

# E5EC Digital Controller

## OMRON

### EN INSTRUCTION MANUAL

Thank you for purchasing the OMRON E5EC 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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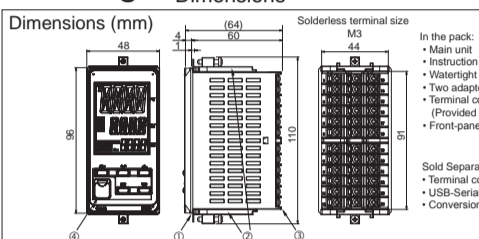
Refer to the *E5C Digital Controllers User's Manual* (Cat. No. H174) for detailed application procedures.

### Safety Precautions

#### Key to Warning Symbols

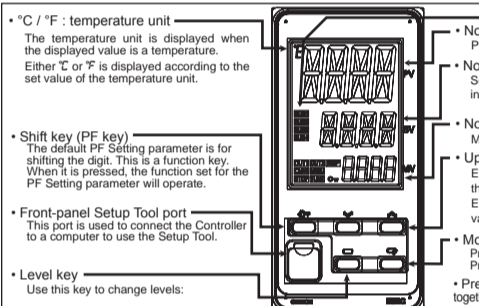
**CAUTION** Indicates a potentially hazardous situation which, if not avoided, is likely to result in minor or moderate injury or property damage. Read this manual carefully before using the product.

### Wiring



- Do not remove the terminal block. Doing so may result in failure or malfunction.
- Setup Tool ports are provided on the top and front of the Digital Controller. Use these ports to connect a personal computer to the Digital Controller when using the Setup Tool. The E58-CIF02 USB-Serial Conversion Cable is required to connect to the top-panel port. The E58-CIF02-E USB-Serial Conversion Cable is required to connect to the front-panel port. (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.
- If the front-panel port cover is lost or damaged, order it separately. The Waterproof Packing should be periodically replaced because it may deteriorate, shrink, or harden depending on the operating environment.

#### 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.
- 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.
- Front-panel Setup Tool port**: This port is used to connect the Controller to a computer to use the Setup Tool.
- Level key**: Use this key to change levels.
- No. 1 display**: Process value or set data type.
- No. 2 display**: Set point, set data read-out value or changed input value.
- No. 3 display**: MV, Soak Time Remain, and Multi-SP.
- Up and Down keys**: Each press of  $\uparrow$  key increments or advances the values displayed on the No. 2 display. Each press of  $\downarrow$  key decrements or returns the values displayed on the No. 2 display.
- Mode key**: Press this key to change the contents of the display. Press this button for 1 s or longer for reverse scroll.
- Press the  $\square$  key and the  $\square$  key together for at least 3 seconds to switch to protect level.**
- STOP: Control stop indicator**: Lit when "Run/Stop" is stopped during operation. During control stop, functions other than control output are valid.
- CMW: Communications writing enable/disable indicator**: Lit when communications writing is "enabled" and is out when it is "disabled".
- On: 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.

### Warning Symbols

- 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, the Setup Tool ports, or between the pins on the connectors on the Setup Tool cable.**
- 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 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.  
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.  
e) Loose screws may occasionally result in fire. Tighten the terminal screws to the specified torque of 0.43 to 0.58 N·m.  
f) 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.  
g) 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.

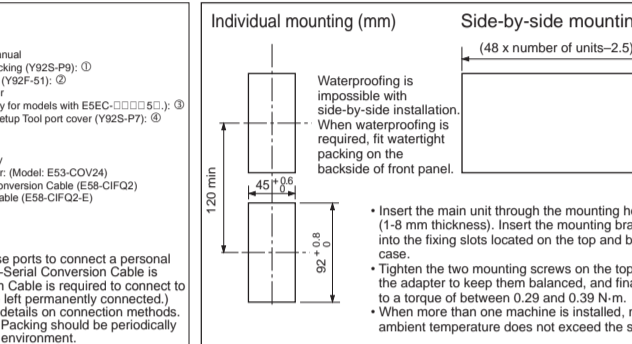
### Suitability for Use

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 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.

