Digital Position-Proportional Controllers
E5EZ-PRR

A position proportional control model for the E5EZ-PRR series

- Depth of only 78 mm.
- Various temperature inputs (thermocouple, platinum resistance thermometer, infrared temperature sensor, voltage inputs) and analog inputs (current, voltage)
- Makes use of high-visibility LCD, with three lines of 4-digit display, for simplicity and clarity
- 3 lines of display to observe PV/ SV/ MV (valve open percentage), clearly displaying the state of control (operations)
- Event input enables multi-SP selection and run/ stop function
- Alarm delay function
- Communications function
- Able to choose closed/floating control. In floating control, position proportional control can be performed without a potentiometer
- Equipped with a manual output function (equipped with an automatic/manual key)
- CE marking and UL/CSA certification

48×96×78 (W×H×D)

⚠ Refer to “Safety Precautions” on page 23.

Model Number Structure

■ Model Number Legend

E5EZ - PRR2□□
1 2 3 4 5 6

1. Control method
P: Valve control
2. Control output 1
R: Relay (OPEN)
3. Control output 2
R: Relay (CLOSE)

4. Number of alarms
2: Two alarms

5. Option
Blank: Not available
01: RS-232C
03: RS-485
B: 2 event inputs

6. Input Type
T: Temperature
L: Analog input (current, voltage)

Ordering Information

Size	Power Supply Voltage	Input Type	Control Method	Number of alarms	Communications Function	Event Input	Model
1/8DIN 48×96×78 (W×H×D)	100 to 240 VAC	Temperature Input Type	Valve Control	2	None	None	E5EZ-PRR2T
						2 points	E5EZ-PRR2BT
					RS-232C	None	E5EZ-PRR201T
					RS-485		E5EZ-PRR203T
		Analog (Current, Voltage) Input Type			None	None	E5EZ-PRR2L
						2 points	E5EZ-PRR2BL
					RS-232C	None	E5EZ-PRR201L
					RS-485		E5EZ-PRR203L

■ Accessories (Order Separately)

Unit Label

Model	Y92S-L1

■ Input Range

• Thermocouples / Platinum Resistance Thermometer

Input Type	Platinum resistance thermometer					Thermocouple													ES1B Infrared temperature sensor				Analog input
Name	Pt100			JPt100		K		J		T		E	L	U		N	R	S	B	10 to 70°C	60 to 120°C	115 to 165°C	140 to 260°C	0 to 50mV
Temperature range (°C)	850 / -200	500.0 / -199.9	100.0 / 0.0	500.0 / -199.9	100.0 / 0.0	1300 / -200	500.0 / -20.0	850 / -100	400.0 / -20.0	400 / -200	400.0 / -199.9	600 / 0	850 / -100	400 / -200	400.0 / -199.9	1300 / -200	1700 / 0	1700 / 0	1800 / 100	70 / 10	120 / 60	165 / 115	260 / 140	Usable in the following ranges by scaling: -1999 to 9999 or -199.9 to 999.9
Setting number	0	1	2	3	4	5	6	7	8	9	22	10	11	12	23	13	14	15	16	17	18	19	20	21

The applicable standards for each of the above input ranges are as follows:

K, J, T, E, N, R, S, B: JIS C1602-1995, IEC 584-1

L: Fe-CuNi, DIN 43710-1985

U: Cu-CuNi, DIN 43710-1985

JPt100: JIS C 1604-1989, JIS C 1606-1989

Pt100: JIS C 1604-1997 IEC 751

• Models with Analog Inputs

Parameters	Current [mA]		Voltage [V]		
	4 to 20	0 to 20	1 to 5	0 to 5	0 to 10
Set value	0	1	2	3	4
Minimum Setting Unit (Set Value, Alarm)	(Scaling, according to the location of the decimal point)				

indicates factory settings.

■ Optional Functions

Type	Performance
RS-232C	Baud Rate: 1200/2400/4800/9600/19200bps
RS-485	Baud Rate: 1200/2400/4800/9600/19200bps
Event Input	ON: Maximum of 1 KΩ OFF: Minimum of 100 KΩ

Specifications

■ Ratings

Power supply voltage		100 to 240 VAC, 50/60 Hz
Operating voltage range		85% to 110% of rated supply voltage
Power consumption		10 VA (10 W)
Sensor input		Temperature input type Thermocouple: K, J, T, E, L, U, N, R, S,B Platinum resistance thermometer: Pt100,JPt100 Infrared temperature sensor: 10 to 70°C, 60 to 120°C, 115 to 165°C, 140 to 260°C Voltage input: 0 to 50 mV
		Analog (current, voltage) input type Current input: 4 to 20 mA,0 to 20 mA Voltage input: 1 to 5 V, 0 to 5 V, 0 to 10 V
Control output	**Relay output (OUT1,OUT2)**	SPST-NO,250 VAC 1A (resistive load) electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA
Potentiometer input		100 Ω to 2.5 KΩ
Alarm output		SPST-NO,250 VAC 2 A (resistive load) electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA.
Event input	**Contact input**	ON: 1 kΩ max., OFF: 100 kΩ min.
	Non-contact input	ON: Residual voltage: 1.5 V max., OFF: Leakage current: 0.1 mA max.
		Outflow current: Approx. 7 mA per point
Control method		2-PID control
Setting method		Digital setting using front panel keys
Indication method		7-segment digital display and single-lighting indicators Character height: PV: 9 mm; SV: 7 mm; MV: 6.8 mm
Other functions		According to controller model
Ambient operating temperature		−10 to 55°C (with no icing or condensation)
Ambient operating humidity		25% to 85%
Storage temperature		−25 to 65°C (with no icing or condensation)

■ Communications Specifications

Transmission line connection	RS-485: Multidrop RS-232C: Point-to-point
Communications method (see note 1)	RS-485 (two-wire, half duplex)/RS-232C
Synchronization method	Start-stop synchronization
Baud rate	1,200/2,400/4,800/9,600/19,200 bps
Communications code	ASCII
Data length (see note 2)	7 or 8 bits
Stop bits (see note 2)	1 or 2 bits
Error detection	Vertical parity (none, even, odd) Block check character (BCC)
Flow control	Not available
Interface	RS-485/RS-232C
Retry function	Not available

Specifications

■ Characteristics

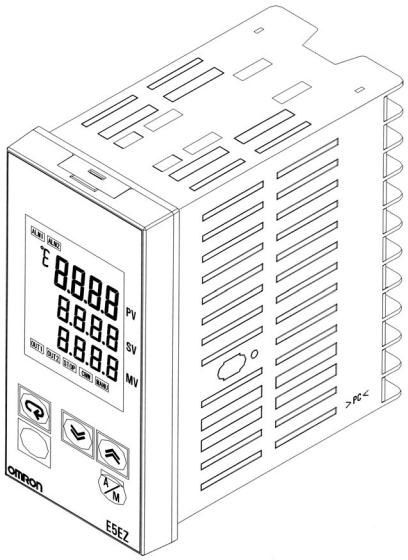
Indication accuracy	Thermocouple: (±0.5% of indicated value or ±1°C, whichever is greater) ±1 digit max. (See note 1.) Platinum resistance thermometer: (±0.5% of indicated value or ±1°C, whichever is greater) ±1 digit max. Analog Input: ±0.5% FS ±1 digit max. Potentiometer Input: ±5% FS ±1 digit max.		
Influence of temperature (See note 2.) **Influence of voltage (See note 2.)**	R, S, and B thermocouple inputs: (±1% of PV or ±10°C, whichever is greater) ±1 digit max. Other thermocouple inputs: (±1% of PV or ±4°C, whichever is greater) ±1 digit max. *±10°C for -100°C or less for K sensors Platinum resistance thermometer inputs: (±1% of PV or ±2°C, whichever is greater) ±1 digit max. Analog inputs: (±1% of FS) ±1 digit max.		
Proportional band (P)	0.1 to 999.9 EU (in units of 0.1 EU)		
Integral time (I)	0 to 3999 s (in units of 1 s) With floating control, 1 to 3999 s		
Derivative time (D)	0 to 3999 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	−1999 to 9999 (decimal point position depends on input type)		
Sampling period	500 ms		
Insulation resistance	20 MΩ min. (at 500 VDC)		
Dielectric strength	2000 VAC, 50 or 60Hz for 1min (between terminals of different charge)		
Vibration resistance	10 to 55Hz, 20 m/s² for 10min each in X,Y, and Z directions		
Shock resistance	100 m/s², 3 times each in X, Y, and Z directions		
Weight	Approx. 260 g		
Memory protection	EEPROM (non-volatile memory) (number of writes: 100,000 operations)		
EMC	Emission enclosure:	EN55011(GB/T 6113.1,2)	1 group, type A
	Emission AC mains:	EN55011(GB/T 6113.1,2)	1 group, type A (see note 2)
	Immunity ESD:	IEC61000-4-2(GB/T 17626.2)	4 kV contact discharge (series 2) 6 kV air discharge (series 3)
	Immunity RF interference:	IEC61000-4-3(GB/T 17626.3):	10 V/m, 80 MHz-1GHz (series)
	Immunity-conducted disturbance:	EC61000-4-6(GB/T 17626.6):	3 V(0.15-80 MHz) (series 3)
	Surges (shocks):	IEC61000-4-5(GB/T 17626.5):	2 kV power supply line (series 3) 1 kV I/O signal line (series 4)
Approved standards	UL61010C-1,CSA C22.2 No.1010.1		
Conformed standards	EN61326, EN61010-1 (IEC61010-1)		

Note 1: The indication accuracy of K thermocouples in the −200 to 1300°C range, T and N thermocouples at a temperature of −100°C max., and U and L thermocouples at any temperature is ±2°C ±1 digit maximum. The indication accuracy of the B thermocouple at a temperature of 400°C max. is not specified. The indication accuracy of the R and S thermocouples at a temperature of 200°C max. is ±3°C ±1 digit max.

2: For E5EZ-PRR□03-model products, in order to satisfy the conduction and emission specifications of EN61326CLASSA, a magnetic ring (TDK:ZAT1730-0730) should be added to the communications line between the K3SC unit and the controller.

