Digital Temperature Controllers
E5CN/E5CN-U

This Best-selling General-purpose 48×48-mm Temperature Controller Is Now Even Better. Setup Tool Cable and Support Software Are Also Available.

- New models added with two control outputs and three-phase heater burnout detection.
- Controllers now available with analog inputs.
- Faster sampling at 250 ms.
- Transfer output provided for easy output to recorders.
- Voltage outputs (to drive SSRs) for both heating and cooling control. Can be used for alarms to provide three alarm outputs.
- Models available with three-phase heater burnout detection and SSR failure detection.
- Easy setting with 11-segment displays.
- Connect to either a thermocouple or platinum resistance thermometer with the same model.
- Easily see the status from a distance with PV display with three-color switching function.
- Setting protection indicator informs operator when protection is enabled.
- Manual output provided.
- Controller available with long-life relay output.
- Models available with external power supply for ES1B Infrared Thermosensor.

Note: 1. Refer to *Safety Precautions for All Temperature Controllers.*
2. Refer to *NEW E5CN/E5CN-U/E5EN/E5AN Operation.*

Features

Improved Functions for a Wider Range of Application

Control Analog Values, such as Pressures, Flowrates, and Levels

The E5CN Series now also includes models that accept analog inputs, enabling control applications other than for temperature, including pressure, flowrate, level, humidity, and weight control.

Note: E5CN-□L (Models with Analog Inputs)

Faster Sampling at 250 ms

The previous sampling time of 500 ms has been reduced by half to 250 ms. This enables the E5CN to handle application requiring even greater response speed and accuracy.

Easy Connector to a Recorder

A transfer output now makes it easy to connect to a recorder or PLC Analog I/O Unit.

Note: E5CN-C□ (Models with Current Outputs)

Voltage Outputs (to Drive SSRs) for Both Heating and Cooling Control. Can Be Used for Alarms to Provide Three Alarm Outputs.

Voltage outputs can be used for both heating and cooling for Models with Two Control Outputs. Also, control output 2 can be set for use as an alarm output, to enable using up to three alarm outputs.

Note: E5CN-□Q (Models with Two Control Outputs)

Three-phase Heater Burnout Detection

With Models with Three-phase Heater Burnout and SSR Failure Detection, two current transformers can be connected to detect both heater burnout and SSR failure at the same time, reducing costs because a separate heater burnout alarm device is not required. SSR failure detection can be used even with Models with Single-phase Heater Burnout Alarms.

Note: E5CN-□HH□ (Models with Three-phase Heater SSR failure Detection)

E58-CIFQ1 USB-Serial Conversion Cable for Computer Connection

A personal computer connection is possible for models without communications.

The CX-Thermo Support Software (sold separately) can be used to set parameters, monitor operation, and parameter masks. The free ThermoMini Parameter Copy Software can be used to reach E5CN parameters using communications and copy them to another E5CN to increase onsite productivity.

Specifications: page 10, Dimensions: page 14

Related Product	• EST2-2C-MV3 CX-Thermo Support Software • ES1B Infrared Thermosensor

Model Number Structure

■ Model Number Legend

Controllers

E5CN-☐☐M☐-500
       1 2 3 4

1. **Output type**
   R: Relay
   Q: Voltage (for driving SSR)
   C: Current
   Y: Long-life relay (with a triac)
2. **Number of alarms**
   Blank: No alarm
   2:     Two alarms
3. **Option Unit**
   M: Option Unit can be mounted
4. **Input type**
   T: Thermocouple/platinum resistance thermometer (multi-input)
   L: Analog input

Option Units

E53-CN-☐N
       1

1. **Functions**
   H03:   Communications and heater burnout/SSR failure detection
   03:     Communications
   HB: Heater burnout/SSR failure detection and event inputs
   B: Event inputs
   HH03: Communications and 3-phase heater burnout/SSR failure detection
   Q03:   Communications and control output 2 (voltage output)
   QH: Heater burnout/SSR failure detection and control output 2 (voltage output)
   QHH: 3-phase heater burnout/SSR failure detection and control output 2 (voltage output)
   QB: Event input and control output 2 (voltage output)
   PB: External power supply for ES1B and event inputs
   PH: External power supply for ES1B and heater burnout/SSR failure detection.

Note: 1. The heating and cooling function is available for models with two alarm points.

     2. Current transformers (CTs) are not provided with the Units. Be sure to order CTs when ordering the E5CN and the Option Units.

     3. Specify the power supply specifications when ordering.

Ordering Information

■ Controllers with Temperature Inputs (Multi-input)

Size	Power supply voltage	Number of alarm points	Control outputs	Model
1/16 DIN 48 × 48 × 78 (W × H × D)	100 to 240 VAC	0	Relay	E5CN-RMT-500
			Voltage (for driving SSR)	E5CN-QMT-500
			Current	E5CN-CMT-500
		2	Relay	E5CN-R2MT-500
			Voltage (for driving SSR)	E5CN-Q2MT-500
			Current	E5CN-C2MT-500
			Long-life relay (with a triac) (See note.)	E5CN-Y2MT-500
	24 VAC/VDC	0	Relay	E5CN-RMT-500
			Voltage (for driving SSR)	E5CN-QMT-500
			Current	E5CN-CMT-500
		2	Relay	E5CN-R2MT-500
			Voltage (for driving SSR)	E5CN-Q2MT-500
			Current	E5CN-C2MT-500

Note: Switching for the long-life relay output is performed using a triac to open and close the circuit. The output will not turn OFF if the long-life relay output is connected to a DC load. Always use the long-life relay output connected to an AC load. For details, check the conditions in *Ratings/Characteristics*.

■ Controllers with Analog Inputs

Size	Power supply voltage	Number of alarm points	Control outputs	Model
1/16 DIN 48 × 48 × 78 (W × H × D)	100 to 240 VAC	0	Relay	E5CN-RML-500
			Voltage (for driving SSR)	E5CN-QML-500
			Current	E5CN-CML-500
		2	Relay	E5CN-R2ML-500
			Voltage (for driving SSR)	E5CN-Q2ML-500
			Current	E5CN-C2ML-500
			Long-life relay (with a triac)	E5CN-Y2ML-500
	24 VAC/VDC	2	Relay	E5CN-R2ML-500
			Voltage (for driving SSR)	E5CN-Q2ML-500
			Current	E5CN-C2ML-500

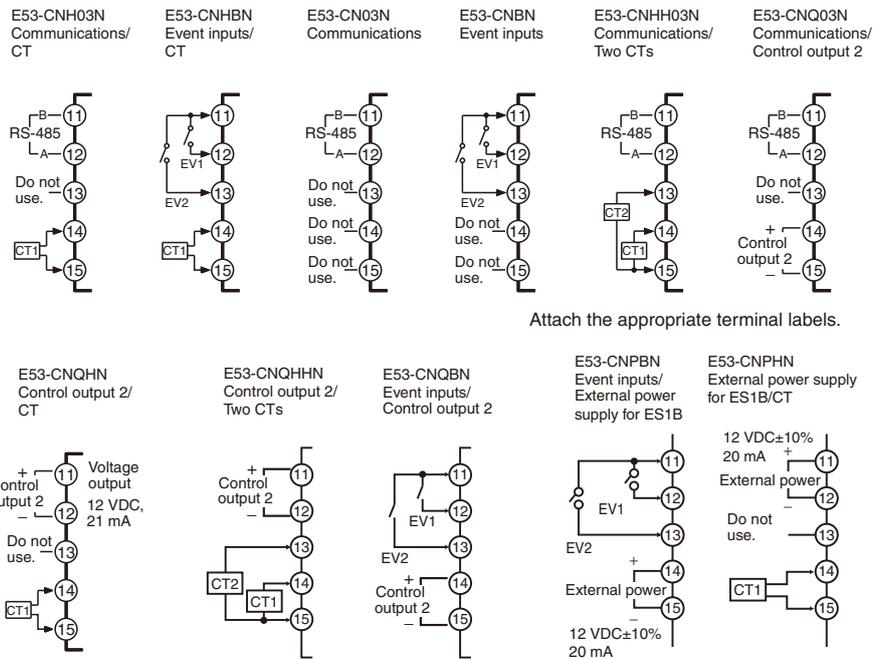## ■ Option Units

The E5CN provides optional functionality when one of the following Option Units is mounted.

Functions				Model
Communications	Heater burnout/SSR failure detection			E53-CNH03N
Communications				E53-CN03N
	Heater burnout/SSR failure detection	Event inputs		E53-CNHBN
		Event inputs		E53-CNBN
Communications	3-phase heater burnout/SSR failure detection			E53-CNHH03N
Communications			Control output 2 (voltage output)	E53-CNQ03N
	Heater burnout/SSR failure detection		Control output 2 (voltage output)	E53-CNQHN
	3-phase heater burnout/SSR failure detection		Control output 2 (voltage output)	E53-CNQHHN
		Event inputs	Control output 2 (voltage output)	E53-CNQBN
		Event inputs	External power supply for ES1B	E53-CNPBN (See note 1.)
	Heater burnout/SSR failure detection		External power supply for ES1B	E53-CNPHN (See note 1.)

Note: 1. E53-CNPBN and E53-CNPHN cannot be mounted on E5CN-C□□ (current output models).
2. Option Units cannot be used for Plug-in models.
These Option Units can be used for the new E5CN models only.

E53-CNH03N
Communications/
CT

E53-CNHBN
Event inputs/
CT

E53-CN03N
Communications

E53-CNBN
Event inputs

E53-CNHH03N
Communications/
Two CTs

E53-CNQ03N
Communications/
Control output 2

Attach the appropriate terminal labels.

E53-CNQHN
Control output 2/
CT

E53-CNQHHN
Control output 2/
Two CTs

E53-CNQBN
Event inputs/
Control output 2

E53-CNPBN
Event inputs/
External power
supply for ES1B

E53-CNPHN
External power supply
for ES1B/CT

Model Number Structure

■ Model Number Legend (Plug-in-type Controllers)

E5CN-□□□U
 1 2 3 4

1. Output type
   R: Relay
   Q: Voltage
2. Number of alarms
   Blank: No alarm
   1:    One alarm
   2:    Two alarms

3. Input type
   T: Thermocouple/platinum resistance thermometer (multi-input)
4. Plug-in type
   U: Plug-in type

Ordering Information (Plug-in-type Controllers)

■ Controllers with Temperature Inputs (Multi-input)

Size	Power supply voltage	Number of alarm points	Control outputs	Model
1/16 DIN	100 to 240 VAC	0	Relay	E5CN-RTU
			Voltage (for driving SSR)	E5CN-QTU
		1	Relay	E5CN-R1TU
			Voltage (for driving SSR)	E5CN-Q1TU
		2	Relay	E5CN-R2TU
			Voltage (for driving SSR)	E5CN-Q2TU
	24 VAC/VDC	0	Relay	E5CN-RTU
			Voltage (for driving SSR)	E5CN-QTU
		1	Relay	E5CN-R1TU
			Voltage (for driving SSR)	E5CN-Q1TU
		2	Relay	E5CN-R2TU
			Voltage (for driving SSR)	E5CN-Q2TU

Note: Option Units (E53-CN□□N) cannot be used for Plug-in models.

■ Accessories (Order Separately)

USB-Serial Conversion Cable

Model
E58-CIFQ1

Terminal Cover

Connectable models	Terminal type
Model	E53-COV10

Rubber Packing

Model
Y92S-29

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

Current Transformers (CTs)

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

Adapter

Connectable models	Terminal type
Model	Y92F-45

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

Front Cover

Type	Model
Hard Plastic Front Cover	Y92A-48B

Sockets (for Models with Plug-in Connectors)

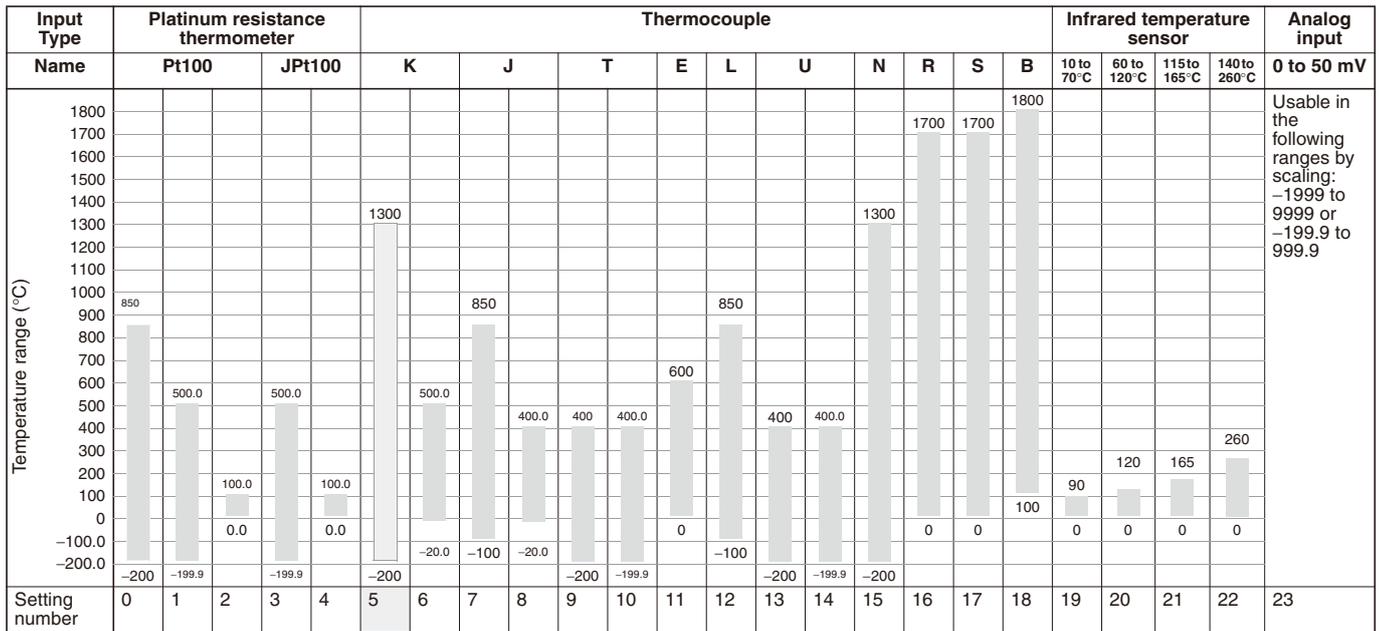| Model	P2CF-11	P2CF-11-E	P3GA-11	Y92A-48G
Type	Front-connecting Socket	Front-connecting Socket with Finger Protection	Back-connecting socket	Terminal Cover for Finger Protection

Specifications

■ Ratings

Item	Power supply voltage	100 to 240 VAC, 50/60 Hz (See note.)		24 VAC, 50/60 Hz or 24 VDC
Operating voltage range		85% to 110% of rated supply voltage		
Power consumption	E5CN	7.5 VA max. (E5CN-R2T: 3.0 VA at 100 VAC)		5 VA/3 W max. (E5CN-R2T: 2.7 VA at 24 VAC)
	E5CN-U	6 VA max.		3 VA/2 W max.

Sensor input		Models with temperature inputs
		   Thermocouple: K, J, T, E, L, U, N, R, S, or B
		   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, Voltage input: 1 MΩ (Use a 1:1 connection when connecting the ES2-HB.)		
Control output	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	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. 2,700	
	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)	
Alarm output		SPST-NO, 250 VAC, 1 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA		
Event input	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.		
		Outflow current: Approx. 7 mA per point		
External power supply for ES1B		12 VDC ±10%, 20 mA, Short-circuit protection provided.		
Control method		ON/OFF control or 2-PID control (with auto-tuning)		
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		
Other functions		Manual output, heating/cooling control, transfer output (on some models), loop break alarm, multi SP, SP ramp, MV limiter, input digital filter, self-tuning, temperature input shift, run/stop, protection functions, etc.		
Ambient operating temperature		−10 to 55°C (with no icing or condensation), for 3-year warranty: −10 to 50°C		
Ambient operating humidity		25% to 85%		
Storage temperature		−25 to 65°C (with no icing or condensation)		

Note: Do not use the output from an inverter as the power supply. (Refer to *Safety Precautions for All Temperature Controllers.*)

■ Input Ranges

Thermocouples/Platinum Resistance Thermometers (Multi-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	10 to 70°C	60 to 120°C	115 to 165°C	140 to 260°C	0 to 50 mV
Temperature range (°C) / top	850	500.0 / 100.0	1300	850 / 500.0	400 / 400.0	600	850	400 / 400.0	1300	1700	1700	1800 / 100	90	120	165	260	Usable in the following ranges by scaling: −1999 to 9999 or −199.9 to 999.9
Temperature range (°C) / bottom	−200	−199.9 / 0.0	−200	−100 / −20.0	−200 / −199.9	0	−100	−200 / −199.9	−200	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	19	20	21	22	23

The applicable standards for the input types are as follows:

K, J, T, E, N, R, S, B: IEC584-1

L: Fe-CuNi, DIN 43710-1985

U: Cu-CuNi, DIN 43710-1985

Pt100: IEC 751
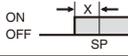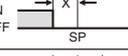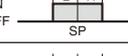
Shaded settings are the default settings.

Models with Analog Inputs

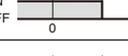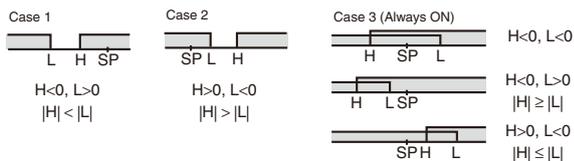| Input Type	Current		Voltage		
Input specification	4 to 20mA	0 to 20 mA	1 to 5 V	0 to 5 V	0 to 10 V
Setting range	Usable in the following ranges by scaling: −1999 to 9999, −199.9 to 999.9, −19.99 to 99.99 or −1.999 to 9.999				
Setting number	0	1	2	3	4

Shaded settings are the default settings.

