

OMRON

988 637 to 686

Digital Controller (1/16 Din)

E5CK

Advanced, Compact Digital Controllers

- IP66/NEMA4 (indoor use) front face.
- Modular structure, one-stock type.
- Heat/Cool control.
- Serial communications: RS-232C and RS-485. (option)
- Temperature and analog inputs.
- 4–20mA re-transmission. (option)
- High-accuracy: 100 ms sampling (for analog input).
- Advanced tuning which includes fuzzy self-tuning.
- Conforms to international EMC and safety standards.
- Event input. (option)
- Loop break alarm (LBA) facility.
- One alarm relay fitted as standard.



Ordering Information

Description	Model	Specification
Base Units	E5CK-AA1-500	Base Unit (AC100–240V) with terminal cover
	E5CK-AA1-500 AC/DC24V	Base Unit (AC/DC24V) with terminal cover

Note: A single Output Unit and Option Unit can be mounted to each Base Unit.

Description	Model	Specification
Output Units	E53-R4R4	Relay/Relay
	E53-Q4R4	Pulse (NPN)/Relay
	E53-C4R4	Linear (4 to 20 mA)/Relay
	E53-C4DR4	Linear (0 to 20 mA)/Relay
	E53-V44R4	Linear (0 to 10 V)/Relay
	E53-Q4Q4	Pulse (NPN)/Pulse (NPN)

Description	Model	Specification
Option Units	E53-CK01	RS-232C
	E53-CK03	RS-485
	E53-CKB	Event input: 1 point
	E53-CKF	Transfer output (4 to 20 mA)

Temperature Ranges

Platinum Resistance Thermometer

Input (software selectable)		JPt100	Pt100
Range	°C	-199.9 to 650.0	-199.9 to 650.0
	°F	-199.9 to 999.9	-199.9 to 999.9
Setting Code		0	1

Thermocouple

Input (software selectable) (see note)		K1	K2	J1	J2	T	E	L1	L2	U	N	R	S	B	W	PLII
Range	°C	-200 to 1,300	0.0 to 500.0	-100 to 850	0.0 to 400.0	-199.9 to 400.0	0 to 600	-100 to 850	0.0 to 400.0	-199.9 to 400.0	-200 to 1,300	0 to 1,700	0 to 1,700	100 to 1,800	0 to 2,300	0 to 1,300
	°F	-300 to 2,300	0.0 to 900.0	-100 to 1,500	0.0 to 750.0	-199.9 to 700.0	0 to 1,100	-100 to 1,500	0.0 to 750.0	-199.9 to 700.0	-300 to 2,300	0 to 3,000	0 to 3,000	300 to 3,200	0 to 4,100	0 to 2,300
Setting Code		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Note: Setting number is factory-set to 2 (K1).

Current/Voltage

Input (software selectable)	Current input		Voltage input		
	4 to 20 mA	0 to 20 mA	1 to 5 V	0 to 5 V	0 to 10 V
Range	One of following ranges depending on results of scaling -1999 to 9999 -199.9 to 999.9 -19.99 to 99.99 -1.999 to 9.999				
Setting Code	17	18	19	20	21

Specifications

■ Ratings

Item	AC100-240V type	AC/DC24V type
Supply voltage	AC100-240V, 50/60 Hz	AC/DC24V, 50/60 Hz
Power consumption	15 VA	6 VA, 3.5 W
Operating voltage range	85% to 110% of rated supply voltage	
Input	Thermocouple: K, J, T, E, L, U, N, R, S, B, W, PLII Platinum resistance thermometer: JPt100, Pt100 Current input: 4 to 20 mA, 0 to 20 mA Voltage input: 1 to 5 V, 0 to 5 V, 1 to 10 V	
Input impedance	Current input: 150 Ω Voltage input: 1 MΩ max.	
Control output	According to Output Unit (see "Output Unit Ratings and Characteristics")	
Auxiliary output	SPST-NO, 1 A at 250 VAC (resistive load)	
Control method	ON/OFF or advanced PID control	
Setting method	Digital setting using front panel keys	
Indication method	7-segment digital display and LEDs	
Other functions	According to Option Unit (see "Option Unit Ratings and Characteristics")	

■ Characteristics

Indication accuracy (see note)	Thermocouple: (±0.3% of indication value or ±1°C, whichever greater) ±1 digit max. Platinum resistance thermometer: (±0.2% of indication value or ±0.8°C, whichever greater) ±1 digit max. Analog input: ±0.2% FS ±1 digit max.
Hysteresis	0.01% to 99.99% FS (in units of 0.01% FS)
Proportional band (P)	0.1% to 999.9% FS (in units of 0.1% FS)
Integral (reset) time (I)	0 to 3,999 s (in units of 1 s)
Derivative (rate) time (D)	0 to 3,999 s (in units of 1 s)
Control period	1 to 99 s (in units of 1 s)
Manual reset value	0.0% to 100.0% (in units of 0.1%)
Alarm setting range	-1,999 to 9,999 or -199.9 or 999.9 (decimal point position dependent on input type)
Sampling period	Temperature input: 250 ms Analog input: 100 ms
Insulation resistance	200 MΩ min. (at 500 VDC)
Dielectric strength	2,000 VAC, 50/60 Hz for 1 min between terminals of different polarities
Vibration resistance	Malfunction: 10 to 55 Hz, 10 m/s ² (approx. 1G) for 10 min each in X, Y, and Z directions Destruction: 10 to 55 Hz, 20 m/s ² (approx. 2G) for 2 hrs each in X, Y, and Z directions
Shock resistance	Malfunction: 200 m/s ² min. (approx. 20G), 3 times each in 6 directions (100 m/s ² (approx. 10G) applied to the relay) Destruction: 300 m/s ² min. (30G), 3 times each in 6 directions
Ambient temperature	Operating: -10°C to 55°C (with no icing)/3-year warranty period: -10°C to 50°C Storage: -25°C to 65°C (with no icing)
Ambient humidity	Operating: 35% to 85%
Enclosure ratings	Front panel: NEMA4 for indoor use (equivalent to IP66) Rear case: IEC standard IP20 Terminals: IEC standard IP00
Memory protection	Non-volatile memory (number of writings: 100,000 operations)
Weight	Approx. 170 g; Adapter: approx. 10 g

