OMRON

E5EZ-PRR

Position Proportional Controller

User's Manual

Cat. No. H200-E1-01

Introduction

E5EZ-PRR Temperature Controller Features：

Thank you for choosing the OMRON E5EZ-PRR.

This user manual describes E5EZ-PRR features, performance, and necessary precautions.

When using the E5EZ-PRR please carefully observe the following:

- The E5EZ-PRR should be used only by trained professionals;
- Read the instruction manual carefully before using, and following the instructions during use;
- Keep this manual for future reference.

✱ For detailed explanations of communications functions please see E5AN/EN/CN/GN Temperature Controller Communications Manual (Cat.N0. H102). The E5EZ-PRR has similar communications functions.

Read and Understand this Manual

Please read and understand this manual before using the product. Please consult your OMRON representative if you have any questions or comments.

Warranty and Limitations of Liability

WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

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.

At the customer's request, OMRON will provide applicable third party certification documents identifying ratings and limitations of use that apply to the products. This information by itself is not sufficient for a complete determination of the suitability of the products in combination with the end product, machine, system, or other application or use.

The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products:

- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this manual.
- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
- Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

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.

PROGRAMMABLE PRODUCTS

OMRON shall not be responsible for the user's programming of a programmable product, or any consequence thereof.

Disclaimers

CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons.

It is our practice to change model numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the products may be changed without any notice. When in doubt, special model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased products.

DIMENSIONS AND WEIGHTS

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

PERFORMANCE DATA

Performance data given in this manual 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.

ERRORS AND OMISSIONS

The information in this document has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical, or proofreading errors, or omissions.

Safety Precautions

■ Definition of Precautionary Information

The following notation is used in this manual to provide precautions requiredto ensure safe usage of the product.

The safety precautions that are provided are extremely important to safety. Always read and heed the information provided in all safety precautions.

The following notation is used.

⚠ CAUTION	Indicates a potentially hazardous situation which, if not avoided, is likely to result in minor or moderate injury or in property damage.

■ Symbols

Symbol		Meaning
Caution		**General Caution** Indicates non-specific general cautions, warnings, and dangers.
		**Electrical Shock Caution** Indicates possibility of electric shock under specific conditions.
Prohibition		**General Prohibition** Indicates non-specific general prohibitions.
		**Disassembly Prohibition** Indicates prohibitions when there is a possibility of injury, such as from electric shock, as the result of disassembly.
Mandatory Caution		**General Caution** Indicates non-specific general cautions, warnings, and dangers.

■ 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.	
Do not allow pieces of metal, wire clippings, or fine metallic shav-ings 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 Equip-ment. 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.*1 d)Caution: To reduce the risk of fire or electric shock, do not inter-connect the outputs of different Class 2circuits.*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.	

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

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

⚠ CAUTION	
Tighten the terminal screws to between 0.74 and 0.90 N • m. Loose screws may occasionally result in fire. (See note.)	
Set the parameters of the product so that they are suitable for the system being controlled. If they are not suitable, unexpected operation may occasionally result in property damage or accidents.	
A malfunction in the 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.	
A semiconductor is used in the output section of long-life relays. If excessive noise or surge is impressed on the output terminals, a short-circuit failure is likely to occur. If the output remains shorted, fire will occur due to overheating of the heater or other cause. Take measures in the overall system to prevent excessive temper-ature increase and to prevent fire from spreading.	

Precautions for Safe Use

Be sure to observe the following precautions to prevent operation failure, malfunction, or adverse affects onthe 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 followinglocations.
- 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 Digital Temperature Controller within the rated ambient temperature and humidity. Gang-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. Insuch a case, use forced cooling by fans or other means of air ventilation to cool down the Digital Temperature Controllers.

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

(4) Be sure to wire properly with correct polarity of terminals.

(5) Use the specified size (M3.5, width 7.2 mm or less) crimped terminals for wiring. For open-wiredconnection, use stranded or solid copper 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 or two crimpterminals can be inserted into a single terminal.

(6) Do not wire the terminals which are not used.

(7) To avoid inductive noise, keep the wiring for the Digital Temperature Controller's terminal block away from power cables carry high voltages or large currents. Also, do not wire power lines together with or parallel to Digital 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 Digital Temperature Controller and devices that generate powerful high frequencies (high-frequency welders, high-frequency sewing machines, etc.) or surge.

(8) Use this product within the rated load and power supply.

(9) Make sure that the rated voltage is attained within two seconds of turning ON the power using a switch or relay contact. If the voltage is applied gradually, the power may not be reset or output malfunctions may occur.

(10) Make sure that the Temperature Controller has 30 minutes or more to warm up after turning ON the power before starting actual control operations to ensure the correct temperature display.

(11) When executing self-tuning, turn ON power for the load (e.g., heater) at the same time as or before supplying power to the Digital Temperature Controller. If power is turned ON for the Digital Temperature Controller before turning ON power for the load, self-tuning will not be performed properly and optimum control will not be achieved.

(12) 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.

(13) Always turn OFF the power supply before pulling out the interior of the product, and never touch nor apply shock to the terminals or electronic components. When inserting the interior of the product, do not allow the electronic components to touch the case.

(14) Do not use paint thinner or similar chemical to clean with. Use standard grade alcohol.
(15) Design system (control panel, etc) considering the 2 second of delay that the controller's output to be set after power ON.
(16) The output may turn OFF when shifting to certain levels. Take this into consideration when performing control.
(17) The number of EEPROM write operations is limited. Therefore, use RAM write mode when frequently overwriting data during communications or other operations.

●Service Life

Use the Temperature Controller within the following temperature and humidity ranges:
Temperature: -10 to 55°C (with no icing or condensation), Humidity: 25% to 85%
If the Controller is installed inside a control board, the ambient temperature must be kept to under 55°C, including the temperature around the Controller.
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.
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.

●Ambient Noise

To avoid inductive noise, keep the wiring for the Digital Temperature Controller's terminal block wiring away from power cables carrying high voltages or large currents. Also, do not wire power lines together with or parallel to Digital 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 Digital Temperature Controller and devices that generate powerful high frequencies (high-frequency welders, high-frequency sewing machines, etc.) or surge.

●Ensuring Measurement Accuracy

When extending or connecting the thermocouple lead wire, be sure to use compensating wires thatmatch the thermocouple types.
When extending or connecting the lead wire of the platinum resistance thermometer, be sure to use
Mount the Temperature Controller so that it is horizontally level.
If the measurement accuracy is low, check to see if input shift has been set correctly.

●Waterproofing

The degree of protection is as shown below. Sections without any specification on their degree of protection or those with IP□0 are not waterproof.
Front panel: NEMA4X for indoor use (equivalent to IP66)
Rear case: IP20, Terminal section: IP00

Precautions for Operation

(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 into a control panel or similar device.

(2) Make sure that the Temperature Controller has 30 minutes or more to warm up after turning ON the power before starting actual control operations to ensure the correct temperature display.

(3) When executing 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. 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. The Controller maycause radio disturbance for these devices.

Preparations for Use

Be sure to thoroughly read and understand the manual provided with the product, and check the following points.

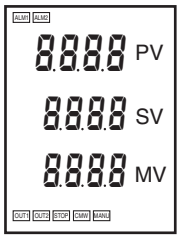
Timing	Check point	Details
Purchasing the product	Product appearance	After purchase, check that the product and packaging are not dented or otherwise damaged. Damaged internal parts may prevent optimum control.
	Product model and specifications	Make sure that the purchased product meets the required specifications.
Setting the Unit	Product installation location	Provide sufficient space around the product for heat dissipation. Do not block the vents on the product.
Wiring	Terminal wiring	Do not subject the terminal screws to excessive stress (force) when tightening them. Make sure that there are no loose screws after tightening terminal screws to the specified torque of 1.13 to 1.36 N • m (see note).
		Be sure to confirm the polarity for each terminal before wiring the termi-nal block and connectors.
	Power supply inputs	Wire the power supply inputs correctly. Incorrect wiring will result in damage to the internal circuits.
Operating environment	Ambient temperature	The ambient operating temperature for the product is -10 to 55°C (with no condensation or icing). To extend the service life of the product, install it in a location with an ambient temperature as low as possible. In locations exposed to high temperatures, if necessary, cool the products using a fan or other cooling method.
	Vibration and shock	Check whether the standards related to shock and vibration are satisfied at the installation environment. (Install the product in locations where the conductors will not be subject to vibration or shock.)
	Foreign particles	Install the product in a location that is not subject to liquid or foreign particles entering the product.

Conventions Used in This Manual

■ Meanings of abbreviations

The following abbreviations are used in parameter names, figures, and in the text.
Their meanings are explained below:

Symbol	Term
PV	Present value (displayed as “PV” on the panel)
SP	Set point (displayed as “SV” on the panel)
SV	Set value
MV	Valve percent open
AT	Auto-tuning
EU	Engineering unit *1



*1 “EU” represents one engineering unit. EU (e.g. °C, m, or, g) indicates the smallest engineering unit.
EU size depends on input type. For example, when input temperature range is set to -200°C ~ +1300°C, 1EU is 1°C; and when input temperature range is set to -20.0°C ~ 500.0°C, 1EU is 0.1°C.
With analog input, EU varies according to the decimal point of the scaling setting, and 1 EU becomes the smallest scaling unit.

■ Distinguishing Characters

The following table shows the relationship between the character and letter symbols as displayed on the monitor.

A	B	C	D	E	F	G	H	I	J	K	L	M

N	O	P	Q	R	S	T	U	V	W	X	Y	Z

■ How to use this manual

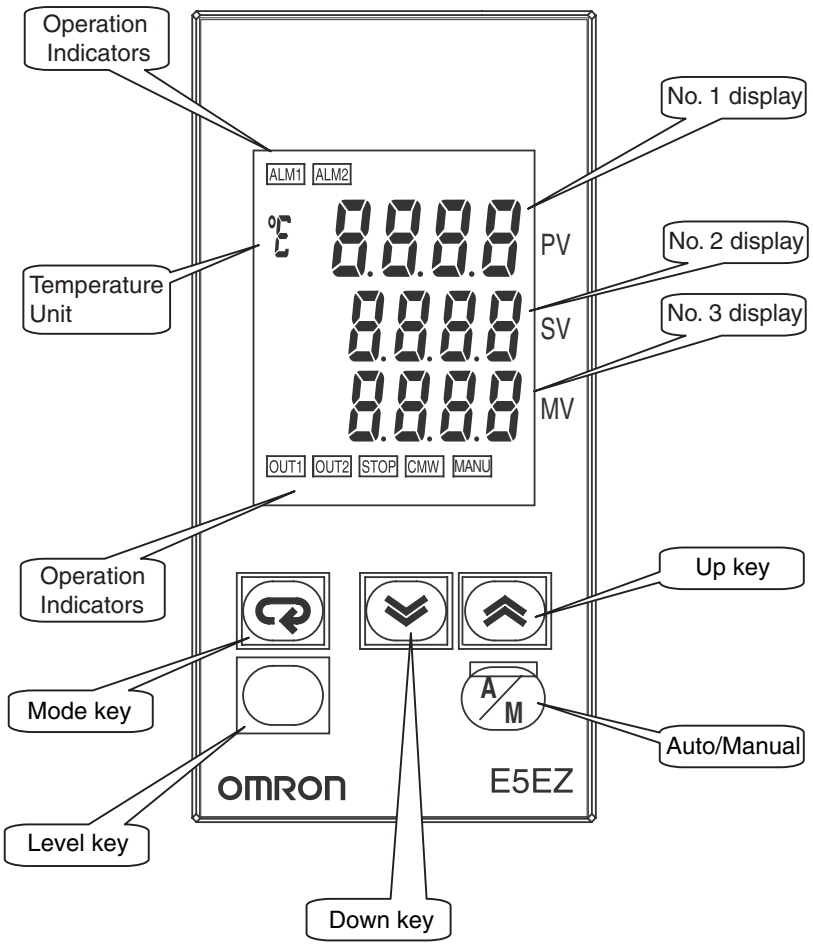
Objective	Related titles	Description
● Understanding the E5EZ-PRR	Chapter One Introduction	This chapter describes the features, names, and typical functions of each component.
● Configuring the E5EZ-PRR	Chapter Two Preparing for Operation	This chapter describes installation and wiring procedures.
● Basic Operation	Chapter Three Basic Operation Chapter Five Parameters	These two chapters give examples of basic controls.
● Operation Applications	Chapter Four Operation Applications Chapter Five Parameters	These two chapters describe how to use the E5EZ-PRR's advanced functions.
● Appendix		This chapter describes unit specifications. The attached parameter table can serve as a parameter setting reference.

Content

Chapter 1
Overview

1.1 Name of Parts

■ E5EZ-PRR Front Panel



■ Display

● No. 1 Display

Displays process value and setting types.
All display segments light up for one second at startup.

● No. 2 Display

Displays the set point, reading values, and input values.

● No. 3 Display

When "valve opening display" is set to ON, displays the percentage of valve opening. When "valve opening display" is set to OFF nothing will be displayed. (for "value opening display", see page 5-40.) During parameter set-up No.3 displays the current level.

● Operation Indicator Lights

(1) ALM1 (alarm 1)
When the alarm 1 output is ON, this light will come on.
ALM2 (alarm 2)
When the alarm 2 output is ON, this light will come on.

(2) OUT1, OUT2 (control output 1 (OPEN) , control output 2 (CLOSE))
When control output 1/control output 2 is ON, the light will come on.

(3) STOP (stop)
The light comes on when operation stops.
During opreration, when the event or run/stop setting stops, the light will come on.

(4) CMW (communications writing control)
The light comes on with communications writing "starts" and goes off when communications writing "stops".

(5) MANU (manual control)
The light comes on during 「manual mode」 and goes off during 「automatic mode」 .

● Temperature Unit

When the display unit parameter is set to temperature, the temperature unit will be displayed. Current "temperature unit" data settings will be displayed. When this parameter is set to "°C ", "℃" will be displayed; when it is set to "°F","℉" will be displayed.

■ Using the Keys

The basic function of the panel keys are described below.

● (level) key

Press to select setting level. Levels appear in the following sequence: "operations level", ←→ "adjustment level", "initial settings level", ←→ "communications level"

● (mode) key

This key is used to select parameters for each level.

● (up) key

Each press of this key increases values displayed on the No. 2 display, with the rate of increase proportional to the time the key is held down. In 「manual mode」 , pressing turns the output 1 (OPEN output) ON.

● (down) key

Each press of this key decreases values displayed on the No. 2 display with the rate of increase proportional to the time the key is held down. In 「manual mode」 , pressing turns the output 2 (CLOSE output) ON.

● (manual/ automatic) key

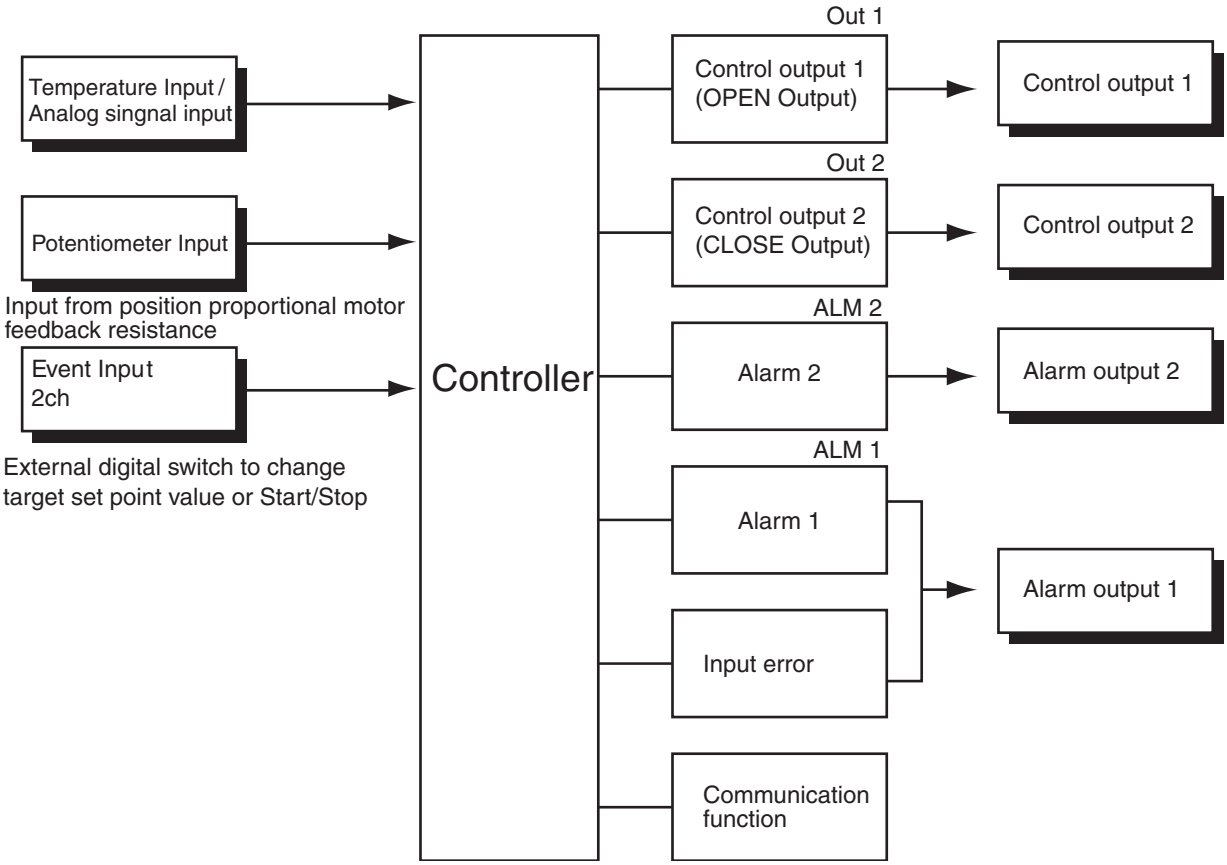
Manual/automatic switch key, switches between "manual mode" and "automatic mode". Holding this button for 1 second or more (regardless of how long to let go) changes the mode.

● + group key

The group key accesses the E5EZ-PRR "protect level". For details on the protect level, please see Chapter Five "Parameters".

1.2 Input/Output Configuration and Main Functions

■ Input/Output Configuration



E5EZ-PRR2□□

Input type T : Thermocouple/non-contact temperature sensor/ Types of platinum resistance input
L : Analog input (current input/voltage input)

Select B : Event input (2 points)
01 : RS232C
03 : RS485

■ Main Functions

The main functions of the E5EZ-PRR are discussed below. The details of each function and their uses are detailed from Chapter Three on.

● Input Sensor Types

- Temperature input (T) can be connected to the following input sensors:
  Platinum resistance: Pt100, JPt 100
  Thermocouple : K, J, T, E, L, U, N, R, S, B
  Non-contact Temperature Sensor ES1B
  : 10°C~70°C, 60°C~120°C, 115°C~165°C, 140°C~260°C
  Analog signal input: 0~50mV
- Analog input (L) can be connected using the following input specifications:
  Electric current input: DC4~20mA, DC0~20mA
  Voltage input: DC1~5V, DC0~5V, DC0~10V

● Control Output

- E5EZ-PRR models control the output using relays.

● Alarms

- Setting alarm type, alarm values, and upper and lower limit alarms.
- If necessary the "standby sequence", "alarm hysteresis", "alarm delay" and "alarm off/alarm on" alarm latch parameters may be used for more complete alarm functions.
- When input error output is set to "ON", any errors will register on alarm output 1.

● Control Tuning

- Optimal PID constants can be set easily with AT (auto-tuning).

● Position Proportional Control

- Floating control or closed control can be selected. Floating control can be used with or without potentiometer feedback during position proportional control.

● Event Input

- The E5EZ-PRR2B □ , can access the following functions via event input: Selection of a variety of settings (a maximum of 4 setting points) and run/stop functions.

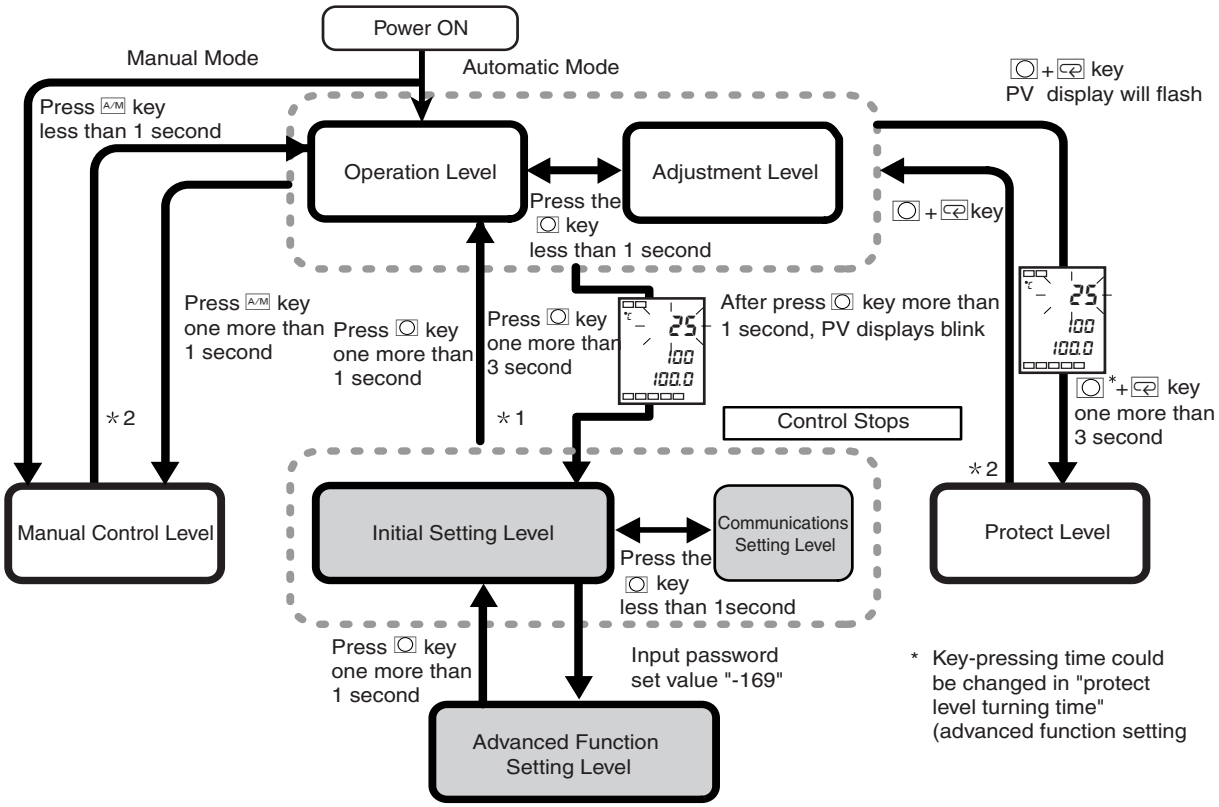
● Communication Functions

- Models with communication capabilities can communicate via CompoWay/F*1 or Sysway.
  E5EZ-PRR203 □ : RS-485 interface
  E5EZ-PRR201 □ : RS-232C interface

*1 CompoWay/F is a serial based communication protocol developed by OMRON using unified standards. CompoWay/F uses commands in compliance with FINS standards, and uses the same frame format as OMRON's programmable controller to communicate with prior computers and components.

1.3 Setting Level Configuration and Panel Key Operations

Parameters are divided into groups, and each group is assigned a "level". The setting values in these levels (set items) are called "parameters". The E5EZ-PRR's parameters are divided into the following 7 levels.



＊1 From initial level to operation level shows default measure of the operation level.

＊2 From initial level to operation level shows default measure of the operation level.

Control in progress

Control stops

Unable to display depend on modles

Level change

	Control in progress	Control stopped
Protect level	○	-
Operation level	○	-
Adjustment level	○	-
Manual control level	○	-
Initial setting level	-	○
Advanced function setting level	-	○
Communications setting level	-	○

＊ : Set the parameters in the "protect Level" under "initial setting/communications protection" to "0", to activate advanced function levels.

○ : Indicates items that can be set.

Of these levels, the initial setting level, communications level, and advanced functions level may only be used when control has stopped. Please note that when selecting any of these three levels, controller output will stop.

Unless the operation level is being displayed, the current level will be displayed.When settings are being changed, the No. 3 display will show the following:

No. 3 display	Level name
Manual MV	Manual control level
L.Prt	Protect level
No display	RUN level
LAdJ	adjustment level
L.InI	input initial setting level
L.Con	Communications setting level
LAdu	advanced function setting level

- **Protect Level**
  - To switch to this level, you must press and hold the [O] and [↵] keys for 3 or more seconds. Protect level is used to prevent any unnecessary or accidental changes to the parameters. Protected levels are not displayed, so parameters located in these protected levels cannot be changed.
    * The key's timing can be changed under "Protect level change time" (advanced function level).

- **Operation Level**
  - When the power is turned on this level is displayed. From this level the protect level , the initial setting level, and adjustment level can be accessed.
  - During operation process value and set point can be monitored, and set point, alarm values, and upper/lower alarm limits can be monitored and changed.

- **Adjustment Level**
  - To access this level, press and hold the [O] key for less than 1 second.
  - Input from this level is used in control settings and offset values. The level contains parameters used to set AT (auto-tuning), communications writing activation/deactivation hysteresis, various setting values, input shift values and PID constants. The uppermost parameters of the initial settings level, protect level, and operation level can be accessed from this level.

- **Manual Control Level**
  - Pushing 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/setting 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 level's initial data, and allow manual operation of MV in this mode.

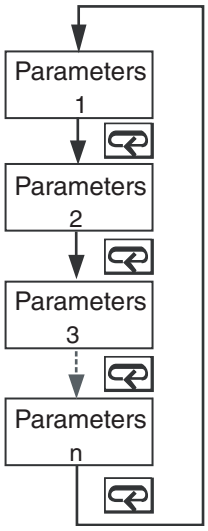
- **Initial Settings Level**
  - To access this level, press the [O] key for 3 or more seconds in the operation level or adjustment level. 1 second later, the PV display will blink. This level is used to indicate input type and select control method, control time, direct/ reverse operation, and alarm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

- **Advanced Function Level**
  - To activate the advanced function setting level, set the "initial setting/ communications protection" value under the "protect level" to "0", then enter your password under the initial settings menu ("-169").
  - The initial settings level can be accessed from this level.
  - This level is used to set the display mode, and specify event input, standby sequence, alarm hysteresis, and alarm delay.

- **Communications Level**
  - To access this level, hold the [O] key for less than 1 second under the initial settings menu. When the communications function is used, set the communications conditions in this level. When communicating with a personal computer (host), allow read and write set points and monitoring of operation volume.

■ Select Parameters

- Press ⏎ under any level to select parameters. A new parameter appears each time ⏎ is pressed. For details about each parameter, see chapter 5.



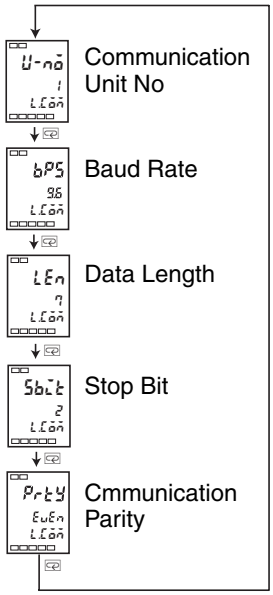
■ Fixed Settings

- If the last parameter is reached and the ⏎ key is pressed again, the display will return to the first parameter.
- To change a parameter's setting or value the ⏶ or ⏷ keys may be used. Wait for 2 seconds without changing or press the ⏎ key to fix the settings.
- When selecting another level, fix the parameters and settings on the display.
- When turning the power off, first fix the settings or parameters (by holding the ⏎ key). In some cases settings cannot be changed by just holding down the ⏶ or ⏷ key.

1.4 Communications Functions

E5EZ-PRR comes equipped with communications functions that allow monitoring of the controller and setting of parameters from a host computer. If communications functions are needed, please use a model equipped with these functions (E5EZ-PRR201 □ or PRR203 □). For details on communications functions please see the E5AN/EN/CN/GN temperature controller (Communications Function User's Manuals).
The communications functions on the E5EZ-PRR are similar.
Access the communications level as follows.

(1) In the "Operations level", hold down the [○] button for 3 or more seconds. Access to the "Initial Settings Level".
(2) Hold down the [○] button for less than 1 second. From the "initial settings level" access the "communications level".
(3) Press the [◁] key to access the next group of parameters.
(4) Press the [△] or [▽] key to change the parameter settings.



