

Nomenclature

E5AN

Operation Indicators

1. ALM1 (alarm 1)
Lights when alarm 1 output is ON.
ALM2 (alarm 2)
Lights when alarm 2 output is ON.
ALM3 (alarm 3)
Lights when alarm 3 output is ON.
2. HB (heater burnout alarm display)
Lights when a heater burnout is detected.
The heater burnout alarm remains ON by setting the heater burnout latch. To reset, turn the power supply OFF and then ON or set the heater burnout alarm value to "0.0A."
3. OUT1, OUT2 (control output 1, control output 2)
Lights when control output 1 and/or control output 2 (cool) are ON.
However, if control output 1 is current output, OUT1 will always be unlit.
4. STOP (stop)
Lights when control of the E5AN has been stopped.
During control, this indicator lights when an event or the run/stop function has become stopped. Otherwise, this indicator is out.
5. CMW (communications writing control)
Lights when communications writing is enabled and is out when it is disabled.

Temperature Unit

The temperature unit is displayed when the display unit parameter is set to a temperature. Indication is determined by the currently selected "temperature unit" parameter set value. When this parameter is set to "°C," "C" is displayed, and when set to "°F," "F" is displayed.

No. 1 Display

Displays the process value or parameter type.

No. 2 Display

Displays the set point, manipulated variable, or set value (setup) of the parameter.

Up Key

Each press of this key increases values displayed on the No.2 display. Holding down this key continuously increases values.

Down Key

Each press of this key decreases values displayed on the No.2 display. Holding down this key continuously decreases values.

Mode Key

Press this key to select parameters within each level.

Level + Mode Keys

This key combination sets the E5AN to the "protect level."

Level Key

Press this key to select the setup level. The setup level is selected in order "operation level" ↔ "adjustment level," "initial setting level" ↔ "communications setting level."

E5EN

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However, if control output 1 is current output, OUT1 will always be unlit.
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Level + Mode Keys

This key combination sets the E5EN to the "protect level."

Mode Key

Press this key to select parameters within each level.

E5CN

Operation Indicators

1. AL1 (alarm 1)
Lights when alarm 1 output is ON.
AL2 (alarm 2)
Lights when alarm 2 output is ON.
2. HB (heater burnout alarm display)
Lights when a heater burnout is detected.
The heater burnout alarm remains ON by setting the heater burnout latch. To reset, turn the power supply OFF and then ON or set the heater burnout alarm value to "0.0A."
3. OT1, OT2 (control output 1, control output 2)
Lights when control output 1 and/or control output 2 (cool) are ON. However, if control output 1 is current output, OT1 will always be unlit.
4. STP (stop)
Lights when control of the E5CN has been stopped.
During control, this indicator lights when an event or the run/stop function has become stopped. Otherwise, this indicator is out.
5. CMW (communications writing control)
Lights when communications writing is enabled and is out when it is disabled.

Temperature Unit

The temperature unit is displayed when the display unit parameter is set to a temperature. Indication is determined by the currently selected "temperature unit" parameter set value. When this parameter is set to "°C," "°C" is displayed, and when set to "°F," "°F" is displayed.

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Displays the process value or parameter type.

No. 2 Display

Displays the set point, manipulated variable, or set value (setup) of the parameter.

Up Key

Each press of this key increases values displayed on the No.2 display. Holding down this key continuously increases values.

Down Key

Each press of this key decreases values displayed on the No.2 display. Holding down this key continuously decreases values.

Mode Key

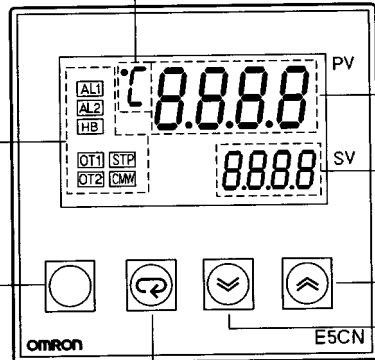
Press this key to select parameters within each level.

Level + Mode Keys

This key combination sets the E5CN to the "protect level."

Level Key

Press this key to select the setup level. The setup level is selected in order "operation level" ↔ "adjustment level," "initial setting level" ↔ "communications setting level."



E5GN

Operation Indicators

1. AL (alarm)
Lights when alarm output is ON.
2. CMW (communications writing control)
Lights when communications writing is enabled and is out when it is disabled.
3. STP (stop)
Lights when control of the E5GN has been stopped.
During control, this indicator lights when an event or the run/stop function has been stopped. Otherwise, this indicator is out.
4. OUT (control output)
Lights when control output is ON.

Temperature Unit

The temperature unit is displayed when the display unit parameter is set to a temperature. Indication is determined by the currently selected "temperature unit" parameter set value. When this parameter is set to "°C," "°C" is displayed, and when set to "°F," "°F" is displayed.

No. 1 Display

Displays the process value or parameter type.

No. 2 Display

Displays the set point, manipulated variable or set value (setup) of the parameter.

Up Key

Each press of this key increases values displayed on the No.2 display. Holding down this key continuously increases values.

Down Key

Each press of this key decreases values displayed on the No.2 display. Holding down this key continuously decreases values.

Level + Mode Key

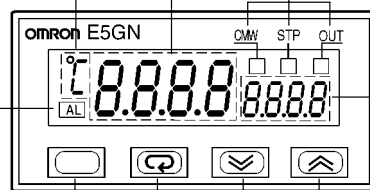
This key combination sets the E5GN to the "protect level."

Level Key

Press this key to select the setup level. The setup level is selected in order "operation level" ↔ "adjustment level," "initial setting level" ↔ "communications setting level."

