

EN INSTRUCTION MANUAL

Thank you for purchasing the OMRON ES5C Digital 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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Refer to the ES5C/ES5CQ Digital Controllers User's Manual (Cat. No. H174) for detailed application procedures.

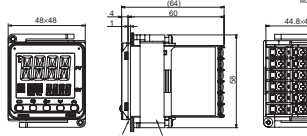
Key to Warning Symbols

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.

Wiring

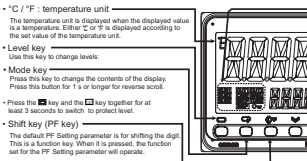
Dimensions

Dimensions (mm)



* Do not remove the terminal block. Doing so may result in failure or malfunction.
* A Setup Tool port is provided to be used to connect a personal computer to the product when using the Setup Tool. ES5C/ES5CQ USB-Serial Conversion Cable is required to connect the personal computer to the product. (Do not use the product with the USB-Serial Conversion Cable left permanently connected.)
Refer to the instruction manual provided with the USB-Serial Conversion Cable for details on connection methods.

Names of Parts on Front Panel



* C / °F: temperature unit
The temperature unit is displayed when the displayed value is a temperature. Either °C or °F is displayed according to the set value of the temperature unit.
* Level key
Press this key to change levels.
* Mode key
Press this key to change the contents of the display. Press this button for 1 s for longer reverse select.
* Press key and OK key together at least 3 seconds to return to protect level.
* Shift key (PF key)
The default PF Setting parameter is for shifting the digit. This is a function key. When it is pressed, the function set for the PF Setting parameter will operate.

Operation Menu

Input Type

Input type	Input	Setting	Setting range
Platinum resistance thermometer	RT100	0	-200.0 to 850.0
		1	-199.9 to 500.0
		2	0.0 to 100.0
		3	-199.9 to 500.0
Thermocouple	JPH100	4	0.0 to 100.0
		5	-199.9 to 500.0
		6	-20.0 to 500.0
		7	-100.0 to 850.0
		8	-20.0 to 400.0
		9	-199.9 to 500.0
		10	-199.9 to 500.0
		11	-200.0 to 850.0
		12	-100.0 to 850.0
		13	-20.0 to 400.0
		14	-199.9 to 500.0
		15	-199.9 to 500.0
Infrared Thermosensor	E318	16	0.0 to 1300.0
		17	0.0 to 1700.0
		18	100.0 to 1800.0
		19	0.0 to 2300.0
		20	100.0 to 2300.0
		21	0.0 to 190.0
		22	0.0 to 120.0
		23	115.0 to 180.0
		24	140.0 to 280.0
		25	0.0 to 200.0
		26	1.999 to 9.999
		27	0.0 to 200.0
28	4.0 to 20.0		
29	0.0 to 10.0		

*The default is "5".
*SFP will be displayed when a platinum resistance thermometer is mistakenly connected while input type is not set for it. To clear the SFP display, correct the wiring and cycle the power supply.

Alarms

Setting	Alarm type	Alarm output function
0	No alarm function	Alarm output function OFF
1	Deviation upper/lower limit	ON: Alarm output ON (alarm alarm value 0) OFF: Alarm output OFF
	2	Deviation upper limit
3	Deviation lower limit	ON: Alarm output ON (alarm alarm value 2) OFF: Alarm output OFF
	4	Deviation upper/lower range
5	Deviation upper/lower limit standby sequence ON	ON: Alarm output ON (alarm alarm value 4) OFF: Alarm output OFF
	6	Deviation upper limit standby sequence ON
7	Deviation lower limit standby sequence ON	ON: Alarm output ON (alarm alarm value 6) OFF: Alarm output OFF
	8	Absolute value upper limit
9	Absolute value lower limit	ON: Alarm output ON (alarm alarm value 8) OFF: Alarm output OFF
	10	Absolute value upper limit standby sequence ON
11	Absolute value lower limit standby sequence ON	ON: Alarm output ON (alarm alarm value 10) OFF: Alarm output OFF
	12	LBA (only for alarm 1)
13	PV Change Rate Alarm	ON: Alarm output ON (alarm alarm value 12) OFF: Alarm output OFF
	14	SP absolute value upper limit
15	SP absolute value lower limit	ON: Alarm output ON (alarm alarm value 14) OFF: Alarm output OFF
	16	MV absolute value upper limit
17	MV absolute value lower limit	ON: Alarm output ON (alarm alarm value 16) OFF: Alarm output OFF

*1: Upper and lower limits can be set for parameters 1, 4 and 5 to provide for different types of alarm. These are indicated by the letter "L" and "H".
* The default alarm type is "2".

