Temperature Controllers
E5CS

CSM_E5CS_DS_E_4_1

Simple Functions in DIN 48 × 48 mm-size Plug-in Temperature Controllers

- Easy setting using DIP switch.
- Models with two alarms added to Series, ideal for applications requiring alarms.
- Universal-input (thermocouple/platinum resistance thermometer) models also available.
- Clearly visible digital display with character height of 13.5 mm.
- RoHS compliant.

⚠ Refer to *Safety Precautions for All Temperature Controllers.*

Refer to *E5CS/E5CSV Operation* for operating procedures.

Model Number Structure

■ Model Number Legend

Plug-in Models

E5CS-□□□□U-W
1 2 3 4 5 6

1. Control Outputs
R: Relay
Q: Voltage for driving SSR

2. Alarm Outputs
Blank: No alarm
1: 1 alarm
2: 2 alarms

3. Input
KJ: Thermocouple
P: Platinum resistance thermometer
G: Thermistor
T: Thermocouple/platinum resistance thermometer (universal-input)

4. Power Supply Voltage
Blank: 100 to 240 VAC
D: 24 VAC/VDC

5. Terminal Shape
U: Plug-in

6. Case Color
W: Light gray

Note: A functional explanation is provided here for illustration, but models are not necessarily available for all possible combinations. Refer to *Ordering Information* when ordering.

Examples

- Relay control output, without alarm, thermocouple input, plug-in construction, light gray case: E5CS-RKJU-W
- Relay control output, one alarm output, platinum resistance thermometer input, plug-in construction, light gray case: E5CS-R1PU-W

Ordering Information

■ List of Models

Case Color: Light Gray, Thermocouple or Platinum Resistance Thermometer, Power Supply Voltage: 100 to 240 VAC

Size	Type	Control modes	Alarms	Outputs	Model with thermocouple	Model with platinum resistance thermometer
E5CS-U 48 × 48 mm	Plug-in	ON/OFF or PID	0	Relay	E5CS-RKJU-W	E5CS-RPU-W
				Voltage (for driving SSR)	E5CS-QKJU-W	E5CS-QPU-W
			1	Relay	E5CS-R1KJU-W	E5CS-R1PU-W
				Voltage (for driving SSR)	E5CS-Q1KJU-W	E5CS-Q1PU-W

Case Color: Light Gray, Thermocouple or Platinum Resistance Thermometer, Power Supply Voltage: 24 VAC/VDC

Size	Type	Control modes	Alarms	Outputs	Model with thermocouple	Model with platinum resistance thermometer
E5CS-U 48 × 48 mm	Plug-in	ON/OFF or PID	0	Relay	E5CS-RKJDU-W	E5CS-RPDU-W
				Voltage (for driving SSR)	E5CS-QKJDU-W	---
			1	Relay	E5CS-R1KJDU-W	E5CS-R1PDU-W
				Voltage (for driving SSR)	E5CS-Q1KJDU-W	---

Case Color: Light Gray, Thermistor or Universal-input, Power Supply Voltage: 100 to 240 VAC

Size	Type	Control modes	Alarms	Outputs	Model with thermistor	Model with universal-input (thermocouple and platinum resistance thermometer)
E5CS-U 48 × 48 mm	Plug-in	ON/OFF or PID	0	Relay	E5CS-RGU-W	E5CS-RTU-W
				Voltage (for driving SSR)	E5CS-QGU-W	E5CS-QTU-W
			1	Relay	E5CS-R1GU-W	E5CS-R1TU-W
				Voltage (for driving SSR)	E5CS-Q1GU-W	E5CS-Q1TU-W
			2 (See note.)	Relay	---	E5CS-R2TU-W
				Voltage (for driving SSR)		E5CS-Q2TU-W

Note: There is no alarm output 2 mode switch. The default setting for alarm output 2 is for the upper limit alarm mode. To change the setting, change the alarm type for alarm output 2 in initial setting level 5. For details, refer to the *"E5CSV/E5CS-U Digital Temperature Controller User's Manual"* (Cat. No. H140-E1-01).

