

Modular Temperature Controller

E5ZN

New In-panel DIN Track Mounting Temperature Controller

- Two channels of temperature control available despite width of only 22.5 mm.
- The Temperature Controller itself can be replaced without changing terminal wiring.
- Use in combination with a compact Setting Display Unit to reduce communications programming requirements.
- A wide variety of operation indicators (single-color LEDs) enable easy operation monitoring.
- Power supply and communications wiring not required between Units when mounted side-by-side.



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Ordering Information

Name	Power supply	No. of control points	Control output	Auxiliary output	Functions	Communications functions	Input type	Model	
Temperature Controller	24 VDC	2	Voltage output (for SSRs)	Transistor output: 2 pts (sinking)	Heating or cooling control is selectable (See note 2.)	RS-485	Thermocouple	E5ZN-2QNH03TC-FLK	
				Platinum resistance thermometer			E5ZN-2QNH03P-FLK		
				Transistor output: 2 pts (sourcing)			Thermocouple	E5ZN-2QPH03TC-FLK	
				Platinum resistance thermometer			E5ZN-2QPH03P-FLK		
			Transistor output	Transistor output: 2 pts (sinking)	Heater burnout alarm (See note 3.)		Thermocouple	E5ZN-2TNH03TC-FLK	
				Platinum resistance thermometer			E5ZN-2TNH03P-FLK		
				Transistor output: 2 pts (sourcing)			Event input: 1 point per Unit	Thermocouple	E5ZN-2TPH03TC-FLK
								Platinum resistance thermometer	E5ZN-2TPH03P-FLK

- Note:**
1. Terminal Units are required for wiring. Purchase separately.
 2. When using heating or cooling output functionality, the auxiliary output will be either heating control output or cooling control output.
 3. When using the heater burnout alarm, purchase a Current Transformer (CT) separately.
 4. Analog input and infrared temperature sensors (ES1A) can also be used with thermocouple models.

Name	No. of terminals	Functions	Model
Terminal Unit	24	Equipped with communications terminals for power supply, communications, and setting devices.	E5ZN-SCT24S-500
	18 (See note 1.)	Not equipped with communications terminals for power supply, communications, and setting devices.	E5ZN-SCT18S-500

- Note:**
1. When using 2 or more E5ZNs mounted side-by-side, use the E5ZN-SCT18S-500 for the second and subsequent Units. When using E5ZNs separately, be sure to use the E5ZN-SCT24S-500.
 2. Two End Plates are provided with E5ZN-SCT24S-500 Terminal Units. When mounting to a DIN track, be sure to mount End Plates on both sides.

Current Transformer (CT) (Sold Separately)

Model	E54-CT1	E54-CT3
Diameter	5.8 dia.	12.0 dia.

Terminal Cover

Model	E53-COV12	E53-COV13
Type	For SCT24S-500 models	For SCT18S-500 models

- Note:** The Terminal Cover comes with the Terminal Unit and does not have to be purchased separately.

Setting Display Unit (Sold Separately)

Name	Power supply	Model
Setting Display Unit (See note.)	24 VDC	E5ZN-SDL

Note Purchase sockets for wiring (shown in the table below) separately.

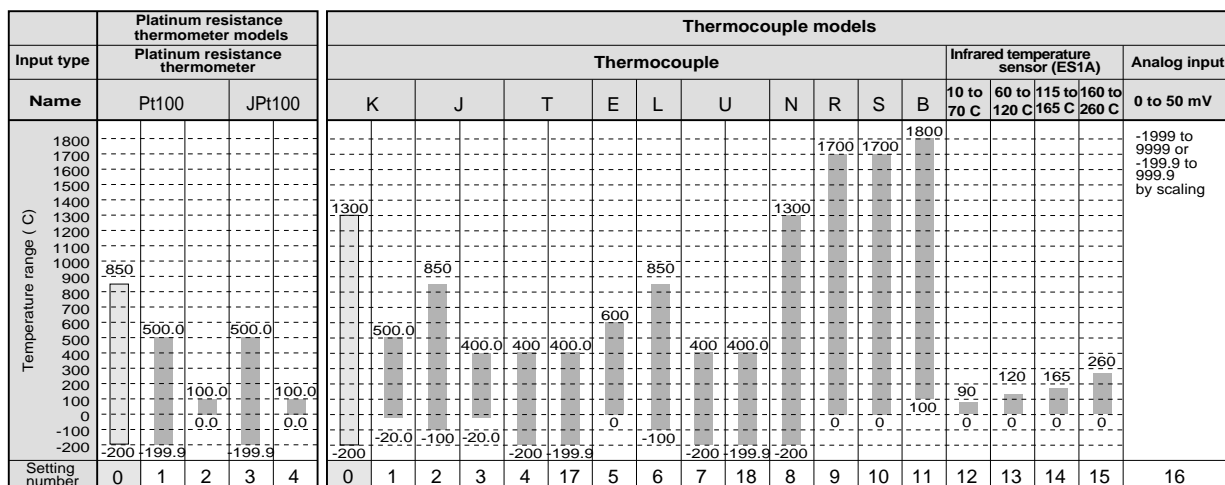
Sockets (for Setting Display Unit - Sold Separately)

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

Note Refer to the following manual for precautionary information and other information necessary to use the E5ZN: E5ZN Modular Temperature Controller User's Manual (Cat. No. H113).