Note: The indication accuracy of the K1, T, and N thermocouples at a temperature of -100°C or less is ±2°C ±1 digit maximum. The indication accuracy of the U, L1, and L2 thermocouples at any temperature is ±2°C ±1 digit maximum.

The indication accuracy of the B thermocouple at a temperature of 400°C or less is unrestricted.

The indication accuracy of the R and S thermocouples at a temperature of 200°C or less is $\pm 3^\circ\text{C} \pm 1$ digit maximum.

The indication accuracy of the W thermocouple at any temperature is ($\pm 0.3\%$ of the indicated value or $\pm 3^\circ\text{C}$, whichever is greater) ± 1 digit maximum.

The indication accuracy of the PLII thermocouple at any temperature is ($\pm 0.3\%$ or $\pm 2^\circ\text{C}$, whichever is greater) ± 1 digit maximum.

■ Output Unit Ratings and Characteristics

Relay output	SPST, 250 VAC, 3 A (resistive load) Mechanical life expectancy: 10,000,000 operations min. Electrical life expectancy: 100,000 operations min.
Voltage output	NPN: 20 mA at 12 VDC (with short-circuit protection)
Linear voltage output	0 to 10 VDC: Permissible load impedance: 1 k Ω min. Resolution: approx. 2,600
Linear current output	4 to 20 mA: Permissible load impedance: 500 Ω max. Resolution: approx. 2,600 0 to 20 mA: Permissible load impedance: 500 Ω max. Resolution: approx. 2,600

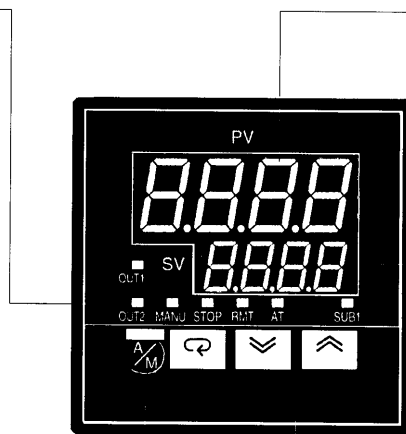
■ Option Unit Ratings and Characteristics

Event inputs	Contact input: ON: 1 k Ω max., OFF: 100 k Ω min. No-contact input: ON: residual voltage 1.5 V max., OFF: leakage current 0.1 mA max.
Communications	Interface: RS-232C or RS-485 Transmission method: Half-duplex Synchronization method: Start-stop synchronization (asynchronous method) Baud rate: 1.2/2.4/4.8/9.6/19.2 kbps
Transfer output	4 to 20 mA: Permissible load impedance: 500 Ω max. Resolution: approx. 2,600

Terminals/Connections

Operation Indicators

- **OUT1**
Lit when the pulse output function assigned to control output 1 turns ON.
- **OUT2**
Lit when the pulse output function assigned to control output 2 turns ON.
- **SUB1**
Lit when the output function assigned to auxiliary output 1 turns ON.
- **MANU**
Lit when in the manual operation mode.
- **STOP**
Lit when operation has stopped.
- **RMT**
Lit during remote operation.
- **AT**
Flashes during auto-tuning.



No. 1 Display

Displays the process value or parameter symbols.

No. 2 Display

Displays the set point, set point during SP ramp, manipulated variable, or parameter settings.

Up Key/Down Key

Press to increase or decrease the value on the No.2 display.

Display Key

Press for less than 1 s to shift the display to the next parameter. When this key is pressed for 1 s or more, the menu screen will be displayed in any case.