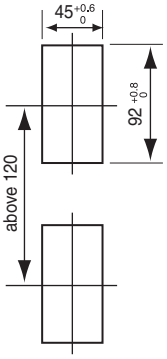
Dimensions

Note: All units are in millimeters unless otherwise indicated.



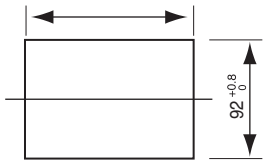
Panel Cutout

Mounted Separately



Group Mounted

(48 × number of units –2.5) $^{+1.0}_{0}$

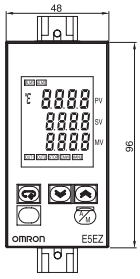


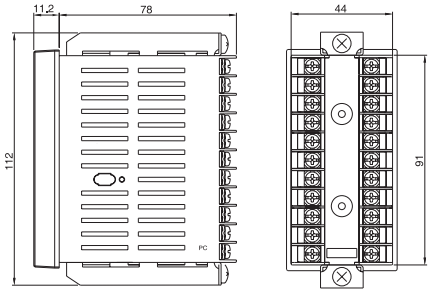
- Recommended panel thickness is 1 to 8 mm.
- Group mounting is not possible in the vertical direction. (Maintain the specified mounting space between Controllers.)
- When two or more Controllers are mounted, make sure that the surrounding temperature does not exceed the allowable operating temperature specified in the specifications.

- **Package Content**

- 1 Temperature Gauge
- 2 Metallic Components For Installation
- 1 Operating Manual
- 1 Quality Certificate

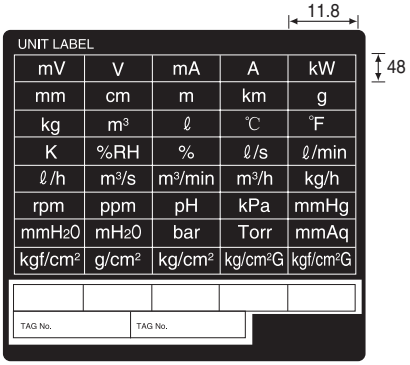
During removal, please use a screwdriver to remove the clips on the top and bottom of the front covering panel, and then remove the temperature gauge's front panel.





- **Unit Labels (Order Separately)**

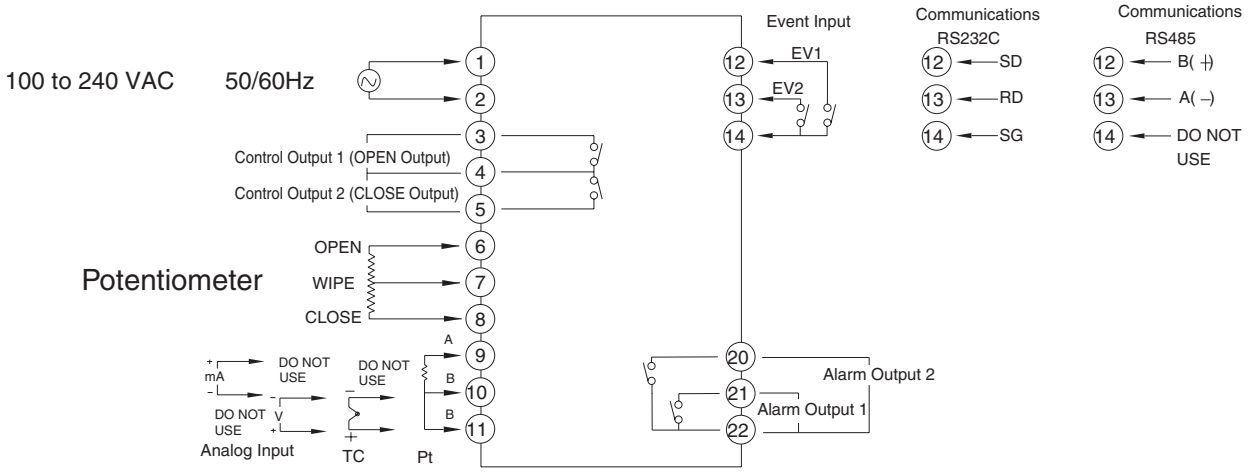
Y92S-L1 Type



Wiring Terminals

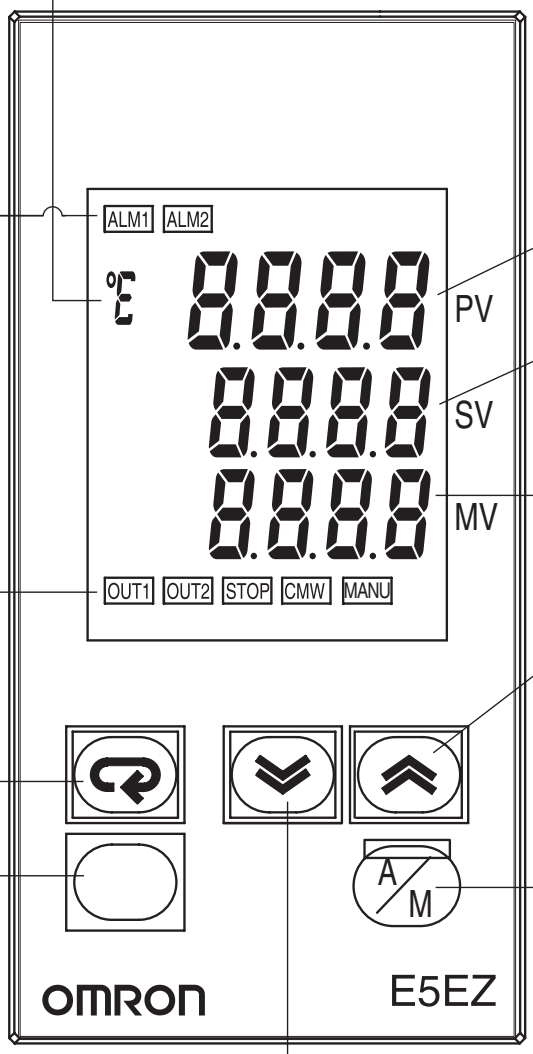
- Standard insulation is applied to the temperature gauge's I/O sections. If reinforced insulation is required, connect the input and output terminals to a device without any exposed current-carrying parts, or to a device with standard insulation suitable for the maximum operation voltage of the power supply I/O section.
- For E5EZ-PRR□03-model products, in order to satisfy the conduction and emission specifications of EN61326CLASSA, a magnetic ring (TDK: ZAT1730-0730) should be added to the communications line between the K3SC unit and the controller.

■ E5EZ-PRR



Nomenclature

■ E5EZ-PRR



Temperature Unit

The temperature unit is displayed when parameters are set to display a temperature. The display is determined by the currently selected "temperature unit" parameter set value. ℃ indicates °C and ℉ indicates °F.

Operation Indicators

1. ALM1 (alarm 1)
   Lights when alarm 1 output is ON.
   ALM2 (alarm 2)
   Lights when alarm 2 output is ON.
2. OUT1, OUT2 (control output 1, control output 2)
   Lights when control output 1 or control output 2 is ON.
3. STOP (Stop)
   Lights when operation is stopped.
   During operation, this indicator lights when operation is stopped by an event or by using the RUN/STOP function.
4. CMW (Communications Writing Control)
   Lights when communications writing is enabled and is not lit when it is disabled.
5. MANU (Manual Mode)
   Lights when the auto/manual mode is set to manual mode.

No. 1 Display

Displays the process value or parameter type.
Lights for approximately one second during startup.

No. 2 Display

Displays the set point, parameter operation read value, or the variable input value.
Lights for approximately one second during startup.

No. 3 Display

Displays valve open percentage when valve opening display is on.
Nothing will be displayed when valve opening display is switched off.

Up Key

Each press of this key increments the value displayed on the No. 2 display or advances the setting. Holding the key down speeds up the incrementation.

Mode Key

Press this key to change parameters within a setting level.

Level Key

Press this key to move between setting levels. The setting level is selected in the following order: operation level: adjustment level, initial setting level, communications setting level.

Automatic/ Manual Key

Press this key for at least one second to switch between automatic and manual mode.

Down Key

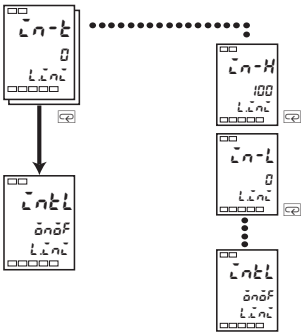
Each press of this key decrements values displayed on the No. 2 display or reverses the setting. Holding the key down speeds up the decrementation.

Operation

Initial hardware setup, including the sensor input type, alarm types, control periods, and other settings is done using parameter displays. The ○ and ↵ keys are used to switch between parameters, and the amount of time that you press the keys determines which parameter you move to. Two typical examples are described as follows.

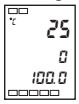
• Explanation of Examples

Changing Parameters



A ▭ image means that there are parameters.
Continue pressing the ↵ key to change parameters until you reach the intended parameter.