● Setting Communications Data

● Set the E5EZ-PRR communication specifications to conform with the communication settings of the host. In a 1 to many configuration, aside from communication unit numbers, all other settings should match. Each unit must have a unique communication unit number.

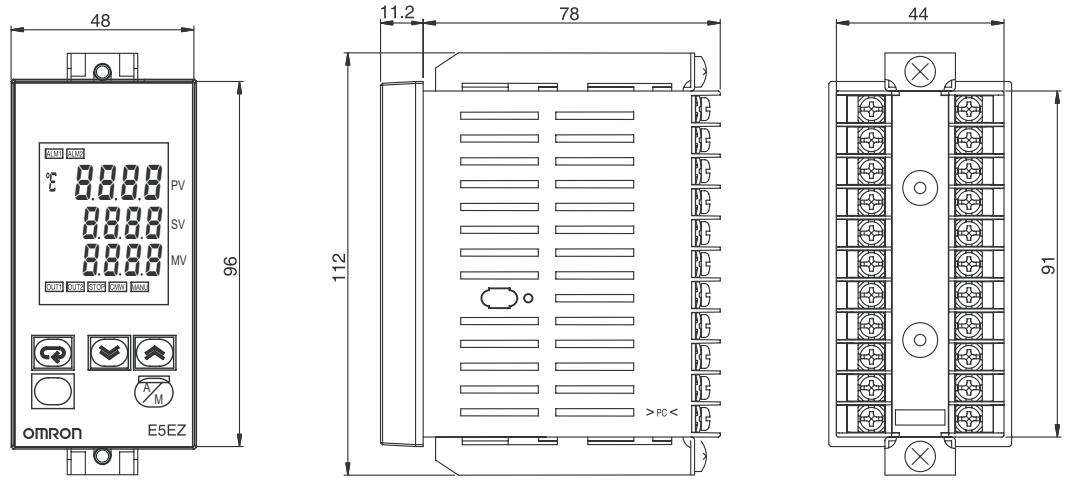
Parameters	Character Display	Setting (monitor) Values	Setting	Initial Value	Units
Communication Unit No	U-no	0 ~ 99		1	None
Baud Rate	bPS	1.2, 2.4, 4.8, 9.6, 19.2	1.2, 2.4, 4.8, 9.6, 19.2	9.6	Kbps
Data Length	LEn	7, 8		7	bit
Stop Bit	Sbit	1, 2		2	bit
Communication Parity	PrtY	none, even, odd	nonE, EuEn, odd	even	None

Chapter 2
Setup

2.1 Installation

■ E5EZ-PRR Dimensions

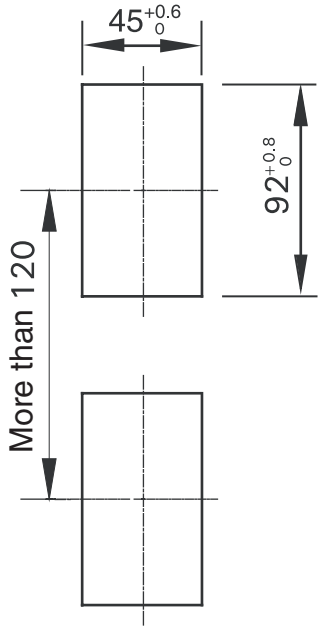
(Unit: mm)



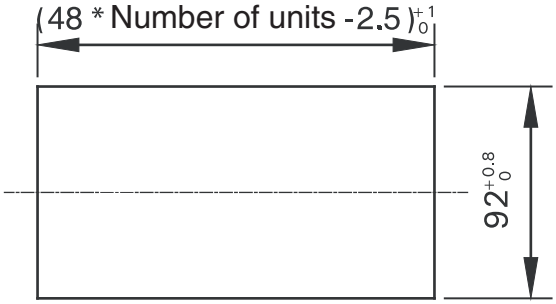
■ E5EZ-PRR Panel Cutout

(unit:mm)

single installation (unit: mm)

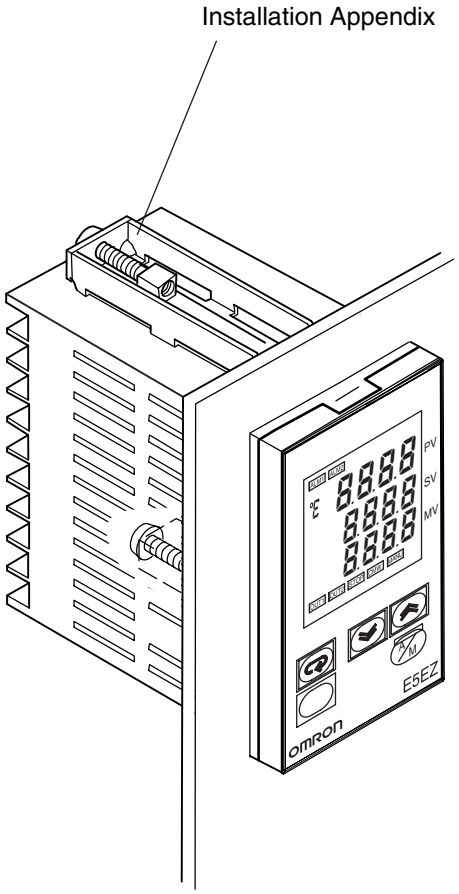


Multi-parallel installation (unit: mm)



- When installing, please insert the temperature gauge into the panel (thickness 1~8mm) holes, and install metal components in the upper and lower grooves .
- Please ensure that the screws to metallic components are even, and locked.
- When doing multiple installations, please ensure that surrounding temperature of the temperature gauge remains within the specified temperature range.

■ E5EZ-PRR Assembly



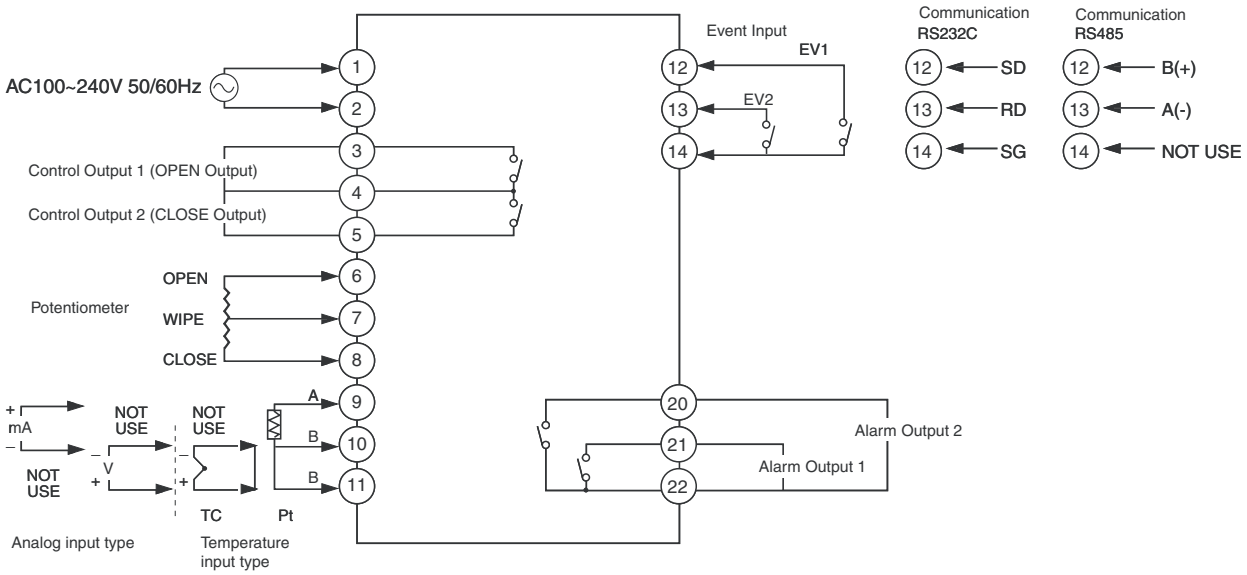
■ Installing the E5EZ-PRR onto Panel

(1) Insert the main unit into the panel using the installation holes (thickness 1-8mm). Remove the installation components from the back case, and temporarily secure them to the panel.

(2) Use a screwdriver to firm the screws by turns the screws on the upper and lower sections. Turn the screwdriver through one rotation, and maintain balanced torsion.

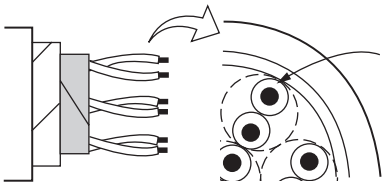
2.2 Wiring Terminals

■ E5EZ-PRR Wiring



■ Wires Connecting Notice

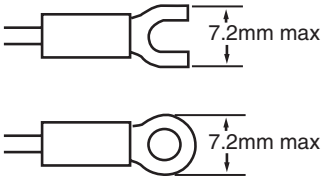
- Independent input lead and power cords are used to protect the E5EZ-PRR and reduce the impact of external noise.
- Use AWG28 or larger twisted pair cable.



AWG28 or larger twisted pair cable

Lead wire cross section greater than 0.081mm^2

- We recommend that when wiring the E5EZ-PRR you use solderless terminals.
- Use 0.74 to 0.90N • m torque on the wiring terminals.
- For the M3.5 screws, use the following types of solderless terminals.



■ Connecting Wires

- Connect to terminals 1 and 2. Specifications are given below.

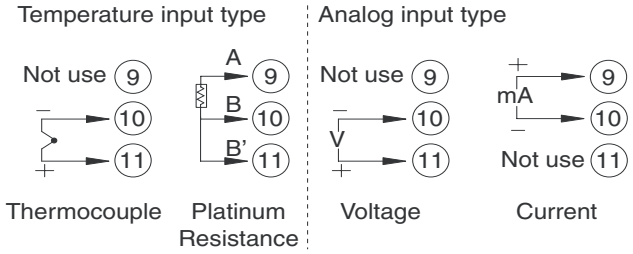
Input Power Supply	E5EZ-PRR
100-240VAC, 50/60Hz	10VA (10W)

● Power Source

- Power supply input/output should use standard insulation. If stronger insulation is needed, then the input and output terminals can be linked to a device whose components have no current outflow or one whose power input/output components have the highest working voltage insulation standards.

● Input

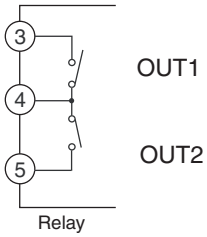
- Connect to terminals 9 through 11 according to input type.



● Control Input 1

● Control Input 2

- Terminals 3 through 5 are used to control output. The following figure shows permissible outputs and their compensation circuits.



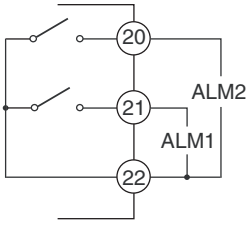
- Output type specifications are given below.

Output Types	Specifications
Relay	250VAC, 1A(includes initial current), electrical life: 100,000 operations, minimum load 5V 10mA

● Alarm Output

- In the E5EZ-PRR alarm output 1 (ALM1) is located between terminals 21 and 22, and alarm output 2 (ALM2) is located between terminals 20 and 22.When input error output is set to “ON”, input errors will be reported via alarm output 1.

- The internal compensation circuits for alarm output 1 and 2 are shown in the following figure.

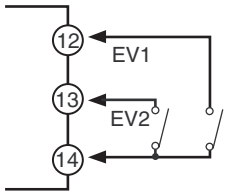


- Relay specifications are shown below.

Output Types	Specifications
Relay	250VAC, 2A (resistive load), electrical life: 100,000 operations, minimum load 1V 1mA

■ Event Input

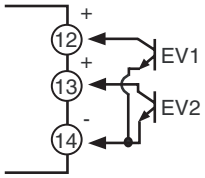
- When the E5EZ-PRR2B □ is used with event input, terminals 12 ~ 14 should be connected.



- Event input may be used in the following circumstances:

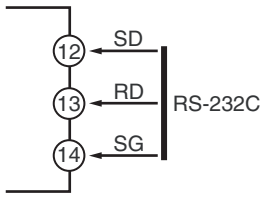
Contact input	ON: Maximum 1kΩ , OFF: Minimum 100kΩ
Noncontact input	ON Maximum residual voltage 1.5V, OFF: maximum current leak 0.1mA

Non contact input polarity is shown below:



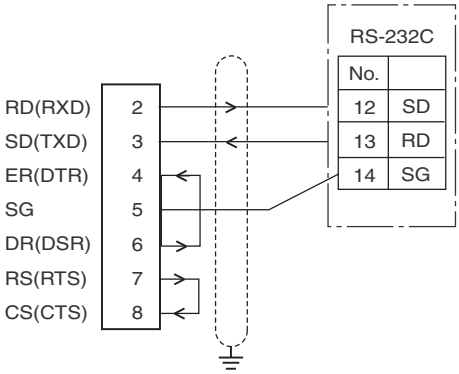
● Communications (RS-232C)

- When the E5EZ-PRR201 □ is used for communications, terminals 12 ~ 14 should be connected.



Communication unit wiring diagram

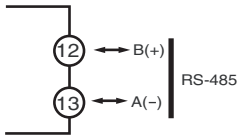
Host
RS232：9P



- RS-232C connection 1:1
- Maximum length of cable is 15m.
- Use a sheathed twisted pair cable (at least AWG28).

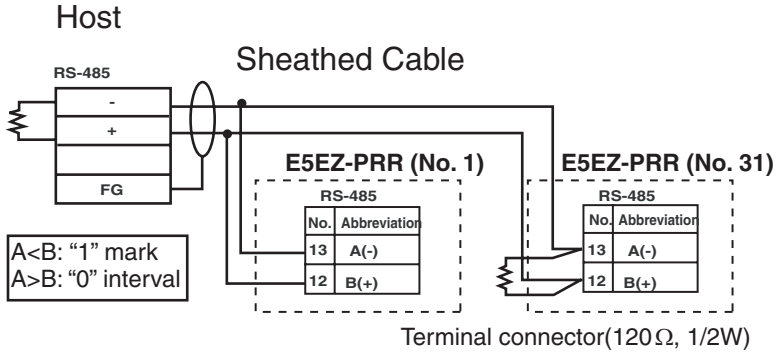
● Communications (RS-485)

- When the E5EZ-PRR203 □ is used for communications, the communications cable should be connected between terminals 12 and 13. Specify a two terminal transmission route, including the host of the terminal node (i.e. link terminal connectors to two terminals).
  Maximum terminal resistance is 54Ω .



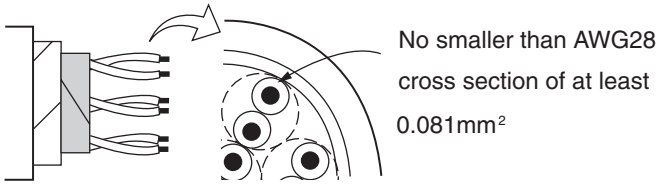
- For communications, in order to meet EN61326 CLASS A transmission protection standards, add a magnetism link (TDK:ZAT1730-0730) between the K3SC and the controller.

Communication unit wiring diagram



- RS-485 connection can be 1:1 or 1:N. When using 1:N connections, a maximum of 32 units can be connected, including the host. sheathed twisted pair cable (no smaller than AWG28), with the main cable 500m or less.

cablereference diagram



2.3 Installation Requirements

■ Ensuring Long Service Life

Use the temperature controller in the following environments:
temperature:-10°C ~ +55°C (with no condensation or icing)
humidity: 25%~85% (RH)
When installing the temperature controller on the control panel, ensure that the temperature controller's surroundings (not the panel's surroundings) do not exceed 55°C.
The service life of the electronic devices like the 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. The service life of the components is influenced by the surrounding temperature: the higher the temperature, the shorter the service life, and the lower the temperature the longer the service life; therefore lowering the internal temperature will increase the service life of the temperature controller.
When using or storing any model of temperature controller within the appropriate temperature and humidity ranges, when two or more temperature controllers are in close proximity either horizontally or vertically, heat radiation raises their internal temperatures, thus shortening their service lives. 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 terminal sections alone to avoid measurement errors.

■ Decreasing Noise

To avoid noise interference, the temperature controller's wires on the electrical box must be kept far away from high voltage/large current power lines. Likewise wires should not be run parallel to or share the same circuit with power lines. Using independent conduits and wire guides, or sheathed wires, is also effective.
Install surge absorbers or noise filters on all noise producing peripheral devices (especially electronic devices, transformers, solenoids, and other devices containing magnetic coils or inductors).
If using a noise filter with the power supply, first confirm the voltage and the current, then mount the noise filter as near as possible to the temperature controller.
Set up the temperature controller, along with its power supply, as far as possible from devices that generate strong, high frequency waves (high-frequency welders, high-frequency sewing machine etc.) and devices that generate surges.

■ Ensuring High Accuracy Measurement

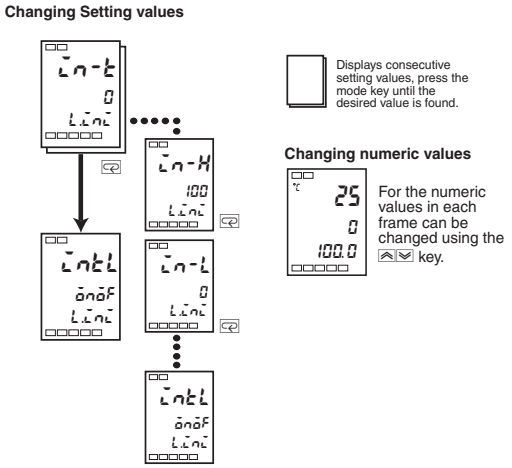
When extending or connecting the thermocouple lead wire, be sure to use compensating wires that match the thermocouple types.
When extending or connecting the lead wire of the platinum resistance thermometer, be sure to use wires that have low resistance, used for electrical impedance of three pieces of wire.
When wiring the platinum resistance thermometer to the temperature controller, keep the wire route as short as possible. Separate this wiring away from the power supply wiring and load wiring to avoid inductance or other forms of noise.
Mount the temperature controller so that it is horizontally level.
If the measurement accuracy is low, check to see that if input float has been set correctly.

Chapter 3
Basic Operations

3.1 Initial Setting Samples

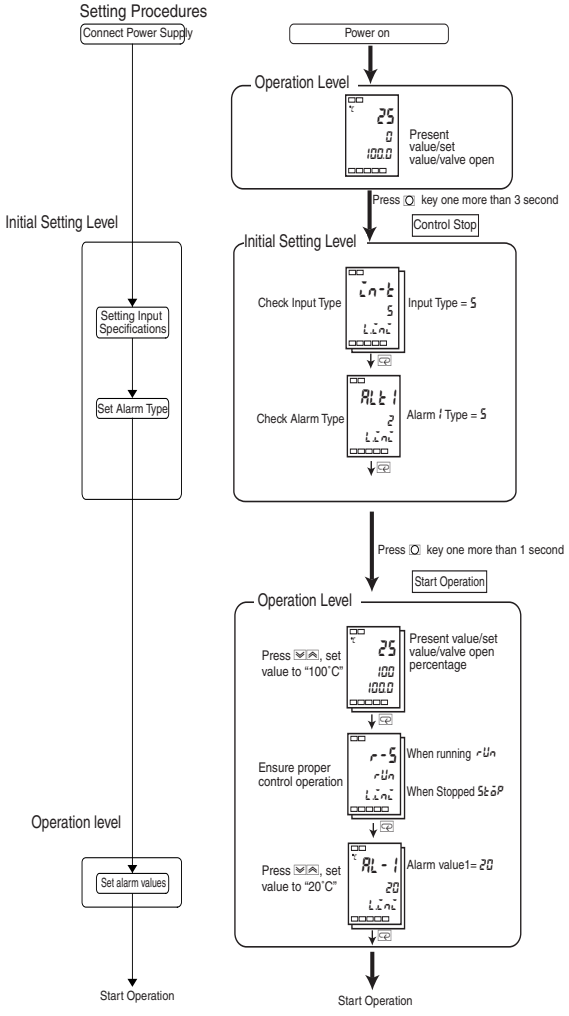
The settings are made in the parameters in setup menus, the [O] and [↵] keys are used to switch between setting levels. The time which the key is held down continuously determined which setting level to access. This section contains two typical settings as examples.

● Typical examples



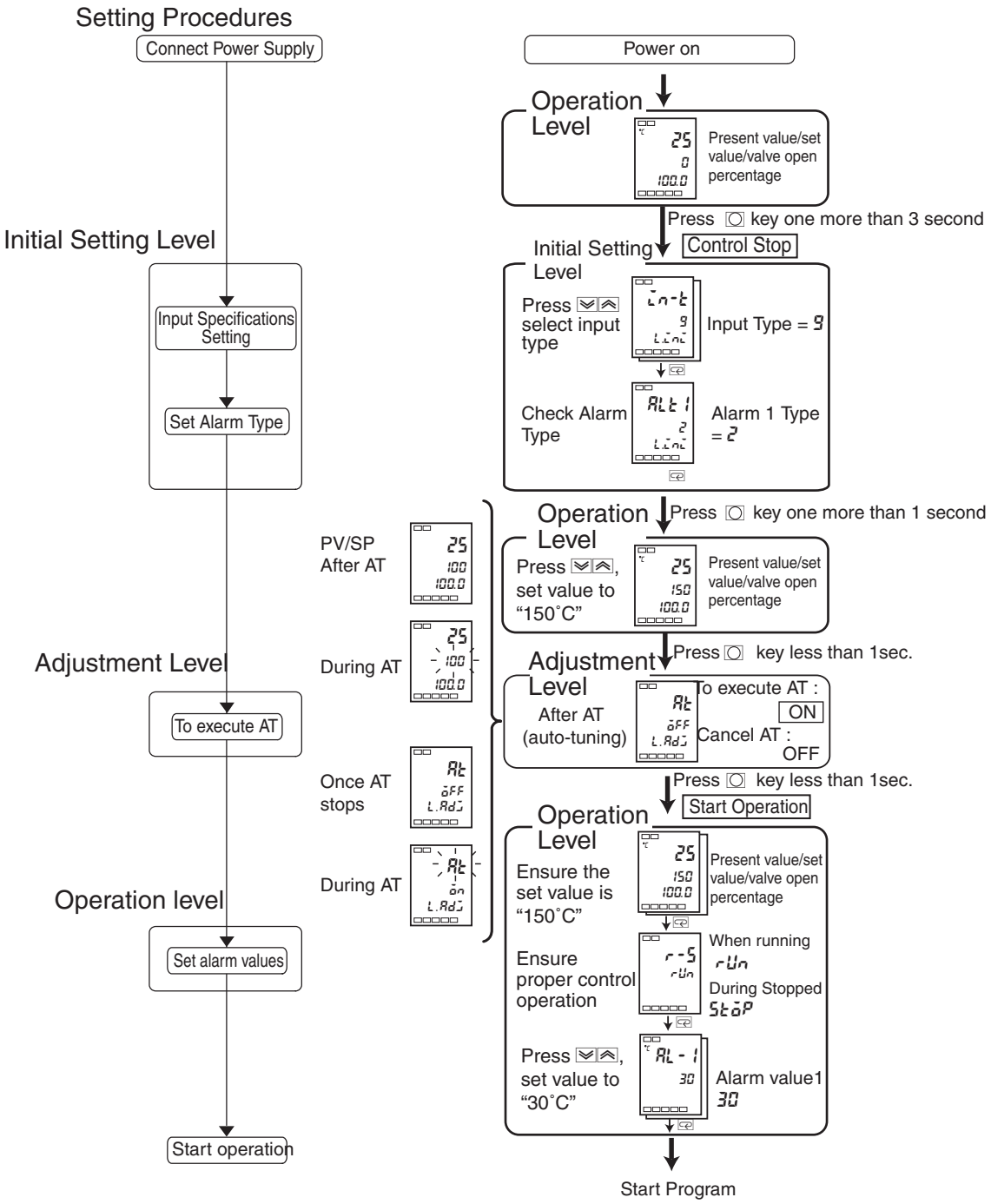
● Example 1

Input Type	:	**5** K thermocouple -200°C to 1300°C
Control Mode	:	PID control
Alarm 1 Type	:	**2** upper limit (deviation)
Alarm Value 1	:	20°C(deviation)
Setting Value	:	100°C



● Example 2

Input Type	:	**9** T thermocouple-200°C to 400°C
Control Mode	:	PID control
Execute AT (auto-tuning) to calculate the PID constant		
Alarm1Type	:	**2** upper limit deviation
Setting Value	:	150°C



3.2 Set Input Type

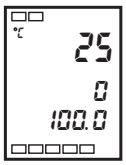
Input types include platinum resistance thermometers, thermocouples, non-contact temperature sensors, and analog input. Input type should be set based on the type of sensor being used. Product specifications include thermocouple/ platinum resistance thermometers multi-input and analog input, all of which require different setting values. Please be sure to verify what type of machine you are using.

■ Input Type

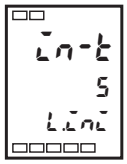
Operation Procedure

Set input type for a "-20.0°C to 500.0°C K thermocouple".

Operation Level

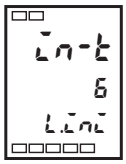


Initial Setting Level



Input Type

(1) Press the ○ key for 3 or more seconds, and from the "operation level" access the "initial settings level".



(2) Press the ∧ key, input all necessary sensor set points. When using a K type thermocouple (-20.0°C to 500.0°C), input "6" as the setting.

Note: 2 seconds after changing parameters, if the ○ or ↵ keys on the operation panel have not been pressed, then the settings will be fixed.

Input type list

Input Type	Name	Set Point	Input Temperature Setting Range
Platinum resistance thermometer	Pt100	0	-200 ~ 850 (°C) /-300 ~ 1500 (°F)
		1	-199.9 ~ 500.0 (°C) /-199.9 ~ 900.0 (°F)
		2	0.0 ~ 100.0 (°C) /0.0 ~ 210.0 (°F)
	JPt100	3	-199.9 ~ 500.0 (°C) /-199.9 ~ 900.0 (°F)
		4	0.0 ~ 100.0 (°C) /0. 0 ~ 210.0 (°F)
Thermocouple	K	5	-200 ~ 1300 (°C) /-300 ~ 2300 (°F)
		6	-20.0 ~ 500.0 (°C) /0.0 ~ 900.0 (°F)
	J	7	-100 ~ 850 (°C) /-100 ~ 1500 (°F)
		8	-20.0 ~ 400.0 (°C) /0.0 ~ 750.0 (°F)
	T	9	-200 ~ 400 (°C) /-300 ~ 700 (°F)
		22	-199.9 ~ 400.0 (°C) /-199.9 ~ 700.0 (°F)
	E	10	0 ~ 600 (°C) /0 ~ 1100 (°F)
	L	11	-100 ~ 850 (°C) /-100 ~ 1500 (°F)
	U	12	-200 ~ 400 (°C) /-300 ~ 700 (°F)
		23	-199.9 ~ 400.0 (°C) /-199.9 ~ 700.0 (°F)
	N	13	-200 ~ 1300 (°C) /-300 ~ 2300 (°F)
	R	14	0 ~ 1700 (°C) /0 ~ 3000 (°F)
	S	15	0 ~ 1700 (°C) /0 ~ 3000 (°F)
	B	16	100 ~ 1800 (°C) /300 ~ 3200 (°F)
Non-contact temperature sensor ES1B	10°C ~ 70°C	17	0 ~ 90 (°C) /0 ~ 190 (°F)
	60°C ~ 120°C	18	0 ~ 120 (°C) /0 ~ 240 (°F)
	115°C ~ 165°C	19	0 ~ 165 (°C) /0 ~ 320 (°F)
	140°C ~ 260°C	20	0 ~ 260 (°C) /0 ~ 500 (°F)
Analog Input	0 ~ 50mV	21	Applicable scaling range: -1999 ~ 9999 or-199.9 ~ 999.9.

● Initial setting value is 「5」 .

The shaded range indicates the initial settings.

	Input Type	Specifications	Set Point	Input Temperature Setting Range
Analog Input Type	Current Input	4 ~ 20mA	0	One of the following ranges applies, depending on measurements
		0 ~ 20mA	1	-1999 ~ 9999
	Voltage Input	1 ~ 5V	2	-199.9 ~ 999.9
		0 ~ 5V	3	-19.99 ~ 99.99
		0 ~ 10V	4	-1.999 ~ 9.999

● Initial setting value is 「0」 .

3.3 Selecting °C/°F

■ Temperature Unit

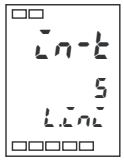
- Select "°C" or "°F" as the temperature unit.
- Under "initial level" -> "temperature unit" set the temperature unit. Initial value is "C: Celsius".