CAUTION

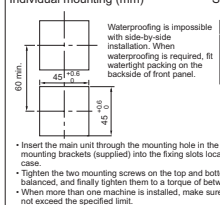
- Minor injury due to electric shock may occasionally occur.
Do not touch the terminals while power is being supplied.
- Electric shock, fire, or malfunction may occasionally occur. Do not allow metal objects, conductors, clothing from rotation work, or moisture to enter the Digital Controller, the Setup Tool ports, or between the pins on the connectors on the Setup Tool cable.
Do not use this 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 is the product UL listed as an Open Type 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 relays are relay 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.
E) 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.
F) Loose screws may occasionally result in fire. Tighten the terminal screws to the specified torque of 0.43 to 0.58 Nm.
- Check 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 Digital 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 Digital Controller, take appropriate safety measures, such as installing a monitoring device on a separate line.

Suitability for Use

Omron Companies shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the Product in the Buyer's application or use of the Product.
At the Buyer's request, Omron will provide applicable third party certification documents identifying ratings and limitations of use which apply to the Product. This information by itself is not sufficient for a complete determination of the suitability of the Product in combination with the end product, machine, system, or application of use. Buyer shall be fully responsible for determining appropriateness of the particular product with respect to Buyer's application, product or system. Buyer shall take application responsibility in all cases.
NEVER USE THE PRODUCT 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(S) IS/ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OMRON EQUIPMENT OR SYSTEM.

Installation

Individual mounting (mm)



- Waterproofing is impossible with side-by-side installation. When waterproofing is required, fit waterproofing packing on the backside of front panel.
- Insert the main unit through the mounting hole in the panel (1 to 5 mm thickness). Insert the mounting brackets (supplied) into the fixing slots located on the top and bottom of the rear case.
- Tighten the two mounting screws on the top and bottom of the adapter to keep them secure, and finally tighten them to a torque of between 0.29 and 0.38 N·m.
- When more than one machine is installed, make sure that the ambient temperature does not exceed the specified limit.
- Operation indicators
-S1: Auxiliary output 1 indicator
-S2: Auxiliary output 2 indicator
-OUT1: Control output 1 indicator
- STOP: Control stopped indicator
Lit when the setting parameter is changed during operation. During stop step, functions other than control output are valid.
- CMW: Communications writing enabled/disabled indicator
Lit when communications writing is enabled and not in the state it is disabled.
- On: Protection indicator
Lit when the setting parameter is changed (ON and Down Key).
- MANU: Manual output indicator
Lit when the Auto/Manual Mode is set to Manual Mode.

