

**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.

Tighten the terminal screws to between 0.74 and 0.90 N·m. 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 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.

**EN** Instruction Manual

Thank you for purchasing the OMRON E5CN-H 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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For detailed operating instructions, please refer to the E5CN-H/E5AN-H/E5EN-H Digital Controllers User's Manual Advanced Type (Cat. No. H157).

**Significance of WARNINGS and CAUTIONS**

**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.

**Suitability for Use**

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of the product 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.

**Precautions for Safe Use**

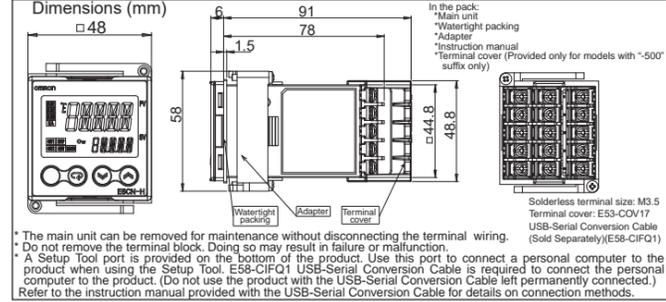
- Be sure to observe the following precautions to prevent operation failure, malfunction, or adverse effects on the performance and functions of the product. Not doing so may occasionally result in unexpected events.
- Use the product within specifications.
- The product is designed for indoor use only. Do not use the product outdoors. Do not use or store the product in any of the following locations.
- Places 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) Be sure to wire properly with correct polarity of terminals.
- (5) 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 or tinned or solid wires with a gage of AWG14 (equal to cross-sectional area of 0.205 to 0.281 mm<sup>2</sup>). (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.
- (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 powerful high-frequency or surge.
- (8) 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) 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 be reset or output malfunctions may occur.
- (11) When switching self-latching, 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 this unit.
- (13) Always turn OFF the power supply before pulling out the interior of the product, and never touch nor apply shock to the terminals or electronic components. When inserting the interior of the product, do not allow the electronic components to touch the case.
- (14) Do not use paint thinner or similar chemical to clean with. Use standard grade alcohol.
- (15) Design system (turn OFF) and (2) considering the 2 second of delay that the controller's output to be set.
- (16) The output may turn OFF when shifting to certain levels. Take this into consideration when performing control.
- (17) Refer to the instruction sheet for installing Option unit (E53CNH03N / E53CNH04N / E53CN03N / E53CN04N / E53CNH05N / E53CNH06N / E53CNH07N / E53CNH08N / E53CNH09N / E53CNH10N / E53CNH11N / E53CNH12N / E53CNH13N / E53CNH14N / E53CNH15N / E53CNH16N / E53CNH17N / E53CNH18N / E53CNH19N / E53CNH20N).
- (18) The number of non-volatile memory write operations is limited. Therefore, use RAM write mode when frequently overwriting data during communications or other operations.
- (19) When disassembling the Temperature Controller for disposal, use suitable tools.
- (20) Do not use the Temperature Controller if the front sheet is peeling or torn.