Changing Numbers

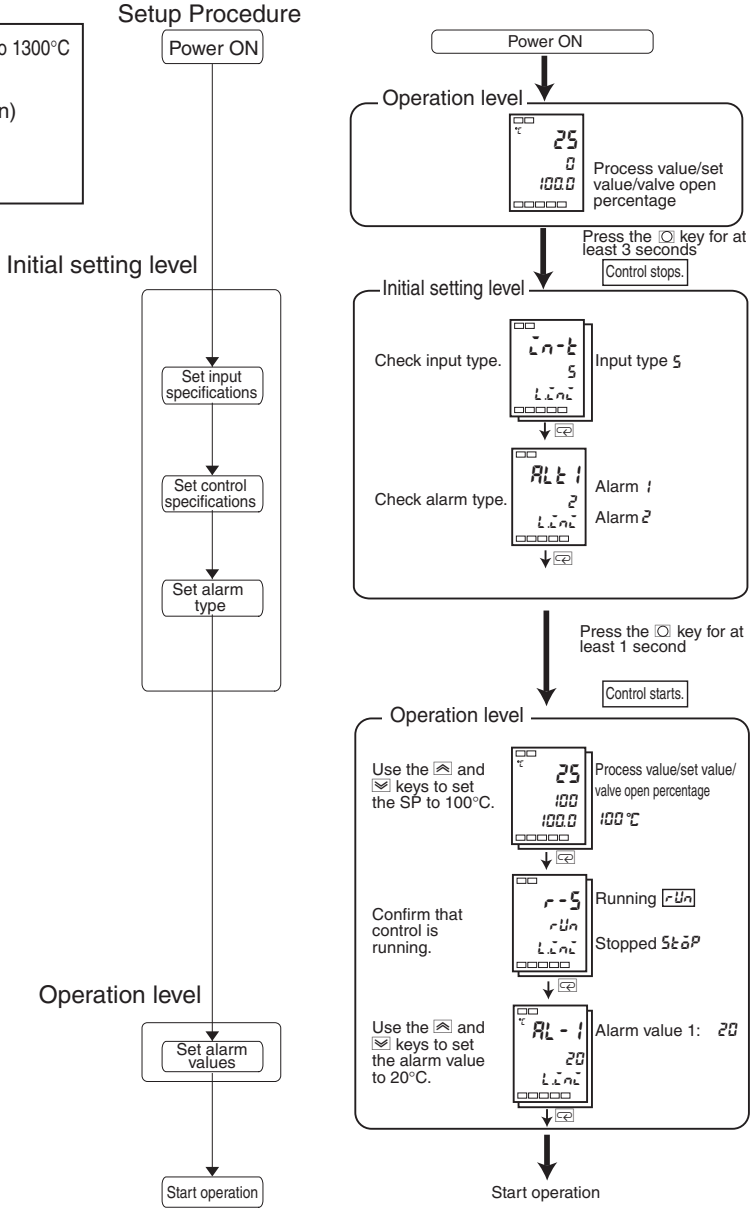


Numeric data and selections in each screen can be changed by using the ↑ and ↓ keys.

• Typical Example 1

Input Type	: 5K thermocouple -200°C to 1300°C
Control Method	: PID Control
Alarm 1 Type	: 2 upper limit (deviation)
Alarm Value 1	: 20°C (deviation)
Set value	: 100°C

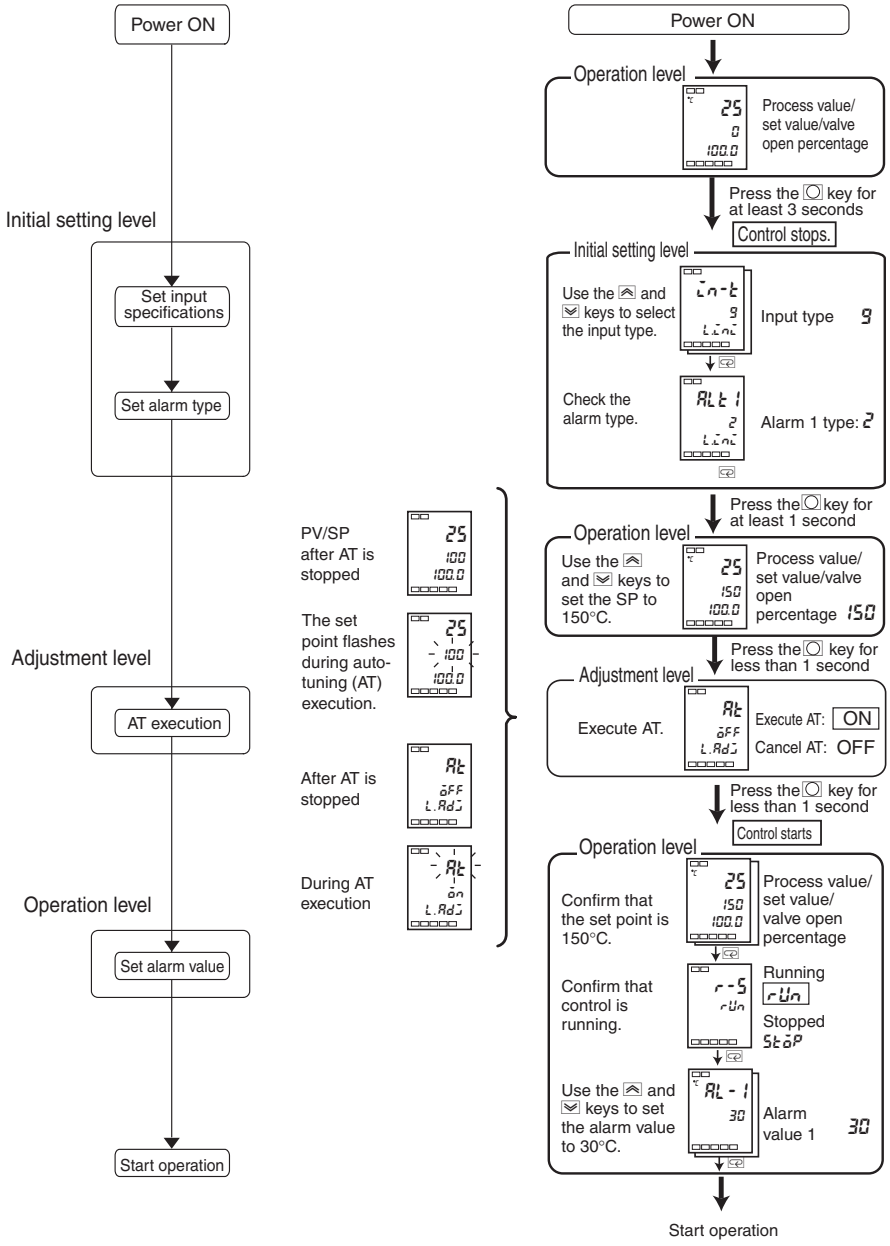
Setup Procedure



• Typical Example 2

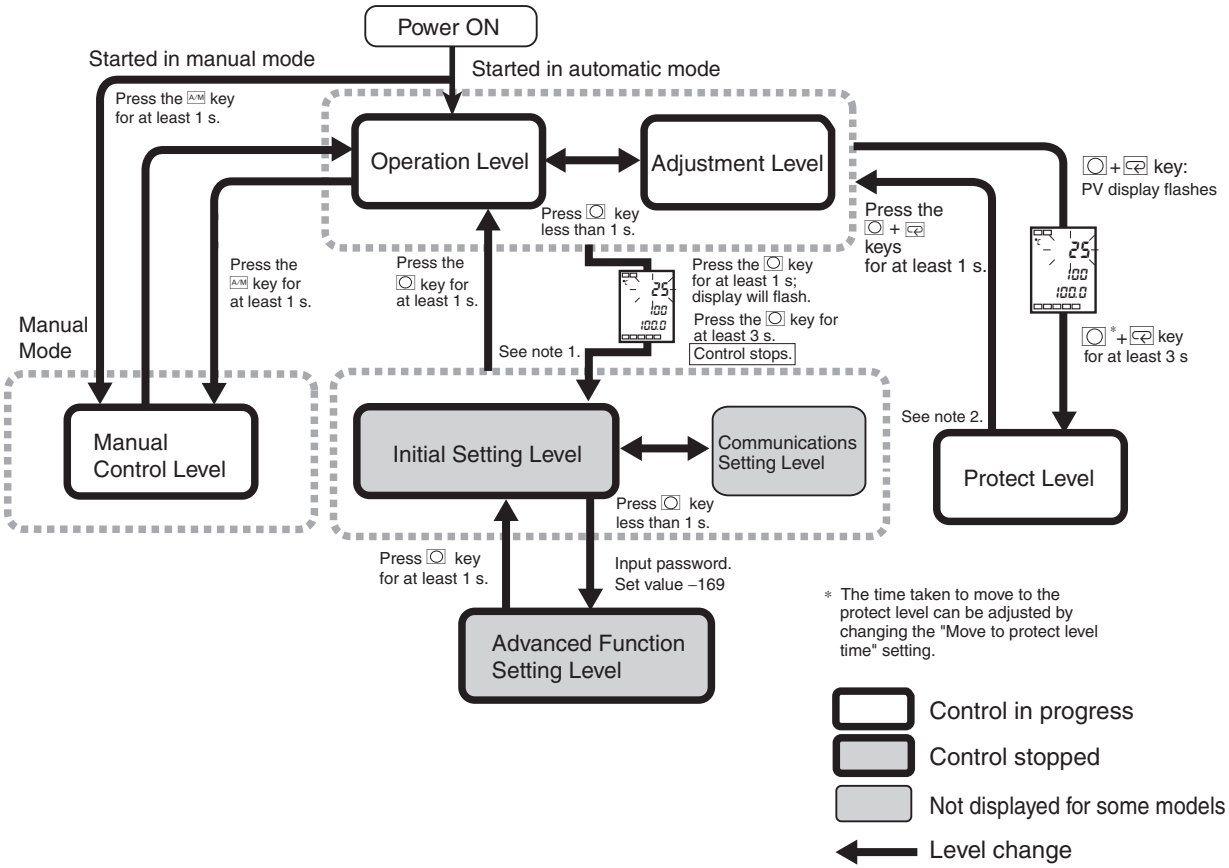
Input type	: 9T thermocouple -200°C to 400°C
Control method	: PID control
Calculate PID constants by AT (auto-tuning).	
Alarm 1 type	: 2 upper limit
Set value	: 150°C

Setup Procedure



■ Setting Level Configuration and Key Operations

Parameters are divided into groups, each called a “level.” Each of the set values (setup items) in these levels are called a “parameter.” The parameters on the E5EZ-PRR are divided into the following seven levels:



Note1: When returning from the initial setting level to the operation level, the default in the operation level will be displayed.

2: When returning from the protect level to the operation level, the default in the operation level will be displayed.

	Control in Progress	Control Stopped
Protect level	Can be set.	---
Operation level	Can be set.	---
Adjustment level	Can be set.	---
Manual control level	Can be set.	---
Initial setting level	---	Can be set.
Advanced function setting level (See note.)	---	Can be set.
Communications setting level	---	Can be set.