Precautions for Safe Use

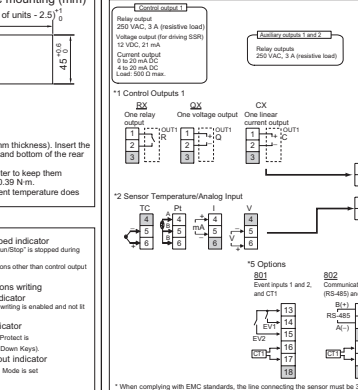
- Be sure to observe the following precautions to prevent operation failure, malfunction, or adverse effects on the performance and functions of the product. Do not do so may occasionally result in unexpected events.
(1) Use the product within specifications.
(2) Use the product designed for indoor use only. Do not use the product outdoors. Do not use or store the product in any of the following locations:
-Places directly subject to heat radiated from heating equipment.
-Places subject to splashing liquid or gas (in particular, sulfuric gas and ammonia gas).
-Places subject to direct sunlight.
-Places subject to dust or corrosive gas (in particular, sulfuric gas and ammonia gas).
-Places subject to vibration and temperature change.
-Places subject to strong air flow.
-Places subject to infrared and large shocks.
- (3) Operators within the rated temperature and humidity ranges. Provide forced-cooling if required.
(4) Do not block the ventilation holes and do not block the area around the product.
(5) Use the specified size of crimped terminals (MS, with 0.8 mm or less) for wiring. To connect wires to the terminal block, use copper braided or solid wires with a gauge of AWG16 to AWG18 (equal to cross-sectional area of 0.205 to 0.8231 mm²). (The stripping length is 8 to 10 mm.) Up to two wires of same size and type, or two crimped terminals can be inserted into a single terminal.
(6) Do not wire the terminals which are not used.
(7) Allow as much space as possible between the controller and devices that generate a high-frequency or surge. Separate the high-frequency or large-current power lines from their lines, avoid parallel or contact wiring with the power lines when they are wiring to the terminals.
(8) Use this product within the rated load and power supply.
(9) Make sure that the rated voltage is attained within two seconds of turning ON the power using a switch or relay contact. If the voltage is applied gradually, the power may not reset or output malfunctions may occur.
(10) Make sure that the Digital Controller has 30 minutes or more to warm up after turning ON the power before control operation to ensure the correct temperature stability.
(11) When executing self-tuning, turn the load and the unit ON simultaneously, or turn the load ON before you turn the controller ON.
(12) A switch or circuit breaker should be provided close to the unit. The switch or circuit breaker should be within easy reach of the operator, and must be marked as a disconnecting means for this product.
(13) Wipe off any dirt from the Digital Controller with a soft dry cloth. Never use benzene, alcohol, or any other chemical that contains these or other organic solvents, deformation or discoloration may occur.
(14) Design system (control panel, etc.) complying the 2 second delay of the controller's output to be set after the controller ON.
(15) The output will turn OFF when you move to the Initial Setting Level. Take this into consideration when the setting is completed.
(16) The non-volatile memory write operations are limited. Therefore, use RAM write mode when frequently overwriting data during communications or other operations.
(17) When disassembling the Digital Controller for disposal, use suitable tools.
(18) Do not exceed the communication distance that is given in the specifications and use the specified communication cables. Refer to the ES5C/ES5CQ Digital Controllers User's Manual (Cat. No. H174) for the communication's distance and cable specifications.
(19) Do not turn the power supply to the Digital Controller ON or OFF while the USB-Serial Conversion Cable is connected. The Digital Controller may malfunction.
(20) The maximum terminal temperature is 75°C.

Specifications

Power supply voltage	100 to 240 VAC, 50/60 Hz or 24 VAC, 50/60 Hz / 24 VDC
Operating voltage range	85 to 110% of the rated voltage
Power consumption	5.2 W max. (100 to 240 VAC) 3.1 W max. (24 VAC) / 6.0 W max. (24 VDC) 0.5 W max. (100 to 240 VAC) 4.1 W max. (24 VAC) / 2.3 W max. (24 VDC)
All other specifications:	
Indication accuracy	±0.2 % of indication value or ±1°C, whichever is greater at 1 digit max.
(Ambient temperature: 23°C)	
Resolution	10.0 % of indication value or 0.1°C, whichever is greater at 1 digit max.
Analog input	40.2 to 75.3 at 1 digit max.
Event input	Output current approx. 7 mA per contact. ON: residual voltage 1.5 V max. OFF: residual voltage 0.1 V max.
No-contact input	Relay output: SPST-NO 250 VAC, 50/60 Hz (resistive load) Electrical life of relay: 100,000 operations Voltage drop (for driving SSR): 12 VDC 50%, 21 mA Current capacity: 4.0 to 20 mA DC, 10 to 20 mA DC Load 500 Ω max.
Control output 1	ON/OFF or 2-PID control Relay output: SPST-NO 250 VAC, 3 A (resistive load) Electrical life of relay: 100,000 operations -10 to 55°C (Avoid freezing or condensation) Approx. 25% to 85% 25 to 85°C (Avoid freezing or condensation) Max. 2,000 m
Control method	ON/OFF or 2-PID control
Auxiliary outputs	Approx. 50% (Digital Controller only) Front panel: P06 Rear case: P02, terminal socket: P00 Installation category II, pollution degree 2 (see IEC 61010-1)
Ambient temperature	Approx. 25% to 85% 25 to 85°C (Avoid freezing or condensation) Max. 2,000 m
Ambient humidity	Approx. 25% to 85% 25 to 85°C (Avoid freezing or condensation) Max. 2,000 m
Storage temperature	Approx. 25% to 85% 25 to 85°C (Avoid freezing or condensation) Max. 2,000 m
Altitude	Approx. 25% to 85% 25 to 85°C (Avoid freezing or condensation) Max. 2,000 m
Recommended fuse	7.5A, 250 VAC time-lag, low-breaking capacity
Weight	Approx. 50 g (Digital Controller only)
Degree of protection	Front panel: P06 Rear case: P02, terminal socket: P00 Installation category II, pollution degree 2 (see IEC 61010-1)
Installation environment	Non-volatile memory (Number of write operations: 1,000,000) Non-volatile memory (Long term: 250 V+ (power supply voltage))
Memory protection	
Temporary overvoltage	

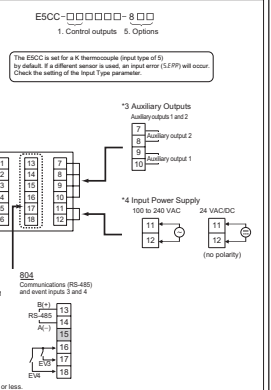
Connections

(The applicability of the electric terminals varies with the type of machine.)