**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	Approx. 8.5 VA (100 to 240 VAC) / Approx. 5.5 VA (24 VAC) / Approx. 3.5 W (24 VDC)
Indication accuracy (Ambient temperature: 23°C)	(±0.1% of indication value ±1°C, whichever is greater) ±1 digit max. Platinum resistance thermometer: (±0.1% of indication value or ±0.5°C, whichever is greater) ±1 digit max. Thermocouple: Analog input: ±0.1% FS ±1 digit max. 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. Relay output: SPST-NO 250VAC, 3A(resistive load) Voltage output (for driving SSR): 12 VDC, 21 mA Current output: 4 to 20 mADC, 0 to 20mA/DC Load: 600 Ω max. Linear voltage output 0-10VDC Load: 1 kΩ min. Electrical life of relay: 100,000 operations (Long-life model: 1 million operations) Voltage output (for driving SSR): 12 VDC, 21 mA ON/OFF or 2-PID control Relay outputs: 250 VAC, 3 A (resistive load), Electrical life of relay: 100,000 operations (Long-life model: 1 million operations) Non-volatile memory (Number of write operations: 1,000,000) 4 to 20 mA DC, Load : 600Ωmax.
Event input	ON: 1 kΩ max., OFF: 100 kΩ min. ON: residual voltage 1.5 V max. OFF: leakage current 0.1 mA max. Relay output: SPST-NO 250VAC, 3A(resistive load) Voltage output (for driving SSR): 12 VDC, 21 mA Current output: 4 to 20 mADC, 0 to 20mA/DC Load: 600 Ω max. Linear voltage output 0-10VDC Load: 1 kΩ min. Electrical life of relay: 100,000 operations (Long-life model: 1 million operations) Voltage output (for driving SSR): 12 VDC, 21 mA ON/OFF or 2-PID control Relay outputs: 250 VAC, 3 A (resistive load), Electrical life of relay: 100,000 operations (Long-life model: 1 million operations) Non-volatile memory (Number of write operations: 1,000,000) 4 to 20 mA DC, Load : 600Ωmax.
Control output 1	ON: 1 kΩ max., OFF: 100 kΩ min. ON: residual voltage 1.5 V max. OFF: leakage current 0.1 mA max. Relay output: SPST-NO 250VAC, 3A(resistive load) Voltage output (for driving SSR): 12 VDC, 21 mA Current output: 4 to 20 mADC, 0 to 20mA/DC Load: 600 Ω max. Linear voltage output 0-10VDC Load: 1 kΩ min. Electrical life of relay: 100,000 operations (Long-life model: 1 million operations) Voltage output (for driving SSR): 12 VDC, 21 mA ON/OFF or 2-PID control Relay outputs: 250 VAC, 3 A (resistive load), Electrical life of relay: 100,000 operations (Long-life model: 1 million operations) Non-volatile memory (Number of write operations: 1,000,000) 4 to 20 mA DC, Load : 600Ωmax.
Control output 2	ON: 1 kΩ max., OFF: 100 kΩ min. ON: residual voltage 1.5 V max. OFF: leakage current 0.1 mA max. Relay output: SPST-NO 250VAC, 3A(resistive load) Voltage output (for driving SSR): 12 VDC, 21 mA Current output: 4 to 20 mADC, 0 to 20mA/DC Load: 600 Ω max. Linear voltage output 0-10VDC Load: 1 kΩ min. Electrical life of relay: 100,000 operations (Long-life model: 1 million operations) Voltage output (for driving SSR): 12 VDC, 21 mA ON/OFF or 2-PID control Relay outputs: 250 VAC, 3 A (resistive load), Electrical life of relay: 100,000 operations (Long-life model: 1 million operations) Non-volatile memory (Number of write operations: 1,000,000) 4 to 20 mA DC, Load : 600Ωmax.
Auxiliary outputs	ON: 1 kΩ max., OFF: 100 kΩ min. ON: residual voltage 1.5 V max. OFF: leakage current 0.1 mA max. Relay output: SPST-NO 250VAC, 3A(resistive load) Voltage output (for driving SSR): 12 VDC, 21 mA Current output: 4 to 20 mADC, 0 to 20mA/DC Load: 600 Ω max. Linear voltage output 0-10VDC Load: 1 kΩ min. Electrical life of relay: 100,000 operations (Long-life model: 1 million operations) Voltage output (for driving SSR): 12 VDC, 21 mA ON/OFF or 2-PID control Relay outputs: 250 VAC, 3 A (resistive load), Electrical life of relay: 100,000 operations (Long-life model: 1 million operations) Non-volatile memory (Number of write operations: 1,000,000) 4 to 20 mA DC, Load : 600Ωmax.
Ambient temperature	-10 to 55 °C (Avoid freezing or condensation)
Ambient humidity	RH25 to 85% (Avoid freezing or condensation)
Storage temperature	-25 to 65 °C (Avoid freezing or condensation)
Altitude	Max. 2,000m
Recommended fuse	T2A, 250 VAC, time-lag, low-breaking capacity
Weight	Approx. 150 g (main unit only)
Degree of protection	Front panel: IP00 Rear case: IP20, terminal case: IP00
Installation environment	Installation category II, pollution degree 2 (as per IEC61010-1)
Memory protection	Non-volatile memory (Number of write operations: 1,000,000) 4 to 20 mA DC, Load : 600Ωmax.
Transfer output	ON: 1 kΩ max., OFF: 100 kΩ min. ON: residual voltage 1.5 V max. OFF: leakage current 0.1 mA max. Relay output: SPST-NO 250VAC, 3A(resistive load) Voltage output (for driving SSR): 12 VDC, 21 mA Current output: 4 to 20 mADC, 0 to 20mA/DC Load: 600 Ω max. Linear voltage output 0-10VDC Load: 1 kΩ min. Electrical life of relay: 100,000 operations (Long-life model: 1 million operations) Voltage output (for driving SSR): 12 VDC, 21 mA ON/OFF or 2-PID control Relay outputs: 250 VAC, 3 A (resistive load), Electrical life of relay: 100,000 operations (Long-life model: 1 million operations) Non-volatile memory (Number of write operations: 1,000,000) 4 to 20 mA DC, Load : 600Ωmax.