Operation Procedure

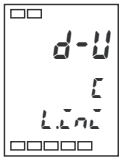
Select "°C".

Operation Level

Initial Setting Level



Input Type



Temperature Unit

Operation Level

Present value/set value/valve open percentage

(1) Press the ○ key for 3 or more seconds, and from the "operation level" access the "initial settings level".

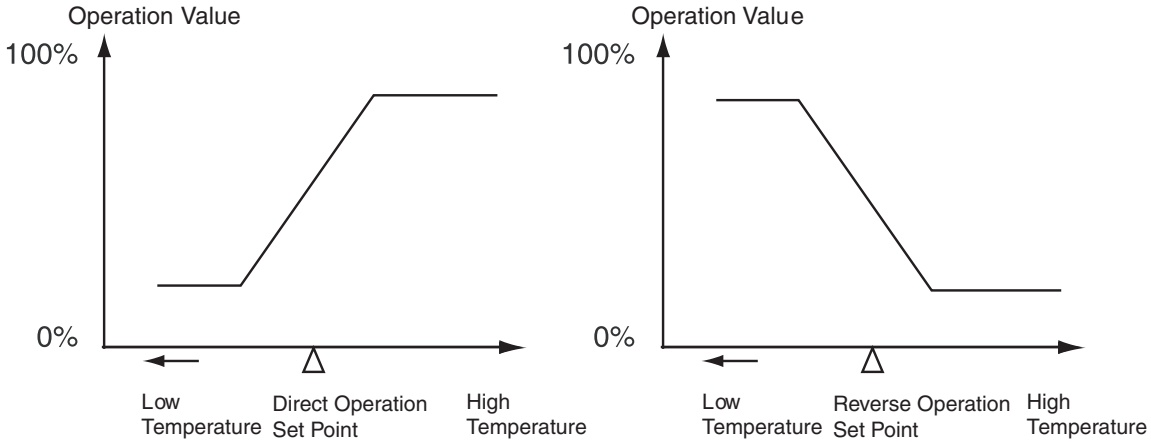
(2) Press the ↵ key, select the "temperature unit" parameter.
Press the ∧ or ∨ key and select "C" or "F".
C: Celsius F: Fahrenheit

(3) Press the ○ key for 1 or more seconds, to return to the "operation level".

3.4 Setting Output Specifications

■ Direct/reverse Operation

- "Direct operation" indicates that MV increases as the process value increases. In contrast, "reverse operation" indicates that MV increases as the process value decreases.



For example, for the present values (PV) (temperature) used in heating control systems, is lower than the set point (SP) (temperature), or the present values (PV) (temperature) the cooling control system present values (PV) is higher than the set point (SP), MV increases in proportion to the difference between PV and SP.
The processes described above refer to "reverse operation" for heating control systems and "direct operation" for cooling control systems.

- Direct/reverse operation can be set under the "direct/reverse operation" parameter (initial settings level). The "direct/reverse operation" parameter's initial setting is "reverse operation".

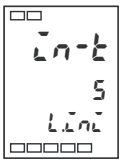
Operation Procedure

In this example, the "input type", "temperature unit", "direct/reverse operation" parameters are monitored.

"input type " = "5" K type thermocouple
"temperature unit" = "C" Celsius
"direct/reverse operation" = "dir-r" reverse operation

Operation Level

Initial Setting Level



Input Type

(1) Press the ○ key for 3 or more seconds, and from the "operation level" access the "initial settings level".

(2) Display input type. The first time you adjust this setting, the input type is "5" K type thermocouple. Press the ∧ or ∨ key, select different sensor.

Temperature Unit

(3) Press the ↵ key, select the "temperature unit" parameter. Initial value is "C": Celsius. Press the ∧ or ∨ key select "F": Fahrenheit.

Direct/
Reverse Operation

(4) Press the ↵ key and select the "direct/reverse operation" parameter. The initial setting is "dir-r" reverse operation. Press the ∧ or ∨ key to change.

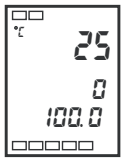
Operation Level

Present value/set value/valve open percentage

(5) Press the ○ key for 1 or more seconds to return to the "operation level".

3.5 SP Setting

Operation Level



When the power supply is connected, the "operation level" will be displayed. (No. 1 display) is the process value, (No. 2 display) is the set point , (No. 3 display) is the valve open percentage.

■ SP Modifying

- When the "operation/adjustment protection" parameter is set to "3", the set point cannot be changed. For details please see "4.8 Using the Key Protection Level".
- "Present value/ set point" parameter (operation level). Press the ⩓ and ⩔ keys, modify the set point, and set all necessary set points. Within 2 seconds of setting the new value, the new set point will be fixed.
- Multiple set point (SP1 to SP4) are possible (Refer to page 5-14).

Operation Procedure

In this example, the set point changes from "0°C" to "200°C".

Operation Level

(1) Normally, the "present value/ set point" parameter is displayed. The set point is "0°C".

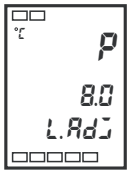
(2) Use the ⩓⩔ key, to change the set point to "200°C".

3.6 Verifying PID Constants (AT and manual settings)

■ AT (auto-tuning)

- When using auto-tuning, the program will force modifications in operation volume to calculate the set point's optimal PID parameter, and calculate the unique automatic settings of the controlled object (the "limit cycle method").
- Select "on: Execute AT" execute AT (auto-tuning), select "oFF: Cancel AT" to cancel AT (auto-tuning). When AT is finished, "on" will fall-back to "oFF" automatically.
- In the "adjustment level", the "proportional band (P)", "integral time (I)", and "derivative time (D)" parameters indicate the AT (auto-tuning) results.

Adjustment Level



Proportional Band

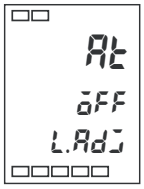
Integral Time

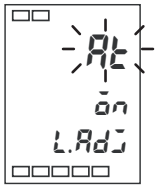
Derivative Time

● Explanation

When the "execute/cancel AT" parameter is set to "ON", AT (auto-tuning) is activated. During AT execution, the "execute/cancel AT" parameter flashes on the No. 1 display. When AT is finished, the "execute/cancel AT" parameter goes off, and No. 1 display stops flashing.

Execute/cancel AT



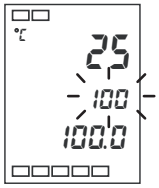


No. 1 Display

When AT is executing

If while AT is executing you switch to the "operation level ", No. 2 display will flash to indicate that AT is executing.

present value/
set point /
valve open percentage



No. 2 Display

When AT is executing

When AT is executing, only the "communication writing", "run/stop" and "execute/cancel AT" parameters may be changed. Other parameters may not be changed.

Operation Procedure

Using auto-tuning (AT).

Adjustment level

Execute/cancel AT

(1) Press the ○ key for less than 1 second to switch from the "operation level" to the "adjustment level".

(2) Press the ∧ key to execute AT (auto-tuning).
When AT is executing, "on" will be displayed.

(3) When AT finishes, "oFF" will be displayed again.

Operation Level

(4) Press the ○ key to return to "operation level".

Present value/set value/valve open percentage

■ Manual Settings

Independent PID parameters may be set manually for the “proportional band”, “integrate time”, and “derive time” parameters under “adjustment level”.

Operation Procedure

In this example, the “proportional band” parameter is set to “10.0”, the “integral time” parameter is set to “250”, and the “derivative time” parameter is set to “45”.

Adjustment level

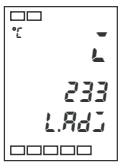
Execute/cancel AT

(1) Press the [O] key to switch from “operation level” to “adjustment level”.

Proportional Band

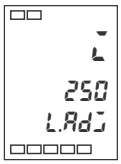
(2) Press the [↵] key to select “proportional band”.

(3) Use the [∧][∨] key to set the parameter to “10.0”.



Integral Time

(4) Press the [↵] key and select “integral time”.



(5) Use the [∧][∨] key to set the parameter to “250”.

Derivative Time

(6) Press the [↵] key and select “derivative time”.

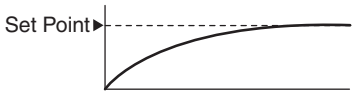
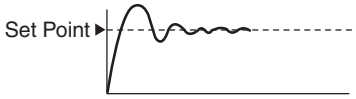
(7) Use the [∧][∨] key to set the parameter to “45”.

(8) Press the [O] key to return to “operation level”.

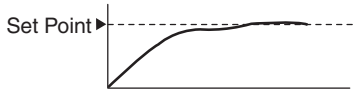
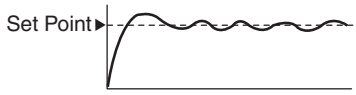
Proportional operation

When the PID constants I (integral time) and D (derivative time) are set to “0”, control will be by proportional operation. The default set point becomes the central value of the proportional band.

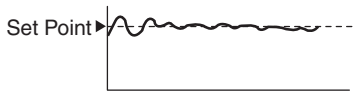
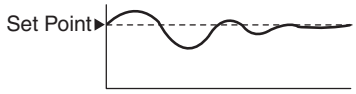
- When tuning P (proportional band)

When P is increasing		The curve gradually increases, then enters a long period of stability to prevent overshoot.
When P is decreasing		When overshoot or vibration occurs after the curve stabilizes, the set point will be reached very quickly.

- When tuning I (integral time)

When I is increasing		The present value needs a long time to reach the set point. Overshoot/undershoot or vibration still occurs after stabilization.
When I is decreasing		When overshoot/undershoot or vibration occurs, and the curve is still increasing rapidly.

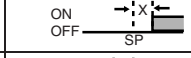
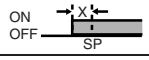
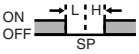
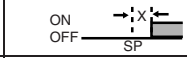
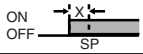
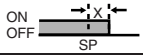
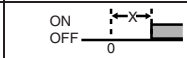
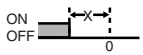
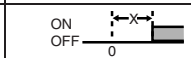
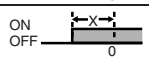
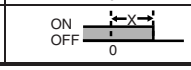
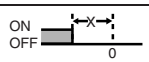
- When tuning D (derivative time)

When D is increasing		When overshoot/undershoot and stable time decreases, but the curve itself experiences slight vibration.
When D is decreasing		Overshoot /undershoot increases, it takes a long time for present values to reach its set point.

3.7 Alarm Output

- Alarm output is determined by “alarm type” and “alarm hysteresis”.
- The “alarm type”, “alarm value”, “upper limit alarm” and “lower limit alarm” parameters are explained below.

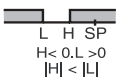
■ Alarm Type

Set Value	Type	Alarm Output Operation	
		When alarm value **X** is positive	When alarm value **X** is negative
0	No alarm function	Output OFF	
1	upper and lower limits *1		*2
2	upper limit		
3	lower limit		
4	upper and lower limit range *1		*3
5	standby sequence upper and lower limits *1	*5 	*4
6	standby sequence upper limit		
7	standby sequence lower limit		
8	absolute value upper limit		
9	absolute value lower limit		
10	standby sequence absolute value upper limit		
11	standby sequence absolute value lower limit		

*1: Each alarm point my be set independently with “L” and “H” representing the upper and lower limit values, and set points 1, 4, and 5.

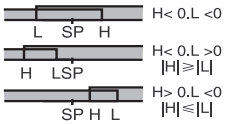
*2: setting value: **1** upper and lower limit alarms

case 1



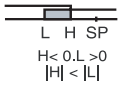
case 2

case 3 (Always ON)

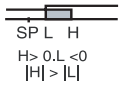


*3：setting value: **4** Upper and lower limit range alarm

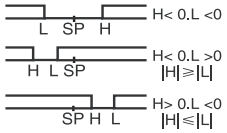
case 1



case 2



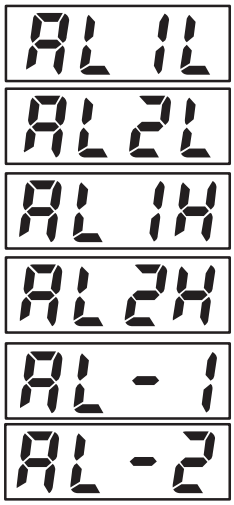
case 3 (Always OFF)



*4: setting value : 5 standby sequence upper and lower limit alarms
*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, the alarm is always OFF.

*5: setting value: 5 standby sequence upper and lower limit alarms
If there is significant overlap between the upper and lower limit values after hysteresis, the alarm will always be OFF.
Alarm types include “alarm1 ~ 2” (initial settings level), and each should be set individually. Initial value is “2: Upper limit”.

■ Alarm Value



Lower Limit Alarm Value

Upper Limit Alarm Value

Alarm Value

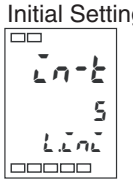
- On the previous page, "X" refers to the alarm value.
  When setting the upper and lower limits, "H" represents the upper limit, and "L" represents the lower limit.
- For shifted upper and lower limit alarm values, upper and lower limits should be set under "alarm upper limit 1 to 3" and "alarm lower limit 1 and 2" (operation level).

Operation Procedure

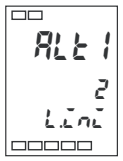
Set alarm1 to "upper limit alarm", and alarm value to "10°C". Relevant parameters and settings are given below. In this example, when the alarm value is exceeded by "10°C", the alarm output executes.

"alarm1 type"="2: upper limit alarm"
"alarm value 1"="10"

Initial Setting Level



Input Type



Alarm 1 Type 1

Operation Level

Present value/se value/valve oper percentage

Alarm Value 1

(1) Press the [O] key for 3 or more seconds, and from the "operation level" access the "initial settings level".

(2) Press the [↵] key, and select "alarm1 type". Verify that the "alarm type" parameter is set to "2" (initial value, upper limit alarm).

(3) Press the [O] key for 1 or more seconds to return to the "operation level".

(4) Press the [↵] key, and select "alarm value1".

(5) Use the [∧][∨] key to set the parameter to "10".

■ Alarm Delay

Alarm ON Delay

Alarm OFF Delay

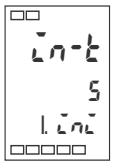
- Creates a delay between the time the PV value reaches the alarm ON/OFF set point and the time of alarm output. Alarm delay may be set independently for alarms 1 and 2.
- This level is under the advanced function level, before changing settings please verify that the protection function has been disabled. (See page5-6.)

Operation Procedure

Set alarm 1 ON delay to "10 seconds". Relevant parameters and settings are given below. In this example, alarm output will begin after a "10 second" delay.

"alarm 1 ON delay"="10"

Initial Setting Level



Input Type

(1) Press the [O] key for 3 or more seconds, and from the "operation level" access the "initial settings level".

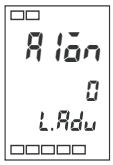
(2) Press the [↵] key , select the "advanced function setting level". Switch to the advanced function setting level.

Switch to advanced function setting level

(3) Use the [∧][∨] key to set the parameter to "-169". Enter the advanced function setting level.

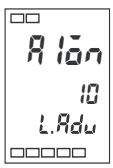
Advanced Function Setting Level

Parameter Initialization



Alarm 1 ON delay

(4) To set "alarm1 ON delay" press the [↵] key, select the "alarm 1 ON delay" parameter.



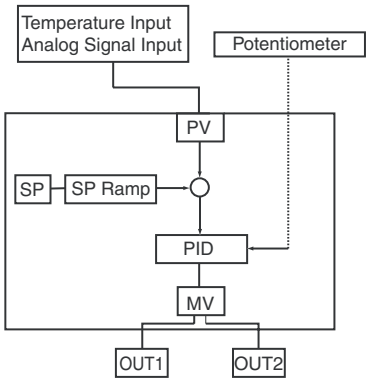
(5) Use the [∧][∨] key to set 10 second (delay).

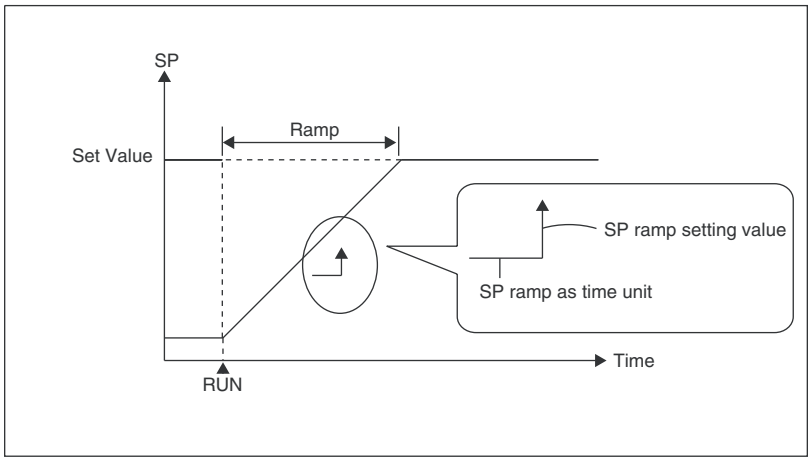
3.8 Ceramic Kiln Setting Position Proportional Control

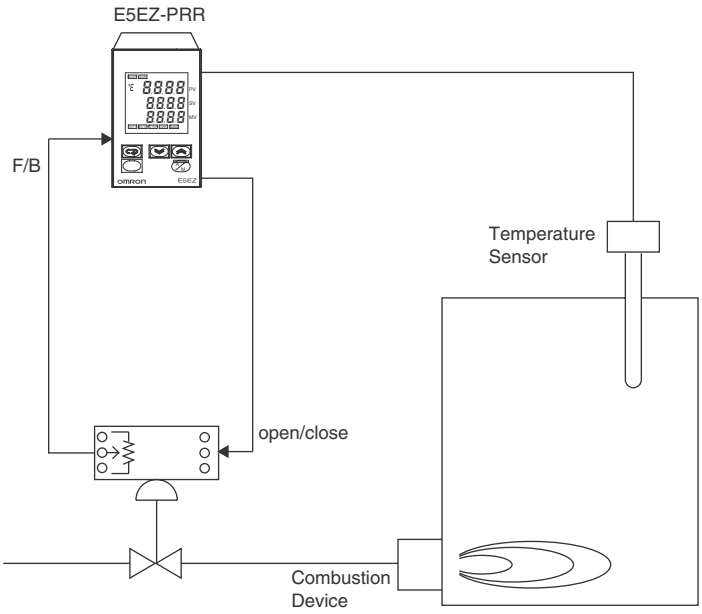
Using potentiometer to read the degree of valve opening, along with Open and CLOSE tuning control is called position proportional control or ON/OFF servo control.

■ Application Examples

When using position proportional to control valves in combustion devices, position proportional control should be used. See the following figure for measurement devices.





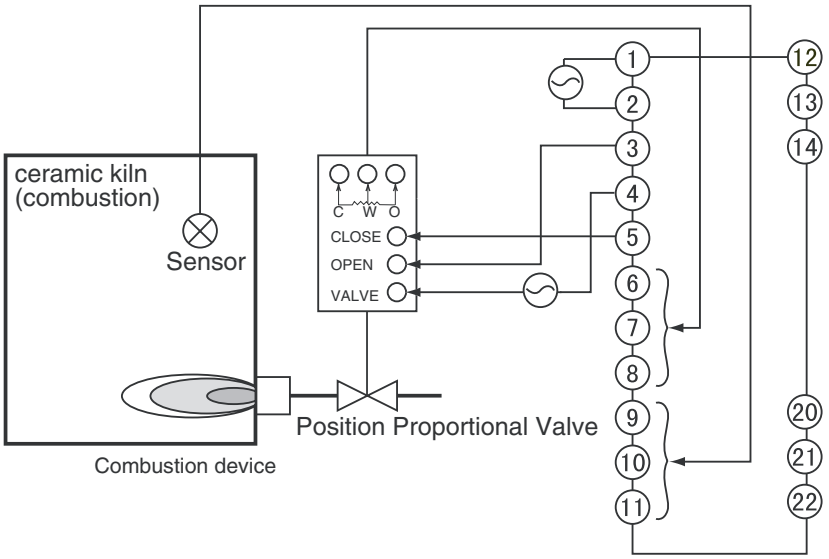


NOTES

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 kilns, 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. The OUT1 terminal links to the position proportional valve OPEN side and the OUT2 terminal to the CLOSE side.

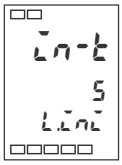


■ Settings

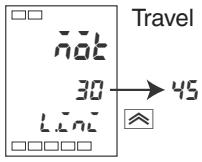
Use position proportional control type position proportional valves, with travel time (from fully closed to fully open) at 45 seconds to floating control. And use the SP ramp function at 10.0°C/minute to gradually change the present value. Related setting data and information are given below:

「Direct Reverse Operation」	= 「dir-r: Reverse Operation」 (initial value)
「Closed/floating」	= 「FLoAt: Floating」 (initial value)
「Travel time」	=“45” second
「SP ramp Set Point」	= “10”

Travel time and SP ramp set point are set, other parameters use the initial values.

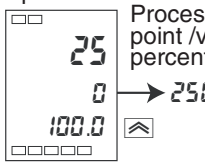


(1) Press the key ○ for 3 or more seconds, and from the “operation level” access the “initial settings level”.



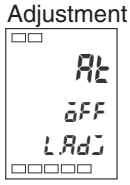
(2) Press the key repeatedly, select "Travel time". Press the key, set the set point to "45".

Operation Level

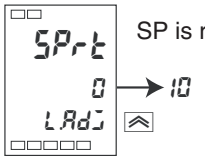


(3) Press the key for 1 second or more to return to the "operation level". When "present value/target value/valve open percentage" is displayed, press the key to set the target value to "250".

Adjustment Level



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



(5) Press the key repeatedly, select "SPRT: SP ramp set point", then press the key to set the value to "10".

■ Adjustment

For PID adjustment please execute AT.
For detailsplease see "3.6 Verifying PID Constants (AT and manual settings)" page 3-10.

■ Fixed settings for position proportional control

After selecting position proportional control, “closed/floating”, “electro-mechanical calibration”, “Travel time”, “position proportional dead band”, “switch hysteresis”, “potentiometer input error”, “present value dead band” may be used.

● Closed/floating

- Closed control
  link potentiometer for valve open percentage feedback control.
- Floating control
  Potentiometer non-feedback valve open percentage control can be done without linkage to the potentiometer. For settings see page 5-26.

● Calibration and travel time

Calibration is similar to closed control or monitor valve opening control when connected to a potentiometer.
The “travel time” from valve completely open to valve completely closed is also set to self measuring.

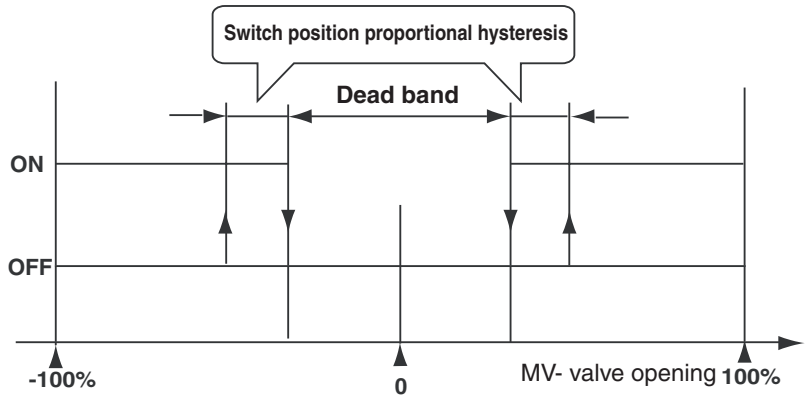
Floating control with no potentiometer connected also requires manual setting of “travel time”. The time from valve completely closed to valve completely open is set as “travel time”.
For settings see page 5-27.

● Position Proportional Dead Band

The valve output period (the time it takes OPEN output and CLOSE output to switch from ON to OFF) is set as the “position proportional dead band”, and hysteresis is set as “switch hysteresis”.

Switch position proportional hysteresis

The relationship to the valve opening is given below:



For settings see page 5-18.

● PV dead band

When the present value is in the present value dead band, then for control purposes present value = set point; this function presents unnecessary output when the present value approaches the set point.
For settings see page 5-39.

● Potentiometer input errors

When the potentiometer produces errors under closed control, select control stop or switch to floating control to continue with control.

3.9 During Manual Control

■ During Manual Control

Valve open degree operation during manual control

Manual output display
Under manual control level, “present value/ set point / manual MV” are displayed, and MV may be set in manual mode. During proportional control, the No. 3 display shows the valve open percentage; if is no potentiometer input, the potentiometer input error is displayed as “----”.

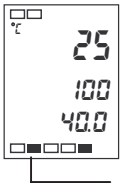
Manual input settings
Press the ⩓ key, turn control output 1 (OPEN side output) to ON, and press the ⩔ key, turn control output 2 (CLOSE side output) to ON.

Operation Procedure

Instructions on moving to manual mode, activating valve open degree modification operation.

“MANU” lights up.

When the ⩓ key is pressed, “OUT1” lights up.



When the ⩔ key is pressed, “OUT2” lights up.

(1) In the operation /adjustment level, press the A/M key for 1 second or more, and the “MANU” light comes on indicating manual control mode.

(2) Press the ⩓ key to switch control output 1 (OPEN side output) to ON.

(3) Press the ⩔ key to switch control output 2 (CLOSE side output) to ON.

3.10 Operation Requirements

(1) Output commences roughly 4 seconds after power is turned on; please take this into consideration when selecting a control circuit.

(2) Please ensure that at least 30 minutes are provided for pre-heating.

(3) When using self-tuning, turn on the temperature controller at the same time as the load (e.g heater), or connect the load before the temperature controller is turned on. If the temperature controller's power supply is turned on before the load is connected, then self tuning may not be accurate and control may not be optimal.

When pre-heating is complete and operation has begun, the power supply should be disconnected immediately after pre-heating is complete, then the temperature controller and load should be turned on simultaneously (the temperature control's power supply may also be turned on and off by switching from stop mode to run mode.)

(4) If the Temperature Controller is used close to radios, television sets or wireless devices, it may affect reception.

Chapter 4
Applied Operations

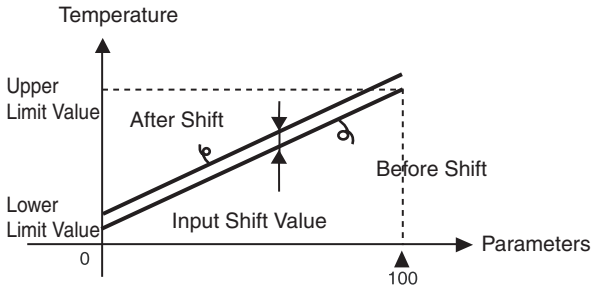
4.1 Input Shift Values

■ Input Shift

- Displays the input shift type that accords with the sensor selected under the present "input type" parameter.

● 1 point shift

- 2 point shift is only used with non-contact type temperature sensors.
- When selecting 1 point shift, set the "temperature input shift" parameter set point to the entire temperature input range. For example, if the set point is 200°C, if the input shift value is set to "1.2°C", then the set point will be considered 201.2°C.

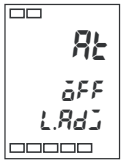


Operation Procedure

In this example, 1 point input shift is used to set the K type thermocouple input value shift to "1°C"

Operation level

Adjustment Level



Temperature Input Shift

(1) Press the ○ key, switch from "operation level" to "adjustment level".

(2) Press the ↵ key, select "temperature input shift".

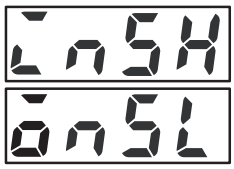
(3) Use the ▲▼ key to set it to "1.0".

Operation Level

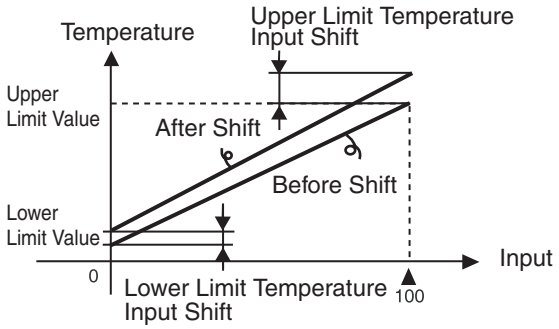
PV/SP/valve open percentage

(4) Press the ○ key, return to "operation level". The set point is now 1°C higher than it was before.