Mode Key

Press this key to select parameters within each level.



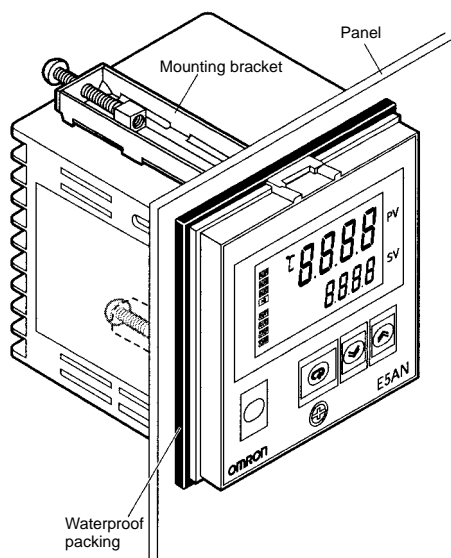
Installation

■ E5AN/E5EN

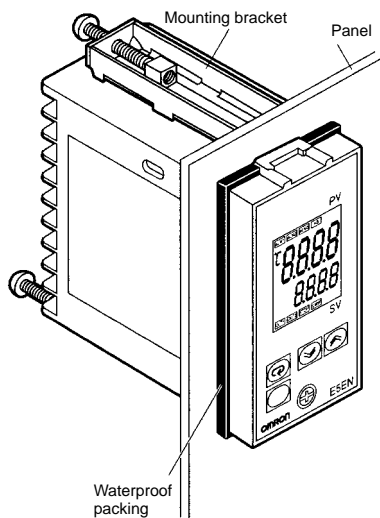
Mounting

1. Insert the E5AN/E5EN into the mounting hole in the panel from the front.
2. Push the mounting bracket along the E5AN/E5EN body from the terminals up to the panel, and secure it temporarily.
3. Tighten the fixing screw on each mounting bracket alternately until the ratchet stops tightening.

E5AN



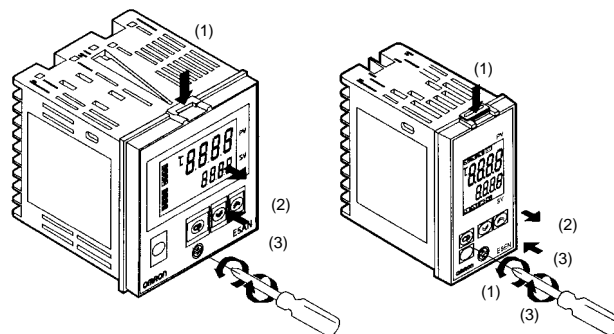
E5EN



Drawing Out

For drawing out the Unit, use a suitable Philips screwdriver for the screw located at the bottom on the front panel.

1. While pressing down on the hook located at the top of the front panel, turn the screw (located at the bottom on the front panel) counterclockwise using a Philips screwdriver.
2. Hold both sides of the front panel and draw out the Unit towards you.
3. When inserting the Unit, confirm that the waterproof packing is in place. While pressing down on the hook located at the top of the front panel, turn the screw (located at the bottom on the front panel) clockwise using a Philips screwdriver and tighten to a torque of 0.3 to 0.5 N·m. Make sure that electronic parts do not come in contact with the case.



■ E5CN

Setting Up Option Units

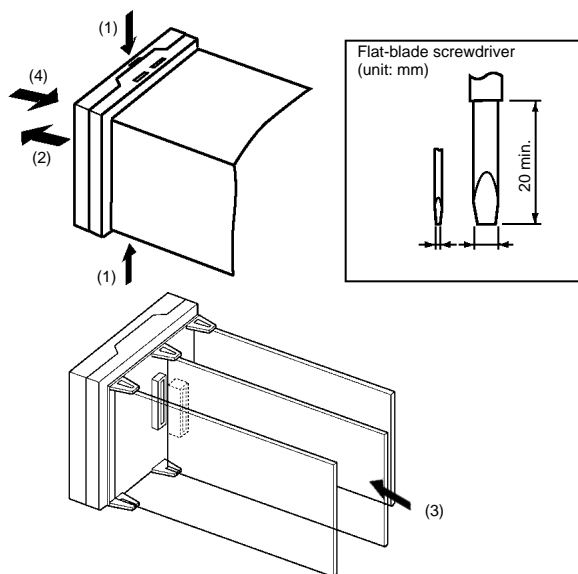
If communications, event input, or heater burnout functions are required, mount the E53-CNH03 Communications Unit or the E53-CNHB Event Input Unit. The heater burnout function is supported on either of these two Option Units.

Option Units

Name	Model	Function
Communications Unit	E53-CNH03	RS-485 communications
Event Input Unit	E53-CNHB	Event inputs

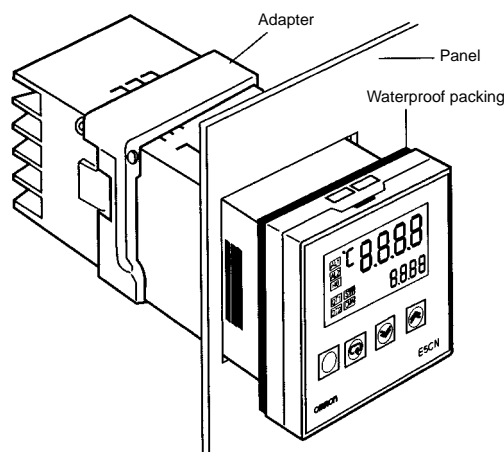
Note: Terminal label: x1

Assembling a Unit



1. Insert the tools (see drawing above) into the slots (one on the top and one on the bottom) and release the hooks.
2. Insert the tool in the space between the front and rear panels and slightly pull out the front panel. Hold the top and bottom of the front panel and pull toward yourself to remove it.
3. Match up the upper and lower claws with the connection points and insert the Option Unit. Mount the Option Unit in the center.
4. Before inserting the Unit, confirm that the waterproof packing is in place. Insert the Unit into the rear case until you hear a click. When inserting the Unit, press down the hooks on the top and bottom of the rear case so that they firmly hook on the inserted Unit. Make sure that electronic parts do not come in contact with the case.