■ Alarm Types

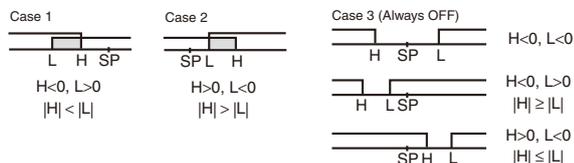Select alarm types out of the 12 alarm types listed in the following table.

Set value	Alarm type	Alarm output operation	
		When X is positive	**When X is negative**
0	Alarm function OFF	Output OFF	
1 (See note 1.)	Upper- and lower-limit	ON/OFF, L H, SP	(See note 2.)
2	Upper limit	ON/OFF, X, SP	ON/OFF, X, SP
3	Lower limit	ON/OFF, X, SP	ON/OFF, X, SP
4 (See note 1.)	Upper- and lower-limit range	ON/OFF, L H, SP	(See note 3.)
5 (See note 1.)	Upper- and lower-limit with standby sequence	ON/OFF, L H, SP (See note 5.)	(See note 4.)
6	Upper-limit with standby sequence	ON/OFF, X, SP	ON/OFF, X, SP
7	Lower-limit with standby sequence	ON/OFF, X, SP	ON/OFF, X, SP
8	Absolute-value upper-limit	ON/OFF, X, 0	ON/OFF, X, 0
9	Absolute-value lower-limit	ON/OFF, X, 0	ON/OFF, X, 0
10	Absolute-value upper-limit with standby sequence	ON/OFF, X, 0	ON/OFF, X, 0
11	Absolute-value lower-limit with standby sequence	ON/OFF, X, 0	ON/OFF, X, 0
12 (See note 6.)	LBA (for alarm 1 only)	---	
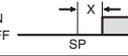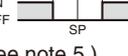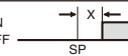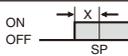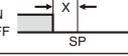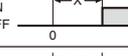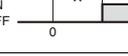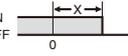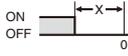
Note: 1. With set values 1, 4 and 5, the upper and lower limit values can be set independently for each alarm type, and are expressed as "L" and "H."

    2. Set value: 1, Upper- and lower-limit alarm

Case 1 — L H SP — H<0, L>0, $|H| < |L|$

Case 2 — SP L H — H>0, L<0, $|H| > |L|$

Case 3 (Always ON):
H SP L — H<0, L<0
H L SP — H<0, L>0, $|H| \geq |L|$
SP H L — H>0, L<0, $|H| \leq |L|$

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

Case 1 — L H SP — H<0, L>0, $|H| < |L|$

Case 2 — SP L H — H>0, L<0, $|H| > |L|$

Case 3 (Always OFF):
H SP L — H<0, L<0
H L SP — H<0, L>0, $|H| \geq |L|$
SP H L — H>0, L<0, $|H| \leq |L|$

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

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

    6. Set value: 12, LBA can be set only for alarm 1.

Set the alarm types for alarms 1 to 3 independently in the initial setting level. The default setting is 2 (upper limit).

■ Characteristics

Indication accuracy		Thermocouple: (See note 1.) E5CN: (±0.5% of indicated value or ±1°C, whichever is greater) ±1 digit max. E5CN-U: (±1% of indicated value or ±2°C, whichever is greater) ±1 digit max. Platinum resistance thermometer: (±0.5% of indicated value or ±1°C, whichever is greater) ±1 digit max. Analog input: ±0.5% FS ±1 digit max. CT input: ±5% FS ±1 digit max.
Influence of temperature (See note 2.) Influence of voltage (See note 2.)		Thermocouple input (R, S, B): E5CN: (±1% of PV or ±10°C, whichever is greater) ±1 digit max. E5CN-U: (±2% of PV or ±10°C, whichever is greater) ±1 digit max. Other thermocouple input: E5CN: (±1% of PV or ±4°C, whichever is greater) ±1 digit max. E5CN-U: (±2% of PV or ±4°C, whichever is greater) ±1 digit max. ＊K thermocouple at −100°C max.: ±10°C max. Platinum resistance thermometer: (±1% of PV or ±2°C, whichever is greater) ±1 digit max. Analog input: (±1%FS) ±1 digit max.
Hysteresis		Models with thermocouple/platinum resistance thermometer (multi-input) input: 0.1 to 999.9 EU (in units of 0.1 EU) (See note 3.) 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 (multi-input) input: 0.1 to 999.9 EU (in units of 0.1 EU) (See note 3.) 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) (See note 4.)
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)
Sampling period		250 ms
Affect of signal source resistance		Thermocouple: 0.1°C/Ω max. (100 Ω max.) (See note 5.) Platinum resistance thermometer: 0.4°C/Ω max. (10 Ω max.)
Insulation resistance		20 MΩ min. (at 500 VDC)
Dielectric strength		2,000 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 min., 3 times each in X, Y, and Z directions
	Destruction	300 m/s² min., 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: NEMA4X for indoor use (equivalent to IP66) Rear case: IP20, Terminal section: IP00
	E5CN-U	Front panel: Equivalent to IP50, rear case: IP20, terminals: IP00
Memory protection		Non-volatile memory (number of writes: 1,000,000 operations)

EMC		ESD Immunity: EN61000-4-2: 4 kV contact discharge
		    8 kV air discharge
		Electromagnetic Immunity: EN61000-4-3: 10 V/m (amplitude-modulated, 80 MHz to 1 GHz, 1.4 GHz to 2 GHz)
		Burst Noise Immunity: EN61000-4-4: 2 kV power line
		    1 kV measurement line, I/O signal line
		Surge Immunity: EN61000-4-5: 1 kV normal mode (power line, output line (relay output))
		    2 kV common mode (power line, output line (relay output))
		Conducted Disturbance Immunity: EN61000-4-6: 3 V (0.15 to 80 MHz)
		Voltage Dip/Interrupting Immunity: EN61000-4-11: 0.5 cycle, 100% (rated voltage)
		Radiated Interference Electromagnetic Field Strength: EN61326 Class A
		Noise Terminal Voltage: EN61326 Class A

Approved standards	E5CN	UL 61010C-1 (listing) CSA C22.2 No.1010.1 (evaluated by UL)
	E5CN-U	UL 61010C-1 (listing in combination with the P2CF-11, E5CN-U alone supports recognition) CSA C22.2 No.1010.1 (evaluated by UL)
Conformed standards		EN61010-1: 2001 IEC61010-1: 2001

Note: 1. The indication 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 temperature is ±2°C ±1 digit maximum. The indication accuracy of the B thermocouple at a temperature of 400°C max. is not specified. The indication accuracy of the R and S thermocouples at a temperature of 200°C max. is ±3°C ±1 digit max.
    2. Conditions
       Ambient temperature: −10°C to 23°C to 55°C, Voltage range: −15% to +10% of rated voltage
    3. "EU" stands for Engineering Unit and is used as the unit after scaling. For a temperature sensor, the EU is °C or °F.
    4. When robust tuning (RT) is ON, the differential time is 0.0 to 999.9 (in units of 0.1 s).
    5. B, R, and S sensors: 0.2°C/Ω max. (100 Ω max.)

■ USB-Serial Conversion Cable

Applicable OS	Windows 2000/XP
Applicable software	Thermo Mini, CX-Thermo
Applicable models	E5CN/E5CN-U/E5AN/E5EN
USB interface standard	Conforms to USB Specification 1.1.
DTE speed	38400 bps
Connector specifications	Computer: USB (type A plug) Temperature Controller: Serial
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
Baud rate	1200, 2400, 4800, 9600, 19200, or 38400 bps
Transmission code	ASCII
Data bit length (See note.)	7 or 8 bits
Stop bit length (See note.)	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	40 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 (Sold Separately)

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 and SSR Failure Detection Alarms

Maximum heater current	50 A AC
Input current indication accuracy	±5% FS ±1 digit max.
Heater burnout alarm setting range	0.1 to 49.9 A (in units of 0.1 A) 0.0 A: Heater burnout/SSR failure alarm output turned OFF. 50.0 A: Heater burnout/SSR failure alarm output turned ON. Minimum detection ON time: 190 ms (See note 1.)
SSR failure detection alarm setting range	0.1 to 49.9 A (in units of 0.1 A) 0.0 A: Heater burnout/SSR failure alarm output turned ON. 50.0 A: Heater burnout/SSR failure alarm output turned OFF. Minimum detection OFF time: 190 ms (See note 2.)

Note: 1. If the ON time of control output 1 is less than 190 ms, heater burnout detection and the heater current will not be measured.

2. If the OFF time of control output 1 is less than 190 ms, SSR failure detection and the leakage current will not be measured.

■ Electrical Life Expectancy Curve for Relays (Reference Values)

E5CN 250 VAC, 30 VDC (resistive load) cosφ = 1

Switching current (A)
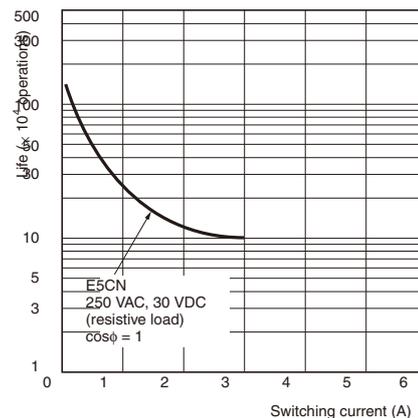
Note: Do not connect a DC load to a Controller with a Long-life Relay Output.

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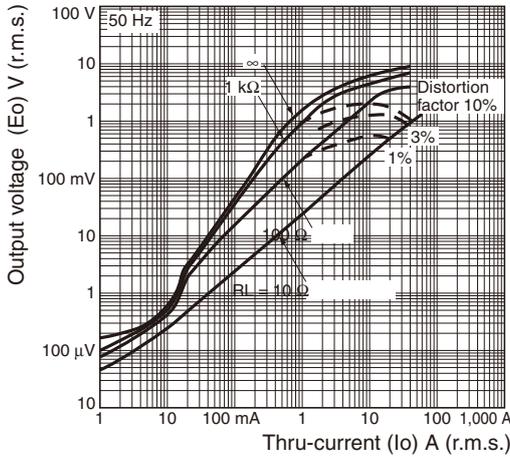
E54-CT3
Thru-current (Io) vs. Output Voltage (Eo) (Reference Values)

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
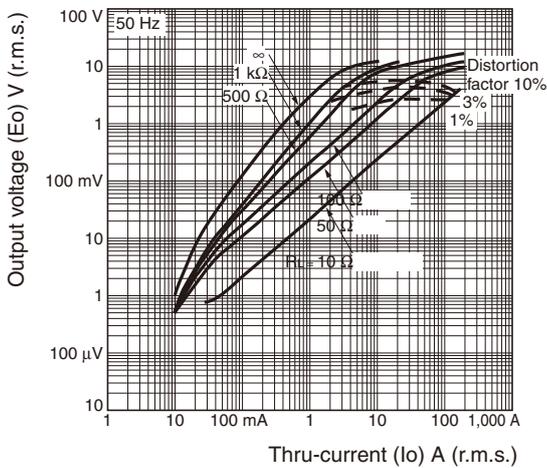
External Connections

- A voltage output (control output) 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.
- An "R" suffix on the lot number indicates reinforced insulation between input power supply, relay output, and other terminals.
- Consult with your OMRON representative before using the external power supply for the ES1B for any other purpose.

E5CN
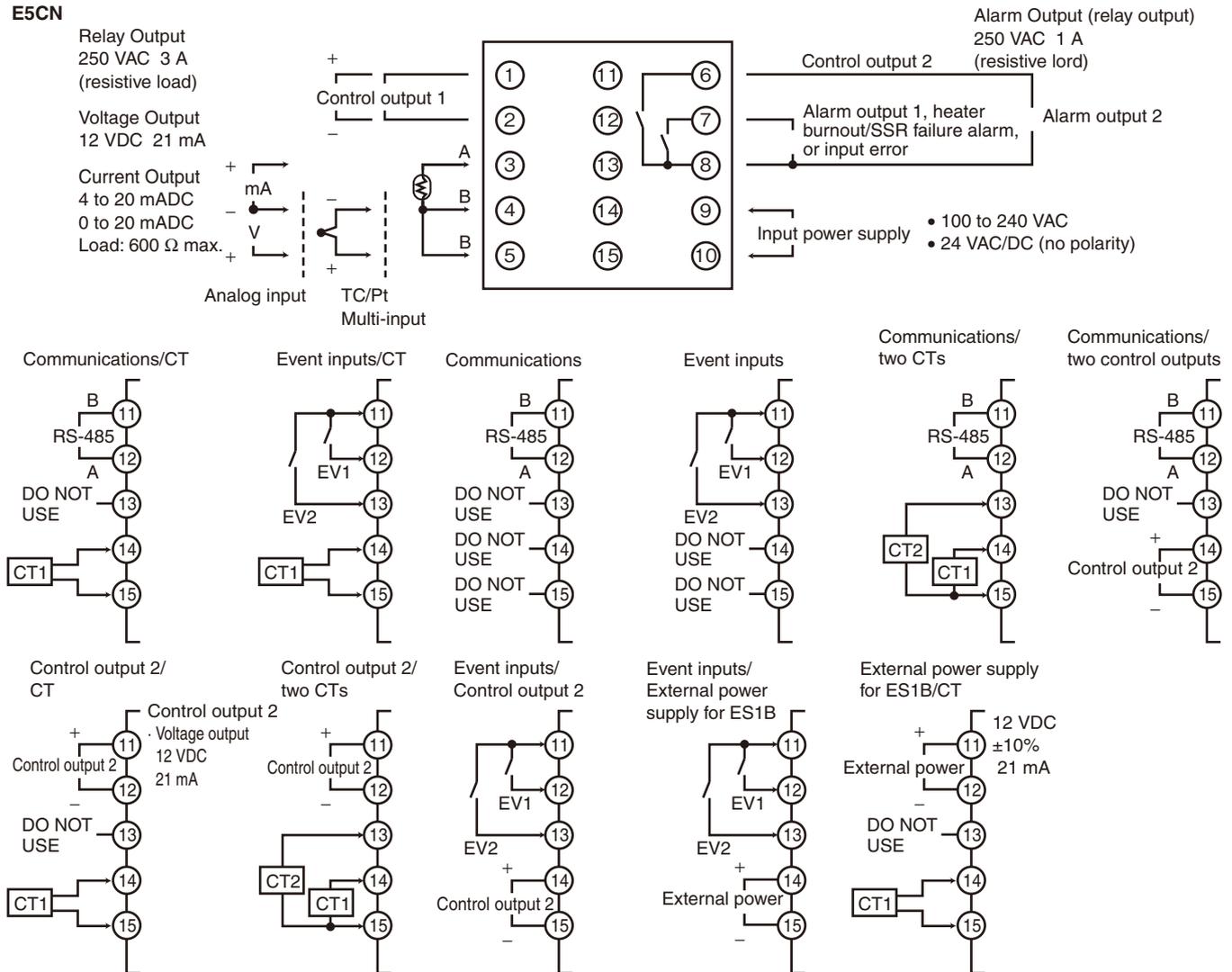
E5CN-U
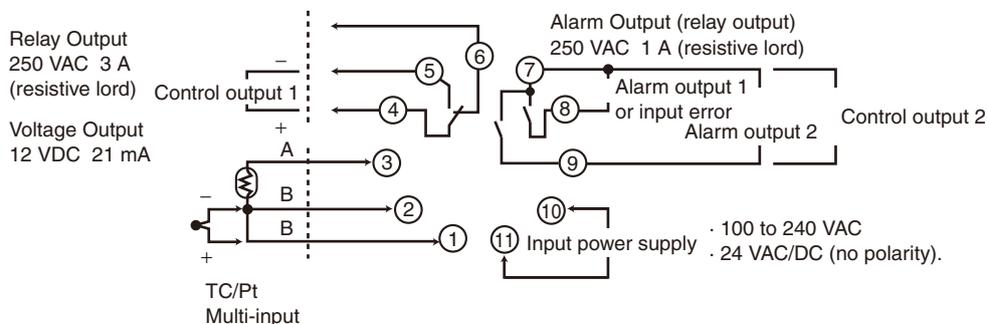
Note: Order the P2CF-11 or P3GA-11 Socket separately. (See page 5.)

Nomenclature

E5CN
E5CN-U

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

Temperature unit

Operation indicators

No.1 display

No. 2 display

Level Key

Up Key

Mode Key

Down Key
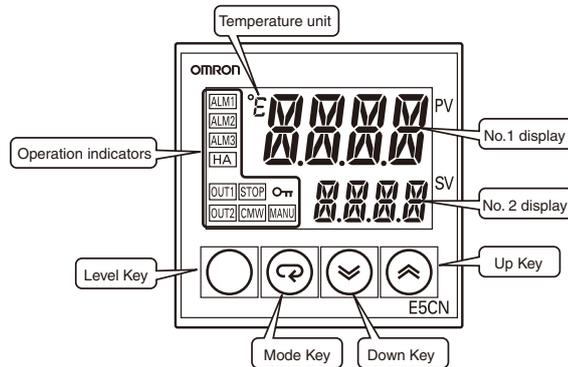
Dimensions

Note: All units are in millimeters unless otherwise indicated.

E5CN

6
91
78
1.5
48 × 48
58
44.8 × 44.8
48.8

Rubber packing

Mounting Adapter (Accessory)

Terminal Cover (E53-COV10)
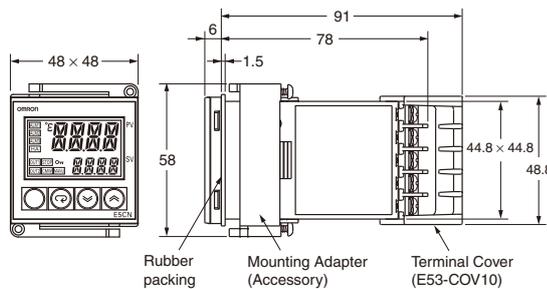
Note: The terminal block cannot be removed. The suffix "–500" is added to the model number of each Controller provided with a E53-COV10 Terminal Cover.