Case Color: Light Gray, Thermistor, Power Supply Voltage: 24 VAC/VDC

Size	Type	Control modes	Alarms	Outputs	Model with thermistor
E5CS-U 48 × 48 mm	Plug-in	ON/OFF or PID	0	Relay	E5CS-RGDU-W
			1		E5CS-R1GDU-W

■ Accessories (Order Separately)

Socket without Alarm (8 Pins)

Type	Model
Front Connecting Socket	P2CF-08
Back Connecting Socket (flush mounting)	P3G-08
Front Connecting Socket (with finger protection)	P2CF-08-E
Finger Safe Terminal Cover for P3G	Y92A-48G

Socket with Alarm (11 Pins)

Type	Model
Front Connecting Socket	P2CF-11
Back Connecting Socket (flush mounting)	P3GA-11
Front Connecting Socket (with finger protection)	P2CF-11-E
Finger Safe Terminal Cover for P3G	Y92A-48G

Protective Cover

Type	Model
Hard Protective Cover	Y92A-48B

Specifications

■ Ratings

Supply voltage		100 to 240 VAC, 50/60 Hz 24 VAC, 50/60 Hz; 24 VDC
Operating voltage range		85% to 110% of rated supply voltage
Power consumption		100 to 240 VAC: 5 VA 24 VAC: 3 VA, 24 VDC: 2 W
Sensor input		Thermocouple: K, J, L Platinum resistance thermometer: Pt100, JPt100 Thermistor: E52-THE□□ Universal-input (thermocouple/platinum resistance thermometer): K, J, L, T, U, N, R, Pt100, JPt100
Control output	**Relay output**	SPDT, 250 VAC, 3 A (resistive load)
	Voltage output (for driving the SSR)	12 VDC, 21 mA (with short-circuit protection circuit)
Control method		ON/OFF or 2-PID (with automatic PID parameter setting function)
Alarm output		SPST-NO, 250 VAC, 1A (resistive load)
Setting method		Digital setting using front panel keys
Indication method		7-segment digital display (character height: 13.5 mm) and deviation indicators
Other functions		• Setting change prohibit (key protection) • Input shift • Temperature unit change (°C/°F) • Direct/reverse operation • Temperature range, Sensor switching (K/J/L, Pt100/JPt100) • Switching is performed between a thermocouple and platinum resistance thermometer for universal-input models. • Control period switching • 8-mode alarm output • Sensor error detection (excluding thermistor models)
Ambient operating temperature		–10 to 55°C (with no condensation or icing); with 3-year guarantee: –10 to 50°C
Ambient operating humidity		25% to 85%
Storage temperature		–25 to 65°C (with no condensation or icing)