Mounting



Attaching the E5CN to a Panel

1. Insert the E5CN into the mounting hole in the panel.
2. Push the adapter along the E5CN body from the terminals up to the panel, and secure it temporarily.
3. Tighten the two fixing screws on the adapter. When tightening screws, tighten the two screws alternately keeping the torque to between 0.29 and 0.39 N•m (2.9 kgf•cm to 3.9 kgf•cm).

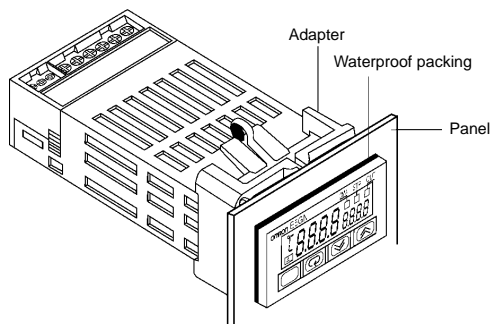
Attaching the Terminal Cover

Make sure that the "UP" mark is facing up, and then fit the Terminal Cover (E53-COV10) into the holes on the top and bottom. A E5CN-□-500 Controller is provided with a Terminal Cover.

■ E5GN

Mounting

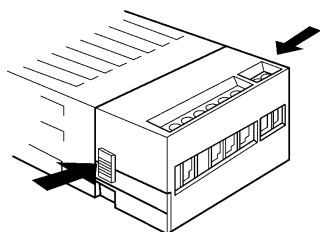
1. Insert the E5GN into the mounting hole in the panel from the front.
2. Push the adapter along the E5GN body from the terminals up to the panel, and secure it temporarily.
3. Tighten the two fixing screws on the adapter. When tightening screws, tighten the two screws alternately keeping the torque to within approximately 0.29 to 0.39 N•m.



Removing and Attaching the Terminal Plate

The E5GN can be replaced by removing the terminal plate.

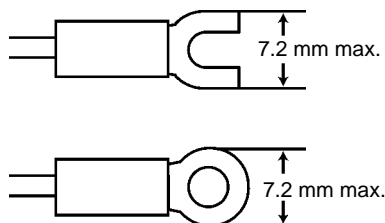
1. Press down hard on the fasteners on both sides of the terminals to unlock the terminal plate and pull upwards.



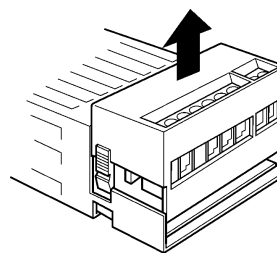
■ Wiring Precautions

E5AN/E5EN/E5CN

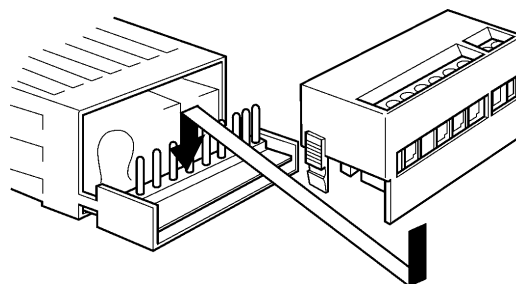
- Separate input leads and power lines to protect the E5AN/E5EN/E5CN and its lines from external noise.
- We recommend using solderless terminals when wiring the E5AN/E5EN/E5CN.
- Tighten the terminal screws using a torque between 0.74 and 0.90 N • m.
- Use the following type of solderless terminals for M3.5 screws.



2. Draw out the terminal plate as it is.



3. Before you insert the terminal plate again, make sure that the pins match the positions of the holes in the terminal plate.

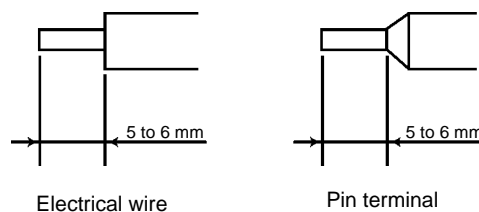


E5GN

- Connect the terminals as specified below.

Terminal No.	Cables	Pin terminals
1 to 6	AWG24 to AWG14	2.1 dia. max.
7 to 9	AWG28 to AWG22	1.3 dia. max.

- The exposed current-carrying part to be inserted into terminals must be 5 to 6 mm.







- Tighten the terminal screws to the torque specified below.

