

OMRON

Model **E5CS / E5CS-X**

Temperature Controller

English

INSTRUCTION MANUAL

Thank you for purchasing an OMRON Product. To ensure the safe application of the Product, only a professional with an understanding of electricity and electric devices must handle it. Read this manual carefully before using the Product and always keep it close at hand when the Product is in use.

OMRON Corporation

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DISCONTINUED

Safety Precautions

● Key to Warning Symbols

CAUTION

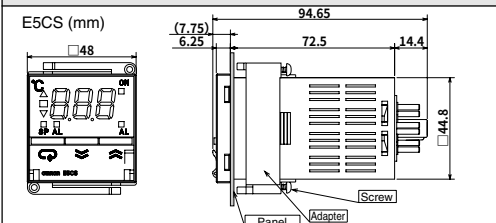
Indicates a potentially hazardous situation which, if not avoided, is likely to result in minor or moderate injury or property damage. Read this manual carefully before using the product.

1618455-6A

Mounting

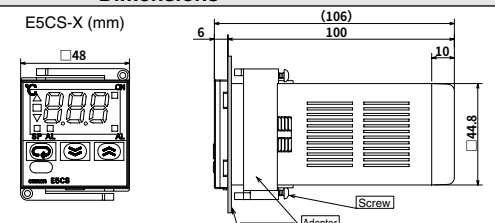
Dimensions

E5CS (mm)



94.65
72.5
14.4
44.8
6.25
(7.75)

E5CS-X (mm)



(106)
100
10
144.8
6

Package Contents (Same for E5CS and E5CS-X)

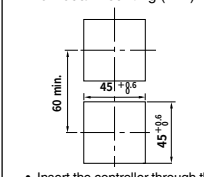
• Controller
• Adapter (1)
• Instruction Manual
• °C/°F labels, specifications entry label *1

*1 When changing the display unit, attach the °C/°F label over the previous °C/°F label. Enter the settings on the specifications entry label and use it to manage the settings.

Installation Diagrams

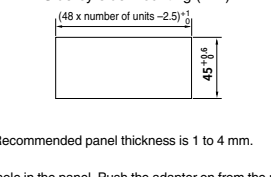
● Flush mounting (Panel cutout)

Individual mounting (mm)



45±0.6
45±0.6
60 min.

Side-by-side mounting (mm)



(48 x number of units -2.5)±1
45±0.6

Recommended panel thickness is 1 to 4 mm.

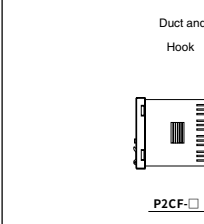
• Insert the controller through the hole in the panel. Push the adapter on from the rear and fasten temporarily, removing any gap between the controller, panel and adapter. Finally, secure two fixing screws alternately keeping the torque to between 0.29 to 0.39 N·m.
Refer to the dimension diagram for the mounting status.

• When mounting more than one Temperature Controller, be sure that the heat generated by the Temperature Controllers does not cause the ambient temperature to exceed the specified value.

• Close side-by-side mounting is possible in one direction only, either horizontally or vertically.

● Surface mounting

When mounting plural units in vertical arrangement, leave space of approx. 20 mm above and below the mounting socket.

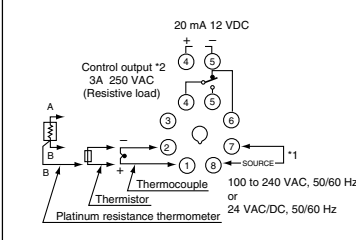


(mm)
20
Duct and etc.
Hook
Panel
P2CF-□

Terminal Layout

● E5CS-R □, -Q □ (No alarm output type)

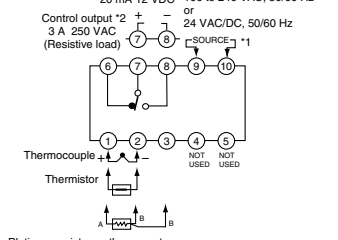
Suitable socket is P2CF-08- □ or P3G-08.