Input Range

Platinum Resistance Thermometer Models and Thermocouple Models



The applicable standards for the inputs types are as follows:

- K, J, T, E, N, R, S, B: JIS C1602-1995, IEC584-1
 - L: Fe-CuNi, DIN 43710-1985
 - U: Cu-CuNi, DIN 43710-1985
 - JPt100: JIS C 1604-1989, JIS C 1606-1989
 - Pt100: JIS C 1604-1997 IEC 751
- Shaded parts indicate the settings at the time of purchase.

Specifications

■ Ratings

Power supply voltage	24 VDC	
Allowable voltage range	85% to 110% of the rated power supply voltage	
Power consumption	Approx. 3 W	
Sensor input	Thermocouple: K, J, T, E, L, U, N, R, S, B Infrared temperature sensor: 10 to 70°C, 60 to 120°C, 115 to 165°C, 160 to 260°C (ES1A Series) Voltage input: 0 to 50 mV	
	Platinum resistance thermometer: Pt100, JPt100	
Control output	Voltage output	Output voltage: 12 VDC ±15% (PNP); Maximum load current: 21 mA; Equipped with short-circuit protection circuit
	Transistor output	Maximum operational voltage: 30 VDC; Maximum load current: 100 mA; Residual voltage: 1.5 V max.; Leakage current: 0.4 mA max.

Auxiliary output	Transistor output	Sourcing	Maximum operating voltage: 30 VDC; Maximum load current: 50 mA; Residual voltage: 1.5 V max.; Leakage current: 0.4 mA max.
		Sinking	
Event output	Contact output	ON: 1 kΩ max., OFF: 100 kΩ min.	
	Non-contact output	ON: Residual voltage: 1.5 V max., OFF: Leakage current: 0.1 mA max.	
Number of input and control points	Input points: 2, Control points: 2		
Setting method	Via communications or using the Setting Display Unit (E5ZN-SDL)		
Control method	2-PID or ON/OFF control		
Other functions	Heater burnout detection function Multi-SP and RUN/STOP switching using event input		
Ambient operating temperature	-10 to 55°C (with no icing or condensation) For 3-years of assured use: -10 to 50°C		
Ambient operating humidity	25% to 85%		
Storage temperature	-25 to 65°C (with no icing or condensation)		

■ Characteristics

Indication accuracy	Thermocouple: (Indicated value $\pm 0.5\%$ or $\pm 1^\circ\text{C}$, whichever is greater) ± 1 digit max. (See note 1.) Platinum resistance thermometer: (Indicated value $\pm 0.5\%$ or $\pm 1^\circ\text{C}$, whichever is greater) ± 1 digit max. (See note 1.) Analog input: $\pm 0.5\%$ or ± 1 digit max.		
Hysteresis	0.1 to 999 EU (in units of 0.1 EU) (See note 2.)		
Proportional band (P)	0.1 to 999 EU (in units of 0.1 EU) (See note 2.)		
Integral time (I)	0 to 3,999 s (in units of 0.1 s)		
Derivative time (D)	0 to 3,999 s (in units of 0.1 s)		
Control period	1 to 99 s (in units of 0.1 s)		
Manual reset value	0.0 to 100.0% (in units of 0.1%)		
Alarm setting range	-1,999 to 9,999 (Position of decimal point depends on input type.)		
Sampling period	500 ms		
Insulation resistance	20 MΩ min. (at 500 VDC)		
Dielectric strength	600 VAC for 1 minute at 50 or 60 Hz (between unlike terminals of charged parts)		
Vibration resistance	10 to 55 Hz, 10 m/s ² for 2 hrs each in X, Y, and Z directions		
Shock resistance	150 m/s ² max., 3 times each in $\pm X$, $\pm Y$, and $\pm Z$ directions		
Enclosure rating	Temperature Controller: IP00 Terminal Unit: IP00		
Memory protection	EEPROM (non-volatile memory) (Number of write operations: 100,000)		
Weight	Temperature Controller: Approx. 90 g Terminal Unit (1): Approx. 80 g Terminal Unit (2): Approx. 100 g		
Approved standards	UL File No.:	E200593	
	CSA File No.:	203889-1140084	
	CE EMS:	ESD	EN61326, EN61000-4-2 (4 kV/contact, 8 kV/air)
		REM field	EN61326, EN61000-4-3 (10 V/m)
		Fast transient	EN61326, EN61000-4-4 (2 kV/DC power, 1 kV/I/O)
		Surge immunity	EN61326, EN61000-4-5 (line to ground: 2 kV/DC power 1 kV/I/O line to line: 1 kV/DC power)
	Conducted RF	EN61326, EN61000-4-6 (10 V)	
	EMI: Radiated	EN61326 Class A	

Note: 1. The indication accuracy for T and N thermocouples at -100°C, and for U and L thermocouples is $\pm 2^\circ\text{C} \pm 1$ digit max. There is no specification for the indication accuracy for the B thermocouple used at 400°C max. The indication accuracy for R and S thermocouples at 200°C max. is $\pm 3^\circ\text{C} \pm 1$ digit max.

2. "EU" stands for "Engineering Unit."

■ Communications (Host Communications)

Transmission line connection method	RS-485 multipoint
Communications method	RS-485 (2-wire, half-duplex)
Synchronization method	Start-stop synchronization
Baud rate	4,800, 9,600, 19,200, or 38,400 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) BCC (block check character)
Flow control	None
Interface	RS-485
Retry function	None
Number of Units that can be connected in parallel	16 Units max. (32 channels)

Note The baud rate, data bit length, stop bit length, and vertical parity can all be set independently as host communications settings.