Terminal No.	Screw	Maximum tightening torque
1 to 6	M2.6	0.23 to 0.25 N • m
7 to 9	M2	0.12 to 0.14 N • m

Operation

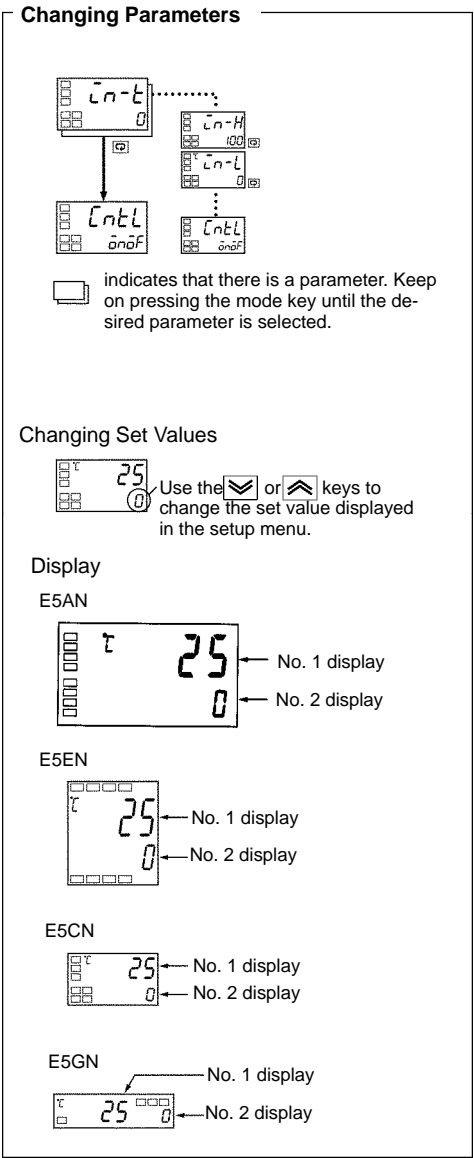
Initial Setup

On previous Controllers, sensor input type, alarm type and control period were set on DIP switches. These hardware settings are now set in parameters in setup menus. The  and  keys are used to switch between setup menus, and the amount of time that you hold the keys down for determines which setup menu you move to. This section describes two typical examples.

Note: On the E5EN/E5GN, the  Key is the  Key.

1. ON/OFF Control

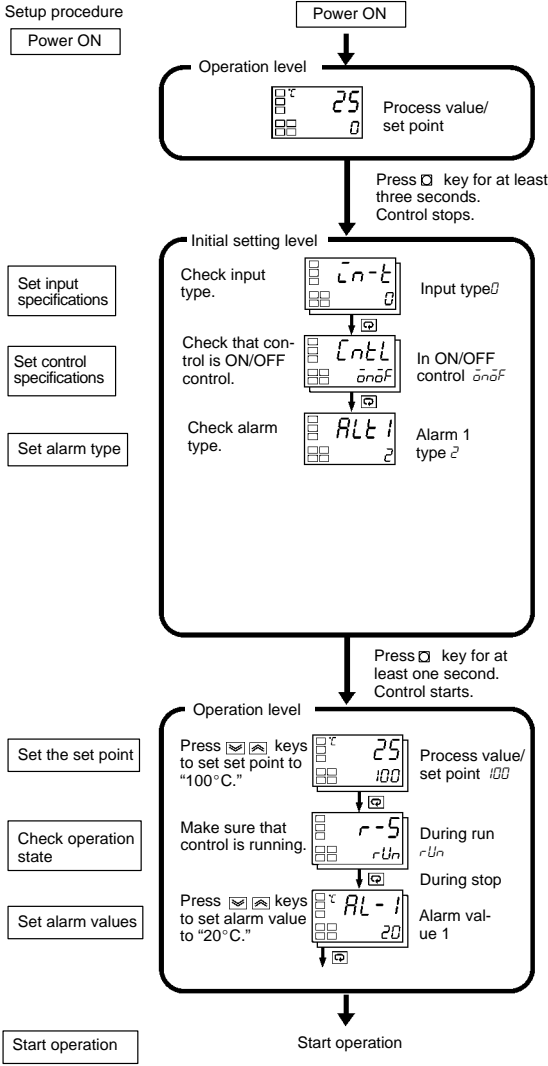
Typical Application Examples



Typical Example

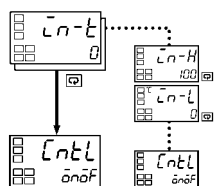
Input type:	0 K thermocouple -200 to 1300°C
Control method:	ON/OFF control
Alarm type:	2 upper limit
Alarm value 1:	20°C (For setting deviation)
Set point:	100°C

Change only the alarm value 1 and set point.
The rest must be left as default settings.



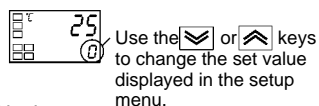
2. PID Control Using Auto-tuning

Changing Parameters



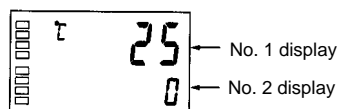
indicates that there is a parameter. Keep on pressing the mode key until the desired parameter is selected.

Changing Set Values

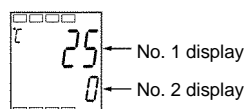


Display

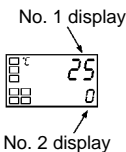
E5AN



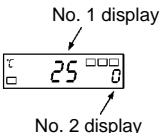
E5EN



E5CN

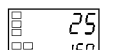


E5GN

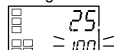


PV/SP

After AT execution.

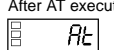


During AT execution.

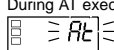


While AT is being executed, SP will flash.

After AT execution.



During AT execution.



Typical Example

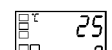
Input type: 4 T thermocouple -200 to 400°C
Control method: PID control
ST (self-tuning): OFF
Calculate PID constants by AT (auto-tuning).
Alarm type: 2 upper limit
Alarm value 1: 30°C (For setting deviation)
Set point: 150°C

Setup procedure

Power ON

Power ON

Operation level



Process value/
set point

Press <M> key for at least three seconds. Control stops.

Initial setting level

Press <V> <A> keys to select input type.



Input type 4

Press <V> <A> keys to select PID control.



In PID control

Press <V> <A> keys to set ST to OFF.