A/M Key

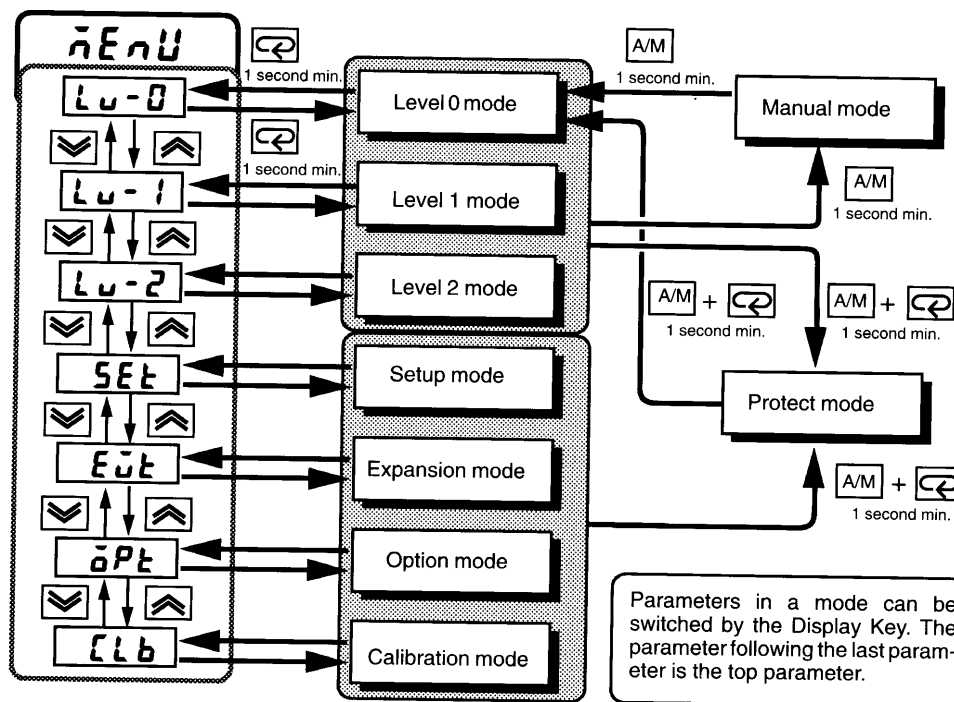
Press to select the auto operation or manual operation.

Operation

■ Parameter Operation List

Switching to modes other than manual or protect mode is carried out using mode selection in the menu display.

The figure below shows all parameters in the order that they are displayed. Some parameters are not displayed depending on the protect mode setting and conditions of use.



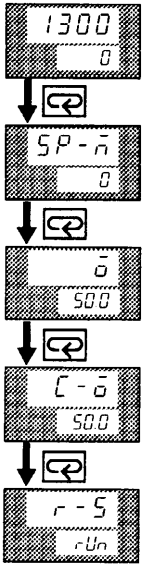
■ Parameters and Menus

Note: For more details on the functions of each part and display contents, refer to the *E5CK User's Manual (H78)*.

Protect Mode	Limits access to the menus and A/M Keys. The protect function can prevent unwanted modification of parameters and switching between the auto and manual operation.
Manual Mode	The Controller can be switched to manual operation. The manipulated variable is only accessible in this mode.
Level 0 Mode	Set the Controller to this mode during normal operation. In this mode you can change the set point, and start or stop Controller operation. The process value, ramp SP, and manipulated variable can only be monitored in this mode.
Level 1 Mode	The main mode for adjusting basic parameters, execute AT (auto-tuning), set alarm values, control period, and PID parameters.
Level 2 Mode	The auxiliary mode for adjusting control. In this mode you can set the parameters for limiting the manipulated variable and set point. Switch between the remote and local modes, and set the loop break alarm (LBA), alarm hysteresis, and the digital filter value inputs.
Setup Mode	The mode for setting the basic specifications parameters that must be checked or set before operation. Such as the input type, scaling, output assignments and direct/reverse operation.
Expansion Mode	The mode for setting expanded functions. In this mode you can set ST (self-tuning), SP setting limiter, select advanced PID or ON/OFF control, specify the standby sequence resetting method, initialize parameters, and set the time for automatic return to the monitoring display.
Option Mode	The mode for setting option functions. Select this mode only when an Option Unit is installed in the Controller. In this mode you can set the communications conditions, transfer output or event input parameters to match the Option Unit being used.
Calibration Mode	This mode is used for setting limits on the analogue inputs and transfer output. (E53-CKF) only (if fitted).

Parameters Operation

Level 0 Mode



PV/SV

The process value is displayed on the No.1 display and the set point is displayed on the No.2 display. When the multi-SP function is in use, the value of the selected is shown.

Set Point During SP Ramp

Monitors the set point when the SP ramp function is used.

MV Monitor (Heat)

Used when the unit is heating control. (reverse action)

MV Monitor (Cool)

Used when the Unit is in cooling control. (direct operation)

Run/Stop



Security

Any mode marked with "X" in the following table is not displayed on the menu when this parameter is set from "0" to "4".

Mode	Set value				
	0	1	2	3	4
Calibration		x	x	x	x
Option			x	x	x
Expansion			x	x	x
Setup			x	x	x
Level 2				x	x
Level 1, 0					x

Only access to level "0" and monitor mode will be available when this parameter is set to either "4" or "6".

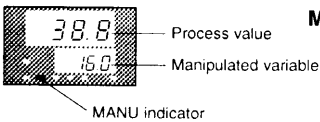
Only the "PV/SP monitor" and "set point" parameter can be used when this parameter is set to "5."

Only the "PV/SP monitor" parameter can be used when this parameter is set to "6."

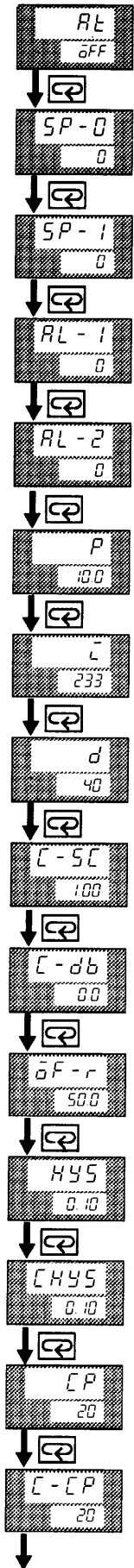
A/M Key Protect

Invalidate the function of the A/M Key.