20 mA 12 VDC
Control output *2
3 A 250 VAC (Resistive load)
Thermistor
Platinum resistance thermometer
100 to 240 VAC, 50/60 Hz or 24 VAC/DC, 50/60 Hz

● E5CS-R □ X, -Q □ X (No alarm output type)

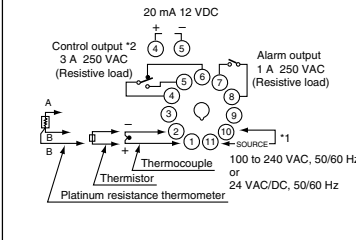
Suitable socket is P2CF-08- □ or P3G-08.



20 mA 12 VDC
Control output *2
3 A 250 VAC (Resistive load)
Thermistor
Platinum resistance thermometer
100 to 240 VAC, 50/60 Hz or 24 VAC/DC, 50/60 Hz

● E5CS-R1 □, -Q1 □ (Alarm output type)

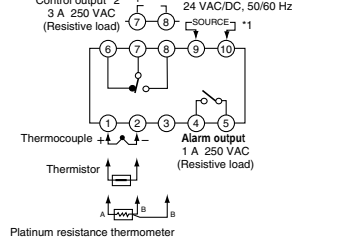
Suitable socket is P2CF-11- □ or P3GA-11.



20 mA 12 VDC
Control output *2
3 A 250 VAC (Resistive load)
Thermistor
Platinum resistance thermometer
100 to 240 VAC, 50/60 Hz or 24 VAC/DC, 50/60 Hz

● E5CS-R1 □ X, -Q1 □ X (Alarm output type)

Suitable socket is P2CF-11- □ or P3GA-11.

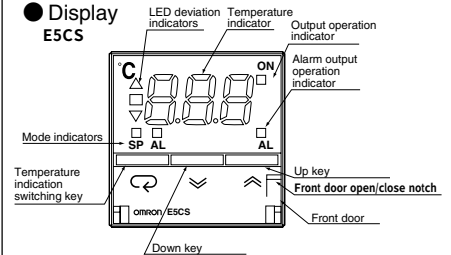


20 mA 12 VDC
Control output *2
3 A 250 VAC (Resistive load)
Thermistor
Platinum resistance thermometer
100 to 240 VAC, 50/60 Hz or 24 VAC/DC, 50/60 Hz

*1 Separate models are provided for 100 to 240 VAC and 24 VAC/DC. There is no polarity for 24 VDC.
*2 The following operation will be performed when the control output is turned ON.
Relay output: The NO contacts will close.
Voltage output: 12 V will be output.

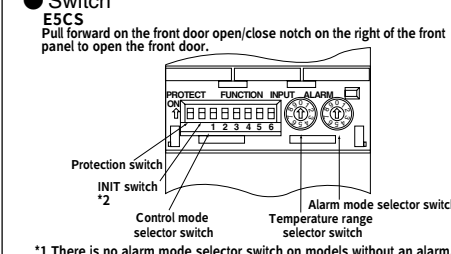
Names of Front Parts

● Display E5CS



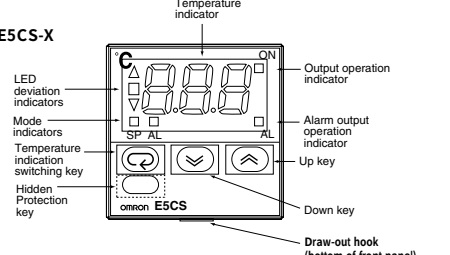
LED deviation indicators
Temperature indicator
Output operation indicator
Alarm output operation indicator
Mode indicators
SP AL
AL
Temperature indication switching key
Up key
Down key
Front door open/close notch
Front door
Down key