■ Setting Display Unit (Sold Separately) Ratings and Characteristics

Power supply voltage	24 VDC
Allowable voltage range	85% to 110% of the rated power supply voltage
Power consumption	Approx. 1 W
Display method	7-segment digital display and single-color display
Ambient operating temperature	-10 to 55°C (with no icing or condensation) For 3-years of assured use: -10 to 50°C
Ambient operating humidity	25% to 85%
Storage temperature	-25 to 65°C (with no icing or condensation)
Communications method	RS-485 (half-duplex)
Communications format	Fixed (baud rate: 38,400 bps; data bit length: 7 bits; even parity; stop bit length: 2)
Insulation resistance	20 MΩ min. (at 500 VDC)
Dielectric strength	1,500 VAC for 1 minute at 50 or 60 Hz (between unlike terminals of charged parts)
Vibration resistance	10 to 55 Hz, 20 m/s ² for 2 hrs each in X, Y, and Z directions
Shock resistance	300 m/s ² max., 3 times each in ±X, ±Y, and ±Z directions
Enclosure ratings	Front panel: IP50 Rear case: IP20 Terminal case: IP00
Memory protection	EEPROM (non-volatile memory) (Number of write operations: 100,000)
Weight	Approx. 100 g Fittings: Approx. 10 g

■ Current Transformer (CT) Ratings (Sold Separately)

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

■ Heater Burnout Alarm Characteristics

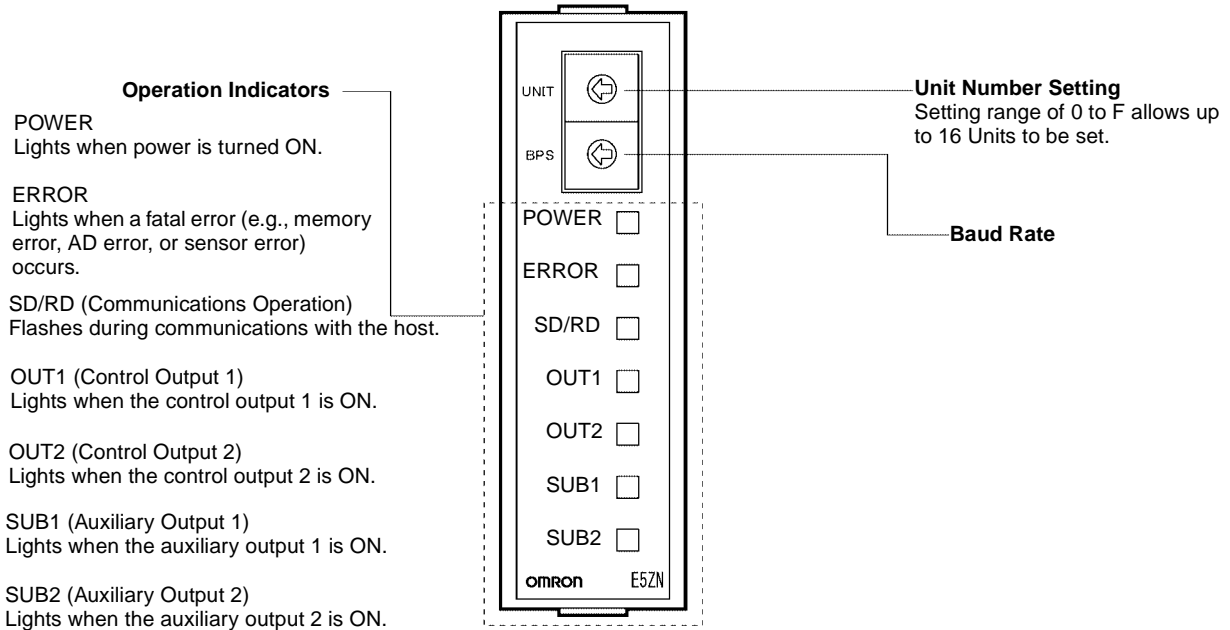
Maximum heater current	Single-phase, 50 A AC (See note 1.)
Input current readout accuracy	±5% FS ±1 digit max.
Heater burnout alarm setting range	0.0 to 50.0 A (in units of 0.1 A) (See note 2.)
Minimum detection ON time	190 ms (See note 3.)

Note:

1. Use the K2CU-F@@A-@GS (with GATE input terminal) for burnout detection of 3-phase heaters.
2. If the heater burnout alarm setting is set to 0.0 A, the alarm is always OFF, and if it is set to 50.0 A the alarm is always ON.
3. If the ON time for control output is less than 190 ms, heater burnout detection and heater current measurement will not be performed.