MV Manual



Level 1 Mode



AT Execute/Cancel

Set Point 0

Used with multi-SP function.

Set Point 1

Used with multi-SP function.

Alarm Value 1

Available only when the alarm output function of the Controller is selected.

Alarm Value 2

Available only when the alarm output function of the Controller is selected.

Proportional Band

Integral Time

Derivative Time

Cooling Coefficient

Used when the Controller is in heat/cool mode.

Dead Band

Used when the Controller is in heat/cool mode.
(To separate heating and cooling proportional bands.)

Manual Reset Value

Available when the integral time parameter of the Controller in standard control is "0."

Hysteresis (Heat)

Available when the Controller is in ON/OFF control.

Hysteresis (Cool)

Available when the Controller is in ON/OFF control in heating and cooling control.

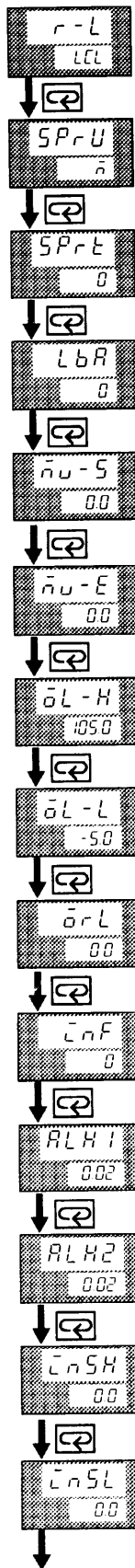
Control Period (Heat)

Available when the Controller has a relay or voltage output, or is in advanced PID control.

Control Period (Cool)

Available when the Controller has a relay or voltage output, or is in advanced PID control in heat/cool mode.

Level 2 Mode

**Remote/Local**

Used for the communications function.

SP Ramp Time Unit**SP Ramp Set Value****LBA Detection Time**

Available only when the LBA (loop break alarm) function of the Controller is selected.

MV at Stop**MV at PV Error****MV Upper Limit****MV Lower Limit****MV Change Rate Limit****Input Digital Filter****Alarm 1 Hysteresis**

Available only when the Controller has an alarm output.

Alarm 2 Hysteresis

Available only when the Controller has a second alarm output.

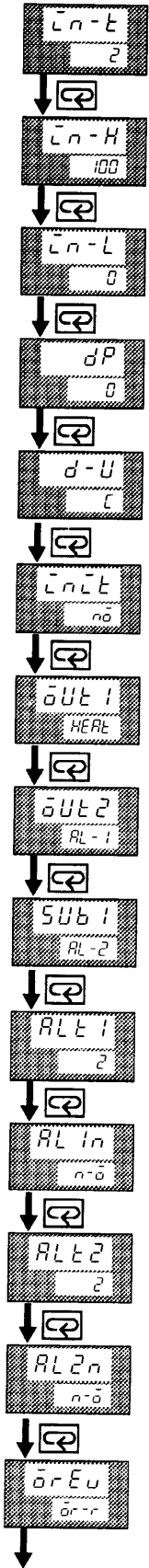
Input Shift Upper Limit

Available if the input type connected to the Controller is a thermocouple or platinum resistance thermometer.

Input Shift Lower Limit

Available if the input type connected to the Controller is a thermocouple or platinum resistance thermometer.

Setup Mode



Input Type

Codes are used to determine the input type connected to terminals 6 to 8.

Scaling Upper Limit

Used if the input type connected to the Controller is an analog input (voltage or current input).

Scaling Lower Limit

Used if the input type connected to the Controller is an analog input (voltage or current input).

Decimal Point

Used if the input type connected to the Controller is an analog input (voltage or current input).

°C/°F Selection

Used if the input type connected to the Controller is a temperature input (thermocouple or platinum resistance thermometer).

Parameter Initialize

Control Output 1 Assignment

Sets Output 1 to be heating, cooling, alarm 1, alarm 2, alarm 3, or LBA (loop break alarm) output.

Control Output 2 Assignment

Sets Output 2 to be heating, cooling, alarm 1, alarm 2, alarm 3, or LBA (loop break alarm) output.

Auxiliary Output 1 Assignment

Sets output to be alarm 1, alarm 2, alarm 3, LBA (loop break alarm), error 1, or error 2 output.

Alarm 1 Type

See option table.

Available only when the Controller has an alarm output (see the table on the next page).

Alarm 1 Open in Alarm

Allows alarm contact to be opened or closed. When alarm is active.

Alarm 2 Type

See option table.

Alarm 2 Open in Alarm

Allows alarm contact to be opened or closed. When alarm is active.

Direct/Reverse Operation

Direct = cooling application
Reverse = heating application

Switch setting	Alarm operation	Alarm output	
		When X or Y is positive	When X or Y is negative
1	Upper- and lower-limit alarm (<u>deviation</u>)		Always ON
2	Upper-limit alarm (<u>deviation</u>)		
3	Lower-limit alarm (<u>deviation</u>)		
4	Upper- and lower-limit range alarm (<u>deviation</u>)		Always OFF
5	Upper- and lower-limit alarm with standby sequence (<u>deviation</u>)		Always OFF
6	Upper-limit alarm with standby sequence (<u>deviation</u>)		
7	Lower-limit alarm with standby sequence (<u>deviation</u>)		

Note: Alarm settings 1–7 inclusive: Alarm value X is set **relative** to set point.