● Switch E5CS



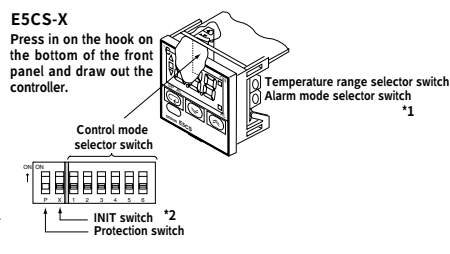
Protection switch
INIT switch *2
Control mode selector switch
Temperature range selector switch *1
Alarm mode selector switch

● Display E5CS-X



LED deviation indicators
Temperature indicator
Output operation indicator
Alarm output operation indicator
Mode indicators
SP AL
AL
Temperature indication switching key
Up key
Down key
Front door open/close notch
Front door
Down key
Draw-out hook (bottom of front panel)

● Switch E5CS-X



Protection switch
INIT switch *2
Control mode selector switch
Temperature range selector switch *1
Alarm mode selector switch

● Protection switch

• The protection switch can be turned ON to disable the Up/Down Keys and prevent setting mistakes.

• The temperature indication switching key, however, will operate even when the protection switch is ON (i.e., the display can be switched between the present temperature, set temperature, alarm set temperature, and input shift value).

• Default: OFF

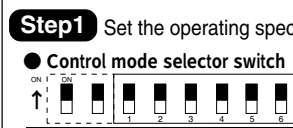
*1 There is no alarm mode selector switch on models without an alarm.
*2 The INIT switch is always OFF.

Operation

Setting

Step1 Set the operating specifications with the switches.

● Control mode selector switch



ON OFF
1 2 3 4 5 6

Switch	Function	OFF	ON
1	Control	ON/OFF control	PID control
2	Proportional period	20 seconds	2 seconds
3	Control output	Reverse	Normal
4	Input shift	Disable	Enable
5	Input type	Thermocouple: K,J Resistance thermometer: JPt100	Thermocouple: K,L Resistance thermometer: Pt100
6	Scale indication	°C	°F

• All switches are OFF by default.

• The optimum proportional band is set automatically and offset is adjusted automatically in the PID control.

• The input shift value is valid even if the input shift display is disabled. To disable the input shift, set the input shift value to H0. The default setting is H0.

• The setting of switch 5 will not affect operation if a thermistor model is used.

● Temperature range selector switch

• Thermocouple type (E5CS- □ KJ, E5CS- □ KJX)

Input	SW No.	Setting range
K	0	0 to 200
	1	0 to 300
	2	0 to 400
	3	0 to 500
	4	0 to 600
J, L	5	0 to 999
	6	0 to 200
	7	0 to 300
	8	0 to 400
	9	0 to 500

*Default = "2"

• Platinum resistance thermometer type (E5CS- □ P, E5CS- □ PX)

Input	SW No.	Setting range
JPt100, P100	0	-50 to 50
	1	0.0 to 50.0
	2	-20 to 80
	3	0.0 to 99.9
	4	0 to 200
G	5	0 to 300
	6	0 to 400
	7	Do not set
	8	Do not set
	9	Do not set

*Default = "3"

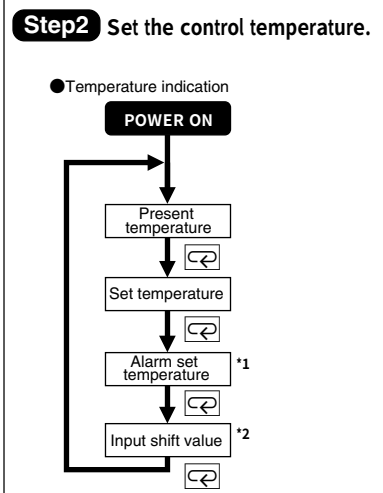
● Alarm mode selector switch

SW No.	Alarm type	Alarm output
0,9	No alarm output	OFF
1	Upper and lower limit alarm	ON OFF
	2	Upper limit alarm
3	Lower limit alarm	ON OFF
	4	Upper and lower limit range alarm
5	Upper and lower limit alarm with standby sequence	ON OFF
	6	Upper limit alarm with standby sequence
7	Lower limit alarm with standby sequence	ON OFF
	8	Absolute value alarm

* For alarms 1 to 7, set the alarm value (X) to the deviation from the set point.
For alarm 8, set the alarm value (Y) to the absolute value from 0°C/°F.
* Default: 2 (upper limit alarm)

Step2 Set the control temperature.

