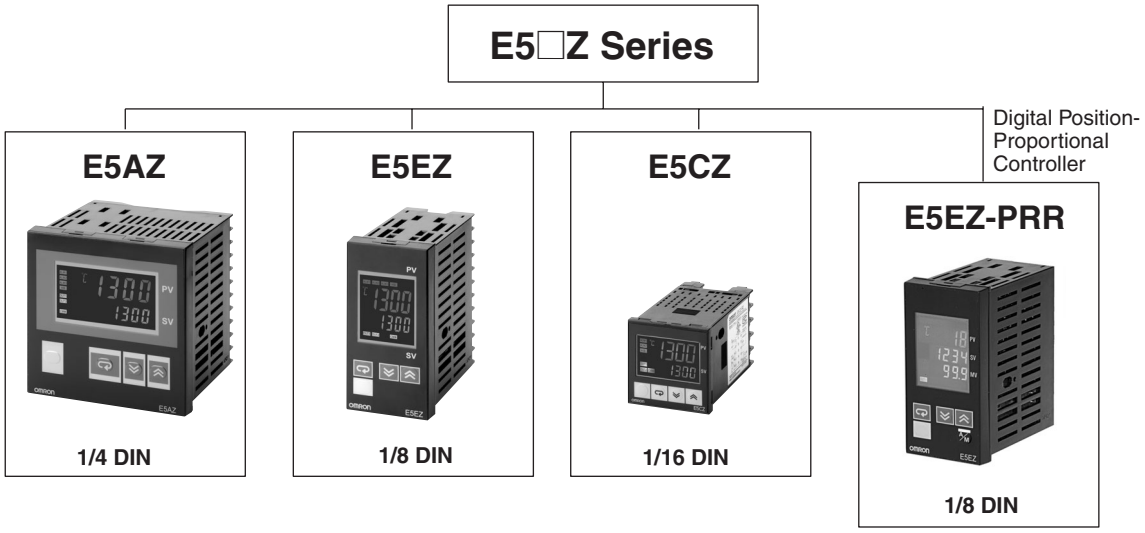
Digital Temperature Controllers
E5□Z

Compact and Intelligent General-purpose Temperature Controllers

- Various temperature inputs: thermocouple, platinum resistance thermometer, infrared temperature sensor, and analog inputs.
- Auto-tuning and self-tuning available. Auto-tuning is possible even while self-tuning is being executed.
- Heating or heating/cooling control is available.
- Event input allows multi-SP selection and run/stop function.
- CE marking and UL/CSA certification.
  (CE marking and UL/CSA certification are pending for the E5EZ-PRR.)



Contents

Digital Temperature Controllers
E5AZ

Next-generation Digital Temperature Controller

- Depth of only 78 mm.
- Various temperature inputs: thermocouple, platinum resistance thermometer, infrared temperature sensor, and analog inputs.
- Auto-tuning and self-tuning are available. Auto-tuning is possible even while self-tuning is being executed.
- Heating or heating/cooling control is available.
- Event input allows multi-SP selection and run/stop function.
- Modular output cards.
- Time delay alarm function.
- Communications function.
- CE marking and UL/CSA approval.

⚠ Refer to the "*Safety Precautions*" on page 52.

96 × 96 × 78 mm (W × H × D)

Model Number Structure

■ Model Number Legend

E5AZ- □ **3** □ □
1 2 3 4

1. Output type
- R: Relay
- Q: Voltage (for driving SSR)
- C: Current
- A: Output Unit can be mounted

2. Number of alarms
- 3: Three alarms

3. Option 1
- Blank: Not available
- H: Heater Burnout Alarm

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

Note: Options 1 and 2 are supported when using an E53-AZM Option Board.

Ordering Information

■ List of Models

Size	Power supply voltage	Number of alarm points	Control outputs	Model
1/4 DIN 96 × 96 × 78 mm (W × H × D)	100 to 240 VAC	3	Relay	E5AZ-R3
			Voltage (for driving SSR)	E5AZ-Q3
			Current	E5AZ-C3
			Additional control output	E5AZ-A3

■ Output Modules

Type	Model
Relay	E53-AZR
Voltage	E53-AZQ
Current	E53-AZC

■ Option Units

The E5AZ provides optional functions when an E53-AZM Option Board is mounted along with the following Option Units.

Functions	Model
Option Board	E53-AZM
Heater Burnout Alarm	E53-AZH
Communications	E53-AZ01
	E53-AZ03
Event Input	E53-AZB

■ Accessories (Order Separately)

Current Transformers (CTs)

Model	E54-CT1	E54-CT3
Hole diameter	5.8 dia.	12.0 dia.

Specifications

■ Ratings

Power supply voltage		100 to 240 VAC, 50/60 Hz
Operating voltage range		85% to 110% of rated supply voltage
Power consumption		10 VA
Sensor input		Thermocouple: K, J, T, E, L, U, N, R, S, B Platinum resistance thermometer: Pt100, JPt100 Infrared temperature sensor: 10 to 70°C, 60 to 120°C, 115 to 165°C, 140 to 260°C Voltage input: 0 to 50 mV
Control outputs	**Relay outputs**	SPST-NO, 250 VAC, 5 A (resistive load), electrical life: 100,000 operations
	Voltage outputs	12 VDC $^{+15\%}/_{-20\%}$ (PNP), max. load current: 40 mA, with short-circuit protection circuit
	Current outputs	4 to 20 mA DC, load: 600 Ω max., resolution: approx. 2,600
Alarm output		SPST-NO, 250 VAC, 2 A (resistive load), electrical life: 100,000 operations
Event input	**Contact input**	ON: 1 kΩ max., OFF: 100 kΩ min.
	Non-contact input	ON: Residual voltage: 1.5 V max., OFF: Leakage current: 0.1 mA max.
		Outflow current: Approx. 7 mA per point
Control method		2-PID control or ON/OFF control
Setting method		Digital setting using front panel keys
Indication method		7-segment digital display and single-lighting indicators Character height: PV: 15.0 mm; SV: 9.5 mm
Other functions		According to Controller model
Ambient operating temperature		–10 to 55°C (with no condensation or icing)
Ambient operating humidity		25% to 85%
Storage temperature		–25 to 65°C (with no condensation or icing)

■ Input Ranges

Platinum Resistance Thermometer Input

Input type	Pt100			JPt100	
Temperature range	–200 to 850°C	–199.9 to 500.0°C	0.0 to 100.0°C	–199.9 to 500.0°C	0.0 to 100.0°C
Setting number	0	1	2	3	4

Thermocouple Input

Input type	K		J		T		E	L	U		N	R	S	B
Temperature range	–200 to 1300°C	–20 to 500°C	–100 to 850°C	–20.0 to 400.0°C	–200 to 400°C	–199.9 to 400.0°C	0 to 600°C	–100 to 850°C	–200 to 400°C	–199.9 to 400.0°C	–200 to 1300°C	0 to 1700°C	0 to 1700°C	100 to 1800°C
Setting number	5	6	7	8	9	22	10	11	12	23	13	14	15	16

Shaded setting indicates the default setting.

ES1B Infrared Temperature Sensor

Input type	10 to 70°C	60 to 120°C	115 to 165°C	140 to 260°C
Temperature range	0 to 90°C	0 to 120°C	0 to 165°C	0 to 260°C
Setting number	17	18	19	20

Analog Input

Input type	0 to 50 mV
Setting range	Usable in the following ranges by scaling: –1999 to 9999 or –199.9 to 999.9
Setting number	21

Applicable standards by input type are as follows:

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/T 5977-99

Output Modules

Type	Model	Rating and performance
Relay	E53-AZR	250 VAC, 5 A (resistive load), electrical life: 100,000 operations
Voltage	E53-AZQ	12 VDC, 40 mA PNP
Current	E53-AZC	4 to 20 mA DC, load: 600 Ω max, resolution: approx. 2,600

Communications Modules

Type	Model	Performance
RS-232C	E53-AZ01	Half-duplex: 1,200/2,400/4,800/9,600/19,200 bps ASCII
RS-485	E53-AZ03	Full-duplex: 1,200/2,400/4,800/9,600/19,200 bps ASCII

Other Modules

Type	Model	Rating and performance
Option board	E53-AZM	Expansion for E53-AZH and E53-AZ01 or E53-AZ03 or E53-AZB
Event input	E53-AZB	ON: 1 KΩ max.; OFF: 100 KΩ min.
Heater burnout detection	E53-AZH	Using CT to detect heater burnout

■ Characteristics

Indication accuracy	Thermocouple: (±0.5% of indicated value or ±1°C, whichever is greater) ±1 digit max. (See note 1.) Platinum resistance thermometer: (±0.5% of indicated value or ±1°C, whichever is greater) ±1 digit max. Analog input: ±0.5% FS±1 digit max. CT input: ±5% FS±1 digit max.
Influence of temperature (See note 3.)	R, S, and B thermocouple inputs: (±1% of PV or ±10°C, whichever is greater) ±1 digit max.
Influence of voltage (See note 3.)	Other thermocouple inputs: (±1% of PV or ±4°C, whichever is greater) ±1 digit max. *±10°C for −100°C or less for K sensors Platinum resistance thermometer inputs: (±1% of PV or ±2°C, whichever is greater) ±1 digit max. Analog inputs: (±1% of FS) ±1 digit max.
Hysteresis	0.1 to 999.9 EU (in units of 0.1 EU)
Proportional band (P)	0.1 to 999.9 EU (in units of 0.1 EU)
Integral time (I)	0 to 3999 s (in units of 1 s)
Derivative time (D)	0 to 3999 s (in units of 1 s)
Control period	1 to 99 s (in units of 1 s)
Manual reset value	0.0% to 100.0% (in units of 0.1%)
Alarm setting range	−1999 to 9999 (decimal point position depends on input type)
Sampling period	500 ms
Insulation resistance	20 MΩ min. (at 500 VDC)
Dielectric strength	2,000 VAC, 50 or 60 Hz for 1min (between current-carrying terminals of different polarity)
Vibration resistance	10 to 55 Hz, 20 m/s^2 for 10 min in X, Y and Z directions
Shock resistance	100 m/s^2, 3 times each in 3 axes, 6 directions
Weight	Approx. 310 g; accessories: approx. 100 g
Memory protection	EEPROM (non-volatile memory) (number of write operations: 100,000)
EMC	Enclosure Emission: EN 55011 (GB/T 6113.1,2) Group 1 Class A AC Mains Emission: EN 55011 (GB/T 6113.1,2) Group 1 Class A (See note 2.) ESD Immunity: IEC 61000-4-2 (GB/T 17626.2) 4 kV contact discharge (level 2) 8 kV air discharge (level 3) RF-interference Immunity: IEC 61000-4-3 (GB/T 17626.3): 10 V/m, 80 MHz to 1 GHz (level 3) Conducted Disturbance Immunity: IEC 61000-4-6 (GB/T 17626.6): 3 V (0.15 to 80 MHz) (level 3) Burst Immunity: IEC 61000-4-5 (GB/T 17626.5): 2 kV powerline (level 3) 2 kV I/O signalline (level 4)
Applicable standards	UL 61010C-1, CSA C22.2 No.1010.1 Conforms to EN 61326, EN 61010-1 (IEC 61010-1).

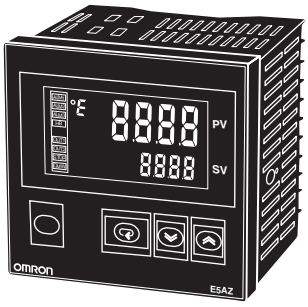
Note 1: The indication accuracy of K thermocouples in the −200 to 1300°C range, T and N thermocouples at a temperature of −100°C or less, and U and L thermocouples at any temperature is ±2°C ±1 digit maximum. The indication accuracy of the B thermocouples at a temperature of 400°C max. is not specified.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

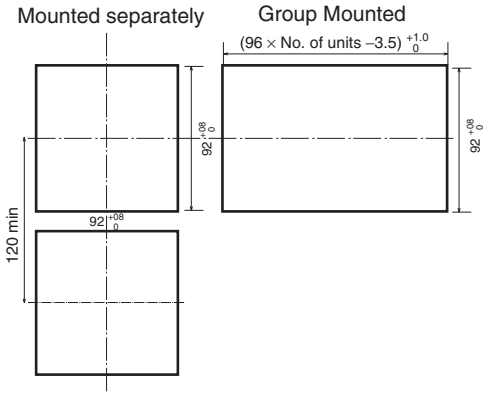
2: To fulfill the EN 61326 Class A standard for the E5□Z-□3□03, add a magnetic link (TDK: ZAT1730-0730) between the K3SC and the Controller.

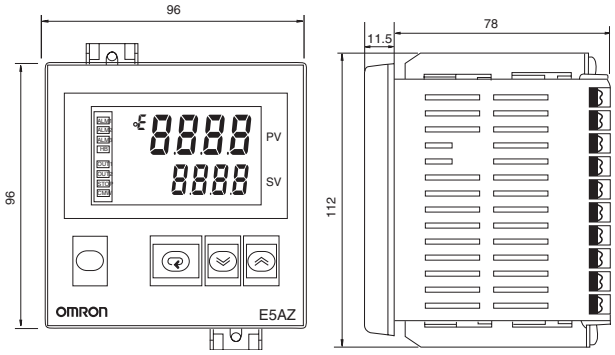
3: Conditions: Ambient temperature: −10°C to 23°C to 55°C, Voltage range: −15% to +10% of rated voltage.

Dimensions

Note: All units are in millimeters unless otherwise indicated.



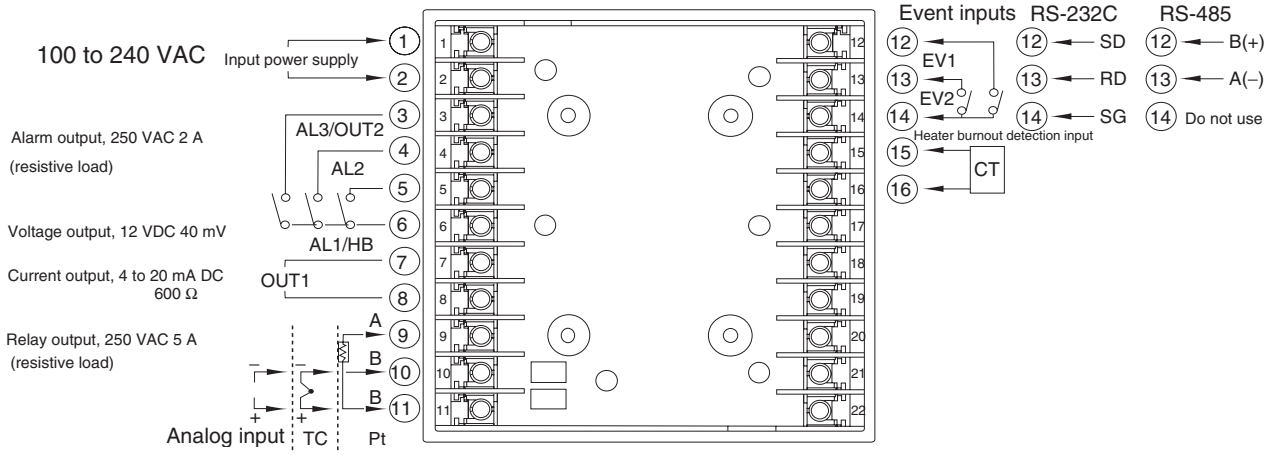




- Recommended panel thickness is 1 to 8 mm.
- Group mounting is not possible in the vertical direction. (Maintain the specified mounting space between Controllers when they are group mounted.)
- When two or more Controllers are mounted, make sure that the surrounding temperature does not exceed the allowable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

Wiring Terminals

- The voltage output (control output) is not electrically insulated from the internal circuits. When using a grounding thermocouple, do not connect the control output terminals to the ground. If the control output terminals are connected to the ground, errors will occur in the measured temperature values as a result of leakage current.
- Standard insulation is applied to the power supply I/O sections. If reinforced insulation is required, connect the input and output terminals to a device without any exposed current-carrying parts or to a device with standard insulation suitable for the maximum operating voltage of the power supply I/O section.



Digital Temperature Controllers
E5EZ

Next-generation Digital Temperature Controller

- Depth of only 78 mm.
- Various temperature inputs: thermocouple, platinum resistance thermometer, infrared temperature sensor, and analog inputs.
- Auto-tuning and self-tuning are available. Auto-tuning is possible even while self-tuning is being executed.
- Heating or heating/cooling control is available.
- Event input allows multi-SP selection and run/stop function.
- Modular output cards.
- Time delay alarm function.
- Communications function.
- CE marking and UL/CSA approval.

⚠ Refer to the "*Safety Precautions*" on page 52.

48 × 96 × 78 mm (W × H × D)

Model Number Structure

■ Model Number Legend

E5EZ- □ **3** □ □
1 2 3 4

1. Output type
- R: Relay
- Q: Voltage (for driving SSR)
- C: Current
- A: Output Unit can be mounted

2. Number of alarms
- 3: Three alarms

3. Option 1
- Blank: Not available
- H: Heater Burnout Alarm

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

Note: Options 1 and 2 are available when using an E53-AZM Option Board.

Ordering Information

■ List of Models

Size	Power supply voltage	Number of alarm points	Control outputs	Model
1/8 DIN 48 × 96 × 78 mm (W × H × D)	100 to 240 VAC	3	Relay	E5EZ-R3
			Voltage (for driving SSR)	E5EZ-Q3
			Current	E5EZ-C3
			Additional control output	E5EZ-A3

■ Output Modules

Type	Model
Relay	E53-AZR
Voltage	E53-AZQ
Current	E53-AZC

■ Option Units

The E5EZ provides optional functions when an E53-AZM Option Board is mounted along with the following Option Units.

Functions	Model
Option Board	E53-AZM
Heater Burnout Alarm	E53-AZH
Communications	E53-AZ01
	E53-AZ03
Event Input	E53-AZB

■ Accessories (Order Separately)

Current Transformers (CTs)

Model	E54-CT1	E54-CT3
Hole diameter	5.8 dia.	12.0 dia.