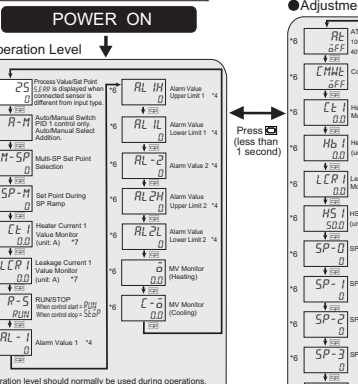
Connections

(Do not connect wiring to the terminals that are shaded gray.)



POWER ON

Check the wiring before turning ON the power supply.

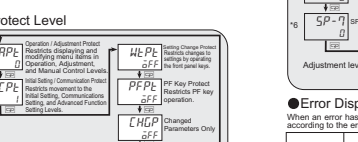


Operation level should normally be used during operations.

Hold [AL] and [RH] keys down for at least 3 seconds

Hold [AL] and [RH] keys down for at least 3 seconds

Protect Level



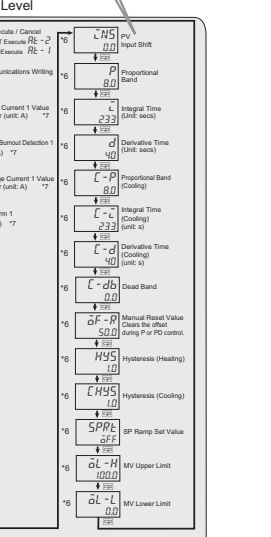
Restricts which settings can be displayed or changed, and restricts change by key operation.

Other functions

Refer to the ES5C/ES5CQ Digital Controllers User's Manual (Cat. No. H174) for information on the Advanced Function Setting Level, Manual Control Level, and other functions.
Refer to the ES5C/ES5CQ Digital Controllers Communications Manual (Cat. No. H175) for information on Communications.

Adjustment Level

Only the value set in the <C> Temperature Unit Shift parameter is applied to the write temperature unit range (when the process value is 25°C). The process value is limited to 198.8°C when input shift value is set to <1>.



Adjustment level is for entering set values and shift values for control.

Error Display (troubleshooting)

When an error has occurred, the No.1 display shows the error code. Take necessary measure according to the error code, referring the table below.

No.1 display	Meaning	Action	Status at error	Operate as when the error is cleared
SERR (S Err)	Input error	Check the setting of the input type parameter. Check the input wiring for connection or disconnection.	Control OFF	Alarm ON
E333 (E333)	A/D converter error	After the completion of A/D converter, turn the power OFF then back ON again. If the display remains the same, the controller must be repaired. If the display returns to normal, there is a possible cause can be external noise affecting the control system. Check for interference.	Control OFF	Alarm OFF
E111 (E111)	Memory error	Turn the power OFF then back ON again. If the display remains the same, the controller must be repaired. If the display returns to normal, there is a possible cause can be external noise affecting the control system. Check for interference.	Control OFF	Alarm OFF

If the input value exceeds the display limit (-1999 to 9999), though it is within the control range, it will be displayed under -1999 or 9999 above/below. Under these conditions, control output and alarm output will operate normally.
*2: Refer to the ES5C/ES5CQ Digital Controllers User's Manual (Cat. No. H174) for the controllable ranges.
*3: Error shown only for "Process value / Set point". Not shown for other status.

OMRON EUROPE B.V.
Weghalen 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 1-847-843-7800
FAX 1-847-843-7877
OMRON ASIA PACIFIC PTE. LTD.
No. 438A Alexandra Road # 05-05/08 (Lobby 2),
Alexandra Technopark, Singapore 119967
Phone 65-6835-3011
FAX 65-6835-2711
OMRON CORPORATION
Shiojiri Honkawa, Shimogyo-ku, Kyoto 600-8530 JAPAN