● 2 point shift



- By independently setting the sensor's upper limit input shift values and lower limit input shift values, you can shift the input temperature range on a non-contact temperature sensor. In other words, by setting different shift values for the two ends of the temperature range, all the values in the range will be shifted. For example, if the upper limit value is "2°C", and the lower limit value is "1°C", then the entire sensor range will have an average shift value of 1.5°C at 50% input.
- Under "upper limit temperature input shift values" set the upper limit value, and under "lower limit temperature input shift values" set the lower limit value.



■ Calculating Input Shift Values (2 Point Shift)

When a non-contact temperature sensor model No. ES1B is connected to the temperature controller model E5EZ-PRR,seeral degrees to several tenth of degrees shift will occur. Therefore a 1 point or 2 point shift compensation must be used for the read out value.When the detection controller error sensor bias current reaches the output impedance of the non-contact temperature sensor, a shift will occur. The point shift will only occur with a non-contact temperature sensor, and may not be used with other input types.

[Set Up]

(1) Set the controller's temperature range based on the non-contact temperature sensor's input specifications.

(2) As shown in figure 1, use a temperature gauge capable of measuring the temperature of the controlled object, in order to execute 1 point shift and 2 point shift.

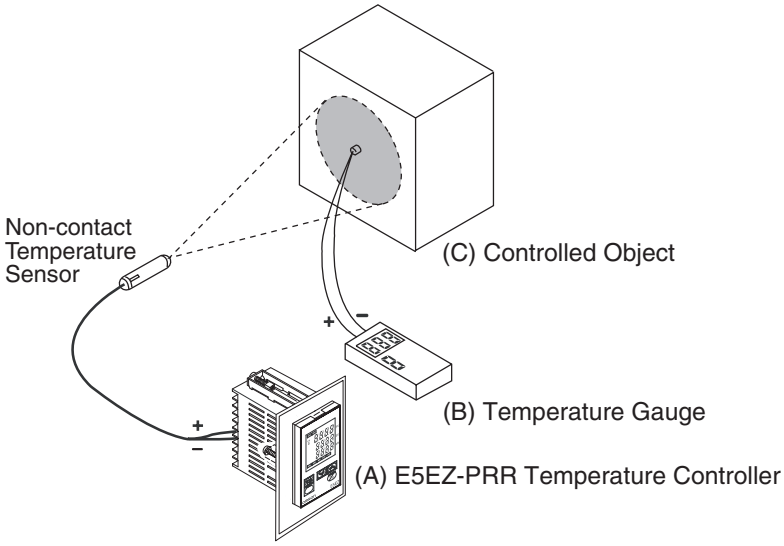


Figure 1 Compensating for a non-contact temperature sensor

■ 1 Point Shift Method

Adjustment level

Upper Limit Temperature Input Shift

Lower Limit Temperature Input Shift

(1) In figure 1, select a set point near the controlled temperature value of the controlled object. Assume that temperature (C) and temperature (B) of the controlled object are the same.

(2) Check the controlled object's temperature (B) and the controller's reading (A). Input shift values may be calculated as shown below, with "InSL" and "InSH" set to the same value.

controlled object's temperature (B) - controller reading (A)

figure 2 shows result of a 1 point temperature input shift

(3) After setting input shift values, check the controlled object's temperature (B) and the controller reading (A), if they are roughly equal, then the temperature input shift has been successful.

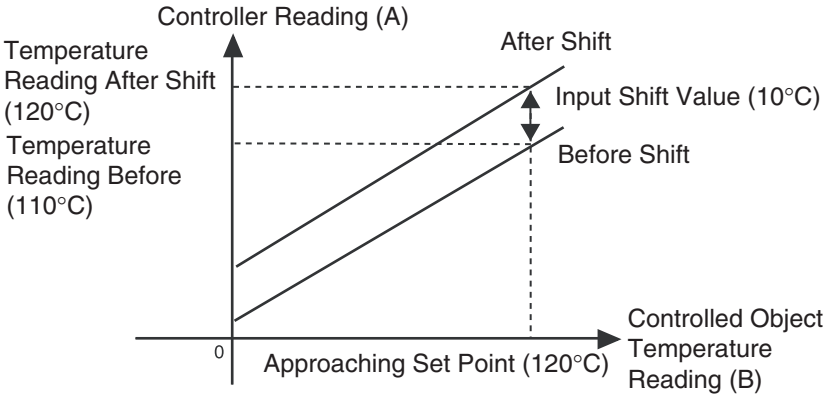


figure 2 1 Point Temperature Input Shift

■ 2 Point Shift Method

To increase the accuracy of the reading values across the sensor range, the 2 point input shift method may be used.

(1) To shift two points of the controller's reading, use two points near room temperature and the controlled temperature of the controlled object. Therefore, set the controlled object's temperature settings near room temperature and the set point, then check the controlled object's temperature (B) and controller reading (A).

(2) Use the reading and temperature shift values from step 1, as well as equations (1) and (2), to calculate the upper and lower limit temperature input shift values. figure 3 shows the results of the 2 point temperature input shift.

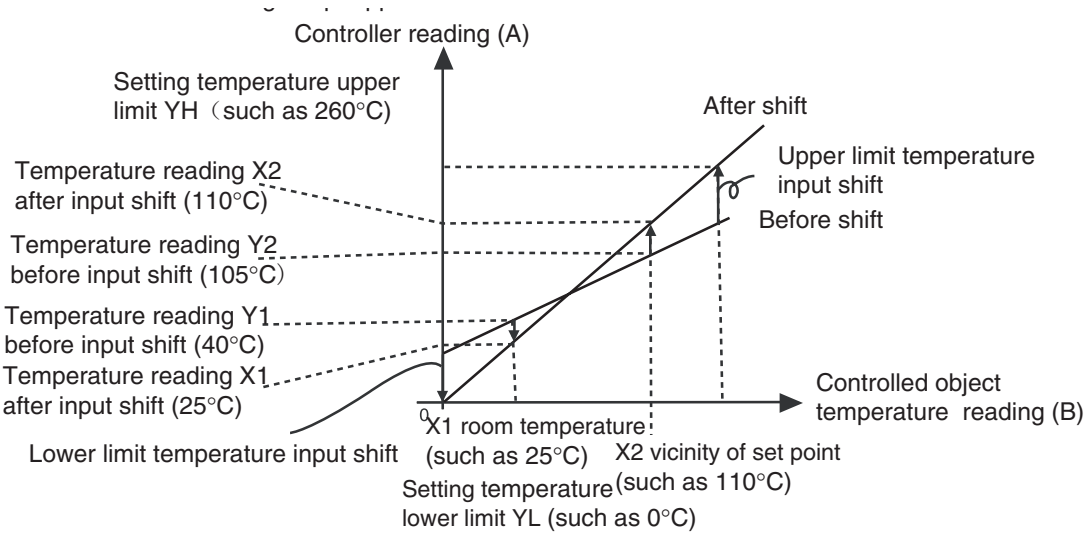


figure 3 2 Point Temperature Input Shift

- Use the following method to calculate the lower limit temperature input shift values.

$$\text{InSL} = \frac{YL - Y1}{Y2 - Y1} \times \{(X2 - Y2) - (X1 - Y1)\} + (X1 - Y1) \cdots\cdots \text{Eq 1}$$

- Use the following method to calculate the upper limit temperature input shift values.

$$\text{InSH} = \frac{YH - Y1}{Y2 - Y1} \times \{(X2 - Y2) - (X1 - Y1)\} + (X1 - Y1) \cdots\cdots \text{Eq 2}$$

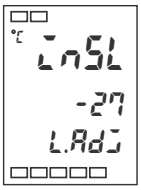
(3) After setting InSL and InSH as the calculated value, check the controller reading (A) and controlled object's temperature (B).

(4) When shifting input near room temperature (environmental temperature) and set point 2 point, you must select two points near the ends of the sensor's measurement range, to increase the overall accuracy across the sensor's measurement range.

■ 2 Point Temperature Input Shift Example

This example uses ES1B non-contact temperature sensor, temperature range 0°C ~ 260°C YL and YH in equations 1 and 2 are set as follows： lower limit temperature YL set to 0°C; upper limit temperature YH set to 260°C. Check the controlled object's temperature.
When room temperature X1 is 25°C, the controller reading Y1 is 40°C, the temperature near the set point X2 is 110°C, and the controller reading Y2 is 105°C,

Adjustment level



Lower Limit Temperature Input Shift

Upper Limit Temperature Input Shift

lower limit temperature input shift values

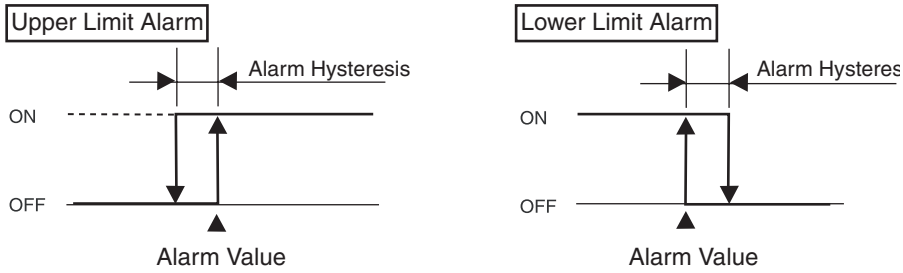
$$\text{InSL} = \frac{0 - 40}{105 - 40} \times \{(110 - 105) - (25 - 40)\} + (25 - 40) = -27.3\ (^{\circ}\text{C})$$

upper limit temperature input shift values

$$\text{InSH} = \frac{260 - 40}{105 - 40} \times \{(110 - 105) - (25 - 40)\} + (25 - 40) = 52.7\ (^{\circ}\text{C})$$

4.2 Alarm Hysteresis

- When the alarm is used, alarm output hysteresis may be set according to the figure below:



- Under the "alarm hysteresis 1 to 2" parameters (advanced function level), you can independently set the alarm hysteresis. The initial value is "0.2°C or °F". (analog input initial value is "0.02%FS")

■ Standby Sequence

- When the first alarm is triggered, the "standby sequence" can temporarily inactivate the alarm output. Alarm output will continue to be effective during subsequent alarm events.
- For example, during standard heating applications if the standard "low level" alarm is used, then when the controller is turned on the alarm function will be effective. But if using the "standby sequence", then the first time the heating alarm output will not be effective, rather the temperature must exceed the alarm set point before the alarm is activated. When the temperature is lower than the alarm set point, the alarm output is effective.

■ Standby Sequence Restart

- After alarm output, the standby sequence is cancelled. But by resetting the "standby sequence" parameter (advanced function level) you can reactivate the standby sequence.
  For details, please see the "standby sequence" parameter in "Chapter Five, Parameters" .

■ Alarm Latch

- The "alarm latch" function sets the alarm output as the permanent connection status, regardless of temperature variations.
- The alarm latch may be cancelled when disconnecting the power. (Note: when switching to initial level, communication level or advanced function level, alarm latch will be cancelled.)

■ Shutdown on Alarm /Alarm Activation

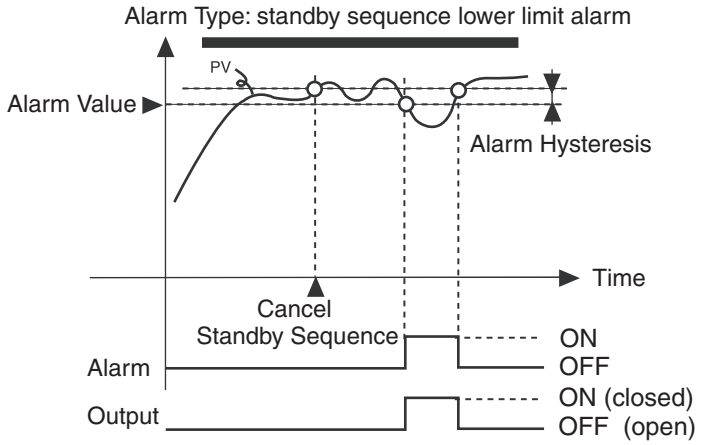
- When the E5EZ-PRR is set to “shutdown on alarm”, alarm output will normally be activated. When set to “activate on alarm”, alarm output will usually transfer output or be off.
- Alarm type and “shutdown on alarm (usually on)”/“activate on alarm” (usually off) can all be set independently.
- Using the “activate alarms 1 and 2 on alarm” parameter, the “shut down on alarm/activate on alarm” (advanced function level) can be set. The Initial value is “ꜟ-ᾱ: shutdown on alarm”.

	Alarm output function	Output	Alarm LCD display light
Shutdown on alarm	ON	ON	ON
	OFF	OFF	OFF
Activate on alarm	ON	OFF	ON
	OFF	ON	OFF

Any shutdown on alarm/activate on alarm setting, when power is interrupted and within two seconds of power connectivity, the alarm output will stop (relay contact point connected).

■ Alarm Operation Overview

The figure below summarizes the above mentioned alarm functions (with alarm type set to “standby sequence with lower limit”, or E5EZ-PRR set to “shutdown on alarm”).

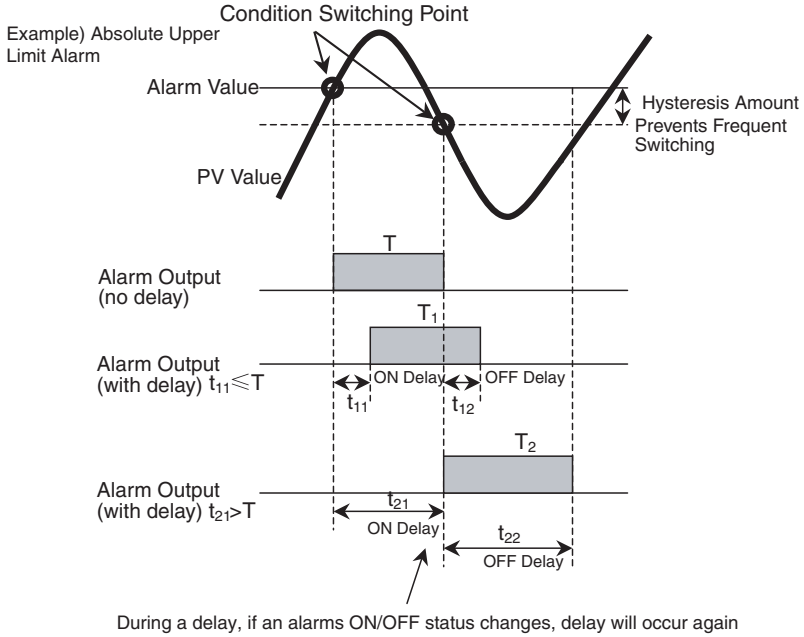


When the “activate alarm1 on alarm” (advanced function level) parameter is set to “activate on alarm”, the heater burnout alarm and input error output will all “activate on alarm”.

■ Alarm Delay Function

- When "alarm type" is not set to "0: no alarm function", then alarm ON/OFF delays can be set independently.
- Using the "alarm 1 ~ 2 ON/OFF delay" parameter (advanced function level) , users can set alarm delay times independently. The initial value is "0: alarm no delay".

The following figure uses examples of absolute upper limit alarms to illustrate the effect of delay function on alarm output.



■ Note:

1. During a delay, the alarm light and communication status will also be delayed.
2. During a delay, if an alarms ON/OFF status changes, delay will occur again.
3. When power is turned on, or the initial level changes to the operation level, the ON delay will be used.
4. When switching to the initial level, all alarm output immediately turns OFF, without using OFF delay .
5. The alarm will not turn ON if the time that the alarm is ON is equal to or less than the ON delay set time. Also, the alarm will not turn OFF if the time that the alarm is OFF is equal to or less than the OFF delay set time.
6. If an alarm turns OFF and then back ON during the ON delay time, the time will be remeasured from the last time the alarm turns ON. Also, if an alarm turns ON and then back OFF during the OFF during the OFF delay time, the time will be remeasured from the last time the alarm turns OFF.

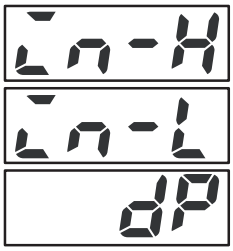
Parameter

Symbol	Parameter: Level	Explanation
AHy □	alarm 1 ~ 2 hysteresis : advanced function level	alarm
rESt	standby sequence reset: advanced function level	alarm
AL □ n	alarm 1 ~ 2 activate on alarm: advanced function level	alarm
A □ on	alarm 1 ~ 2 ON delay advanced function level	alarm
A □ oF	alarm 1 ~ 2 OFF delay advanced function level	alarm

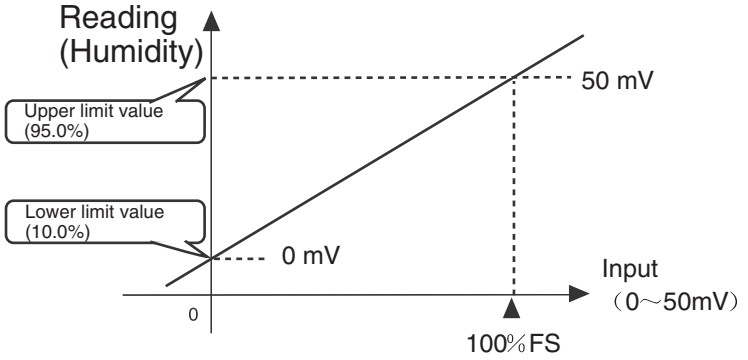
□ : 1, 2

4.3 Calibrating Upper and Lower Limits (Analog Signal Input)

■ Analog Signal Input



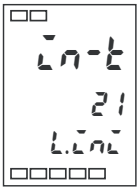
- When analog signal input (voltage input , current input) is selected, you can set the associated control scaling.
- Calibration can be done using the “scaling upper limit”, “scaling lower limit”and “decimal point” parameters (initial level) . After the temperature input type is selected, these parameters cannot be used.
- “Scaling upper limit” parameter setting input upper limit value indicates. The indicated physical value; “scaling lower limit” parameter setting input lower limitvalue. The indicated physical value; The “decimal point”parameter is used to specify the place after the decimal point.
- The following figure is an example of 0 ~ 50mV input calibration. After calibration, humidity can be read directly.



Operation Procedure

In this example, calibrating the lower limit value changed the 0 ~ 50mV input value to 10.0% through 95.0%.

Initial Setting Level



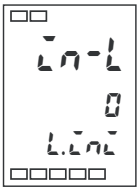
Input Type

(1) Press the ○ key for 3 or more seconds, to switch from "operation level" to"initial level".

Scaling Upper Limit

(2) Use the ↵ key to select "scaling upper limit".

(3) Use the ∧∨ key to set the parameter to "950".



Scaling Lower Limit

(4) Press the ↵ key, to select "scaling lower limit".

(5) Use the ∧∨ key to set the parameter to "100".

Decimal Point

(6) Use the ↵ key to select the position of the decimal point.

(7) Use the ∧∨ key to set the parameter to "1".

(8) Press the ○ key for 1 or more seconds to return to the "operation level".

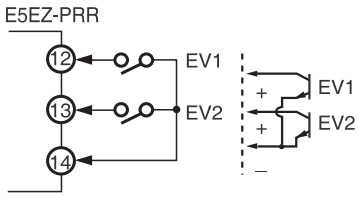
4.4 Using Event Input

■ Setting Event Input

Run/stop control and Auto/Manual selection can be done with event input assignment 1 and 2.
The following table shows “number of multi set points used ”, it gives event input 1 and 2 function assignment.
When 2 or 4 multiple set points are used, use the “number of multi-set points used” parameter, which determines whether or not “event input assignment 1” and “event input assignment 2” are displayed.

No. of Multi-SP Used	Setting		Event Input Function	
	Event Input Assignment 1	Event Input Assignment 2	Event Input 1 Function	Event Input 2 Function
0	NONE or STOP or MANU “1”		none or Switching RUN/STOP or Switching Auto/Manual “1”	
1	- (Not displayed)	NONE or STOP or MANU	2 set points multi set points (alternate set point 0/1)	No or Switching RUN/STOP or Switching Auto/ Manual
2	- (not displayed)		4 set points multi set point (alternate set point 0/1/2/3)	

*1 Only when using event input indicators 1 or 2 , the “stop (run/stop) switching” and Auto/Manual can be set.
Once “STOP” is assigned to one event input, the other side is set to “NONE” or “MANU”.



When setting two external input set points, the “number of multi-SP used” parameter may be set to:

- select set point (0/1)
  When “number of multi-SP used” is set to “1” (initial value) , two set points may be selected. This setting may not be changed. Set point 0 or 1 is indicated by the event input 1 status.

■ Using Multiple Set Points

● Using Event Input With Multiple

“Multiple set points” is a presetting set points 0 through 3 function . It uses both input event 1 and 2 to select set points.
When using E5EZ-PRR2B □ , and the “number of multi-SP used” is set to “1” or “2”, multiple set points can be used.

- when “multi-SP used” is set to “1”

Event Input 1	Select Set Point
OFF	set point 0
ON	set point 1

- When “multi-SP used” is set to “2”

Event Input 1	Event Input 2	Select Set Point
OFF	OFF	set point 0
ON	OFF	set point 1
OFF	ON	set point 2
ON	ON	set point 3

*Event input the E5EZ-PRR2B □ model. Event input ON/OFF should be used when the power is on. It can distinguish 50ms or more of input ON/OFF.

■ Key Operation Settings

Using “multi-SP” set point modification, “target value 0 ~ 3” can be changed . “Multi-SP” display conditions are as follows:

- For products without event input specifications, “use multi SP ” is “ON”.
- For products with event input specifications, “number of multi-SP used” is “0”, “use multi-SP ” is “ON”.

The relationship between “multi SP” set point and the selected target value is given below:

Multi Set Point	Select Set Point
0	set point 0
1	set point 1
2	set point 2
3	set point 3

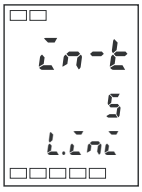
■ Setting

Operation Procedure

Before setting “number of multi-SP used”, cancel protection and switch to the “advanced function level”. For details on canceling protection, see “4.8 Using The Key Protection Level”.

Operation Level

Initial Level



Input Type

(1) Press the ○ key for 3 or more seconds, from the “operation level” switch to the “initial level”

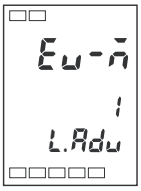
Switch to The Advanced Function Level

(2) Press the ↵ key ,select “switch to advanced function level”.

(3) Use the ∧∨ key enter “-169” (password) .
Using the ↵ key or preserve this setting for 2 or more seconds, to switch to the “advanced function level”.

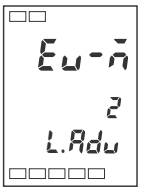
Advanced Function Level

Parameter Initialization



Number of
Multi-SP Used

(4) Press the ⏎ key , select “number of multi-SP used”.



(5) Press the ∧∨ key , set the parameter to “2”.

(6) Press ○ to return to the “initial level”.

(7) Press the ○ key for 1 second or more, return to the “operation level”.

■ Using Run/Stop Control

When “event input assignment 1” or “event input assignment 2” is set to “run/stop”, if event input 1 or 2 is set to “OFF”, control will start. When set to “ON ”, control will stop.

When control stops, the light goes off.

Setting	Input Contact Point	Status
event input 1 or 2	ON	stop
event input 1 or 2	OFF	RUN

Note: when “number of multi-SP used” is set to “0” or “1”, and not “2”, run/stop may be controlled by event input

Based on “number of multi-SP used” settings, event input indicators 1 and 2 are used as follows:

Number of Multi-SP Used	Setting		Event Input Function	
	Event Input Assignment 1	Event Input Assignment 2	Event Input 1 Function	Event Input 2 Function
0	none	stop	none	run/stop switching
	stop	none	run/stop switching	none
	none	none	none	none
1	- (setting data not displayed)	stop	2 set point multi set point (set point 0/1 switching)	run/stop switching
	- (setting data not displayed)	none	2 set point multi set point (set point 0/1 switching)	none
2	- (setting data not displayed)	- (setting data not displayed)	4 set point multi set point (set point 0/1/2/3 switching)	

- Number of multi-SP used set to 1 or 2, and event input indicator 1 or 2 set to “do not display”, setting will automatically change to “none”.
- Number of multi-SP used set to “0”, and input indicator 1 and 2 setting, run/stop will only indicate one event input . The other event indicator will automatically be set to OFF.
- When the run/stop function is used as event input , run/stop will not display in the operation level.

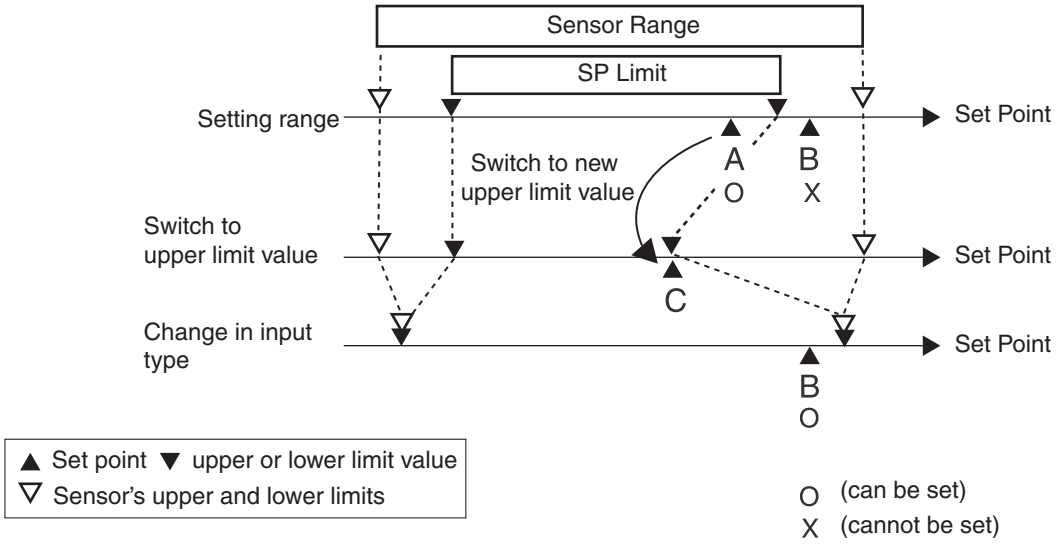
Parameter

Symbol	Parameter: Level	Explanation
Eu-1	event input 1 indicator: advanced function level	Used with event input function
Eu-2	event input 2 indicator: advanced function level	
Eu-n	number of multi-SP used: advanced function level	

4.5 Setting SP Upper and Lower Limit Values

■ Set Point Limits

A set point's setting range is limited by the set point limit. The set point limit is used to prevent the controlled object from exceeding the normal temperature range. The set point limit's upper and lower limit values are set by "set point upper limit" and "set point lower limit" parameter in the "initial level". When resetting the set point limit, be sure to remember that if the set point exceeds the limit range, then it will be automatically returned to the set point limits upper or lower limit value. When input type and temperature unit change, the set point limit is forcibly reset to within the sensor setting range.

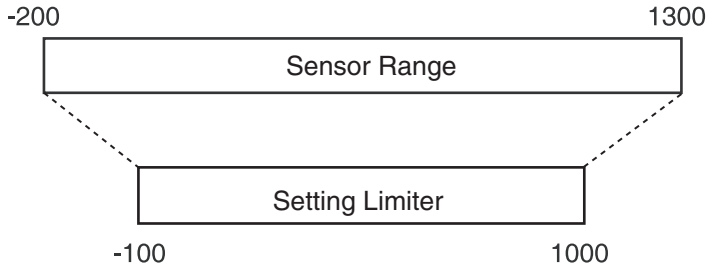


Parameter

Symbol	Parameter: Level	Explanation
SL-H	set point upper limit: initial level	used to limit set point settings
SL-L	set point lower limit: initial level	used to limit set point settings

■ Settings

By setting the “set point upper limit”and “set point lower limit” parameters in the “initial level”, the set points upper and lower lower limit values can be set. This example describes how to set “-200°C ~ 1300°C” range K type thermocouple input limit settings at “-100°C ~ 1000°C”.



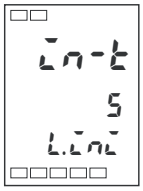
● Setting Set Point Upper Limit

Set the “set point upper limit” parameter to “1000”.

Operation Procedure

(1) Press the ○ key for 3 seconds or more, switch from the “initial level” to the “operations level”.

Initial Setting Level



Input Type

(2) Select “set point upper limit”.

Setting Upper Limit

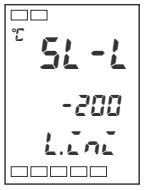
(3) Use the ∧∨ key to set the parameter to “1000”.

● Setting Set Point Lower Limit

Set the “set point lower limit” parameter to “-100”.

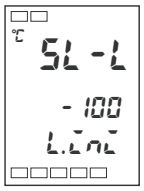
Operation Procedure

(1) In the “initial level” select “set point lower limit”.