8	<u>Absolute</u> -value upper-limit alarm		
9	<u>Absolute</u> -value lower-limit alarm		
10	<u>Absolute</u> -value upper-limit alarm with standby sequence		
11	<u>Absolute</u> -value lower-limit alarm with standby sequence		

Note: Alarm settings 8–11 inclusive: Alarm value Y is **actual** value to 0.

Expansion Mode

SL-H
1300

SP Setting Upper Limit

Sets maximum, set point limit.

SL-L
-200

SP Setting Lower Limit

Sets minimum, set point limit.

EntL
P.d

PID/ ON/OFF

Control method selection.

SE
oFF

Self tune

Available if the Controller in standard control or advanced PID control has a temperature input. Activated if the temperature fluctuates outside the stable range.

SE-b
150

ST Stable Range

Available if the Controller in standard control or advanced PID control with the ST set to ON has a temperature input.

ALFA
065

ALFA

Available if the Controller is in advanced PID control with the ST set to OFF.

RE-G
10

AT Calculated Gain

Available if the Controller is in advanced PID control with the ST set to OFF.

rSEt
0

Standby Sequence Reset Method

rEt
1

Automatic Return of Display Mode

To exit menus automatically.

RE-H
02

AT Hysteresis

Available if the Controller is in advanced PID control with the ST set to OFF.

LbAb
02

LBA Detection Width

Available only when the LBA (loop break alarm) function of the Controller is selected.

Option Mode

Multi-SP Function

Available for the event input function.

Event Input Assignment 1

Available for the event input function.

Communication Stop Bit

Used when the communications function is being used.

Communication Data Length

Used when the communications function is being used.

Communication Parity

Used when the communications function is being used.

Communication Baud Rate

Used when the communications function is being used.

Communication Unit No.

Used when the communications function is being used.

Transfer Output Type

Set when the transfer output function is being used.

Transfer Output Upper Limit

Set when the transfer output function is being used.

Transfer Output Lower Limit

Set when the transfer output function is being used.

■ How to Use the Error Display

When an error has occurred, the No.1 display alternately indicates error codes together with the current display item. This section describes how to check error codes on the display, and the actions that must be taken to remedy the problem.

Input Error

Meaning

Input is in error.

Action

Check the wiring of inputs, disconnections, and shorts, and check the input type and the input type jumper connector.

Operation at Error

For control output functions, output the manipulated variable matched to the setting of the "MV at PV error" parameter (level2 mode). Alarm output functions are activated when the upper limit is exceeded.

Memory Error

Meaning

Internal memory operation is in error

Action

First, turn the power OFF then back ON again. If the display remains the same, the E5CK Controller must be repaired. If the display is restored to normal, the probable cause may be external noise affecting the control system. Check for external noise.

Operation at Error

Control output functions turn OFF (2 mA max. at 4 to 20 mA output, and output equivalent to 0% in case of other outputs). Alarm output functions turn OFF.

E333**A/D Converter Error****Meaning**

Internal circuits are in error.

Action

First, turn the power OFF then back ON again. If the display remains the same, the E5CK Controller must be repaired. If the display is restored to normal, the probable cause may be external noise affecting the control system. Check for external noise.

Operation at Error

Control output functions turn OFF (2 mA max. at 4 to 20 mA output, and output equivalent to 0% in case of other outputs). Alarm output functions turn OFF.

R.E r r**Calibration Data Error****Meaning**

This error is displayed for two seconds when the power is turned ON.

Action

Calibration data is in error.

Must be repaired – consult Omron.

Operation at Error

Both control output functions and alarm output functions are active. However, note that the readout accuracy is not assured.

CCCC**Display Range Over****JJJJ****Meaning**

Though not an error, this is displayed when the process value exceeds the display range when the control range (setting range $\pm 10\%$) is larger than the display range (–1999 to 9999).

- When less than “–1999” **CCCC**
- When greater than “9999” **JJJJ**

Operation

Control continues, allowing normal operation.

■ Fuzzy Self-tuning

Fuzzy self-tuning is a function that enables the E5CK to calculate the most suitable PID constants for the controlled object.

Features

- The E5CK determines by itself when to perform fuzzy self-tuning.

Fuzzy Self-tuning Function

The fuzzy self-tuning function has three modes.

In SRT (step response tuning) mode, the PID constants are tuned using a step response method at the time the set point is changed.

In DT (disturbance tuning) mode, the PID constants are amended so that the controlled temperature will be within the target range set in advance when there is external disturbance.

In HT (hunting tuning) mode, when hunting occurs, the PID constants are amended to suppress the hunting.

Note: Be sure to turn on the power supply to the load either before or simultaneously with the start of Temperature Controller operation.

Dead time will be measured from the time the Temperature Controller starts operating. If a load such as a heater is turned on after the Temperature Controller is turned on, dead time longer than the actual value will be measured and inappropriate PID constants will be obtained. If an extremely large amount of dead time is measured, the control amount will be set to 0% for a short period of time before being returned to 100%, and the constants will then be retuned. Retuning is performed only for large amounts of dead time, so be sure to follow the precaution given above when starting operation.