Panel Cutout

Mounted Separately

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

$45^{+0.6}_{0}$
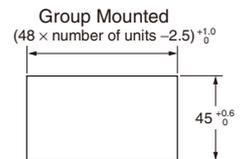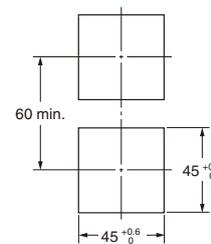
Group mounting does not allow waterproofing.

60 min.

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

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

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

E5CN-U
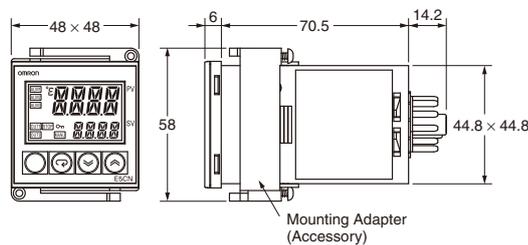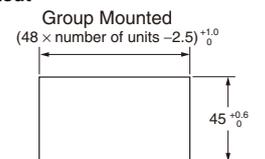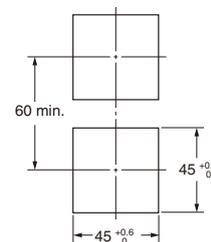
48 × 48
6
70.5
14.2
58
44.8 × 44.8

Mounting Adapter (Accessory)

Panel Cutout

Mounted Separately

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

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

60 min.

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

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

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

■ Accessories

USB-Serial Conversion Cable (Sold Separately)

E58-CIFQ1

(2,100)

250 — LED indicator (SD) — 1,765

USB connector (type A plug)

LED indicator (RD)

Serial connector

Terminal Cover

E53-COV10

48

48.8

22

9.1
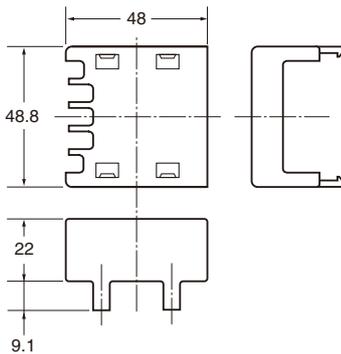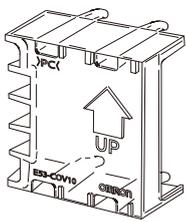
Note: The suffix "−500" is added to the model number of each Controller provided with a E53-COV10 Terminal Cover.

Rubber Packing

Y92S-29 (for DIN 48 × 48)
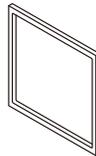
Order the Rubber Packing separately if it becomes lost or damaged.

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

(Deterioration, shrinking, or hardening of the rubber packing may occur depending on the operating environment. Therefore, periodic replacement is recommended to ensure the level of waterproofing specified in NEMA4. 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 Rubber Packing does not need to be attached if a waterproof structure is not required.

Current Transformers (Sold Separately)

E54-CT1

21
15
5.8 dia.
2.8
7.5
25
3
10.5
40
Two, 3.5 dia.
10
30

E54-CT3

30
12 dia.
2.36 dia.
9
40 × 40
Two, M3 (depth: 4)
15
30
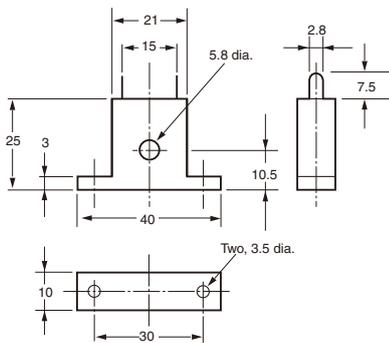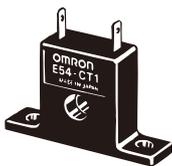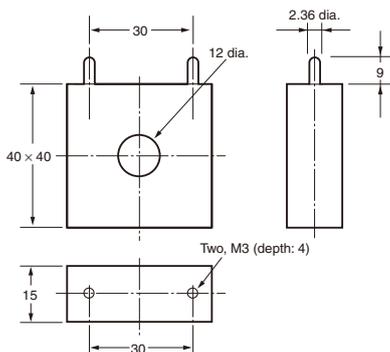
E54-CT3 Accessory

• **Armature**

Approx. 3 dia.

18

• **Plug**

Approx. 6 dia.

(22)
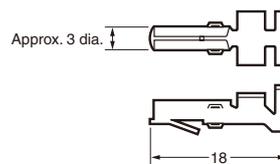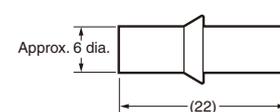
Connection Example

Plug

Armature

Lead
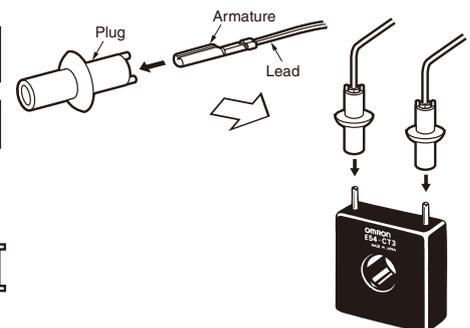
Adapter (Sold Separately)

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

Y92F-45

Fixture (Accessory)

4.7 | 76
69.6 to 77.6
72 × 72
67 × 67 | 87

Mounted to E5CN

Panel (1 to 8 mm)

72 × 72

OMRON

48 × 48
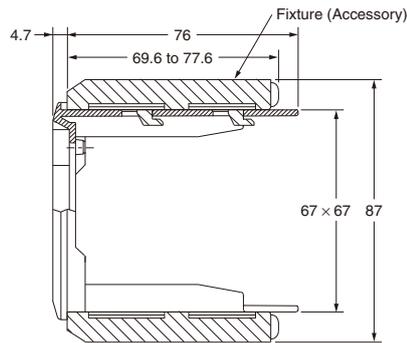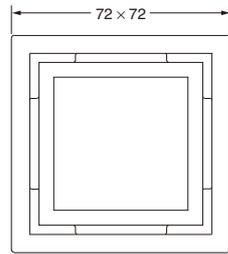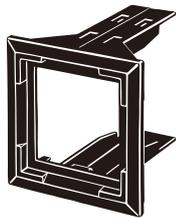
E5CN

2.2 | 4.7
77.3 (to back of E5CN)
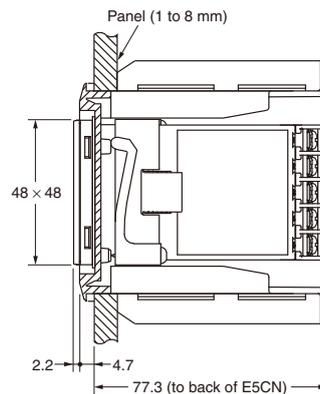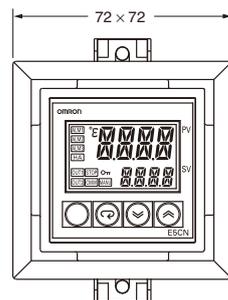
E5CN-U Wiring Socket (Sold Separately)

Front-connecting Socket
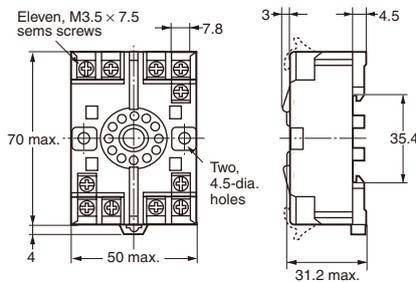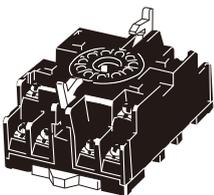
P2CF-11

Eleven, M3.5 × 7.5 sems screws | 7.8

3 | 4.5

70 max. | 35.4

Two, 4.5-dia. holes

4 | 50 max.

31.2 max.

Terminal Layout/Internal Connections (Top View)

8 7 6 5
4
9 3
10 11 1 2

Mounting Holes

Two, 4.5-dia mounting holes

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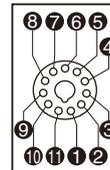
Note: Can also be mounted to a DIN track.

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

Back-connecting Socket

P3GA-11

27 dia.

45

45

25.6

4 | 7 | 3

4.5 16.3 6.2

8.7 | 6
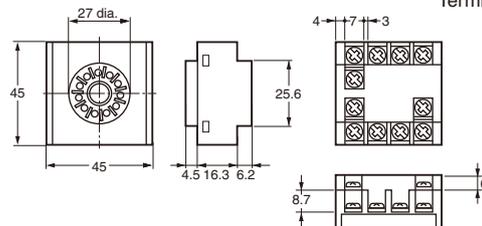
Terminal Layout/Internal Connections (Bottom View)

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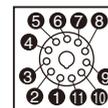
Note: 1. Using any other sockets will adversely affect accuracy. Use only the specified sockets.
　　　2. A Protective Cover for finger protection (Y92A-48G) is also available.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

In the interest of product improvement, specifications are subject to change without notice.

New E5CN/E5CN-U/E5EN/E5AN Operation

Nomenclature

E5CN

Operation Indicators

1. ALM1 (alarm 1)
   Lights when alarm 1 output is ON.
   ALM2 (alarm 2)
   Lights when alarm 2 output is ON.
   ALM3 (alarm 3)
   Lights when alarm 3 output is ON.

2. HA
   (heater burnout alarm display)
   Lights when heater burnout and/or SSR failure occurs.

3. OUT1, OUT2
   (control output 1, control output 2)
   Lights when control output 1 and/or control output 2 (cool) are ON.
   For a current output, however, OFF for a 0% output only.

4. STOP (stop)
   Lights when control of the E5CN has been stopped.
   During control, this indicator lights when an event or the run/stop function has been stopped.

5. CMW
   (communications writing control)
   Lights when communications writing is enabled and is out when it is disabled.

6. MANU (manual mode)
   Lights when the auto/manual mode is set to manual mode.

7. O┬┬ (Key)
   Lights when setting change protect is ON. (Protection disables the UP and DOWN Keys.)

Temperature Unit

The temperature unit is displayed when the display unit parameter is set to a temperature. Indication is determined by the currently selected "temperature unit" parameter set value. When this parameter is set to "°C," "°C" is displayed, and when set to "°F," "°F" is displayed.
This display flashes during ST operation.

LEVEL Key

Press this key to select the setup level. The setup level is selected in order "operation level" ↔ "adjustment level," "initial setting level" ↔ "communications setting level."

No. 1 Display

Displays the process value or parameter type.

No. 2 Display

Displays the set point, manipulated variable, or set value (setup) of the parameter.

UP Key

Each press of this key increases values displayed on the No. 2 display. Holding down this key speeds up the incrementation. This key can also be used to advance the setting.

DOWN Key

Each press of this key decreases values displayed on the No. 2 display. Holding down this key speeds up the decrementation. This key can also be used to reverse the setting.

MODE Key

Press this key to select parameters within each level.
The parameters can be displayed in reverse order by holding down the key (moving one per second in reverse order).

LEVEL + MODE Keys

This key combination sets the E5CN to the "protect level."

Note: Be sure to read the precautions for correct use and other precautions in the following user's manual before using the Digital Controller.
   E5CN/E5CN-U/E5EN/E5AN Digital Temperature Controller User's Manual (Cat. No. H134)
   E5CN/E5EN/E5AN Digital Temperature Controller Communications Functions User's Manual (Cat. No. H135)

E5EN

Operation Indicators

1. ALM1 (alarm 1)
   Lights when alarm 1 output is ON.
   ALM2 (alarm 2)
   Lights when alarm 2 output is ON.
   ALM3 (alarm 3)
   Lights when alarm 3 output is ON.

2. HA
   (heater burnout alarm display)
   Lights when a heater burnout and/or SSR failure occurs.

3. OUT1, OUT2
   (control output 1, control output 2)
   Lights when control output 1 and/or control output 2 (cool) are ON.
   For a current output, however, OFF for a 0% output only.

4. STOP (stop)
   Lights when control of the E5EN has been stopped.
   During control, this indicator lights when an event or the run/stop function has been stopped.

5. CMW
   (communications writing control)
   Lights when communications writing is enabled and is out when it is disabled.

6. MANU (manual mode)
   Lights when the auto/manual mode is set to manual mode.

7. O┱ (Key)
   Lights when setting change protect is ON. (Protection disables the UP and DOWN Keys.)

Temperature Unit

The temperature unit is displayed when the display unit parameter is set to a temperature. Indication is determined by the currently selected "temperature unit" parameter set value. When this parameter is set to "°C," "℃" is displayed, and when set to "°F," "℉" is displayed.
This display flashes during ST operation.

No. 1 Display

Displays the process value or parameter type.

No. 2 Display

Displays the set point, manipulated variable, or set value (setup) of the parameter.

UP Key

Each press of this key increases values displayed on the No. 2 display. Holding down this key speeds up the incrementation.
This key can also be used to advance the setting.

DOWN Key

Each press of this key decreases values displayed on the No. 2 display. Holding down this key speeds up the decrementation.
This key can also be used to reverse the setting.

LEVEL Key

Press this key to select the setup level. The setup level is selected in order "operation level" ↔ "adjustment level," "initial setting level" ↔ "communications setting level."

LEVEL + MODE Keys

This key combination sets the E5EN to the "protect level."

Mode Key

Press this key to select parameters within each level.
The parameters can be displayed in reverse order by holding down the key (moving one per second in reverse order).

E5AN

Operation Indicators

1. ALM1 (alarm 1)
   Lights when alarm 1 output is ON.
   ALM2 (alarm 2)
   Lights when alarm 2 output is ON.
   ALM3 (alarm 3)
   Lights when alarm 3 output is ON.

2. HA
   (heater burnout alarm display)
   Lights when a heater burnout and/or SSR failure occurs.

3. OUT1, OUT2
   (control output 1, control output 2)
   Lights when control output 1 and/or control output 2 (cool) are ON.
   For a current output, however, OFF for a 0% output only.

4. STOP (stop)
   Lights when control of the E5AN has been stopped.
   During control, this indicator lights when an event or the run/stop function has been stopped.

5. CMW
   (communications writing control)
   Lights when communications writing is enabled and is out when it is disabled.

6. MANU (manual mode)
   Lights when the auto/manual mode is set to manual mode.

7. O⊓ (Key)
   Lights when setting change protect is ON. (Protection disables the UP and DOWN Keys.)

Temperature Unit

The temperature unit is displayed when the display unit parameter is set to a temperature. Indication is determined by the currently selected "temperature unit" parameter set value. When this parameter is set to "°C," "℃" is displayed, and when set to "°F," "°F" is displayed.
This display flashes during ST operation.

LEVEL Key

Press this key to select the setup level. The setup level is selected in order "operation level" ↔ "adjustment level," "initial setting level" ↔ "communications setting level."

No. 1 Display

Displays the process value or parameter type.

No. 2 Display

Displays the set point, manipulated variable, or set value (setup) of the parameter.

UP Key

Each press of this key increases values displayed on the No. 2 display. Holding down this key speeds up the incrementation.
This key can also be used to advance the setting.

DOWN Key

Each press of this key decreases values displayed on the No. 2 display. Holding down this key speeds up the decrementation.
This key can also be used to reverse the setting.

MODE Key

Press this key to select parameters within each level.
The parameters can be displayed in reverse order by holding down the key (moving one per second in reverse order).

LEVEL + MODE Keys

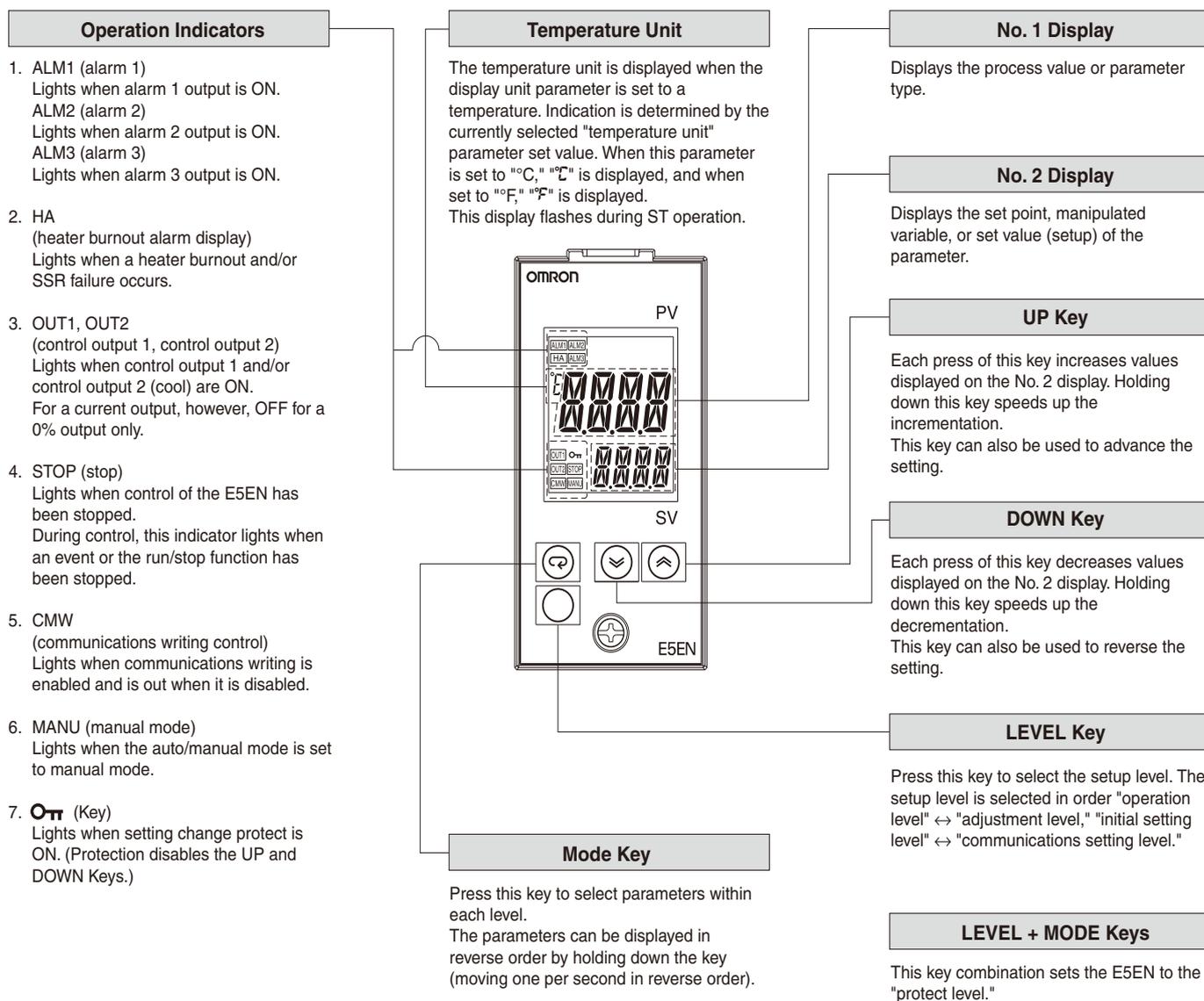This key combination sets the E5AN to the "protect level."