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

■ Characteristics

Setting accuracy		Thermocouple (See note 1.): (±1% of indication value or ±2°C, whichever is greater) ±1 digit max. Platinum resistance thermometer (See note 2.): (±0.5% of indication value or ±1°C, whichever is greater) ±1 digit max. Thermistor (See note 3.): (1% FS of indication value) ±1 digit max.
Indication accuracy (ambient temperature of 23°C)		
Influence of temperature		R thermocouple inputs: (±2% of PV or ±10°C, whichever is greater) ±1 digit max. Other thermocouple inputs: (±2% of PV or ±4°C, whichever is greater) ±1 digit max. Platinum resistance thermometer inputs: (±1% of PV or ±2°C, whichever is greater) ±1 digit max. Thermistor: (±2% FS) ±1 digit max.
Influence of voltage		
Hysteresis (for ON/OFF control)		0.2% FS (0.1% FS for universal-input (thermocouple/platinum resistance thermometer) models)
Proportional band (P)		1 to 999°C (automatic adjustment using auto-tuning/self-tuning)
Integral time (I)		1 to 1,999 s (automatic adjustment using auto-tuning/self-tuning)
Derivative time (D)		1 to 1,999 s (automatic adjustment using auto-tuning/self-tuning)
Alarm output range		Absolute-value alarm: Same as the control range Other: 0 to input setting range full scale (°C or °F) Alarm hysteresis: 0.2°C or °F (fixed)
Control period		2/20 s
Sampling period		500 ms
Insulation resistance		20 MΩ min. (at 500 VDC)
Dielectric strength		2,000 VAC, 50/60 Hz for 1 min between current-carrying terminals of different polarity
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 hr each in X, Y, and Z directions
Shock resistance	**Malfunction**	100 m/s² min., 3 times each in six directions
	Destruction	300 m/s² min., 3 times each in six directions
Life expectancy	**Electrical**	100,000 operations min. (relay output models)
Weight		Approx. 110 g (Controller only)
Degree of protection		Front panel: Equivalent to IP50, Enclosure Category 2 (IEC 60529), Rear case: IP20; Terminals: IP00
Memory protection		EEPROM (non-volatile memory) (number of writes: 1,000,000)
EMC		EMI Radiated: EN 55011 Group 1 Class A EMI Conducted: EN 55011 Group 1 Class A Radiated Electromagnetic Field Immunity: EN 61000-4-2: 4 kV contact discharge (level 2) 8 kV air discharge (level 3) RF-interference Immunity: EN 61000-4-3: 10 V/m (80-1000 MHz, 1.4-2.0 GHz amplitude modulated) (level 3) 10 V/m (900 MHz pulse modulated) Conducted Disturbance Immunity: EN 61000-4-6: 3 V (0.15 to 80 MHz) (level 2) Noise Immunity (First Transient Burst Noise): EN 61000-4-4 Burst Immunity: 2 kV power-line (level 3), 1 kV I/O signal-line (level 3) Surge Immunity: EN 61000-4-5: Power line: Normal mode 1 kV; Common mode 2 kV Output line (relay output): Normal mode 1 kV; Common mode 2 kV Voltage Dip/Interrupting Immunity: EN 61000-4-11 0.5 cycle, 100% (rated voltage)
Approved standards		UL 61010C-1 (listing) CSA C22.2 No.1010-1
Conformed standards		EN 61326, EN 61010-1, IEC 61010-1

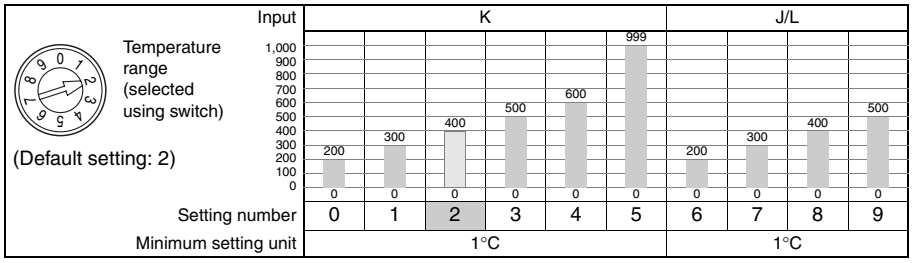
Note: 1. The following exceptions apply to thermocouples.
- U, L: ±2°C ±1 digit max.
- R: ±3°C ±1 digit max. at 200°C or less

2. The following exception applies to platinum resistance thermometers.
- Input set values 1 for E5CS-U: 1% FS ±1 digit max.

3. The following exceptions apply to thermistors.
- When the unit setting is °C, temperature indication ranges exceeding the set temperature range ±10% FS may not be accurate.
- When the unit setting is °F, the temperature range for the input setting numbers 4 and 9 (609 to 630°F) and temperature indication ranges exceeding the set temperature range –5% FS to +10% FS may not be accurate.