Startup Conditions of SRT

SRT will start if the following conditions are satisfied simultaneously when the E5CK is turned on or the set point is changed.

At the time the E5CK starts operating	At the time set point is changed
1. The set point at the time the E5CK starts operating is different from the set point used at the time SRT was last executed (see note).	1. The new set point is different from the set point used at the time SRT was last executed (see note).
2. The difference between the set point and the process value at the time the E5CK starts operating is larger than the present proportional band value (P) x 1.27+4.	2. The set point changing range is larger than the present proportional band value (P) x 1.27+4.
3. The process value at the time the E5CK starts operating is smaller than the set point in reverse operation and larger than the set point in normal operation.	3. The process value is in stable condition before the set point is changed.
	4. A larger set point value is set in reverse operation and a smaller set point is set in normal operation.

Note: The last SRT-executed set point is set to 0 before shipping and when changing from advanced PID control to advanced PID control with fuzzy self-tuning.

Imposition Completion Condition of Step Control Amount

In order to prevent overshooting, the step controlled amount must be imposed continuously only while the present deviation is the same as or greater than the value obtained from the proportional band (P) x

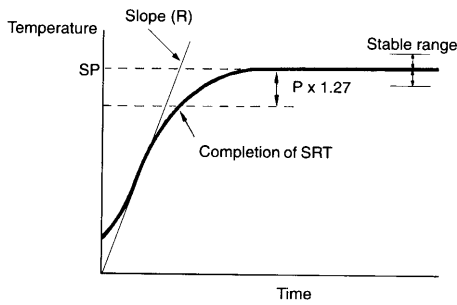
1.27. The step control will not be applied when the deviation becomes smaller than this value.

PID Constant Refreshing Conditions

If the step control amount is applied before the maximum temperature slope (R) is obtained, SRT will not renew any PID constant. If the proportional band obtained from the R and L values that were measured before the imposition had been completed is larger than the present proportional band, the PID constants will be renewed because the measured value is in the direction towards the suitable proportional band value, and the set point at that time will be the SRT-executed set point.

Stable Temperature Status

If the temperature is within the stable range for a specified period, it is deemed that the temperature is stable.



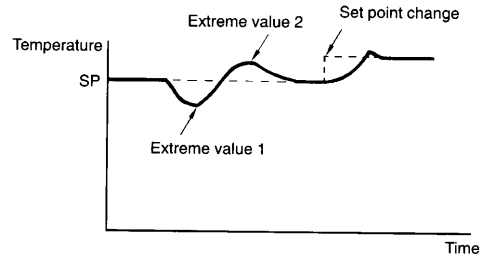
Balanced Status

If the process value is within the stable range for 60s when there is no output, it is deemed that the the temperature is balanced.

Startup Conditions of DT

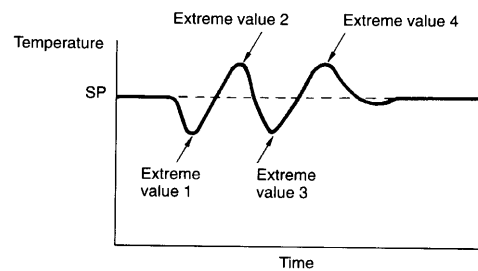
1. DT will start if the temperature that has been stable varies due to external disturbance and the deflection of the temperature exceeds the stable range, and then the temperature becomes stable, provided that the number of maximum temperature values (extreme values) is less than four.

2. DT will start if the set point is changed under the condition that SRT does not start and the temperature becomes stable, provided that the number of maximum temperature values is less than four. If there are four or more maximum temperature values, HT will start.



Startup Conditions of HT

HT will be ON when there is hunting with four or more maximum temperature values (extreme values) while SRT is not being executed.

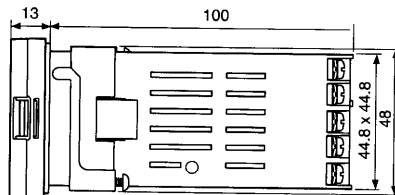
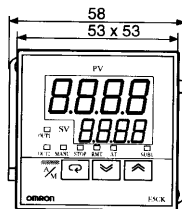


Note: In specific applications where temperature varies periodically due to disturbance, internal parameters need to be adjusted. For details, refer to the "E5CK User's Manual."

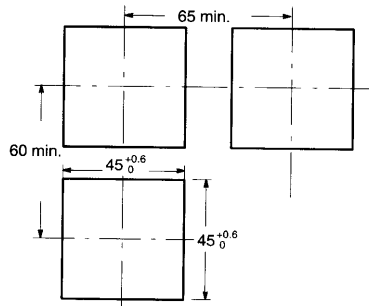
Dimensions

Note: All units are in millimeters unless otherwise indicated.

E5CK



Panel Cutouts

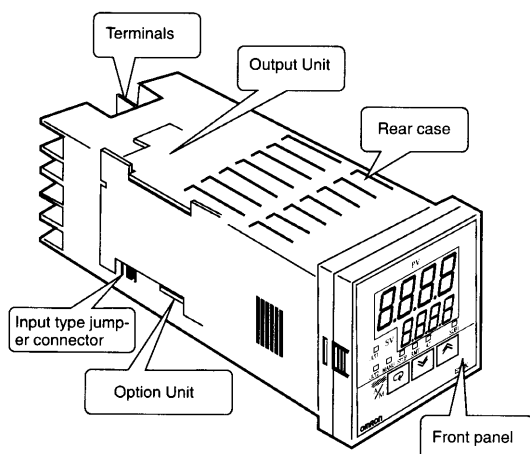


- Note:**
1. Recommended panel thickness is 1 to 5 mm.
 2. Maintain the specified vertical and horizontal mounting space between each Unit. Units must not be closely mounted vertically or horizontally.