Specifications

■ Ratings

Power supply voltage		100 to 240 VAC, 50/60 Hz
Operating voltage range		85% to 110% of rated supply voltage
Power consumption		10 VA
Sensor input		Thermocouple: K, J, T, E, L, U, N, R, S, B Platinum resistance thermometer: Pt100, JPt100 Infrared temperature sensor: 10 to 70°C, 60 to 120°C, 115 to 165°C, 140 to 260°C Voltage input: 0 to 50 mV
Control outputs	**Relay outputs**	SPST-NO, 250 VAC, 5 A (resistive load), electrical life: 100,000 operations
	Voltage outputs	12 VDC $^{+15\%}/_{-20\%}$ (PNP), max. load current: 40 mA, with short-circuit protection circuit
	Current outputs	4 to 20 mA DC, load: 600 Ω max., resolution: approx. 2,600
Alarm output		SPST-NO, 250 VAC, 2 A (resistive load), electrical life: 100,000 operations
Event input	**Contact input**	ON: 1 kΩ max., OFF: 100 kΩ min.
	Non-contact input	ON: Residual voltage: 1.5 V max., OFF: Leakage current: 0.1 mA max.
		Outflow current: Approx. 7 mA per point
Control method		2-PID control or ON/OFF control
Setting method		Digital setting using front panel keys
Indication method		7-segment digital display and single-lighting indicators Character height: PV: 14.0 mm; SV: 9.5 mm
Other functions		According to Controller model
Ambient operating temperature		−10 to 55°C (with no condensation or icing)
Ambient operating humidity		25% to 85%
Storage temperature		−25 to 65°C (with no condensation or icing)

■ Input Ranges

Platinum Resistance Thermometer Input

Input type	Pt100			JPt100	
Temperature range	–200 to 850°C	–199.9 to 500.0°C	0.0 to 100.0°C	–199.9 to 500.0°C	0.0 to 100.0°C
Setting number	0	1	2	3	4

Thermocouple Input

Input type	K		J		T		E	L	U		N	R	S	B
Temperature range	–200 to 1300°C	–20 to 500°C	–100 to 850°C	–20.0 to 400.0°C	–200 to 400°C	–199.9 to 400.0°C	0 to 600°C	–100 to 850°C	–200 to 400°C	–199.9 to 400.0°C	–200 to 1300°C	0 to 1700°C	0 to 1700°C	100 to 1800°C
Setting number	5	6	7	8	9	22	10	11	12	23	13	14	15	16

Shaded setting indicates the default setting.

ES1B Infrared Temperature Sensor

Input type	10 to 70°C	60 to 120°C	115 to 165°C	140 to 260°C
Setting range	0 to 90°C	0 to 120°C	0 to 165°C	0 to 260°C
Setting number	17	18	19	20

Analog Input

Input type	0 to 50 mV
Setting range	Usable in the following ranges by scaling: –1999 to 9999 or –199.9 to 999.9
Setting number	21

Applicable standards by input type are as follows:

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/T 5977-99

Output Modules

Type	Model	Rating and performance
Relay	E53-AZR	250 VAC, 5 A (resistive load), electrical life: 100,000 operations
Voltage	E53-AZQ	12 VDC, 40 mA PNP
Current	E53-AZC	4 to 20 mA DC, load: 600 Ω max, resolution: approx. 2,600

Communications Modules

Type	Model	Performance
RS-232C	E53-AZ01	Half-duplex: 1,200/2,400/4,800/9,600/19,200 bps ASCII
RS-485	E53-AZ03	Full-duplex: 1,200/2,400/4,800/9,600/19,200 bps ASCII

Other Modules

Type	Model	Rating and performance
Option board	E53-AZM	Expansion for E53-AZH and E53-AZ01 or E53-AZ03 or E53-AZB
Event input	E53-AZB	ON: 1 KΩ max.; OFF: 100 KΩ min.
Heater burnout detection	E53-AZH	Using CT to detect heater burnout

■ Characteristics

Indication accuracy	Thermocouple: (±0.5% of indicated value or ±1°C, whichever is greater) ±1 digit max. (See note 1.) Platinum resistance thermometer: (±0.5% of indicated value or ±1°C, whichever is greater) ±1 digit max. Analog input: ±0.5% FS±1 digit max. CT input: ±5% FS±1 digit max.
Influence of temperature (See note 3.)	R, S, and B thermocouple inputs: (±1% of PV or ±10°C, whichever is greater) ±1 digit max.
Influence of voltage (See note 3.)	Other thermocouple inputs: (±1% of PV or ±4°C, whichever is greater) ±1 digit max. *±10°C for −100°C or less for K sensors Platinum resistance thermometer inputs: (±1% of PV or ±2°C, whichever is greater) ±1 digit max. Analog inputs: (±1% of FS) ±1 digit max.
Hysteresis	0.1 to 999.9 EU (in units of 0.1 EU)
Proportional band (P)	0.1 to 999.9 EU (in units of 0.1 EU)
Integral time (I)	0 to 3999 s (in units of 1 s)
Derivative time (D)	0 to 3999 s (in units of 1 s)
Control period	1 to 99 s (in units of 1 s)
Manual reset value	0.0% to 100.0% (in units of 0.1%)
Alarm setting range	−1999 to 9999 (decimal point position depends on input type)
Sampling period	500 ms
Insulation resistance	20 MΩ min. (at 500 VDC)
Dielectric strength	2,000 VAC, 50 or 60 Hz for 1min (between current-carrying terminals of different polarity)
Vibration resistance	10 to 55 Hz, 20 m/s^2 for 10 min in X, Y and Z directions
Shock resistance	100 m/s^2, 3 times each in 3 axes, 6 directions
Weight	Approx. 260 g; accessories: approx. 100 g
Memory protection	EEPROM (non-volatile memory) (number of write operations: 100,000)
EMC	Enclosure Emission: EN 55011 (GB/T 6113.1,2) Group 1 Class A AC Mains Emission: EN 55011 (GB/T 6113.1,2) Group 1 Class A (See note 2.) ESD Immunity: IEC 61000-4-2 (GB/T 17626.2) 4 kV contact discharge (level 2) 8 kV air discharge (level 3) RF-interference Immunity: IEC 61000-4-3 (GB/T 17626.3): 10 V/m, 80 MHz to 1 GHz (level 3) Conducted Disturbance Immunity: IEC 61000-4-6 (GB/T 17626.6): 3 V (0.15 to 80 MHz) (level 3) Burst Immunity: IEC 61000-4-5 (GB/T 17626.5): 2 kV powerline (level 3) 2 kV I/O signalline (level 4)
Applicable standards	UL 61010C-1, CSA C22.2 No.1010.1 Conforms to EN 61326, EN 61010-1 (IEC 61010-1).

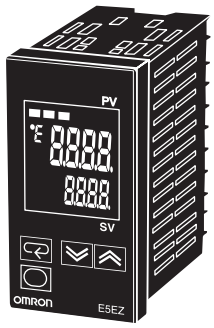
Note 1: The indication accuracy of K thermocouples in the −200 to 1300°C range, T and N thermocouples at a temperature of −100°C or less, and U and L thermocouples at any temperature is ±2°C ±1 digit maximum. The indication accuracy of the B thermocouples at a temperature of 400°C max. is not specified.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

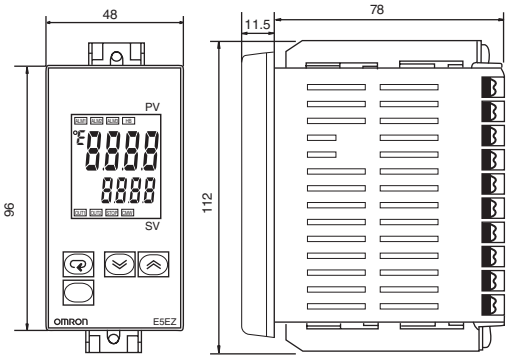
2: To fulfill the EN 61326 Class A standard for the E5□Z-□3□03, add a magnetic link (TDK: ZAT1730-0730) between the K3SC and the Controller.

3: Conditions: Ambient temperature: −10°C to 23°C to 55°C, Voltage range: −15% to +10% of rated voltage.

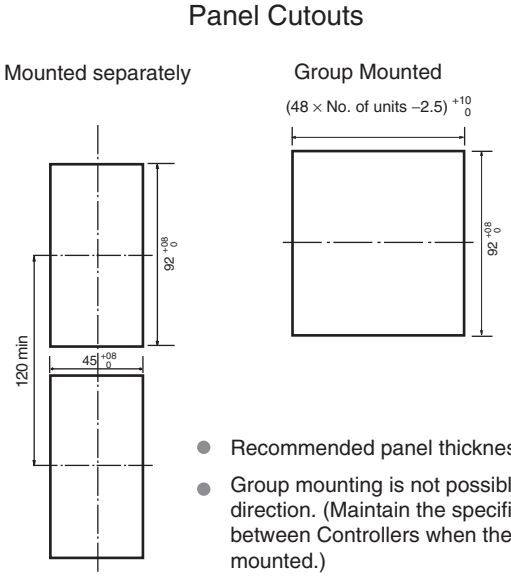
Dimensions

Note: All units are in millimeters unless otherwise indicated.





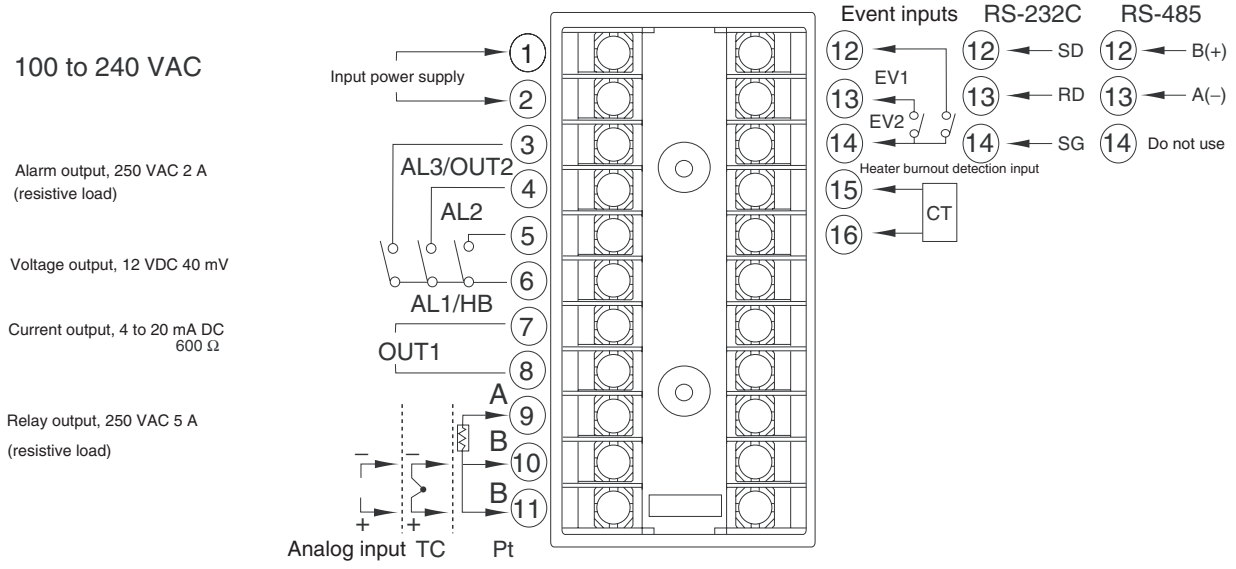
Panel Cutouts



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

Wiring Terminals

- The voltage output (control output) is not electrically insulated from the internal circuits. When using a grounding thermocouple, do not connect the control output terminals to the ground. If the control output terminals are connected to the ground, errors will occur in the measured temperature values as a result of leakage current.
- Standard insulation is applied to the power supply I/O sections. If reinforced insulation is required, connect the input and output terminals to a device without any exposed current-carrying parts or to a device with standard insulation suitable for the maximum operating voltage of the power supply I/O section.



Digital Temperature Controllers
E5CZ

Next-generation Digital Temperature Controller

- Depth of only 78 mm.
- Various temperature inputs: thermocouple, platinum resistance thermometer, infrared temperature sensor, and analog inputs.
- Auto-tuning and self-tuning are available. Auto-tuning is possible even while self-tuning is being executed.
- Heating or heating/cooling control is available.
- Start/stop function.
- CE marking and UL/CSA approval.
- Models with optional functions and current output added to the series.

⚠ Refer to the "*Safety Precautions*" on page 52.

48 × 48 × 78 mm (W × H × D)

Model Number Structure

■ Model Number Legend

E5CZ- □ **2** □ □
1 2 3 4

1. Output type
R: Relay
Q: Voltage (for driving SSR)
C: Current

2. Number of alarms
2: Two alarms

3. Option Unit
Blank: Not available
M: Option Unit can be mounted

4. Power supply voltage
Blank: 100 to 240 VAC
D: 24 VAC/VDC

Ordering Information

■ List of Models

Size	Power supply voltage	Number of alarm points	Control output	Option Unit	Model
1/16 DIN 48 × 48 × 78 mm (W × H × D)	100 to 240 VAC	2	Relay	Not Available	E5CZ-R2
			Voltage for driving SSR	Not Available	E5CZ-Q2
			Relay	Available	E5CZ-R2M
			Voltage for driving SSR	Available	E5CZ-Q2M
			Current	Available	E5CZ-C2M
	24 VAC/VDC	2	Relay	Available	E5CZ-R2MD
			Voltage for driving SSR	Available	E5CZ-Q2MD
			Current	Available	E5CZ-C2MD

■ Option Units

The E5CZ-□2M provides communications or event input functionality when one of the following Option Units is mounted.

Functions			Model
Communications	Heater burnout		E53-CNH03N
Communications			E53-CN03N
	Heater burnout	Event inputs	E53-CNHBN
		Event inputs	E53-CNBN

■ Accessories (Order Separately)

Current Transformers (CTs)

Model	E54-CT1	E54-CT3
Hole diameter	5.8 dia.	12.0 dia.

Specifications

■ Ratings

Power supply voltage		100 to 240 VAC, 50/60 Hz	24 VAC/VDC, 50/60 Hz
Operating voltage range		85% to 110% of rated supply voltage	
Power consumption		7 VA	5 VA, 3 W
Sensor input		Thermocouple: K, J, T, E, L, U, N, R, S, B Platinum resistance thermometer: Pt100, JPt100 Infrared temperature sensor: 10 to 70°C, 60 to 120°C, 115 to 165°C, 140 to 260°C Voltage input: 0 to 50 mV	
Control output	**Relay output**	SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations	
	Voltage output	12 VDC $^{+15\%}/_{-20\%}$ (PNP), max. load current: 21 mA, with short-circuit protection circuit	
	Current output	4 to 20 mA DC, load: 600 Ω max., resolution: approx. 2,600	
Alarm output		SPST-NO, 250 VAC, 1 A (resistive load), electrical life: 100,000 operations	
Event input	**Contact input**	ON: 1 kΩ max., OFF: 100 kΩ min.	
	Non-contact input	ON: Residual voltage: 1.5 V max., OFF: Leakage current: 0.1 mA max.	
		Outflow current: Approx. 7 mA per point	
Control method		2-PID control or ON/OFF control	
Setting method		Digital setting using front panel keys	
Indication method		7-segment digital display and single-lighting indicators Character height: PV: 10.0 mm; SV: 6.5 mm	
Other functions		According to Controller model	
Ambient operating temperature		–10 to 55°C (with no condensation or icing)	
Ambient operating humidity		25% to 85%	
Storage temperature		–25 to 65°C (with no condensation or icing)	

■ Input Ranges

Platinum Resistance Thermometer Input

Input type	Pt100			JPt100	
Temperature range	–200 to 850°C	–199.9 to 500.0°C	0.0 to 100.0°C	–199.9 to 500.0°C	0.0 to 100.0°C
Setting number	0	1	2	3	4

Thermocouple Input

Input type	K		J		T		E	L	U		N	R	S	B
Temperature range	–200 to 1300°C	–20 to 500°C	–100 to 850°C	–20.0 to 400.0°C	–200 to 400°C	–199.9 to 400.0°C	0 to 600°C	–100 to 850°C	–200 to 400°C	–199.9 to 400.0°C	–200 to 1300°C	0 to 1700°C	0 to 1700°C	100 to 1800°C
Setting number	5	6	7	8	9	22	10	11	12	23	13	14	15	16

Shaded setting indicates the default setting.