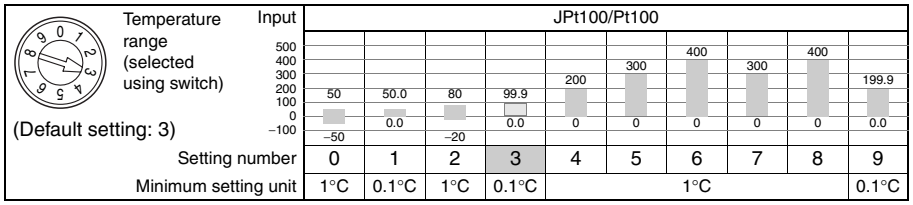
■ Temperature Range

Thermocouple Input Models



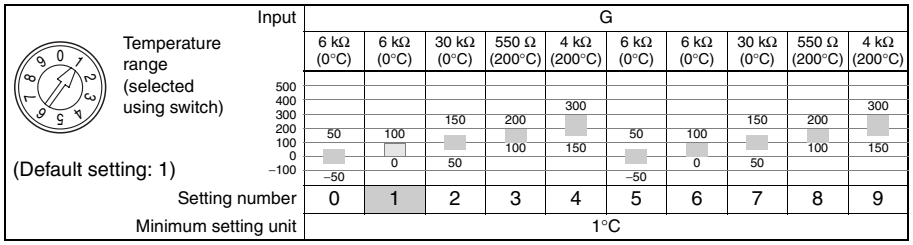
The shaded value indicates the default setting status.

Platinum Resistance Thermometer Input Models



The shaded value indicates the default setting status.

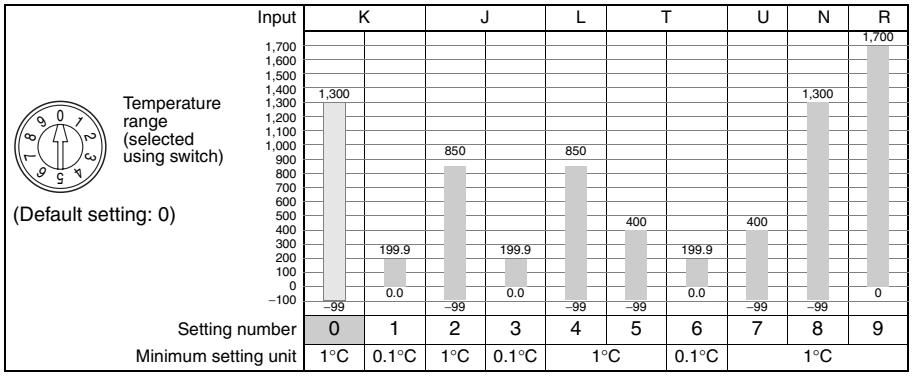
Thermistor Input Models (For details on Sensors, refer to *E52*.)



The shaded value indicates the default setting status.

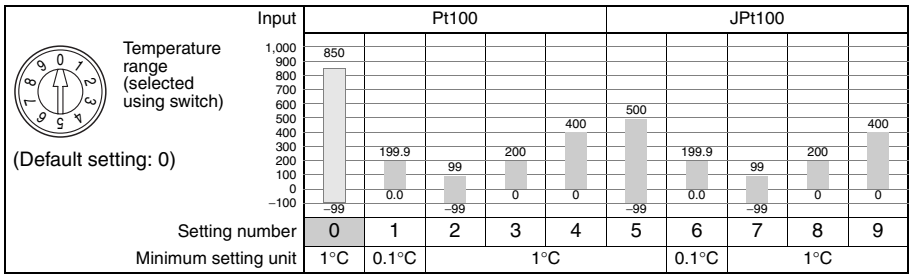
Universal-input (Thermocouple/Platinum Resistance Thermometer) Models