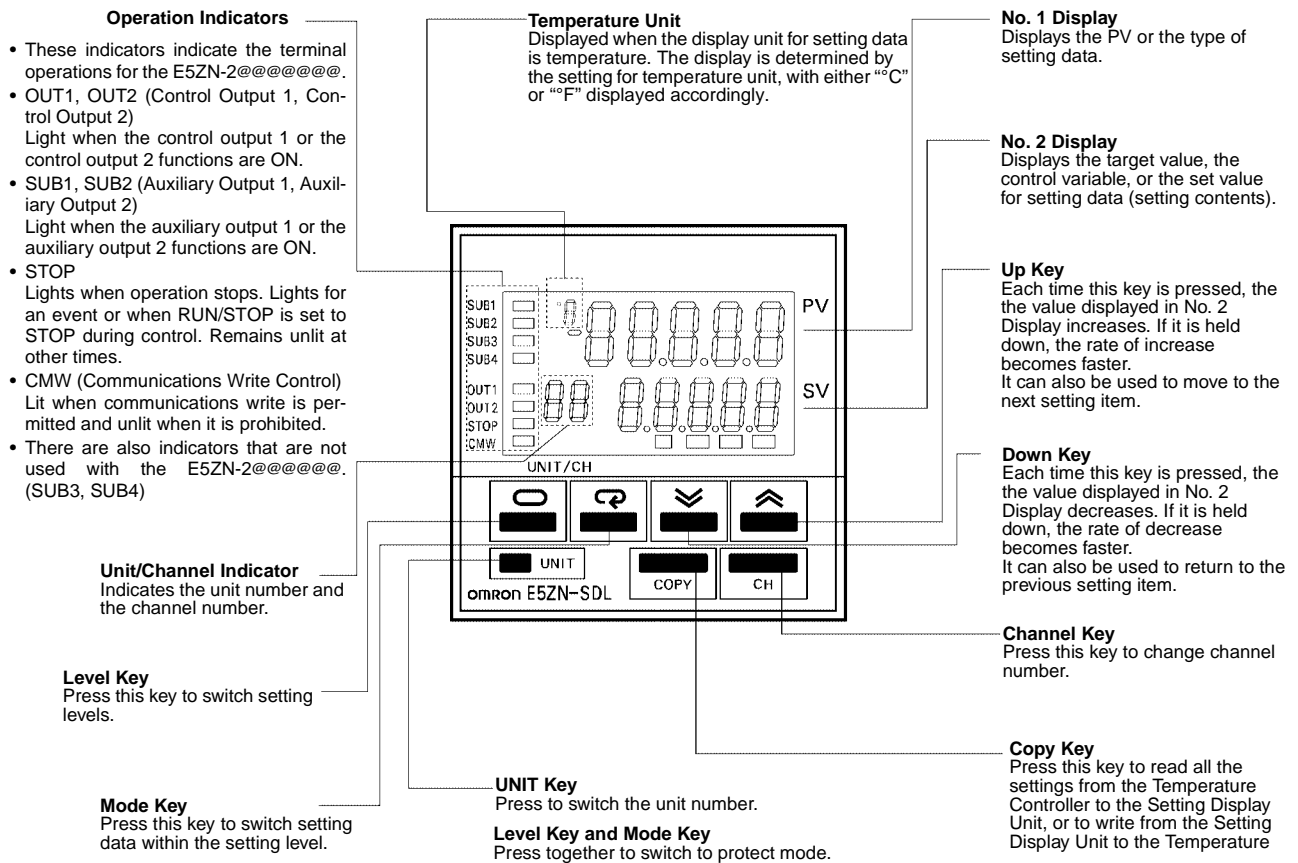
Nomenclature

E5ZN-2



E5ZN-SDL

The following diagram shows the names and functions of the E5ZN-SDL parts for when it is connected to the E5ZN-2@@@@@@.



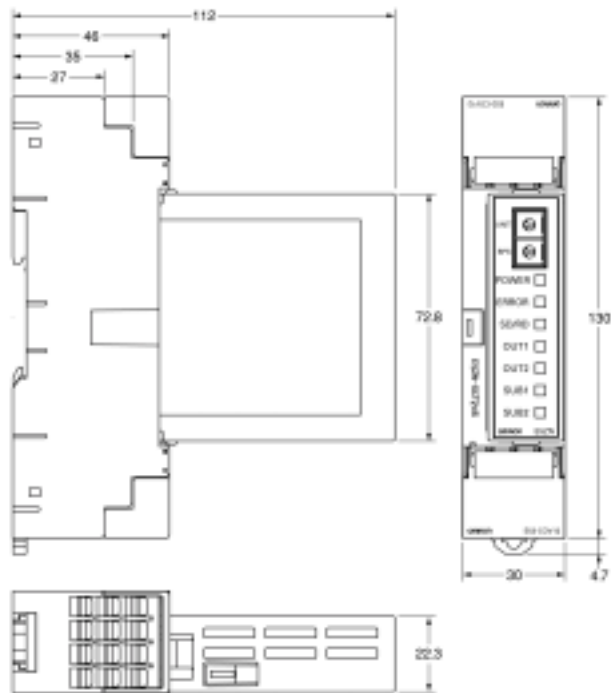
Dimensions

Note All units are in millimeters unless otherwise indicated.