To cancel ST

Check the control period.



Control period (heat) (unit: seconds)

Check alarm type.



Alarm 1 type 2 (upper-limit alarm)

When set to ON, self-tuning operates. Recommended settings: 20 seconds for the relay output and 2 seconds for the SSR output.

Press <M> key for at least one second.

Operation level

Press <V> <A> keys to set set point to "150°C."



Process value/
set point 150

Press <M> key for less than one second.

Adjustment level

Execute AT (auto-tuning).



To execute AT

Set to ON for executing AT and to OFF for stopping AT.

Press <M> key for less than one second.

Operation level

Make sure that set point is "150°C."



Process value/
set point 150

Make sure that control is running.



During run

Press <V> <A> keys to set alarm value to "30°C."



Alarm value 1 30

Set operation status

Set alarm values

Start operation

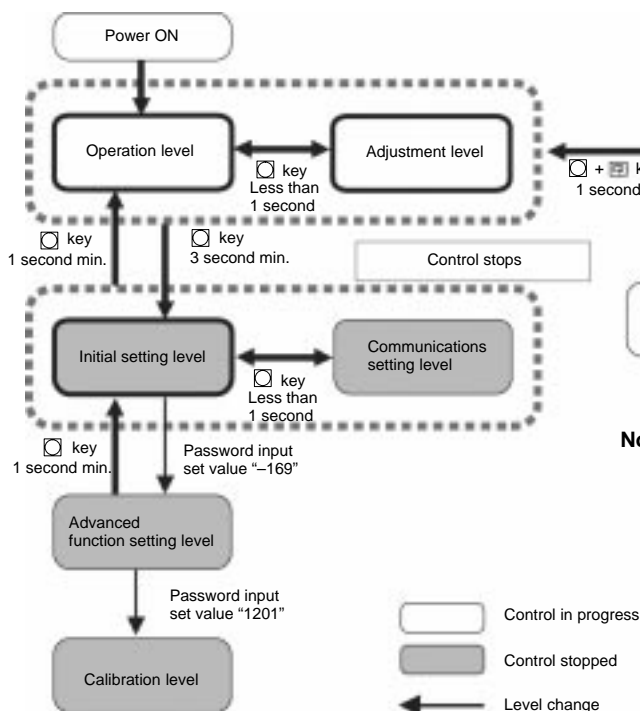
Start program execution

Specification Setting after Turning ON Power

■ Outline of Operation Procedures

Key Operation

In the following descriptions, all the parameters are introduced in the display sequence. Some parameters may not be displayed depending on the protect settings and operation conditions.



- Note:**
1. Of these levels, the initial setting level, communications setting level, advanced function setting level and calibration level can be used only when control has stopped. Note that control is stopped when these four levels are selected. When switched back to the operation level from one of these levels, control will start.
 2. For the calibration mode, refer to the relevant Operation Manual (H100 or H101).
 3. On the E5EN/E5GN, the Key is the Key.

■ Description of Each Level

Operation Level

This level is displayed when you turn the power ON. You can move to the protect level, initial setting level and adjustment level from this level.

Normally, select this level during operation. During operation, the process value, set point and manipulated variable can be monitored, and the alarm value and upper- and lower-limit alarms can be monitored and modified.

Adjustment Level

To select this level, press the key once for less than one second.

This level is for entering set values and offset values for control. This level contains parameters for setting the set values, AT (auto-tuning), communications writing enable/disable, hysteresis, multi-SP, input shift values, heater burnout alarm (HBA) and PID constants. You can move to the top parameter of the operation level or initial setting level from here.

Initial Setting Level

To select this level, press the key for at least three seconds in the operation level. This level is for specifying the input type, selecting the control method, control period, setting direct/reverse action and alarm type. You can move to the advanced function setting level or communications setting level from this initial setting level. To return to the operation level, press the key for at least one second. To move to the communications setting level, press the key once for less than one second.

Protect Level

To select this level, simultaneously press the and keys for at least one second. This level is to prevent unwanted or accidental modification of parameters. Protected levels will not be displayed, and so the parameters in that level cannot be modified.

Communications Setting Level

To select this level, press the key once for less than one second in the initial setting level. When the communications function is used, set the communications conditions in this level. Communicating with a personal computer (host computer) allows set points to be read and written, and manipulated variables to be monitored.

Advanced Function Setting Level

To select this level, you must enter the password ("-169") in the initial setting level.

You can move only to the calibration level from this level.

This level is for setting the automatic return of display mode, MV limiter, event input assignment, standby sequence, alarm hysteresis, ST (self-tune) and to move to the user calibration level.

Calibration Level

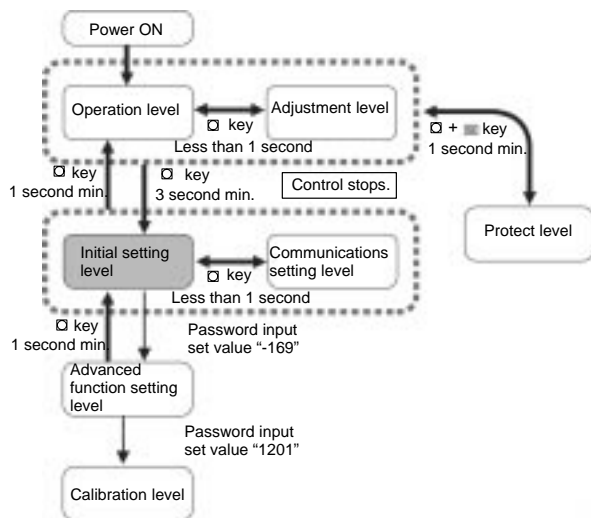
To select this level, you must enter the password ("1201") in the advanced function setting level. This level is for offsetting deviation in the input circuit.