ES1B Infrared Temperature Sensor

Input type	10 to 70°C	60 to 120°C	115 to 165°C	140 to 260°C
Temperature range	0 to 90°C	0 to 120°C	0 to 165°C	0 to 260°C
Setting number	17	18	19	20

Analog Input

Input type	0 to 50 mV
Setting range	Usable in the following ranges by scaling: –1999 to 9999 or –199.9 to 999.9
Setting number	21

Applicable standards by input type are as follows:

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/T 5977-99

■ Characteristics

Indication accuracy	Thermocouple: (±0.5% of indicated value or ±1°C, whichever is greater) ±1 digit max. (See note 1.) Platinum resistance thermometer: (±0.5% of indicated value or ±1°C, whichever is greater) ±1 digit max. Analog input: ±0.5% FS±1 digit max. CT input: ±5% FS±1 digit max.
Influence of temperature (See note 2.)	R, S, and B thermocouple inputs: (±1% of PV or ±10°C, whichever is greater) ±1 digit max.
Influence of voltage (See note 2.)	Other thermocouple inputs: (±1% of PV or ±4°C, whichever is greater) ±1 digit max. *±10°C for –100°C or less for K sensors Platinum resistance thermometer inputs: (±1% of PV or ±2°C, whichever is greater) ±1 digit max. Analog inputs: (±1% of FS) ±1 digit max.
Hysteresis	0.1 to 999.9 EU (in units of 0.1 EU)
Proportional band (P)	0.1 to 999.9 EU (in units of 0.1 EU)
Integral time (I)	0 to 3999 s (in units of 1 s)
Derivative time (D)	0 to 3999 s (in units of 1 s)
Control period	1 to 99 s (in units of 1 s)
Manual reset value	0.0% to 100.0% (in units of 0.1%)
Alarm setting range	–1999 to 9999 (decimal point position depends on input type)
Sampling period	500 ms
Insulation resistance	20 MΩ min. (at 500 VDC)
Dielectric strength	2,000 VAC, 50 or 60 Hz for 1min (between current-carrying terminals of different polarity)
Vibration resistance	10 to 55 Hz, 20 m/s^2 for 10 min in X, Y and Z directions
Shock resistance	100 m/s^2, 3 times each in 3 axes, 6 directions
Weight	Approx. 150 g
Memory protection	EEPROM (non-volatile memory) (number of write operations: 100,000)
EMC	Enclosure Emission: EN 55011 (GB/T 6113.1,2) Group 1 Class A AC Mains Emission: EN 55011 (GB/T 6113.1,2) Group 1 Class A ESD Immunity: IEC 61000-4-2 (GB/T 17626.2) 4 kV contact discharge (level 2) 8 kV air discharge (level 3) RF-interference Immunity: IEC 61000-4-3 (GB/T 17626.3): 10 V/m, 80 MHz to 1 GHz (level 3) Conducted Disturbance Immunity: IEC 61000-4-6 (GB/T 17626.6): 3 V (0.15 to 80 MHz) (level 3) Burst Immunity: IEC 61000-4-5 (GB/T 17626.5): 2 kV powerline (level 3) 2 kV I/O signalline (level 4)
Applicable standards	UL 61010C-1, CSA C22.2 No.1010.1 Conforms to EN 61326, EN 61010-1 (IEC 61010-1).

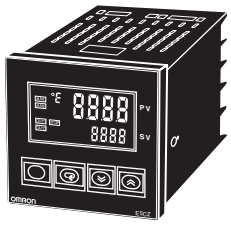
Note 1. The indication accuracy of K thermocouples in the –200 to 1300°C range, T and N thermocouples at a temperature of –100°C max. and U and L thermocouples at any temperature is ±2°C ±1 digit maximum. The indication accuracy of the B thermocouples at a temperature of 400°C max. is not specified.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

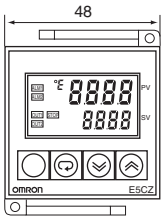
2. Conditions: Ambient temperature: –10°C to 23°C to 55°C, Voltage range: –15% to +10% of rated voltage.

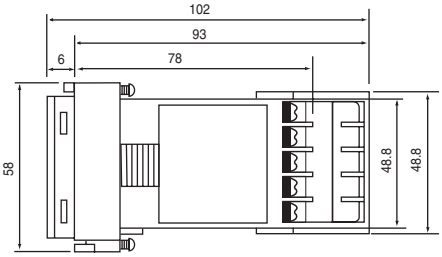
3. When using the E53-CN03N or E53-CNBN Option Unit with the E5CZ-C2M or E5CZ-C2M to satisfy the Class A limit for the radiated interference field strength test, always connect a ZCAT2235-1030 Clamp Filter (manufactured by TDK) to the power line of the Temperature Controller.

Dimensions

Note: All units are in millimeters unless otherwise indicated.

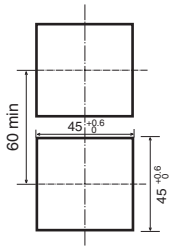




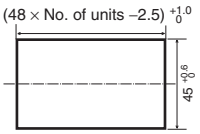


Panel Cutouts

Mounted separately



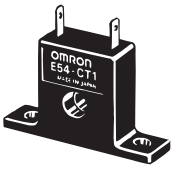
Group Mounted

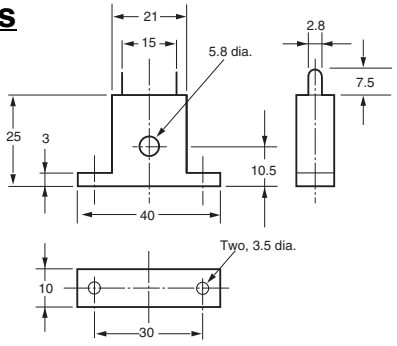


- Recommended panel thickness is 1 to 8 mm.
- Group mounting is not possible in the vertical direction. (Maintain the specified mounting space between Controllers when they are group mounted.)
- When two or more Controllers are mounted, make sure that the surrounding temperature does not exceed the allowable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

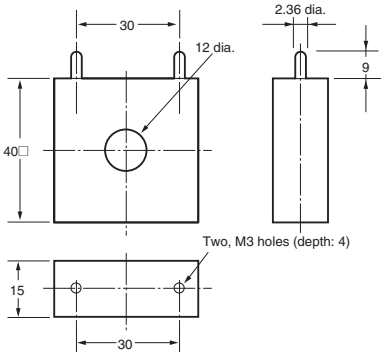
Current Transformers

E54-CT1



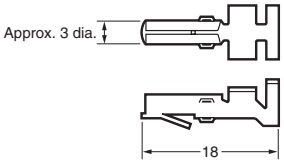


E54-CT3

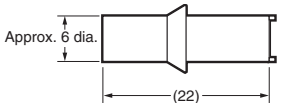


E54-CT3 Accessories

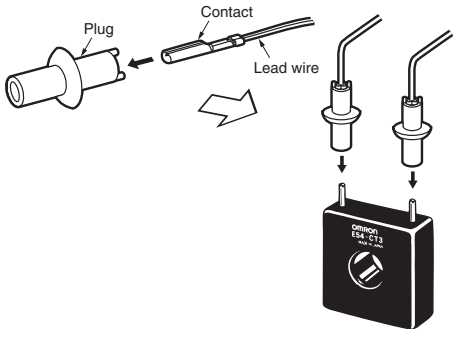
• Contact



• Plug

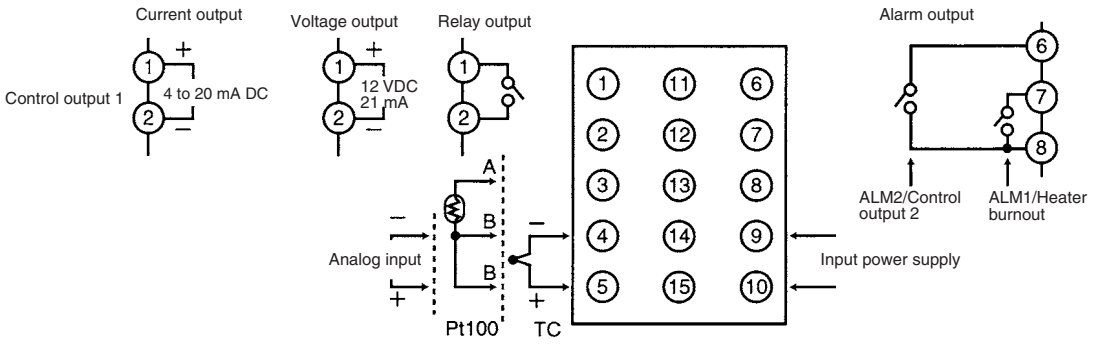


Connection Example



Wiring Terminals

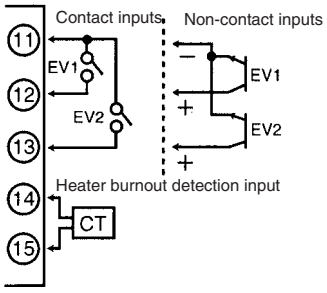
- The voltage output (control output) is not electrically insulated from the internal circuits. When using a grounded thermocouple, do not connect the control output terminals to the ground. If the control output terminals are connected to the ground, errors will occur in the measured temperature values as a result of leakage current.



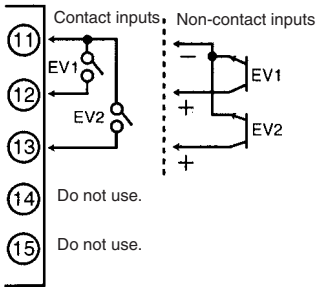
Two input power supplies are available: 100 to 240 VAC or 24 VDC.

Option Units

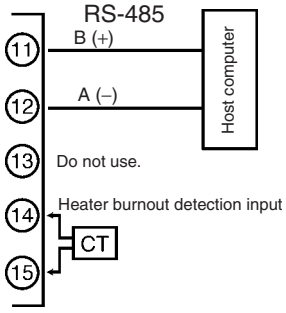
E53-CNHBN
Event Inputs/Heater Burnout Detection



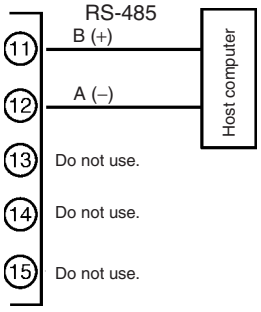
E53-CNBN
Event Inputs



E53-CNH03N
Communications/Heater Burnout Detection



E53-CN03N
Communications



Communications

Interface:	RS-485
Synchronization:	Start-stop (asynchronous)
Communications:	Half duplex
Baud rate:	1.2/2.4/4.8/9.6/ 19.2 kbps

Event Inputs

Contact Inputs
ON: 1 kΩ max., OFF: 100 kΩ min.
Non-Contact Inputs
ON: residual voltage of 1.5 V max.
OFF: leakage current of 0.1 mA max.

Heater Burnout Alarm

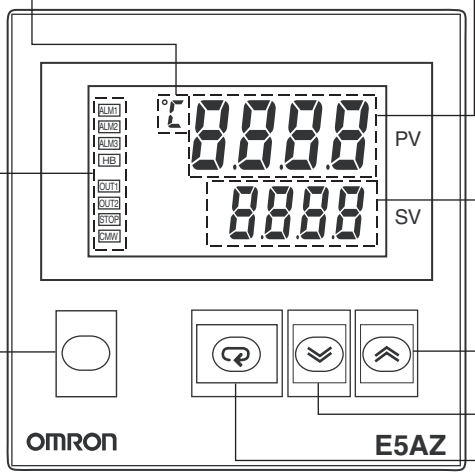
Maximum heater current: 50 A AC
Input current indication accuracy: ±5% FS ±1 digit max.
Heater burnout alarm setting range: 0.1 to 49.9 A, in 0.1 A increments

Nomenclature

E5AZ

Operation Indicators

1. ALM1 (alarm 1)
   Lights when the alarm 1 output is ON.
   ALM2 (alarm 2)
   Lights when the alarm 2 output is ON.
   ALM3 (alarm 3)
   Lights when the alarm 3 output is ON.
2. HB (heater burnout alarm display)
   Lights when a heater burnout is detected.
   The heater burnout alarm can be held ON by setting the heater burnout latch. To reset, turn the power supply OFF and then ON or set the heater burnout alarm value to 0.0 A.
3. OUT1, OUT2 (control output 1, control output 2)
   Lights when control output 1 or control output 2 (cool) is ON.
   However, if control output 1 is a current output, OUT1 will always be not lit.
4. STOP (stop)
   Lights when control of the E5AZ has been stopped. During control, this indicator lights when an event or the run/stop function has become stopped. Otherwise, this indicator is not lit.
5. CMW (communications writing control)
   Lights when communications writing is enabled and is not lit when it is disabled.



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

No. 1 Display
Displays the process value or parameter type.

No. 2 Display
Displays the set point, manipulated variable, or set value (setup) of the parameter.

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

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

Mode Key
Press this key to select parameters within each level.

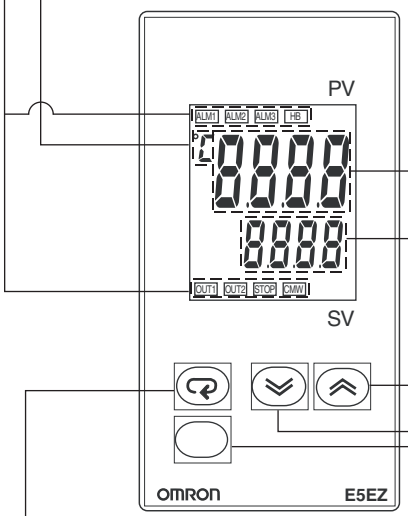
Level + Mode Keys
This key combination sets the E5AZ to the "protect level."

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

E5EZ

Operation Indicators

1. ALM1 (alarm 1)
   Lights when the alarm 1 output is ON.
   ALM2 (alarm 2)
   Lights when the alarm 2 output is ON.
   ALM3 (alarm 3)
   Lights when the alarm 3 output is ON.
2. HB (heater burnout alarm display)
   Lights when a heater burnout is detected.
   The heater burnout alarm can be held ON by setting the heater burnout latch. To reset, turn the power supply OFF and then ON or set the heater burnout alarm value to 0.0 A.
3. OUT1, OUT2 (control output 1, control output 2)
   Lights when control output 1 or control output 2 (cool) is ON.
   However, if control output 1 is a current output, OUT1 will always be not lit.
4. STOP (stop)
   Lights when control of the E5EZ has been stopped.During control, this indicator lights when an event or the run/stop function has become stopped. Otherwise, this indicator is not lit.
5. CMW (communications writing control)
   Lights when communications writing is enabled and is not lit when it is disabled.



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

No. 1 Display
Displays the process value or parameter type.

No. 2 Display
Displays the set point, manipulated variable, or set value (setup) of the parameter.

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

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

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

Level + Mode Keys
This key combination sets the E5EZ to the "protect level."

Mode Key
Press this key to select parameters within each level.

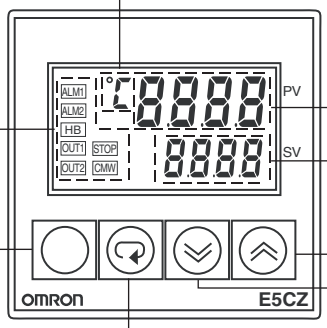
E5CZ

Operation Indicators

1. ALM1 (alarm 1)
   Lights when the alarm 1 output is ON.
   ALM2 (alarm 2)
   Lights when the alarm 2 output is ON.
2. HB (heater burnout alarm display)
   Lights when a heater burnout is detected.
   The heater burnout alarm can be held ON by setting the heater burnout latch. To reset, turn the power supply OFF and then ON or set the heater burnout alarm value to 0.0 A.
3. OUT1, OUT2 (control output 1, control output 2)
   Lights when control output 1 or control output 2 (cool) is ON.
   However, if control output 1 is a current output, OUT1 will always be not lit.
4. STP (stop)
   Lights when control of the E5CZ has been stopped.
   During control, this indicator lights when an event or the run/stop function has become stopped. Otherwise, this indicator is not lit.
5. CMW (communications writing control)
   Lights when communications writing is enabled and is not lit when it is disabled.

Temperature Unit

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



No. 1 Display

Displays the process value or parameter type.

No. 2 Display

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

Up Key

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

Down Key

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

Mode Key

Press this key to select parameters within each level.

Level + Mode Keys

This key combination sets the E5CZ to the "protect level."

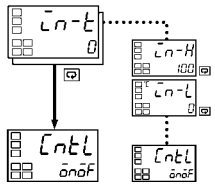
Level Key

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

Operation

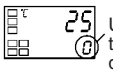
PID Control Using Autotuning

Changing Parameters



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

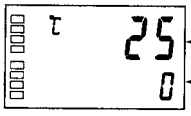
Changing Set Values



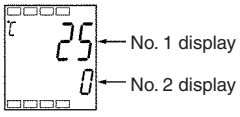
Use the ▼ or ▲ keys to change the set value displayed in the setup menu.

Display

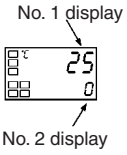
E5AZ



E5EZ



E5CZ



Typical Example

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

Setup procedure

Power ON

Set input specifications

Set control specifications

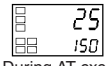
Self-tuning

Check control period

Check alarm type

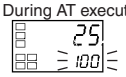
PV/SP

After AT execution.



Set the set point

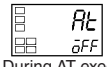
During AT execution.



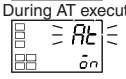
While AT is being executed, SP will flash.

AT execution

After AT execution.



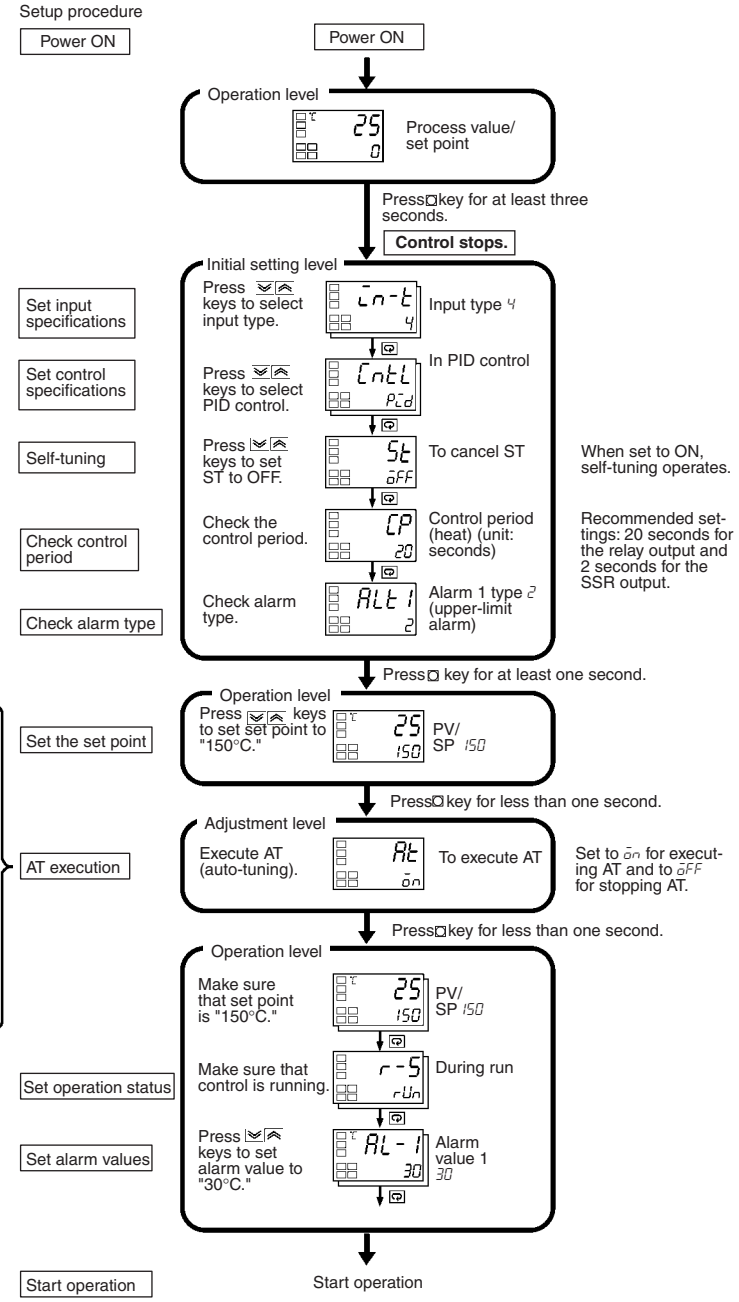
During AT execution.



