

E5CSL/E5CWL OMRON

Temperature Controller Instruction Manual

Thank you for purchasing the OMRON E5CSL/E5CWL 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.

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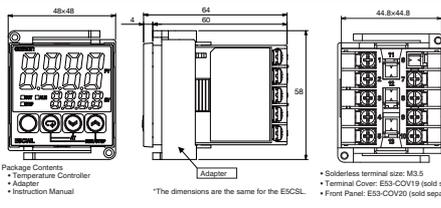
2113603-9C (Side-A) (CL)

Wiring

Model Number Legends

Models with Single Display		Models with Dual Display	
E5CSL-□□	□□	E5CWL-□□	□□
R	Relay output: 250 VAC, 3 A	1	Relay output: 250 VAC, 1 A (resistive load)
O	Voltage output (for driving SSR): 12 VDC, 21 mA	2	Relay output: 250 VAC, 1 A (resistive load)
A	Alarm (E5CWL only)	TC	Thermocouple (K, J, T, R, S)
1	Relay output: 250 VAC, 1 A (resistive load)	P	Platinum resistance thermometer (Pt100)
TC	Thermocouple (K, J, T, R, S)		
P	Platinum resistance thermometer (Pt100)		

Dimensions (mm)



Precautions for Safe Use

- Be sure to observe the following precautions to prevent operation failure, malfunction, or adverse effects on the performance and function of the product. Not doing so may occasionally result in unexpected events.
- 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.
 - Use/store within the rated temperature and humidity ranges. Provide frost-protecting if required.
 - Do not touch the ventilation holes on the product.
 - Do not use the product where there is 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.
 - 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. Tighten the terminal screws to between 0.14 and 0.30 Nm. Loose screws may occasionally result in fire.
 - Set the parameters of the product so that they are suitable for the system being controlled. If they are not suitable, unexpected operation may occasionally result in property damage or accidents.
 - 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.

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. Takes 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.

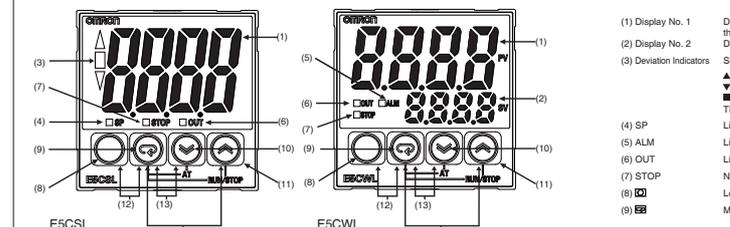
NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

See also product catalog for Warranty and Limitation of Liability.

Specifications

Power supply voltage	100 to 240 VAC, 50/60 Hz
Power consumption range	85% to 110% of the rated voltage
Operating voltage	Approx. 3.5 VA
Sensor type	Thermocouple: K, J, T, R, or S (JIS C 1602-1995 and IEC 60584-1) Platinum resistance thermometer: Pt100 (JIS C 1604-1997 and IEC 60751)
Indication accuracy (ambient temperature 23°C)	(±0.5% of indication value or ±1°C, whichever is greater) ±1 digit max. K, T thermocouple at 200°C or less: ±2°C 1 digit max. J, R thermocouple at 100°C or less: ±2°C 1 digit max.
Control output	Relay output: 250 VAC, 3 A (resistive load) Voltage output (for driving SSR): 12 VDC ±2% 250 mA
Alarm output	Relay output: 250 VAC, 1 A (resistive load)
Control method	ON/OFF or 2-PID control
Electrical life of relay	100,000 operations
Sampling period	250 ms
Malfunction vibration	10 to 55 Hz, 20 m/s ² for 2 min each in X, Y and Z directions
Vibration resistance	10 to 55 Hz, 20 m/s ² for 2 h each in X, Y and Z directions
Malfunction shock	100 m/s ² , 3 times each in X, Y, and Z directions
Shock resistance	30 m/s ² , 3 times each in X, Y, and Z directions
Ambient temperature	-10 to 55°C (with no freezing or condensation)
Ambient humidity	25% to 85% (with no freezing or condensation)
Storage temperature	-25 to 65°C (with no freezing or condensation)
Altitude	2,000 m max.
Recommended use	12A, 250 VAC, time-lag, low-breaking capacity
Weight	Approx. 100 g (Controller only)
Degree of protection	Front panel: IP00, Rear case: IP20, Terminal section: IP00
Installation environment	Installation category II, pollution degree 2 (as per IEC 61010-1)
Memory protection	Non-volatile memory (number of write operations: 100,000)