You cannot move to other levels by operating the keys on the front panel from the calibration level. To cancel this level, turn the power OFF then back ON again.

■ Specification Setting after Turning ON Power

Initial Setting Level

This level is used for setting basic specifications of the Temperature Controller. Using this level, set the input type for selecting the input to be connected such as the thermocouple or platinum resistance thermometer and set the range of set point and the alarm mode.

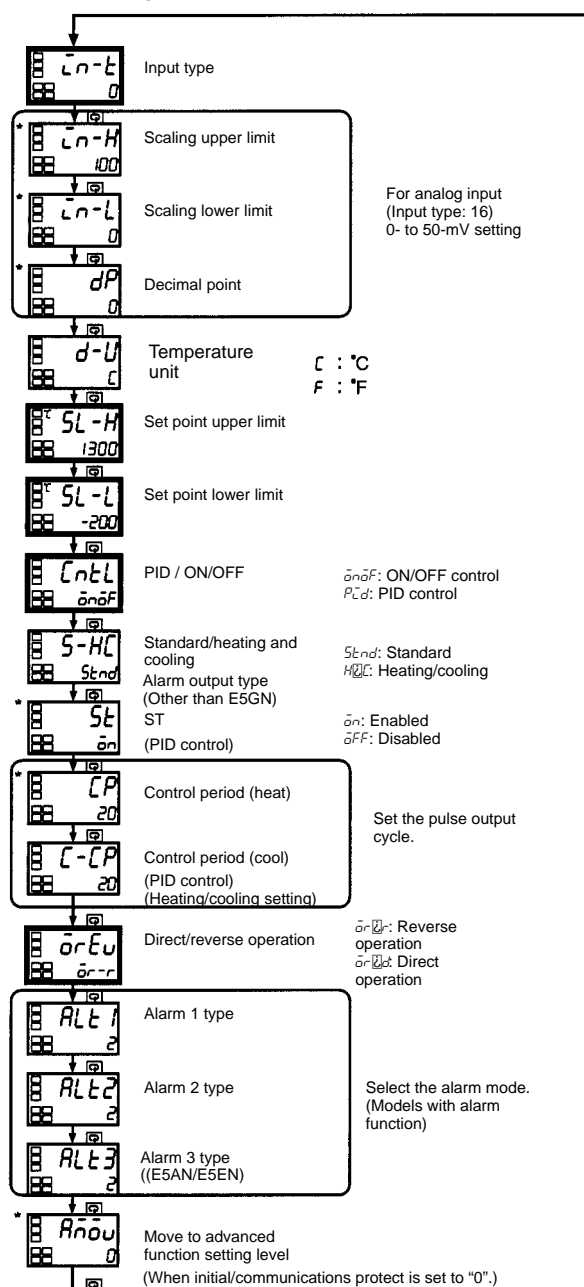


The move from the operation level to the initial setting level, press \square key for three seconds or more.

The initial setting level is not displayed when "initial/communications protection" is set to "2." This initial setting level can be used when "initial setting/communications protection" is set to "0" or "1."

The "scaling upper limit," "scaling lower limit," and "decimal point" parameters are displayed when an analog voltage input is selected as the input type.

Initial setting level



To return to the operation level, press the \square key for longer than one second

* Not displayed as default setting.

■ Input Type

When using a thermocouple input type, follow the specifications listed in the following table.

	Input Type	Specifications	Set Value	Input Temperature Range
Thermocouple input type	Thermocouple	K	0	–200 to 1300 (°C) / –300 to 2300 (°F)
			1	–20.0 to 500.0 (°C) / 0.0 to 900.0 (°F)
		J	2	–100 to 850 (°C) / –100 to 1500 (°F)
			3	–20.0 to 400.0 (°C) / 0.0 to 750.0 (°F)
		T	4	–200 to 400 (°C) / –300 to 700 (°F)
		E	5	0 to 600 (°C) / 0 to 1100 (°F)
		L	6	–100 to 850 (°C) / –100 to 1500 (°F)
		U	7	–200 to 400 (°C) / –300 to 700 (°F)
		N	8	–200 to 1300 (°C) / –300 to 2300 (°F)
		R	9	0 to 1700 (°C) / 0 to 3000 (°F)
		S	10	0 to 1700 (°C) / 0 to 3000 (°F)
		B	11	100 to 1800 (°C) / 300 to 3200 (°F)
	Non-contact temperature sensor ES1A	K10 to 70°C	12	0 to 90 (°C) / 0 to 190 (°F)
		K60 to 120°C	13	0 to 120 (°C) / 0 to 240 (°F)
		K115 to 165°C	14	0 to 165 (°C) / 0 to 320 (°F)
		K160 to 260°C	15	0 to 260 (°C) / 0 to 500 (°F)
	Analog input	0 to 50mV	16	One of following ranges depending on the results of scaling: 1999 to 9999, 199.9 to 999.9

Note: The initial settings are: 0: –200 to 1300°C/–300 to 2300°F.

When using the platinum resistance thermometer input type, follow the specifications listed in the following table.

	Input Type	Specifications	Set Value	Input Temperature Range
Platinum resistance thermometer input type	Platinum resistance thermometer	Pt100	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)
		JPt100	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)

Note: The initial settings are: 0: Pt100 –200 to 850°C/–300 to 1500°F.
The ES1A Non-contact Temperature Sensor is now available.

