

E5AC-8□□

Digital Controller

OMRON

EN INSTRUCTION MANUAL

Thank you for purchasing the OMRON E5AC 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.

OMRON Corporation

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Refer to the E5□C Digital Controllers User's Manual (Cat. No. H174) for detailed application procedures.

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.

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, cuttings from installation work, or moisture to enter the Digital Controller.

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

- This is the product UL listed as Open Type Process Control Equipment. It must be mounted in an enclosure that does not allow fire to escape externally.
 - More than one disconnect switch may be required to de-energize the equipment before servicing.
 - Signal inputs are SELV, limited energy.
 - 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 the terminal screws to the specified torque of 0.43 to 0.58 N·m.
- 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 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 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 other application or use. Buyer shall be solely 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 PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

Precautions for Safe Use

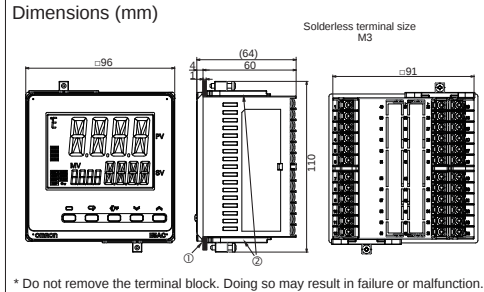
- Be sure to observe the following precautions to prevent operation failure, malfunction, or adverse effects on the performance and functions of the product. Not doing so may occasionally result in unexpected events. Use the product within specifications.
- The product is designed for indoor use only. 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 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.
 - Usestore within the rated temperature and humidity ranges. Provide forced-cooling if required.
 - To allow heat to escape, do not block the area around the product.
 - Do not block the ventilation holes on the product.
 - Be sure to wire properly with correct polarity of terminals.
 - Use the specified size of crimped terminals (M3, width 5.8 mm or less) 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 cross-sectional area of 0.205 to 0.8231 mm²). (The stripping length is 6 to 8 mm.). Up to two wires of same size and type, or two crimped terminals can be inserted into a single terminal.
 - Do not wire the terminals which are not used.
 - 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.
 - Use this product within the rated load and power supply.
 - To allow heat to escape, do not block the area around the product.
 - Make sure that the voltage is applied gradually, the power may not be reset or output malfunctions may occur.
 - Make sure that the Digital Controller has 30 minutes or more to warm up after turning ON the power before starting actual control operations to ensure the correct temperature display.
 - When executing self-tuning, turn the load and the unit ON simultaneously, or turn the load ON before you turn the controller ON.
 - 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.
 - Wipe off any dirt from the Digital Controller with a soft dry cloth. Never use thinners, benzene, alcohol, or any cleaners that contain these or other organic solvents. Deformation or discoloration may occur.
 - Design system (control panel, etc.) considering the 2 second of delay that the controller's output is set after power ON.
 - The output will turn OFF when you move to the Initial Setting Level. Take this into consideration when performing control.
 - The number of non-volatile memory write operations is limited. Therefore, use RAM write mode when frequently overwriting data during communications or other operations.
 - When disassembling the Digital Controller for disposal, use suitable tools.
 - Do not exceed the communications distance that is given in the specifications and use the specified communications cable. Refer to the E5□C Digital Controllers User's Manual (Cat. No. H174) for the communications distance and cable specifications.
 - The maximum terminal temperature is 75°C. Use wires with heat resistance of 75°C min to wire the terminals.