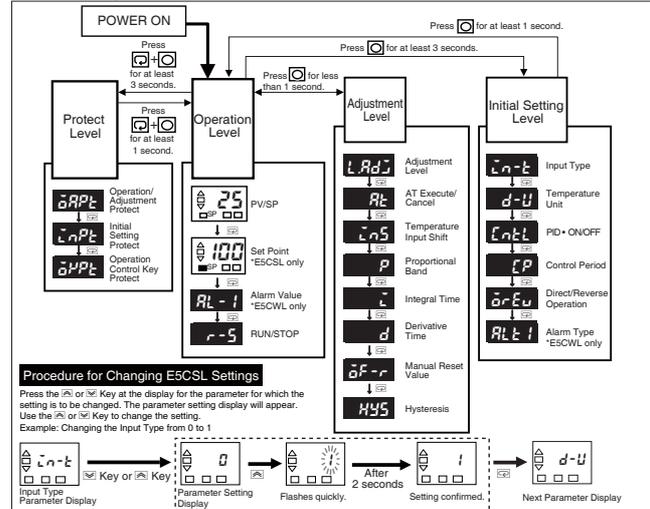
Front Panel Part Names and Functions



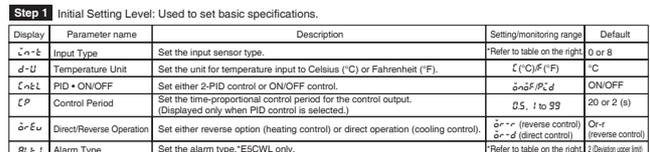
- Display No. 1: Displays the process value (PV) or parameter. For the E5CSL, the set point or parameter is also displayed.
 - Display No. 2: Displays the set point (SP) or parameter setting.
 - Deviation Indicators: Show the relation between the process value and the set point.
 - ▲ Lit: The process value is more than 5°C/F higher than the set point.
 - ▼ Lit: The process value is more than 5°C/F lower than the set point.
 - ▲ Lit: The process value is within 5°C/F of the set point.
 - AL: While the set point is displayed on display No. 1 (E5CSL only). Lit while the alarm is ON. Not lit while the alarm is OFF.
 - SP: Lit while the control output is ON. Not lit while the control output is OFF.
 - OUT: Not lit during operation. Lit when operation is stopped.
 - STOP: Level Key: Changes the setting level.
 - Mode Key: Changes the parameter within the setting level.
 - Down Key: Reduces the setting.
 - Up Key: Increases the setting.
 - Mode Key: Press these keys for at least 3 seconds in Operation Level or Adjustment Level to go to Protect Level. Press these keys for at least 1 second in Protect Level to return to Operation Level. Press these keys for at least 2 seconds to start or stop autotuning.¹ Press these keys for at least 2 seconds to start or stop autotuning.²
- ¹: These keys are disabled when starting and stopping autotuning has been disabled with operation control key protection.
²: These keys are disabled when starting and stopping operation has been disabled with operation control key protection.

Operation Menu

Parameter Operations

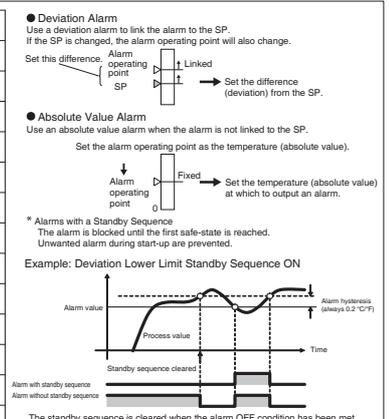


Procedure for Changing E5CSL Settings



Alarms

Setting	Alarm type	Positive alarm value (X)	Negative alarm value (X)	Deviation/absolute value alarm
0	No alarm	ON/OFF	Output OFF	Deviation alarm
1	Deviation upper/lower limit	ON/OFF	Always ON	Deviation alarm
2	Deviation upper limit	ON/OFF	Always ON	Deviation alarm
3	Deviation lower limit	ON/OFF	Always ON	Deviation alarm
4	Deviation upper/lower range	ON/OFF	Always OFF	Deviation alarm
5	Deviation upper/lower limit standby sequence ON	ON/OFF	Always OFF	Deviation alarm
6	Deviation upper limit standby sequence ON	ON/OFF	Always OFF	Deviation alarm
7	Deviation lower limit standby sequence ON	ON/OFF	Always OFF	Deviation alarm
8	Absolute value upper limit	ON/OFF	Always OFF	Absolute value alarm
9	Absolute value lower limit	ON/OFF	Always OFF	Absolute value alarm
10	Absolute value upper limit standby sequence ON	ON/OFF	Always OFF	Absolute value alarm
11	Absolute value lower limit standby sequence ON	ON/OFF	Always OFF	Absolute value alarm
12	Do not set.			