E5ZN-2@@H03@-FLK Connected to E5ZN-SCT24S-500



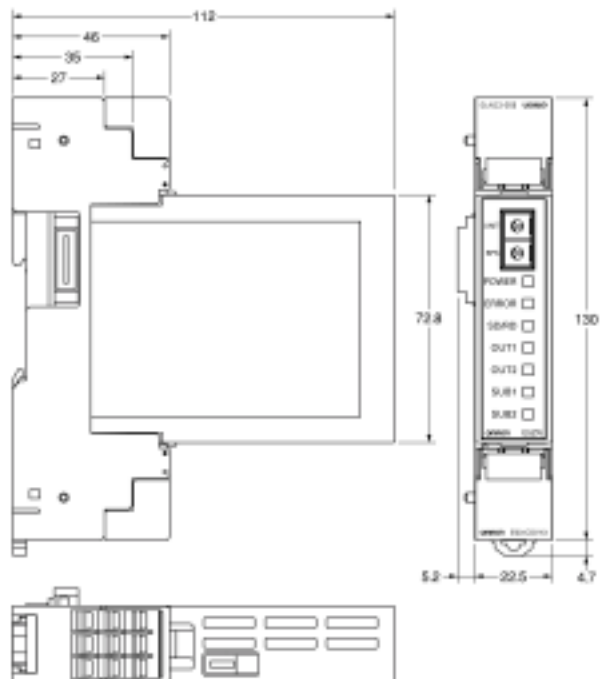
When only using one Unit, purchase the E5ZN-2@@H03@-FLK and the E5ZN-SCT24S-500 together. Also, when using horizontal side-by-side mounting, purchase the first Unit together with the E5ZN-SCT24S-500.



E5ZN-2@@H03@-FLK Connected to E5ZN-SCT18S-500

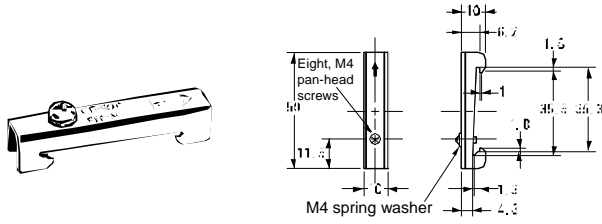


When mounting Units side-by-side, purchase the E5ZN-2@@H03@-FLK together with the E5ZN-SCT18S-500 for the second and subsequent Units.



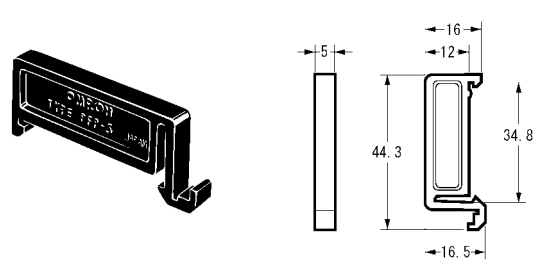
Note Refer to the following manual for precautionary information and other information necessary to use the E5ZN: E5ZN Modular Temperature Controller User's Manual (Cat. No. H113).

■ End Plate
PFP-M



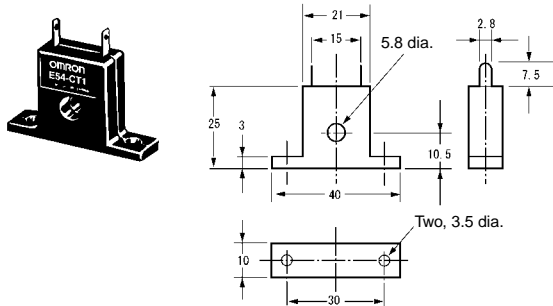
Note End Plates are provided with the E5ZN-SCT24-500. Be sure to mount End Plates at both ends of Unit blocks.

■ Spacer
PFP-S

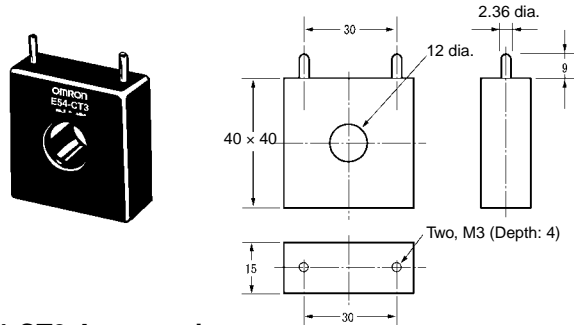


■ Current Transformer (Sold Separately)

E54-CT1

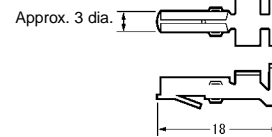


E54-CT3

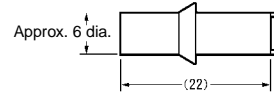


E54-CT3 Accessories

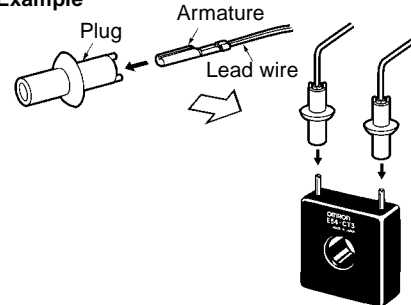
Armature



Plug

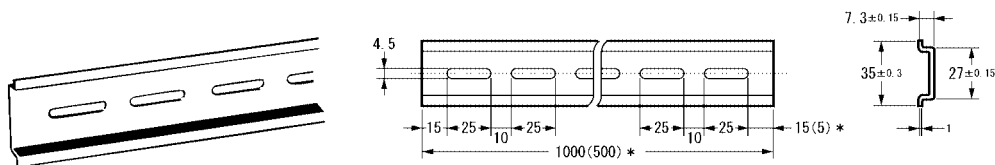


Connection Example



■ Mounting Track (for DIN Track Mounting - Sold Separately)