Set Point Lower Limiit

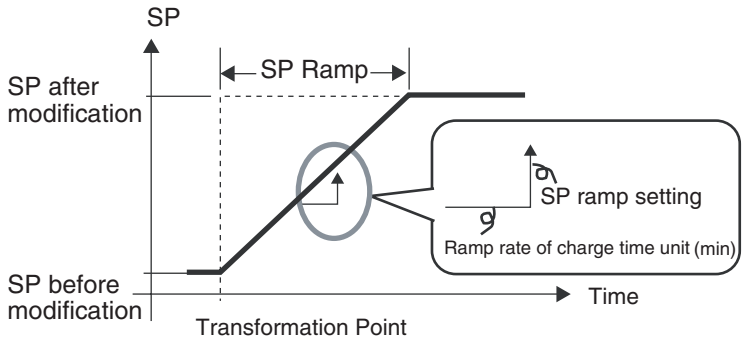
(2) Use the ∧∨ key to set the parameter to “-100”.



4.6 Using the SP Ramp Function (to limit rate of SP change)

■ SP Ramp

Using the SP Ramp function , the controller can operate based on rate of change limit value. When SP ramp limits are in place, the set point is called the “SP ramp”.



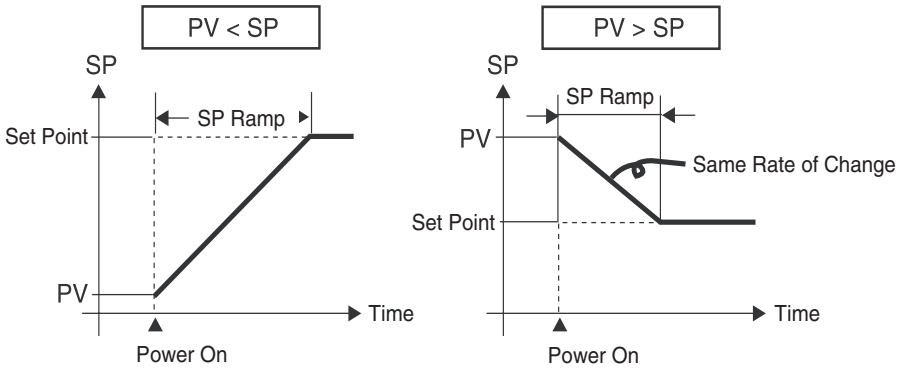
The rate of change of the SP ramp can be set using the “SP ramp set point” parameter. The initial value of the “SP ramp set point” is “OFF”, and the “SP ramp function” initially is not effective.
Using the “SP ramp set point” parameter (operation level) , the rate of change of the ramp’s set point can be monitored. This parameter should be used to monitor the SP ramp.
Operation is similar to multi set point set point switching.

Parameter

Symbol	Parameter : Level	Explanation
oL-H	MV upper limit : adjustment level	Used to limit MV
oL-L	MV lower limit : adjustment level	Used to limit MV
SL-H	Set point upper limit : initial level	Used to limit SP setting
SL-L	Set point lower limit : initial level	Used to limit SP setting
SPrt	Sp ramp set point : adjustment level	Limit rate of SP change

Getting Started

If the SP ramp function is activated , when the E5EZ-PRR is turned on, or switched from “stop” to “run”, When the process value reaches the SP ramp set point, it follows the same method used when the set point changes.Under this condition, Before changing process value, controller will operate by process value as the setting value.
The SP ramp direction will change according to the relationship between the process value and the set point.



SP Ramp Operation Limits

- When the SP ramp finishes, auto-tuning begins.
- When control stops or has an error, the SP ramp function is not effective.

4.7 Switching to the Advanced Function Level

In the initial setting level, the advanced function level is protected and cannot be accessed. To switch to the advanced function level, first cancel protection in the "protection level". Please see "4.8 Using the Key Protection Level".

Protection Level

"Run/Adjustment Protection"

(1) In the "operation level", simultaneously press the ○ and ↵ keys for 3 seconds or more.
* Key timing can be set using "protection level switching time" (advanced function level) .

(2) The controller will switch to the protection level and display "operation / adjustment protection".

"Initial/Communications Protection"

(3) Press the ↵ key once to switch to "initial/communications protection".

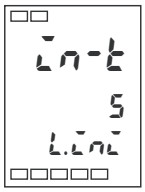
(4) Set the set point to "0".

Operation Level

PV/SP/Valve Open %

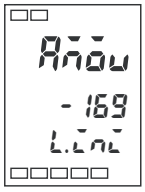
(5) Simultaneously press the ○ and ↵ keys to return to the "operation level".

Initial Setting Level



Input Type

(6) Press the ○ key for 3 seconds or more to switch from the "operation level" to the "initial level".



(7) Press the ↵ key , select thse "switch to advanced function level" parameter .

(8) Use the ∧∨ key to input the password ("-169") , then press the ↵ key or wait 2 seconds or more to switch from the "initial level" to the "advanced function level".

Advanced Function Level

Switch to Advanced Function Level

4.8 Using The Key Protection Level

■ Key Protection

- Press the [O] and [↵] keys simultaneously for 3 seconds or more to switch to the protection level.
  * Key timing can be set in the "protection level switch timing" (advanced function level).
- The protection level protects parameters that are changed after operation starts to prevent accidental modification.
- Protection level settings can use the parameter's range .

● Operation / Adjustment Protection

The relationship between set point and protection range is shown below

Level		Set Point			
		0	1	2	3
Operation Level	Present Value	○	○	○	○
	Set Point	◎	◎	◎	○
	Other	◎	◎	×	×
Adjustment Level		◎	×	×	×

◎ :can be displayed and changed
○ :can be displayed
× :cannot be displayed or switched to other

- When this parameter is set to "0", no parameters are protected.
- The initial value is "0".

● Initial/ Communication Protection

These protection level limits affect the initial level, communications level, and advanced function level.

Set Point	Initial Level	Comm. Level	Advanced Function Level
0	○	○	○
1	○	○	×
2	×	×	×

○ :can switch to other levels
× :cannot switch to other levels

- Initial value is "1".

● Setting Modification Protection

This protection level protection setting will not be affected by panel keys.

Set Point	Explanation
OFF	Settings can be changed with keys.
ON	Settings cannot be changed with keys. (protection level can be changed.)

- The initial value is set to "OFF".

Automatic/manual key protection

Using the protection [A/M] key.

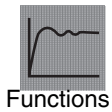
Set Point	description
OFF	Use the [A/M] key to switch between manual/automatic
ON	Cannot use the [A/M] to switch between manual/automatic

- The initial value is "OFF".

Chapter 5
Parameters

Contents of This Chapter

■ Definition of the symbols used in this chapter


Functions

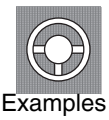
Explaining parameter function.


Settings

Explaining setting range examples and parameter initial values.


Monitoring

Explaining monitoring ranges.


Examples

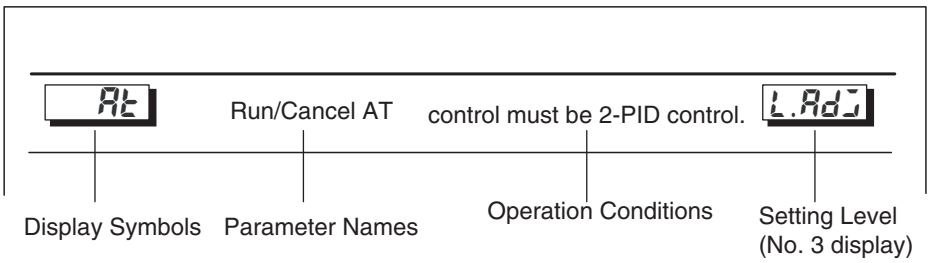
Explaining use of parameters.


Reference

Explaining related parameters and categories.

■ Parameter display

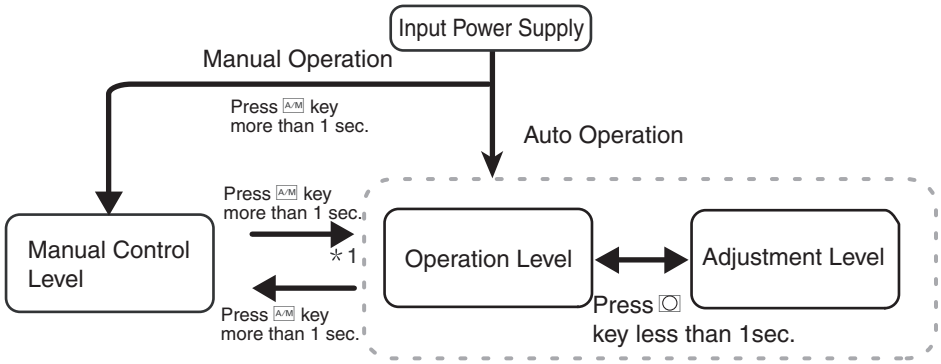
Parameters can only be displayed if the conditions given to the right are met. Note that protected parameters are not displayed regardless of whether the conditions are met.



■ Parameter explain order in this chapter

Parameters are explained by level.
Parameters that may be used in each level are given on the first page of each section. The names of the parameters are ordered according to the display sequence used by the E5EZ-PRR.

When using manual operation, this level is displayed.
Setting valve open percentage.



＊1 Switching from the manual control level to key control can only be done from the current operation level (initial values).

Accessing the manual control level.
In the operation /adjustment level, press the A/M key for 1 second or more to change to manual mode, i.e. switch to the manual control level. In the future during manual operation only "process value/set value/valve open percentage" will be displayed. When "process value/set value/valve open percentage" is displayed in the manual control level, press the A/M key for 1 second or more to switch to manual/auto mode, change to the operation level, and display the operation level's initial data.

Manual MV

Manual MV

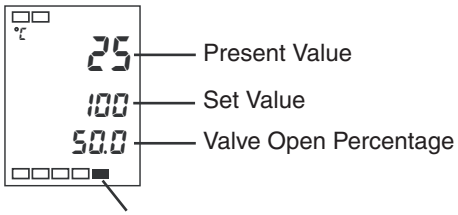
During Manual Operation

Setting manual control valve open percentage

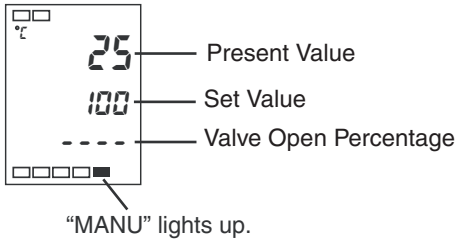
Manual output display

Under manual control level, **"**process value/set point/manual MV**"** are displayed, and MV may be set in manual mode. During proportional control, the No. 3 display shows the valve open degree; there is no potentiometer input, so potentiometer input errors are displayed as **"----"**.

Potentiometer Present



No potentiometer or potentiometer input error



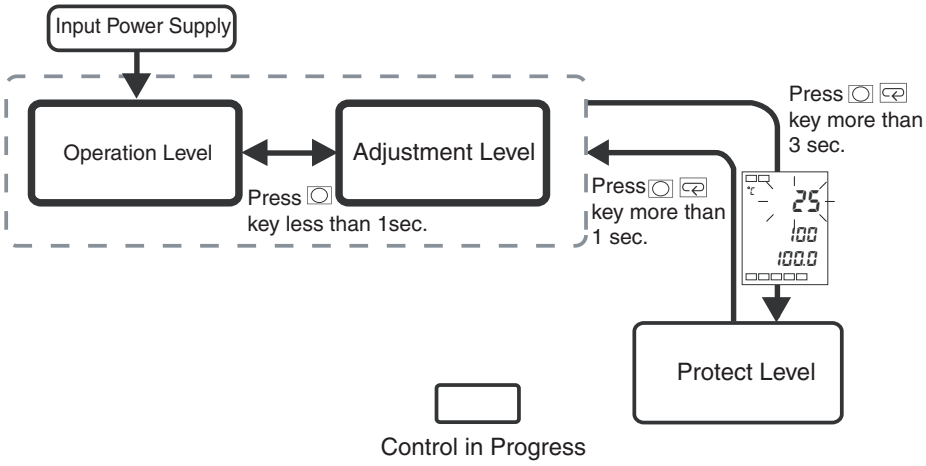
Manual input settings

Press the ⩓ key, control output 1 (OPEN side output) will turn ON; press the ⩔ key control output 2 (CLOSE side output) will turn ON.

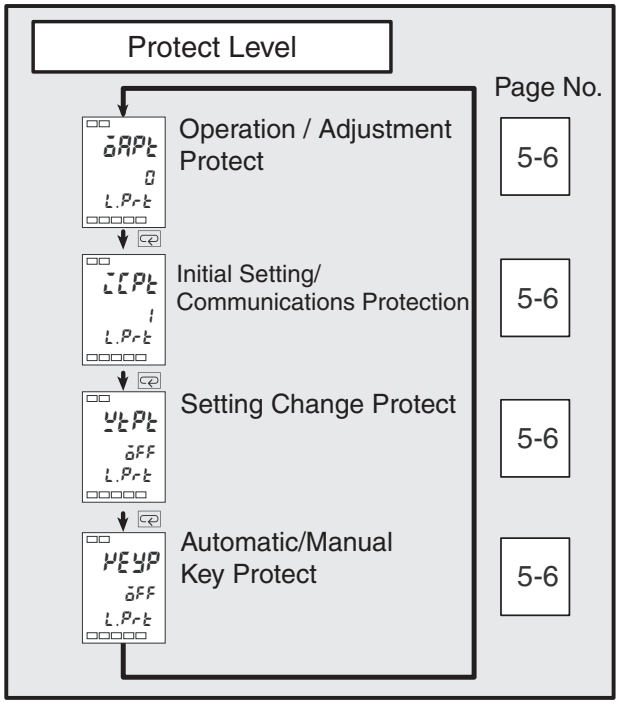
- Position proportional type

Control Mode	Monitoring Range	Units
Position proportional	-10.0 ~ 110.0	%

The E5EZ-PRR provides 4 protect functions, namely “Operation/Adjustment Protect”, “Initial Setting/ Communications Protect”, “Setting Change Protect”. These 4 protect functions prevent unintentional changes from occurring when panel keys are pressed.



To switch from Operation Level to Protect Level by pressing and key more than 3 seconds.



Setting of protected parameter are not displayed, therefore they cannot be changed.

oAPt	**Operation/Adjustment Protect**	L.Prt
iCPt	**Initial /Communications Protect**	
StPt	**Setting Change Protect**	
MEnP	**Automatic/Manual Key Protect**	

This parameter determines the range of parameters protected. ▭ indicates the initial value.


Functions


Note

- Operation/adjustment protect

  The relationship between set points and protect range is shown below.

Level		Set Point 0	1	2	3
Operation level	Process value	○	○	○	○
	Set Point	◎	◎	◎	○
	Other	◎	◎	×	×
Adjustment level		◎	×	×	×

◎ : display/change: Yes
○ : display: Yes
× : Cannot display or switch to level

- When the set point is "0", there is no protect function .
- Initial /communications protect

  Restricts access to the "initial level", "communications level" and "advanced function level".

Set Point	Initial Level	Communications Level	Advanced Function Level
0	○	○	○
1	○	○	×
2	×	×	×

○ : can switch to other levels
× : cannot switch to other levels

- Setting Change Protect

  Limits the ability to change settings by pressing keys.

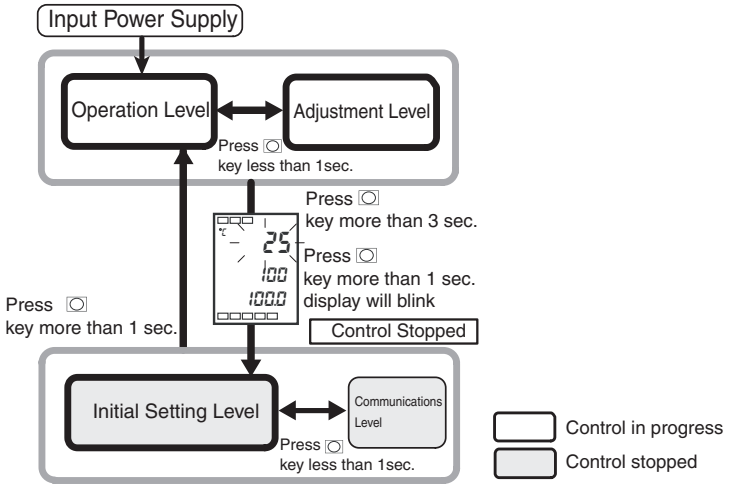
Set Point	Explanation
OFF	Limits the ability to change settings by pressing keys.
ON	Doesn't limit the ability to change settings by pressing keys (Protect Level can be changed.)

- Auto/manual key protect

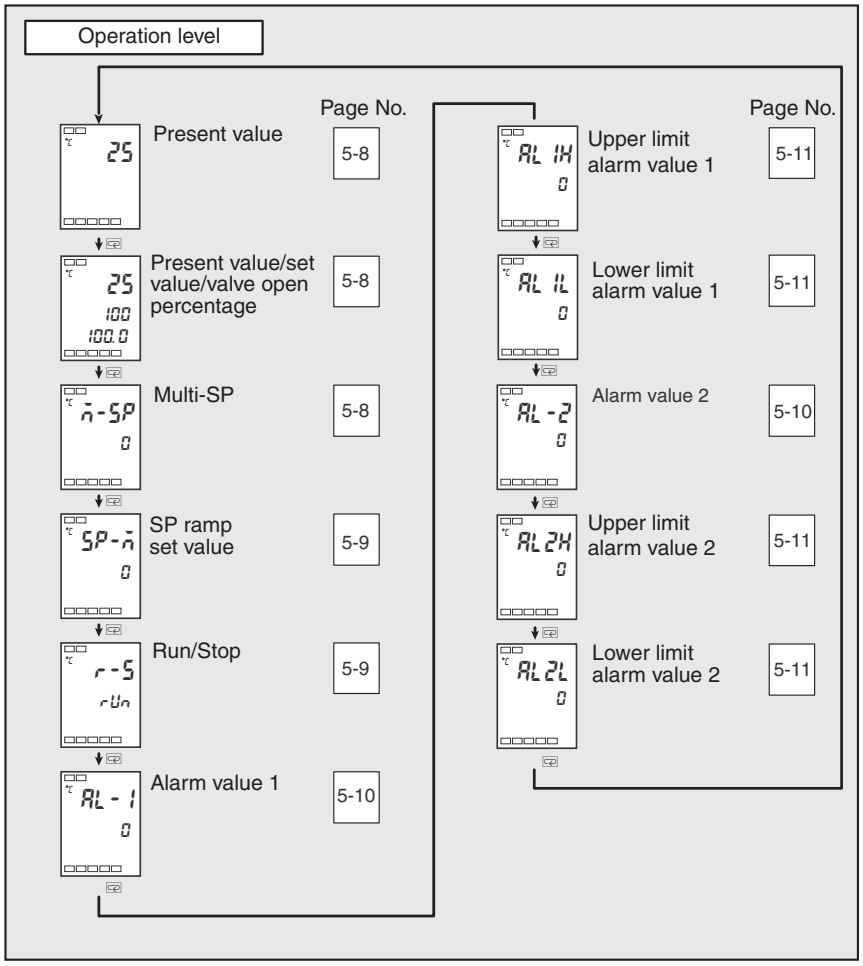
  Protect A/M key operations

Set Point	Explanation
OFF	The A/M key can be used to switch automatic/manual
ON	The A/M key cannot be used to switch between automatic/ manual

When the E5EZ-PRR is engaged in control, this level is displayed. Alarm values and monitor MV can be set in this level.



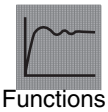
When the E5EZ-PRR is turned on, this level will be displayed automatically. Press the key or and key to switch to other levels.



Process Value

"Add process value display" parameter must be "ON"。

None Display


Functions

The process value is displayed on No.1 display but not No.2 or No.3 displays.

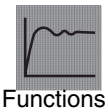

Monitoring

	Monitor range	Units
Process value	Input indicator range (see p.5-21)	EU


Reference

- Related parameters
  "input type" (initial level) (p. 5-21)
  "set point upper limit", "set point lower limit" (initial level) (p. 5-23)

Process value/set value/valve open percentage


Functions

Process value is displayed on no. 1 display, set point is displayed on no. 2 display, and valve open percentage on no. 3 display.

	Monitor Range	Setting Range	Units
Process value	Input indicator range (see p.A-10)		EU
Set point		Set point lower limit ~ Set point upper limit	EU
Valve open penentage	10.0~110.0%		%

Decimal point position depends on sensor type being used.

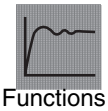

Reference

See process value parameter.

Multiple set point (set points 0 through 3)

Event input ON: parameter "number of multi SP used" must be set to "0"
Parameter "number of multi SP used" must be set to "ON"
Event input OFF: parameter "number of multi SP used" must be set to "ON"

None Display


Functions

Multiple set point allows the user to set 4 set points in the adjustment level (set points 0 through 3) . These values can be switched by pressing keys on the panel or by external input signals. In the parameter, input set points 0 through 3.

SP ramp set points

"SP ramp set point" parameter cannot be set to "OFF".

None Display

This parameter monitors the target value ramp set point.

Functions

The **"ramp"** function uses the form of the rate of change to limit the set point's width of variation. The set point is displayed under **"**target value ramp set point**"** (advanced function level).
When the set point exceeds the pre-set ramp value, the set point will adjust to the set point of the **"**present value /target value**"** parameter.

Monitoring

Monitor Range	Units
SP: Set point lower limit ~ set point upper limit	EU

Reference

- Related parameters
  "process value/set value/valve open percentage" (operation level) (p.5-8)
  "SP ramp set point" (advanced function level) (p.5-17)
  "set point upper limit", "set point lower limit" (initial level) (p.5-23)

Run/Stop

The run/stop function cannot be set to event input indicators 1 and 2 .

None Display

This parameter indicates run and stop.

Functions

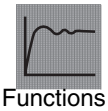
When selecting **"**run**"**: run**"**, control executes. When selecting **"**stop**"**: stop**"**, control stops. when control stops, the stop light will come on.
The initial value is **"**run**"**

When the run/stop function is controlled by event input, the run/stop function cannot be set by pressing keys on the panel.

Reference

AL-1	**Alarm value 1**	None Display
AL-2	**Alarm value 2**	Alarm type must be set to no alarm or upper or lower limit, upper or lower limit range or other than attached standby order sequence upper or lower limit.

This parameter is listed under alarm type, setting input value “X”.


Functions

- This parameter is used to set the alarm output 1, 2 alarm value .
- With temperature input, the decimal point is determined by the sensor currently in use. With analog signal input, the decimal point is determined by the “decimal point” parameter.


Settings

Setting range	Units	Initial value
-1999~9999	EU	0


Reference

The alarm type must be set to something other than upper or lower limit alarm.

- Related parameters
  “Input type” (initial level) (p. 5-21), “scaling upper limit”, “scaling lower limit”, “decimal point” (initial level) (p. 5-22)
  “Alarm 1 and 2 type” (initial level) (p. 5-24)
  “Activate alarm 1 and 2 on alarm” “alarm 1 and 2 hysteresis” (from p.5-32 to p.5-33)
  “standby sequence reset” (p. 5-31) , “alarm latch” (p. 5-36) (advanced function level)

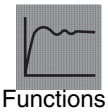
AL1H **Upper limit alarm value 1**

AL1L **Upper limit alarm value 2**

None Display

Alarm 1 type must be set to upper or lower limit, upper or lower limit range or attached the standby sequence upper or lower limit alarm.

When alarm 1 type (initial level) is set to upper or lower limit mode, this parameter is independently set to the upper or lower limit alarm value.


Functions

- This parameter is set to alarm 1 upper or lower limit value.
- During the temperature input period, decimal point location is related to the sensor currently in use. With analog signal input, the decimal point is determined by the "decimal point" parameter.


Settings

Setting Range	Units	Initial Value
-1999~9999	EU	0


Reference

- Related parameters
  "alarm 1 type" (initial level) (p. 5-24)
  "standby sequence reset " (p. 5-31) , "activate alarm 1 on alarm", "alarm 1 hysteresis" (p. 5-32) , "alarm 1 latch" (p. 5-36) (advanced function level)

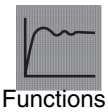
AL2H **Upper limit alarm value 2**

AL2L **Lower limit alarm value 2**

None Display

Alarm 2 type must be set to upper or lower limit, lower limit range or near the standby sequence upper or lower limit alarm.

When alarm 2 type (initial level) is set to upper or lower limit mode, this parameter is independently set to the upper or lower limit alarm value.


Functions

- This parameter is set to alarm 2 upper or lower limit value.
- During the temperature input period, decimal point location is related to the sensor currently in use. With analog signal input, the decimal point is determined by the "decimal point" parameter.


Settings

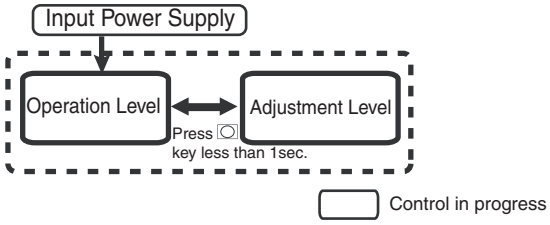
Setting Range	Units	Initial Value
-1999~9999	EU	0


Reference

- Related parameters
  "Alarm 2 type" (initial level) (p. 5-24)
  "Standby sequence reset" (p. 5-31) , "activate alarm 2 on alarm", "alarm 2 hysteresis"
  (p. 5-32) , "alarm 2 latch" (p. 5-36) (advanced function level)

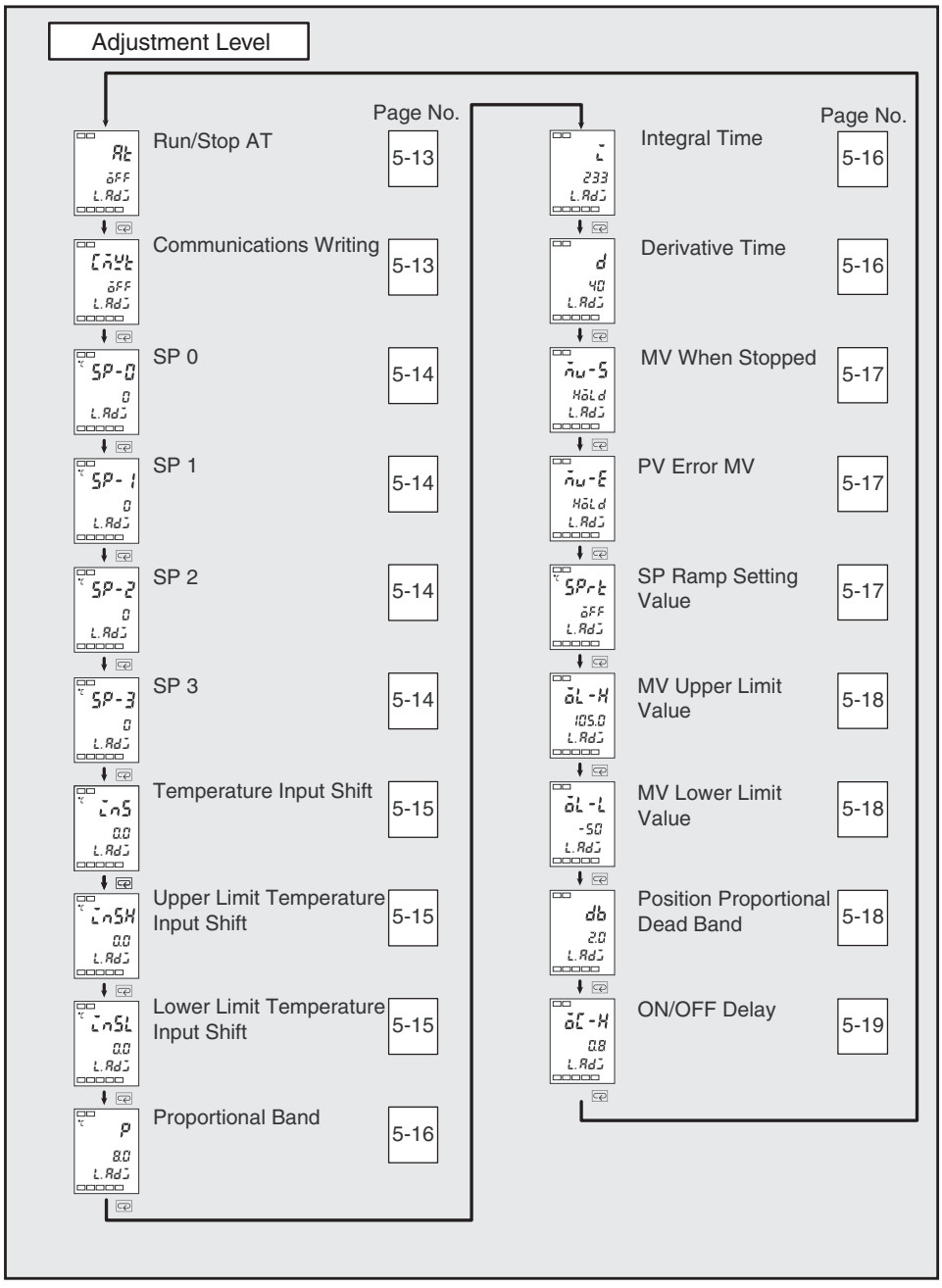
Adjustment Level

This level is used for AT (auto-tuning) or setting control.
This level provides basic controller parameter settings for use with PID (proportional band, integral time and derivative time) .