**Wiring**

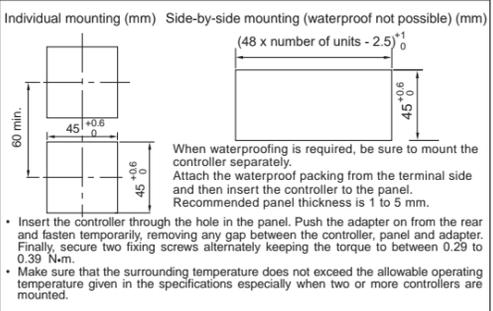
**Dimensions**



\* 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.

\* A Setup Tool port is provided on the bottom of the product. Use this port to connect a personal computer to the product when using the Setup Tool E5B-CIF01 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.

**Installation**

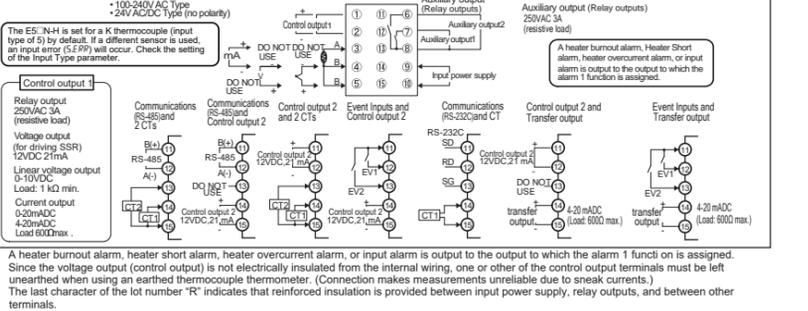


When waterproofing is required, be sure to mount the controller separately. Attach the waterproof packing from the terminal side and then insert the controller to the panel. Recommended panel thickness is 1 to 5 mm.

• 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.

• Make sure that the surrounding temperature does not exceed the allowable operating temperature given in the specifications especially when two or more controllers are mounted.

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

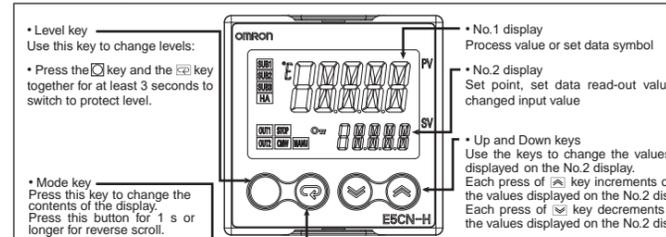


• A heater burnout alarm, heater short alarm, heater overcurrent alarm, or input alarm is output to the output to which the alarm 1 function is assigned.

• Since the voltage output (control output) is not electrically insulated from the internal wiring, one or other of the control output terminals must be left unearthened when using an earthed thermocouple thermometer. (Connection makes measurements unreliable due to sneak currents.)

• The least character of the lot number "R" indicates that reinforced insulation is provided between input power supply, relay outputs, and between other terminals.

**Names of parts on front panel**



• Level key Use this key to change levels.

• Press the **OK** key and the **ESC** key together for at least 3 seconds to switch to protect level.

• Mode key Press this key to change the contents of the display. Press this button for 1 s or longer for reverse scroll.

• No.1 display Process value or set data symbol

• No.2 display Set point, set data read-out value or changed input value

• Up and Down keys Use the keys to change the values displayed on the No.2 display. Each press of **▲** key increments or advances the values displayed on the No.2 display. Each press of **▼** key decrements or returns the values displayed on the No.2 display.