• Using Thermocouple Sensors, Control Mode Switch 5: OFF



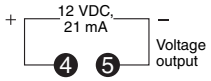
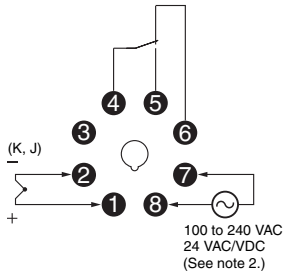
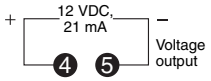
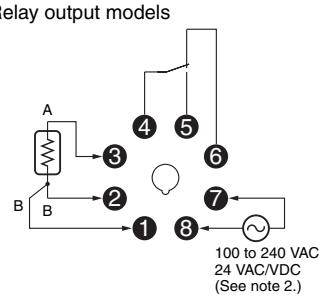
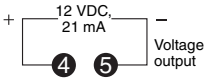
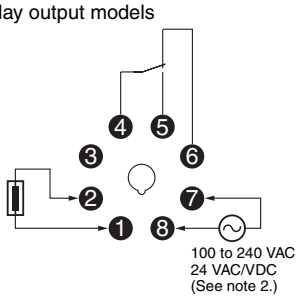
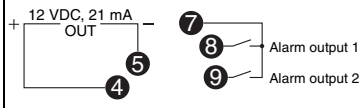
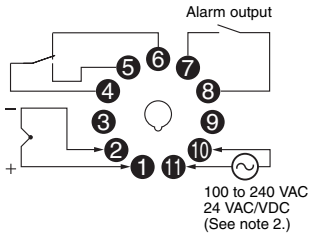
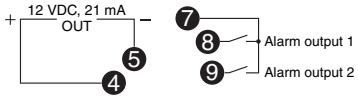
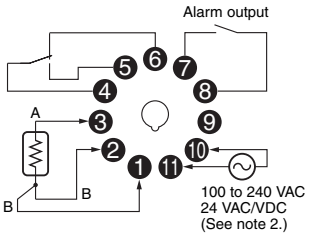
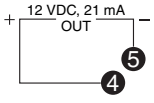
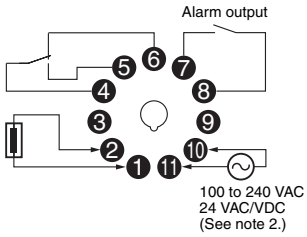
The shaded value indicates the default setting status.

• Using Platinum Resistance Thermometers, Control Mode Switch 5: ON



The shaded value indicates the default setting status.

External Connection Diagram

	Sensor	Thermocouple (See note 3.)	Platinum resistance thermometer (See note 3.)	Thermistor
Plug-in models	**Without alarms**	Voltage output models (See note 1.)  Relay output models 	Voltage output models (See note 1.)  Relay output models 	Voltage output models (See note 1.)  Relay output models 
	With alarms	Voltage output models (See note 1.) Two alarm points  Relay output models 	Voltage output models (See note 1.) Two alarm points  Relay output models 	Voltage output models (See note 1.)  Relay output models 

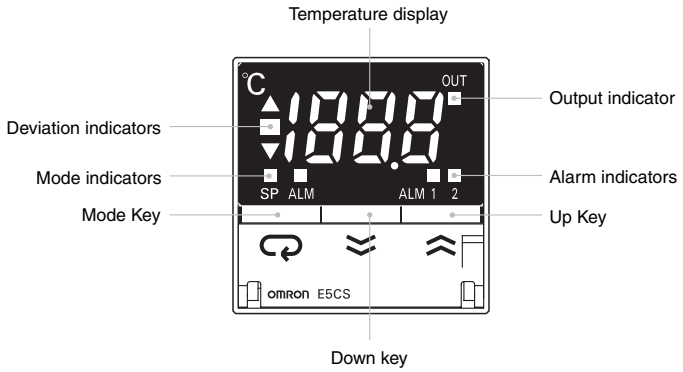
Note: 1. The voltage output (12 VDC, 21 mA) is not electrically isolated from the internal circuits. When using a grounding thermocouple, do not connect output terminals 4 or 5 to ground. Otherwise, unwanted current paths will cause measurement errors.

2. Models with 100 to 240 VAC and 24 VAC/VDC are separate. Models using 24 VDC have no polarity.

3. Be sure to check the sensor type before using multi-output (thermocouple/platinum resistance thermometer) models.

Nomenclature

E5CS-U Plug-in Models

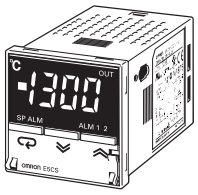


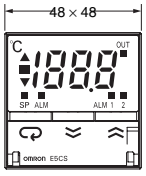
Dimensions

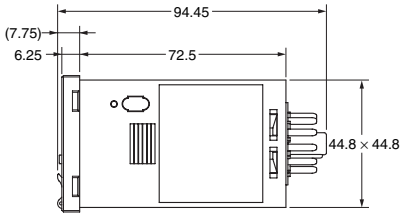
Note: All units are in millimeters unless otherwise indicated.