Note: Set the parameters in the “initial setting/communications protect” under “protect level” to “0”, to activate advanced function setting level. Of these levels, the initial setting level, communications setting level, and advanced function setting level can be used only when control has stopped. Note that controller outputs are stopped when any of these three levels are selected.
With the exception of operation level, the present level will be displayed. No. 3 display will show the following when settings are being changed:

No. 3 Display	Level name
Manual MV	Manual control level
LPrt	Protect level
No display	Operation level
LAdJ	Adjustment level
LInI	Initial setting level
LCom	Communications setting level
LAdu	Advanced function setting level

■ Descriptions of Each Level

• Protect Level

- To select this level, simultaneously press the ◯ and ↵ keys for at least 3 seconds. 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.

• Operation Level

- This level is displayed when you turn the power ON. You can move to the protect level, initial setting level, manual control level and adjustment level from this level.
- Normally, select this level during operation. During operation, the process value and manipulated variable can be monitored, and the set points, alarm values, and upper- and lower-limit alarms can be monitored and modified.

• Adjustment Level

- To select this level, press the ◯ key for less than one second.
- This level is for entering set values and offset values for control. This level contains parameters for setting the 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, initial setting level and protect level from here.

• Manual Control Level

- Pressing the A/M key under the operation/adjustment level for 1 second or more will activate manual mode, and switch to the manual control level.
  Under manual control, only “process value/set value/valve open percentage (manual MV)” can be displayed. Under the “process value/set value/valve open percentage (manual MV)” manual control level, pressing the A/M key for 1 second or more will switch to automatic mode, switch to the operation level, display the default in the level, and allow manual operation of MV in this mode.

• Initial Setting Level

- To access this level, press the ◯ key for 3 or more seconds in the operation level or adjustment level. 1 second later, the PV display will blink. This level is used to indicate input type and select control method, control period, direct/reverse operation, and alarm type. You can move to the advanced function setting level or communications setting level from this level. Press the ◯ key for at least 1 second to switch to the operation level. Press the ◯ key less than 1 second to switch to the communications level.

• Advanced Function Setting Level

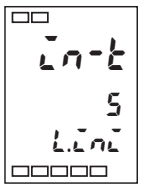
- To activate this level, set the parameters in the “initial setting/communications protect” under the “protect level” to “0” and then enter the password (“-169”) in the initial setting level.
- The initial setting level can be accessed from this level.
- This level is for setting the automatic display return time, MV limiter, event input assignment, standby sequence, alarm hysteresis, and ST (self-tuning).

• Communications Setting Level

- To select this level, press the ◯ key 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.

■ Setting the Input Type

The Controller supports four input types: platinum resistance thermometer, thermocouple, infrared temperature sensor, and analog inputs. Set the input type that matches the sensor that is used. In the product specifications, there are models with thermocouple/resistance thermometer inputs (multi-input) and models with analog input. The settings differ depending on the model.
Check to make sure which model you are using.



Input Types 5

List of Input Types

Input Type	Specifications	Set value	Input temperature setting range	
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)
Thermocouple	K	5	–200 to 1300 (°C)	/ –300 to 2300 (°F)
		6	–20.0 to 500.0 (°C)	/ 0.0 to 900.0 (°F)
	J	7	–100 to 850 (°C)	/ –100 to 1500 (°F)
		8	–20.0 to 400.0 (°C)	/ 0.0 to 750.0 (°F)
	T	9	–200 to 400 (°C)	/ –300 to 700 (°F)
		22	–199.9 to 400.0 (°C)	/ –199.9 to 700.0 (°F)
	E	10	0 to 600 (°C)	/ 0 to 1100 (°F)
	L	11	–100 to 850 (°C)	/ –100 to 1500 (°F)
	U	12	–200 to 400 (°C)	/ –300 to 700 (°F)
		23	–199.9 to 400.0 (°C)	/ –199.9 to 700.0 (°F)
	N	13	–200 to 1300 (°C)	/ –300 to 2300 (°F)
	R	14	0 to 1700 (°C)	/ 0 to 3000 (°F)
	S	15	0 to 1700 (°C)	/ 0 to 3000 (°F)
	B	16	100 to 1800 (°C)	/ 300 to 3200 (°F)
Infrared temperature sensor, ES1B	10°C to 70°C	17	0 to 90 (°C)	/ 0 to 190 (°F)
	60°C to 120°C	18	0 to 120 (°C)	/ 0 to 240 (°F)
	115°C to 165°C	19	0 to 165 (°C)	/ 0 to 320 (°F)
	140°C to 260°C	20	0 to 260 (°C)	/ 0 to 500 (°F)
Analog Input	0 to 50 mV	21	Either of the following ranges, by scaling: –1999 to 9999 or –199.9 to 999.9	

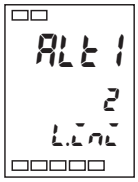
- **The default is "5"**

	Input Type	Specifications	Set value	Input temperature setting range
Analog Input Type	Current Input	4 to 20 mA	0	Use the following scales based on the range of measurements: –19999 to 9999 –199.9 to 999.9 –19.99 to 99.99 –1.999 to 9.999
		0 to 20 mA	1	
	Voltage Input	1 to 5 V	2	
		0 to 5 V	3	
		0 to 10 V	4	

- **The default is "0"**

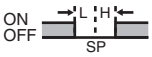
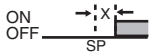
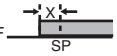
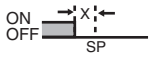
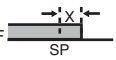
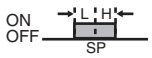
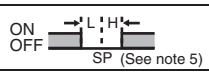
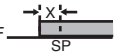
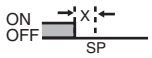
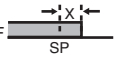
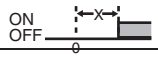
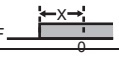
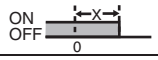
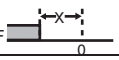
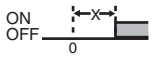
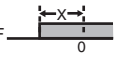
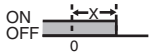
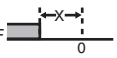
■ Alarm Types

- Alarm outputs are determined by a combination of “alarm type,” “alarm value,” and “alarm hysteresis” alarm output conditions.
- This section describes the “alarm type,” “alarm value,” “upper-limit alarm” and “lower-limit alarm” parameters.



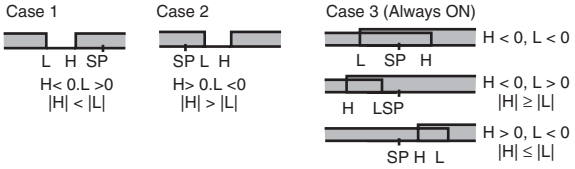
Alarm *1*

Type *2*

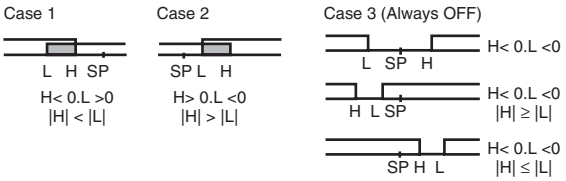
Set values	Type	Alarm output operation	
		When X is positive	When X is negative
0	Alarm function OFF	Output OFF	
1 See note 1.	Upper-and lower-limit		See note 2.
2	Upper-limit		
3	Lower-limit		
4 See note 1.	Upper-and lower-limit range		See note 3.
5 See note 1.	Upper-and lower-limit with standby sequence		See note 4.
6	Upper-limit with standby sequence		
7	Lower-limit with standby sequence		
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		

Note 1. Upper and lower-limit values can be set independently for each alarm type, and are expressed as L and H. The set values are 1, 4, and 5.

2. Set value: 1 (Upper-and lower-limit alarm)

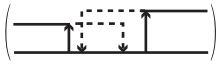


3. Set value: 4 (Upper-and lower-limit range)



4. Set value: 5 (Upper-and lower-limit with standby sequence)

- The upper and lower limit alarms described above.
- In cases 1 and 2, if there is significant overlap between the upper and lower limit values after hysteresis, the alarm will always be OFF.
  Examples of case 1 and 2 : In case 3, under general conditions, the alarm is turned OFF.



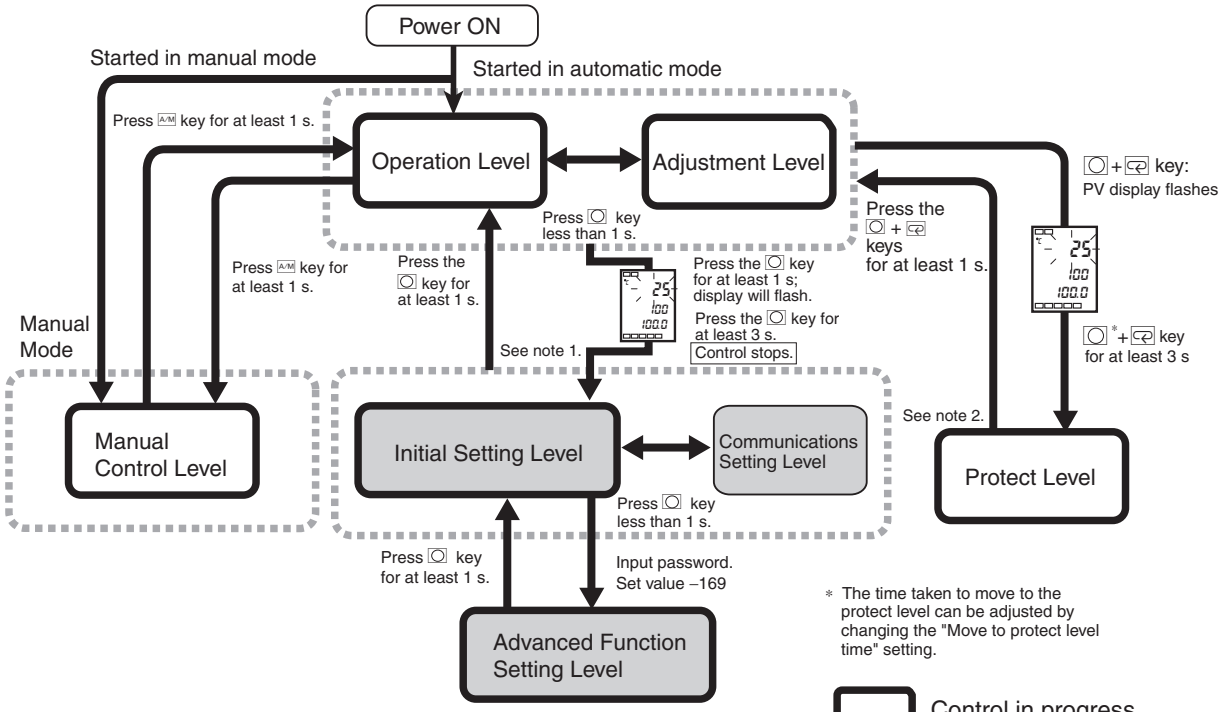
5. Set value: 5 (Upper-and lower-limit with standby sequence)

If there are any overlaps in the upper and lower limits for hysteresis, the alarm will always be OFF.