### Installation



- Waterproofing is impossible with side-by-side installation. When waterproofing is required, fit waterproof packing on the backside of front panel.
- Insert the main unit through the mounting hole in the panel (1.8 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 balanced, and finally tighten them to a torque of between 0.29 and 0.39 N·m.
- When more than one machine is installed, make sure that the ambient temperature does not exceed the specified limit.

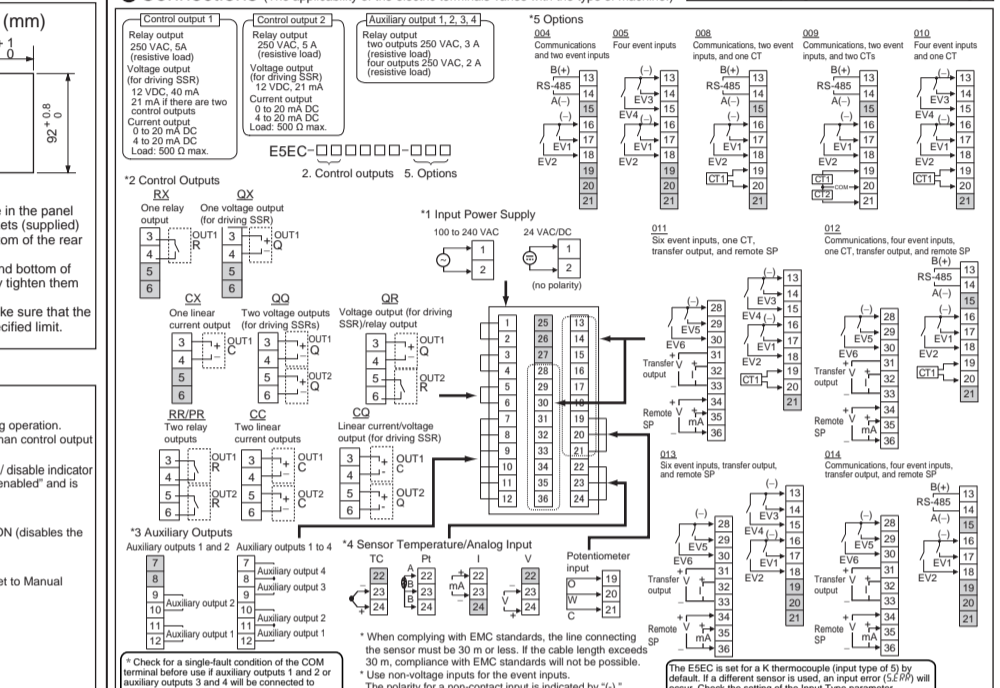
### Precautions for Safe Use

- 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 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.
- Use/store 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 0.823 mm<sup>2</sup>). (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.
- 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.
- 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 other cleaning agent that contains these or other organic solvents. Deformation or discoloration may occur.
- Design system (control panel, etc.) considering the 2 second delay of the controller's output to be 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 connect cables to both the front-panel Setup Tool port and the top-panel Setup Tool port at the same time. The Digital Controller may be damaged or may malfunction.
- Do not exceed the communications distance that is given in the specifications and use the specified communications cable. Refer to the *E5C Digital Controllers User's Manual* (Cat. No. H174) for the communications distance and cable specifications.
- 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.
- 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 VDC, 50/60 Hz / 24VDC
Operating voltage range	85 to 110% of the rated voltage
Power consumption	Option 000: 6.6 VA max. (100 to 240 VAC) 2.1 VA max. (24 VDC) 3.2 W max. (24 VDC) All other specifications: 8.3 VA max. (100 to 240 VAC) 3.3 VA max. (24 VDC) 3.2 W max. (24 VDC)
Indication accuracy (Ambient temperature: 23°C)	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% of indication value or ±1 mA max. Output current: approx. 7 mA per contact. ON: 1 kΩ max., OFF: 100 kΩ min. No-contact input: ON: residual voltage 1.5 V max. OFF: leakage current 0.1 mA max. 0 to 5 V DC or 0 to 20 mA DC. Remote SP input: 0 to 5 V DC or 0 to 10 V DC. Potentiometer input: Between 100 Ω and 10 kΩ for maximum open position. Control output 1: Relay output: SPST-NO, 250 VAC, 5 A (resistive load). Electrical life of relay: 100,000 operations. Voltage output (for driving SSR): 12 VDC, 21 mA. Current output: 4 to 20 mA DC, 0 to 20 mA DC with load of 500 Ω max. ON/OFF or 2-PID control. Relay outputs: 250 VAC, two outputs: 3 A (resistive load), four outputs: 2 A (resistive load). Electrical life of relay: 100,000 operations. 4 to 20 mA DC with load of 500 Ω max. 1 to 5 VDC with load of 1 kΩ min.
Ambient temperature	-10 to 55°C (Avoid freezing or condensation)
Ambient humidity	25% to 85% (Avoid freezing or condensation)
Storage temperature	-25 to 85°C (Avoid freezing or condensation)
Weight	Max. 2,000 m
Recommended use	F2A, 250 VAC, time-lag, low-breaking capacity