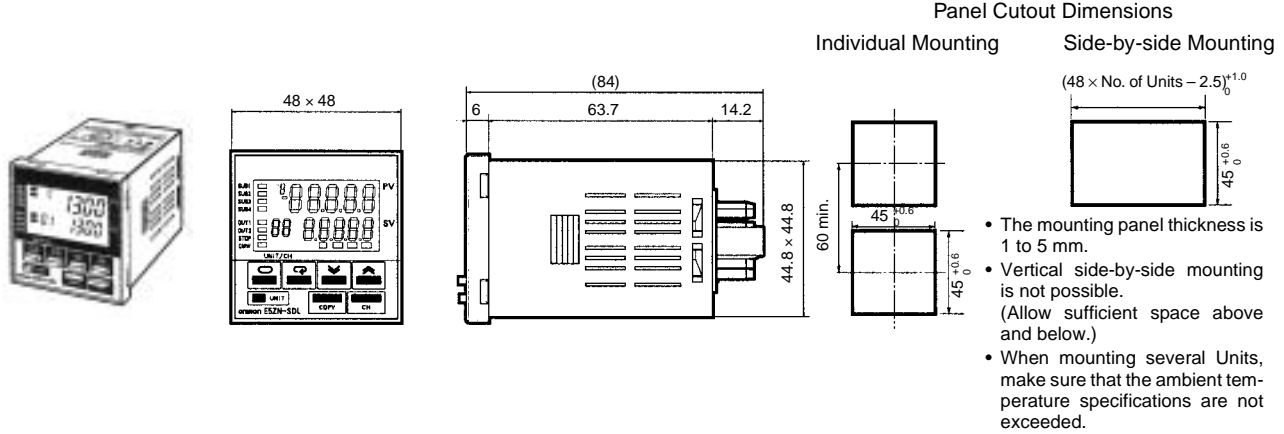
PFP-100N
PFP-50N



* indicates dimensions for the PFP-50N.

■ Setting Display Unit

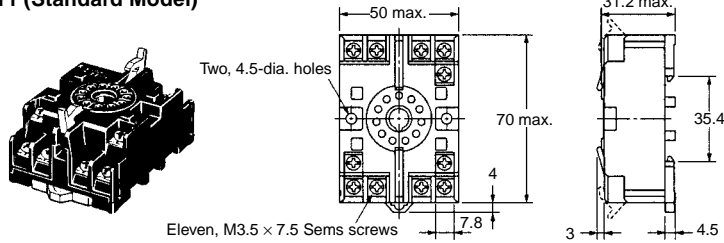
E5ZN-SDL



■ E5ZN-SDL Wiring Sockets

Front-connecting Sockets

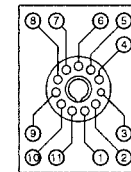
P2F-11 (Standard Model)



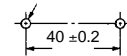
Terminal Arrangement/ Internal Connections

(TOP VIEW)

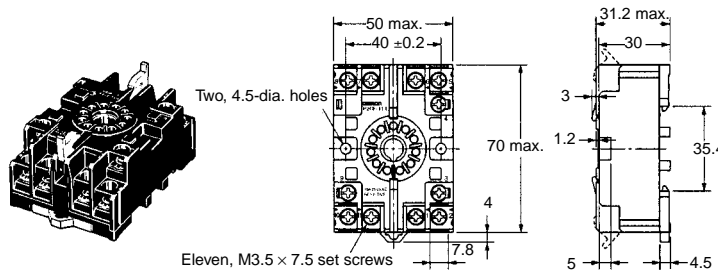
Mounting Hole Cutout Dimensions



Two, M4 or 4.5 dia.



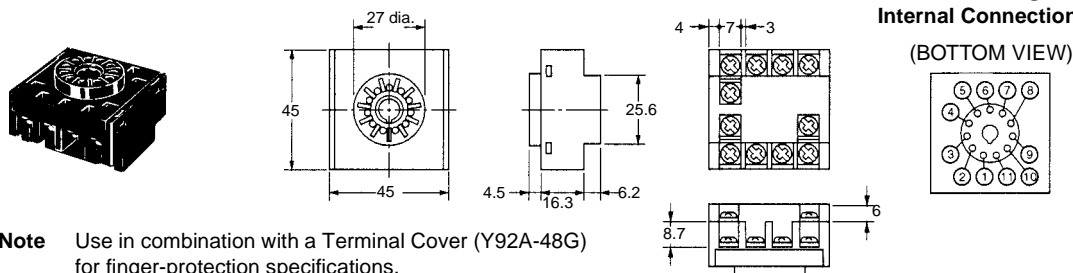
P2F-11-E (with Finger Protection)



Note DIN track mounting is also possible.

Back-connecting Sockets

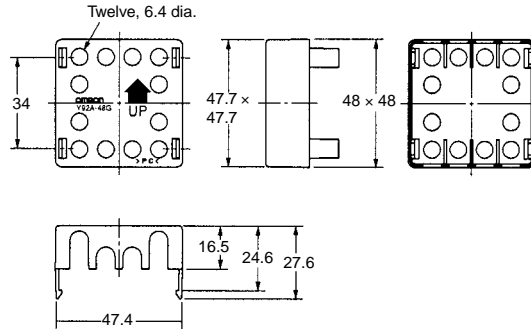
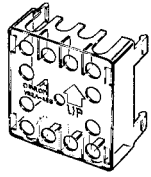
P3GA-11 (Standard Model)



Note Use in combination with a Terminal Cover (Y92A-48G) for finger-protection specifications.