There are alarm types 1 to 2 (initial setting level), and settings should be made independently for each alarm.
The default is 2: upper limit.

■ Parameters

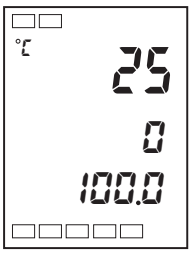
Parameters related to setting items for each level are marked in boxes in the following flowchart and brief descriptions are given as required. After finishing each setting, press the mode key to return to the beginning of each level.



Note 1: When returning from the initial setting level to the operation level, the default in the operation level will be displayed.

2: When returning from the protect level to the operation level, the default in the operation level will be displayed.

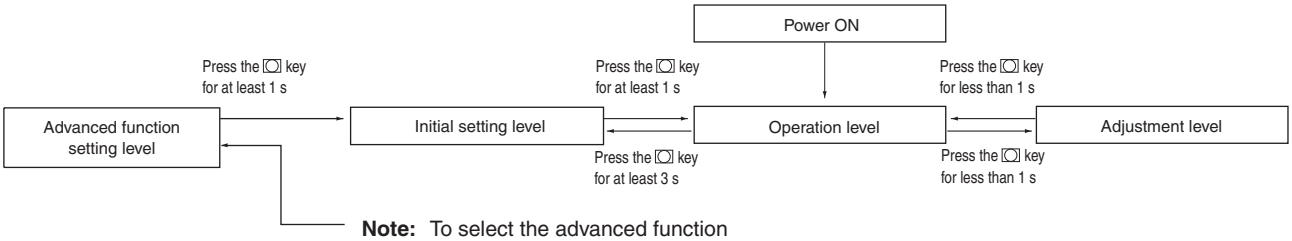
Display



← No. 1 Display

← No. 2 Display

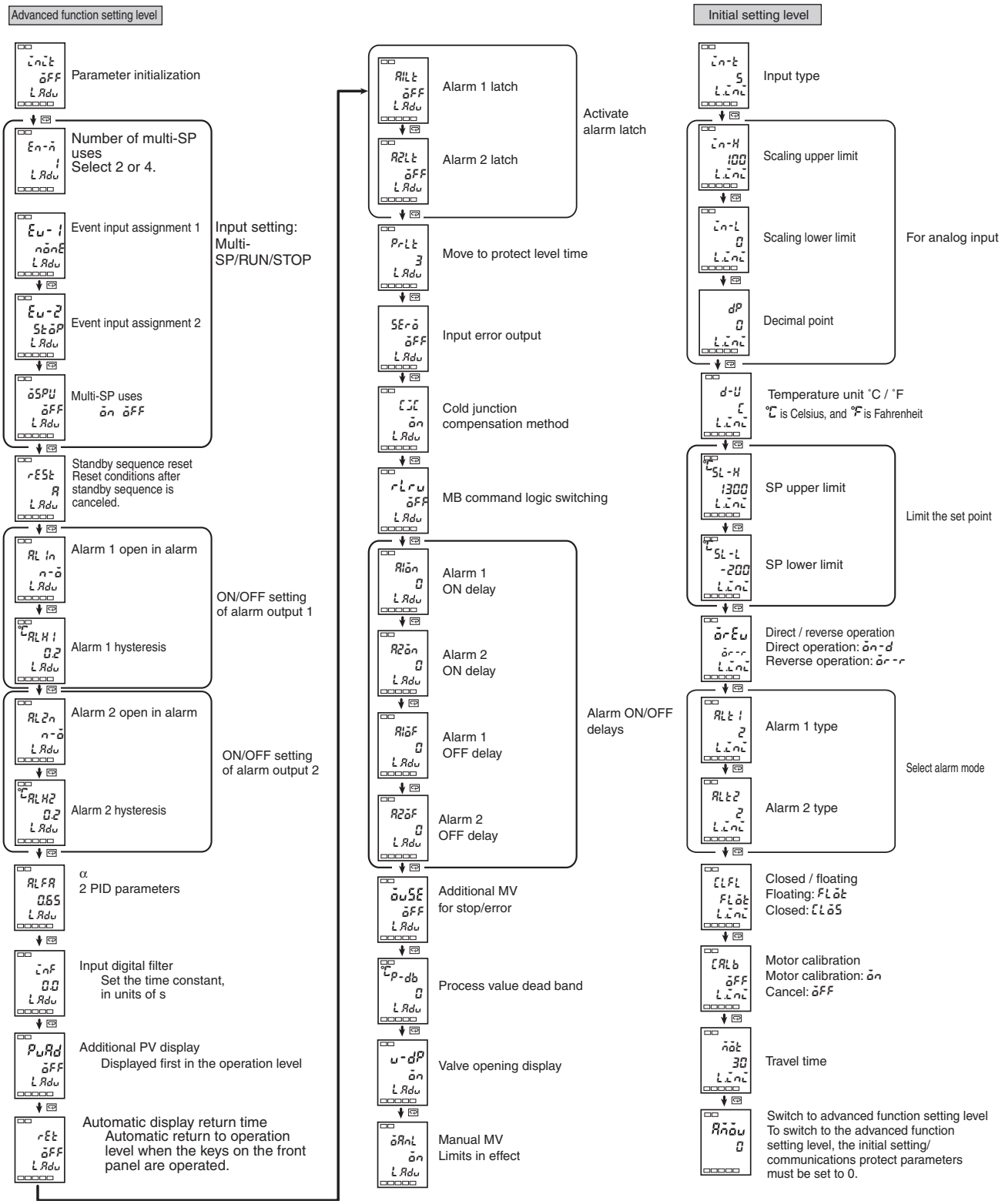
← No. 3 Display

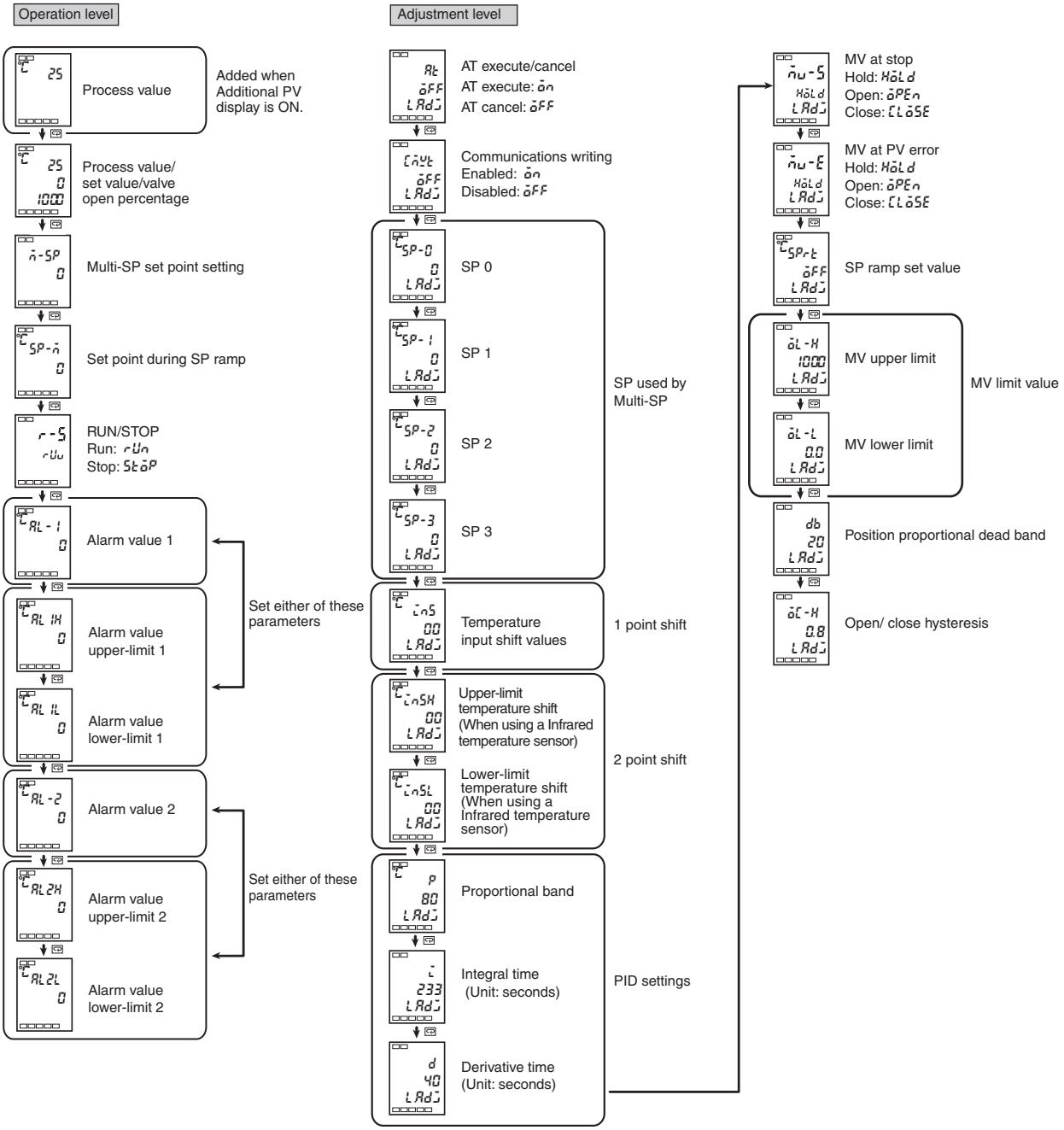


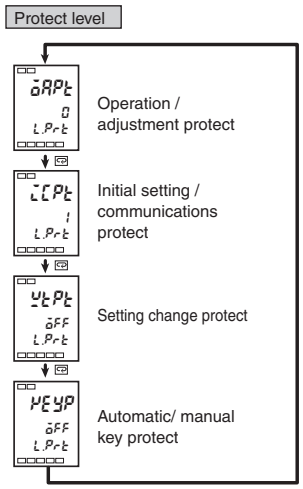
Note: To select the advanced function setting level, you must input the password (-169) in the initial setting level.