■ Controller

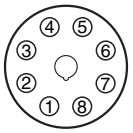
E5CS-U





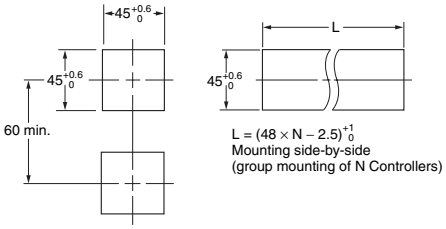


Terminal Arrangement
(Bottom View)

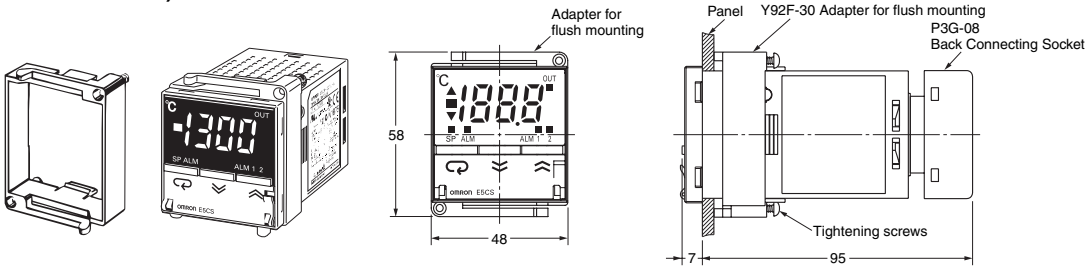


Note: The external dimensions are the same for both models with and without alarms.

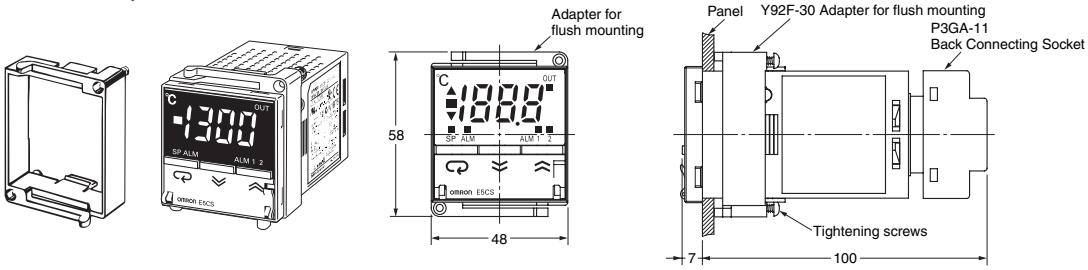
Panel Cutout Dimensions



E5CS-U + Adapter for Flush Mounting (Enclosed) + Back Connecting Socket (Order Separately) (Without Alarms)



E5CS-U + Adapter for Flush Mounting (Enclosed) + Back Connecting Socket (Order Separately) (With Alarms)

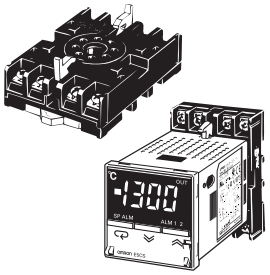


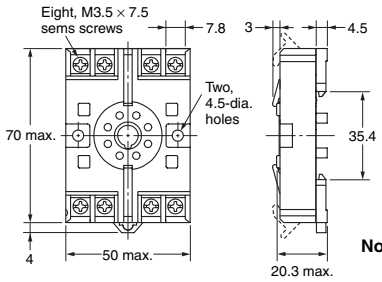
Note: Use the P2CF-08 and P3G-08 Sockets for models without alarms, and use the P2CF-11 and P3GA-11 Sockets for models with alarms.

■ Accessories (Order Separately)

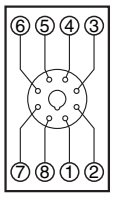
8-pin Sockets without Alarms

P2CF-08 Front Connecting Socket

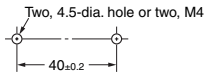




Terminal Arrangement/ Internal Connections (Top View)



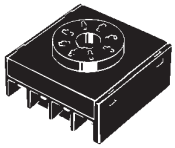
Mounting Hole Dimensions

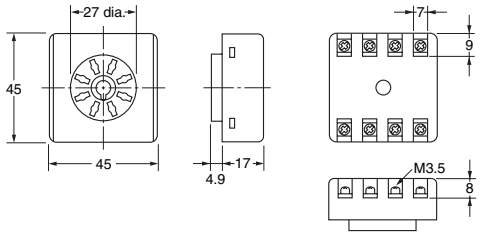


Note: DIN Track mounting is also possible.