Set operation status

Set alarm values

Start operation

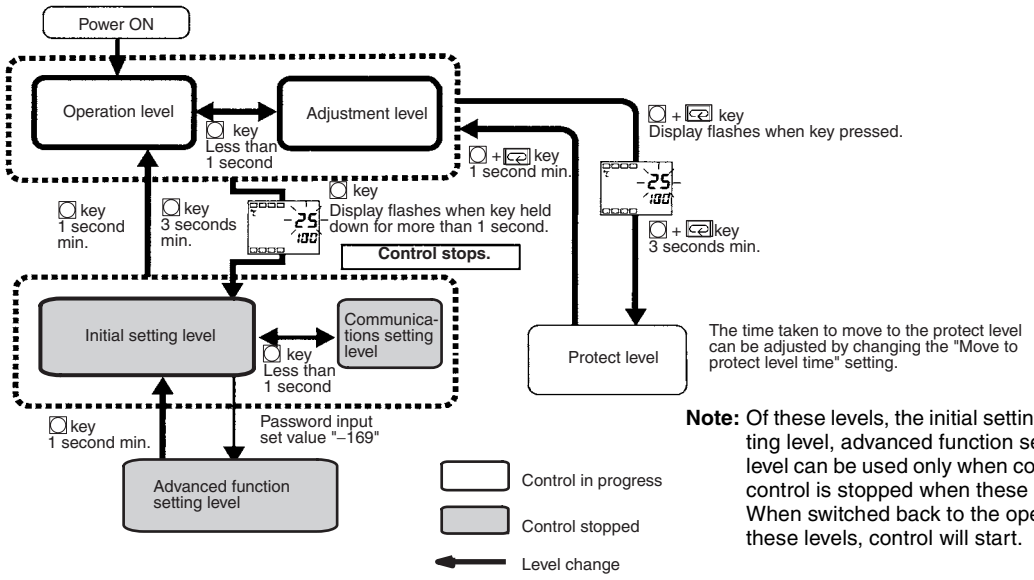


■ Specification Setting after Turning ON Power

Outline of Operation Procedures

Key Operation

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



Note: Of these levels, the initial setting level, communications setting level, advanced function setting level and calibration level can be used only when control has stopped. Note that control is stopped when these four levels are selected. When switched back to the operation level from one of these levels, control will start.

Description of Each Level

Operation Level

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

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

Adjustment Level

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

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

Initial Setting Level

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

Protect Level

To select this level, simultaneously press the and keys for at least 3 seconds. This level is to prevent unwanted or accidental modification of parameters. Protected levels will not be displayed, and so the parameters in that level cannot be modified.

Communications Setting Level

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

Advanced Function Setting Level

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

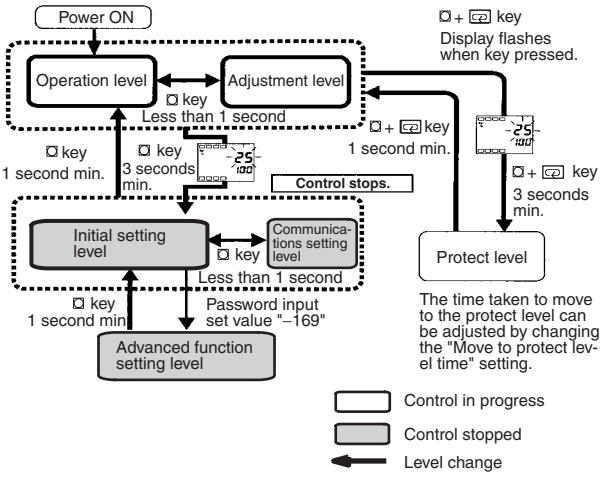
You can move only to the calibration level from this level.

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

Specification Setting after Turning ON Power

Initial Setting Level

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

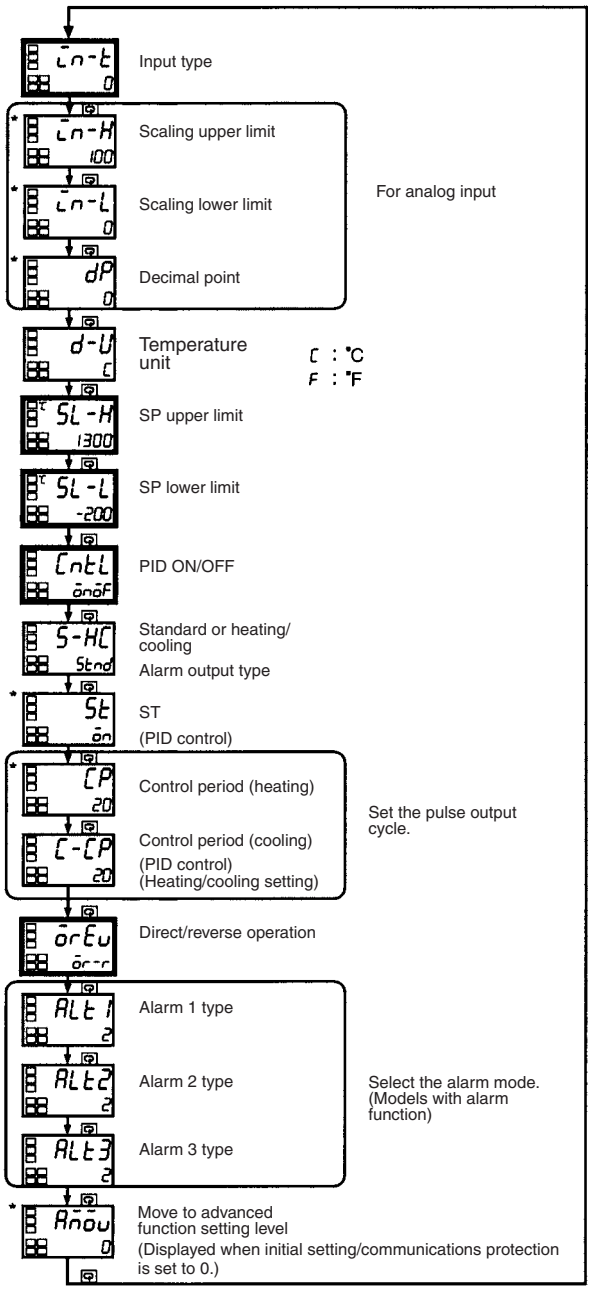


The move from the operation level to the initial setting level, press ◯ key for three seconds or more.

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

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

Initial setting level



To return to the operation level, press the ◯ key for longer than one second.

* Not displayed as default setting.

Input Type

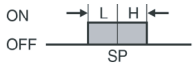
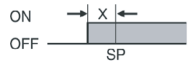
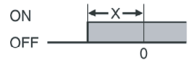
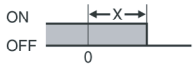
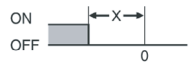
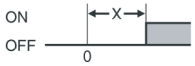
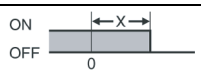
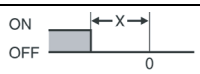
When selecting the input type, follow the specifications listed in the following table.

	Specifications	Set Value	Input Temperature Range
Platinum resistance thermometer input	Pt100	0	–200 to 850 (°C)/–300 to 1500 (°F)
		1	–199.9 to 500.0 (°C)/–199.9 to 900.0 (°F)
		2	0.0 to 100.0 (°C)/0.0 to 210.0 (°F)
	JPt100	3	–199.9 to 500.0 (°C)/–199.9 to 900.0 (°F)
		4	0.0 to 100.0 (°C)/0.0 to 210.0 (°F)
Thermocouple input	K	5	–200 to 1300 (°C)/–300 to 2300 (°F)
		6	–20.0 to 500.0 (°C)/0.0 to 900.0 (°F)
	J	7	–100 to 850 (°C)/–100 to 1500 (°F)
		8	–20.0 to 400.0 (°C)/0.0 to 750.0 (°F)
	T	9	–200 to 400 (°C)/–300 to 700 (°F)
		22	–199.9 to 400.0 (°C)/199.9 to 700.0 (°F)
	E	10	0 to 600 (°C)/0 to 1100 (°F)
	L	11	–100 to 850 (°C)/–100 to 1500 (°F)
	U	12	–200 to 400 (°C)/–300 to 2300 (°F)
		23	–199.9 to 400.0 (°C)/199.9 to 700.0 (°F)
	N	13	–200 to 1300 (°C)/–300 to 2300 (°F)
	R	14	0 to 1700 (°C)/0 to 3000 (°F)
	S	15	0 to 1700 (°C)/0 to 3000 (°F)
	B	16	100 to 1800 (°C)/300 to 3200 (°F)
Non-contact Temperature Sensor (ES1B)	10 to 70°C	17	0 to 90 (°C)/0 to 190 (°F)
	60 to 120°C	18	0 to 120 (°C)/0 to 240 (°F)
	115 to 165°C	19	0 to 165 (°C)/0 to 320 (°F)
	160 to 260°C	20	0 to 260 (°C)/0 to 500 (°F)
Analog input	0 to 50 mV	21	One of the following ranges depending on the results of scaling: 1999 to 9999, 199.9 to 999.9

Note: The initial setting is 5: –200 to 850°C/–300 to 2300°F.

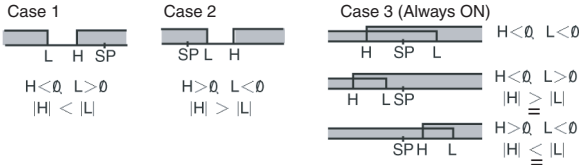
Alarm Types

Select the alarm type from the 12 types listed in the following table.

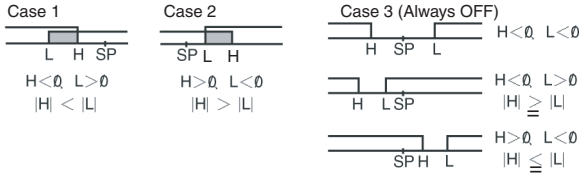
Set Value	Alarm Type	Alarm Output Operation	
		When X is positive	When X is negative
0	Alarm function OFF	Output OFF	
1 (See note 1.)	Upper- and lower-limit (deviation)		(See note 2.)
2	Upper-limit (deviation)		
3	Lower-limit (deviation)		
4 (See note 1.)	Upper- and lower-limit range (deviation)		(See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

Note 1: With set values 1, 4 and 5, the upper and lower limit values can be set independently for each alarm type, and are expressed as "L" and "H."
Following operations are for cases when an alarm set point is "X" or negative.

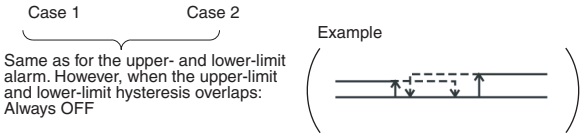
2: Set value: 1, Upper- and lower-limit alarm



3: Set value: 4, Upper- and lower-limit range



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

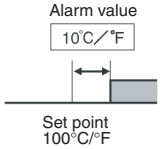


5: Set value: 5, Upper- and lower-limit with standby sequence alarm. Always OFF when the upper-limit and lower-limit hysteresis overlaps.
Set the alarm types for alarm 1 and alarm 2 independently in the initial setting level. The default setting is 2 (upper limit). With the E5AZ/E5EZ, perform settings similarly for alarm 3.

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

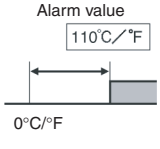
When an alarm type other than the absolute-value alarm is selected

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



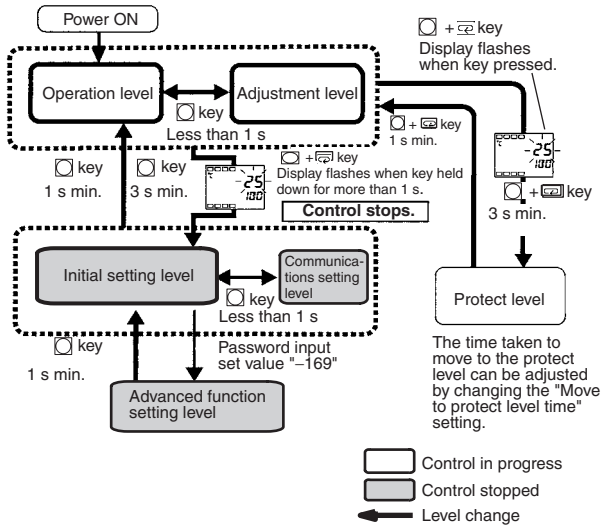
When the absolute-value alarm is selected