Assembly/Disassembly

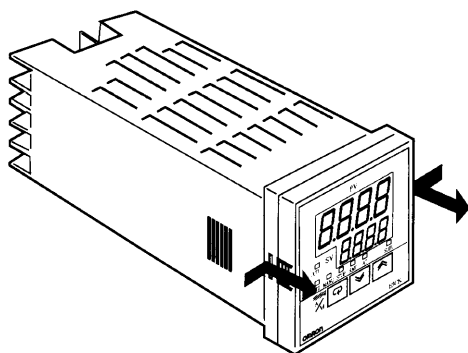
■ Installation

Main Parts



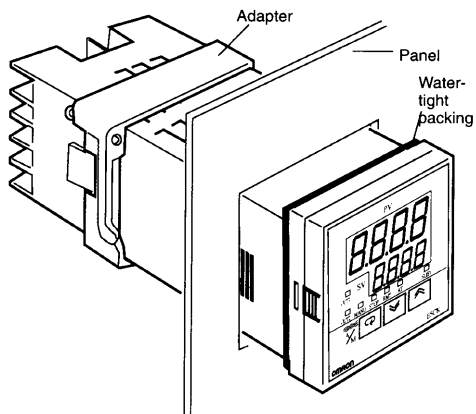
Draw-out

First, draw out the internal mechanism from the housing. Pull out the internal mechanism while pressing the hooks on the left and right sides of the front panel.



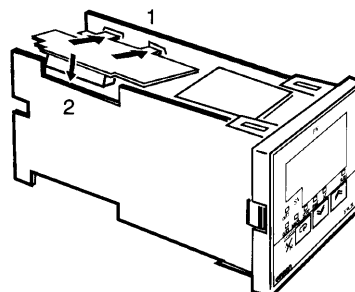
■ Mounting

1. Insert the E5CK Controller into the panel's mounting hole at the position shown in the figure below.
2. Push the adapter along the Controller body from the terminals up to the panel, and fasten temporarily.
3. Tighten the two fixing screws on the adapter. When tightening screws, tighten the two screws alternately keeping the torque to approximately 0.29 to 0.39 N • m, or 3 to 4 kgf • cm.



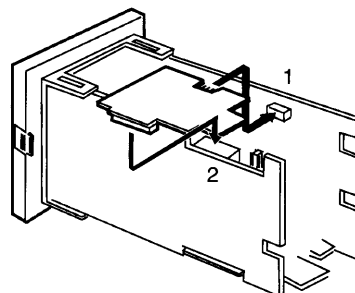
Setting Up the Output Unit

1. Two rectangular holes are provided on the power board (right side of Controller). Fit the two protrusions of the Output Unit into these two holes.
2. With the Output Unit fitted into the power board, fit the Output Unit into the connector on the control board (left side of Controller).



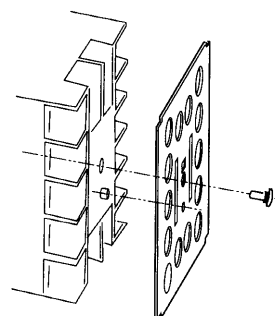
Setting Up the Option Unit

1. Place the Controller with its bottom facing up, and fit the board horizontally into the Connector on the power board (right side of controller).
2. With the power board connected, fit the board vertically into the Connector on the control board (left side of controller).

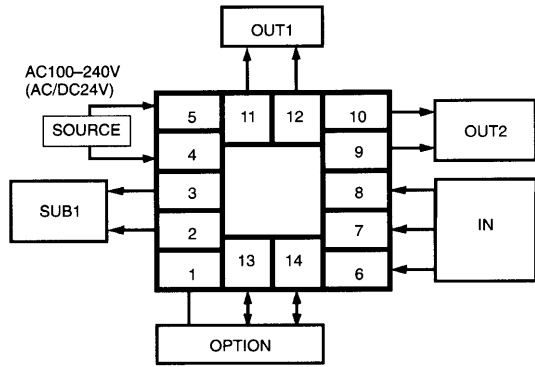


Terminal Cover

The E5CK-AA1-500 Controller is provided with a Terminal Cover (E53-COV07). Fasten the Terminal Cover as follows by using the snap pin.



Wiring
Terminal Arrangement

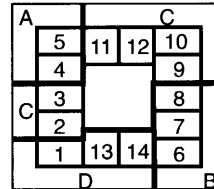


Solderless terminals are recommended when wiring the Controller. Tighten the terminal screws using a torque no greater than 0.78 N • m, or 8 kgf • cm max. Take care not to tighten the terminal screws too tightly.

Power Blocks

The E5CK has independent power supplies for each of the terminal blocks shown below. However, note that the power supplies for blocks C (exclude relay output) and D are shared for the following option unit.