Specifications

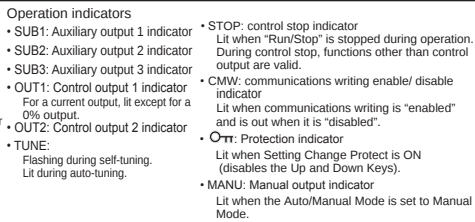
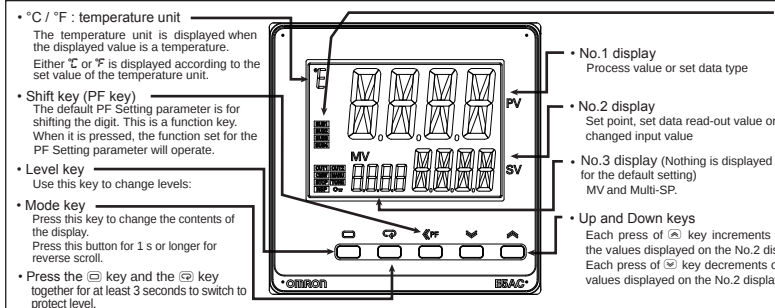
Power supply voltage	100 to 240 VAC, 50/60 Hz or 24 VAC, 50/60 Hz / 24VDC
Operating voltage range	85 to 110% of the rated voltage
Power consumption	7.0 VA max. (100 to 240 VAC) 4.2 VA max. (24 VAC)/2.4 W max. (24 VDC) 9.0 VA max. (100 to 240 VAC) 5.6 VA max. (24 VAC)/3.4 W max. (24 VDC)
All other specifications:	Thermocouple: (±0.3 % of indication value or ±1°C, whichever is greater) ±1 digit max. Platinum resistance thermometer: (±0.2 % of indication value or ±0.8°C, whichever is greater) ±1 digit max. Analog input: ±0.2 % FS ±1 digit max.
Indication accuracy (Ambient temperature: 23°C)	Output current: approx. 7 mA per contact. ON: 1 KΩ max. OFF: 100 KΩ min. ON: residual voltage 1.5 V max., OFF: leakage current 0.1 mA max.
Event input	Transfer output: 100,000 operations Voltage output (for driving SSR): 12 VDC ±20%, 40 mA Current output: 4 to 20 mA DC, 0 to 20 mA DC Load: 500 Ω max.
Contact input	Relay output: SPST-NO, 250 VAC, 5 A (resistive load)
No-contact input	Electrical life of relay: 100,000 operations ON/OFF or 2-PID control Relay outputs: 250 VAC, 3 A (resistive load) Electrical life of relay: 100,000 operations
Potentiometer input	Non-volatile memory (Number of write operations: 1,000,000) Short term: 1200 V+ (power supply voltage) Long term: 250 V+ (power supply voltage)
Control output 1	
Control output 2	
Control method	
Auxiliary outputs	
Ambient temperature	-10 to 55°C (Avoid freezing or condensation)
Ambient humidity	25% to 85%
Storage temperature	-25 to 65°C (Avoid freezing or condensation)
Altitude	Max. 2,000 m
Recommended fuse	T2A, 250 VAC, time-lag, low-breaking capacity
Weight	Approx. 250 g (Digital Controller 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	
Temporary overvoltage	

Wiring

●Dimensions



●Names of Parts on Front Panel



Operation Menu

●Input Type

Input type	Input	Setting	Setting range
Temperature inputs	Platinum resistance thermometer	0	-200 to 850 °C / -300 to 1500 °F
		1	-199.9 to 500.0 °C / -199.9 to 900.0 °F
		2	0.0 to 100.0 °C / 0.0 to 210.0 °F
	Thermocouple	3	-199.9 to 500.0 °C / -199.9 to 900.0 °F
		4	0.0 to 100.0 °C / 0.0 to 210.0 °F
		5	-200 to 1300 °C / -300 to 2300 °F
	J	6	-20.0 to 500.0 °C / 0.0 to 900.0 °F
		7	-100 to 850 °C / -100 to 1500 °F
		8	-20.0 to 400.0 °C / 0.0 to 750.0 °F
	T	9	-200 to 400 °C / -300 to 700 °F
		10	-199.9 to 400.0 °C / -199.9 to 700.0 °F
		11	-200 to 600 °C / -300 to 1100 °F
	E	12	-100 to 850 °C / -100 to 1500 °F
		13	-200 to 400 °C / -300 to 700 °F
Analog input type	Current input	14	-199.9 to 400.0 °C / -199.9 to 700.0 °F
		15	-200 to 1300 °C / -300 to 2300 °F
		16	0 to 1700 °C / 0 to 3000 °F
	Voltage input	17	0 to 1700 °C / 0 to 3000 °F
		18	100 to 1800 °C / 300 to 3200 °F
		19	0 to 2300 °C / 0 to 3200 °F
	Infrared Thermosensor	20	0 to 1300 °C / 0 to 2300 °F
		21	0 to 90 °C / 0 to 190 °F
		22	0 to 120 °C / 0 to 240 °F
	ESB	23	0 to 165 °C / 0 to 320 °F
		24	0 to 260 °C / 0 to 500 °F
		25	Use the following ranges for scaling: -1999 to 9999, -199.9 to 999.9, -19.99 to 99.99, -1.999 to 9.999