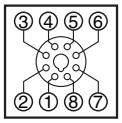
Note: The P2CF-08-E Socket with finger protection is also available.

P3G-08 Back Connecting Socket





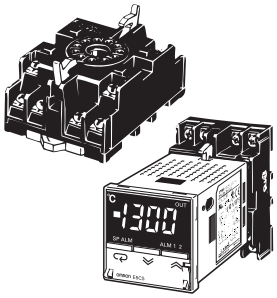
Terminal Arrangement (Bottom View)

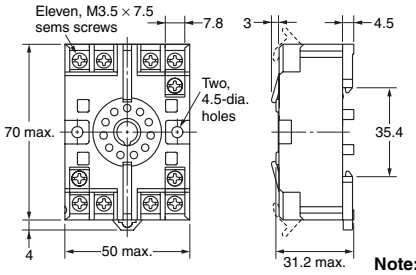


Note: The Y92A-48G Finger Safe Terminal Cover is also available.

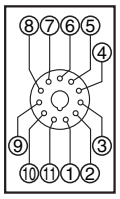
11-pin Sockets with Alarms

P2CF-11 Front Connecting Socket

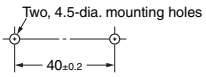




Terminal Arrangement/ Internal Connections (Top View)



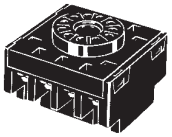
Mounting Hole Dimensions

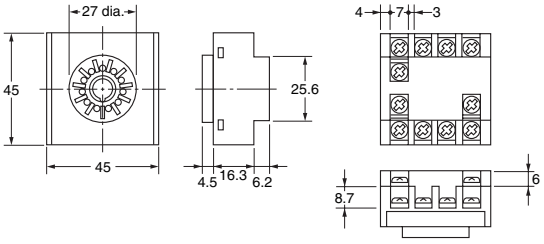


Note: DIN Track mounting is also possible.

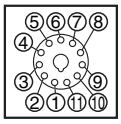
Note: The P2CF-11-E Socket with finger protection is also available.

P3GA-11 Back Connecting Socket





Terminal Arrangement (Bottom View)



Note: The Y92A-48G Finger Safe Terminal Cover is also available.

Note: Do not use any other types of Sockets. Doing so will adversely affect the accuracy.

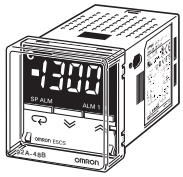
Applicable Thermistors

Use Element Interchangeable Thermistors (E52-THE5A, E52-THE6D, and E52-THE6F) to connect to the E5CS-□GU. For details on Sensors, refer to *E52*.

Hard Protective Cover

The Y92A-48B Hard Protective Cover is available for the following applications.

- To protect the set from dust and dirt.
- To prevent the panel from being accidentally touched causing displacement of set values.
- To provide effective protection against water droplets.



Safety Precautions

Refer to *Safety Precautions for All Temperature Controllers*. Refer to *E5CS/E5CSV Operation* for operating procedures.

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.

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At the customer's request, OMRON will provide applicable third party certification documents identifying ratings and limitations of use that apply to the products. This information by itself is not sufficient for a complete determination of the suitability of the products in combination with the end product, machine, system, or other application or use.

The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products:

- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this catalog.
- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
- Systems, machines, and equipment that could present a risk to life or property.

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

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

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Disclaimers

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

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DIMENSIONS AND WEIGHTS

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

PERFORMANCE DATA

Performance data given in this catalog is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON Warranty and Limitations of Liability.

ERRORS AND OMISSIONS

The information in this document has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical, or proofreading errors, or omissions.

2009.1

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

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