Degree of protection	Approx. 210 g (Digital Controller only) Front panel: IP66 Rear case: IP20, Terminal section: IP00 Installation category II, pollution degree 2 (as per IEC61010-1)
Installation environment	Non-volatile memory (Number of write operations: 1,000,000) Short term: 1200 (power supply voltage) Long term: 250 V+ (power supply voltage)
Memory protection	
Temporary overvoltage	

### Connections



### Operation Menu

#### Input Type

Input type	Input	Setting	Setting range
Temperature inputs	Platinum resistance thermometer	Pt100	0 -200 to 850 -300 to 1500
		JPt100	1 -199.9 to 500.0 -199.9 to 900.0
	Thermocouple	K	3 0.0 to 100.0 0.0 to 210.0
		J	4 0.0 to 100.0 0.0 to 210.0
		T	5 -200 to 1300 -300 to 2300
		E	6 -20.0 to 500.0 -0.0 to 900.0
		L	7 -100 to 850 -0.0 to 1500
		U	8 -20.0 to 400.0 0.0 to 750.0
		N	9 -200 to 400 -300 to 700.0
		S	10 -199.9 to 400.0 -199.9 to 700.0
Analog input type	Current input	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
		26	Use the following ranges for scaling: -1999 to 9999, -199.9 to 999.9, -19.99 to 99.99, -1.999 to 9.999
	Voltage input	27	0 to 5V
		28	0 to 5V
		29	0 to 10V
		30	0 to 10V
		31	0 to 10V
		32	0 to 10V
		33	0 to 10V
		34	0 to 10V

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

#### Alarms

Setting	Alarm type	Alarm output function
0	No alarm function	Positive alarm value (X) / Negative alarm value (X)
1	Deviation upper/lower limit	ON: Vary with "L", "H" values
		OFF: Vary with "L", "H" values
2	Deviation upper limit	ON: Vary with "L", "H" values
		OFF: Vary with "L", "H" values
3	Deviation lower limit	ON: Vary with "L", "H" values
		OFF: Vary with "L", "H" values
4	Deviation upper/lower range	ON: Vary with "L", "H" values
		OFF: Vary with "L", "H" values
5	Deviation upper/lower limit standby sequence ON	ON: Vary with "L", "H" values
		OFF: Vary with "L", "H" values
6	Deviation upper limit standby sequence ON	ON: Vary with "L", "H" values
		OFF: Vary with "L", "H" values
7	Deviation lower limit standby sequence ON	ON: Vary with "L", "H" values
		OFF: Vary with "L", "H" values
8	Absolute value upper limit	ON: Vary with "L", "H" values
		OFF: Vary with "L", "H" values
9	Absolute value lower limit	ON: Vary with "L", "H" values
		OFF: Vary with "L", "H" values
10	Absolute value upper limit standby sequence ON	ON: Vary with "L", "H" values
		OFF: Vary with "L", "H" values
11	Absolute value lower limit standby sequence ON	ON: Vary with "L", "H" values
		OFF: Vary with "L", "H" values
12	LBA (only for alarm 1)	ON: Vary with "L", "H" values
		OFF: Vary with "L", "H" values
14	SP absolute value upper limit	ON: Vary with "L", "H" values
		OFF: Vary with "L", "H" values
15	SP absolute value lower limit	ON: Vary with "L", "H" values
		OFF: Vary with "L", "H" values
16	MV absolute value upper limit	ON: Vary with "L", "H" values
		OFF: Vary with "L", "H" values
17	MV absolute value lower limit	ON: Vary with "L", "H" values
		OFF: Vary with "L", "H" values
18	RSP absolute value upper limit	ON: Vary with "L", "H" values
		OFF: Vary with "L", "H" values
19	RSP absolute value lower limit	ON: Vary with "L", "H" values
		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".