■ Alarm 1 and Alarm 2

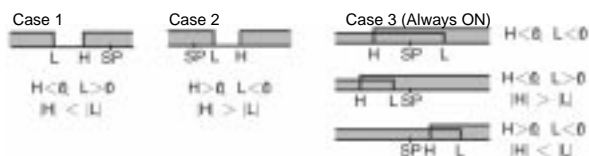
For the alarm 1 and alarm 2, select alarm types out of the 12 alarm types listed in the following table. (The alarm 3 for E5AN/E5EN, which has three alarms, can also be selected from this table.)

Set Value	Alarm Type	Alarm Output Operation	
		When X is positive	When X is negative
0	Alarm function OFF	Output OFF	
1*1	Upper- and lower-limit (deviation)		*2
2	Upper-limit (deviation)		
3	Lower-limit (deviation)		
4*1	Upper- and lower-limit range (deviation)		*3
5*1	Upper- and lower-limit with standby sequence (deviation)		*4
6	Upper-limit with standby sequence (deviation)		
7	Lower-limit with standby sequence (deviation)		
8	Absolute-value upper-limit		
9	Absolute-value lower-limit		
10	Absolute-value upper-limit with standby sequence		
11	Absolute-value lower-limit with standby sequence		

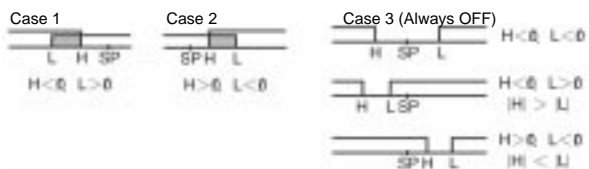
*1: With set values 1, 4 and 5, the upper and lower limit values can be set independently for each alarm type, and are expressed as "L" and "H."

Following operations are for cases when an alarm set point is "X" or negative.

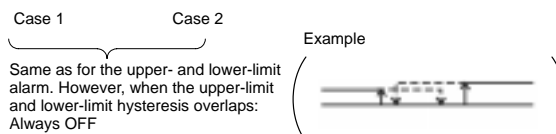
*2: Set value: 1, upper- and lower-limit alarm



*3: Set value: 4, upper- and lower-limit range



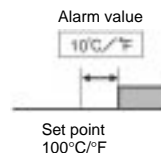
*4: Set value: 5, upper- and lower-limit with standby sequence



Example: When the alarm is set ON at 110°C/°F or higher.

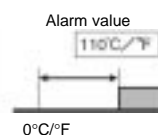
When an alarm type other than the absolute-value alarm is selected

(For alarm types 1 to 7)
The alarm value is set as a deviation from the set point.



When the absolute-value alarm is selected

(For alarm types 8 to 11)
The alarm value is set as an absolute value from the alarm value of 0°C/F.

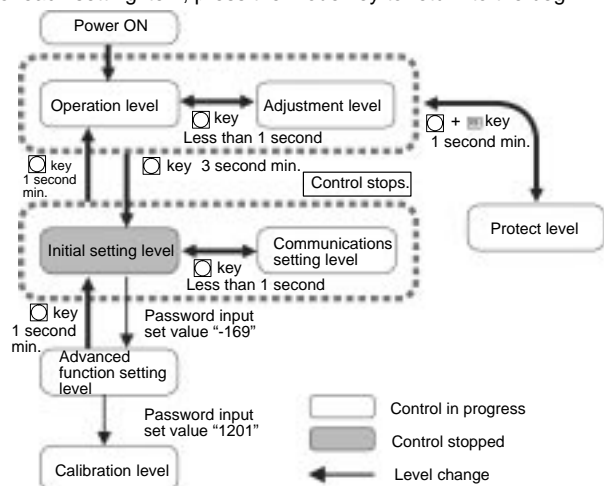


*5: Set value: 5, upper- and lower-limit with standby sequence alarm. Always OFF when the upper-limit and lower-limit hysteresis overlaps.

Set the alarm types for alarm 1 and alarm 2 independently in the initial setting level. The default setting is 2 (upper limit). With the E5AN/E5EN, perform settings similarly for alarm 3.

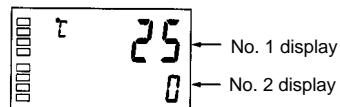
■ Parameters

Parameters related to setting items for each level are marked in boxes in the flowcharts and brief descriptions are given as required. At the end of each setting item, press the mode key to return to the beginning of each level.

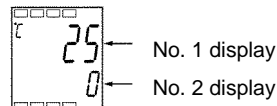


Display

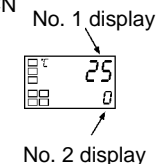
E5AN



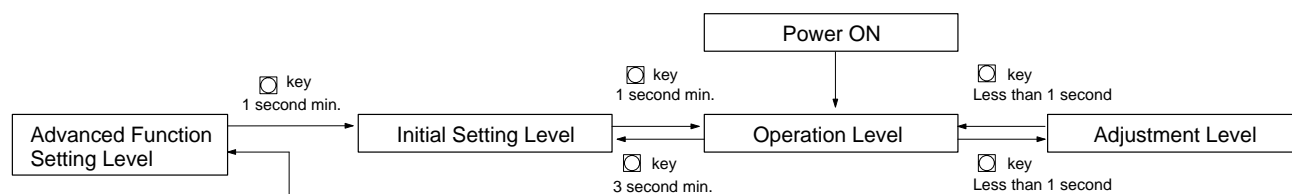
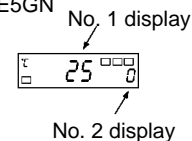
E5EN