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



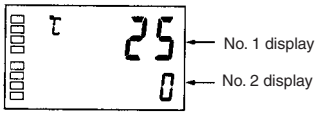
Parameters

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

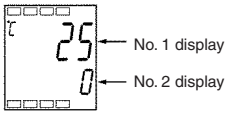


Display

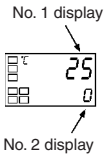
E5AZ

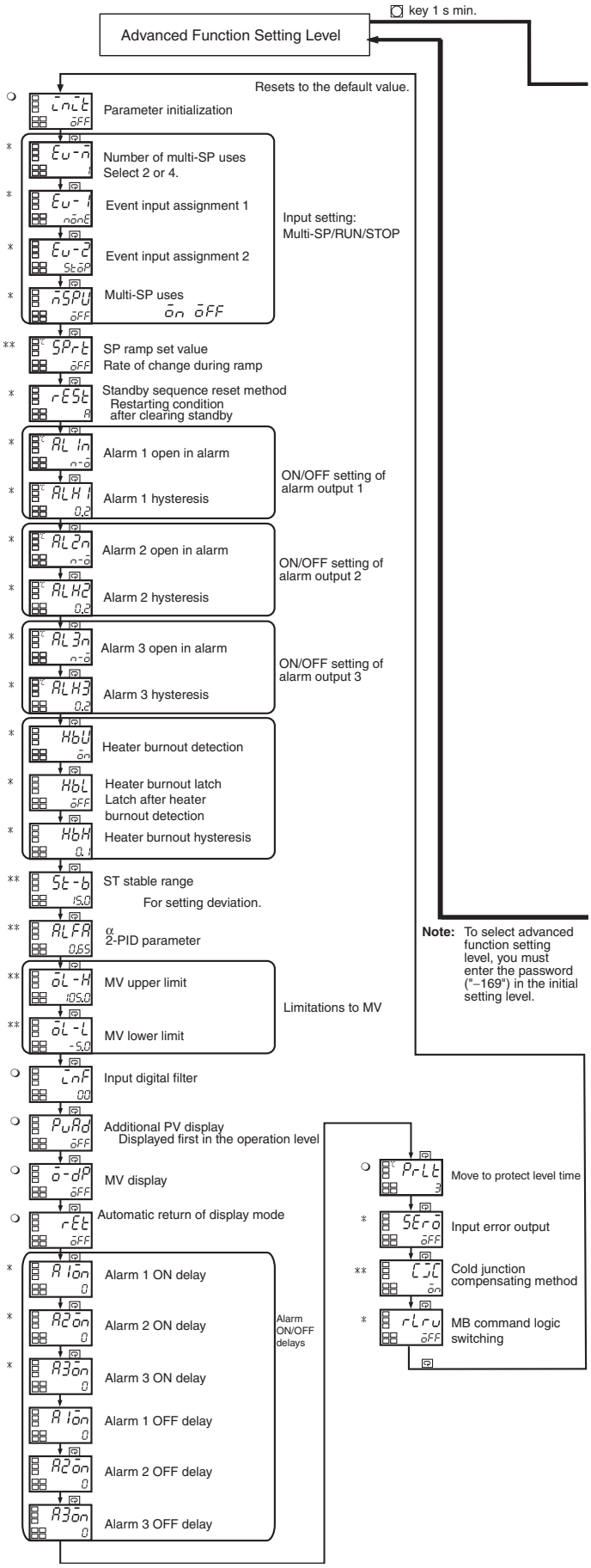


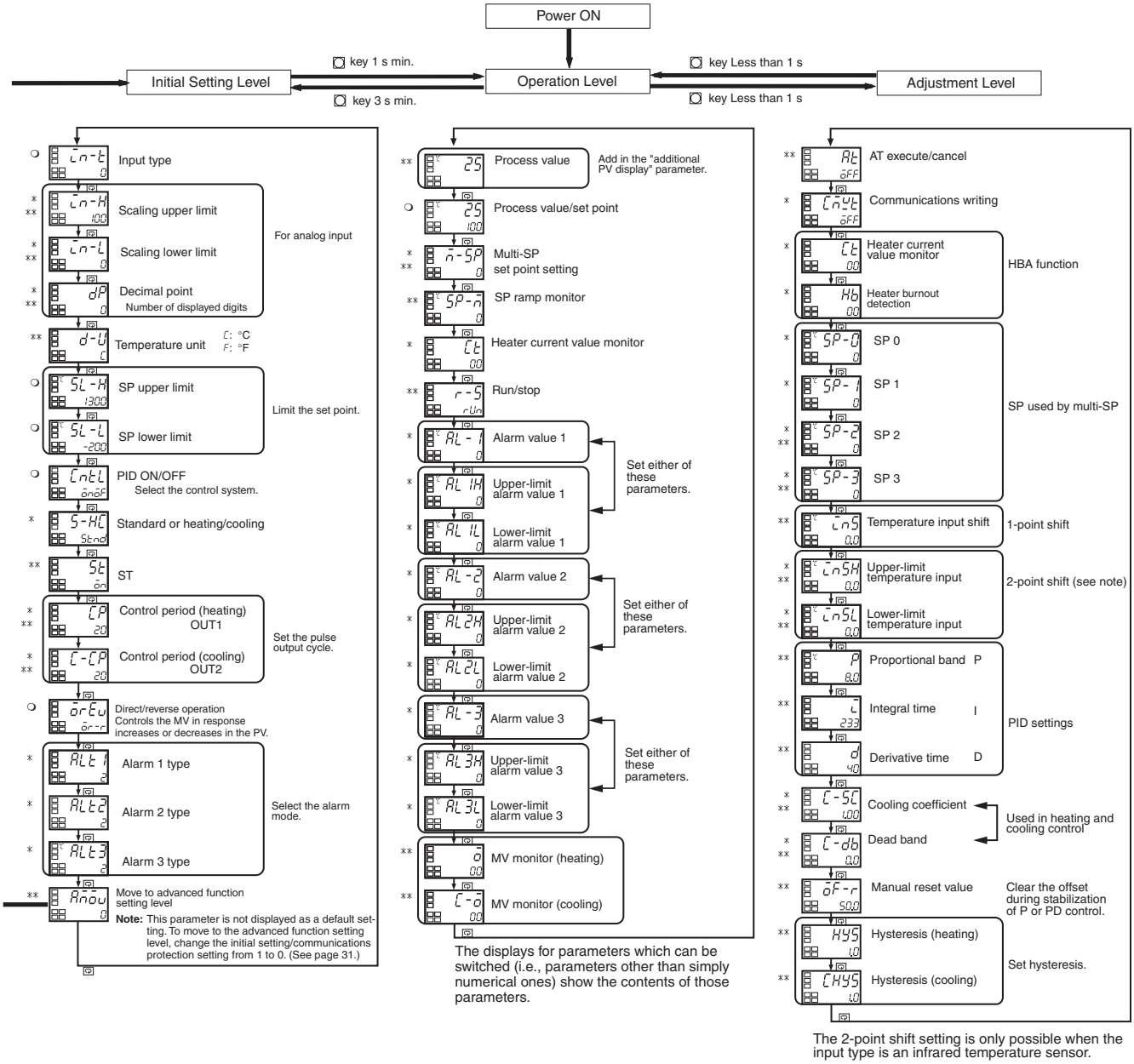
E5EZ



E5CZ







Note: These diagrams show all the parameters that may be displayed. Depending on the specifications of the model used, there may be some parameters that are not displayed.

Input Shift

All points in the sensor range are shifted by the value set as the temperature input shift value.

Example

Input shift setting	Temperature measured by sensor	Temperature display
0 (no shift)	100°C	100°C
10 (shifted +10°C)	100°C	110°C
−10 (shifted −10°C)	100°C	90°C

Protect Level

Operation/adjustment protection
Restricts displaying and modifying menus in operation, adjustment, and manual control levels.

Initial setting/communications protection
This protect level restricts movement to the initial setting, communications setting, and advanced function setting levels.

Setting change protection
Protects changes to setups by operating the front panel keys.

Operation/Adjustment Protection

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

Level		Set value			
		0	1	2	3
Operation level	**PV**	❍	❍	❍	❍
	PV/SP	◎	◎	◎	❍
	Other	◎	◎	X	X
Adjustment level		◎	X	X	X

When this parameter is set to “0,” parameters are not protected.

Default setting: 0

◎: Can be displayed and changed
❍: Can be displayed
X : Cannot be displayed and move to other levels not possible

Initial Setting/Communications Protection

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

Set value	Initial setting level	Communications setting level	Advanced function setting level
0	❍	❍	❍
1	❍	❍	X
2	X	X	X

Default setting: 1
❍: Move to other levels possible
X: Move to other levels not possible

Setting Change Protection

This protect level protects setup from being changed by operating the keys on the front panel.

Set value	Description
OFF	Setup can be changed by key operation.
ON	Setup cannot be changed by key operation. (The protect level, can be changed.)

Default setting: OFF

Communications Setting Level

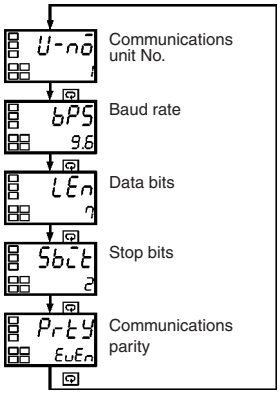
Set the E5AZ/E5EZ/E5CZ communications specifications in the communications setting level. For setting communications parameters, use the E5AZ/E5EZ/E5CZ panel. The communications parameters and their settings are listed in the following table.

Parameter	Displayed characters	Set (monitor) value	Set value
Communications unit No.	U-no	0 to 99	0.**1** to 99
Baud rate	bPS	1.2/2.4/4.8/9.6/19.2 (kbps)	1.2/2.4/4.8/**9.6**/19.2
Data bits	LEn	7/8 (bit)	**7**/8 (bit)
Stop bits	Sbit	1/2	1/**2** (bit)
Parity	Prty	None, even, odd	non**E**/**Even**/odd

Note: The highlighted values indicate default settings.

Before executing communications with the E5AZ/E5EZ/E5CZ, set the communications unit No., baud rate, etc., through key operations as described below. As for other operations, refer to relevant Operation Manual.

1. Press the ◯ key for at least three seconds in the "operation level." The level moves to the "initial setting level."
2. Press the ◯ key for less than one second. The "initial setting level" moves to the "communications setting level."
3. Pressing the ↩ key advances the parameters as shown in the following figure.
4. Press the ∧ or ∨ keys to change the parameter setups.



Note: On the E5AZ/E5EZ, the ◯ key is the ⬭ key.

Set each communications parameter to match those of the communicating personal computer.

Communications Unit No. (U-no)

When communicating with the host computer, the unit number must be set in each Temperature Controller so that the host computer can identify each Temperature Controller. The number can be set in a range from 0 to 99 in increments of 1. The default setting is 1. When using more than one Unit, be careful not to use the same number twice. Duplicate settings will cause malfunction. This value becomes valid when the power is turned OFF and ON again.

Baud Rate (bPS)

Use this parameter to set the speed of communications with the host computer. It can be set to one of the following values; 1.2 (1200 bps), 2.4 (2400 bps), 4.8 (4800 bps), 9.6 (9600 bps), and 19.2 (19200 bps).
This setting becomes valid when the power is turned OFF and ON again.

Data Bits (LEn)

Use this parameter to change the communications data bit length to 7 bits or 8 bits.

Stop Bits (Sbit)

Use this parameter to change the communications stop bit to 1 or 2.

Communications parity (Prty)

Use this parameter to set the communications parity to None, Even, or Odd.

Troubleshooting

When an error occurs, an error code will be displayed on the No. 1 display. Check the contents of an error and take appropriate countermeasures.

No.1 display	Contents	Countermeasure	Output status	
			Control output	Alarm output
S.Err (S. Err)	Input error (See note.)	Check that the input wiring is correct, that there is no disconnection or short-circuit, and that the input type is correct. (Thermocouple input short-circuits cannot be detected.)	OFF	Handled as abnormally high temperature
	A/D converter error (See note.)	After noting the error, reset the power. If the display does not change, replacement is necessary. If the error is removed, it is possible that the original error was caused by noise. Check that there are no possible sources of noise.	OFF	OFF
E111 (E111)	Memory error	Reset the power. If the display does not change, replacement is necessary. If the error is removed, it is possible that the original error was caused by noise. Check that there are no possible sources of noise.	OFF	OFF
H.Err (H. Err)	HB error (See note.)		OFF	OFF

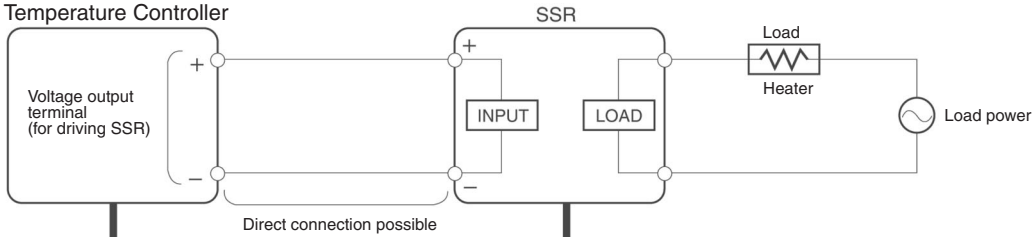
Note 1. If the input is within the range for which control is possible but outside the displayable range (–1999 (–199.9) to 9999 (999.9)), cccc will be displayed if the value is less than –1999 (–199.9), and jjjj will be displayed if it is greater than 9999 (999.9). Control output and alarm output will operate normally for either of these displays. Refer to the relevant User's Manual for details on the ranges for which control is possible.

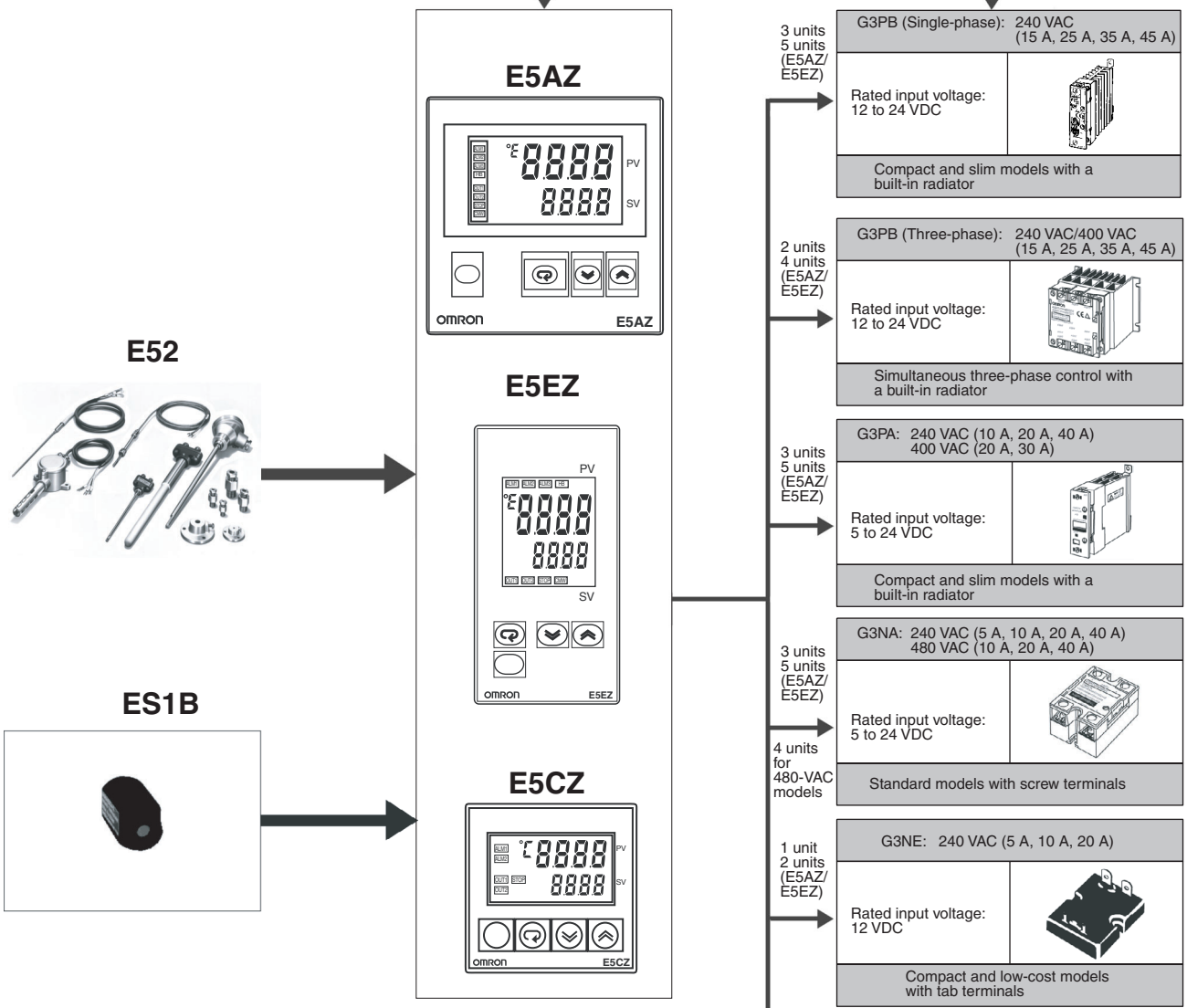
2. These errors are displayed only when the Controller is set to display the present value or the present value and the set value. They are not displayed in other statuses.

Peripheral Devices

■ Temperature Sensor / SSR

Connection Example with SSR





Number of Connectable SSRs

	A: G3PB (Single-phase) G3PA	B: G3PB (Three-phase)	C: G3NA (See note.)	D: G3NE	E: G3NH
E5AZ/EZ	5 units	4 units	5 units	2 units	4 units
E5CZ	3 units	2 units	3 units	1 unit	8 units

Note: 480 VAC models: 4 units

Digital Position-Proportional Controllers
E5EZ-PRR

A position proportional control model for the E5□Z-PRR series

- Just 78mm depth
- All types of input: temperature input type, analog (current, voltage) input type
- Makes use of high-visibility LCD, with three lines of 4-digit display, for simplicity and clarity
- 3 lines of display to observe PV/ SV/ MV (percentage of valve's opening), clearly displaying the state of control (operations)
- Event input enables the selection of multi configurations as well as a start/ stop function
- Alarm delay function
- Communications function
- Able to choose floating control or closed control. In floating control, position proportional control can be realized without a potentiometer
- Equipped with a manual output function (equipped with an automatic/ manual key)

48×96×78 (W×H×D)

⚠ Refer to the "Safety Precautions" on page 52.

Model Number Structure

■ Model Number Legend

E5EZ - PRR2□□
1 2 3 4 5 6

1. Control method
P: Valve control

2. Control output 1
R: Relay (OPEN)

3. Control output 2
R: Relay (CLOSE)

4. Alarm output
2: 2 alarm outputs

5. Option

Blanks:	Not available
01:	RS-232C
03:	RS-485
B:	2 event inputs

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

Ordering Information

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

■ Accessories (Order Separately)

Unit Label

Model	Y92S-L1

■ Input Range

• Thermocouples / Platinum Resistance Thermometer

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

The applicable standards for input types are as follows.

K:GB/T2814-98 R:GB/T1598-98

J,L:GB/T4994-98 S:GB/T3772-98

T,U:GB/T2903-98 B:GB/T2902-99

E:GB/T4993-98 JPt100,Pt100:GB/T5977-99

N:GB/T17615-98

Shaded settings are the default settings.

• Models with Analog Inputs

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

indicates factory settings.

■ Optional Functions

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

Specifications

■ Ratings

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

■ Communications Specifications

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

Specifications

■ Characteristics

Indication accuracy	Thermocouple: (displayed value ±0.5 % or ±1°C, whichever is largest) ±1 digit max. (see note 1) Platinum Resistance Thermometer: (displayed value ±0.5 % or ±1°C, whichever is largest) ±1 digit max. Analog Input: ±0.5% FS ±1 digit max. Potentiometer Input: ±5% FS ±1 digit max.		
Influence of temperature (See note 2.) **Influence of voltage (See note 2.)**	R, S, and B thermocouple inputs: (±1% of PV or ±10°C, whichever is greater) ±1 digit max. Other thermocouple inputs: (±1% of PV or ±4°C, whichever is greater) ±1 digit max. *±10°C for -100°C or less for K sensors Platinum resistance thermometer inputs: (±1% of PV or ±2°C, whichever is greater) ±1 digit max. Analog inputs: (±1% of FS) ±1 digit max.		
Proportional band (P)	0.1 to 999.9°C (unit: 0.1 EU)		
Integral time (I)	0 to 3999 s (in units of 1s) With floating control, 1 to 3999 s		
Derivative time (D)	0 to 3999 s (in units of 1s)		
Control period	1 to 99 s (in units of 1s)		
Manual reset value	-10.0% to 110.0% (in units of 0.1%)		
Alarm settings range	-1999 to 9999 (decimal point position depends on input type)		
Sampling period	500 ms		
Insulation resistance	20MΩ min, 2 seconds (500 VDC)		
Dielectric strength	2000VAC,50 or 60Hz for 1min (at different stages of charging)		
Vibration resistance (Error)	10 to 55Hz, 20m/s² for 10min each in X,Y, and Z directions		
Shock resistance (Error)	100m/s²,3 times each in 3		
Weight	Controller : Approx. 260g		
Memory protection	EEPROM (non-volatile memory) (number of writes: 100,000 operations)		
EMC	Emission enclosure:	EN55011(GB/T 6113.1,2)	1 group, type A
	Emission AC mains:	EN55011(GB/T 6113.1,2)	1 group, type A (see note 2)
	Immunity ESD:	IEC61000-4-2(GB/T 17626.2)	4kV contact discharge (series 2) 6kV air discharge (series 3)
	Immunity RF interference:	IEC61000-4-3(GB/T 17626.3):	10V/m, 80MHz-1GHz (series)
	Immunity-conducted disturbance:	EC61000-4-6(GB/T 17626.6):	3V(0.15-80MHz) (series 3)
	Surges (shocks):	IEC61000-4-5(GB/T 17626.5):	2kV power supply line (series 3) 1kV I/O signal line (series 4)
Pending standards	UL61010C-1,CSA C22.2 No.1010.1 meets the requirements of EN61326,EN61010-1(IEC61010-1)		

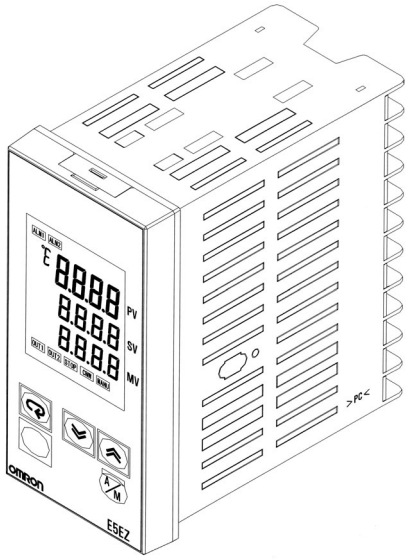
Note 1: The indication accuracy of K thermocouples in the -200 to 1300°C range, T and N thermocouples at a temperature of -100°C max., and U and L thermocouples at any temperature is ±2°C ±1 digit maximum. The indication accuracy of the B thermocouple at a temperature of 400°C max. is not specified.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

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

Dimensions

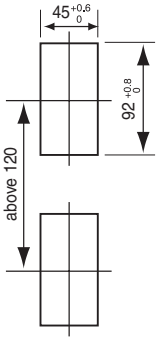
Note: All figures are in mm, unless otherwise stated.