Note: Be sure to read the precautions for correct use and other precautions in the following user's manual before using the Digital Controller.
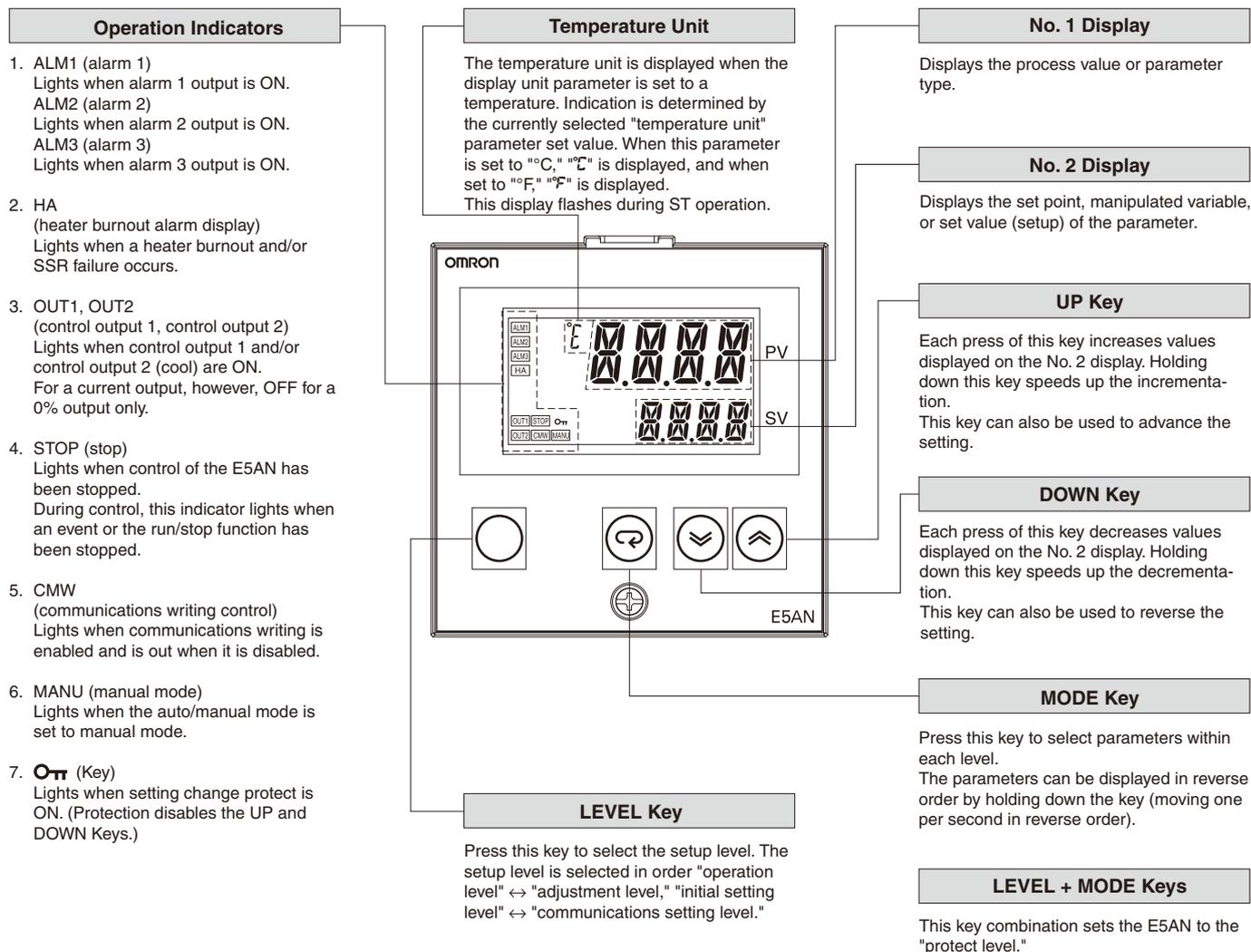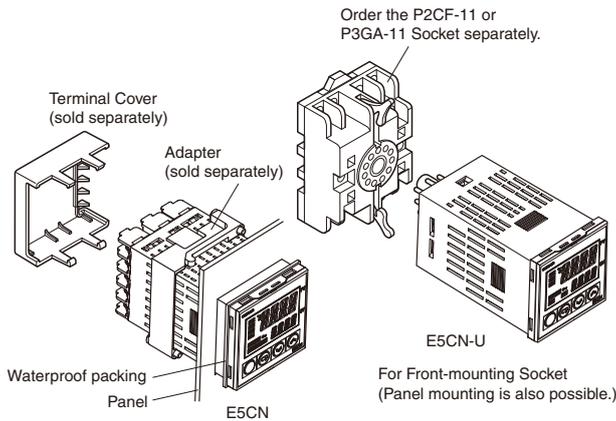E5CN/E5CN-U/E5EN/E5AN Digital Temperature Controller User's Manual (Cat. No. H134)
E5CN/E5EN/E5AN Digital Temperature Controller Communications Functions User's Manual (Cat. No. H135)
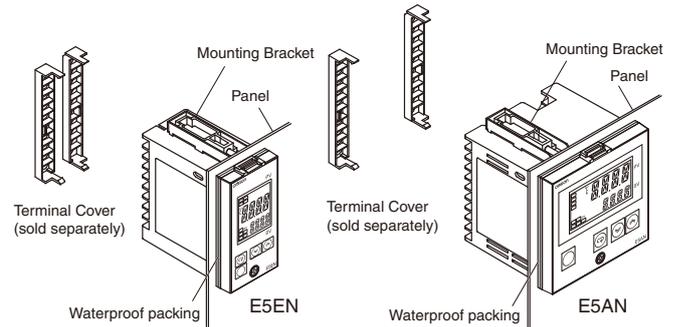
Mounting

E5CN

Order the P2CF-11 or
P3GA-11 Socket separately.

Terminal Cover
(sold separately)

Adapter
(sold separately)

E5CN-U

For Front-mounting Socket
(Panel mounting is also possible.)

Waterproof packing

Panel

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

Mounting Bracket

Panel

Terminal Cover
(sold separately)

Mounting Bracket

Panel

Terminal Cover
(sold separately)

Waterproof packing   E5EN

Waterproof packing   E5AN

1. Insert the E5EN/E5AN 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

For the E5CN, make sure the "UP" characters on the Cover are in the correct position and insert the Cover into the holes at the top and bottom.

For the E5EN or E5AN, fit the E53-COV11 Terminal Cover over the upper hook. Mount it in the direction shown in the above diagram. If the Terminal Cover is mounted in the opposite direction, proper mounting of the fixtures may not be possible.

# Removing the Temperature Controller from the Case

The Temperature Controller must be removed from the case to set specifications.

Refer to *Specification Setting after Turning ON Power* on page 24 for information on setting specifications.

Remove the Temperature Controller from the case when it requires maintenance.

E5CN

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

Tool insertion hole

Flat-blade screwdriver
(Unit: mm)

20 min.

0.4   2.0
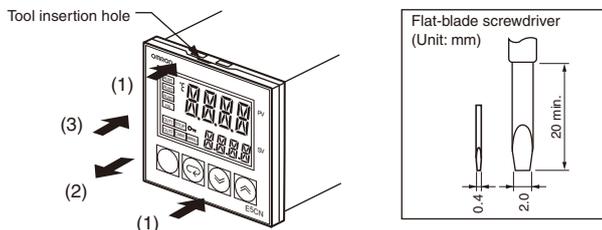
1. Insert the tool into the two tool insertion holes (one on the top and one on the bottom) and release the hooks.
2. Insert the tool in the gap between the front panel and rear case, and pull out the front panel slightly. Hold the top and bottom of the front panel and carefully pull it out toward you, without applying unnecessary force.
3. When inserting the E5CN, check to make sure that the sealing rubber is in place and push the E5CN toward the rear case until it snaps 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.

E5EN/E5AN

Prepare a Phillips screwdriver suitable for the screw on the front panel to remove the Temperature Controller.
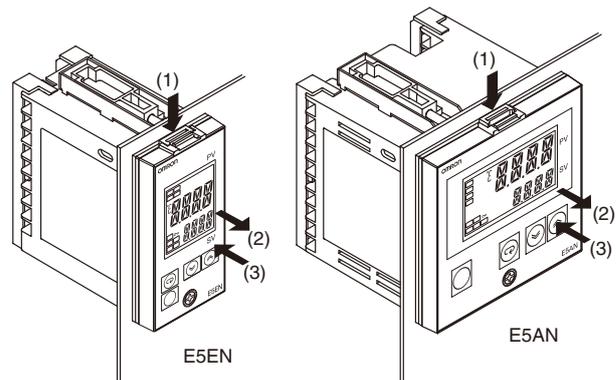
E5EN

E5AN

1. Push on the hooks on the top of the front panel, and at the same time, turn the Phillips screwdriver to the left to loosen the screw on the bottom of the front panel.
2. Pull out the front panel gripping both sides.
3. When inserting the E5EN/E5AN Temperature Controller, check to make sure that the sealing rubber is in place. Then, while pushing the front panel into place, turn the Phillips screwdriver to the right in the opposite direction used when removing the panel to tighten the screws on the top and bottom surfaces (tightening torque: 0.3 to 0.5 N·m). Make sure that electronic components do not come into contact with the case.
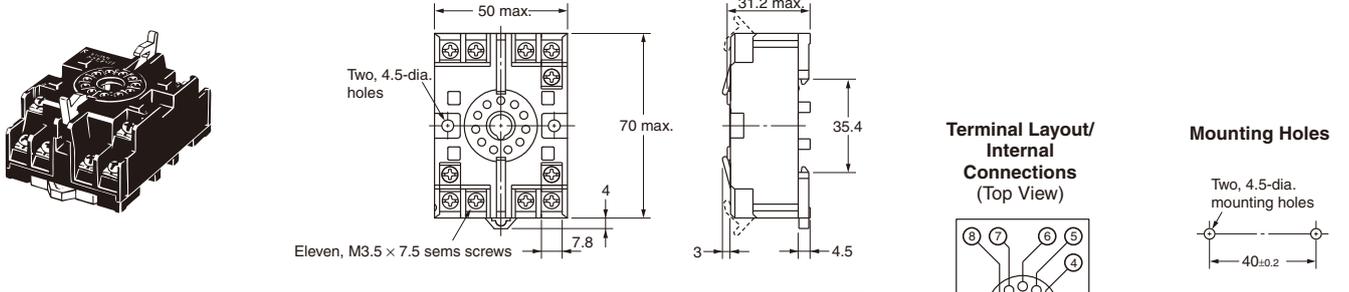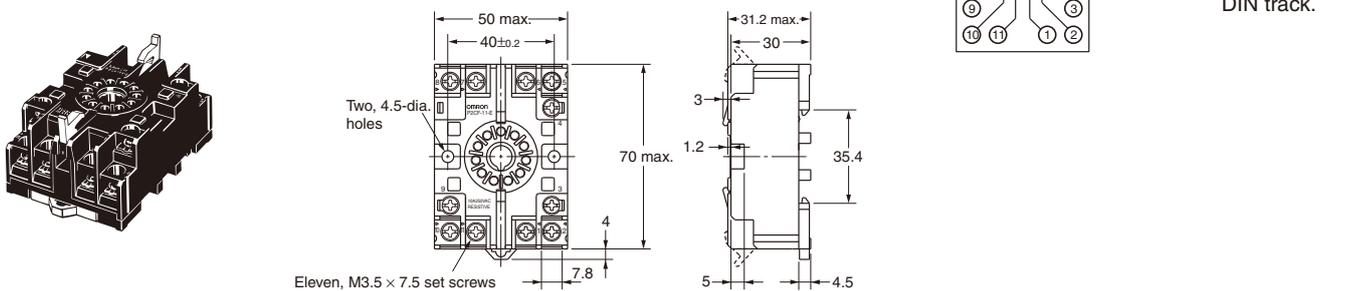
E5CN-U Wiring Socket

Note: Do not use any other sockets. Otherwise, accuracy may be adversely affected.

■ Front-connecting Socket

P2CF-11 (Standard Model)

Two, 4.5-dia. holes

50 max.

70 max.

Eleven, M3.5 × 7.5 sems screws

4

7.8

31.2 max.

35.4

3

4.5

Terminal Layout/ Internal Connections (Top View)

8 7 6 5 4 9 3 10 11 1 2

Mounting Holes

Two, 4.5-dia. mounting holes

40±0.2

Note: Can also be mounted to a DIN track.

P2CF-11-E (Model with Finger Protection)

50 max.

40±0.2

Two, 4.5-dia. holes

70 max.

Eleven, M3.5 × 7.5 set screws

4

7.8

31.2 max.

30

3

1.2

35.4

5

4.5

Note: This socket uses a structure with finger protection. Round crimp terminals cannot be used. Use forked crimp terminals.

■ Back-connecting Socket

P3GA-11 (Standard Model)
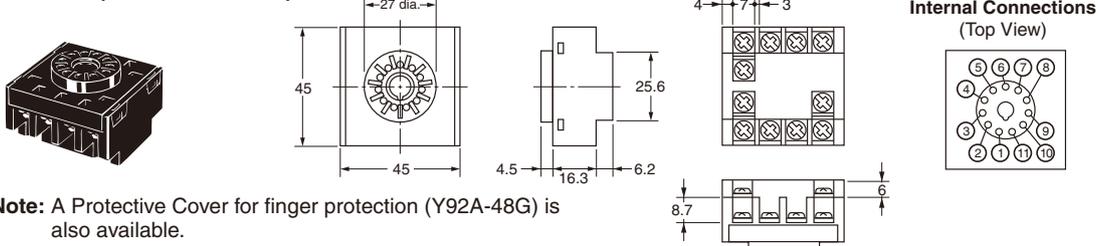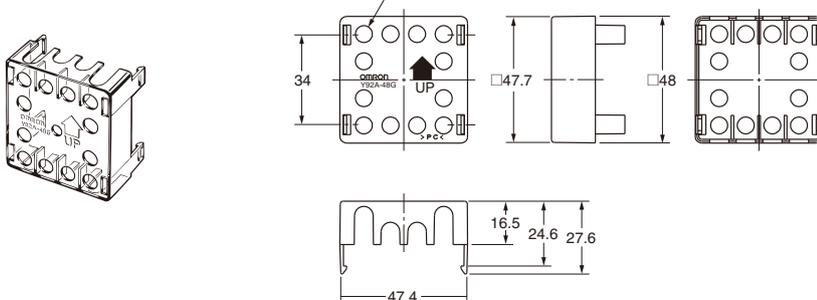
27 dia.

45

45

4.5

16.3

6.2

25.6

4 7 3

8.7

6

Terminal Layout/ Internal Connections (Top View)

5 6 7 8 4 3 9 2 1 11 10

Note: A Protective Cover for finger protection (Y92A-48G) is also available.

■ Terminal Cover

Y92A-48G

Twelve, 6.4 dia.

34

UP

□47.7

□48

16.5

24.6

27.6

47.4

Wiring Precautions

- Separate input leads and power lines to protect the E5AN/E5EN/E5CN/E5CN-U and its lines from external noise.
- We recommend using solderless terminals when wiring the E5AN/E5EN/E5CN/E5CN-U.
- Tighten the terminal screws using a torque between 1.13 and 1.36 N·m.
- Use the following type of solderless terminals for M3.5 screws.

7.2 mm max.

7.2 mm max.

Setup Guide

**Refer to *E5CN/E5CN-U/E5EN/E5AN/E5GN Operation* for previous models of the E5CN/E5CN-U/E5EN/E5AN.**

On previous Controllers, sensor input type, alarm type and control period were set on DIP switches. These hardware settings are now set in parameters in setup menus. The **LEVEL** and **MODE** Keys are used to switch between setup menus, and the amount of time that you hold the keys down for determines which setup menu you move to. This section describes two typical examples.
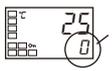
1. ON/OFF Control

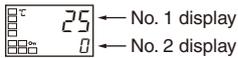### Typical Application Examples
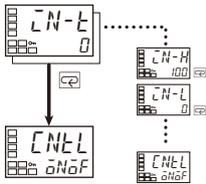
① Changing Parameters

▯ indicates that there is a parameter. Keep on pressing the mode key until the desired parameter is selected.