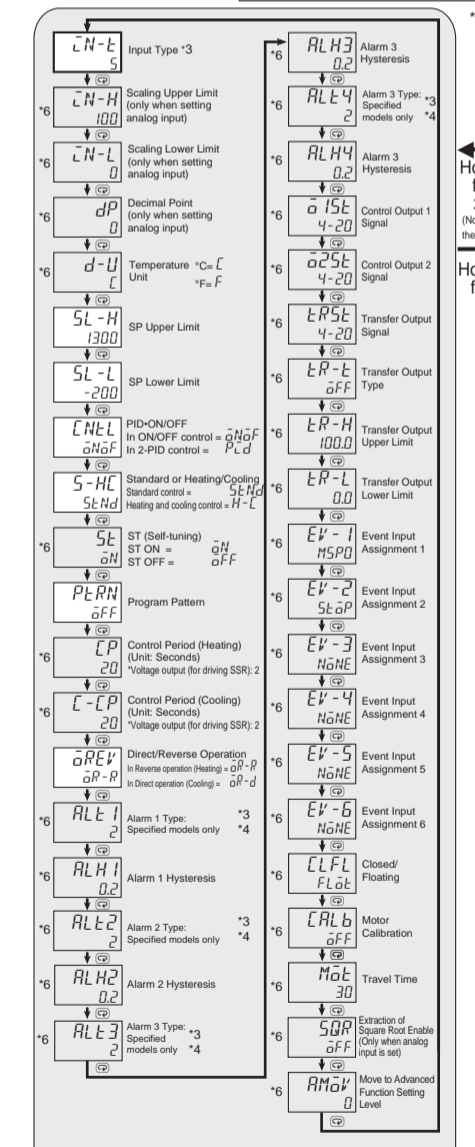
#### Conformance to EN/IEC Standards

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.

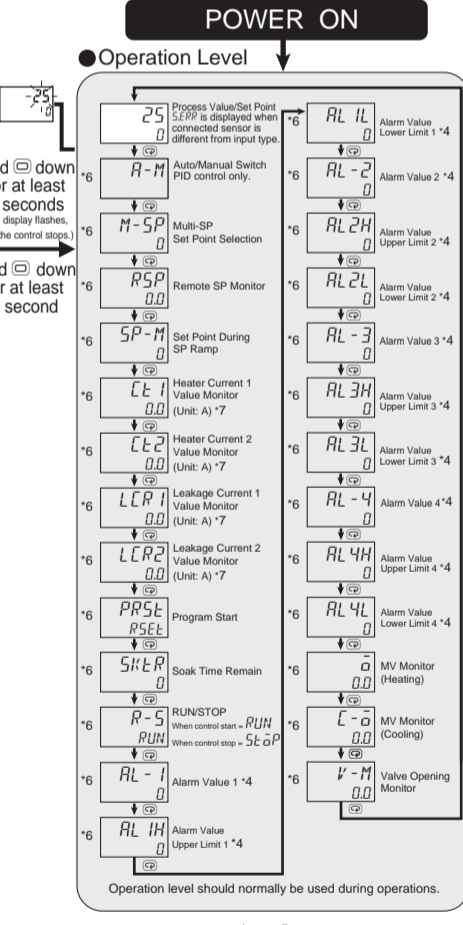
A 급 기기 (업무용 방송통신기자재) 이 기기는 업무용(A급) 전자파적합기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.

