OMRON

Model E5CSV
Temperature Controller

English INSTRUCTION MANUAL

Thank you for purchasing the OMRON E5CSV Digital Temperature Controller. This manual describes the functions, performance, and application methods needed for optimum use of the product.
Please observe the following items when using the product.
- This product is designed for use by qualified personnel with a knowledge of electrical systems.
- Before using the product, thoroughly read and understand this manual to ensure correct use.
- Keep this manual in a safe location so that it is available for reference whenever required.

OMRON Corporation

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.

CS4

1651885-3B

●Warning Symbols

⚠CAUTION	
Do not touch the terminals while power is being supplied. Doing so may occasionally result in minor injury due to electric shock.	⚡
Do not allow pieces of metal, wire clippings, or fine metallic shavings or filings from installation to enter the product. Doing so may occasionally result in electric shock, fire, or malfunction.	⊘
Do not use the product where subject to flammable or explosive gas. Otherwise, minor injury from explosion may occasionally occur.	⊘
Never disassemble, modify, or repair the product or touch any of the internal parts. Minor electric shock, fire, or malfunction may occasionally occur.	⊘
CAUTION - Risk of Fire and Electric Shock a) This product is UL listed as Open Type Process Control Equipment. It must be mounted in an enclosure that does not allow fire to escape externally. b) More than one disconnect switch may be required to de-energize the equipment before servicing. c) Signal inputs are SELV, limited energy. d) Caution: To reduce the risk of fire or electric shock, do not interconnect the outputs of different Class 2 circuits.	⚠
If the output relays are used past their life expectancy, contact fusing or burning may occasionally occur. Always consider the application conditions and use the output relays within their rated load and electrical life expectancy.The life expectancy of output relays varies considerably with the output load and switching conditions.	
Loose screws may occasionally result in fire. Tighten terminal screws to the specified torque (0.74 to 0.9 N･m).	❗
Unexpected operation may result in equipment damage or accidents if the settings are not appropriate for the controlled system. Set the Temperature Controller as follows: ・Set the parameters of the Temperature Controller so that they are appropriate for the controlled system. ・Turn the power supply to the Temperature Controller OFF before changing any switch setting. Switch settings are read only when the power supply is turned ON. ・Make sure that the INIT switch in the control mode selector switches is turned OFF before operating the Temperature Controller.	
A malfunction in the Temperature Controller may occasionally make control operations impossible or prevent alarm outputs, resulting in property damage. To maintain safety in the event of malfunction of the Temperature Controller, take appropriate safety measures, such as installing a monitoring device on a separate line.	
Faulty terminal contact or decreased waterproofing capability may result in a fire or equipment malfunction. When inserting the Temperature Controller into the rear case after setting the switches, check the watertight packing and make sure that the top and bottom hooks are locked securely in place.	

Precautions for Safe Use

Be sure to observe the following precautions to prevent operation failure, malfunction, or adverse affects on the performance and functions of the product. Not doing so may occasionally result in unexpected events.
1) The product is designed for indoor use only. Do not use the product outdoors or in any of the following locations.
   ・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. To connect bare wires to the terminal block, use copper braided or solid wires with a gage of AWG24 to AWG18 (equal to a crosssectional area of 0.205 to 0.832 mm^2). (The stripping length is 5 to 6 mm.). Up to two wires of same size and type, or two crimped terminals can be inserted into a single terminal.
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 the internal circuits. When using a grounded temperature sensor, do not connect any of the control output terminals to ground. Otherwise unwanted current paths will cause measurement errors.
8) Allow as much space as possible between the controller and devices that generate a powerful highfrequency 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) 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.
12) Design system (control panel, etc) considering the 2 second of delay that the controller's output to be set after power ON.
13) 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.
14) 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.
15) Be sure that the platinum resistance thermometer type and the input type set on the Temperature Controller are the same.
16) When extending the thermocouple lead wires, always use compensating conductors suitable for the type of thermocouple. Do not extend the lead wires on a platinum resistance thermometer. Use only low-resistance wire (5 Ω max. per line) for lead wires and make sure that the resistance is the same for all three wires.
17) When drawing out the controller from the case, do not apply force that would deform or alter the Product.
18) 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.
19) 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.
20) Static electricity can damage internal components. Always touch grounded metal to discharge any static electricity before handling the Temperature Controller. When drawing out the controller from the case, do not touch the electronic components or patterns on the board with your hand. Hold the Temperature Controller by the edge of the front panel when handling it.
21) Do not use paint thinner or similar chemical to clean with. Use standard grade alcohol.
22) Use tools when separating parts for disposal.