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

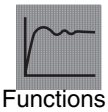
- Adjustment level set points 0 ~ 3, are the set points used during transfer between multiple set point input.
- By setting the operation /adjustment protect to "0", the adjustment level parameters can be changed. If the protect level is set to values from "1" ~ "3" value, the adjustment level parameter will not be displayed.



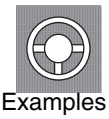
AT Execute/Cancel

operation level/adjustment level/ protect level operation

This parameter executes AT (auto-tuning) .


Functions

- During auto-tuning, by forcibly changing the MV, the controlled object's unique values are calculated, and optimal set point PID parameters are automatically set (“proportional band”, “integral time” and “derivative time”) .


Examples

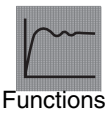
- Under normal conditions, this parameter is set to “oFF”. press ⩓ or ⩔, to open the parameter, and execute AT.
- After AT finishes, this parameter automatically returns to “oFF”.


Reference

- Related parameters
  “proportional band”, “integral time”, “derivative time” (adjustment level) (p. 5-16)

communications writing

The communications unit must be installed.


Functions

This parameter starts/stops the host (superior computer), from using communications to write to the temperature controller's parameter function .


Settings

ON : activate writing
OFF : deactivate writing
initial value is OFF

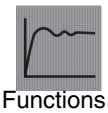

Reference

- Related parameters
  “MB command logic switching” (advanced function level) (p. 5-38)
  “communications unit No.”, “baud rate”, “data length”, “communication parity”, “stop bit” (communications level) (p. 5-42)

L.Adj

SP-0	**Set Point 0**	set point 0 and 1 event input ON: "number of multi SP used" set to 1 or 2, or "number of multi SP used" set to 0 "multiple settings" set to 「ON」. event input OFF: "multiple set point used" set to 「ON」.
SP-1	**Set Point 1**	
SP-2	**Set Point 2**	set point 2 and 3 event input ON: "number of multi SP used" set to 2, or "number of multi SP used" set to 0 "multiple settings" set to 「ON」. event input OFF: "multiple set point used" set to 「ON」.
SP-3	**Set Point 3**	

When using the multiple set point function, these parameters are used to set multiple set points.


Functions

Using the panel's keys or event input, select set points for these parameters.

- After set points are changed, multiple set point's current parameter set point's can be linked and changed.
- During the temperature input, decimal point location is related to the sensor currently in use.
  With analog signal input, the decimal point is determined by the "decimal point" parameter.


Settings

Setting Range	Units	Initial Value
set point lower limit ~ set point upper limit	EU	0


Reference

- Related parameters
  "number of multi SP used" (advanced function level) (p. 5-29)
  "event input indicator 1" (advanced function level) (p. 5-30)
  "event input indicator 2" (advanced function level) (p. 5-30)
  "Multi SP used" (advanced function level) (p. 5-31)
  "process value" (operation level) , "process value/set point" (operation level) (p. 5-8)
  "Input type" (initial level) (p. 5-21)

Temperature Input Shift Value

L.Adj

Temperature input type "input type" parameter must be set to temperature input, but not for non-contact temperature sensors.

Sometimes the measured value may be different from the actual temperature. To compensate for this difference, the input shift value and input measured value can be added together and displayed as the measured value, and used for control.

Functions

The entire input range uses a fixed numeric shift (1 point shift) . If the input shift value is set to **"**-1.0ºC**"**, then the measured temperature value deducts 1.0ºC before being displayed as the measured value.

Settings

Setting Range	Units	Initial Value
-199.9~999.9	°C or °F	0.0

Reference

- Related parameters
  "input type" (initial level) (p.5-21)

Upper Limit Temperature Input Shift Value

Lower Limit Temperature Input Shift Value

L.Adj

Temperature input type "input type" parameter can only be set to non-contact temperature sensor.

1 point shift uses the "temperature input shift" parameter to apply a fixed shift the entire input range, and 2 point shift uses two point (upper limit and lower limit) to shift the input range. By setting the upper or lower limi input shift value to a different value , 2 point shift can be more accurate than 1 point shift in compensating for the input range.

Functions

These parameters set the shift values of the upper limit and lower limit of the input range respectively (2 point shift).

Settings

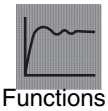
Monitor Range	Units	Initial Value
-199.9~999.9	°C or °F	0.0

Reference

- Related parameters
  "input type" (initial level) (p. 5-21)

P	**Proportional Band**	L.Adj
I	**Integral Time**	
d	**Derivative Time**	

This parameter can be set as a PID parameter. Note that when using AT, the PID will be set automatically.


Functions

Using Proportional:	P refers to MV and deviation zone direct proportional control (control errors) .
Using integrals:	I provides control error integral time proportional control control. During proportional control integral deviation occurs frequently (control discrepancies) . So proportional and integral are used together.After a period of time, control discrepancies vanish and the set point matches the control temperature (process value).
Using derivatives:	D provides control error derivative time proportional control. Because proportional control and integral control correct control errors, the control system will delay reaction to sudden temperature changes temperature. derivative control makes use of pre-measured output proportional control, to facilitate correction of errors in advance.


Settings

Parameters	Setting Range	Units	Initial Value
proportional band	temperature input: 0.1~999.9	EU	8.0
	analog input: 0.1~999.9	%FS	10.0
integral time	floating:1~3999	second	233
	closed: 0~3999		
derivative time	0~3999	second	40


Reference

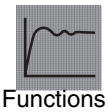
- Related parameters
  “activate/deactivate AT” (adjustment level) (p. 5-13)

MV When Stopped

L.AdJ

MV During Error

"stop/error add MV" must be set to "ON"


Functions

- "MV when stopped" refers to MV when operation has stopped (off/hold/on) .
- "MV during error" refers to operation during error (off/hold/on) .


Settings

- Position proportional type

Setting Range	Units	Initial Value
HoLd: hold/oPEn: open/CLoS: close	none	HoLd

SP ramp set point

L.AdJ


Functions

- This parameter specifies the rate of change of the SP ramp. Allow each unit time (min) maximum change width to be set to "SP ramp set point". But note that when SP ramp set point is set to "OFF", SP ramp function is not effective.
- With temperature input, the SP ramp set value's decimal point is determined by the sensor currently in use. During analog signal input, it is related to scaling.


Settings

Parameters	Setting Range	Units	Initial Value
SP ramp set value	OFF,1~9999	EU	OFF

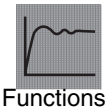

Reference

- Related parameters
  "input type" (p. 5-21) , "scaling upper limit", "scaling lower limit" "decimal point ", (p. 5-22) .

MV Upper Limit

MV Lower Limit

L.Adj


Functions

- The "MV upper limit" and "MV lower limit" parameter are used to set the MV upper and lower limits. When the MV value calculated by the E5EZ-PRR exceeds the upper or lower limit value, the upper limit or lower limit is set to the output limit.


Settings

- MV upper limit

Control Mode	Setting Range	Units	Initial Value
standard	MV lower limit +0.1~105.0	%	100.0

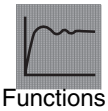

Reference

- MV upper limit

Control Mode	Setting Range	Units	Initial Value
standard	0.5 ~ MV upper limit -0.1	%	0.0

Position proportional dead band

L.Adj


Functions

- Setting position proportional control output hold period (he time it takes OPEN output and CLOSE output switch from ON to OFF) .


Settings

Setting Range	Units	Initial Value
Floating: 0.1~10.0	%	2.0
Closed: 0.1~10.0	%	4.0


Reference

- Related events
  3.8 ceramic kiln position proportional control
  ■ Position proportional control fixed settings (p. 3-20).

oC-H Hysteresis off/on

L.AdJ

Functions

- With position proportional control, the OPEN and CLOSE output ON, OFF switching uses hysteresis.

Settings

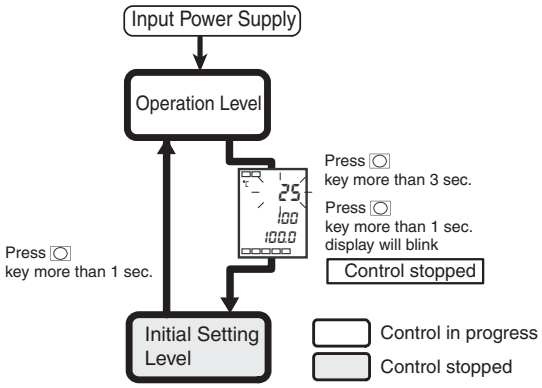
Setting Range	Units	Initial Value
0.1~20.0	%	0.8

Reference

- Related events
  3.8 ceramic kiln position proportional control
  ■ Position proportional control fixed settings (p. 3-20).

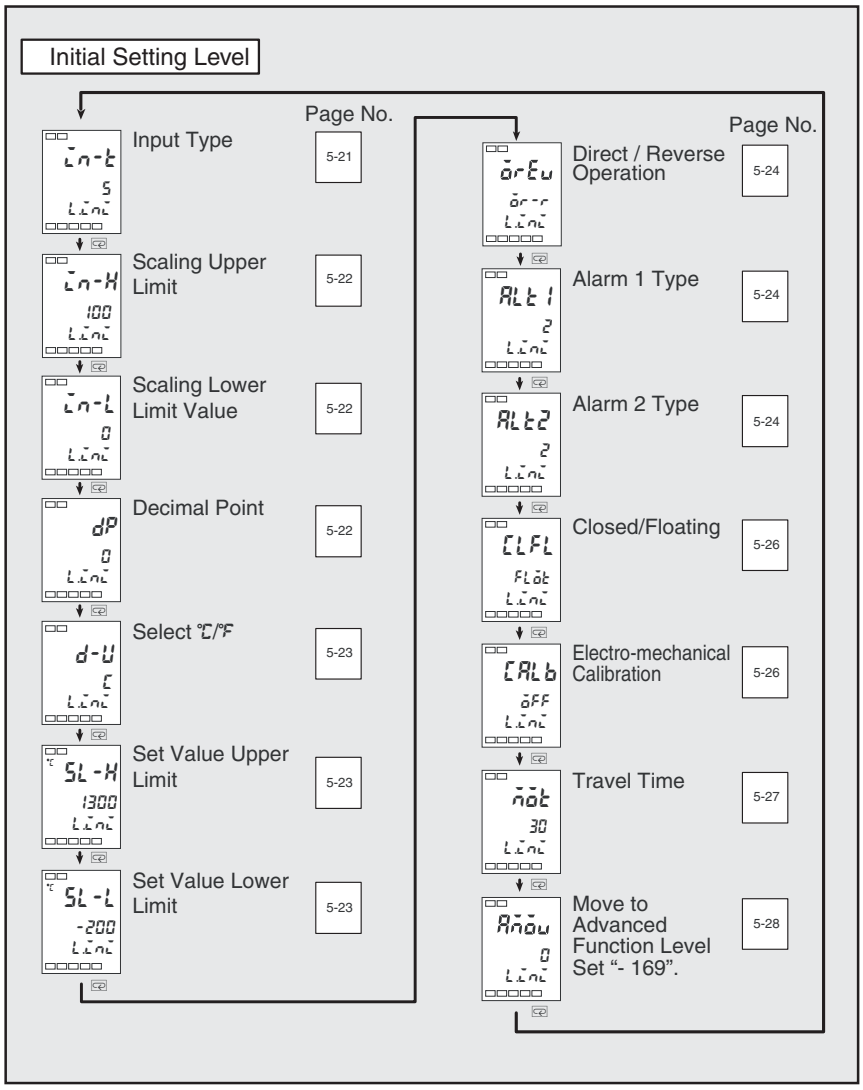
Initial Level

This level is used to set the basic specifications of the E5EZ-PRR . In this level, users can set the “input type” parameter used to select the sensor input type and link it to the E5EZ-PRR, limit set point's setting range or set alarm modes.



Press the key for 3 seconds or more to switch from the operation level to the initial level.

- When “initial/communications protect” is set to “2”, the initial level is not displayed. When “initial/communications protect” is set to “0”or “1”, the initial level may be used.
- When selecting analog signal input as the input type, the “scaling upper limit”, “scaling lower limit” and “decimal point ” parameters are displayed.



Input Type

Functions

- By using the appropriate code, this parameter can set the sensor type .
- After changing parameters, the set point upper limit becomes the initial value. If changing the set point limit range, users can set the "set point upper limit" and "set point lower limit" parameters (initial level).

Settings

- Set code according to the following table. The shaded area represents the initial setting.

Temperature input: E5EZ-PRR2 □ T

Input Type	Name	Set Point	Input Temperature Range	
platinum resistance thermometer	Pt100	0	-200 ~ 850 (°C)	/-300 ~ 1500 (°F)
		1	-199.9 ~ 500.0 (°C)	/-199.9 ~ 900.0 (°F)
		2	0.0 ~ 100.0(°C)	/0.0 ~ 210.0 (°F)
	JPt100	3	-199.9 ~ 500.0 (°C)	/-199.9 ~ 900.0 (°F)
		4	0.0 ~ 100.0 (°C)	/0. 0 ~ 210.0 (°F)
thermocouple	K	5	-200 ~ 1300 (°C)	/-300 ~ 2300 (°F)
		6	-20.0 ~ 500.0 (°C)	/0.0 ~ 900.0 (°F)
	J	7	-100 ~ 850 (°C)	/-100 ~ 1500 (°F)
		8	-20.0 ~ 400.0 (°C)	/0.0 ~ 750.0 (°F)
	T	9	-200 ~ 400 (°C)	/-300 ~ 700 (°F)
		22	-199.9 ~ 400.0 (°C)	/-199.9 ~ 700.0 (°F)
	E	10	0 ~ 600 (°C)	/0 ~ 1100 (°F)
	L	11	-100 ~ 850 (°C)	/-100 ~ 1500 (°F)
	U	12	-200 ~ 400 (°C)	/-300 ~ 700 (°F)
		23	-199.9 ~ 400.0 (°C)	/-199.9 ~ 700.0 (°F)
	N	13	-200 ~ 1300 (°C)	/-300 ~ 2300 (°F)
	R	14	0 ~ 1700 (°C)	/0 ~ 3000 (°F)
	S	15	0 ~ 1700 (°C)	/0 ~ 3000 (°F)
	B	16	100 ~ 1800 (°C)	/300 ~ 3200 (°F)
Non-contact Temperature Sensor ES1B	10°C ~ 70°C	17	0 ~ 90 (°C)	/0 ~ 190 (°F)
	60°C ~120°C	18	0 ~ 120 (°C)	/0 ~ 240 (°F)
	115°C ~ 165°C	19	0 ~ 165 (°C)	/0 ~ 320 (°F)
	140°C ~ 260°C	20	0 ~ 260 (°C)	/0 ~ 500 (°F)
analog signal input	0 ~ 50mV	21	The following variation ranges are related to calibration results -1999 ~ 9999, -199.9 ~ 999.9	

Analog input type: E5EZ-PRR2 □ L

Input Type	Name	Set Point	Input Temperature Range
Current	4 ~ 20mA	0	Depending on scaling, use in one of these ranges: -1999 ~ 9999, -199.9 ~ 999.9, -19.99 ~ 99.99, -1.999 ~ 9.999
	0 ~ 20mA	1	
Voltage	1 ~ 5V	2	
	0 ~ 5V	3	
	0 ~ 10V	4	

Reference

- Related parameters
  "Select °C/°F", "set point upper limit", "set point lower limit" (initial level) (p. 5-23)

Scaling Upper Limit

Scaling Lower Limit Input type must be set to analog signal input .

Decimal Point

Functions

- When input type is analog signal input, these parameters can be used.
- When input type is analog signal input, execute calibration. For the "scaling upper limit" parameter set the upper limit, for "scaling lower limit" parameter set the lower limit.
- Decimal point parameter determines the parameter's decimal point (set point etc.) .

Settings

- Scaling upper limit, scaling lower limit

Parameters	Setting Range	Units	Initial Value
scaling upper limit	scaling lower limit +1 ~ 9999	none	100
scaling lower limit	-1999 ~ scaling upper limit-1	none	0

- Decimal point :initial value is "0:0 places after the decimal point "
  Temperature input type (E5EZ-PRR2 □ T) can select 「0~1」
  Analog input type (E5EZ-PRR2 □ L) can select 「0~3」

Setting Range	Setting	Example
0	0 places after the decimal point	1234
1	1 places after the decimal point	123.4
2	2 places after the decimal point	12.34
3	3 places after the decimal point	1.234

Reference

- Related parameters
  "input type" (initial level) (p. 5-21)

d-U Select °C/°F

Input type must be set to temperature input

L.Lnk

Functions

- Set temperature input unit to “°C”or “°F”

Settings

Setting Range	Initial Value
C:°C/F: °F	C

Reference

- Related parameters
  “Input type” (initial level) (p. 5-21)

SL-H Set Point Upper Limit

L.Lnk

SL-L Set Point Lower Limit

Functions

- By setting the set points, this parameter can be used to limit upper or lower limit values. Using the “set point upper limit” and “set point lower limit” parameters, set the set point within the upper or lower limit set point specification range. If the current set point exceeds the range, it will be forcibly returned to either the upper limit value or lower limit value (whichever is closest).
- When the temperature input type and temperature unit are changed, the set point upper limit and set point lower limit will be forcibly returned to the sensor's upper or lower limit value.
- With temperature input, the decimal point is determined by the sensor currently in use. During analog signal input, it is related to scaling.

Temperature input: E5EZ-PRR2 □ T

Settings

Parameters	Setting Range	Units	Initial Value
Set point upper limit	Set point lower limit +1 is the sensor range upper limit	EU	1300
Set point lower limit	Sensor range lower limit is the set point upper limit-1	EU	-200

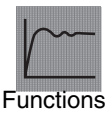
Analog input type: E5EZ-PRR2 □ L

Reference

Parameters	Setting Range	Units	Initial Value
Set point upper limit	Set point lower limit +1 is the sensor range upper limit	EU	100
Set point lower limit	Sensor range lower limit is the set point upper limit -1	EU	0

- Related parameters
  “input type” (p. 5-21), “select °C/°F” (p. 5-23) (initial level)

Direct/Reverse Operation



Functions

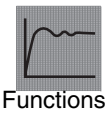
- "Direct operation" refers to control in which MV increasing as the process value increases. "Reverse operation" refers to control in which MV increases as the process value decreases.

Settings

Setting Range	Initial Value
oR-r reverse control/oR-d direct control	oR-r

Alarm 1 Type

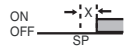
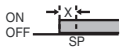
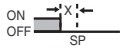
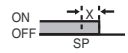
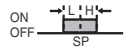
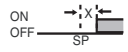
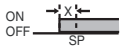
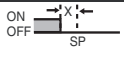
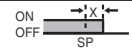
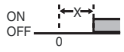
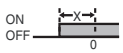
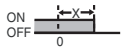
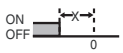
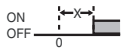
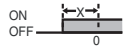
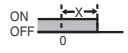
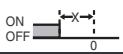
Alarm 2 Type



Functions

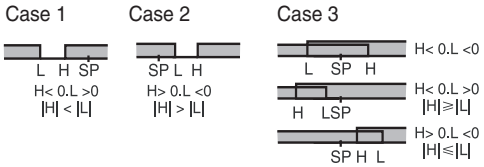
- Select one of the following types for alarm 1 and 2:
  Eviation/deviation range/absolute value

Settings

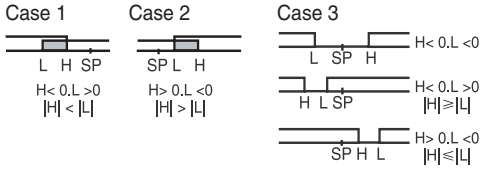
Set Value	Alarm type	Alarm Input Operation	
		X is positive	X is negative
0	No alarm function	Output OFF	
1	upper and lower limits *1		*2
2	upper limits		
3	lower limits		
4	upper and lower limit range *1		*3
5	standby sequence upper and lower limits *1	*5 	*4
6	standby sequence upper limits		
7	standby sequence lower lower limits		
8	absolute value upper limit		
9	absolute value lower limit		
10	standby sequence absolute value upper limit		
11	standby sequence absolute value lower limit		

*1: "L" and "H" represent the upper limit value and lower limit value, alarm points can be set independently for values 1, 4 and 5.

*2: Setting value：1 upper and lower limit alarm



*3: Set value: 4 upper and lower limit range alarm



*4: Set value: standby sequence 5 upper and lower limit alarm

* Used with the upper and lower limit alarms described above

- In cases 1 and 2, if the upper and lower hysteresis limit values overlap, the alarm will always be off.
- In case 3, the alarm will always be off.

*5: Set value: standby sequence 5 upper and lower limit alarm

If hysteresis upper and lower limit values overlap, the alarm will always be on.

Reference

- For "alarm 1 and 2 type" parameter (Initial Level) , the alarm type of each alarm may be set independently. Initial value is "2：upper limit alarm".
- Related parameters

"alarm value 1 and 2" (Operation Level) (p. 5-10)

"upper limit alarm value 1 and 2", "lower limit alarm value 1 and 2" (Operation Level) (p. 5-11)

"Standby Sequence Reset" (p. 5-31), "activate alarm 1, 2 and 3 on alarm", "alarm 1, 2 and 3 hysteresis" (p. 5-32 and 5-33) , "alarm 1, 2 latch" (p. 5-36) (Advanced Function Level)

CLFL Closed/Floating

L.tnL

Functions

- Select position proportional control.
- Closed control
  link potentiometer for valve open percentage feedback control.
- Floating control
  Potentiometer non-feedback valve open percentage control can be done without linkage to the potentiometer. For settings see page 5-26.

Settings

Setting Range	Units	Initial Value
FLōt: floating	—	FLōt: floating
CLōS: closed		

Reference

- Related events
  3.8 ceramic kiln position proportional control (p. 3-17) .

CALb Electro-mechanical

L.tnL

Functions

- Execute electro-mechanical calibration - When monitoring valve opening please be sure to use this setting data (when in use display cannot be changed) .
- After using this setting data, “travel time” will be reset.

Settings

- After switching to this setting data, setting content will change to “oFF”.
- Selecting “on” will start electro-mechanical calibration.
- On completion it will automatically return to “oFF”.

Reference

- Related events
  3.8 ceramic kiln position proportional control ■ Position proportional control fixed settings (p.3-20) .
- Related parameters
  “travel time” (Initial Level) (p. 5-27) .

Travel Time

Functions

- Setting valve time from completely open to completely closed.
- Will be set automatically after using “electro-mechanical calibration”.

Settings

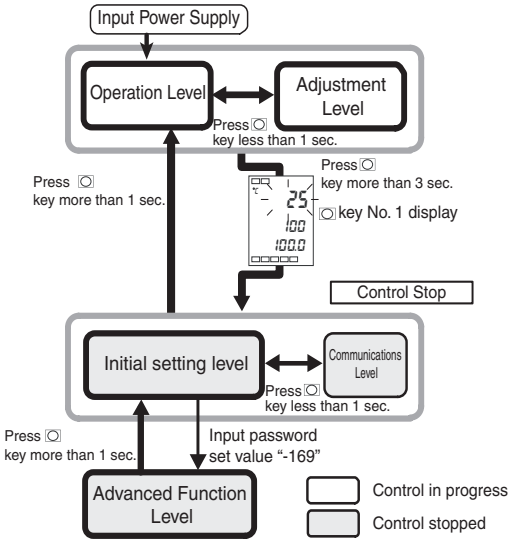
Setting Range	Units	Initial Value
1 ~ 999	second	30

Reference

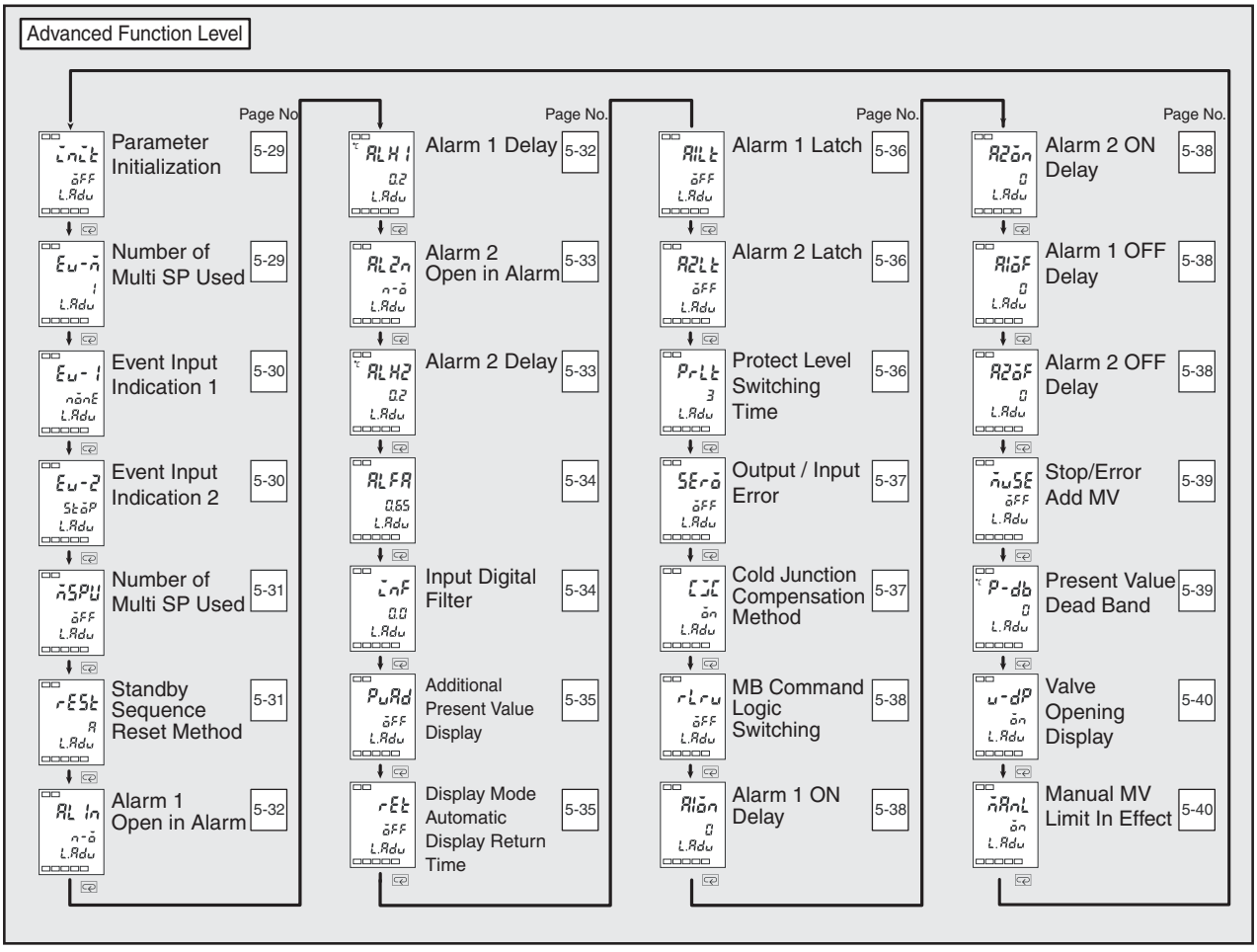
- Related events
  3.8 ceramic kiln position proportional control ■ Position proportional control fixed settings (p.3-20) .
- Related parameters
  “electro-mechanical calibration” (Initial Level) (p. 5-26) .

Advanced Function Level

This permits the maximum use of the E5EZ-PRR's functions. In the "Initial Level" enter the password ("-169") to switch to this level.
When entering password, "initial/communications protect" setting value must be set to "0".