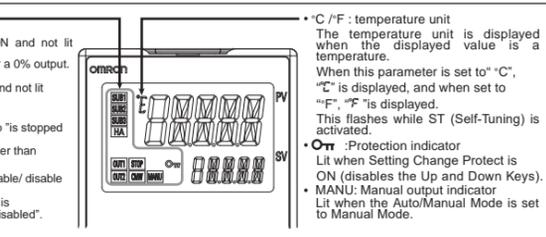
**Operation indicators**

- SUB1: Auxiliary output 1 indicator Lit when the function assigned to auxiliary output 1 is ON.
- SUB2: Auxiliary output 2 indicator Lit when the function assigned to auxiliary output 2 is ON.
- SUB3: Auxiliary output 3 indicator Lit when the function assigned to auxiliary output 3 is ON.
- HA: Heater burnout alarm/Heater short alarm/Heater overcurrent alarm indicator Lit when a heater burnout alarm, heater short alarm, or heater overcurrent alarm has occurred.

• C / F : temperature unit The temperature unit is displayed when the displayed value is a temperature. When this parameter is set to "C", "C" is displayed, and when set to "F", "F" is displayed. This flashes while ST (Self-Tuning) is activated.

• P Protection indicator Lit when Setting Change Protect is ON (disables the Up and Down Keys).

• MANU: Manual output indicator Lit when the Auto/Manual Mode is set to Manual Mode.



**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.

**Operation menu**

**Input type**

Input type	Input	Setting	Input Setting range
Platinum resistance thermometer	Pt100	1	-200.0 to 850.0(°C) / -300.0 to 1500.0(°F)
		2	-199.9 to 500.0(°C) / -199.9 to 900.0(°F)
		3	0.0 to 100.0(°C) / 0.0 to 210.0(°F)
		4	-199.9 to 500.0(°C) / -199.9 to 900.0(°F)
Thermocouple	J	5	-200.0 to 1300.0(°C) / -300.0 to 2300.0(°F)
		6	-20.0 to 500.0(°C) / 0.0 to 900.0(°F)
		7	-100.0 to 850.0(°C) / -100.0 to 1500.0(°F)
		8	-20.0 to 400.0(°C) / 0.0 to 750.0(°F)
		9	-200.0 to 400.0(°C) / -300.0 to 700.0(°F)
		10	-199.9 to 400.0(°C) / -199.9 to 700.0(°F)
		11	-200.0 to 600.0(°C) / -300.0 to 1100.0(°F)
		12	-100.0 to 850.0(°C) / -100.0 to 1500.0(°F)
		13	-20.0 to 400.0(°C) / 0.0 to 700.0(°F)
		14	-199.9 to 400.0(°C) / -199.9 to 700.0(°F)
		15	-200.0 to 1300.0(°C) / -300.0 to 2300.0(°F)
		16	0.0 to 1700.0(°C) / 0.0 to 3000.0(°F)
		17	0.0 to 1700.0(°C) / 0.0 to 3000.0(°F)
		18	100.0 to 1800.0(°C) / 300.0 to 3200.0(°F)
Platinum resistance thermometer	Pt100	24	-50.00 to 200.00(°C) / -50.00 to 200.00(°F)
		25	-50.00 to 200.00(°C) / -50.00 to 200.00(°F)
		26	-1999.9 to 3240.0
		27	-1999.9 to 3240.0
		28	-199.99 to 324.00
		29	-19.999 to 32.400

\*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
0	No alarm function	Output off
*1	1 Deviation upper/lower limit	ON OFF Vary with "L", "H" values
	2 Deviation upper limit	ON OFF Vary with "L", "H" values
	3 Deviation lower limit	ON OFF Vary with "L", "H" values
*1	4 Deviation upper/lower range	ON OFF Vary with "L", "H" values
	5 Deviation upper/lower limit standby sequence ON	ON OFF Vary with "L", "H" values
	6 Deviation upper limit standby sequence ON	ON OFF Vary with "L", "H" values
*1	7 Deviation lower limit standby sequence ON	ON OFF Vary with "L", "H" values
	8 Absolute value upper limit	ON OFF Vary with "L", "H" values
	9 Absolute value lower limit	ON OFF Vary with "L", "H" values
*1	10 Absolute value upper limit standby sequence ON	ON OFF Vary with "L", "H" values
	11 Absolute value lower limit standby sequence ON	ON OFF Vary with "L", "H" values
	12 LBA (only for alarm 1)	ON OFF Vary with "L", "H" values
*1	13 PV change rate alarm	ON OFF Vary with "L", "H" values
	14 RSP absolute value upper limit	ON OFF Vary with "L", "H" values
*1	15 RSP absolute value lower limit	ON OFF Vary with "L", "H" values

\*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".