Parameter Tables

Step	Parameter name	Description	Setting/monitoring range	Default	
Step 1 Initial Setting Level: Used to set basic specifications.	Input Type	Set the input sensor type.	Refer to table on the right. 0 or 8	0	
	Temperature Unit	Set the unit for temperature input to Celsius (°C) or Fahrenheit (°F).	0 (°C) or 8 (°F)	0 (°C)	
	PID ON/OFF	Set either 2-PID control or ON/OFF control.	ON/OFF	ON/OFF	
	Control Period	Set the time-proportional control period for the control output. (Displayed only when PID control is selected.)	0.5, 1 to 99.9	20 or 2 (s)	
	Direct/Reverse Operation	Set either reverse output (heating control) or direct operation (cooling control).	Direct (reverse control) or Reverse (direct control)	Direct (reverse control)	
	Alarm Type	Set the alarm type: "E5CWL only."	Refer to table on the right (Deviation upper limit)		
	Step 2 Operation Level: Used to monitor the process value and to set the set point, alarm value, etc.	PV/SP	Monitor the process value and set the set point.		SV: 0 (°C)
		Alarm value	Set the alarm value. The location of the decimal point depends on the input type. "E5CWL only."	- 999 to 9999	0 (°C)
		RUN/STOP	Start and stop control operation. ¹⁾	RUN/STOP	RUN
		Step 3 Adjustment Level: Used to tune parameters and set control parameters.	Adjustment Level	This display indicates that you have moved to Adjustment Level.	
AT Execute/Cancel			Starts and stops autotuning. (Displayed only when PID control is selected.)	ON/OFF	OFF
Temperature Input Shift			Set a compensation value for the temperature input in increments of 0.1°C or 0.1°F.	- 99.9 to 999.9	0.0 (°C)
Proportional Band			Set the proportional band in increments of 0.1°C or 0.1°F. (Displayed only when PID control is selected.)	0.1 to 999.9	8.0 (°C)
Integral Time			Set the integral time in increments of 1 s. (Displayed only when PID control is selected.)	0 to 3999	233 (s)
Derivative Time			Set the derivative time in increments of 1 s. (Displayed only when PID control is selected.)	0 to 3999	40 (s)
Manual Reset Value			Set the manipulated value to use for P or PD control (I = 0). It will be canceled.	0.0 to 100.0	50.0 (%)
Hysteresis	Set the hysteresis to use to achieve stable operation when switching the control output ON/OFF when ON/OFF control. (Displayed only when ON/OFF control is selected.)	0.1 to 999.9	1.0 (°C)		
Step 4 Protect Level: Used to set parameters to restrict key operations.	Operation/Adjustment Protect	Set protection for Operation Level and Adjustment Level.	Refer to table on the right.	0	
	Initial Setting Protect	Set protection for Initial Setting Level.	Refer to table on the right.	1	
	Operation Control Key Protect	Set protection for the AT Key and RUN/STOP Key (operation control keys).	Refer to table on the right.	0	
	Alarm Control Key Protect	Set protection for the Alarm Control Key.	Refer to table on the right.	0	

Input type: Thermocouple

Input	Setting	Setting range (°C)	Setting range (°F)
K	0	-200 to 1300	-300 to 2300
	1	-20.0 to 500.0	0.0 to 900.0
J	2	-100 to 850	-100 to 1500
	3	-20.0 to 400.0	0.0 to 750.0
T	4	-200 to 400	-300 to 700
	5	-199.9 to 400.0	-199.9 to 700.0
R	6	0 to 1700	0 to 3000
S	7	0 to 1700	0 to 3000

Protection

Level	Setting	0	1	2	3
Process value	Operation/Adjustment Protection	○	○	○	○
	Initial Setting Protection	○	○	○	○
Alarm value	Operation/Adjustment Protection	○	○	○	○
	Initial Setting Protection	○	○	○	○

Initial Setting Protection

Level	Setting	0	1	2
Process value	Operation/Adjustment Protection	○	○	○
	Initial Setting Protection	○	○	○
Alarm value	Operation/Adjustment Protection	○	○	○
	Initial Setting Protection	○	○	○

Input type: Platinum Resistance Thermometer

Input	Setting	Setting range (°C)	Setting range (°F)
Pt100	8	-200 to 850	-300 to 1500
	9	-199.9 to 500.0	-199.9 to 900.0

Troubleshooting

Display	Meaning	Action
SE (S.ERR)	Input error ¹⁾	Check the wiring of inputs, disconnections, short circuits and input type.
E111 (E111)	RAM memory error	Turn the power OFF then back ON again. ²⁾
E111S (E111S) (S111)	Non-volatile memory error	Press the Mode and Stop keys for at least 3 seconds to initialize the settings and clear the non-volatile memory error. ²⁾

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.

OMRON EUROPE B.V.
Wegalaan 67-69, NL-2132 JD Hoofddorp The Netherlands
Phone 31-2356-81-300
Fax 31-2356-81-388

OMRON ELECTRONICS LLC
One Commerce Drive Schaumburg, IL 60173-5302 U.S.A
Phone 1-847-843-7900
Fax 1-847-843-7787

OMRON ASIA PACIFIC PTE. LTD.
No. 438A Alexandra Road # 05-05/08 (Lobby 2),
Alexandra Technopark, Singapore 119967
Phone 65-6335-3011
Fax 65-6335-2711

OMRON CORPORATION
Shikoku Horikawa, Shimogyo-ku, Kyoto 600-8530 JAPAN