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*1	Meaning	Action	Control output	
				Reverse	Normal
FFF (flashing)	Sensor error	・The thermocouple or platinum resistance thermometer has failed. ・A temperature sensor error has occurred at a temperature higher than the set temperature range.	Check the wiring of inputs, disconnections,shorts and input type.	OFF	OFF
--- (flashing)		・The polarity (positive and negative) of thermocouple has been reversed. ・The platinum resistance thermometer has failed. ・A temperature sensor error has occurred at a temperature lower than the set temperature range.		OFF	OFF
E11	Memory error	Memory has failed.	After the correction of input error, turn the power OFF then back ON again.	OFF	OFF

If the input value exceeds the display limit (-99 to 1999), though it is within the control range, ccc will be displayed under -99 and bbb above 1999.
Under these conditions, control output and alarm output will operate normally.
*1 Alarm output
- 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 is displayed.

⚠ Conformance to EN/IEC Standards

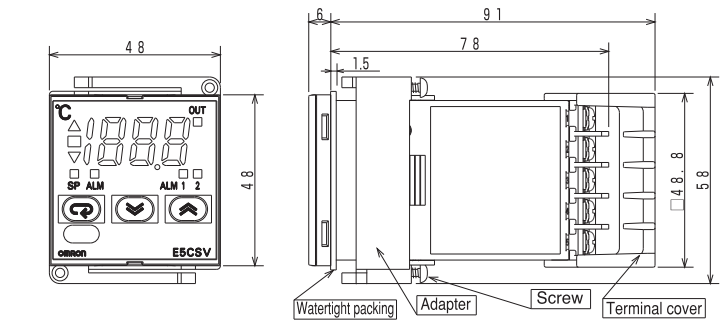
This is a class A product. In residential areas it may cause radio interference, in which case the user may be required to take adequate measures to reduce interference.

⚠ Conformance to Safety Standards

Reinforced insulation is provided between input power supply, relay outputs, and between other terminals. ⧈

■Mounting

Dimensions



In the pack
- Main unit
- Adapter
- Instruction Manual
- ℃ / ℉ labels,specifications entry label *1
- Watertight packing
- Terminal cover (E5CSV-□-500 only)

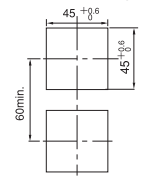
*1 When changing the display unit, attach the ℃ / ℉ label over the previous ℃ / ℉ label.

・The main unit can be removed for maintenance without disconnecting the terminal wiring.
・Do not remove the terminal block. Doing so may result in failure or malfunction.

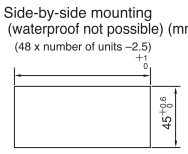
Installation Diagrams

●Flush mounting (Panel cutout)

Individual mounting (mm)



Side-by-side mounting (waterproof not possible) (mm)

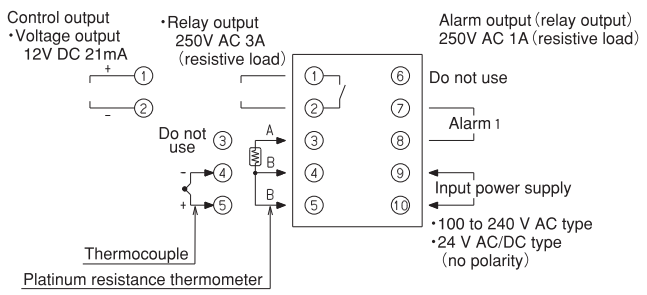


・When waterproofing is required, be sure to mount the controller separately. Attach the waterproof packing from the terminal side and then insert the controller to the panel.
・Recommended panel thickness is 1 to 4 mm.