● Temperature indication



POWER ON
Present temperature
Set temperature
Alarm set temperature *1
Input shift value *2

*1 Displayed only for models with alarms.
When alarm mode selector switch is set to 0 or 9, no alarm temperature is displayed.

*2 Input shift value is not displayed when pin 4 of control mode selector switch is set to OFF.

Precautions for Safe Use

1) Do not use this product in the following places:

• Places directly subject to heat radiated from heating equipment.

• Places subject to splashing liquid or oil atmosphere.

• Places subject to direct sunlight.

• Places subject to dust or corrosive gas (in particular, sulfide gas and ammonia gas).

• Places subject to intense temperature change.

• Places subject to icing and condensation.

• Places subject to vibration and large shocks.

2) Use/store within the rated temperature and humidity ranges.

Provide forced-cooling if required.

3) To allow heat to escape, do not block the area around the product.

Do not block the ventilation holes on the product.

4) Use specified size (M3.5, width 7.2 mm or less) crimped terminals for wiring.

5) Be sure to wire properly with correct polarity of terminals.

Do not wire any of the I/O terminals incorrectly.

6) Do not wire the terminals which are not used.

7) The voltage output (control output) is not electrically isolated from internal circuits. When using a grounded thermocouple, do not connect any of the control output terminals to ground. If they are connected, unwanted current paths will cause error in the measured temperature.

8) Allow as much space as possible between the controller and devices that generate a powerful high-frequency or surge.

Separate the high-voltage or large-current power lines from other lines, and avoid parallel or common wiring with the power lines when you are wiring to the terminals.

9) Use this product within the rated load and power supply.

10) Use a switch, relay, or other contact so that the power supply voltage reaches the rated voltage within 2 seconds. If the applied voltage is increased gradually, the power supply may not be reset or malfunctions may occur.

11) Use a switch, relay, or other contact to turn the power supply OFF instantaneously. Outputs may malfunction and memory errors may occur if the power supply voltage is decreased gradually.

12) When using PID operation (self-tuning), turn ON the power supply to the load at the same time or before turning the power supply to the Temperature Controller ON.

13) Four seconds is required for Temperature Controller outputs to stabilize after turning ON the power supply. Allow for this time when designing the control panel and control system.

14) A switch or circuit breaker should be provided close to this unit.

The switch or circuit breaker should be within easy reach of the operator, and must be marked as a disconnecting means for this unit.

15) Approximately 30 minutes is required for the correct temperature to be displayed after turning the power supply to the Temperature Controller ON. Turn the power supply ON at least 30 minutes prior to starting control operations.

16) Be sure that the temperature sensor type and the input type set on the Temperature Controller are the same.

17) When extending the lead wires on a thermocouple, be sure to use compensating conductors suitable for the thermocouple type. When extending the lead wires on a platinum resistance thermometer, use lead wires with a low resistance (5 Ω max. per line) and be sure that the resistance is the same for all three lead wires.

18) Do not use a microwave receiver near the Temperature Controller. Microwave interference may affect the Temperature Controller.

19) When drawing out the controller from the case, do not apply force that would deform or alter the Product.

20) When drawing out the controller from the case to replace the Product, check the status of the terminals.

If necessary, replace the rear case as well.

21) When drawing out the controller from the case, turn the power supply OFF first, and:

Absolutely do not touch the terminals or electronic components or apply shock to them. When inserting the controller, do not allow the electronic components to come into contact with the case.

22) Static electricity can damage internal components. When drawing out the controller from the case, do not touch the electronic components or patterns on the board with your hand. Hold the Product by the top panel, supports, or edges of the board.