E5CN

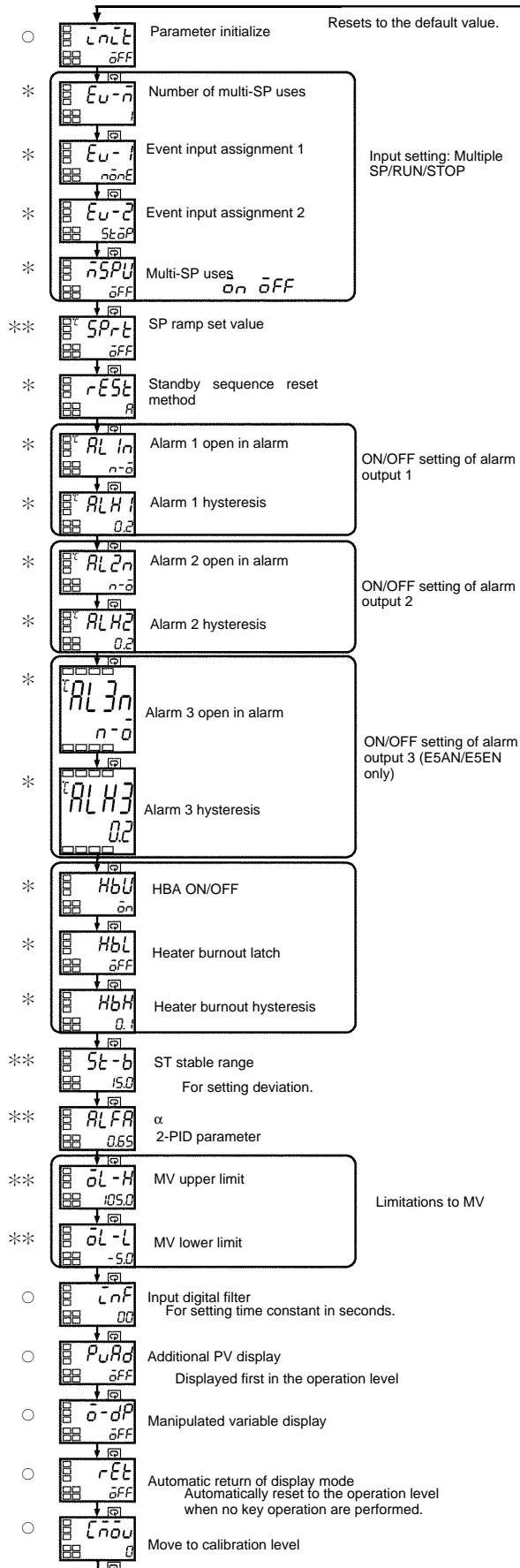


E5GN

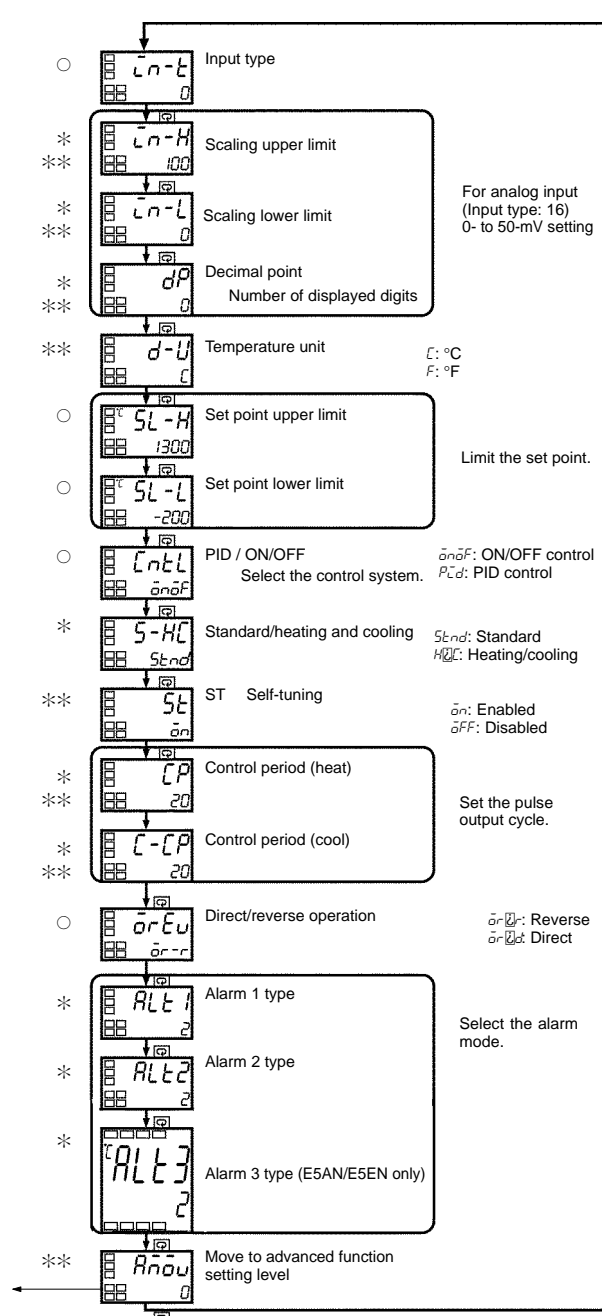


Note: To select advanced function setting level, you must enter the password ("-169") in the initial setting level.

Advanced Function Setting Level



Initial Setting Level



Note: To select advanced function setting level, you must enter the password ("169") in the initial setting level.

Note: These diagrams show all the parameters that may be displayed. Depending on the specifications of the model used, there may be some parameters that are not displayed. The following symbols are used to distinguish between these parameters.

- : Displayed for all models regardless of the settings of other parameters.
- *: Not displayed for some models.
- ***: Depending on the settings of other parameters, may not be displayed.