■ Main Unit

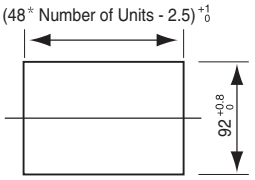


- **Dimensions of Panel's Grooves**

Independent Installation (Unit: mm)



Simultaneous Multiple Installations (Unit: mm)

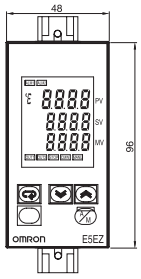


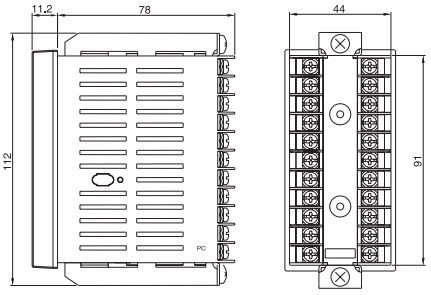
- During installation, please insert a temperature gauge into the grooves on the panel (thickness of 1 to 8 mm), and insert the metallic components for installation into the fixing hooks at the bottom and the top of the rear cover.
- Please ensure that the screws to metallic components are even and locked.
- When doing multiple installations, please ensure that the temperature gauge remains within the specified temperature range.

- **Package Content**

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

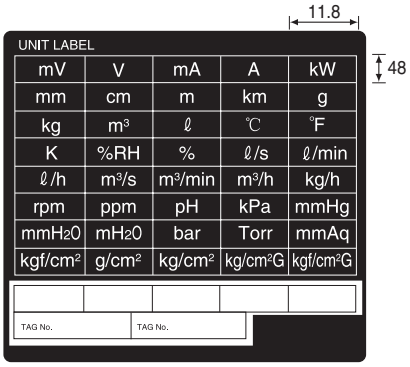
During removal, please use a screwdriver to remove the clips on the top and bottom of the front covering panel, and then remove the temperature gauge's front panel.





- **Unit Labels (Order Separately)**

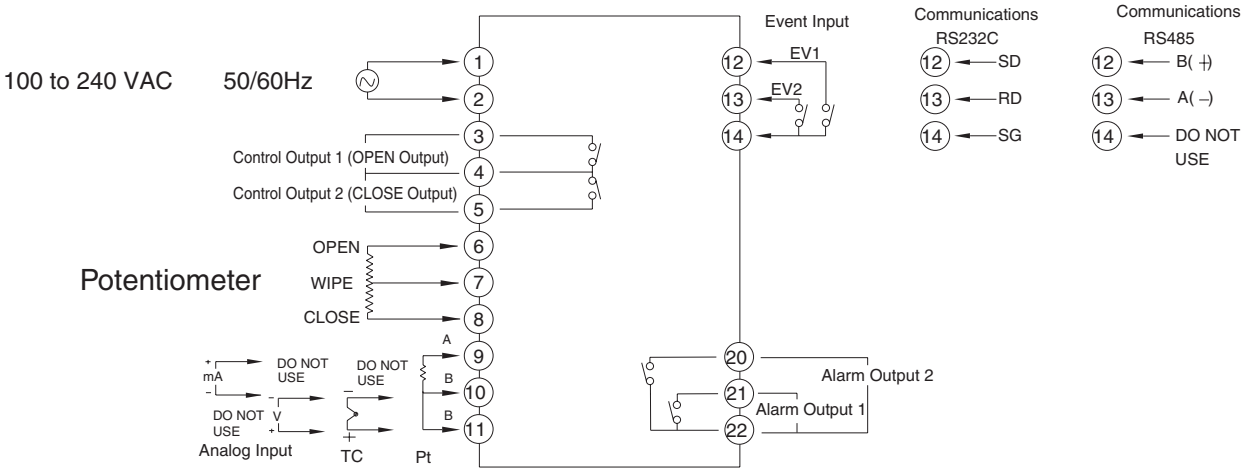
Y92S-L1 Type



Wiring Terminals

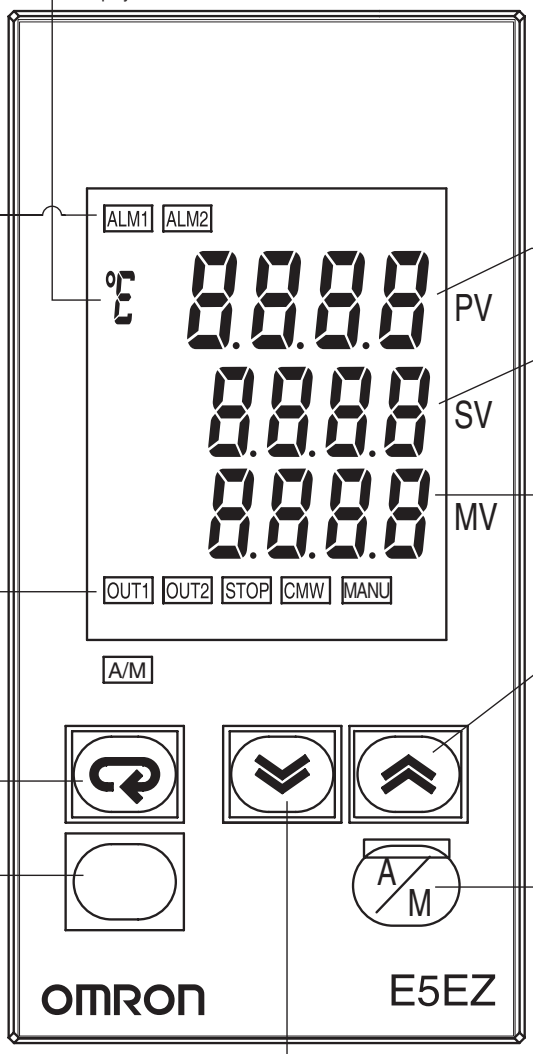
- Standard insulation is applied to the temperature gauge's I/O sections. If reinforced insulation is required, connect the input and output terminals to a device without any exposed current-carrying parts, or to a device with standard insulation suitable for the maximum operation voltage of the power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

■ E5EZ-PRR



Nomenclature

■ E5EZ-PRR



Temperature Unit

The temperature unit is displayed when the display unit parameter is set to temperature.
The value selected for the temperature units parameter determines the unit displayed.
When set to ˚C, ℃ is displayed, and when set to ˚F, ℉ is displayed.

Operation Indicator

1. ALM1 (Alarm 1): Illuminated when Alarm 1 output is on.
   ALM2 (Alarm 2): Illuminated when Alarm 2 output is on.
2. OUT1, OUT2 Control Output 1(OPEN) and 2(CLOSE)
   Illuminated when control output 1 and/ or control output 2 are on.
3. STOP (Stop)
   Illuminated when operations are stopped.
   Illuminated during controls when time input or the start/ stop function is stopped. Not illuminated in any other cases.
4. CMW (Communications Writing Control)
   Illuminated when communications writing is enabled. Not illuminated in any other cases.
5. MANU (Manual Control)
   Illuminated during manual mode. Not illuminated in any other cases.

Mode Key

Press this level key to select parameters.

Level Key

Press this key to select the setting level.
The sequence of setting level selection is: operation level←→Adjustment level, Initial input level←→ Communications setting level.

No. 1 Display

Displays the process value or the designated data type.
Fully illuminated for approximately one second upon start-up.

No. 2 Display

Displays setting values, reading values, and input values.
Fully illuminated for approximately one second upon start-up.

No. 3 Display

When valve opening display is on, it displays the percentage of the valve's opening.
No display when valve opening display is switched off.

Up Key

Every time that this key is pressed, the figure shown in No. 2 Display will increase. Changes in the displayed value accelerate as the time that the button is pressed decreases. In manual mode, pressing the ⩓ key will switch on control output 1 (open side output).

Automatic/ Manual Key

This automatic/ manual key makes the switch between automatic mode and manual mode. When this key is pressed for at least 1 second (unrelated to the time at which the key is released), the unit will switch modes.

Down Key

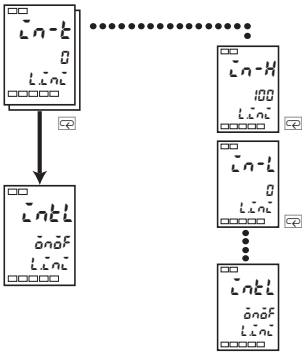
Every time that this key is pressed, the figure shown in No. 2 Display will decrease. Changes in the displayed value accelerate as the time that the key is pressed decreases. In manual mode, pressing the ⩔ key will switch on control output 2 (closed side output).

Operation

In the past, sensor input types, alarm types, and control time for controllers were set using the DIP switch. Now, these hardware settings can be performed with the parameters in the setting level. The ◯ and ⇄ keys are used to switch between setting levels, with the level determined by the amount of time the key is pressed. Two examples of typical setup procedures follow.

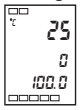
• Typical Examples

Changes in Set Values



When there are multi parameters, press down on the mode key until all necessary parameters have been selected.

Changes in Data



Changes can be made to data on displays with the ▲▼ key.

• Typical Example 1

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

Setup Steps

Connect the power supply

Initial setting level

Set the input type

Set the alarm type

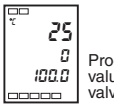
Operation level

Set the alarm value

Begin operations

Connect the power supply

Operation level



Process value/ set value/percentage of valve opening

Press the ◯ key for at least 3 seconds

Control stops

Initial setting level

Check input type

Input type 5

Check alarm type

Alarm 1

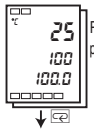
Alarm 2

Press the ◯ key for at least 1 second

Control starts

Operation level

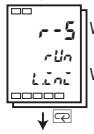
Press the ▲▼ key, and designate the set value as 100˚C



Process value/ set value/ percentage of valve opening

100˚C

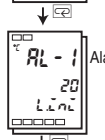
Confirm that control is operating



While running run

While stopped stop

Press the ▲▼ key, and set the alarm value as 20˚C

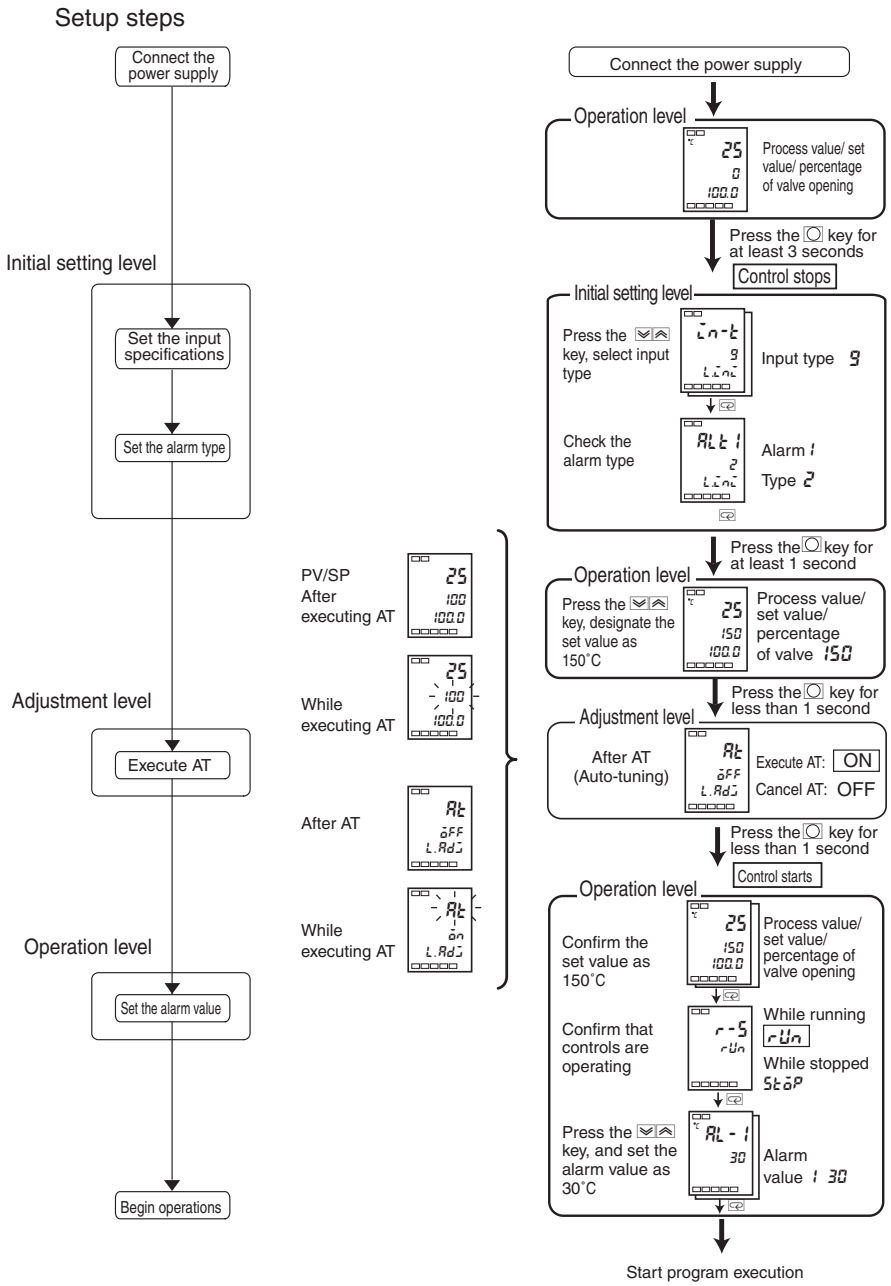


Alarm value 120

Begin operations

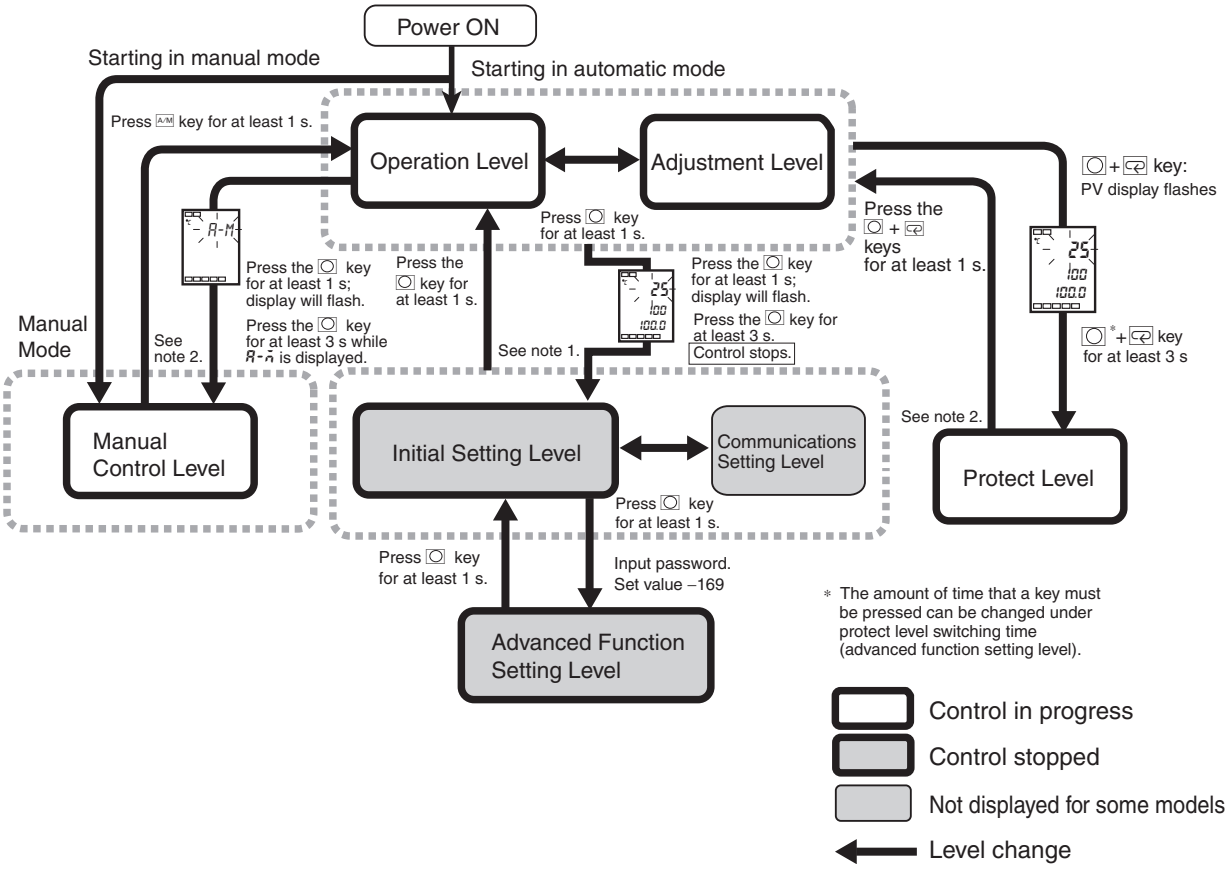
• Typical Example 2

Input type	: 9T thermocouple -200˚C to 400˚C
Control method	: PID control
Execute AT (auto-tuning) to calculate the PID constant	
Alarm 1 type	: Upper limit of 2
Set value	: 150˚C



■ Setting Level Configuration and Panel Key Operations

Parameters are split into groups, which are referred to as levels. Each of the set values (set items) in these levels are referred to as parameters. E5EZ-PRR parameters are categorized into the following 7 levels:



Note1: When returning from the initial setting lever to the operation level, the operation level's initial value will be displayed.