■ Parameter Flow

- In each level, if you press the mode key on the final parameter, you will return to the parameter at the top of the level.




Operation level
Process value
Added when Additional PV display is ON.
Process value/ set value/valve open percentage
Multi-SP set point setting
Set point during SP ramp
RUN/STOP
Run: run
Stop: stop
Alarm value 1
Alarm value upper-limit 1
Alarm value lower-limit 1
Set either of these parameters
Alarm value 2
Alarm value upper-limit 2
Alarm value lower-limit 2
Set either of these parameters
Adjustment level
AT execute/cancel
AT execute: on
AT cancel: off
Communications writing
Enabled: on
Disabled: off
SP 0
SP 1
SP 2
SP 3
SP used by Multi-SP
Temperature input shift values
1 point shift
Upper-limit temperature shift (When using a Infrared temperature sensor)
Lower-limit temperature shift (When using a Infrared temperature sensor)
2 point shift
Proportional band
Integral time (Unit: seconds)
Derivative time (Unit: seconds)
PID settings
MV at stop
Hold: Hold
Open: oPEn
Close: CLoSE
MV at PV error
Hold: Hold
Open: oPEn
Close: CLoSE
SP ramp set value
MV upper limit
MV lower limit
MV limit value
Position proportional dead band
Open/ close hysteresis



■ Operation/ Adjustment Protect

The following table shows the relationship between set values and the range of protection.

Level		Set value			
		0	1	2	3
Operation level	PV	Can be displayed	Can be displayed	Can be displayed	Can be displayed
	PV/SP	Can be displayed and changed	Can be displayed and changed	Can be displayed and changed	Can be displayed
	Others	Can be displayed and changed	Can be displayed and changed	Cannot be displayed and moving to other levels is not possible	Cannot be displayed and moving to other levels is not possible
Adjustment level		Can be displayed and changed	Cannot be displayed and moving to other levels is not possible	Cannot be displayed and moving to other levels is not possible	Cannot be displayed and moving to other levels is not possible

- Parameters are not protected when the set value is set to 0.
- The default is 0.

■ Initial Setting/ Communications Protect

This protect level restricts movement to the initial setting level, communications setting level, and advanced function setting level.

Set value	Initial setting level	Communications setting level	Advanced function setting level
0	Movement possible	Movement possible	Movement possible
1	Movement possible	Movement possible	Movement not possible
2	Movement not possible	Movement not possible	Movement not possible

- The default is 1.

■ Setting Change Protect

This protect level restricts key operations.

Set value	Description
OFF	Settings can be changed using key operations.
ON	Settings cannot be changed using key operations. (The protect level settings, however, can be changed.)

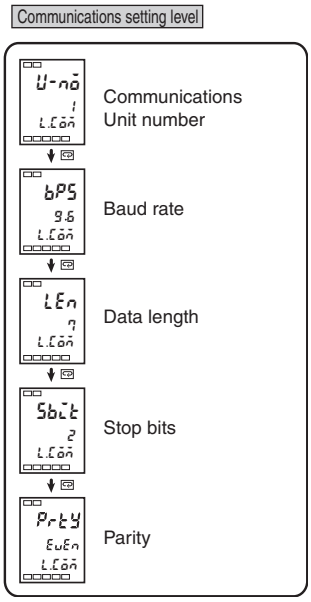
- The default is OFF.

■ Automatic/ Manual Key Protect

This protect level restricts key operations.

Set value	Description
OFF	Settings can be changed between automatic and manual mode using A/M key operations.
ON	Settings cannot be changed between automatic and manual mode using A/M key operations. (The protect level settings, however, can be changed.)

- The default is OFF.



■ Setting Communications Parameters

- Each parameter is enabled when the power is reset.
- Match the communications specifications of the E5EZ-PRR and the host computer. If multiple devices are connected, ensure that the communications specifications for all devices in the system (except the Communications unit number) are the same.

Parameters	Symbol	Set (monitor) values	Settings	Default	Unit
Communications Unit number	U-no	0 to 99		1	None
Baud rate	bPS	1.2, 2.4, 4.8, 9.6, 19.2	1.2, 2.4, 4.8, 9.6, 19.2	9.6	Kbps
Data length	LEn	7, 8		7	Length
Stop bits	SbiT	1, 2		2	Bit
Parity	PrtY	None, even, odd	nonE, EuEn, odd	Even	None

■ Error Displays

When an error occurs, the error contents are shown on the No.1 display.

This section describes how to check error codes on the display, and the actions to be taken to remedy the problems.

Input Error

- **Meaning**

The input value has exceeded the input indication range(-1999 (-199.9) to 9999 (999.9)).

- **Action**

Check the wiring of inputs for miswiring, disconnections, and short-circuits and check the input type.

If no abnormality is found in the wiring and input type, turn the power OFF then back ON again.

If the display remains the same, the Controller must be replaced. If the display is restored, then the probable cause is electrical noise affecting the control system. Check for electrical noise.

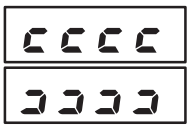
- **Operation at Error**

After an error occurs, the error is displayed and the alarm outputs function as if the upper limit has been exceeded.

When the “input error output” parameter in the advanced function level is set to ON, the alarm 1 output turns ON whenever an input error occurs.

An error message is displayed when the PV or PV/SV/valve open percentage is displayed.

Note. When the manual MV, MV at stop, or MV at PV error is set, the control output corresponds to the set value.



Display Range Exceeded

- **Meaning**

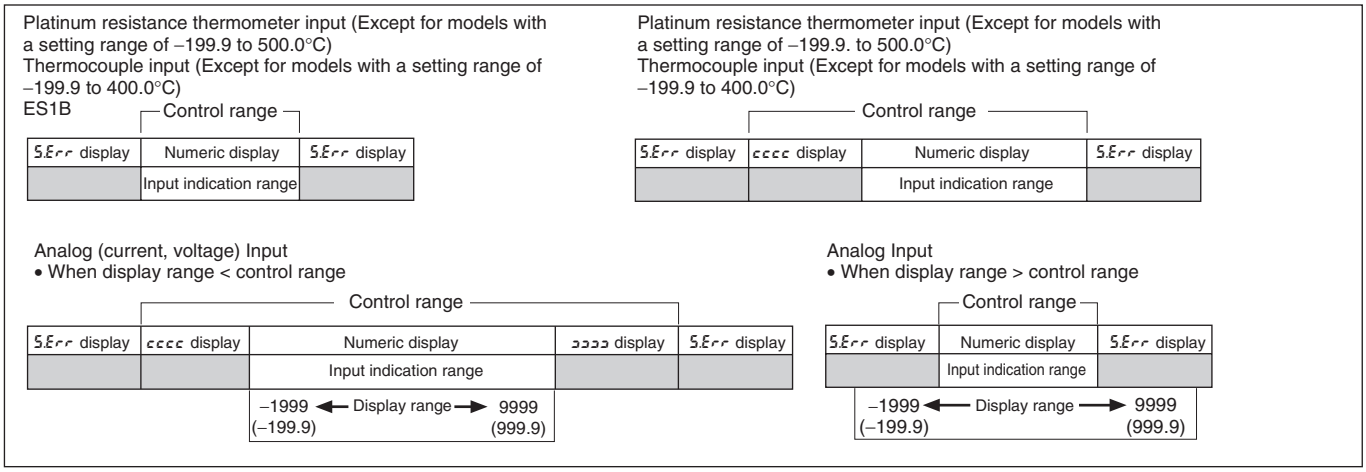
Though this is not an error, it is displayed if the process value exceeds the display range when the control range is larger than the display range.

The display ranges are shown below.

- When less than –1,999 (–199.9) cccc
- When more than 9,999 (999.9) 3333

- **Operation at Error**

Control continues, allowing normal operation. The message is displayed when the PV or PV/SV/valve open percentage is displayed.



E111 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 Controller must be repaired. If the display is restored, then the probable cause is electrical noise affecting the control system. Check for electrical noise.

- **Operation at Error**

  Control output and alarm output turn OFF.

- - - - Potentiometer Input Error

- **Meaning**

  Valve opening has exceeded its regular range of -10% to 110%.

- **Action**

  Check to see if there have been any wiring errors, burnouts, or short-circuits in the potentiometer.
  If there are no problems with the wiring, you can restart the power supply. If the display remains the same, the Controller must be replaced. If the display is restored, then the probable cause is interference which should be avoided.

- **Operation at Error**

  Control output will output MV based on the “MV during error” setting position.
  Alarm output will operate as normal.

Err Motor Calibration Error

- **Meaning**

  Motor calibration did not completely finish.

- **Action**

  After confirming the potentiometer and the wiring of the motor driving valve, perform motor calibration again.

- **Operation at Error**

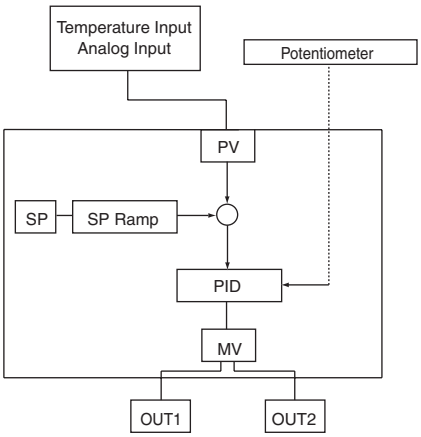
  Control output and alarm output set to OFF.