・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.

Terminal Layout

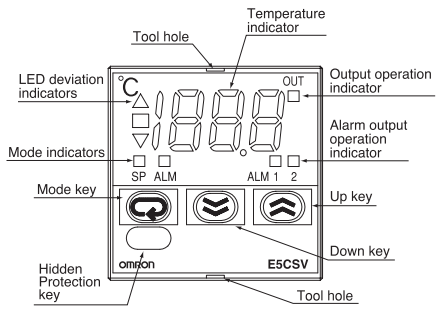
●E5CSV-R1□,-Q1□



Names of Front Parts

●Display

E5CSV

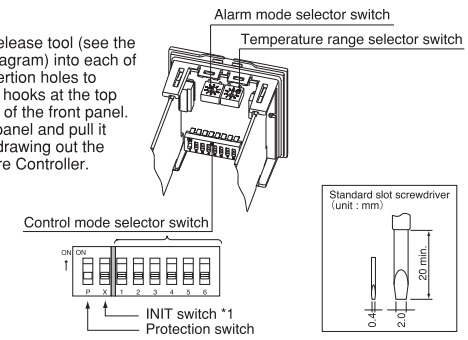


Temperature indicator
The present temperature, set temperature, alarm set temperature, or input shift value is displayed.
LED deviationindicators
▲ : Lit when the difference between the present temperature and the set temperature is larger than +0.25% FS
■ : Lit when the difference between the present temperature and the set temperature is within ±0.25% FS
▼ : Lit when the difference between the present temperature and the set temperature is smaller than -0.25% FS
ST or AT will flash on the temperature indicator when self-tuning or auto-tuning is being performed.
Output operation indicator
OUT : Control output indicator
Lit when the output function is ON; not lit when the output function is OFF.
Alarm output operation indicator
ALM1 : Alarm 1 indicator
Lit when the alarm 1 function is ON.
Mode indicators
SP : Lit when the set temperature is displayed.
ALM : Lit when the alarm set temperature is displayed.
Mode key
Switches the display between the present temperature, set temperature, alarm set temperature, and input shift value.
Up key / Down key
The set temperature, alarm set temperature, or input shift value will increase when the Up Key is pressed.
The set temperature, alarm set temperature, or input shift value will decrease when the Down Key is pressed.
Hidden protection key
Set values can be changed when the protection switch is ON by holding down the hidden protection key and pressing the Up or Down keys.

●Switch

E5CSV

Insert the release tool (see the following diagram) into each of the two insertion holes to release the hooks at the top and bottom of the front panel. Grasp the panel and pull it forward to drawing out the Temperature Controller.



*1 The INIT switch is always OFF.

●Protection switch
・The protection switch can be turned ON to disable the Up and Down keys and prevent setting mistakes.
・The Mode 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).
・The default is "OFF".

Specifications

Power supply voltage	100 to 240V AC type 50/60Hz 24V AC type 50/60Hz / 24V DC type
Operating voltage range	85 to 110% of the rated voltage
Power consumption	Approx. 5VA (100 to 240V AC) Approx. 3VA (24V AC) / Approx. 2W (24V DC)
Indication accuracy (Ambient temperature:23℃)	(±0.5 % of indication value or ±1℃,which is greater)±1 digit max.
Control output	Relay output:250V AC 3A (resistive load) Voltage output:12V DC 21mA Electrical life of relay:100,000 operations
Control method	ON/OFF or 2-PID control
Alarm output	Relay output:250V AC 1A (resistive load) Electrical life of relay:100,000 operations
Ambient temperature	-10 to 55℃ (Avoid freezing or condensation)
Ambient humidity	RH 25 to 85%
Storage temperature	-25 to 65℃ (Avoid freezing or condensation)
Altitude	Max.2,000m
Recommended fuse	T2A 250V AC,time-lag, low-breaking capacity
Weight	Approx.120g (main unit only)
Degree of protection	Front panel : IP66, Rear case : IP20, Terminal section : IP00
Installation environment	Installation category II, pollution degree 2 (as per IEC61010-1)
Memory protection	EEPROM (non-volatile memory) (Number of write operations: 1,000,000)
Terminal	Field wiring terminal

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 theproduct. 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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■Operation

Setting

Step1 Set the operating specifications with the switches.