② Changing Set Values

Use the ▽ or △ keys to change the set value displayed in the setup menu.

③ Display

25 ← No. 1 display
0 ← No. 2 display

Typical Example

Input type:	5 K thermocouple −200 to 1300°C
Control method:	ON/OFF control
Alarm type:	2 upper limit
Alarm value 1:	20°C (For setting deviation)
Set point:	100°C

(Change only the alarm value 1 and set point. The rest must be left as default settings.)

Setup procedure

Power ON

Operation level
25
0 — Process value/set point

Press ◎ key for at least three seconds.
Control stops.

Initial setting level

Check input type. — Input type 5
Check that control is ON/OFF control. — In ON/OFF control ō̄NōF / In PID control Pīd
Check alarm type. — ALt1 — Alarm 1 type 2

Press ◎ key for at least one second.
Control starts.

Operation level

Press △ ▽ keys to set set point to "100°C." — PV/SP 100
Make sure that control is running. — R-S RUN — During run RUN / During stop StōP
Press △ ▽ keys to set alarm value to "20°C." — AL-1 20 — Alarm value 1 20

Start operation

Setup procedure (left flow):
Power ON
Initial setting level
- Set input specifications
- Set control specifications
- Set alarm type
Operation level
- Set the alarm values
Start operation

Note: Be sure to read the precautions for correct use and other precautions in the following user's manual before using the Digital Controller.
E5CN/E5CN-U/E5EN/E5AN Digital Temperature Controller User's Manual (Cat. No. H134)
E5CN/E5EN/E5AN Digital Temperature Controller Communications Functions User's Manual (Cat. No. H135)

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2. PID Control Using Autotuning

Typical Application Examples

[1] Changing Parameters

☐ indicates that there is a parameter. Keep on pressing the mode key until the desired parameter is selected.

[2] Changing Set Values

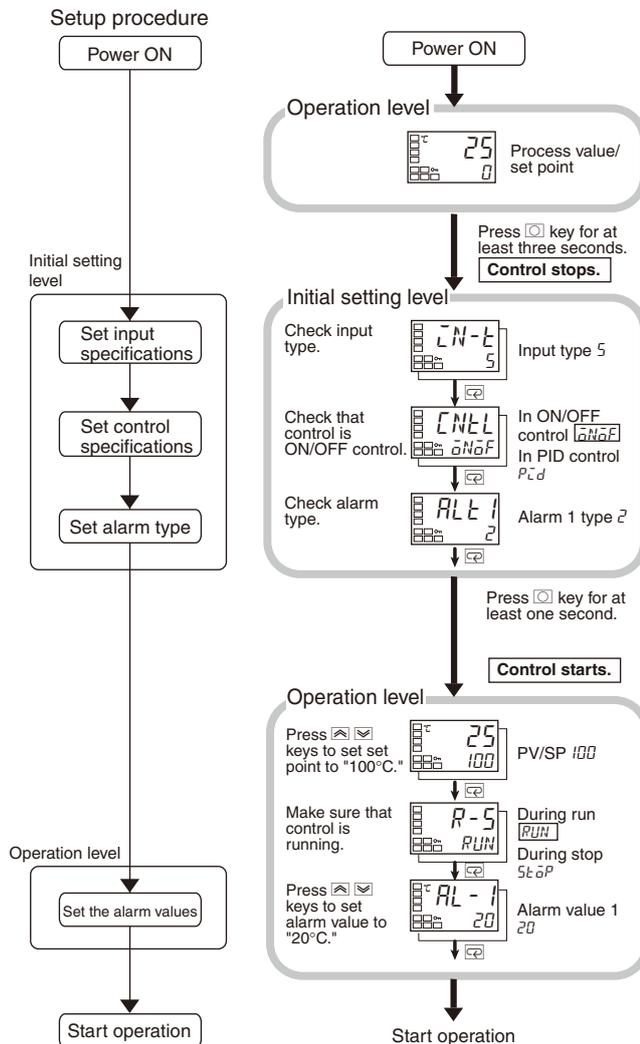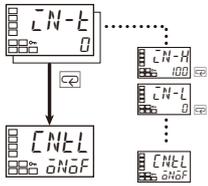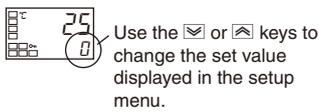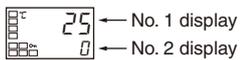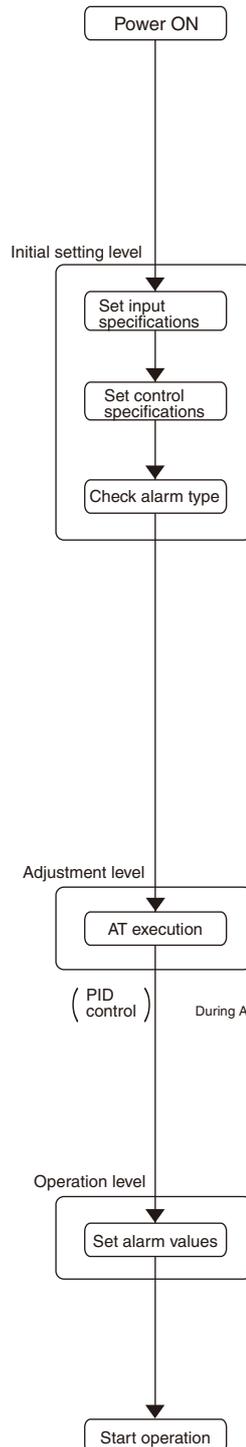Use the ∨ or ∧ keys to change the set value displayed in the setup menu.

[3] Display

← No. 1 display
← No. 2 display

Typical Example

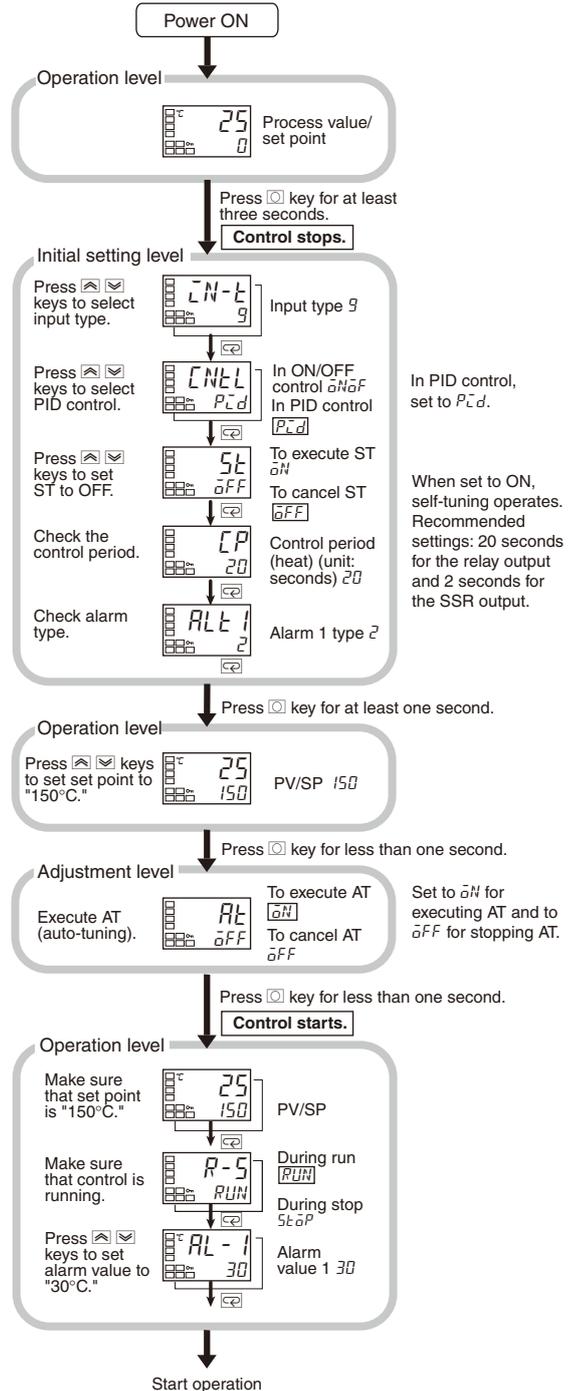| Input type: | 9 T thermocouple −200 to 400°C |
Control method:	PID control
Calculate PID constants by AT (auto-tuning).	
Alarm type:	2 upper limit
Alarm value 1:	30°C (For setting deviation)
Set point:	150°C

Setup procedure

Power ON

Initial setting level

- Set input specifications
- Set control specifications
- Check alarm type

Adjustment level

- AT execution

(PID control)

Operation level

- Set alarm values

Start operation

Typical Example (right column)

Power ON

Operation level

Process value/set point

Press ◎ key for at least three seconds. **Control stops.**

Initial setting level

Press ∧ ∨ keys to select input type. — Input type 9

Press ∧ ∨ keys to select PID control. — In ON/OFF control ōNōF In PID control PＣd

In PID control, set to PＣd.

Press ∧ ∨ keys to set ST to OFF. — To execute ST ōN / To cancel ST ōFF

When set to ON, self-tuning operates. Recommended settings: 20 seconds for the relay output and 2 seconds for the SSR output.

Check the control period. — Control period (heat) (unit: seconds) 2ō

Check alarm type. — Alarm 1 type 2

Press ◎ key for at least one second.

Operation level

Press ∧ ∨ keys to set set point to "150°C." — PV/SP 15ō

Press ◎ key for less than one second.

Adjustment level

Execute AT (auto-tuning). — To execute AT ōN / To cancel AT ōFF

Set to ōN for executing AT and to ōFF for stopping AT.

Press ◎ key for less than one second. **Control starts.**

Operation level

Make sure that set point is "150°C." — PV/SP

Make sure that control is running. — During run RUN / During stop StōP

Press ∧ ∨ keys to set alarm value to "30°C." — Alarm value 1 3ō

Start operation

PV/SP illustrations (middle column)

PV/SP
After AT execution.

While AT is being executed, SP will flash.

After AT execution.

During AT execution.

Specification Setting after Turning ON Power

Refer to *E5CN/E5CN-U/E5EN/E5AN/E5GN Operation* for previous models of the E5CN/E5CN-U/E5EN/E5AN.

■ Outline of Operation Procedures

Key Operation

The following diagram illustrates the entire setting level. A password is required to enter the advance function setting level and the calibration level. Some parameters may not be displayed depending on the protection settings and operation conditions.
The control operation will stop when switching from operation level to initial setting level.

Note: 1. Operation level entered for software reset.
 2. You cannot move to other levels by operating the keys on the front panel from the calibration level. You must turn OFF the power supply.
 3. You can move only to the operation level by operating the keys on the front panel from the manual control level.

Level	Control in progress	Control stopped
Protect level	Can be set.	---
Operation level	Can be set.	---
Adjustment level	Can be set.	---
Manual control level	Can be set.	---
Initial setting level	---	Can be set.
Advanced function setting level	---	Can be set.
Calibration level	---	Can be set.
Communications setting level	---	Can be set.

Of these levels, the initial setting level, communications setting level, advanced function setting level and calibration level can be used only when control has stopped. Note that control is stopped when these four levels are selected. When switched back to the operation level from one of these levels, control will start.

 4. The time taken to move to the protect level can be adjusted by changing the "Move to protect level time" setting.

■ Description of Each Level

Operation Level

• This level is displayed when you turn the power ON. You can move to the protect level, initial setting level and adjustment level from this level.
• Normally, select this level during operation. During operation, the process value, set point and manipulated variable can be monitored, and the alarm value and upper- and lower-limit alarms can be monitored and modified.

Adjustment Level

• To select this level, press the **LEVEL** Key once for less than one second.
• This level is used to enter set values and offset values for control. This level contains parameters for setting the set values, AT (auto-tuning), communications writing enable/disable, hysteresis, multi-SP, input shift values, heater burnout alarm (HBA), and PID constants. You can move to the top parameter of the operation level, protect level, or initial setting level from here.

Manual Control Level

• When the **LEVEL** Key is pressed for at least three seconds in the operation level's auto/manual switching display, the manual control level will be displayed. (The MANU operation indicator will light.)
• The manipulated variable can be changed manually in the manual control level.
• To return to the operation level, press the **LEVEL** Key for at least one second.

Initial Setting Level

• To select this level, press the **LEVEL** Key for at least three seconds in the operation level. This level is for specifying the input type, selecting the control method, control period, setting direct/reverse action and alarm type. You can move to the advanced function setting level or communications setting level from this initial setting level. To return to the operation level, press the **LEVEL** Key for at least one second. To move to the communications setting level, press the **LEVEL** Key once for less than one second.

Protect Level

• To select this level, simultaneously press the **LEVEL** and **MODE** Keys for at least 3 seconds. This level is to prevent unwanted or accidental modification of parameters. Protected levels will not be displayed, and so the parameters in that level cannot be modified.

Communications Setting Level

• To select this level, press the **LEVEL** Key once for less than one second in the initial setting level. When the communications function is used, set the communications conditions in this level. Communicating with a personal computer (host computer) allows set points to be read and written, and manipulated variables to be monitored.

Advanced Function Setting Level

• To select this level, first set the initial setting/communications protection in the protect level to 0, then enter the password ("−169") in the initial setting level.
• You can move to the calibration level or initial setting level from this level.
• This level is for setting the automatic return of display mode, MV limiter, event input assignment, standby sequence, alarm hysteresis, ST (self-tune) and to move to the user calibration level.

Calibration Level

• To select this level, you must enter the password ("1201") in the advanced function setting level. This level is for offsetting deviation in the input circuit.
• You cannot move to other levels by operating the keys on the front panel from the calibration level. To cancel this level, turn the power OFF then back ON again.

■ Initial Setting Level

This level is used for setting basic specifications of the Temperature Controller. Using this level, set the input type for selecting the input to be connected such as the thermocouple or platinum resistance thermometer and set the range of set point and the alarm mode.

The move from the operation level to the initial setting level, press key for three seconds or more.

• The initial setting level is not displayed when "initial/communications protection" is set to "2." This initial setting level can be used when "initial setting/communications protection" is set to "0" or "1."

• The "scaling upper limit," "scaling lower limit," and "decimal point" parameters are displayed when a voltage input is selected as the input type.

■ Initial Setting Level

Abbrev	Description	Options
ĪN-t	Input type	
ĪN-H	Scaling upper limit	
ĪN-L	Scaling lower limit	
dP	Decimal point	
d-U	Temperature unit	C : °C F : °F
SL-H	SP upper limit	
SL-L	SP lower limit	
CNtL	PID ON/OFF	ōnōF: ON/OFF control PĪd: PID control
S-HC	Standard or heating/cooling	Stnd: Standard H-C: Heating/cooling
St	ST	ōn: Enabled ōFF: Disabled
PtRN	Program pattern	ōFF : Program function OFF StōP : Stop Mode at end of program CōNt : Run Mode at end of program
CP	Control period (heating)	
C-CP	Control period (cooling)	
ōREV	Direct/reverse operation	ōr-r : Reverse operation (heating) ōR-d : Direct operation (cooling)
ALt1	Alarm 1 type	
ALt2	Alarm 2 type	
ALt3	Alarm 3 type	
tR-t	Transfer output type (See note 1.)	
tR-H	Transfer output upper limit	
tR-L	Transfer output lower limit	
ōI-t	Linear current output	4-20 : 4 to 20 mA 0-20 : 0 to 20 mA
AMōV	Move to advanced function setting level	

This parameter is not displayed with the default settings. Set the initial/communications protect parameter to "0" to enable moving to the advanced function setting level. (See page 32.)

To return to the operation level, press the ◻ key for longer than one second.

Note 1.

Transfer type	Setting
OFF	OFF
Set point	SP
Ramp set point	SP-M
Present value	PV
Manipulated variable (heating)	MV
Manipulated variable (cooling)	C-MV

■ Input Type

	Input type	Specifications	Set value	Input temperature range
Thermocouple/ resistance thermometer multi-input type	**Resistance thermometer**	Pt100	0	−200 to 850 (°C)/−300 to 1500 (°F)
			1	−199.9 to 500.0 (°C)/−199.9 to 900.0 (°F)
			2	0.0 to 100.0 (°C)/0.0 to 210.0 (°F)
		JPt100	3	−199.9 to 500.0 (°C)/−199.9 to 900.0 (°F)
			4	0.0 to 100.0 (°C)/0.0 to 210.0 (°F)
	Thermocouple	K	5	−200 to 1300 (°C)/−300 to 2300)
			6	−20.0 to 500.0 (°C)/0.0 to 900.0 (°F)
		J	7	−100 to 850 (°C)/−100 to 1500 (°F)
			8	−20.0 to 400.0 (°C)/0.0 to 750.0 (°F)
		T	9	−200 to 400 (°C)/−300 to 700 (°F)
			10	−199.9 to 400.0 (°C)/−199.9 to 700.0 (°F)
		E	11	0 to 600 (°C)/0 to 1100 (°F)
		L	12	−100 to 850 (°C)/−100 to 1500 (°F)
		U	13	−200 to 400 (°C)/−300 to 700 (°F)
			14	−199.9 to 400.0 (°C)/−199.9 to 700.0 (°F)
		N	15	−200 to 1300 (°C)/−300 to 2300 (°F)
		R	16	0 to 1700 (°C)/0 to 3000 (°F)
		S	17	0 to 1700 (°C)/0 to 3000 (°F)
		B	18	100 to 1800 (°C)/30 to 3200 (°F)
	ES1B Infrared Temperature Sensor	10 to 70°C	19	0 to 90 (°C)/0 to 190 (°F)
		60 to 120°C	20	0 to 120 (°C)/0 to 240 (°F)
		115 to 165°C	21	0 to 165 (°C)/0 to 320 (°F)
		160 to 260°C	22	0 to 260 (°C)/0 to 500 (°F)
	Analog input	0 to 50 mV	23	One of following ranges depending on the results of scaling: −1999 to 9999, −199.9 to 999.9

Note: Initial setting: 5 (type K thermocouple)

	Input type	Specifications	Set value	Input temperature range
Analog input type	**Analog input**	4 to 20 mA	0	One of the following ranges depending on the results of scaling: −1999 to 9999, −199.9 to 999.9, −19.99 to 99.99, −1.999 to 9.999
		0 to 20 mA	1	
		1 to 5 V	2	
		0 to 5 V	3	
		0 to 10 V	4	

Note: Initial setting: 0 (Current input of 4 to 20 mA)

Example: When the alarm is set ON at 110°C/°F or higher.