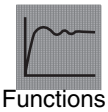


- When the "initial/communications protect" setting values are set to "0", this level's parameters can be used.
- Press the O key to change between setting levels.
- Press the ▲▼ key to change setting values.



Parameter Initialization

L.Adu


Functions

This parameter is used to return parameters to their initial values.

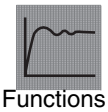

Settings

ON : Initialize all parameters.
OFF : After returning parameters to their initial values, the E5EZ-PRR automatically turns this parameter to "OFF".

Number Of Multi-SP Used

Event input function

L.Adu


Functions

The "Multi-SP" function is used to pre-set set point 0 through 3 by combining event input 1 and 2.
When the number of pre-set set point is 2 or 4, use the "number of multi-SP used" parameter . This parameter determines whether or not the "Event Input assignment 1" and "Event Input assignment 2" parameters will be displayed.


Settings

The parameter "number of multi-SP used" displays the functions given to event input 1 and 2.

Number of multi-SP used	Setting		Event Input Function	
	Event Input assignment 1	Event Input assignment 2	Event Input function	Event Input function
0	NONE or STOP or MANU *1		none or Switching or Switching AUTO/MANUAL *1	
1	- (not displayed)	NONE or STOP or MANU	2 points multi-SP (switch between set point 0/1)	None or Switching RUN/ STOP or Switching AUTO/ MANUAL
2	- (not displayed)	- (not displayed)	4 points multi-SP (switch between setting values 0/1/ 2/3)	

*1 "stop (run/stop) " can only be set when Event Input is 0 or 1. Event input can only be used on the setting side. The setting on the other side will change to "none".

- Initial value: 1
  When the available event input units are already installed on the E5EZ-PRR, multi-SP can be used, "number of multi-SP used" is set to "1" or "2".
- When number of multi-SP used is set to "1"

Event Input Indicator 1	Select the Setting Point
OFF	set point 0
ON	set point 1

- When number of multi-SP used is set to "2"

Event Input Assignment 1	Event Input Assignment 2	Select Set Point
OFF	OFF	set point 0
ON	OFF	set point 1
OFF	ON	set point 2
ON	ON	set point 3

* when the available event input unit E53-AZB are installed on the E5EZ-PRR, event input can be used . When the E5EZ-PRR selects event input status. When event input requires 50ms or more, activate event input switch status determination.

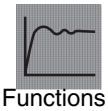

Reference

- Related parameters
  "Event Input Assignment 1" (Advanced Function Level) (p. 5-30)
  "Event Input Assignment 2" (Advanced Function Level) (p. 5-30)
  "Multi-SP used" (Advanced Function Level) (p. 5-31)
  "Set point 0 ~ 3" (Adjustment Level) (p. 5-14)

Event Input Assignment 1

Event Input Assignment 2

Event Input Assignment 1: number of multi-SP used must be set to "0"
Event Input Assignment 2: number of multi-SP used must be set to "0" or "1".


Functions

- The function below are for event input 1 or event input 2:
  run/stop


Settings

Setting	Functions
nonE	None
StoP	Run/Stop
AMnU	Auto/Manual

- The initial value for Event Input Assignment 1 is "none", and the initial value for Event Input Assignment 2 is "stop"


Reference

- Related parameters
  "Set point 0 ~ 3" (Adjustment Level) (p. 5-14)
  "number of multi SP used" (Advanced Function Level) (p. 5-29)

Number Of Multi SP Used

L.Adu

The "number of multi-SP used" parameter must not have installed event input units, or the "number of multi-SP used" parameter must be set to "0".

Functions

When the **"**multi-SP used**"** parameter is set to **"**ON**"**, setting values 0 ~ 3 may be set using the keys on the controller's panel.

Settings

on : Users may select set point 0 ~ 3.
oFF : Users may not select set point 0 ~ 3.

- initial value: oFF

Reference

- Related parameters
  "multi-SP" (Operation Level) (p. 5-8)
  "number of multi SP used" (Advanced Function Level) (p. 5-29)

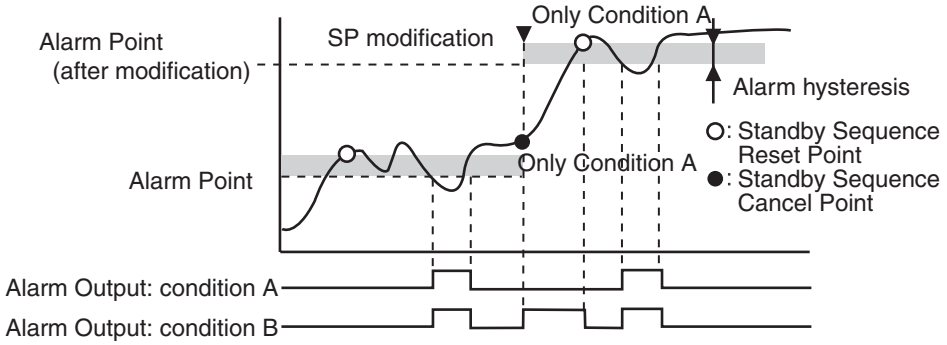
Standby Sequence Reset

alarm1 ~ 2 type must be set to "standby sequence".

L.Adu

Functions

- This parameter is used to cancel the alarm standby sequence, select activate reset conditions.
- When the "activate alarm1 on alarm" is set to "activate on alarm", the heater burnout alarm and input error output also change to "activate on alarm".
- Condition A:
  control startup (including connecting power supply) , setting value, alarm value (upper and lower limit alarm value) or input shift value changed.
- Condition B: Power ON
- The alarm type is shown below apply to the standby sequence lower limit alarm.



Settings

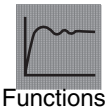
Setting Range	Initial Value
A: condition A b: condition B	A

Reference

- Related parameters
  "Alarm 1 ~ 2type", "Alarm1~ 2 latch" (Advanced Function Level) (p. 5-36)

AL In — Alarm 1 Open in Alarm

L.Adv


Functions

- This parameter sets alarm1 output status.
- When the temperature controller is set to “shutdown on alarm”, alarm output function status is always on. When set to “activate on alarm”, alarm output status will reverse or shut off. The following table describes the relationship between alarm output function and alarm output and output LCD indicator lights.


Settings

When **“**activate alarm1 on alarm**”** is set to **“**activate on alarm**”**, input error output also changes to **“**activate on alarm**”**.

	Alarm Output operation	Alarm Output	Output LCD
Close in Alarm	ON	ON	Lit
	OFF	OFF	Not lit
Open in Alarm	ON	OFF	Lit
	OFF	ON	Not lit

Setting Range	Initial Value
n-o close in alarm/n-C open in alarm	n-o

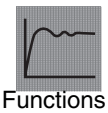

Reference

- Related parameters
  “Alarm value1” (p. 5-10) , “upper limit alarm value1”, “lower limit alarm value1” (p. 5-11) (Operation Level)
  “Alarm 1 type ” (p. 5-24) ,“Alarm 1 hysteresis” (p. 5-32) , “Standby Sequence Reset”, “Alarm 1latch” (p. 5-31) (Advanced Function Level)

ALH1 — Alarm 1 Hysteresis

“Alarm 1 type” parameter must not be “0”.

L.Adv


Functions

- This parameter sets alarm output 1 hysteresis.
- With analog signal input, decimal point setting depends on the “decimal point” setting.


Settings

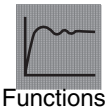
	Setting Range	Units	Initial Value
Temperature Input	0.1 ~ 999.9	°C or °F	0.2
Analog Input	0.01 ~ 99.99	% FS	0.02


Reference

- Related parameters
  “alarm value1” (p. 5-10) , “upper limit alarm value1”, “lower limit alarm value1” (p. 5-11) (Operation Level) “alarm 1 type ” (p. 5-24) ,
  “Alarm 1 open in Alarm” (p. 5-32) , “Standby Sequence Reset” (p. 5-31) “Alarm1 latch (p. 5-36) ” (Advanced Function Level)

AL2n Alarm 2 Open in Alarm

L.Adv


Functions

- This parameter sets alarm2 output status.
- When the temperature controller is set to "shutdown on alarm", alarm output function status is always on. When set to "alarm on", alarm output status will reverse or shut off. The following table describes the relationship between alarm output function and alarm output and output LCD indicator lights.


Settings

	Alarm Output Function	Alarm Output	Output LCD Refers To The Indicator Lights
Close in Alarm	ON	ON	Lit
	OFF	OFF	Not lit
Open in Alarm	ON	OFF	Lit
	OFF	ON	Not lit

Setting Range	Initial Value
n-o close in alarm/n-C open in alarm	n-o

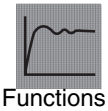

Reference

- Related parameters
  "Alarm value 2" (p. 5-10) , "upper limit alarm value2", "lower limit alarm value2" (p. 5-11) (Operation Level)
  "Alarm2 type" (Initial Level) (p. 5-24)
  "Alarm2 hysteresis" (p. 5-33) , "Standby Sequence Reset" (p. 5-31) , "Alarm2 latch" (p. 5-36) (Advanced Function Level)

ALH2 Alarm 2 Hysteresis

Alarm 2 type parameter must not be "0".

L.Adv


Functions

- This parameter sets alarm output 2 hysteresis.
- With analog signal input, decimal point setting depends on the "decimal point" setting.


Settings

	Setting Range	Units	Initial Value
Temperature Input	0.1 ~ 999.9	°C or °F	0.2
Analog Input	0.01 ~ 99.99	%FS	0.02


Reference

- Related parameters
  "Alarm Value 2" (Operation Level) (p. 5-10)
  "Upper Limit Alarm Value 2", "Lower Limit Alarm Value 1 and 2" (Operation Level) (p. 5-11)
  "Alarm 2 Type" (p. 5-24) (Initial Level)
  "Alarm 2 Open in Alarm" (p. 5-33) , "Standby Sequence Reset" (p. 5-31) "Alarm 2 Latch (p. 5-36) " (Advanced Function Level)

ALFA α L.Adv

Functions

- In general, use these paramater's initial values.
- This parameter sets 2-PID constant α.

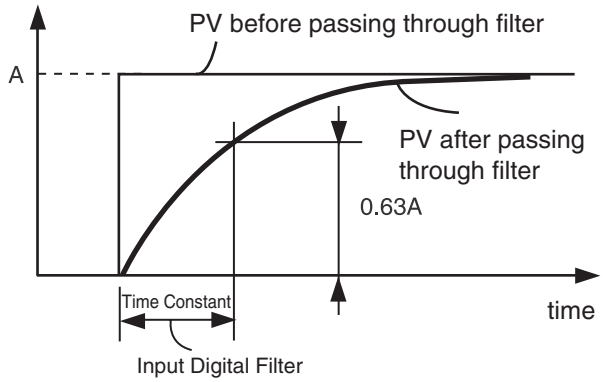
Settings

Setting Range	Units	Initial Value
0.00 ~ 1.00	None	0.65

inF Input Digital Filter L.Adv

Functions

- Set input digital filter time constant. The following figure shows the effects of the digital filter on data.

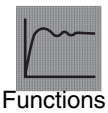


Settings

Setting Range	Units	Initial Value
0.0 ~ 999.9	Second	0.0

PuAd Additional Process Value Display

L.Adu


Functions

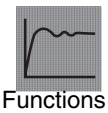
- Add process value display at the beginning of Operation Level. If you do not want the set point/valve open percentage to display, only use when displaying current temperature.


Settings

Setting Range	Initial Value
on:display/oFF not displayed	oFF

rEt Automatic Display Return Time

L.Adu


Functions

In the "Operation Level " and "Adjustment Level", if the panel setting keys are not used for a period of time, then the display will automatically return to the PV/SP/MV.
When this parameter is set to "OFF", this function is not effective (display cannot change automatically) .


Settings

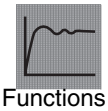
Setting Range	Units	Initial Value
OFF, 1~99	Second	oFF

A1Lt Alarm 1 Latch

L.Adv

A2Lt Alarm 2 Latch

alarm function must not be set to "0"


Functions

- When this is set to "ON", after the alarm function is activated, it will hold until power is turned off. But note that when switching to the Initial Level or Advanced Function Level the latch function is cancelled.
- When the alarm output function is set to alarm on, output shutdown will hold. When set to alarm shutdown, connection output will hold.


Settings

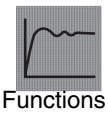
Setting Range	Initial Value
on: ON/oFF: OFF	oFF


Reference

- Related parameters
  "Alarm value 1 and 2" (Operation Level) (p. 5-10)
  "upper limit alarm value1 and 2", "lower limit alarm value1 and 2" (Operation Level) (p. 5-11)
  "Alarm1~2 type " (Initial Level) (p. 5-24)
  "Standby Sequence Reset" (Initial Level) (p. 5-31)
  "Alarm 1 to 2 Open in Alarm", "Alarm1 ~ 2hysteresis" (Advanced Function Level) (p. 5-32 and 5-33)

PrLt Protect Level Switching Time

L.Adv


Functions

- Sets the time required to switch from the Operation Level or Adjustment Level to the protect level.


Settings

Setting Range	Units	Initial Value
1 ~ 30	second	3


Reference

- Related parameters
  "Operation/adjustment protect", "initial/communications protect", "setting adjustment protect", "automatic/manual key protect" (protect level) (p. 5-5)

SEr0 Input Error Output

L.Adv


Settings

- When this is set to "ON", alarm1 output changes to "ON" when input errors occur. But note that alarm 1 operation display will not come on.
- When switching to the Initial Level, Communications Level, Advanced Function Level, output will shutdown.


Settings

Setting Range	Initial Value
on: Enabled/oFF: Disabled	oFF

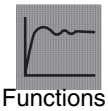

Reference

- Related parameters
  "input error " (error display) (A-4)

CJC Cold Junction Compensation Method

Input type must be thermocouple or non-contact temperature sensor.

L.Adv


Functions

- When input type setting value is set to 5 ~ 20, 22 or 23, determination is made by internal or external controller cold junction compensation.
- When using two thermocouples or two ES1B to measure temperature differences, external cold junction compensation settings are effective.


Settings

Setting Range	Initial Value
on: internal oFF: external	on

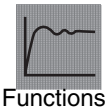

Reference

- Related parameters
  "input error" (error display) (A-4)

MB Command Logic Switching

communications function accords to model

L.Adu


Functions

- Sysway communications procedure, switch MB command logic (communications writing switching)
- MB command (communications writing switching) and E5 □ J MB command (remote/local switching) are equivalent.
- The shaded area indicates the settings initial values (same logic as E5 □ J).


Settings

Setting Value	MB Command Version Data	
	0000	0001
OFF	communications writing activation (select remote mode)	communications writing deactivation (select local mode)
ON	communications writing deactivation (select local mode)	communications writing activation (select remote mode)

(includes the explanation of the symbols used in the E5 □ J) .


Reference

- Related parameters
  "communications writing" (Adjustment Level) (p. 5-13)

Alarm 1 ON delay

L.Adu

Alarm 2 ON delay

Alarm 1 OFF delay

Alarm1, 2 type is not "0: no alarm function"

Alarm 2 OFF delay

- This parameter is used to set alarm1, 2, 3 output delay time.
- Output activation and shutdown delay can be set separately.

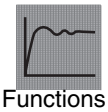
Setting Range	Units	Initial Value
0 ~ 99	Second	0

Alarm type must be set to something other than 0 type

- Related parameters
  "alarm 1 ~ 2 type " (Initial Level) (p. 5-24)

AuSE MV at Stop and Error Addition

L.Adu


Functions

- Setting 「MV on stop」 and 「MV on error」 display or not display.


Settings

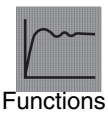
Setting Range	Initial Value
on: display/oFF: not display	oFF


Reference

- 「MV on stop」「MV on error」

P-db Process Value Dead Band

L.Adu


Functions

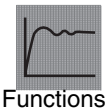
- Position proportional control. When the process value is in the process value dead band, for control purposes, process value = setting value.
- When the process value is near the setting value, this function prevents unnecessary output.


Settings

Setting	Setting Range	Units	Initial Value
Process value dead band	0 ~ 99999	EU	0

u-dP Valve Opening Display

L.Adu


Functions

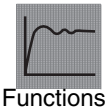
Displays valve open percentage, used when valve open percentage is not displayed.


Settings

Setting Range	Initial Value
on: display/oFF: not display	on

AnL Manual MV Limit Effectiveness

Only closed control L.Adu


Functions

Sets effectiveness of manual MV limit.
(during floating control, this setting value is not effective)

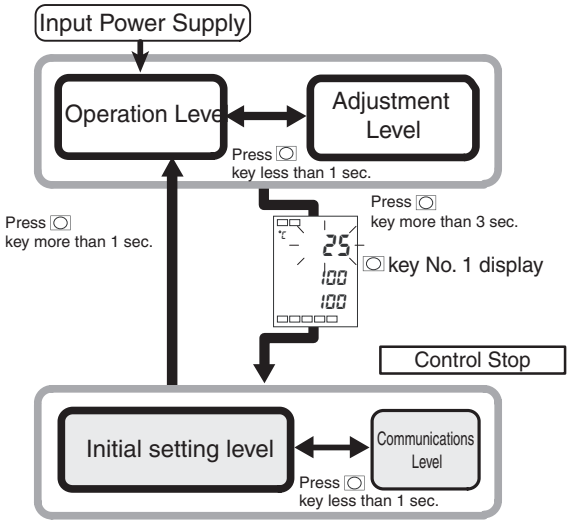

Settings

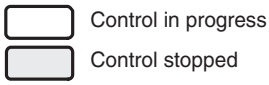
Setting Range	Initial Value
on: effective/oFF: not effective	on

Communications Level

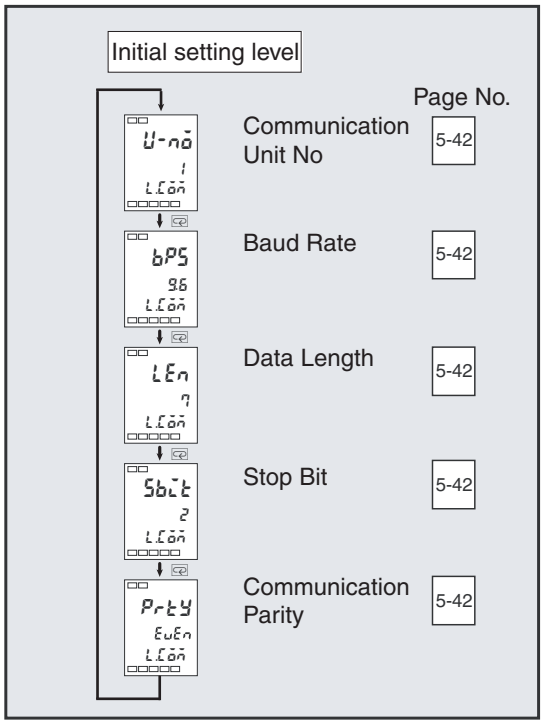
Setting communications specifications level.

Can only be displayed by models with communications function.

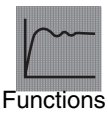




- Press the key to change between setting levels.
- Press the key to change setting values.



U-nō	**Communications Unit Code**	Communications function accords to model.	L.Cōn
bPS	**Baud Rate**		
LEn	**Data Length**		
SbiT	**Stop Bit**		
PrtY	**Communication Parity**		


Functions

- When power is reset, all parameters are activated.
- Match the communications used on the E5EZ-PRR201 □ / PRR203 □ and the host. If using one to many connections, ensure that the system has uniform communications protocols (unless "communications unit code" is selected).


Settings

Parameter	Display Symbols	Setting Value	Initial Value	Setting Range
Communications Unit Code	U-nō	0, 1~99	1	0-99
Baud Rate	bPS	1.2/2.4/4.8/9.6/19.2	9.6	1.2/2.4/4.8/9.6/19.2 (kb/s)
Data Length	LEn	7/8	7	7/8 (bit)
Stop Bit	SbiT	1/2	2	1/2
Communication Parity	PrtY	nōnE/EuEn/ōdd	EuEn	None/even/odd


Reference

- Related parameters
  "communications writing" (Adjustment Level) (p. 5-13)

Appendix

Specifications

■ Ratings

Power supply voltage		100-240 VAC, 50/60 Hz
Working voltage range		85% to 110% of rated supply voltage
Power consumption		10VA (10W)
Sensor input		Temperature input : thermocouple K, J, T, E, L, U, N, R, S, B Platinum resistance thermometer :Pt100, jpt100 Non-contact temperature sensor 10°C~70°C, 60°C~120°C 115°C~165°C, 140°C~260°C Analog signal input 0~50mv
		Analog input : current: 0~20mA, 4~20mA Voltage : 0~5V, 1~5V, 0~10V
Control Output	Relay output (OUT1, OUT2)	SPST-NO, 250 VAC 1A(including startup current) , Service life: 100,000 operations, minimum load of 5V 10mA
Alarm output		SPST-NO, 250 VAC, 2A (resistive load) , Service life: 100,000 operations, minimum load of 1V 1mA
Potentiometer input		100Ω~2.5kΩ
Control mode		2-PID
Setting mode		Use the panel for digital settings
Indicator mode		7 segment digital display and single light indicator, character height PV:9mm SV:7mm MV:6.8mm
Other functions		Based on controller model
Ambient operating temperature		-10°C~55°C(with no condensation or icing)
Ambient operating humidity		25-85％ (RH)
Storage temperature		-25°C~65°C(with no condensation or icing)
Elevation		2,000m or less
Recommended fuses		T2A, 250 VAC, hysteresis , low breaking capacity
Installation environment		Category II, pollution level 2 (IEC 61010-1)

* For the setting range of the sensor input , please see p. A-10.

■ Characteristics

Indicator accuracy	hermocouple: *1 (display value ± 0.5% or ± 1°C, whichever is greater) ± 1 digit maximum(see note) Platinum resistance thermometer: (display value ± 0.5% or ± 1°C, whichever is greater) ± 1 digit maximum Analog signal input: ± 0.5%FS ± 1 digit maximum Position proportional , potentiometer input : ± 5％FS ± 1 digit maximum	
Proportional band (P)	0.1~999.9°C (in units of 0.1°C)	
Integral time (I)	0~3999 (in units of 1 sec.) ＊ floating control time is 「1~3999」	
Derivative time (D)	0~3999 (in units of 1 sec.)	
Completely open to completely closed	0~99 (in units of 1 sec.)	
Manual setting value	0.0~100.0% (in units of 0.1％)	
Alarm setting range	-1999~9999 (decimal point position depends on input type)	
Input sampling period	500ms	
Insulation resistance	At least 20MΩ 2 sec. (500VDC)	
Dielectric strength	2000VAC 50 or 60Hz 1 minute(different polarity charging terminal)	
Vibration resistance (malfunction)	10~55Hz, 20m/s² X, Y and Z directions 10min each	
Shock resistance (malfunction)	100m/s², 3 times each axis, 6 directions	
Weight	Approx. 260g	Accessories: approx 100g
Storage device protection	EEPROM (nonvolatile) (write cycles: 100,000)	

*1 K (-200~1300°C) type, and T and N type thermocouples have a maximum indicator accuracy of ± 2°C ± 1 digit below -100°C, U and L type thermocouple have a maximum accuracy of ± 2°C ± 1 digit over the entire measurement range. The indicator accuracy of B type thermocouples is unlimited below 400°C, while R and S type thermocouple have indicator accuracy of ± 3°C ± 1 digit maximum below 200°C.

Error Display

When errors occur, the main display will alternately display the error code and the current display.
This section explains how to find error codes and corrective procedures.

Input error

- **Meaning**

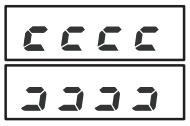
  Input value exceeds input indicator range (input indicator range is -1999(-199.9) ~ 9999(999.9)) .

- **Corrective measures**

  Check input wiring for miswiring, disconnections, short circuits, and input type. If there are problems with the wiring or input type, shut off the power supply then turn it back on. If the display does not change, then the E5EZ-PRR must be replaced. If the display returns, , then the system might have been affected by electrical noise. check electrical noise.

- **Actions on error**

  Control output will output MV based on the “MV during error” setting position. Alarm output function is the same as when the upper limit is exceeded.
  When “output input error” (advanced function level) is set to ON, alarm 1 output will activate when an error occurs.
  When “process value” or “process value/setting value/valve open percentage” is displayed, error information will be displayed.



Exceed display range

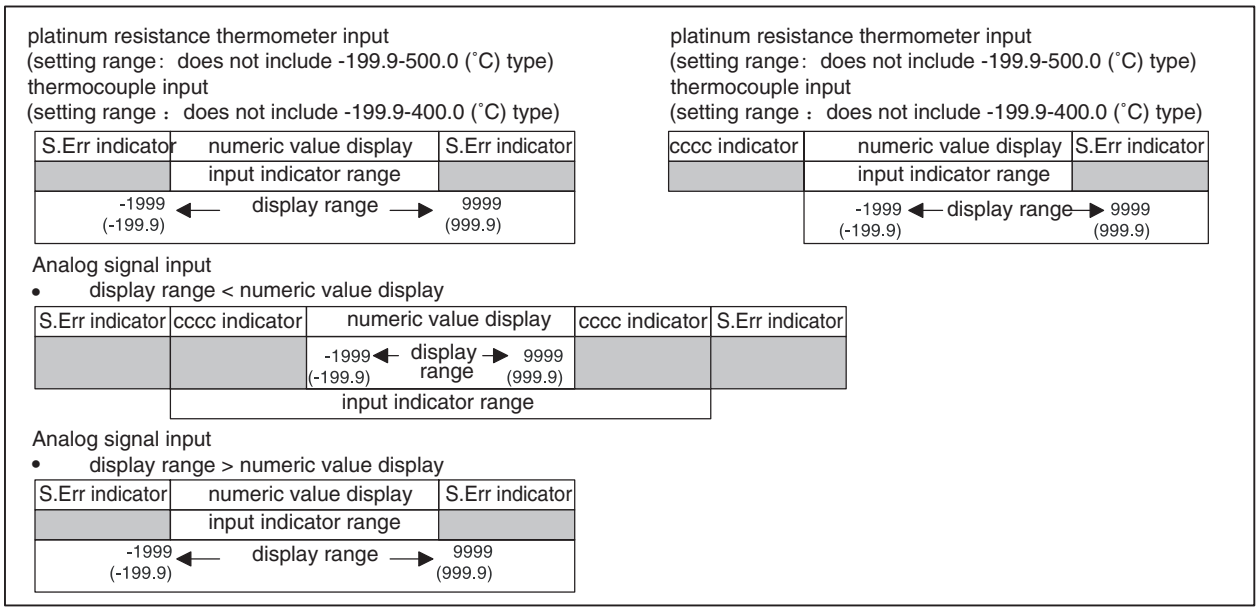
- **Meaning**

  Even though this is not an error, when the control range exceeds the display range
  (-1999(-199.9) ~ 9999(999.9)) , or the process value exceeds the display range, this will be displayed .

  - Displays when smaller than “-1999 (-199.9) ”
  - Displays when more than “9999 (999.9) ”

- **Actions on error**

  Control continues, operates normally. When “process value” or “process value/setting value/valve open percentage” is displayed, error information will be displayed.



E111 Storage device error

- **Meaning** — Internal storage device error.
- **Corrective measures** — First, disconnect and then reconnect the power supply. If the display does not change, then the E5EZ-PRR must be replaced. If the display returns, , then the system might have been affected by electrical noise. Check for electrical noise.
- **Actions on error** — Control output and alarm output off.

- - - - Potentiometer input error

- **Meaning** — A potentiometer input error occurred.
  Valve opening outside the -10% ~ 110% range.
- **Corrective measures** — Ensure that there are no wiring problems with the potentiometer, broken wires, or short circuits.
  If there are no wiring errors then the power supply can be turned on, and if the display content has not changed it will need to be replaced. If normal operation resumes then external interference might have been the cause, and should be avoided.
- **Actions on error** — Control output will output MV based on the "MV during error" setting position.
  Alarm output normal operation.

Err Electro-mechanical calibration error

- **Meaning** — Electro-mechanical calibration did not completely finish.
- **Corrective measures** — Ensure that the potentiometer and valve drive motor were calibrated after they were wired.
- **Actions on error** — Control output, alarm output set to OFF.