2: When returning from the protect level to the operation level, the operation level's initial value will be displayed.

	Control operating	Control stops
Protect level	❍	–
Operation level	❍	–
Adjustment level	❍	–
Manual control level	❍	–
Initial setting level	–	❍
* Advanced function setting level	–	❍
Communications setting level		❍

*: Set the initial/ communications protection parameter in protect level to 0, in order to activate the advanced function setting level.

❍: Indicates items that can be set. In these cases, the initial setting level, communications setting level, and advanced function setting level can only be used when controls are stopped. Please take note of the fact that when any one of these three levels is selected, the controller's output will be stopped.

With the exception of operation level, the present level will be on display. No. 3 Display will show the following when switching between set values:

Third Display	Level's Name
Manual MV	Manual control level
L.Prt	Protect level
No display	Operation level
LAdJ	Adjustment level
L.InI	Initial setting level
L.Com	Communications setting level
LAdu	Advanced function setting level

■ Descriptions of Each Level

• Protect Level

- In order to switch to this level, it is necessary to press the ◯ and ⏎ keys simultaneously for at least 3 seconds. This level is used to prevent unnecessary or accidental revisions to the parameters. The protected level is not displayed, so that no changes can be made to parameters within this level.

• Operation Level

- Once a power supply is connected, this level is displayed. It is possible to switch from this level to protect level, initial setting level, and adjustment level.
- During regular operations, this level is selected. It is possible to view process value and MV during operations, as well as viewing and revising set values, alarm values, and upper and lower limits.

• Adjustment Level

- In order to switch to this level, press the ◯ key for less than 1 second.
- Input in this level is used in controlling set values and shifted values. This level contains parameters used in setting up AT (autotuning), communications writing enabling/ disabling, hysteresis, multi-SP, input shift, and PID constants. It is possible to switch from this level to the peak parameters in the initial setting level, protect level, or operation level.

• Manual Control Level

- Pressing the A/M key for at least 1 second in operations/ adjustment level will place you in manual mode and bring you to manual control level. During manual operations, nothing besides process value/ set value/ percentage of valve opening (manual MV) can be displayed. In manual control, with process value/ set value/ percentage of valve opening (manual MV) displayed, pressing the A/M key for at least 1 second will move you into automatic mode and switch you to the operation level, displaying operation level's initial data. In this mode, it is possible to perform MV manual operations.

• Initial Setting Level

- To switch to this level, it is necessary to press the ◯ key in operation level or adjustment level for at least 3 seconds. One second later, the PV display will flash. This level is used for designating input types, selecting control methods and control times, as well as setting direct/ reverse operations and alarm types. From this level, it is possible to switch to the advanced function setting level or communications setting level. Press the ◯ key for at least 1 second to return to operation level. Press the ◯ key for less than 1 second to switch to the communications setting level.

• Advanced Function Setting Level

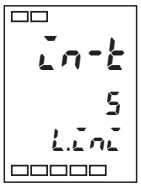
- In order to activate the advanced function setting level, set protect level's initial setting/ communications protection to 0, and then input the password (-169) in the input initial setting level.
- It is possible to switch from this level to the initial setting level.
- This level is used to set the display mode, event input assignment, standby sequence, alarm hysteresis, and alarm delay.

• Communications Setting Level

- To switch to this level, press the ◯ key in the initial setting level for less than 1 second. When using the communications function, the conditions of communication are to be set in this level. Communications with a personal computer (host computer) allows set values to be read and written, and manipulated variables to be monitored.

■ Setting the Type of Input

Types of input include thermocouple, platinum resistance thermometer, infrared temperature sensor, and analog inputs. Please set your input type in accordance with the sensor to be used. Product specifications also include multi input types, such as thermocouples/ plastic resistance thermometers, and analog input types, resulting in differences between set values. Please confirm the model that you are using.



Input Types 5

Table of Input Types

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

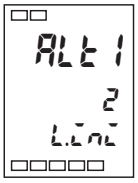
- **Initial value of "5"**

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

- **Initial value of "0"**

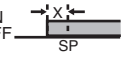
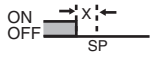
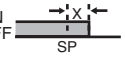
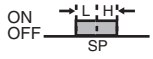
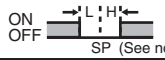
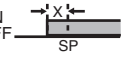
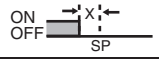
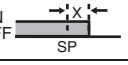
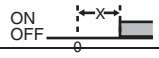
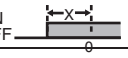
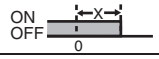
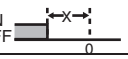
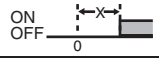
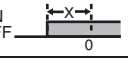
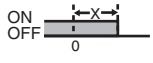
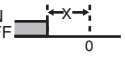
■ Alarm Types

- The conditions of alarm output are jointly determined by Alarm Type and Alarm Hysteresis.
- Below is an explanation of the alarm type, alarm value, upper alarm limit, and lower alarm limit parameters.



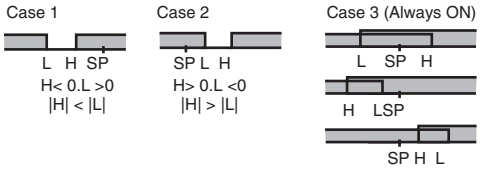
Alarm *1*

Type *2*

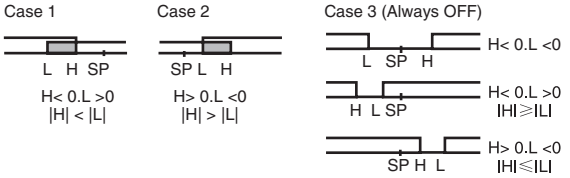
Set values	Type	Alarm output operation	
		When X is positive	When X is negative
0	Alarm function OFF	Output OFF	
1 See note 1.	Upper-and lower-limits		See note 2.
2	Upper limits		
3	Lower limits		
4 See note 1.	Upper-and lower-limits		See note 3.
5 See note 1.	Upper-and lower-limit with standby sequence		See note 4.
6	Upper-limit with standby sequence		
7	Lower-limit with standby sequence		
8	Absolute-value upper-limits		
9	Absolute-value lower-limits		
10	Absolute-value upper-limit with standby sequence		
11	Absolute-value lower-limit with standby sequence		

Note: 1. Upper and lower limits can be set independently for each alarm point, represented by L and H. The set values are 1, 4, and 5.

2. Set value: 1, Upper-and lower-limit



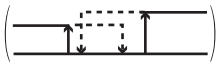
3. Set value: 4, Upper-and lower-limit range



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

*for the upper and lower alarm limits above
- In case 1 and 2, if there are any overlaps in the upper and lower limits for hysteresis, the alarm will always be OFF.

Example of case 1 and case 2: in case 3, the alarm will always be OFF.



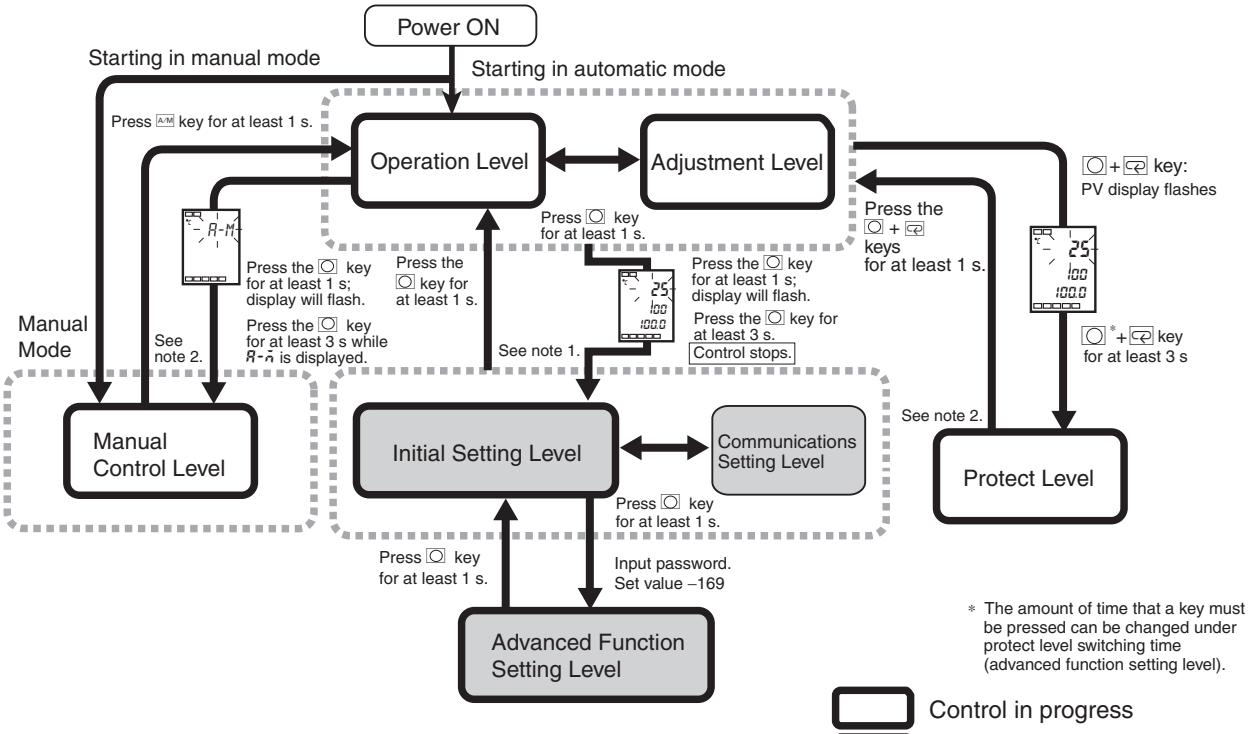
5. Set value: 5, Upper-and lower-limit with standby sequence

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

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

■ Parameters

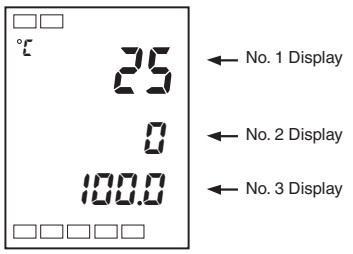
Parameters related to setting items for each level are marked in boxes in the following flowchart and brief descriptions are given as required. After finishing each setting, press the mode key to return to the beginning of each level.

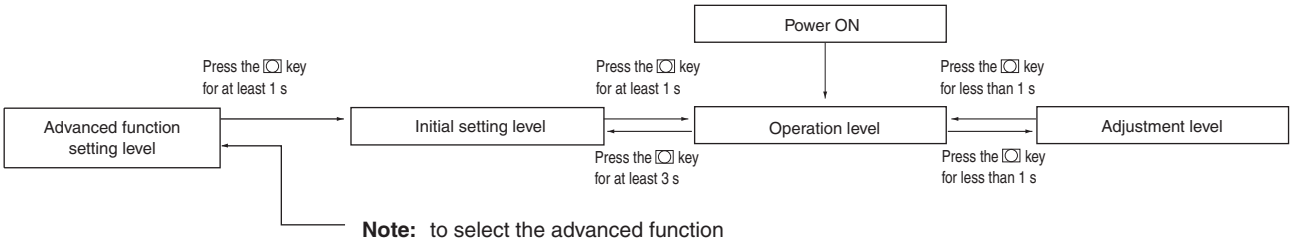


Note 1: When returning from the initial setting lever to the operation level, the operation level's initial value will be displayed.

2: When returning from the protect level to the operation level, the operation level's initial value will be displayed.