23) Do not use paint thinner or similar chemical to clean with. Use standard grade alcohol.

24) Use tools when separating parts for disposal.

25) EEPROM is used as backup memory. The EEPROM has a life of 100,000 writes. EEPROM is written when settings are changed or self-tuning is performed.

SELF-DIAGNOSTIC FUNCTION

If an error occurs, it will be displayed on the temperature display.

Check the type of error and correct the error accordingly.

Display	Error	Meaning	Action	Control output Reverse	Control output Normal
FFF	Overflow *1, *2	•The temperature has risen beyond the set temperature range. •With Thermistor types, the sensor is shorted.	Check the wiring of inputs, disconnections, shorts and input type.	OFF	ON
---	Underflow *1, *2	•The temperature has fallen below the set temperature range. •With Thermistor types, the sensor is disconnected.		ON	OFF
FFF (flashing)	Sensor error *1, *3	•The temperature has risen excessively beyond the set temperature range. •The thermocouple or platinum resistance thermometer has failed. •The temperature has fallen excessively below the set temperature range. •The polarity (positive and negative) of thermocouple has been reversed. •The platinum resistance thermometer has failed.	After the correction of input error, turn the power OFF then back ON again.	OFF	OFF
E11	Memory error	Memory has failed.		OFF	OFF
E33	A/D converter error	The A/D converter has failed.		OFF	OFF

*1 Alarm output (Models with alarm output type only)
• The alarm output will operate as an abnormally high temperature alarm output when FFF is displayed (flashes).
• The alarm output will operate as an abnormally low temperature alarm output when --- is displayed (flashes).
• The alarm output will turn OFF when E11 or E33 is displayed.

*2 Errors are displayed only when the present temperature is being displayed.
Errors will not be displayed if the set temperature, alarm set temperature, or input shift value is displayed.

*3 Sensor error detection function is not provided for thermistor type.

Conformity to Safety standards

Basic insulation is provided between the power supply, input, and output terminals.

When double insulation is required, apply supplemental insulation defined in IEC 60664 that is suitable for the maximum operating voltage with clearances or solid insulation.

Specifications

Power supply voltage

100 to 240V AC 50/60Hz
24V AC 50/60Hz / 24V DC

Operating voltage range

85 to 110% of the rated voltage

Power consumption

Approx. 7VA(100 to 240V AC)
Approx. 4VA(24V AC)/Approx. 3W(24V DC)

Indication accuracy

E5CS: ±1.0 % FS ±1 digit max.
E5CS-X: ±0.5 % FS ±1 digit max.

Control output

Relay output: 250V AC 3A(resistive load)
Voltage output: 12V DC 20mA
Electrical life of relay: 100,000 operations

Control method

ON/OFF or PID control

Alarm output

Relay output: 250V AC 1A(resistive load)
Electrical life of relay: 100,000 operations

Ambient temperature

-10 to 55°C
(Avoid freezing or condensation)

Ambient humidity

RH 35 to 85%

Storage temperature

-25 to 65°C
(Avoid freezing or condensation)

Altitude

Max. 2,000m

Recommended fuse

T1A, 250V AC, time-lag, low-breaking capacity

Weight

E5CS: Approx. 150g (main unit only)
E5CS-X: Approx. 170g (main unit only)

Installation environment

Setup category II,
pollution degree 2 (as per IEC61010-1)

Applicable Connection

Sockets for no Alarm (8-pin):
P2CF-08, P2CF-08-E, and P3G-08

Sockets

(Order Separately)
Sockets for Alarm (11-pin):
P2CF-11, P2CF-11-E, and P3GA-11

(E5CS Only)

Suitability for Use

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of the products in the customer's application or use of the product.

Take all necessary steps to determine the suitability of the product for the systems, machines, and equipment with which it will be used.

Know and observe all prohibitions of use applicable to this product.

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 PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

See also Product catalog for Warranty and Limitation of Liability.

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