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

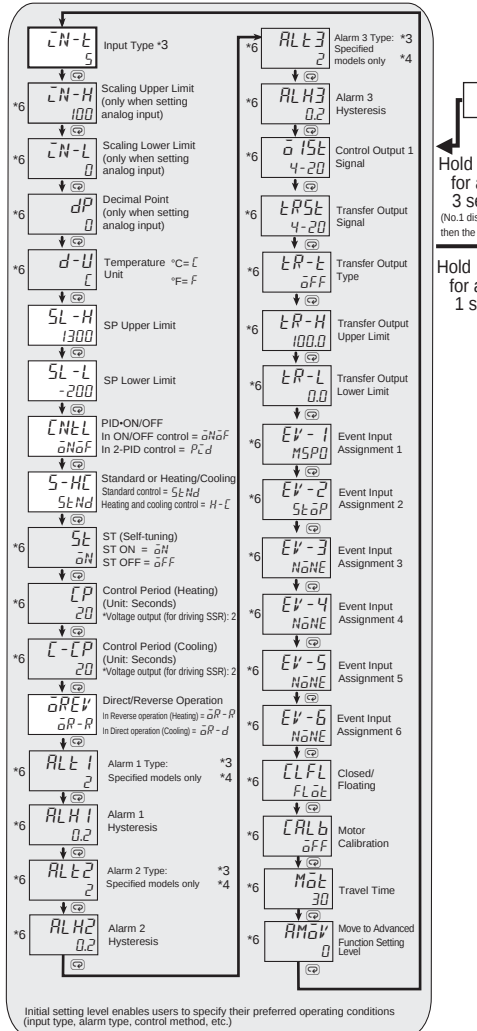
●Alarms

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

*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"

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.
A 급 기기 (업무용 방송통신기자재) 이 기기는 업무용 (A 급) 전자파차폐기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.

●Initial Setting Level



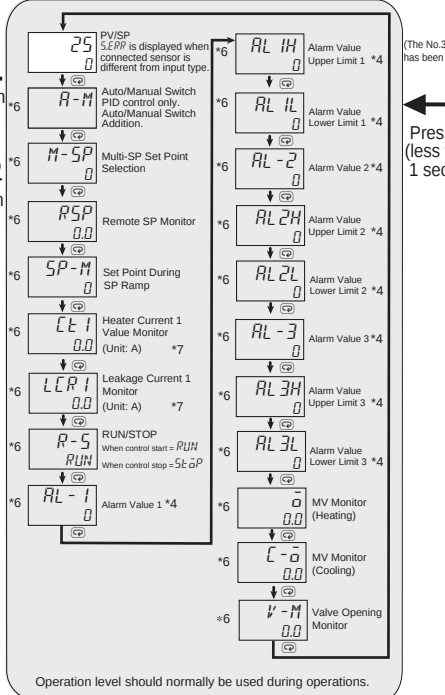
- *3: Refer to the adjoining tables for details of input types and alarm types.
- *4: Applicable only to models with alarm functions.
- *5: Operation is stopped when moved to the initial setting level. (control/alarm are both stopped).
- *6: The grayed-out setting items may not be displayed according to the models and setting.
- *7: Applicable only to models with heater burnout functions.