●Control mode selector switch

Switch	Function	OFF	ON
1	PID ON/OFF	ON/OFF control	2-PID control
2	Control period	20 seconds	2 seconds
3	Forward/reverse operation	Reverse	Normal
4	Input shift	Disable	Enable
5	Thermometer replacement	Thermocouple	Platinum resistance thermometer
6	Selection	℃	℉

・All switches are OFF by default.
・Hysteresis is 0.1% FS when ON/OFF control is selected.
・The PID parameters are automatically set for optimum control by ST (self-tuning) when 2-PID control is selected.
・The input shift values will be effective even when the input shift is not displayed (i.e., when displaying the input shift is disabled).
To disable the input shift, set the input shift value to H0. The default setting is H0.

●Temperature range selector switch

Control mode selector switch No.5 : OFF

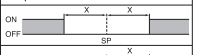
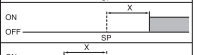
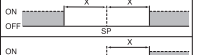
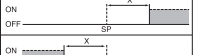
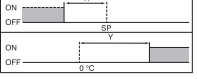
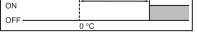
Input	Setting	Setting range ℃	Setting range ℉
K	0	-99 to 1300	-99 to 1999
	1	0.0 to 199.9	0.0 to 199.9
J	2	-99 to 850	-99 to 1500
	3	0.0 to 199.9	0.0 to 199.9
L	4	-99 to 850	-99 to 1500
T	5	-99 to 400	-99 to 700
	6	0.0 to 199.9	0.0 to 199.9
U	7	-99 to 400	-99 to 700
N	8	-99 to 1300	-99 to 1999
R	9	0 to 1700	0 to 1999

Control mode selector switch No.5 : ON

Input	Setting	Setting range ℃	Setting range ℉
Pt100	0	-99 to 850	-99 to 1500
	1	0.0 to 199.9	0.0 to 199.9
	2	-99 to 99	-99 to 99
	3	0 to 200	0 to 200
	4	0 to 400	0 to 400
JPt100	5	-99 to 500	-99 to 900
	6	0.0 to 199.9	0.0 to 199.9
	7	-99 to 99	-99 to 99
	8	0 to 200	0 to 200
	9	0 to 400	0 to 400

*The default is "0".

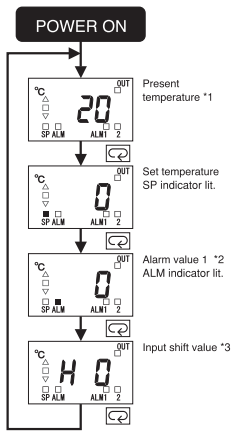
●Alarm mode selector switch

SW No.	Alarm type	Alarm output
0,9	No alarm function	Output off
1	Deviation upper/lower limit	
2	Deviation upper limit	
3	Deviation lower limit	
4	Deviation upper/lower range	
5	Deviation upper/lower limit standby sequence ON	
6	Deviation upper limit standby sequence ON	
7	Deviation lower limit standby sequence ON	
8	Absolute value upper limit	

*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 ℃/℉.
*The default is "2" (Deviation upper limit).

Step2 Set the control temperature.

●Temperature indication



* 1 To start AT (auto-tuning), press and hold the Up and Down keys simultaneously for at least 2 seconds while the temperature is displayed on the temperature indicator. Perform the same operation to stop AT.
* 2 When alarm mode selector switch is set to 0 or 9, no alarm temperature is displayed.
* 3 Input shift value is not displayed when pin 4 of control mode selector switch is set to OFF.