR IN LARGE QUANTITIES WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON'S PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.
2. Programmable Products. Omron Companies shall not be responsible for the user's programming of a programmable Product, or any consequence thereof.
3. Performance Data. Data presented in Omron Company websites, catalogs and other materials 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 user must correlate it to actual application requirements. Actual performance is subject to the Omron's Warranty and Limitations of Liability.
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5. Errors and Omissions. Information presented by Omron Companies has been checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical or proofreading errors or omissions.

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