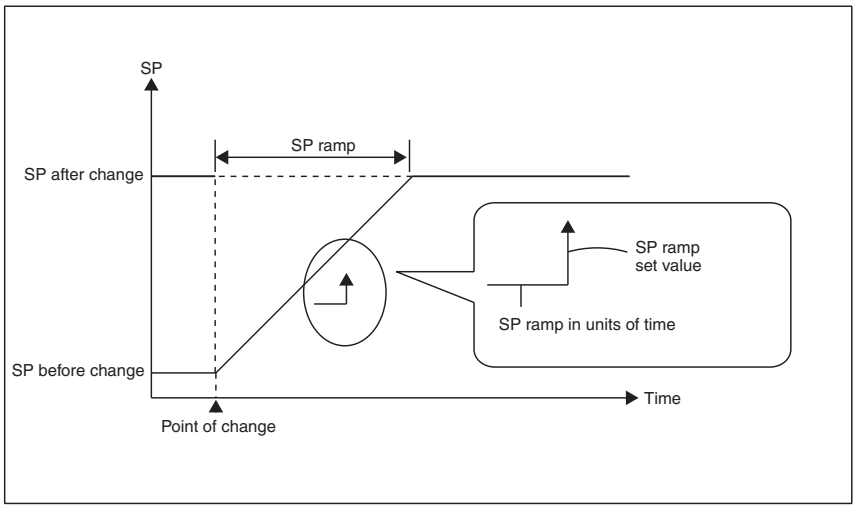
Position proportional control of a ceramic kiln

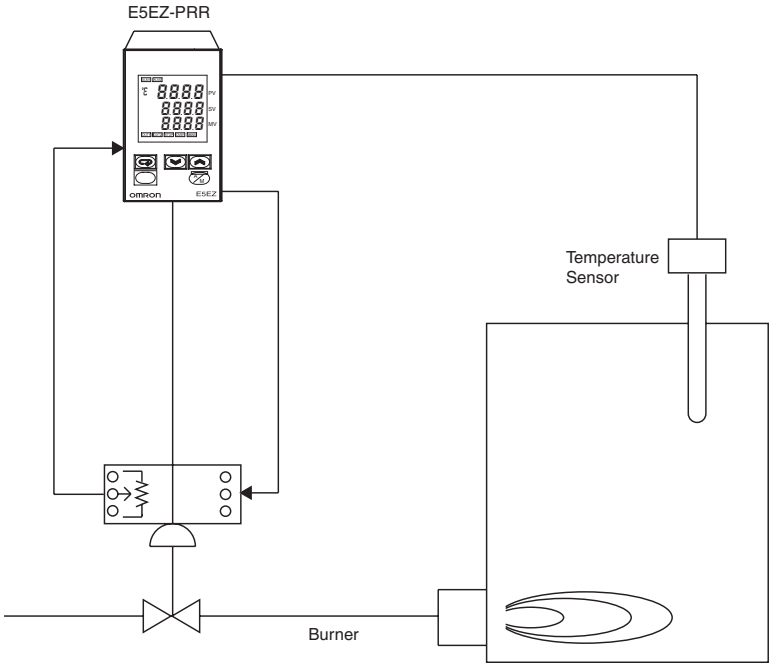
The control method whereby a potentiometer is used to read the amount of opening of a valve and then open or close the valve by means of an attached control motor is called position proportional control or on/off servo control.

■ Application

To control a gas kiln using a position proportional control valve, select the control valve control type and configure the instrumentation as shown in the following example.



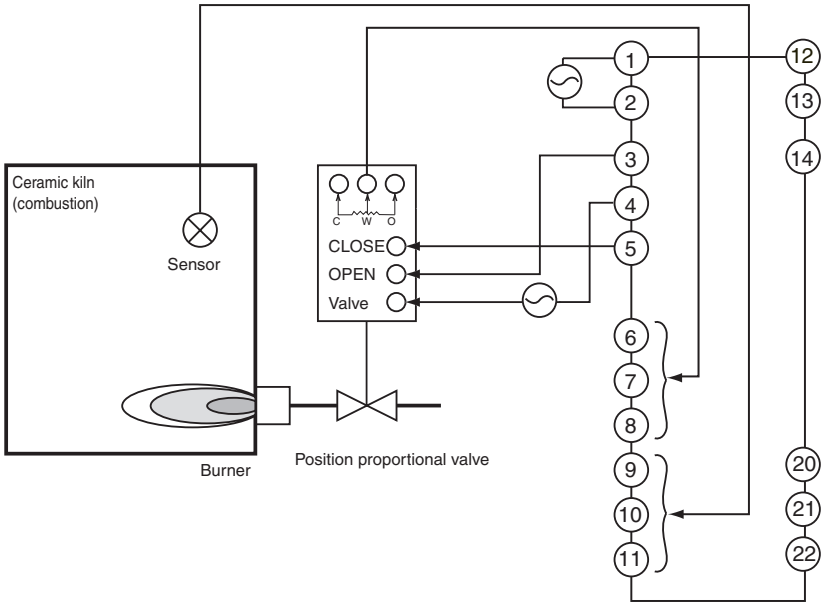




Note: The SP ramp function allows limits to be placed on temperature changes which control the temperature within a specific range. This is useful for ceramic kiln, in which severe temperature changes may cause damage or corruption.

■ Wiring

Input should be connected to terminals 9, 10, and 11 depending on input type. Connect the open side of the position proportional valve to OUT1, and connect the closed side to OUT2.



■ Settings

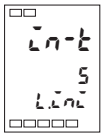
Select the value control type and perform floating control using Position-proportional value with travel time* of 45 seconds. Set SP ramp to change SP within a width of 10.0°C/minute.

*Time from completely open to completely close.

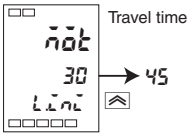
The related setting data and settings are as follows:

Direct/ reverse operation	= oPEr: Reverse operation (initial setting)
Closed/ floating	= FLoA: Floating (initial setting)
Travel time	= 45 seconds
SP ramp set value	= "10"

The travel time and SP ramp set value are set in the following, and the initial settings are used for all other parameters.

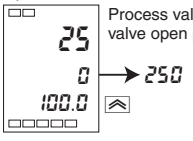


1. Press the key for at least 3 seconds to switch from the operation level to the initial setting level.



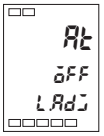
2. Press the key repeatedly to select "tmU: Travel time". Press the key to set the value to "45".

Operation level

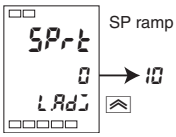


3. Press the key for at least 1 second to return to the “operation level”. When “present value/ set value/valve open percentage” is displayed, press the key to set the set value to “250”.

Adjustment level



4. Press the key for less than 1 second to switch from operation level to adjustment level.



5. Press the key repeatedly to select SPrt: SP ramp set value. Press the key, to set the value to “10”.

■ Adjustment

To adjust the PID constants, run AT.

■ Settings for position proportional control

When position proportional control is selected, "Closed/Floating", "Motor calibration", "Travel time", "Position proportional dead band", "Open/Close hysterisis", "Operation at potentiometer input error", and "PV dead band" can be used.

• Closed/Floating

- Closed control
  Control whereby a potentiometer is connected to feed back the amount of opening of the valve.
- Floating control
  Control without feedback of the amount of opening of the valve. Control is possible without connecting a potentiometer.

• Motor calibration and travel time

Run "Motor calibration" when a potentiometer is connected for closed control or floating control that monitors the amount of valve opening.

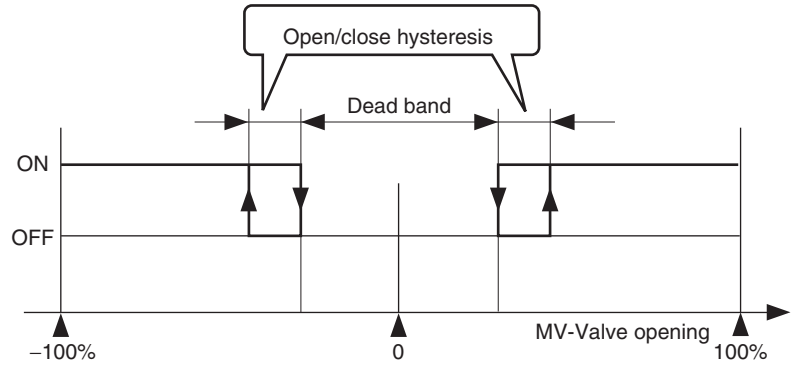
This will also automatically set the "Travel time", which is the amount of time from when the valve is completely open to when the valve is completely closed.

When performing floating control without a potentiometer, it is necessary to manually set the "Travel time". Set the travel time to the amount of time from when the valve is completely open to when the valve is completely closed.

• Position proportional dead band and Open/Close hysterisis

The valve output hold interval (the duration of ON/OFF switching of open output and closed output) is set in "Position proportional dead band", and the hysteresis is set in "Open/Close hysterisis".

The relation to valve opening is shown below.



• PV dead band

When the present value is inside the PV dead band, this function is used to perform control for PV = SP and stop unnecessary output when the PV is close to the SP.

• Operation at potentiometer input error

Use this setting to select whether to stop control or switch to floating control and continue when a potentiometer error occurs during closed control.

Safety Precautions

⚠ Caution

Do not touch the terminals while power is being supplied. Doing so may occasionally result in minor injury due to electric shock.

Operate the Temperature Controller properly. Improper operation may cause minor or moderate injury or property damage.

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 the product.

c) Signal inputs are SELV, limited energy. (See note 1.)

d) Caution: To reduce the risk of fire or electric shock, do not interconnect the outputs of different Class 2 circuits. (See note 2.)

If the output relays are used past their life expectancy, contact fusing or burning may occasionally occur. Always consider the application conditions and use the output relays within their rated load and electrical life expectancy. The life expectancy of output relays varies considerably with the output load and switching conditions.

Loose screws may occasionally result in fire.
Tighten terminal screws to the specified torque of 0.74 to 0.90 N·m.