Terminal Cover

Y92A-48G

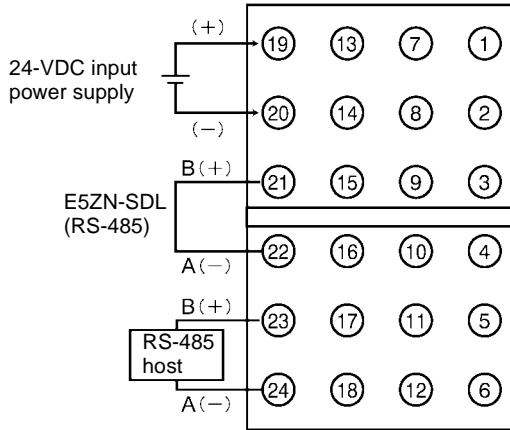


Installation

■ Connections Diagrams

- Voltage output (control output) is not electrically isolated from internal circuitry. Therefore, when using grounded thermocouples, do not ground control output terminals. (Doing so may result in temperature measurement errors due to unwanted current paths.)
- There is basic insulation between the power supply inputs and outputs for this product. If reinforced insulation is required, connect the input and output terminals to equipment without any exposed charge-carrying parts, or to equipment with basic insulation sufficient for the maximum operating voltage of the power supply and the inputs and outputs.

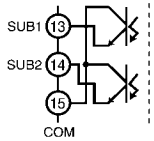
Using with the E5ZN-SCT24S-500



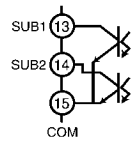
Wiring for terminals 1 to 18 is the same as for the E5ZN-SCT18-500. See below.

Using with the E5ZN-SCT18-500

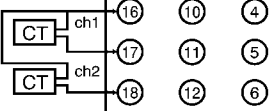
Models with PNP Sourcing Outputs



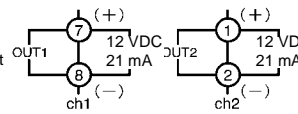
Models with NPN Sinking Outputs



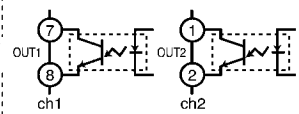
Heater burnout detection function



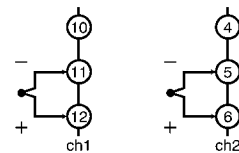
Voltage Output Models



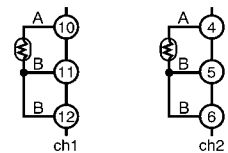
Transistor Output Models



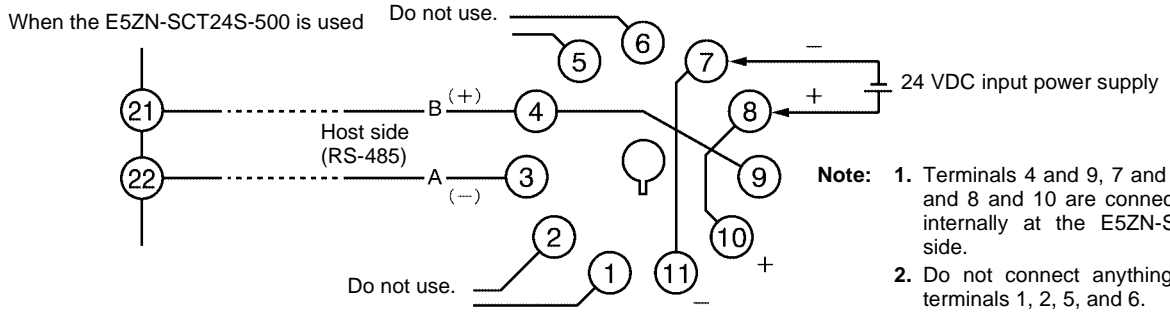
Thermocouple Models



Platinum Resistance Thermometer Models



E5ZN-SDL



Note Purchase either a P2CF-11 or a P3GA-11 Socket separately. (Refer to page 8.)

Precautions

■ General Precautions

The user must operate the product according to the performance specifications described in the operation manuals.

Before using the product under conditions that are not described in the manual or applying the product to nuclear control systems, railroad systems, aviation systems, vehicles, combustion systems, medical equipment, amusement machines, safety equipment, and other systems, machines, and equipment that may have a serious influence on lives and property if used improperly, consult your OMRON representative.

Make sure that the ratings and performance characteristics of the product are sufficient for the systems, machines, and equipment, and be sure to provide the systems, machines, and equipment with double safety mechanisms.

■ Safety Precautions

Definition of Precautionary Information

— ! WARNING —

The above symbol indicates a situation that may result in injury or property damage.

Warnings

— ! WARNING —

Do not allow metal fragments or lead wire scraps to fall inside this product.

These may cause electric shock, fire, or malfunction.

— ! WARNING —

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

— ! WARNING —

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

— ! WARNING —

Provide at least one power-interruption switch to ensure that the power is OFF before wiring. Not doing so may result in electric shock.

— ! WARNING —

To maintain safety in the event of a product malfunction, always take appropriate safety measures, such as installing an alarm on a separate line to prevent excessive temperature rises. If a malfunction prevents proper control, a major accident may result.