When an alarm type other than the absolute-value alarm is selected
(For alarm types 1 to 7)The alarm value is set as a deviation from the set point.
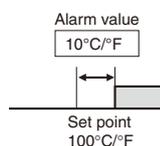
When the absolute-value alarm is selected
(For alarm types 8 to 11)The alarm value is set as an absolute value from the alarm value of 0°C/°F.
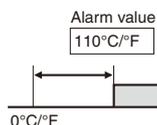
■ Alarm Type

For alarm 1 to alarm 3, select the alarm types out of the 12 alarm types listed in the following table.

Set value	Alarm type	Alarm output operation	
		When X is positive	When X is negative
0	Alarm function OFF	Output OFF	
1[*1]	Upper- and lower-limit	ON/OFF L H SP	*2
2	Upper-limit	ON/OFF X SP	ON/OFF X SP
3	Lower-limit	ON/OFF X SP	ON/OFF X SP
4[*1]	Upper- and lower-limit range	ON/OFF L H SP	*3
5[*1]	Upper- and lower-limit with standby sequence	ON/OFF L H SP *5	*4
6	Upper-limit with standby sequence	ON/OFF X SP	ON/OFF X SP
7	Lower-limit with standby sequence	ON/OFF X SP	ON/OFF X SP
8	Absolute-value upper-limit	ON/OFF X 0	ON/OFF X 0
9	Absolute-value lower-limit	ON/OFF X 0	ON/OFF X 0
10	Absolute-value upper-limit with standby sequence	ON/OFF X 0	ON/OFF X 0
11	Absolute-value lower-limit with standby sequence	ON/OFF X 0	ON/OFF X 0
12	LBA (alarm 1 only)	---	

Note: If the alarm type is set to a value from 1 to 7, set the alarm value as the deviation from the SP.

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

*2: Set value: 1, Upper- and lower-limit alarm

Case 1
L H SP
$H < 0, L > 0$
$|H| < |L|$

Case 2
SP L H
$H > 0, L < 0$
$|H| > |L|$

Case 3 (Always ON)
H SP L
$H < 0, L < 0$
H L SP
$H < 0, L > 0$
$|H| \geq |L|$
SP H L
$H > 0, L < 0$
$|H| \leq |L|$

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

Case 1
L H SP
$H < 0, L > 0$
$|H| < |L|$

Case 2
SP L H
$H > 0, L < 0$
$|H| > |L|$

Case 3 (Always ON)
H SP L
$H < 0, L < 0$
H L SP
$H < 0, L > 0$
$|H| \geq |L|$
SP H L
$H > 0, L < 0$
$|H| \leq |L|$
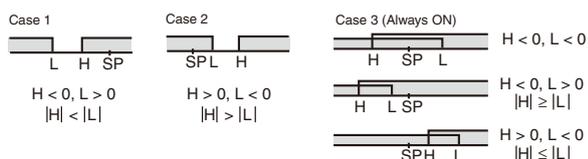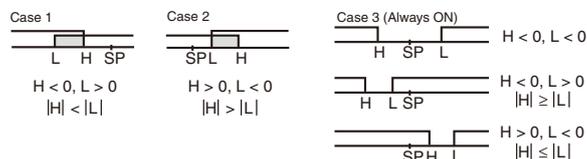
*4: Set value: 5, Upper- and lower-limit with standby sequence

Note: Conditions for upper and lower limit alarm cases in the above diagram:
- The hysteresis is always OFF for cases 1 and 2 when the upper-limit and lower-limit hysteresis overlaps.
- The hysteresis is always OFF for case 3.

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

Set the alarm types for alarm 1 to alarm 3 independently in the initial setting level. The default setting is 2 (upper limit).

■ Parameters

Parameters related to setting items for each level are marked in boxes in the flowcharts and brief descriptions are given as required. At the end of each setting item, press the mode key to return to the beginning of each level.
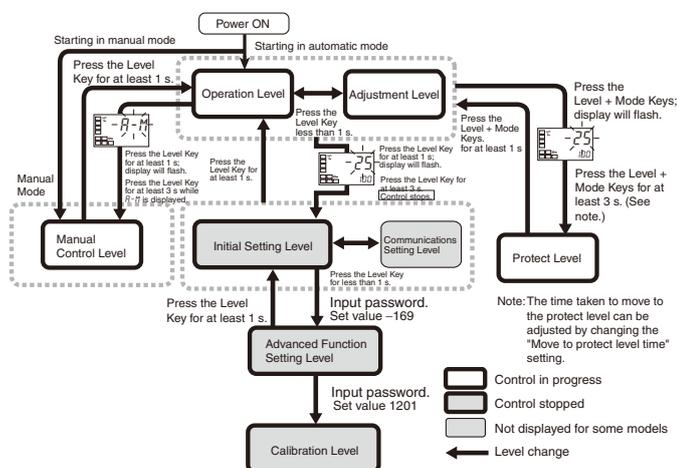
5ᵗ-ᵇ ST Stable Range (°C or °F)

Setting range: 0.1 to 999.9

This parameter is for determining conditions under which fuzzy self-tuning will operate.

If the absolute value of the deviation (i.e., the difference between the process value and the set value) in the stable range set here, control will function properly, so fuzzy self-tuning will not start.

ALFA α
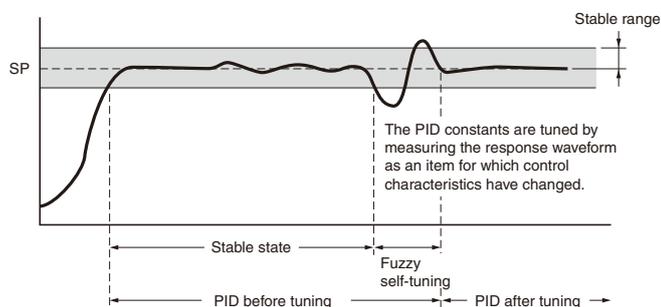
Setting range: 0.00 to 1.00

PID control, such as derivative preceding PID or proportional preceding PID (I-PD) to adjust the internal parameter α a for 2-PID control.

Difference in SP response according to α
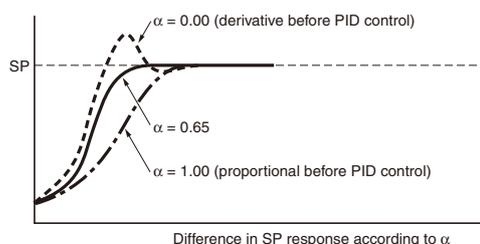
Setting α to a value smaller than the default value is recommended when faster SP response is desired. (Overshooting, however, will become larger.)

Input Shift

All points in the sensor range are shifted by the value set as the temperature input shift value.

Example

Input shift setting	Temperature measured by sensor	Temperature display
0 (no shift)	100°C	100°C
10 (shifted +10°C)	100°C	110°C
−10 (shifted −10°C)	100°C	90°C

Run/Stop Function

The run/stop function is used to start and stop operation in the operation level. Use this function to stop operation when performing maintenance on equipment or other purposes that require the Temperature Controller to be temporarily stopped. Even if this function is set to STOP, however, outputs other than the control outputs (e.g., alarms) will output as set. Operation will be performed when RUN is selected and stopped when STOP is selected. The STOP indicator will light when operation is stopped. The default setting is RUN.

Direct/Reverse Operation

Set the system to direct operation for cooling control (to turn ON outputs if the temperature is above the SP, such as for refrigerators) and to reverse operation for heating control (to turn ON outputs if the temperature is below the SP, such as for ovens).

Hysteresis

With ON/OFF control, hysteresis is used to stabilize operation when switching between ON and OFF.

PV Color Change Function

The following table shows the display functions that can be set using the PV color change function.

Mode	Setting	Function	PV change color	Application example
Constant	ōRᴳ	Orange	Constant: Orange	To match the display color with other Controller models
	REᵈ	Red	Constant: Red	To match the display color with other Controller models
	ᴳRN	Green	Constant: Green	To match the display color with other Controller models
Linked to alarm 1			ALM1 not lit	ALM1 lit	Application example
	R-ᴳ	Red to Green	Red	Green	To display the PV reached signal
	ᴳ-R	Green to Red	Green	Red	To display error signals
Linked to PV stable band			Low	Within PV stable band	High	Application example
	R-ᴳ.R	Red to Green to Red	Red	Green	Red	To display stable status
	ᴳ-ō.R	Green to Orange to Red	Green	Orange	Red	To display stable status
	ō-ᴳ.R	Orange to Green to Red	Orange	Green	Red	To display stable status

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■ Parameters

Some parameters are not displayed depending on the model of the Controller and parameter settings. For details, refer to the E5CN/E5CN-U/E5AN/E5EN Digital Temperature Controller User's Manual (Cat. No. H134).

Press the ⬚ Key for at least 3 s.
(Display flashes for at least 1 s.)
Displays other than that for switching between automatic and manual

Power ON

Starting in manual mode

Manual Control Level

25 PID control only
PV/MV

Press the ⬚ Key for at least 1 s.

Starting in automatic mode

Press the ⬚ Key less than 1 s.

Adjustment Level

Press the ⬚ Key less than 1 s.

Operation Level

L.AdJ Adjustment level display
Displayed only once when entering adjustment level.

AT AT execute/cancel
oFF

CMWt Communications writing
oFF

Ct1 Heater current value 1 monitor
0.0

Ct2 Heater current value 2 monitor
0.0

LCR1 Leakage current value 1 monitor
0.0

LCR2 Leakage current value 2 monitor
0.0

Hb1 Heater burnout 1 detection
0.0

Hb2 Heater burnout 2 detection
0.0

HS1 SSR failure detection 1
50.0

HS2 SSR failure detection 2
50.0

SP-0 SP 0

SP-1 SP 1
0

SP-2 SP 2
0

SP-3 SP 3
0

SP used by multi-SP

CNS Temperature input shift
0.0
1-point shift

CNSH Upper-limit temperature input
0.0
2-point shift

CNSL Lower-limit temperature input
0.0

Set either of these parameters.

P Proportional band
8.0

I Integral time
233

PID settings

d Derivative time
40

C-SC Cooling coefficient
1.00

Heating/cooling

C-db Dead band
0.0

oF-R Manual reset value
50.0
Clear the offset during stabilization of P or PD control.

HYS Hysteresis (heating)
1.0

Hysteresis settings

CHYS Hysteresis (cooling)
1.0

SoAK Soak time
1

Wt-b Wait band
oFF

MV-S MV at stop
0.0

MV-E MV at PV error
0.0

SPRt SP ramp set value
oFF

oL-H MV upper limit
105.0

oL-L MV lower limit
-5.0

25 Process value
Added when PV display is added.

25 Process value/set point

A-M Auto/manual switch
PID control only
Auto/manual select addition

M-SP Multi-SP set point setting

SP-M SP ramp monitor

Ct1 Heater current value 1 monitor
0.0

Ct2 Heater current value 2 monitor
0.0

LCR1 Leakage current value 1 monitor
0.0

LCR2 Leakage current value 2 monitor
0.0

PRSt Program start
RSEt

SKtR Remaining soak time monitor

R-S Run/stop
RUN

AL-1 Alarm value 1
0

AL1H Upper-limit alarm value 1
0

AL1L Lower-limit alarm value 1
0

AL-2 Alarm value 2
0

AL2H Upper-limit alarm value 2
0

AL2L Lower-limit alarm value 2
0

AL-3 Alarm value 3
0

AL3H Upper-limit alarm value 3
0

AL3L Lower-limit alarm value 3
0

o MV monitor (heating)
0.0

C-o MV monitor (cooling)
0.0

Set either of these parameters. Set either of these parameters.

Press the ⬚ Key for at least 3 s. (Display flashes for at least 1 s.)

Press the ⬚ + ⬚ Keys for at least 3 s. Display flashes.

Press the ⬚ + ⬚ Keys for at least 1 s.

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.

PMoV Move to protect level
0
Displayed only when a password is set. Restricts moving to protect level.

oAPt Operation/adjustment protection
Restricts displaying and modifying menus in operation, adjustment, and manual control levels.

iCPt Initial Setting/Communications Protection
1
This protect level restricts movement to the initial setting, communications setting, and advanced function setting levels.

WtPt Setting change protection
oFF
Protects changes to setups by operating the front panel keys.

PMSK Parameter mask enable
oN
Displayed only when a parameter mask is set.

PRLP Password to move to protect level
0
Password setting

Communications Setting Level

Displayed only for models with communications. Changes are effective after cycling power or after a software reset.

PSEL Protocol setting
CWF
Switches between CompoWay/F (SYSWAY) and Modbus.

U-No Communications Unit No.

CompoWay/F (SYSWAY) only

bPS Baud rate
9.6

LEN Data bits
7

SbIt Stop bits
2

PRtY Communications parity
EVEN

SdWt Send delay
20

OMRON http://www.ia.omron.com/

Press the ⬚ Key for at least 1 s.

Initial Setting Level	◄	Advanced Function Setting Level

Press the ⬚ Key less than 1 s.

Initial Setting Level

- `ĪN-Ł` `5` — Input type
- `ĪN-H` `100` — Scaling upper limit
- `ĪN-L` `0` — Scaling lower limit
- `dP` `0` — Decimal point — For input type of analog
- `d-U` `C` — Temperature unit °C, °F — For input type of temperature
- `SL-H` `1300` — SP upper limit — Limit the set point.
- `SL-L` `-200` — SP lower limit
- `CNŁŁ` `ōNōF` — PID ON/OFF
- `5-HC` `5ŁNd` — Standard or heating/cooling
- `5Ł` `ōN` — ST — For input type of temperature, standard, or PID
- `PŁRN` `ōFF` — Program pattern — When assigning PID or control output to pulse output
- `CP` `20` — Control period (heating) — Set the pulse output cycle.
- `C-CP` `20` — Control period (cooling)
- `ōREV` `ōR-R` — Direct/reverse operation
- `ALŁ1` `2` — Alarm 1 type
- `ALŁ2` `2` — Alarm 2 type
- `ALŁ3` `2` — Alarm 3 type
- `ŁR-Ł` `ōFF` — Transfer output type — Linear output
- `ŁR-H` `100.0` — Transfer output upper limit
- `ŁR-L` `0.0` — Transfer output lower limit
- `ō1-Ł` `4-20` — Linear current output — Linear output
- `AMōV` `0` — Move to advanced function setting level — Displayed when initial setting/communications protection is set to 0

Advanced Function Setting Level

- `ĪNŁŁ` `ōFF` — Parameter initialization
- `EV-M` `1` — Number of multi-SP uses — Two SPs: 1 / Four SPs: 2
- `EV-1` `NōNE` — Event input assignment 1
- `EV-2` `5ŁōP` — Event input assignment 2
- `MSPU` `ōFF` — Multi-SP uses
- `SPRU` `M` — SP ramp time unit
- `RE5Ł` `R` — Standby sequence reset method
- `AL1N` `N-ō` — Alarm 1 open in alarm
- `ALH1` `0.2` — Alarm 1 hysteresis
- `AL2N` `N-ō` — Alarm 2 open in alarm
- `ALH2` `0.2` — Alarm 2 hysteresis
- `AL3N` `N-ō` — Alarm 3 open in alarm
- `ALH3` `0.2` — Alarm 3 hysteresis
- `HbU` `ōN` — Heater burnout detection
- `HbL` `ōFF` — Heater burnout latch
- `HbH` `0.1` — Heater burnout hysteresis
- `5Ł-b` `15.0` — ST stable range
- `ALFA` `0.65` — α
- `ĪNF` `0.0` — Input digital filter

- `PVAd` `ōFF` — Additional PV display
- `ō-dP` `ōFF` — MV display
- `REŁ` `ōFF` — Automatic return of display mode
- `A1LŁ` `ōFF` — Alarm 1 latch
- `A2LŁ` `ōFF` — Alarm 2 latch
- `A3LŁ` `ōFF` — Alarm 3 latch
- `PRLŁ` — Move to protect level time
- `5ERō` `ōFF` — Input error output
- `CJC` `ōN` — Cold junction compensating method
- `RLRV` `ōFF` — MB command logic switching
- `CōLR` `REd` — PV display color
- `PV-b` `5.0` — PV stable range
- `A1ōN` `0` — Alarm 1 ON delay
- `A2ōN` `0` — Alarm 2 ON delay
- `A3ōN` `0` — Alarm 3 ON delay
- `A1ōF` `0` — Alarm 1 OFF delay
- `A2ōF` `0` — Alarm 2 OFF delay
- `A3ōF` `0` — Alarm 3 OFF delay
- `Ī5ŁP` `ĪN51` — Input shift type

- `MV5E` `ōFF` — Additional MV for stop/error
- `AMRd` `ōFF` — Auto/manual switching function addition
- `RŁ` `ōFF` — RT
- `H5U` `ōN` — SSR failure detection
- `H5L` `ōFF` — SSR failure latch
- `H5H` `0.1` — SSR failure hysteresis
- `LbA` `0` — LBA detection time
- `LbAL` `8.0` — LBA detection threshold
- `LbAb` `3.0` — LBA detection width
- `ōUŁ1` `ō` — Control output 1 assignment
- `ōUŁ2` `NōNE` — Control output 2 assignment
- `ALM1` `ALM1` — Alarm output 1 assignment
- `ALM2` `ALM2` — Alarm output 2 assignment
- `ALM3` `ALM3` — Alarm output 3 assignment
- `C5EL` `ōN` — Display text switch
- `Ł-U` `M` — Soak time unit
- `ALSP` `5P-M` — Alarm SP selection
- `CMōV` `0` — Move to calibration level

Move by setting password (−169).