Conformance to Safety Standard
Reinforced insulation is provided between input power supply, relay outputs, and between other terminals.
Due to UL Listing requirements, use the E54-CT1L or E54-CT3L current transformer with the factory wiring (internal wiring). Use a UL category X0BA or X0BA7 current transformer that is UL Listed for field wiring (external wiring) and not the factory wiring (internal wiring).
Always externally connect the recommended fuse that is specified in the Instruction Manual before you use the Digital Controller.
Analog Input • If you input an analog voltage or current, set the Input Type parameter to the correct input type. • Do not use the Digital Controller to measure a circuit with Measurement Category II, III, or IV. • Do not use the Digital Controller to measure an energized circuit to which a voltage that exceeds 30 Vrms or 60 VDC is applied.
The protection provided by the Digital Controller may be impaired if the Digital Controller is used in a manner that is not specified by the manufacturer.

Check the wiring before turning ON the power supply.

POWER ON

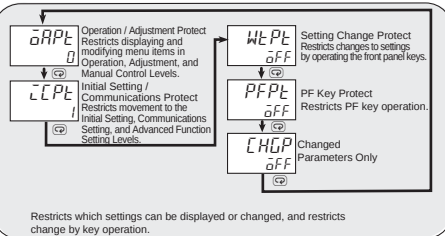
●Operation Level



Hold $\ominus$ and $\oplus$ keys down for at least 1 second

Hold $\ominus$ and $\oplus$ keys down for at least 3 seconds

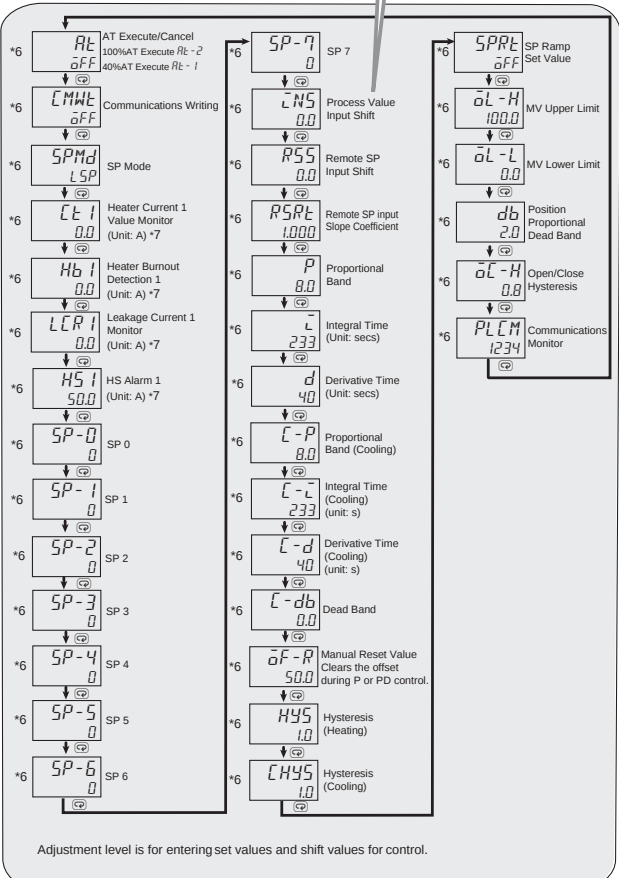
●Protect Level



●Other functions

Refer to the E5□C 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 E5□C Digital Controllers Communications Manual (Cat. No. H175) for information on communications.

●Adjustment Level



●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	Alarm
SEPP (S. En)	Input error *2	Check the setting of the Input Type parameter, check the input wiring, and check for broken or shorts in the temperature sensor.	OFF	Operates as above the upper limit.
E333 (E333)	A/D converter error *2	After the correction of A/D converter error, turn the power OFF then back ON again. If the display remains the same, the controller must be repaired. If the display is restored to normal, then a probable cause can be external noise affecting the control system. Check for external noise.	OFF	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 is restored to normal, then a probable cause can be external noise affecting the control system. Check for external noise.	OFF	OFF

If the input value exceeds the display limit (-1999 to 9999), though it is within the control range, [ECC] will be displayed under -1999 and [222] above 9999. Under these conditions, control output and alarm output will operate normally. Refer to the E5□C Digital Controllers User's Manual (Cat. No. H174) for the controllable ranges.

*2: Error shown only for "Process value / Set point". Not shown for other status.

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