**Error display (trouble shooting)**

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.

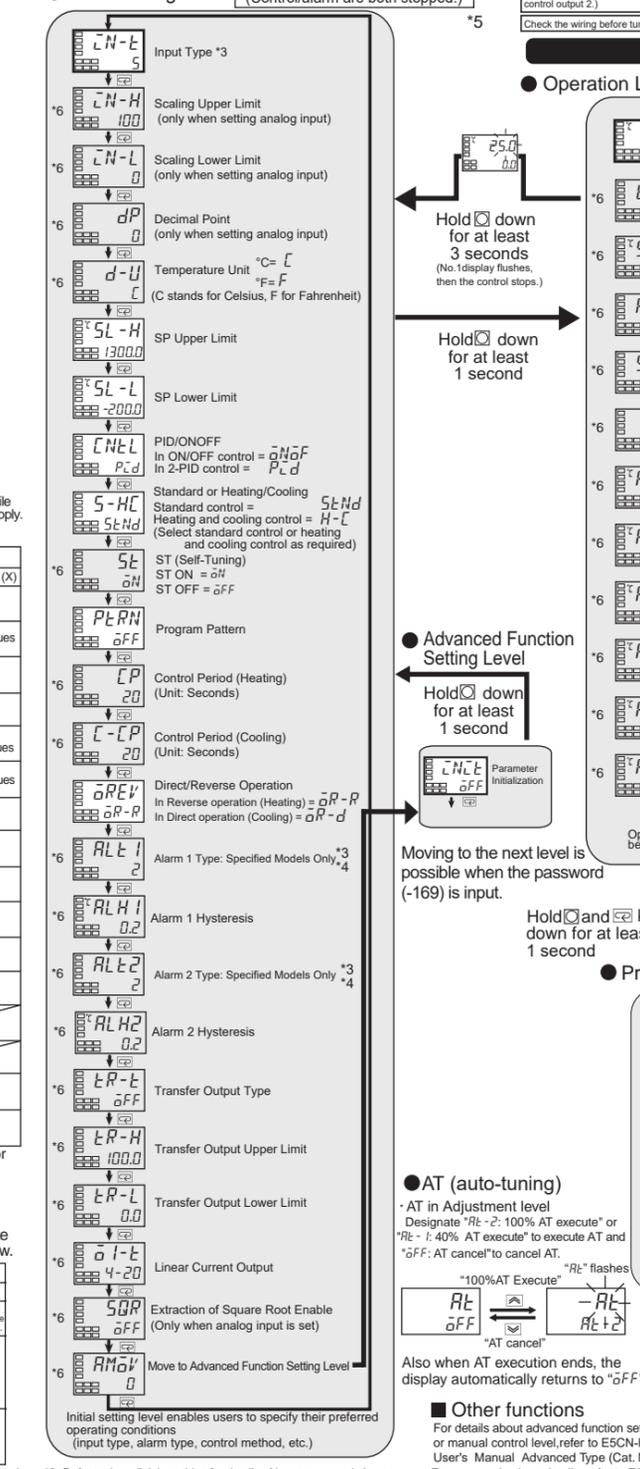
No.1 display	Meaning	Action	Status at error
SEPP (S.Er)	Input error	Check the setting of the Input Type parameter, check the input wiring, and check for broken or shorts in the temperature sensor.	Control OFF Alarm
E333 (E333)	A/D converter error	After the correction of A/D converter error, turn the 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.	Control OFF Alarm
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.	Control OFF Alarm

If the input value exceeds the display limit (-19999 to 32400), though it is within the control range, [SEPP] will be displayed under -19999 and [E333] above 32400. Under these conditions, control output and alarm output will operate normally.