Protect Level

`PMoV` `0`	**Move to protect level** Displayed only when a password is set. Restricts moving to protect level.
`oAPt` `0`	**Operation/adjustment protection** Restricts displaying and modifying menus in operation, adjustment, and manual control levels.
`iCPt` `1`	**Initial Setting/Communications Protection** This protect level restricts movement to the initial setting, communications setting, and advanced function setting levels.
`WtPt` `oFF`	**Setting change protection** Protects changes to setups by operating the front panel keys.
`PMSK` `oN`	**Parameter mask enable** Displayed only when a parameter mask is set.
`PRLP` `0`	**Password to move to protect level** Password setting

Operation/Adjustment Protection

The following table shows the relationship between set values and the range of protection.

Level		Set value			
		0	1	2	3
Operation level	**PV**	○	○	○	○
	PV/SP	◎	◎	◎	○
	Other	◎	◎	×	×
Adjustment level		◎	×	×	×

• When this parameter is set to "0," parameters are not protected.

• Default setting: 0

◎: Can be displayed and changed
○ : Can be displayed
× : Cannot be displayed and move to other levels not possible

Initial Setting/Communications Protection

This protect level restricts movement to the initial setting level, communications setting level and advanced function setting level.

Set value	Initial setting level	Communications setting level	Advanced function setting level
0	○	○	○
1	○	○	×
2	×	×	×

• Default setting: 1

○ : Move to other levels possible
× : Move to other levels not possible

Setting Change Protection

This protect level protects setup from being changed by operating the keys on the front panel.

Set value	Description
OFF	Setup can be changed by key operation.
ON	Setup cannot be changed by key operation. (The protect level, can be changed.)

• Default setting: OFF. The Key indicator will light when ON is set.

Parameter Mask Enable

Use this parameter to turn the parameter mask function ON and OFF. Setup Support Software is required to use the parameter mask function.

Setup Support Software: EST2

Password to Move to Protect Level (Default: 0)

Use this parameter to set the password for moving to protect level. Set the value by simultaneously pressing the **UP** Key and **LEVEL** Key or the **DOWN** Key and the **LEVEL** Key.

The protect level cannot be entered if the password has been forgotten. Contact OMRON if the password has been forgotten.

To set the password, enter the password in the screen indicating moving to protect level (`PMoV` `0`), and then press the **MODE** Key. Operation/adjustment protection will be displayed.

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Communications Setting Level

Set the E5CN/E5CN-U/E5EN/E5AN communications specifications in the communications setting level. For setting communications parameters, use the E5CN/E5CN-U/E5EN/E5AN panel.

The communications parameters and their settings are listed in the following table.

Parameter	Displayed characters	Set (monitor) value	Set value	Default
Protocol setting	P5EL	CWF/Mod	CompoWay/F (Sysway)/Modbus	CWF
Communications unit No.	U-No	0 to 99	0 to 99	1
Baud rate	bP5	1.2/2.4/4.8/9.6/ 19.2/38.4	1.2/2.4/4.8/9.6/19.2/ 38.4 (kbits/s)	9.6
Data bits	LEN	7/8	7/8 (bit)	7
Stop bits	5bct	1/2	1/2	2
Parity	PRtY	NoNE/EVEN/odd	None, even, odd	EVEN
Send data wait time	5dWt	0 to 99	0 to 99 (ms)	20

Before executing communications with the E5CN/E5CN-U/E5EN/ E5AN, set the communications unit No., baud rate, etc., through key operations as described below. As for other operations, refer to relevant Operation Manual.

1. Press the **LEVEL** Key for at least three seconds in the "operation level." The level moves to the "initial setting level."
2. Press the **LEVEL** Key for less than one second. The "initial setting level" moves to the "communications setting level."
3. Pressing the **MODE** Key advances the parameters as shown in the following figure.
4. Press the **UP** or **DOWN** Keys to change the parameter setups.

P5EL Protocol setting
CWF   Switches between Compoway/F (SYSWAY) and Modbus.

U-No Communications Unit No.

bP5   Baud rate Compoway/F (SYSWAY) only
9.6

LEN   Data bits
7

5bct Stop bits
2

PRtY Communications parity
EVEN

5dWt Send wait time
20
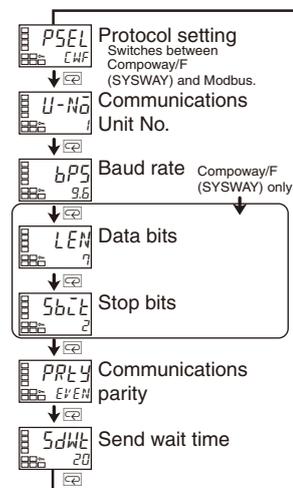
Set the parameters so that they match the host computer.

Protocol Setting (P5EL)

Use this parameter to select the communications protocol. Select from either CompoWay/F (SYSWAY) or Modbus.

Communications Unit No. (U-No)

When communicating with the host computer, the unit number must be set in each Temperature Controller so that the host computer can identify each Temperature Controller. The number can be set in a range from 0 to 99 in increments of 1. The default setting is 1. When using more than one Unit, be careful not to use the same number twice. Duplicate settings will cause malfunction. This value becomes valid when the power is turned OFF and ON again.

Baud Rate (bP5)

Use this parameter to set the speed of communications with the host computer. It can be set to one of the following values; 1.2 (1200 bps), 2.4 (2400 bps), 4.8 (4800 bps), 9.6 (9600 bps), 19.2 (19200 bps), and 38.4 (38400 bps)

This setting becomes valid when the power is turned OFF and ON again.

Data Bits (LEN)

Use this parameter to change the communications data bit length to 7 bits or 8 bits.

Stop Bits (5bct)

Use this parameter to change the communications stop bit to 1 or 2.

Parity (PRtY)

Use this parameter to set the communications parity to None, Even, or Odd.

Send Data Wait Time (5dWt)

Use this parameter to set the send data wait time in increments of 1 ms from 0 to 99 ms. The default setting is 20 ms.

■ Alarm Delays

Delays can be set for the alarm outputs. ON and OFF delays can be set separately for alarms 1, 2, and 3. The ON and OFF delays for alarm 1 function only for the alarm function. If the alarm output 1 is set to be output as an OR with other alarm functions (i.e., the heater burnout alarm, HS alarm, or input error output alarm), the delays will not function for the other alarms. The ON and OFF delays for alarms 1, 2, and 3 also apply to the individual ALM1, ALM2, and ALM3 indicators and to communications status. The alarm ON delays will also function when power is turned ON or when moving from initial setting level to operation level (i.e., to software resets). All outputs will turn OFF and the OFF delays will not function when moving to the initial setting level or when an alarm is output for a heater burnout error.

Operation of Alarm ON and OFF Delays (for an Upper-limit Alarm)
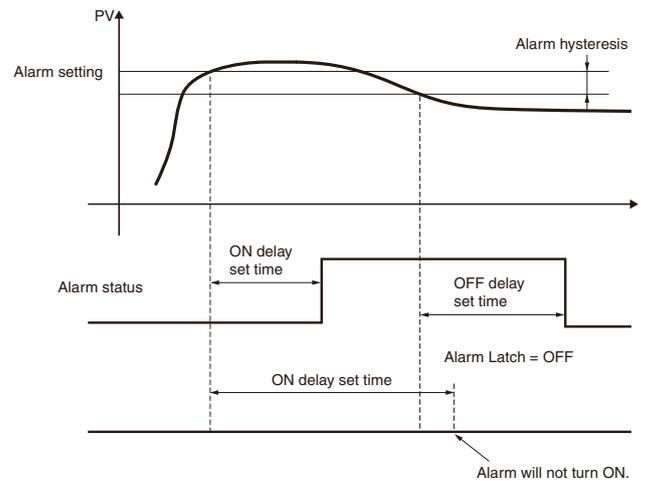
- The alarm will not turn ON if the time that the alarm is ON is equal to or less than the ON delay set time. Also, the alarm will not turn OFF if the time that the alarm is OFF is equal to or less than the OFF delay set time.
- If an alarm turns OFF and then back ON during the ON delay time, the time will be remeasured from the last time the alarm turns ON. Also, if an alarm turns ON and then back OFF during the OFF delay time, the time will be remeasured from the last time the alarm turns OFF.

■ Loop Break Alarm (LBA)

- With a loop break alarm, there is assumed to be an error in the control loop if the control deviation (SP - PV) is greater than the threshold set in the "LBA level" parameter and if the control deviation is not reduced by at least the value set in the "LBA detection band" parameter within the LBA detection time.
- Loop break alarms are detected at the following times.
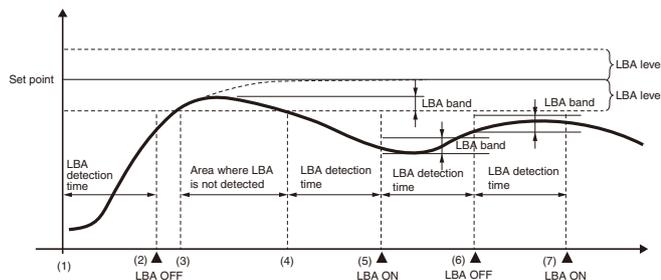
If the control deviation is reduced in the area between 1 and 2 (i.e., the set point is approached) and the amount the control deviation is reduced is at least equal to the LBA band, the loop break alarm will remain OFF.

The process value is within the LBA level between 3 and 4, and thus loop break alarms will not be detected. (The loop break alarm will remain OFF.)

If the process value is outside the LBA level between 4 and 5 and the control deviation is not reduced by at least the LBA band within the LBA detection time, the loop break alarm will turn ON.

If the control deviation is reduced in the area between 5 and 6 (i.e., the set point is approached) and the amount the control deviation is reduced is at least equal to the LBA band, the loop break alarm will turn OFF.

If the control deviation is reduced in the area between 6 and 7 (i.e., the set point is approached) and the amount the control deviation is reduced is less than the LBA band, the loop break alarm will turn ON.

- If the LBA detection time, LBA level, LBA detection band, and PID settings are not appropriate, alarms may be detected inappropriately or alarms may not be output when necessary.
- Loop break alarms may be detected if unexpectedly large disturbances occur continuously and a large deviation does not decrease.
- If a loop break occurs when the set point is near the ambient temperature, the temperature deviation in a steady state may be less than the LBA level, preventing detection of the loop break.
- If the set point is so high or low that it cannot be reached even with a saturated manipulated variable, a temperature deviation may remain even in a steady state and a loop break may be detected.
- Detection in not possible if a fault occurs that causes an increase in temperature while control is being applied to increase the temperature (e.g., an SSR short-circuit fault).
- Detection in not possible if a fault occurs that causes a decrease in temperature while control is being applied to decrease the temperature (e.g., a heater burnout fault).

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Parameters Related to Loop Break Alarms

Parameter name	Symbol	Setting range		Remarks
LBA detection time	*LbA*	0 to 9999 (s)		Setting 0 disables the LBA function.
LBA level	*LbAL*	Controllers with Thermocouple/ Resistance Thermometer Multi-inputs	0.1 to 999.9 (°C/°F) (See note.)	Default: 8.0 (°C/°F)
		Controllers with Analog Inputs	0.01 to 99.99 (%FS)	Default: 10.00% FS
LBA band	*LbAb*	Controllers with Thermocouple/ Resistance Thermometer Multi-inputs	0.0 to 999.9 (°C/°F) (See note.)	Default: 3.0 (°C/°F)
		Controllers with Analog Inputs	0.00 to 99.99 (%FS)	Default: 0.20% FS

Note: Set "none" as the unit for analog inputs.

- A loop break alarm can be output by setting the alarm 1 type to 12 (LBA).
- The ALM1 indicator will light when a loop break is detected.
- Loop breaks are not detected during SP ramp operation.
- Loop breaks are not detected during auto-tuning, manual operation, or while stopped.
- If the alarm 1 latch is set to ON, the latch will be effective for the loop break alarm.

Automatically Setting the LBA Detection Time

- The LBA detection time is automatically set by auto-tuning. (It is not set automatically, however, for heating/cooling control.)
- If the optimum LBA detection time is not obtained by auto-tuning, set the "LBA detection time" parameter (advance function setting level).

Determining the LBA Detection Time

To manually set the LBA detection time, set the "LBA detection time" parameter to twice the LBA reference time given below.

1. Set the output to the maximum value.
2. Measure the time required for the width of change in the input to reach the LBA band.
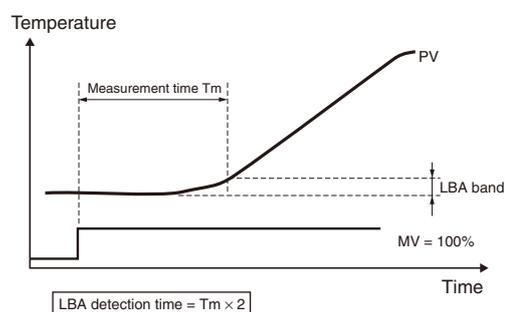
3. Set the "LBA detection time" parameter to two times the measured time.

LBA Level

- Set the control deviation when the control loop is working properly.
- The default is 8.0 (°C/°F) for Controllers with Thermocouple/ Resistance Thermometer Multi-Inputs and 10.00% FS for Controllers with Analog Inputs.

LBA Band

- There is assumed to be an error in the control loop if the control deviation is greater than the threshold set in the "LBA level" parameter and if the control deviation does not change by at least the value set in the "LBA band" parameter.
- The default is 3.0 (°C/°F) for Controllers with Thermocouple/ Resistance Thermometer Multi-Inputs and 0.20% FS for Controllers with Analog Inputs.

■ Manual Operation Control Function

- The manipulated variable can be set in manual mode if the "PV/MV" parameter is displayed in the manual control level. The final MV used in automatic mode will be used as the initial manual MV when moving from automatic mode to manual mode. In manual mode, the change value will be fixed immediately and reflected in the actual MV.
- The automatic display return function will not operate in manual mode.
- Balanceless-bumpless operation will be performed for the MV when switching from manual operation to automatic operation. (See note.)
- If a power interruption occurs during manual operation, manual operation will be restarted when power is restored using the same MV as when power was interrupted.
- Switching between automatic and manual operation is possible for a maximum of one million times.
- Manual operation can be used only for PID control.

Note: In balanceless-bumpless operation, the MV before switching is used initially after the switch and then gradually changed to achieve the proper value after switch to prevent radical changes in the MV after switching operation.

The overall manual operation is illustrated in the following figure.
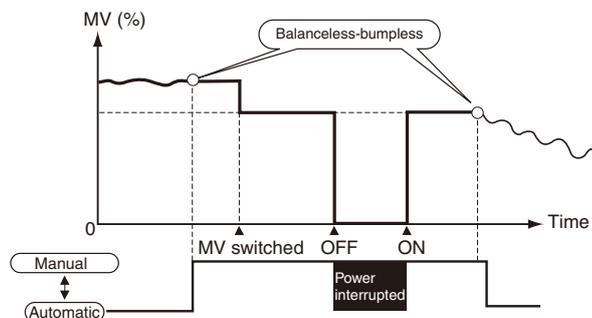
Related Displays and Parameters

Parameter name	Symbol	Level	Remarks
PV/MV (manual MV)	---	Manual Control Level	−5.0 to 105.0 (heating/cooling control: −105.0 to 105.0)
Auto/manual switch	$A\text{-}M$	Operation Level	Switches between automatic and manual modes.
Auto/manual select addition	$AMAd$	Advanced Function Setting Level	Enables switching between automatic and manual modes.

Moving to the Manual Control Level

- When the **LEVEL** Key is pressed for at least 3 seconds in the operation level's auto/manual switching display, the manual mode will be entered and the manual control level will be displayed. It is not possible to move to any displays except for the "PV/MV" parameter during manual operation. Press the **LEVEL** Key for at least one section from the "PV/MV" display in manual control level to return to automatic mode and display the top parameter in the operation level.
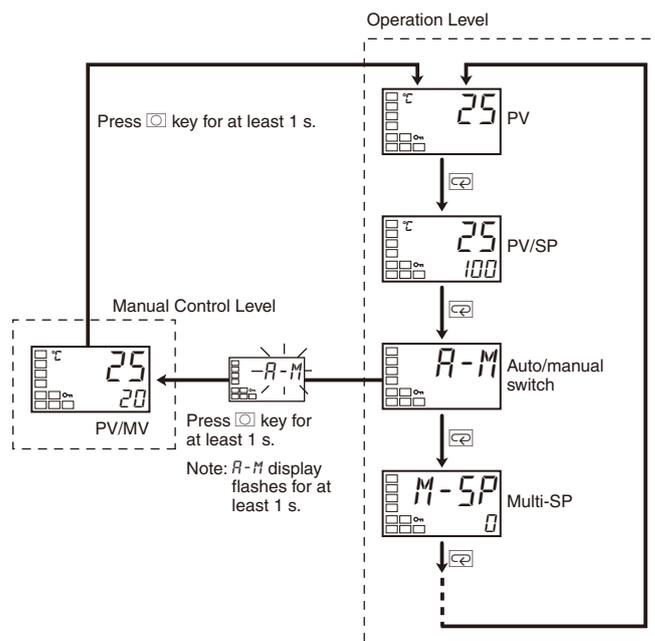
- If an event input is set to "MANU" (auto/manual), the "auto/manual switch" parameter will not be displayed. Use the event input to switch between automatic and manual modes.