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.

#### Initial Setting Level

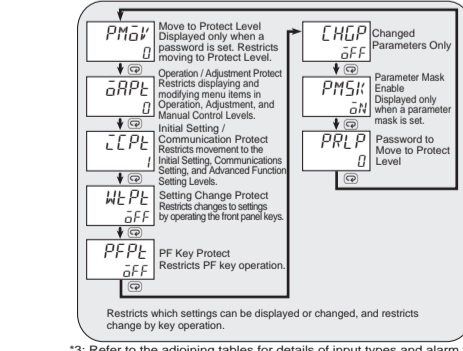


#### Operation Level



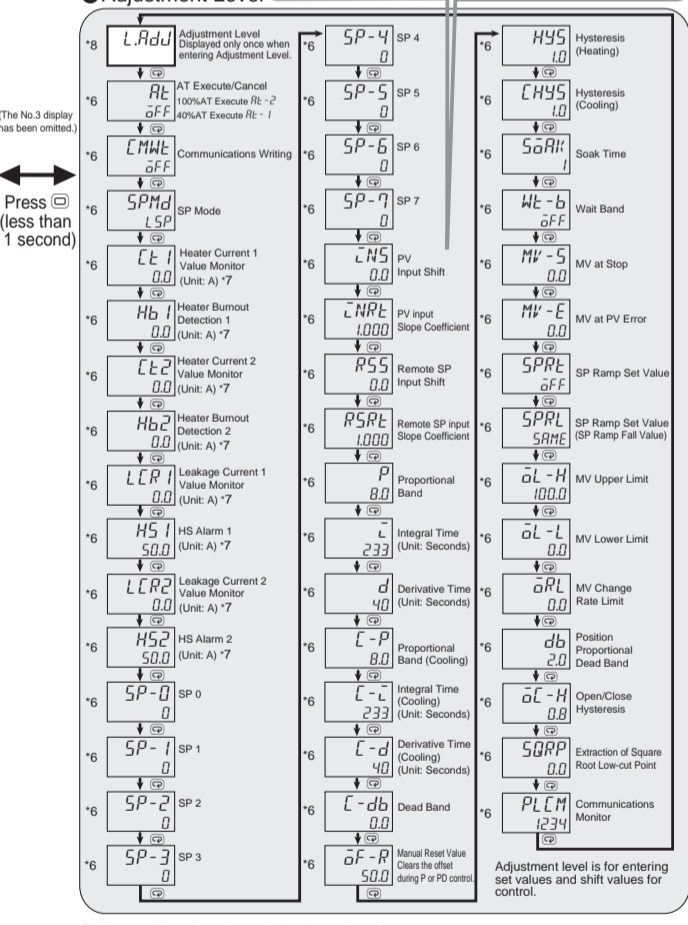
Operation level should normally be used during operations.

#### Protect 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 function.
- \*8: The four numeric digits of the product code are displayed in the No. 2 display. The setting cannot be changed and there is nothing that you need to set.

#### 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
SEPR (S.Err)	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.	Control output: OFF Alarm: 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.	Control output: 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 is restored to normal, then a probable cause can be external noise affecting the control system. Check for external noise.	Control output: OFF Alarm: OFF

If the input value exceeds the display limit (-1999 to 9999), though it is within the control range, [SEPR] will be displayed under -1999 and [E333] above 9999. Under these conditions, control output and alarm output will operate normally. Refer to the *E5C 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.

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 65-6835-3011  
FAX 65-6835-2711  
OMRON Corporation  
Shiohji Horikawa, Shimogyo-ku, Kyoto 600-8530 JAPAN