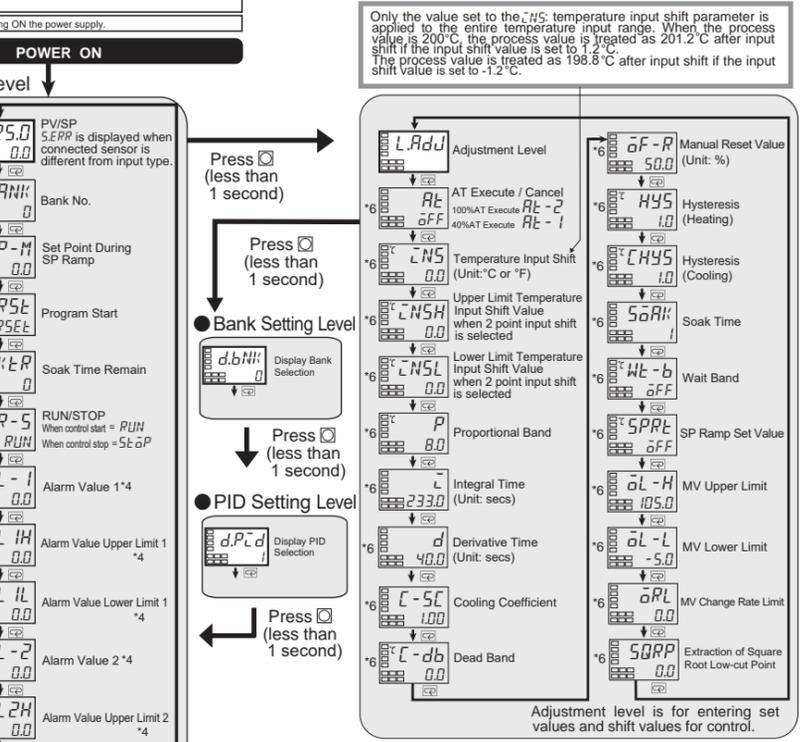
Refer to E5CN-H/E5AN-H/E5EN-H User's Manual Advanced Type (Cat. No. H157) for details of control range.

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

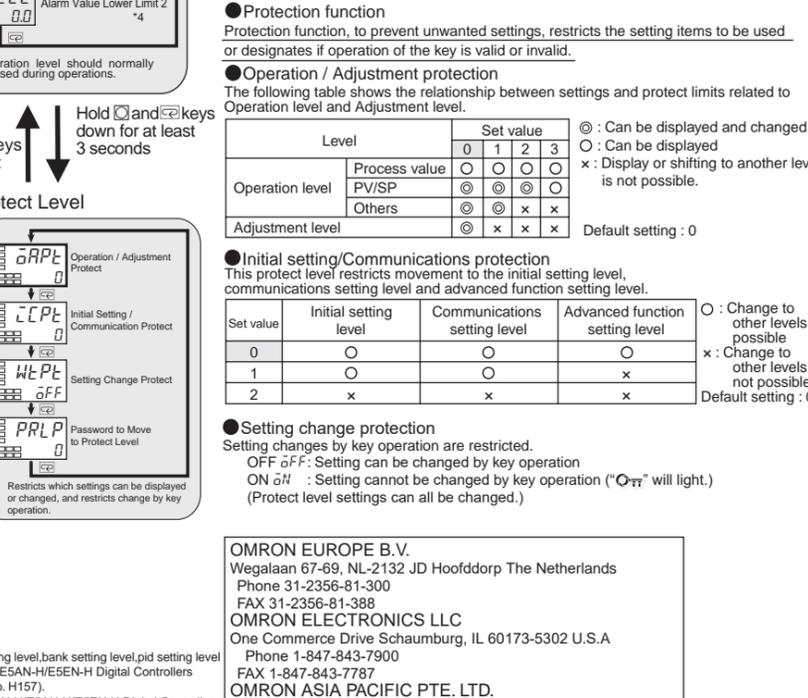
**Initial Setting Level**



**Adjustment Level**



**Advanced Function Setting Level**



**Conformance to EN/IEC Standards**

사용자 안내문 이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서 가정용 환경에서 사용되는 경우 전파간섭의 우려가 있습니다.

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