Auto/Manual Select Addition

The "auto/manual select addition" parameter must be set to ON in the advance function setting level before it is possible to move to manual mode. The default is off.

Note: 1. Priority of Manual MV and Other Functions
Even when operation is stopped, the manual MV is given priority.
Auto-tuning and self-tuning will stop when manual mode is entered.

2. Manual MV and SP Ramp
If operating, the SP ramp function will continue even when manual mode is entered.

■ Transfer Output Function

If a control output is a linear current output it can be used as a transfer output. To use the transfer output, set the "transfer output type" parameter to any setting other than OFF.

(When the "transfer output type" parameter is set to any setting other than OFF, the "transfer output upper limit" and "transfer output lower limit" parameters will be enabled.)

Transfer Output Type

Transfer output type	Symbol	Setting range
OFF (See note 1.)	ōFF	---
Set point	5P	SP lower limit to SP upper limit
Set point during SP ramp	5P-M	SP lower limit to SP upper limit
PV	PV	Sensor setting range lower limit to Sensor setting range upper limit or Scaling lower limit to Scaling upper limit
MV monitor (heating)	MV	−5.0 to 105.0 (heating/cooling control: 0.0 to 105.0) (See note 2.)
MV monitor (cooling)	C-MV	0.0 to 105.0 (See note 2.)

Note: 1. The default is OFF. If the transfer type is set to OFF, the item assigned in the "control output 1 assignment" parameter will be output on control output 1.

2. The difference between the transfer output value and the linear current output value is illustrated in the following figure.
If the linear output is used as the transfer output when the linear current output type is set to 4 to 20 mA, 4.0 mA will be output for 0% and 20.0 mA will be output for 100%.
When a linear output is used for the control output, 3.7 mA is output for 0% and 20.3 mA is output for 100% when the control output for heating is selected to ensure that the control object is controlled at 0% and 100%.
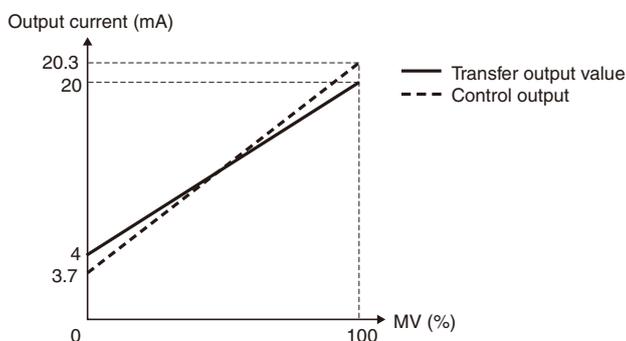
(The above graph is for when the linear current output type is set to 4 to 20 mA.)

Transfer Scaling

- Reverse scaling is possible by setting the "transfer output lower limit" parameter larger than the "transfer output upper limit" parameter. If the "transfer output lower limit" and "transfer output upper limit" parameters are set to the same value when 4 to 20 mA is set, the transfer output will be output continuously at 0% (4 mA).
- If the SP, SP during SP ramp, or PV is selected, the "transfer output lower limit" and "transfer output upper limit" parameters will be forcibly initialized to the respective upper and lower setting limits for changes in the upper and lower limits of the SP limiter and the temperature unit.
  If the MV for heating or MV for cooling is selected, the "transfer output lower limit" and "transfer output upper limit" parameters will be initialized to 100.0 and 0.0, respectively, when a switch is made between standard control and heating/cooling control using the "standard or heating/cooling" parameter.
- The output current when the linear current type is set to 4 to 20 mA, the transfer output upper limit is set to 90.0, and the transfer output lower limit is set to 10.0 is shown in the following graph.
- For scaling from 0.0% to 100.0%, the output for −5.0 to 0.0 will be the same value as for 0.0%, and the output for 100.0 to 105.0 will be the same value as for 100.0%
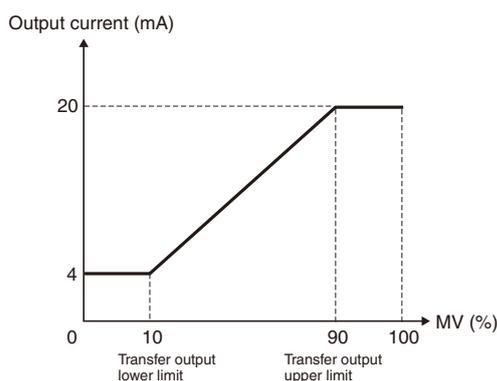
(The above graph is for when the linear current output type is set to 4 to 20 mA.)

■ Simple Program Function

• The simple program function can be used for the following type of control.
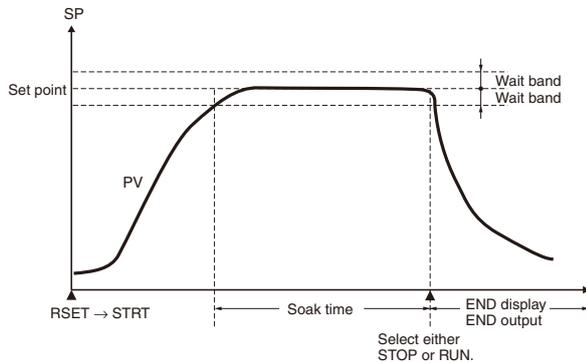
• The program will start when the "program start" parameter is changed from RSET to STRT. END will be displayed on the No. 2 display and the output assigned as the program end output will turn ON after the time set in the "soak time" parameter has expired in the wait band. The "program pattern" parameter can be used to select moving to STOP mode or continuing operation in RUN mode after the program ends.

Parameters Related to the Simple Program Function

Parameter name	Symbol	Set (monitor) values	Unit	Display level
Program pattern	PtRN	OFF, STOP, CONT	---	Initial setting level
Program start	PRSt	RSET, STRT	---	Operation level
Soak time	SoAK	1 to 9999	min or h	Adjustment level
Soak time unit	t-U	m (minutes)/h (hours)	---	Advanced function setting level
Wait band	Wt-b	OFF or 0.1 to 999.9 (See note 2.)	°C or °F (See notes 1 and 2.)	Adjustment level
Soak time remain monitor	SKtR	0 to 9999	min or h	Operation level

Note: 1. Set for Controllers with Thermocouple/Resistance Thermometer Multi-inputs. Set "none" as the unit for Controllers with Analog Inputs.
2. The setting unit of the "wait band" parameter is %FS for Controllers with Analog Inputs and the setting range is OFF or 0.01 to 99.99.

Error Displays (Troubleshooting)

When an error occurs, an error code will be displayed on the No. 1 display. Check the contents of an error and take appropriate countermeasures.

No.1 display	Contents	Countermeasure	Output status	
			Control output	Alarm output
5.ERR (S.ERR)	Input error (See note 2.)	Check that the input wiring is correct, that there is no disconnection or short-circuit, and that the input type is correct. (Thermocouple input short-circuits cannot be detected.)	OFF (See note 3.)	Treated as an abnormal temperature
E 1 1 1 (E111)	Memory error	Reset the power. If the display does not change, replacement is necessary. If the error is removed, it is possible that the original error was caused by noise. Check that there are no possible sources of noise.	OFF	OFF
H.ERR (H.ERR)	HB error (See note 2.)		OFF (See note 3.)	OFF

Note 1. If the input is within the range for which control is possible but outside the displayable range (−1999 (−199.9) to 9999 (999.9)), ⊃⊃⊃⊃ will be displayed if the value is less than −1999 (−199.9), and ⊃⊃⊃⊃ will be displayed if it is greater than 9999 (999.9). Control output and alarm output will operate normally for either of these displays. Refer to the *E5CN/E5CN-U/E5AN/E5EN Digital Temperature Controller User's Manual* (Cat. No. H134) for details on the ranges for which control is possible.

2. These errors are displayed only when the Controller is set to display the present value or the present value and the set value. They are not displayed in other statuses.

3. If a manual MV, MV at stop, or MV at error is set, output will be performed according to the setting.

Troubleshooting

Check the points in the following table if the temperature does not rise, outputs do not turn ON, or there are large discrepancies in the temperature.

Problem	Items to check and probable cause	Countermeasure
The temperature does not rise. Outputs do not turn ON.	1. Has control stopped? If the STOP indicator is lit, control has stopped.	Set *RUN/StoP* to *RUN* in the operation level. The STOP indicator will turn OFF.
	2. Is control set to forward operation? Control must be set to reverse operation for heating control.	Set control operation *oREV* to reverse operation *oR-R* in the initial setting level.
	3. Are the OUT indicators for control output lit or flashing? If the control output is not current output, the OUT indicators turn ON in synchronization with the output.	If the OUT indicators do not light at all, check items 1 and 2. If the OUT indicators are continuously lit, check connections to sensors, heaters, and other peripheral devices.
	4. If PID control is used, it is possible that the PID constants are unsuitable.	If possible, obtain the PID constants using auto-tuning. (Autotuning uses 100% output with respect to the load, and so overshooting may occur.)
There are large discrepancies in the temperature.	1. Is the correct type of sensor used?	After checking the sensor type, check the setting for input type (*CN-t*) in the initial setting level.
	2. Are input offset values used?	Check the settings for input offset (*CN5*) in the adjustment level. To display the temperature as measured by the sensor, set the input offset to 0.0.
	3. Is a compensating conductor used to extend the thermocouple connection?	Be sure to use a compensating conductor that is suitable for the sensor used.
	4. Is the sensor separated by a long distance? Is the insertion length short?	Check the installation location of the sensor with respect to the measured object. The sensor's insertion length must be at least 20 times the diameter of the protective tubing.
	Checking Temperature Controller input: • Thermocouple: Short the input terminals to display the room temperature. • Platinum Resistance Thermometer: Connect a resistance to the input terminals and check the display. Connect 100 Ω to A-B and short B-B: 0°C Connect 140 Ω to A-B and short B-B: Approx. 100°C	

Returning Internal Parameters to Their Defaults

Perform this procedure to return all settings to their initial states

For details, refer to *Parameters* on page 29.

Initialize the settings in the advanced function setting level. To enter the advanced function setting level, initial setting/communications protection must be released in the protect level.

1. Releasing Protection
   Enter the protect level. Set the Initial Setting Communications Protection parameter to 0.
2. Entering the Advanced Function Setting Level
   Enter the advanced function setting level (top display: *CNCt*). Set the bottom display to *FACt*. After a few seconds initialization will be completed and it will return to OFF automatically.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

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

In the interest of product improvement, specifications are subject to change without notice.

Safety Precautions for All Temperature Controllers

Refer to the precautions of individual product for more specific details.

⚠ Warning

The following products contain lithium batteries. Do not disassemble, deform under pressure, heat to over 100°C, or incinerate these products. The lithium battery may ignite or explode. Applicable models: E5ZE, E5LD, and E5LC.

⚠ Caution

Do not touch any of the terminals while the power is being supplied. Doing so may result in electric shock.

Do not allow pieces of metal or wire cuttings to get inside the Temperature Controller. Doing so may result in electric shock, fire, or malfunction.

Do not attempt to disassemble, repair, or modify the Temperature Controller. Any attempt to do so may result in electric shock, fire, or malfunction.

Do not use the Temperature Controller in locations subject to flammable or explosive gases. Doing so may result in an explosion.

The switching capacity and switching conditions will significantly affect the longevity of the output relays. Use the Temperature Controller within the rated load, and do not use the Temperature Controller beyond the number of operations specified under electrical life. Using the Temperature Controller beyond its electrical life may result in contact welding or burning.

Use Temperature Controller settings that are appropriate for the controlled system. Failure to do so may cause unexpected operation resulting in damage to equipment or personal injury

Prepare a circuit with an overheating prevention alarm and implement other safety measures to ensure safe operation in the event of a malfunction. Loss of operational control due to malfunction may result in a serious accident.

Tighten the terminal screws to the following torque:
  M3.5 screws: 0.74 to 0.90 N·m
  M3 screws: 0.40 to 0.56 N·m
  E5GN: Terminals 1 to 6: 0.23 to 0.25 N·m
            Terminals 7 to 9: 0.12 to 0.14 N·m
Failure to tighten terminal screws to the correct torque may result in fire or malfunction.

Make sure there will be no adverse affects from the device connected to the Temperature Controller before using the hardware test mode. Devices connected to the Temperature Controller may reach a dangerous state during the test.

Operating Environment Precautions

1. Do not use the Temperature Controller in the following locations:
   • Locations exposed to radiated heat from heating devices
   • Locations subject to exposure to water or oil
   • Locations subject to direct sunlight
   • Locations subject to dust or corrosive gases (in particular, sulfide gas and ammonia gas)
   • Locations subject to severe changes in temperature
   • Locations subject to icing or condensation
   • Locations subject to excessive shock or vibration
2. Use and store the Temperature Controller within the rated temperature or humidity range specified for each model. 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 the heat they radiate and the service life of the products will decrease. In such cases, forced cooling by fans or other means of air ventilation will be required to cool down the Temperature Controllers.
3. Allow enough space around the Temperature Controller to ensure proper heat dissipation. Do no block the ventilating holes.
4. Be sure to wire properly with correct polarity of terminals.
5. To wire the E5AN, E5EN, or E5CN using crimp terminals, use crimp terminals designed for M3.5 screws and with a width of 7.2 mm max.

6. When wiring the E5GN, use a cable gauge of AWG24 (0.205 mm^2) to AWG14 (2.081 mm^2) for terminals 1 to 6, and use a cable gauge of AWG28 (0.081 mm^2) to AWG22 (0.326 mm^2) for terminals 7 to 9. The exposed current-carrying part to be inserted into terminals must be 5 to 6 mm.
7. After wiring is completed, do not pull on or bend a terminal block lead wire with a force of 30 N or higher.
8. Do not connect anything to unused terminals.
9. Make sure that the power supply voltages and loads are within specification and rating ranges before using the Temperature Controller.
10. To avoid inductive noise, keep the wiring for the Temperature Controller's terminal board away from power cables carrying high voltages or large currents. Also, do not wire power lines together with or parallel to Temperature Controller wiring. Using shielded cables to separate pipes and ducts is recommended.
    Attach surge absorbers or noise filters to peripheral devices that generate noise (e.g., motors, transformers, solenoids, magnetic coils, or other equipment that has an inductance element). If using a noise filter with the power supply, be sure to confirm the voltage and the current, and then mount the power supply as near as possible to the Temperature Controller.
    Set up the Temperature Controller, along with its power supply, as far away as possible from devices that generate strong, high-frequency waves, such as high-frequency welders and high-frequency machines, and from devices that generate surges.
11. Make sure that the rated voltage is attained within two seconds of turning the power ON.
12. Allow at least 30 seconds for the Temperature Controller to warm up.
13. 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.

14. In order that power can be turned OFF in an emergency by the person operating the Temperature Controller, install the appropriate switches and circuit breakers, and label them accordingly.
15. Turn OFF the power before drawing out the Temperature Controller body. Do not touch or apply excessive force to the terminals or electronic parts. When inserting the body, make sure that electronic parts do not come in contact with the case.
16. When the terminal block for the E5GN is detached, do not touch or apply excessive force to any electronic parts.
17. Use alcohol to clean the Temperature Controller. Do not use thinner or other solvent-based substances.
18. Inverters with an output frequency of 50/60 Hz are available, but they may cause the internal temperature of Temperature Controller to rise, possibly resulting in smoke or burning. Do not use an inverter output to supply power to a Temperature Controller.

Precautions for Correct Use

● Service Life

1. Use the Temperature Controller within the specified temperature and humidity ranges. If the product is installed inside a control panel, the temperature around the Temperature Controller and not the temperature around the control panel must be kept within the specified temperature range.
2. The service life of electronic devices such as Temperature Controllers is determined not only by the number of switching operations performed by the relay, but also by the service life of the internal electronic components. The service life of these components depends on the ambient temperature: it will be shorter if the ambient temperature is high and longer if the ambient temperature is low. For this reason, the service life of the product can be extended by keeping the internal temperature of the Temperature Controller low.
3. If several Temperature Controllers are mounted side-by-side or are arranged vertically, the heat generated by them may cause the internal temperature of the products to rise, thus reducing their service life. To prevent this, take steps to ensure that the Temperature Controllers are cooled, such as installing fans. When providing forced cooling, however, be careful not to cool down the terminal sections alone to avoid measurement errors.

● Measurement Accuracy

1. When extending the lead wires for thermocouples, use a compensating conductor appropriate for the type of thermocouple use.
2. When extending the lead wires for platinum resistance thermometers, use lead wires with low resistance, and make the resistance in the 3 lead wires equal.
3. The type of Temperature Sensor and the input type for the Temperature Controller must be set the same.
4. There are two types of platinum resistance thermometers: Pt and JPt. Accurate measurement will not be possible if the input type for the Temperature Sensor is not set correctly.
5. Mount the Temperature Controller horizontally.
6. If significant errors occur, check to see if the input shift has been set correctly.

● Waterproofing

Sections without any specification on their degree of protection or those with IP□0 specifications are not waterproof.

● EN/IEC Compliance

Installing the following fuse in the power supply terminal block is recommended if the Temperature Controller is used in applications requiring EN/IEC compliance.
Recommended fuse: A T2A, 250-VAC, time lag fuse with low breaking capacity

● Operating Precautions

1. It takes approximately five seconds for the outputs to turn ON from the moment the power is turned ON. Due consideration must be given to this time when incorporating Temperature Controllers in a sequence circuit.
2. When using the self-tuning capability of the E5□N, E5□K, or E5□J, supply power to 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. 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 in this case.)
3. The reception of the Temperature Controller may be affected if it is used close to radios, television sets or wireless devices.

Parameter Displays

The following displays are use to represent the characters for parameter names on the Temperature Controller.

● Seven-segment Digital DIsplay

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z

● Eleven-segment Digital Display

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

In the interest of product improvement, specifications are subject to change without notice.