Unexpected operation may result in equipment damage or accidents if the settings are not appropriate for the controlled system. Set the Temperature Controller as follows:

A malfunction in the Temperature Controller may occasionally make control operations impossible or prevent alarm outputs, resulting in property damage. To maintain safety in the event of malfunction of the Temperature Controller, take appropriate safety measures, such as installing a monitoring device on a separate line.

Be sure that the platinum resistance thermometer type and the input type set on the Temperature Controller are the same.

Note: 1. A SELV circuit is one separated from the power supply with double insulation or reinforced insulation, that does not exceed 30 V r.m.s. and 42.4 V peak or 60 VDC.

2. A class 2 power supply is one tested and certified by UL as having the current and voltage of the secondary output restricted to specific levels.

Precautions for Safe Use

Be sure to observe the following precautions to prevent operation failure, malfunction, or adverse affects on the performance and functions of the product. Not doing so may occasionally result in unexpected events.

1. The product is designed for indoor use only. Do not use the product outdoors or 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.

2. Use and store the product within the rated temperature and humidity ranges.
Group-mounting two or more Temperature Controllers, or mounting Temperature Controllers above each other may cause heat to build up inside the Temperature Controllers, which will shorten their service life. In such a case, use forced cooling by fans or other means of air ventilation to cool down the Temperature Controllers.

3. To allow heat to escape, do not block the area around the product. Do not block the ventilation holes on the product.

4. Use the specified size (M3.5, width of 7.2 mm or less) crimped terminals for wiring. To connect bare wires to the terminal block, use copper braided or solid wires with a gage of AWG24 to AWG14 (equal to a cross-sectional area of 0.205 to 2.081 mm^2). (The stripping length is 5 to 6 mm.) Up to two wires of the same size and type, or two crimp terminals can be inserted into a single terminal.

5. Be sure to wire properly with correct polarity of terminals. Do not wire any of the I/O terminals incorrectly.

6. Do not wire the terminals that are not used.

7. The voltage output (control output) is not electrically isolated from the internal circuits. When using a grounded temperature sensor, do not connect any of the control output terminals to ground. Otherwise unwanted current paths will cause measurement errors.

8. To avoid inductive noise, keep the wiring for the Temperature Controller's terminal block away from power cables carrying high voltages or large currents. Also, do not wire power lines together with or parallel to Temperature Controller wiring. Using shielded cables and using separate conduits or ducts is recommended.
Attach a surge suppressor or noise filter to peripheral devices that generate noise (in particular, motors, transformers, solenoids, magnetic coils or other equipment that have an inductance component).
When a noise filter is used at the power supply, first check the voltage or current, and attach the noise filter as close as possible to the temperature controller.
Allow as much space as possible between the Temperature Controller and devices that generate powerful high frequencies (high-frequency welders, high-frequency sewing machines, etc.) or surge.

9. To reduce the risk of fire or electric shock, install the Temperature Controller in a controlled environment relatively free of contaminants.

10. The outputs may turn OFF when shifting to certain levels. Take this into consideration when performing control.

11. When turning OFF the power, use a switch or relay to ensure the voltage decreases immediately. Incorrect operation and data storage errors may occur if the voltage decreases slowly.

12. Make sure that any Option Units are installed correctly. Do not remove the internal PCB when installing an Option Unit.

13. When inserting the Temperature Controller into the case, do not force it into the case. Doing so will damage internal parts.
14. The EEPROM has a limited write life. When overwriting data frequently, e.g., via communications, use RAM Mode.
15. Use the product within the rated load and power supply.
16. Use a switch, relay, or other contact so that the power supply voltage reaches the rated voltage within 2 seconds. If the applied voltage is increased gradually, the power supply may not be reset or malfunctions may occur.
17. When using PID operation (self-tuning), turn ON the power supply to the load (e.g., heater) at the same time or before turning the power supply to the Temperature Controller ON. If power is turned ON for the Temperature Controller before turning ON power supply to the load, self-tuning will not be performed properly and optimum control will not be achieved.
18. Design the system (e.g., control panel) to allow for the 2 seconds of delay required for the Temperature Controller's output to stabilize after the power is turned ON.
19. 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.
20. Approximately 30 minutes is required for the correct temperature to be displayed after turning the power supply to the Temperature Controller ON. Turn the power supply ON at least 30 minutes prior to starting control operations.
21. When extending the thermocouple lead wires, always use compensating conductors suitable for the type of thermocouple. Do not extend the lead wires on a platinum resistance thermometer. Use only low-resistance wire (5 Ω max. per line) for lead wires and make sure that the resistance is the same for all three wires.
22. When drawing out the Temperature Controller from the case, do not apply force that would deform or alter the Temperature Controller.
23. When drawing out the Temperature Controller from the case to replace the Temperature Controller, check the status of the terminals. If corroded terminals are used, contact faults with the terminals may cause the temperature inside the Temperature Controller to increase, possibly resulting in fire. If the terminals are corroded, replace the rear case as well.
24. When drawing out the Temperature Controller from the case, turn the power supply OFF first, and absolutely do not touch the terminals or electronic components or apply shock to them. When inserting the Temperature Controller, do not allow the electronic components to come into contact with the case.
25. Static electricity may damage internal components. Always touch grounded metal to discharge any static electricity before handling the Temperature Controller. When drawing out the Temperature Controller from the case, do not touch the electronic components or patterns on the board with your hand. Hold the Temperature Controller by the edge of the front panel when handling it.
26. Do not use paint thinner or similar chemical to clean with. Use standard grade alcohol.
27. Use tools when separating parts for disposal. Contact with the sharp internal parts may cause injury.

Precautions for Correct Use

Service Life

1. Use the product within the following temperature and humidity ranges:
   Temperature: −10 to 55°C (with no icing or condensation)
   Humidity: 25% to 85%
   If the product is installed inside a control board, the ambient temperature must be kept to under 55°C, including the temperature around the product.
2. The service life of electronic devices like Temperature Controllers is determined not only by the number of times the relay is switched but also by the service life of internal electronic components. Component service life is affected by the ambient temperature: the higher the temperature, the shorter the service life and, the lower the temperature, the longer the service life. Therefore, the service life can be extended by lowering the temperature of the Temperature Controller.
3. When two or more Temperature Controllers are mounted horizontally close to each other or vertically next to one another, the internal temperature will increase due to heat radiated by the Temperature Controllers and the service life will decrease. In such a case, use forced cooling by fans or other means of air ventilation to cool down the Temperature Controllers. When providing forced cooling, however, be careful not to cool down the terminals sections alone to avoid measurement errors.

Measurement Accuracy

1. When extending or connecting the thermocouple lead wire, be sure to use compensating wires that match the thermocouple types.
2. When extending or connecting the lead wire of the platinum resistance thermometer, be sure to use wires that have low resistance and keep the resistance of the three lead wires the same.
3. Mount the product so that it is horizontally level.
4. If the measurement accuracy is low, check to see if input shift has been set correctly.

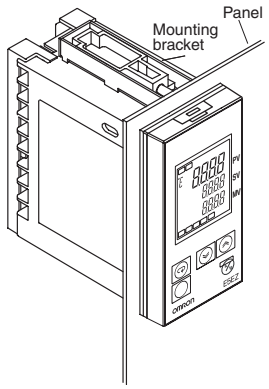
Operating Precautions

1. It takes approximately two seconds for the outputs to turn ON from after the power supply is turned ON. Due consideration must be given to this time when incorporating Temperature Controllers in a sequence circuit.
2. When using self-tuning, turn ON power for the load (e.g., heater) at the same time as or before supplying power to the Temperature Controller. If power is turned ON for the Temperature Controller before turning ON power for the load, self-tuning will not be performed properly and optimum control will not be achieved.
3. When starting operation after the Temperature Controller has warmed up, turn OFF the power and then turn it ON again at the same time as turning ON power for the load. (Instead of turning the Temperature Controller OFF and ON again, switching from STOP mode to RUN mode can also be used.)
4. Avoid using the Controller in places near a radio, television set, or wireless installing. These devices can cause radio disturbances which adversely affect the performance of the Controller.

Mounting (E5EZ-PRR)

1. Insert the E5EZ-PRR into the mounting hole in the panel from the front.
2. Push the mounting bracket along the E5EZ-PRR 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.

E5EZ-PRR

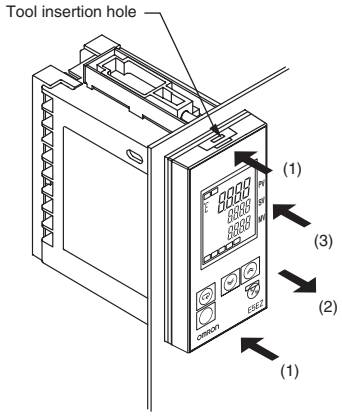


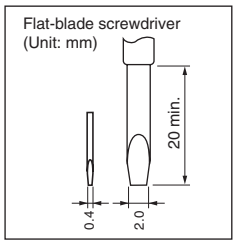
Removing the Temperature Controller from the Case

To remove the Temperature Controller from case, use a suitable Phillips screwdriver for the screw located at the bottom on the front panel.

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. 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.

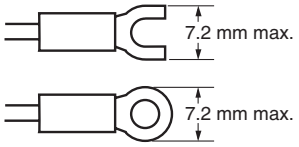
E5EZ-PRR





Precautions when Wiring

- Separate input leads and power lines in order to prevent external noise.
- Use wires with a gage of AWG24 (cross-sectional area: 0.205 mm^2) to AWG14 (cross-sectional area: 2.081 mm^2) twisted-pair cable (stripping length: 5 to 6 mm).
- Use crimp terminals when wiring the terminals.
- Tighten the terminal screws to a torque of 0.74 to 0.9 N·m.
- Use the following types of crimp terminals for M3.5 screws.



- Do not remove the terminal block. Doing so will result in malfunction or failure.

Warranty and Application Considerations

Read and Understand This Catalog

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

Warranty and Limitations of Liability

WARRANTY

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Application Considerations

SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.

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 PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

Disclaimers

PERFORMANCE DATA

Performance data given in this catalog is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON *Warranty and Limitations of Liability.*

CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons. Consult with your OMRON representative at any time to confirm actual specifications of purchased product.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. E206-E1-01 **In the interest of product improvement, specifications are subject to change without notice.**

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