- Option unit: E53-CKB or E53-CKF



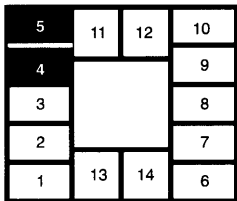
Precautions

Use ducts to separate input leads and power lines in order to protect the Controller and its lines from external noise.

Wiring

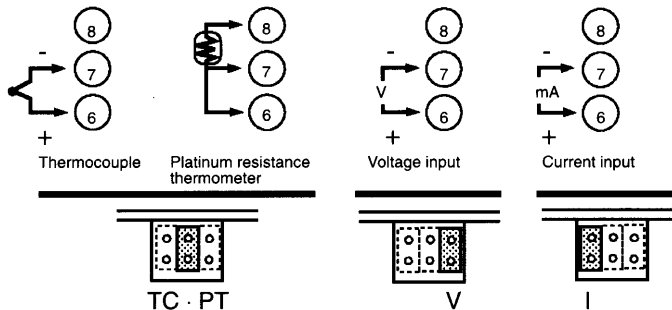
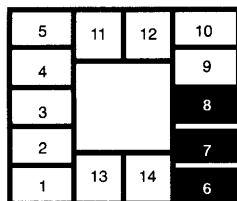
Power Supply

Input 100 to 240 VAC or AC/DC 24 V to terminal numbers 4 and 5 according to the specification.



Input

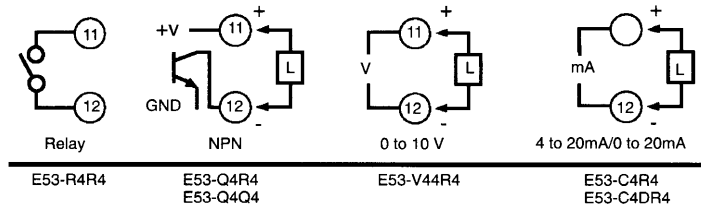
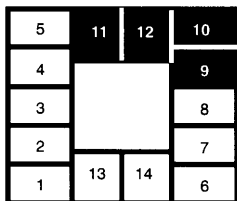
Connect the input to terminal numbers 6 to 8 as follows according to the input type.



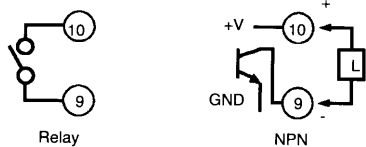
Match the inputs with the internal jumper settings for each input type. For thermocouple or platinum resistance thermometer inputs, set the inputs to a common position (TC/PT) as the temperature input.

Control Output

Terminal numbers 11 and 12 are for control output 1 (OUT1). The four output types and internal equalizing circuits are available according to the Output Unit.



Terminal numbers 9 and 10 are for control output 2 (OUT2). The two output types and internal equalizing circuits are available according to the Output Unit.



Relay: E53-R4R4 / E53-V44R4
E53-Q4R4 / E53-C4R4
E53-Q4HR4 / E53-C4DR4

NPN: E53-Q4Q4

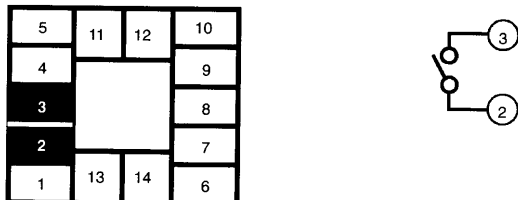
The following table shows the specifications for each output type.

Output type	Specifications
Relay Voltage (NPN)	3 A at 250 VAC 20 mA at 12 VDC (with short-circuit protection)
0 to 10 V 4 to 20 mA 0 to 20 mA	0 to 10 VDC, permissible load impedance: 1 kΩ min., resolution: approx. 2,600 4 to 20 mA, permissible load impedance: 500 Ω max., resolution: approx. 2,600 0 to 20 mA, permissible load impedance: 500 Ω max., resolution: approx. 2,600

Auxiliary Output 1

Terminal numbers 2 and 3 are for auxiliary output 1 (SUB1).

The internal equalizing circuit for auxiliary output 1 is as follows:

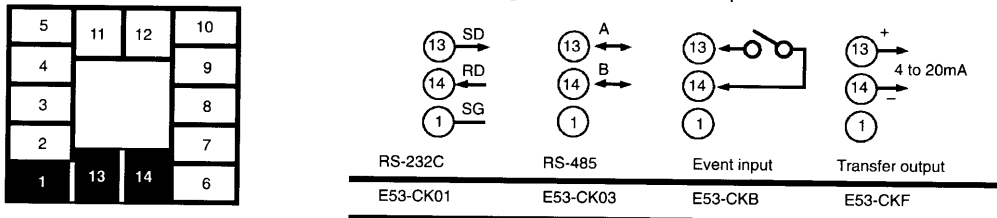


Relay specifications are as follows:
SPST-NO, 250 VAC, 1 A

Option

Terminal numbers 1, 13, and 14 are valid only when the Option Unit is set in the Controller.

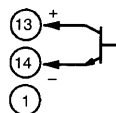
The following four connections are possible depending on the model of the Option Unit.



Use event inputs under the following conditions:

Contact input	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.

The polarity for no-contact input is as follows:



Transfer output specifications are as follows:

4 to 20 mA, load: 500 Ω max., resolution approx. 2600

Cat. No. I-E5CK-002 In the interest of product improvement, specifications are subject to change without notice.

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