Parameter operations table

Manual control level

Parameter name	Symbol	Setting (monitor) value	Display	Initial value	Units	Setting value
Manual MV	—	-10~110.0		—	%	

Operation level

Parameter name	Symbol	Setting (monitor) value	Display	Initial value	Units	Setting value
Process value		Sensor input indicator range			EU	
Present value/set value/valve open percentage		SP lower limit ~ SP upper limit		0	EU	
Multi-SP	ā-SP	0~3		0	None	
SP ramp set points	SP-ā	SP lower limit ~ SP upper limit			EU	
Run/stop	r-S	Run, stop	rUn, StāP	Run	None	
Alarm value 1	AL-1	-1999~9999		0	EU	
Upper limit alarm value 1	AL 1H	-1999~9999		0	EU	
Lower limit alarm value 1	AL 1L	-1999~9999		0	EU	
Alarm value 2	AL-2	-1999~9999		0	EU	
Upper limit alarm value 2	AL 2H	-1999~9999		0	EU	
Lower limit alarm value 2	AL 2L	-1999~9999		0	EU	

Adjustment level

Parameter name	Symbol	Setting (monitor) value	Display	Initial value	Units	Setting value
Run/stop AT	AT	ON, OFF	ōn, ōFF	ōFF	None	
Communications writing	CōMt	ON, OFF	ōn, ōFF	ōFF	None	
Set point 0	SP-0	SP lower limit ~ SP upper limit		0	EU	
Set point 1	SP-1	SP lower limit ~ SP upper limit		0	EU	
Set point 2	SP-2	SP lower limit ~ SP upper limit		0	EU	
Set point 3	SP-3	SP lower limit ~ SP upper limit		0	EU	
Temperature input shift	InS	-199.9~999.9		0.0	°C or °F	
Upper limit temperature input shift value	InSH	-199.9~999.9		0.0	°C or °F	
Lower limit temperature input shift value	InSL	-199.9~999.9		0.0	°C or °F	
Proportional band	P	Temperature input: 0.1~999.9		8.0	EU	
		Analog input:0.1~999.9		10.0	%FS	
Integral time	I	Floating: 1~3999		233	Second	
		Closed: 0~3999				
Derivative time	d	0~3999		40	Second	
MV when stopped	Ou-S	Closed, hold, open	CLōS, HōLd, ōPEn	Hold	None	
MV during error	Ou-E	Closed, hold, open	CLōS, HōLd, ōPEn	Hold	None	
SP ramp set point	SPrt	OFF、 1~9999	ōFF, 1~9999	OFF	EU	
MV limit upper limit value	ōL-H	MV limit lower limit value +0.1~105.0		100.0	%	
MV limit upper limit value	ōL-L	-5.0~MV limit upper limit value -0.1		0.0	%	
Position proportional dead band	db	Floating: 0.1~10.0		2.0	%	
		Closed:0.1~10.0		4.0	%	
Hysteresis off/on	ōC-H	0.1~20.0		0.8	%	

Initial level

Parameter name		Symbol	Setting (monitor) value		Display	Initial value	Units	Setting value
Initial setting	Input type	in-t	Input temperature	0: Pt100 (-200~850°C/-300~1500F) 1: Pt100 (-199.9°C~500.0°C/-199.9~900.0F) 2: Pt100 (0.0~100.0°C/0.0~210.0F) 3: JPt100 (-199.9°C~500.0°C/-199.9~900.0F) 4: JPt100 (0.0~100.0°C/0.0~210.0F) 5: K (-200~1300°C/-300~2300F) 6: K (-20.0~500.0°C/0.0~900.0F) 7: J (-100~850°C/-100~1500F) 8: J (-20.0~400.0°C/0.0~750F) 9: T (-200~400°C/-300~700F) 10: E (0~600°C/0~1100F) 11: L (-100~850°C/-100~1500F) 12: U (-200~400°C/-300~700F) 13: N (-200~1300°C/-300~2300F) 14: R (0~1700°C/0~3000F) 15: S (0~1700°C/0~3000F) 16: B (100~1800°C./300~3200F) 17: 10~70°C(0~90°C/0~190F) 18: 60~120°C(0~120°C/0~240F) 19: 115~165°C(0~165°C/0~320F) 20: 160~260°C(0~260°C/0~500F) 21: 0~50mV 22: T(-199~400.0°C/-199~700F) 23: U(-199~400.0°C/-199~700F)		5	None	
			Analog input	0 :4~20mA 1 :0~20mA 2 :1~5V 3 :0~5V 4 :0~10V		0	None	
	Scaling upper limit	in-H	Scaling lower limit +1~9999			100	None	
	Scaling lower limit	in-L	-1999~scaling upper limit -1			0	None	
	Decimal point	dP	Temperature input: 0~1			0	None	
			Analog input: 0~3			0	None	
	Select °C/°F	d-U	°C, °F		C, F	°C	None	
	Set point upper limit	SL-H	SP lower limit +1 through input range lower limit (temperature)			1300	EU	
			SP lower limit +1 through scaling upper limit(analog signal)			100	EU	
	Set point lower limit	SL-L	Input range lower limit through SPupper limit-1(temperature)			-200	EU	
			Scaling lower limit through SPupper limit-1(analog signal)			0	EU	
	Direct / reverse operation	orEu	Direct operation, reverse operation		or-d,or-r	Reverse operation	None	
	Alarm 1 type	ALt1	0: turn off alarm function 1: upper limit and lower limit alarm 2: upper limit alarm 3: lower limit alarm 4: upper and lower limit range 5: attached standby sequence upper and lower limit alarm 6: attached standby sequence upper limit alarm 7: attached standby sequence lower limit alarm 8: absolute value upper limit alarm 9: attached absolute value lower limit alarm 10: attached standby sequence absolute value upper limit alarm 11: standby sequence absolute value lower limit alarm			2	None	
	Alarm 2 type	ALt2	Alarm 1 type			2	Second	
	Closed/ floating	CLFL	Closed, floating		FLot, CLoS	Floating	None	
	Electro-mechanical calibration	CALb	ON, OFF		on, oFF	OFF	None	
	Travel time	not	1~999			30	Second	
	Switch to advanced function level	Anou	-1999~9999			0	None	

Advanced function level

Parameter name	Symbol	Setting (monitor) value	Display	Initial value	Units	Setting value
Parameter initialization	inIt	ON, OFF	on oFF	OFF	None	
Number of multi-SP used	Su-n	0~2		1	None	
Event input indicator 1	Su-1	Event input 1, run/stop, automatic /manual	nonE, StoP, mAnU	None	None	
Event input indicator 2	Su-2	Event input 1, run/stop, automatic /manual	nonE, StoP, mAnU	RUN/ STOP	None	
Number of multi-SP used	nSPU	ON, OFF	on oFF	OFF	None	
Standby sequence reset	rESt	Condition A, condition B	A b	Condition A	None	
Activate on alarm1 on alarm	AL 1n	Activate on alarm /shutdown on alarm	n-o n-C	Activate on alarm	None	
Alarm 1 hysteresis	AL H1	Temperature input1: 0.1~999.9		0.2	EU	
		Analog input: 0.01~99.99		0.02	%FS	
Activate on alarm2 on alarm	AL2n	Activate on alarm / shutdown on alarm	n-o n-C	Activate on alarm	None	
Alarm2 hysteresis	AL H2	Temperature input 1:0.1~999.9		0.2	EU	
		Analog input: 0.01~99.99		0.02	%FS	
α	AL FA	0.00~1.00		0.65	None	
Input digital filter	inF	0.1~999.9		0.0	Second	
Additional process value display	PuAd	ON， OFF	on oFF	OFF	None	
Display mode automatic return	rEt	OFF， 1~9999	oFF 1~9999	OFF	Second	
Alarm1 latch	AILt	ON， OFF	on oFF	OFF	None	
Alarm2 latch	A2Lt	ON， OFF	on oFF	OFF	None	
Protect level switching time	PrLt	1~30	on oFF	3	Second	
Output input error	SEro	ON， OFF	on oFF	OFF	None	
Cold junction compensation method	CJC	ON， OFF	on oFF	ON	None	
MB command logic switching	rLru	ON， OFF	on oFF	OFF	None	
Alarm1 on delay	AIon	0~99		0	Second	
Alarm2 ON delay	A2on	0~99		0	Second	
Alarm1 OFF delay	AIoF	0~99		0	Second	
Alarm2 OFF delay	A2oF	0~99		0	Second	
When stop/error add MV	muSE	ON， OFF	on oFF	OFF	None	
Process value dead band	P-db	0~9999		0	EU	
Valve open display	u-dP	ON， OFF	on oFF	ON	None	
Manual MV limit is effective	mAnL	ON， OFF	on oFF	ON	None	

Protect level

Parameter name	Symbol	Setting (monitor) value	Display	Initial value	Units	Setting value
Operation/adjustment protect	oAPt	0~3		0	None	
Initial/communication protect	iCPt	0~2		1	None	
Setting change protect	PtPt	ON， OFF	on oFF	OFF	None	
Manual /automatic key protection	MEyP	ON， OFF	on oFF	OFF	None	

Communications level

Parameter name	Symbol	Setting (monitor) value	Display	Initial value	Units	Setting value
Communications unit code	U-no	0~99		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	Bit	
Stop bit	Sbit	1, 2		2	Bit	
Communication parity	Prty	None, even, odd	nonE EuEn odd	Even	None	

Sensor input settings and indicator range

E5EZ-PRR2 □ T

	Input type	Specifications	Setting value	Input temperature range		Input indicator range	
Thermocouple /multi input type platinum resistance thermometer	Platinum resistance thermometer	Pt100	0	-200~850 (°C)	/-300~1500 (°F)	-200~870 (°C)	/-340~1540 (°F)
			1	-199.9~500.0 (°C)	/-199.9~900.0 (°F)	-199.9~520.0 (°C)	/-199.9~940.0 (°F)
			2	0.0~100.0 (°C)	/0.0~210.0 (°F)	-20.0~120.0 (°C)	/-40.0~250.0 (°F)
		JPt100	3	-199.9~500.0 (°C)	/-199.9~900.0 (°F)	-199.9~520.0 (°C)	/-199.9~940.0 (°F)
			4	0.0~100.0 (°C)	/0.0~210.0 (°F)	-20.0~120.0 (°C)	/-40.0~250.0 (°F)
	Thermocouple	K	5	-200~1300 (°C)	/-300~2300 (°F)	-220~1320 (°C)	/-340~2340 (°F)
			6	-20.0~500.0 (°C)	/0.0~900.0 (°F)	-40.0~520.0 (°C)	/-40.0~940.0 (°F)
		J	7	-100~850 (°C)	/-100~1500 (°F)	-120~870 (°C)	/-140~1540 (°F)
			8	-20.0~400.0 (°C)	/0.0~750.0 (°F)	-40.0~420.0 (°C)	/-40.0~790.0 (°F)
		T	9	-200~400 (°C)	/-300~700 (°F)	-220~420 (°C)	/-340~740 (°F)
			22	-199.9~400.0 (°C)	/-199.9~700.0 (°F)	-199.9~420.0 (°C)	/-199.9~740.0 (°F)
		E	10	0~600 (°C)	/0~1100 (°F)	-20~620 (°C)	/-40~1140 (°F)
		L	11	-100~850 (°C)	/-100~1500 (°F)	-120~870 (°C)	/-140~1540 (°F)
		U	12	-200~400.0 (°C)	/-300~700 (°F)	-220~420 (°C)	/-340~740 (°F)
			23	-199.9~400.0 (°C)	/-199.9~700.0 (°F)	-199.9~420.0 (°C)	/-199.9~740.0 (°F)
		N	13	-200~1300 (°C)	/-300~2300 (°F)	-220~1320 (°C)	/-340~2340 (°F)
		R	14	0~1700 (°C)	/0~3000 (°F)	-20~1720 (°C)	/-40~3040 (°F)
		S	15	0~1700 (°C)	/0~3000 (°F)	-20~1720 (°C)	/-40~3040 (°F)
		B	16	100~1800 (°C)	/300~3200 (°F)	0~1820 (°C)	/0~3240 (°F)
	Non-contact temperature sensor ES1B	10°C-70°C	17	0~90 (°C)	/0~190 (°F)	-20~130 (°C)	/-40~270 (°F)
		60°C-120°C	18	0~120 (°C)	/0~240 (°F)	-20~160 (°C)	/-40~320 (°F)
		115°C-165°C	19	0~165 (°C)	/0~320 (°F)	-20~205 (°C)	/-40~400 (°F)
		140°C-260°C	20	0~260 (°C)	/0~500 (°F)	-20~300 (°C)	/-40~580 (°F)
	Analog signal input	0~50mV	21	One of the ranges below, depending on the displayed results: -1999~9999, -199.9~999.9		-5 ~ 105% of the setting range (however, display -1999 ~ 9999 or -199.9 ~ 999.9)	

E5EZ-PRR2 □ L

Analog Input type	Current Input	4~20mA	0		-5 ~ 105% of the setting range (however, display -1999 ~ 9999 or -199.9 ~ 999.9) Other than the decimal point's numerical value range .
		0~20mA	1	-1999~9999	
	Voltage Input	1~5V	2	-199.9~999.9	
		0~5V	3	-19.99~99.99	
		0~10V	4	-1.999~9.999	

- Thermocouple/multi input type platinum resistance thermometer initial value is 「5」 , analog input type is 「0」 .
- Input type specifications are given below:

K: GB/T 2814-98 J, L: GB/T 4994-98 T, U: GB/T 2903-98

E: GB/T 4993-98 N: GB/T 17615-98 R : GB/T 1598-98

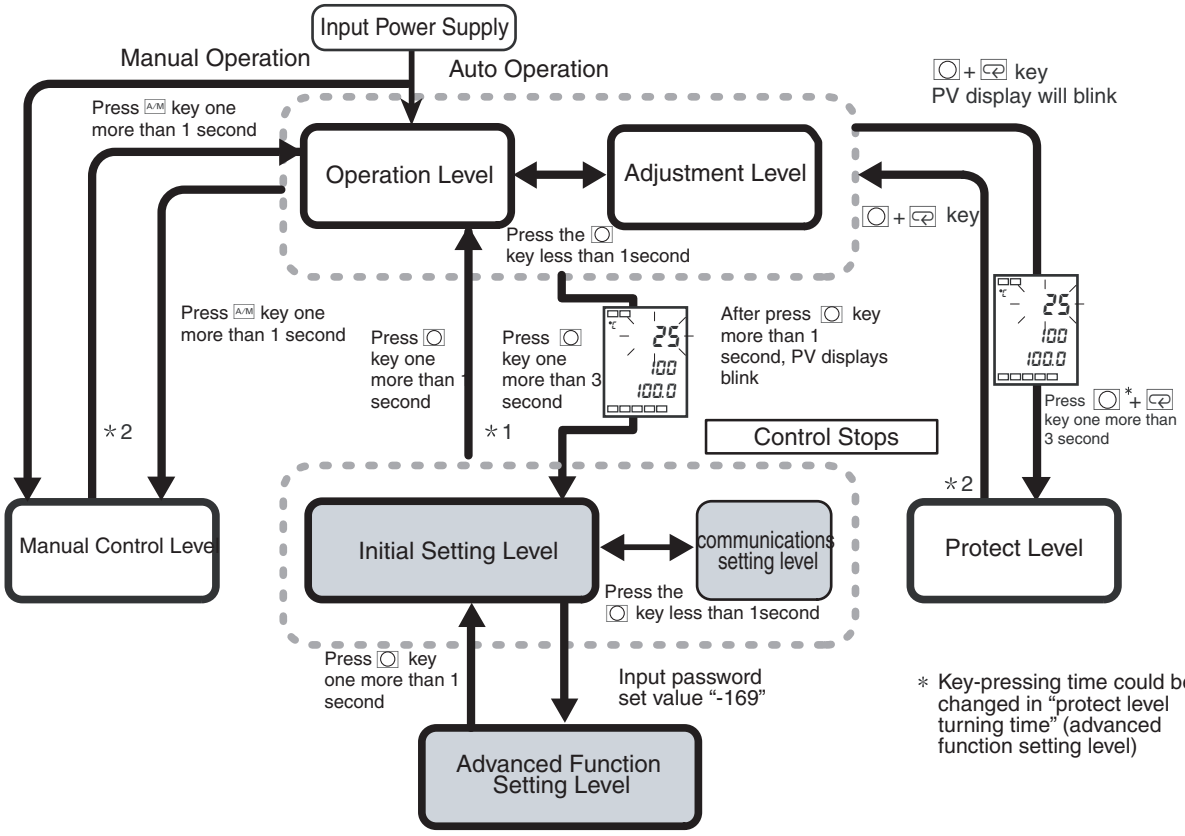
S: GB/T 3772-98 B: GB/T 2902-99 JPt100, Pt100:GB/T5977-99

Control range

- Platinum resistance thermometer and thermocouple input temperature setting lower limit -20°C~ temperature upper limit+20°C or temperature setting lower limit -40F~ temperature setting upper limit+40F.
- ES1B input type has the same input indicator range.
- Analog input indicator range -5%~105%.

Setting Data List

The following chart gives an overview of the setting levels on the E5EZ-PRR. To switch to the advanced function level, you must input the password. Certain parameters will not be displayed, based on protect level settings and usage conditions.
When switching from the operation level to the initial level, control stops.



＊1 From initial level to operation level shows default measure of the operation

＊2 level.

From initial level and manual control level to operation level shows default measure of the operation level.

Control in progress

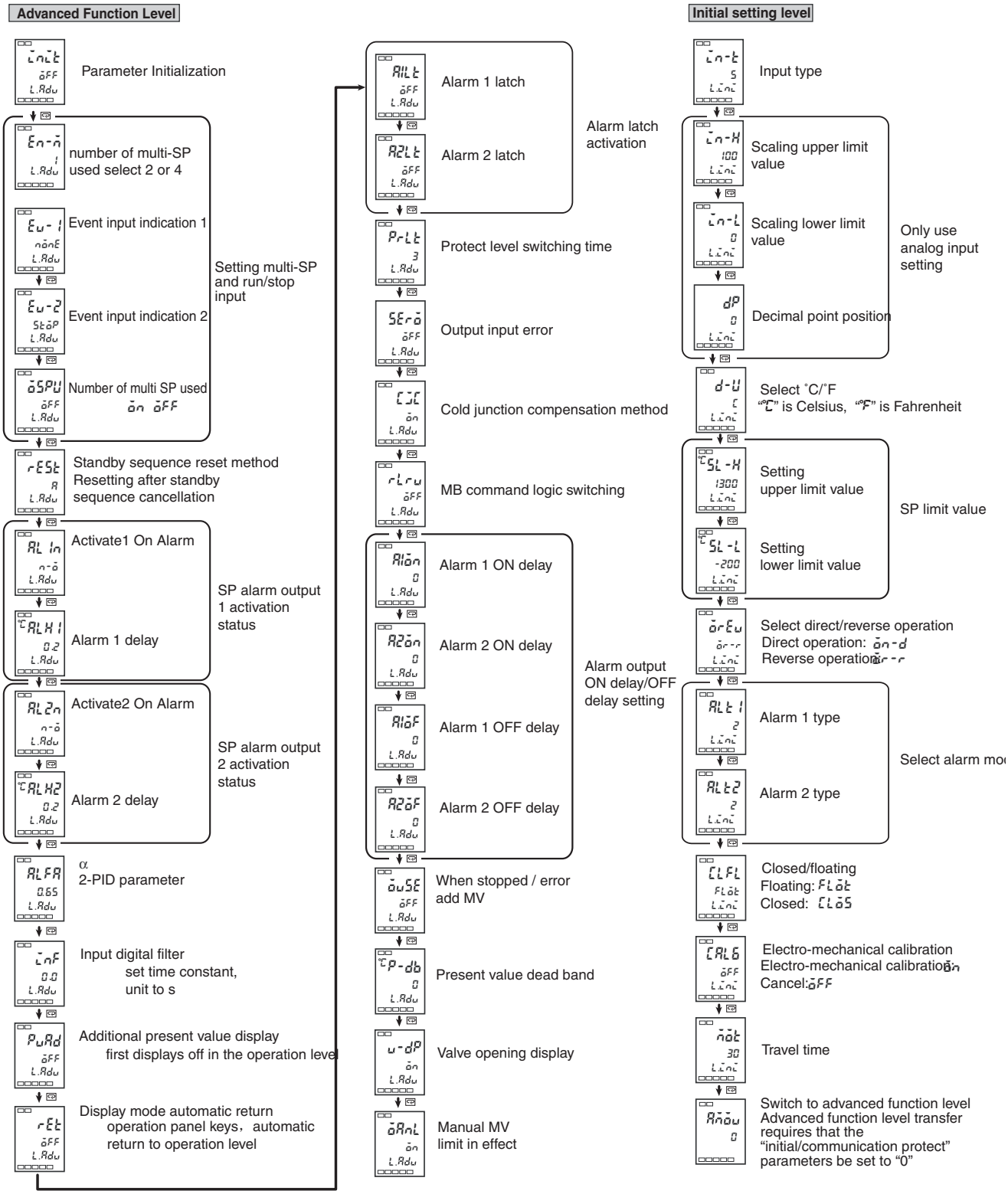
Control stops

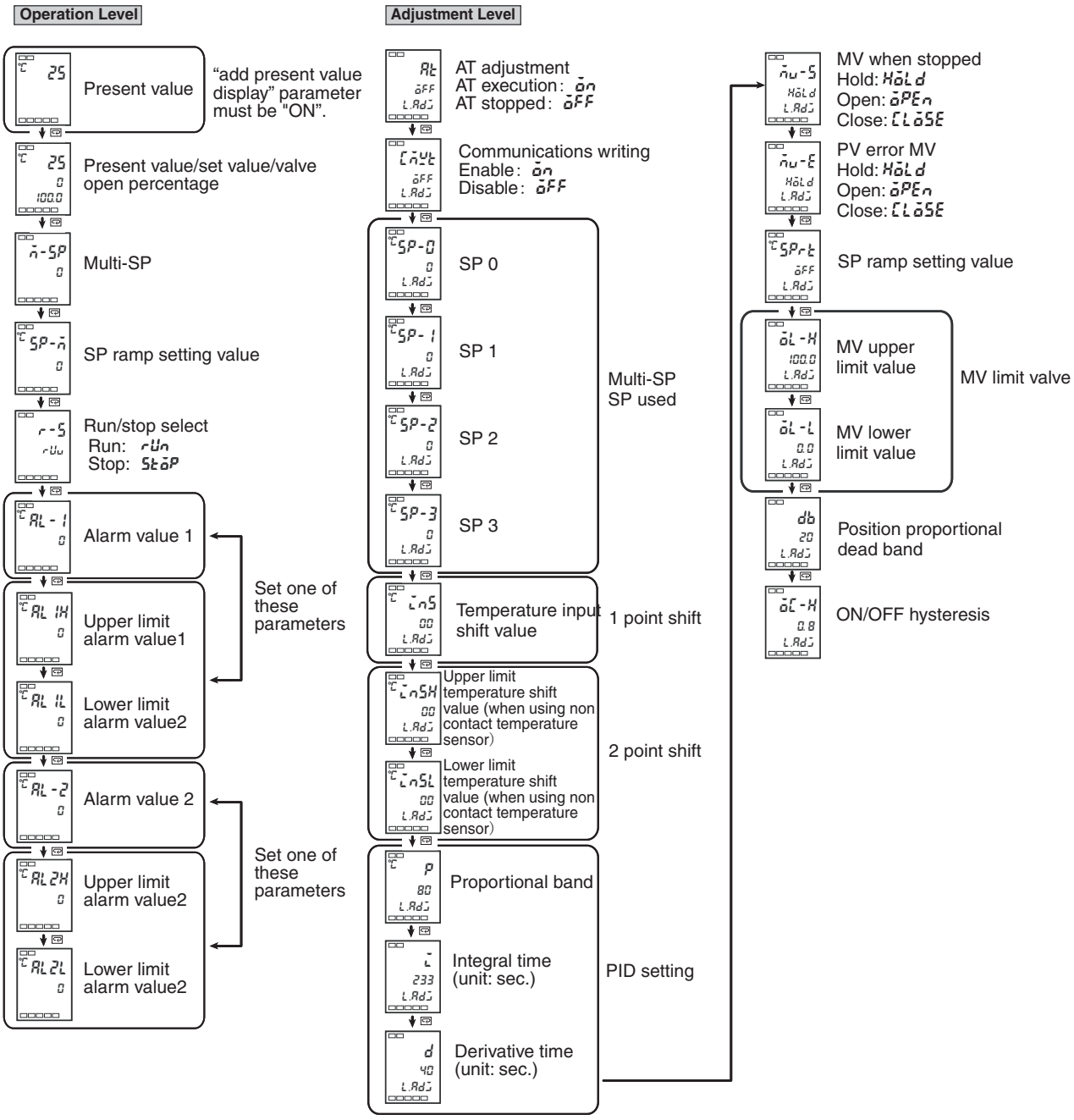
Unable to display depend on modles

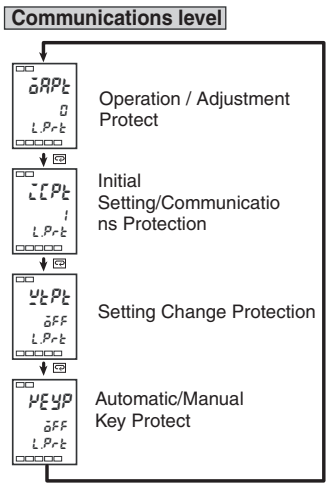
Level change

Parameter Flow

- If the mode key is pressed on the last parameter in a level, the display will return to the first parameter in the level.
  Analog input sample will not display "°C" in the following list.




Operation Level
Present value
"add present value display" parameter must be "ON".
Present value/set value/valve open percentage
Multi-SP
SP ramp setting value
Run/stop select
Run:
Stop:
Alarm value 1
Upper limit alarm value1
Lower limit alarm value2
Alarm value 2
Upper limit alarm value2
Lower limit alarm value2
Set one of these parameters
Set one of these parameters
Adjustment Level
AT adjustment
AT execution:
AT stopped:
Communications writing
Enable:
Disable:
SP 0
SP 1
SP 2
SP 3
Multi-SP SP used
Temperature input shift value
1 point shift
Upper limit temperature shift value (when using non contact temperature sensor)
Lower limit temperature shift value (when using non contact temperature sensor)
2 point shift
Proportional band
Integral time (unit: sec.)
Derivative time (unit: sec.)
PID setting
MV when stopped
Hold:
Open:
Close:
PV error MV
Hold:
Open:
Close:
SP ramp setting value
MV upper limit value
MV lower limit value
MV limit valve
Position proportional dead band
ON/OFF hysteresis



● Operation/tuning protect

The relationship between the set point protect range is given below.

Mode	Setting value			
	0	1	2	3
Process value	○	○	○	○
Setting value	◎	◎	◎	○
Other	◎	◎	×	×
Adjustment level	◎	×	×	×

◎ : can display/modify
○ : can display
× : cannot display /cannot switch level

- When the set point is 「0」, there is no protect function .
- The initial value is 「0」.

● Initial/communications protect

Initial setting level, communications setting level and advanced function setting level have limited access.

Setting value	Initial setting level	Communications setting level
0	Can switch (can switch to 「advanced function setting level」)	Can switch
1	Can switch (cannot switch to 「advanced function setting level」)	Can switch
2	Cannot switch	Cannot switch

- The initial value is 「1」.

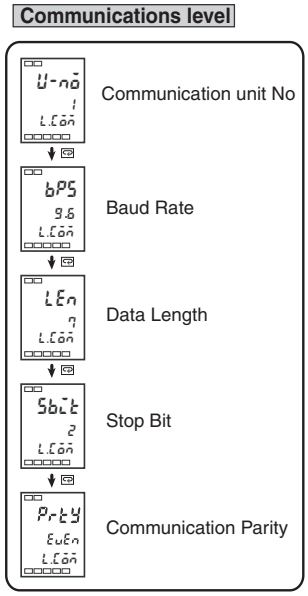
● Setting modification protection

Limits can be changed using the keys.
oFF: settings can be changed using the keys.
on: setting cannot be changed using the keys, but the level can be changed.

● Automatic /manual key protect

Setting value	Automatic/Manual operation
oFF	Automatic /manual can switch
on	Automatic /manual cannot switch

- The initial value is 「oFF」.



● Setting communications data

Set the E5EZ-PRR's communications specifications to match the communications settings on the host. In 1 to many point configurations, other than the communications unit codes, other settings should match each unit must have a unique communications unit code.

Parameter	Symbol Display	Setting (monitor) value	Setting	Initial Value	Units
Communicatio ns Unit Code	U-no	0 ~ 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	Bit
Stop Bit	SbiT	1, 2		2	Bit
Communicatio n Parity	PrtY	None, even, odd	non E, EuEn, odd	Even inspection	None

Symbols

Numerics

A

C

D

E

F

H

I

K

L

M

N

O

P

R

S

T

U

V

W

OMRON

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