— ! WARNING —

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

— ! WARNING —

Tighten screws to the specified torques given below. Loose screws may result in burning or malfunction.
E5ZN-SCT@S-500: 0.40 to 0.56 N·m
E5ZN-SDL: 0.74 to 0.90 N·m

— ! WARNING —

Set all settings according to the control target of the product. If the settings are not appropriate for the control target, the product may operate in an unexpected manner, resulting in damage to the product or accidents.

■ Application and Operating Environment Precautions

Observe the following points to ensure safe operation.

1. Use and store the product within the specified temperature and humidity ranges. Cool the product (e.g., using fans) where necessary.
2. Do not touch the electronic components or pattern of the PCB. Hold the product by the case.
3. To ensure proper heat dissipation, leave a space around the product. Do not block the product's ventilating holes.
4. Use at the rated power supply voltage with the rated load.
5. Be sure to connect terminals with the correct polarity.
6. Perform wiring using crimp terminals of the specified size. (E5ZN-SCT@S-500: M3.0, width 5.8 mm max.; E5ZN-SDL: M3.5, width 7.2 mm max.)
7. Be sure to use wires satisfying the following specifications for connection using bare wires.
Power supply terminals: AWG 22 to 14
Other terminals: AWG 28 to 16
(Length of exposed part: 6 to 8 mm)
8. Do not connect anything to unused terminals.
9. Ensure that the rated voltage is reached within 2 seconds of turning power ON.
10. Allow 30 seconds warm-up time.
11. Install the product as far away as possible from devices that generate strong, high-frequency noise and devices that generate surges.
12. Keep wiring separate from high-voltage power lines or power lines carrying large currents. Do not wire in parallel with or together with power lines.
13. Install switches or circuit-breakers so that the user can turn the power OFF immediately, and indicate these accordingly.
14. Do not use the product in the following locations:
 - Locations subject to dust or corrosive gases (in particular, sulfide gas and ammonia gas)
 - Locations subject to freezing or condensation
 - Locations exposed to direct sunlight
 - Locations subject to vibrations or shocks
 - Locations subject to exposure to water or oil
 - Locations subject to heat radiated directly from heating equipment
 - Locations subject to intense temperature changes
15. When the Terminal Unit is separated from the Temperature Controller, under no circumstances touch the electrical components or apply shock to the Temperature Controller.
16. Do not use solvents to clean the product. Use commercial alcohol.
17. After wiring is completed remove the dust-protection label to allow proper heat dissipation.
18. When mounting the Temperature Controller to the Terminal Unit, make sure that the hook on the side of the Temperature Controller facing the Terminal Unit is inserted properly.
19. Install the DIN track vertically.

■ Correct Use

Service Life

Use within the following temperature and humidity ranges:

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

If the product is installed inside a control panel, the temperature around the product (and not the temperature around the control panel) must be kept below 55°C.

With electronic devices like the E5ZN, the service life will depend not only on the number of switching operations performed by the relay but also on 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 lengthened by keeping the inside of the E5ZN at a low temperature.

If several Units are mounted side-by-side or are arranged vertically, the heat generated may cause the internal temperature of the Units to rise, reducing service life. To prevent this, take steps to ensure that the Units are cooled, such as installing fans.

Ensure, however, that the terminals are not also cooled, otherwise correct temperature measurement will not be possible.

Measurement Accuracy

When extending the lead wires for thermocouples, use a compensating conductor appropriate for the type of thermocouple used.

When extending the lead wires for platinum resistance thermometers, use lead wires with a low resistance, and make the resistance in the 3 lead wires equal.

Mount the E5ZN horizontally.

If significant errors occur, check that input compensation has been set correctly.

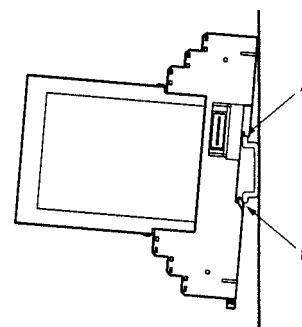
Waterproofing

The enclosure ratings are given below. Parts for which the enclosure rating is not clearly indicated, and parts with IP@0 ratings (where @ is not 0) do not have waterproof specifications.

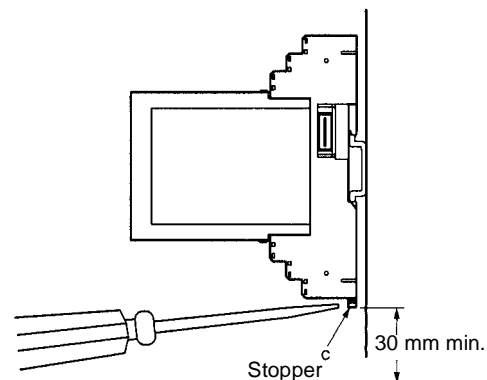
- Temperature Controller: IP00
- Terminal Unit: IP00

Mounting and Dismounting

- To mount using a mounting track, first hook part A (see below) onto the track and then push down on part B.



- To dismount, insert a flat-bladed screwdriver into part C, pull the hook down, and then lift the bottom part of the E5ZN upwards.



- Mount the E5ZN at least 30 mm away from other devices to ensure easy mounting and dismounting.

Note Refer to the following manual for precautionary information and other information necessary to use the E5ZN: E5ZN Modular Temperature Controller User's Manual (Cat. No. H113).

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

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

Cat. No. H116-E1-1 **In the interest of product improvement, specifications are subject to change without notice.**

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