Display

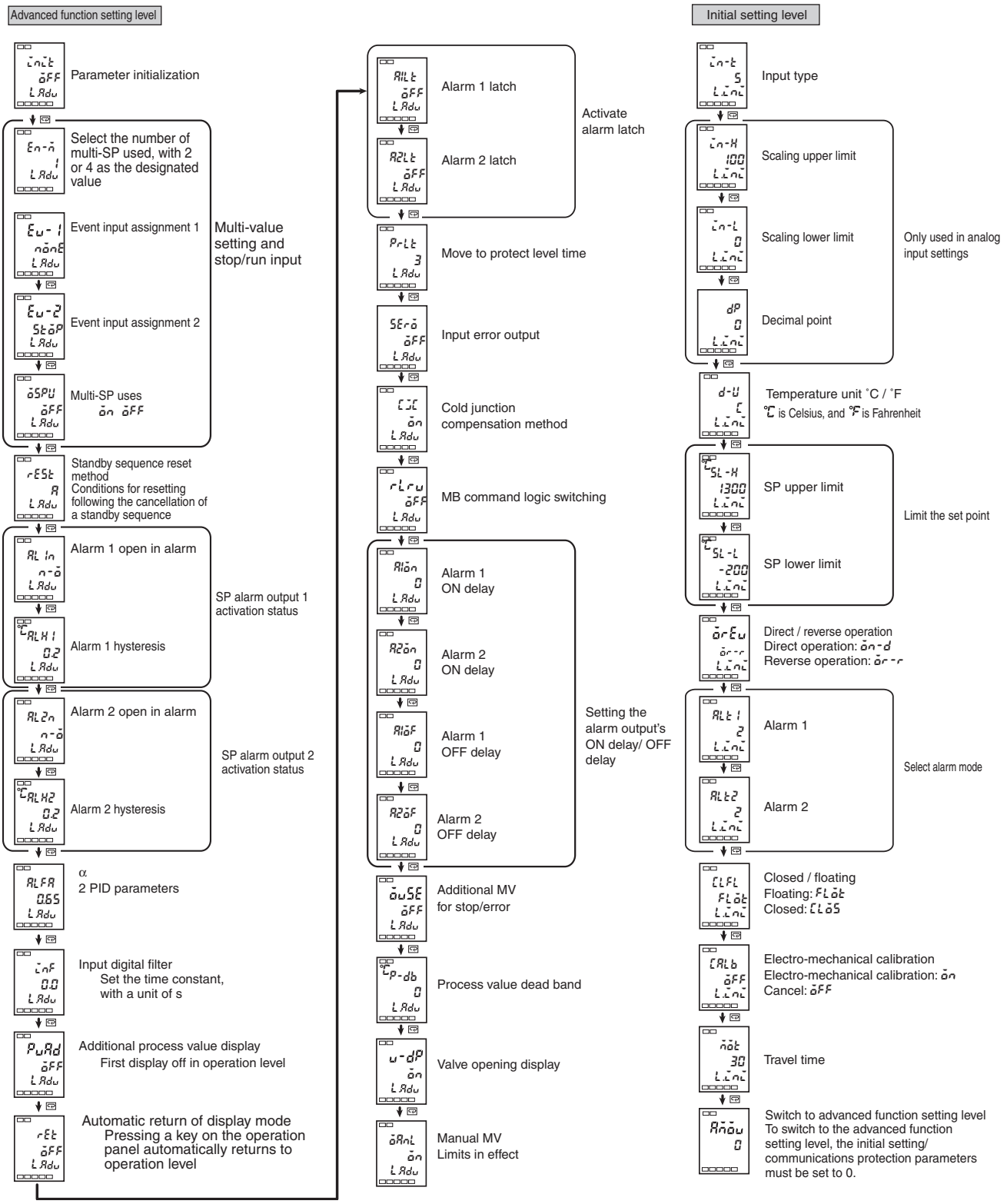


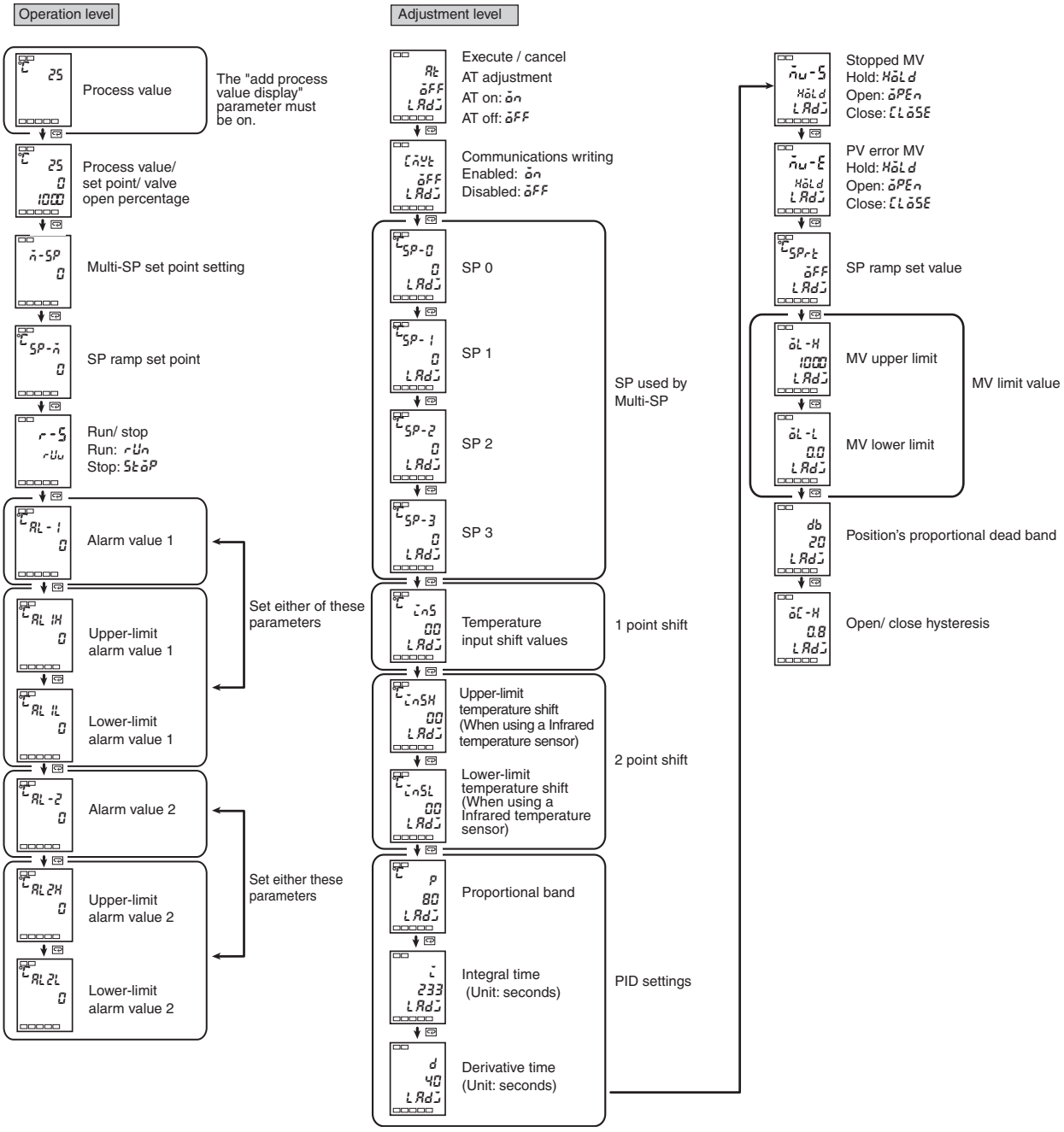


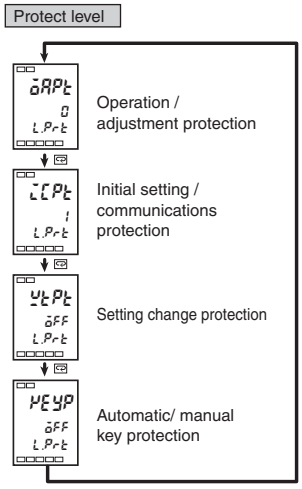
Note: to select the advanced function setting level, you must input the password (-169) in the initial setting level.

■ Parameters

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




Operation level
Process value
The "add process value display" parameter must be on.
Process value/ set point/ valve open percentage
Multi-SP set point setting
SP ramp set point
Run/ stop
Run:
Stop:
Alarm value 1
Upper-limit alarm value 1
Lower-limit alarm value 1
Set either of these parameters
Alarm value 2
Upper-limit alarm value 2
Lower-limit alarm value 2
Set either these parameters
Adjustment level
Execute / cancel
AT adjustment
AT on:
AT off:
Communications writing
Enabled:
Disabled:
SP 0
SP 1
SP 2
SP 3
SP used by Multi-SP
Temperature input shift values
1 point shift
Upper-limit temperature shift (When using a Infrared temperature sensor)
Lower-limit temperature shift (When using a Infrared temperature sensor)
2 point shift
Proportional band
Integral time (Unit: seconds)
Derivative time (Unit: seconds)
PID settings
Stopped MV
Hold:
Open:
Close:
PV error MV
Hold:
Open:
Close:
SP ramp set value
MV upper limit
MV lower limit
MV limit value
Position's proportional dead band
Open/ close hysteresis



■ Operation/ Adjustment Protection

The relationship between the set values and the range of protection is as shown below.

Mode	Set Values			
	0	1	2	3
Present value	❍	❍	❍	❍
Set value	◎	◎	◎	❍
Others	◎	◎	×	×
Adjustment level	◎	×	×	×

◎ : Can be displayed/ changed
❍ : Can be displayed
× : Cannot be displayed/ no changes in level allowed

- When the set value is 0, there is no protective function.
- The initial value is 0.

■ Initial Setting/ Communications Protection

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

Set Value	Initial setting level	Communications
0	Able to switch (able to switch to the advanced functions setting level)	Able to switch
1	Able to switch (unable to switch to the advanced functions setting level)	Able to switch
2	Able to switch	Unable to switch

- Default setting: 1.

■ Setting Change Protection

Places restrictions on changes to settings with keys.

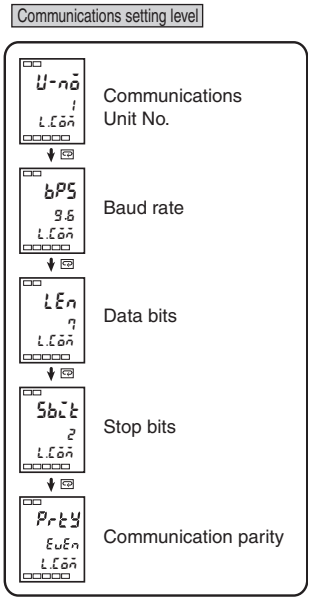
oFF: Able to use unit keys to change settings.

on: Unable to use unit keys to change settings, but this level can be changed.

■ Automatic/ Manual Key Protection

Set Value	Automatic/ Manual Operations	
oFF	Automatic/ Manual	Able to switch
on	Automatic/ Manual	Unable to switch

- Initial value is "oFF".



■ Setting Communications Parameters

Configures the E5EZ-PRR's communications specifications, so that its communications with the host computer can be configured properly. In a layout where one point communicates with multiple points, in addition to all of the communication unit numbers, all other settings should match. Each unit must have a single communication unit number set for it.

Parameters	Character display	Set (monitor) value	Setup	Initial value	Unit
Communications Unit No.	U-no	0 to 99		1	None
Baud rate	bPS	1.2, 2.4, 4.8, 9.6, 19.2	1.2, 2.4, 4.8, 9.6, 19.2	9.6	Kbps
Data bits	LEn	7, 8		7	Length
Stop bits	SbiT	1, 2		2	Bit
Communication parity	PrtY	None, even, odd	nonE, EuEn odd	Even	None

■ Trouble shooting

When an error occurs, the main display alternately shows an error signal and the current item for display.

This section explains how to inspect an error signal, as well as corresponding rectification measures.

S.Err Input Error

• Meaning

The figure inputted has exceeded the designated input range (the designated range is between -1999 (-199.9) to 9999 (999.9)).

• Rectification Measures

Check to make sure that the input line has not been connected incorrectly, unplugged, a short-circuit, or is incompatible with this input type.

If there are no problems with the line type or the connection, power off and then restart the unit. If the display remains unchanged, it will be necessary to change the E5EZ-PRR. If the display is recovered, the root of the problem may have been that noise from the energy flow was affecting the control system. Check for any such noise.

• Operations with Errors

The control output will be determined according to the designated value for error MV.

The alarm output function will be the same as it is when the upper limit is crossed.

After setting I/O error (advanced function setting level) on, alarm 1's output will be activated in cases of error.

In process value or process value/ set value/ valve open percentage display mode, error information will be displayed.

cccc / ɔɔɔɔ Display Range Exceeded

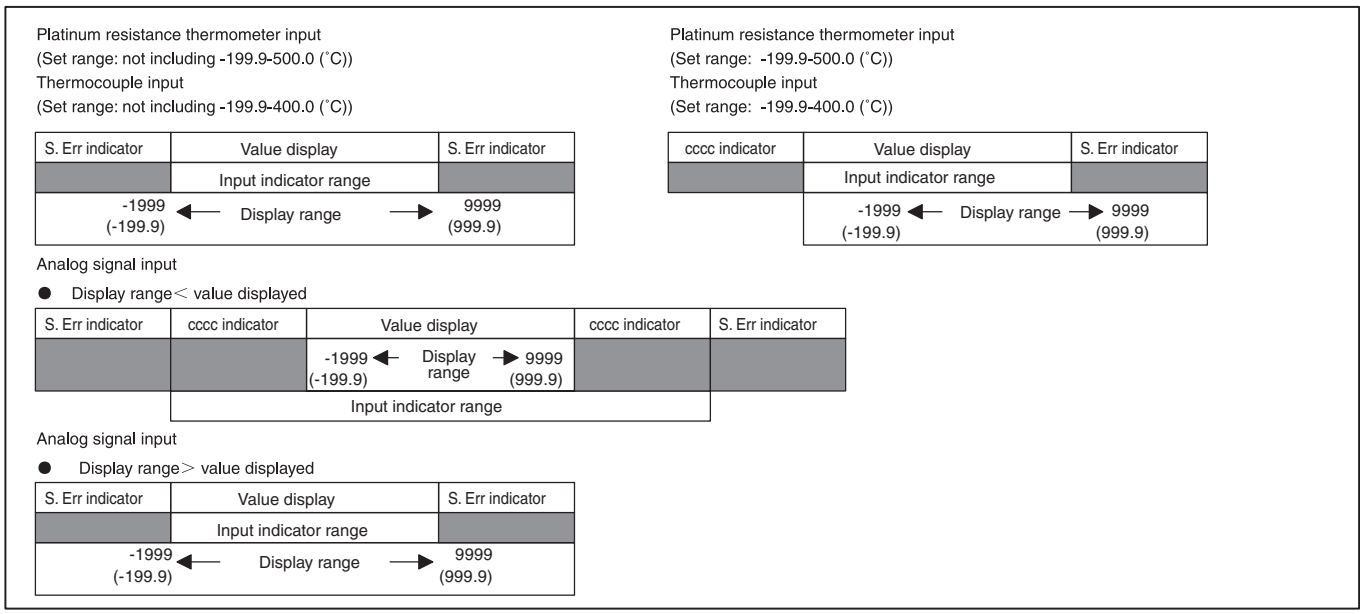
• Meaning

Even though this is not really an error, when the range of control exceeds the range of display (-1999 (-199.9) to 9999 (999.9)), and the process value is beyond the range of display, this signal will appear.

- Will display cccc when the figure is less than -1999 (-199.9).
- Will display ɔɔɔɔ when the figure is more than 9999 (999.9).

• Operations with Errors

Control will continue and operations will remain normal. In process value or process value/ set value/ valve open percentage display mode, error information will be displayed.



E111 Memory Errors

- **Meaning**

There has been an error in the internal memory.

- **Rectification Measures**

Power off and then restart the unit. If the display remains unchanged, it will be necessary to change the E5EZ-PRR. If the display is recovered, the root of the problem may have been that noise from the energy flow was affecting the control system. Check for any such noise.

- **Operations with Errors**

Control output and alarm output will be shut off.

---- Potentiometer Input Errors

- **Meaning**

Errors appear in potentiometer input. Valve opening has exceeded its regular range of -10% to 110%.

- **Rectification Measures**

Check to see if there have been any wiring errors, burnouts, or short-circuits in the potentiometer.

If there are no problems with the wiring, you can restart the power supply. If the display remains unchanged, it will be necessary to change the E5EZ-PRR.

If the display, the root of the problem may have been interference, which should be avoided in the future.

- **Operations with Errors**

The control output will be determined according to the designated value for error MV.

Alarm output will operate as normal.

Err Electro-Mechanical Calibration Error

- **Meaning**

Electro-mechanical calibration was not properly completed.

- **Rectification Measures**

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

- **Operations with Errors**

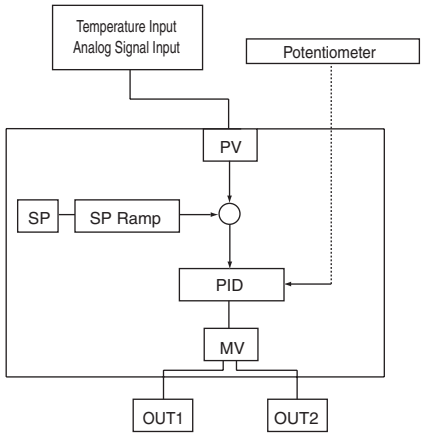
Control output and alarm output are OFF.

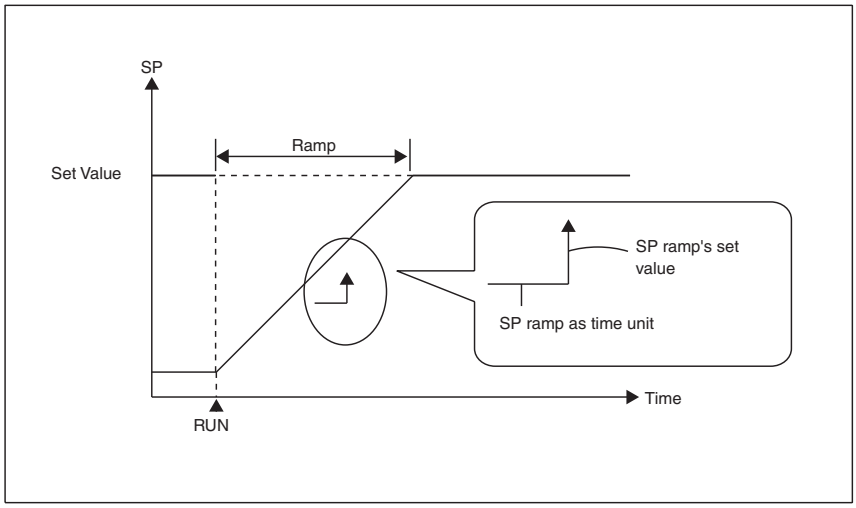
Ceramic Furnace Position Proportional Control

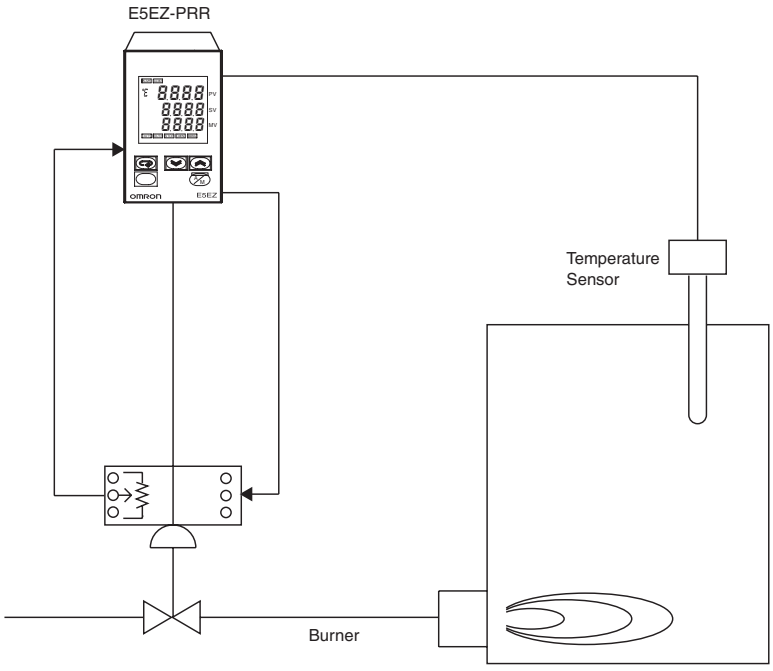
Reading the extent of the valve's opening with a potentiometer, and using open and close tuning control is referred to as position proportional control or on/ off servo control.

■ Examples of Application

When using position proportional methods to control gas combustion furnace valves, position proportional control should be applied. See the following figure for measurement devices:



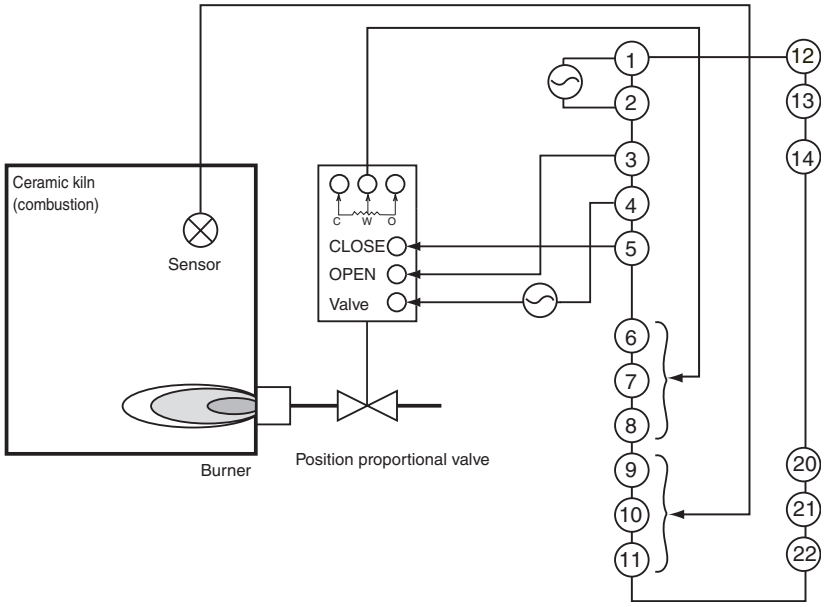




Note: The SP ramp function allows limits to be placed on temperature changes which control the temperature within a specific range. This is useful for ceramic furnace, in which severe temperature changes may cause damage or corruption.

■ Wiring

Input should be connected to terminals 9, 10, and 11 depending upon input type. The Out 1 terminal links to the position proportional valve's open side and the Out 2 terminal links to its closed side.

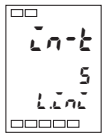


■ Settings

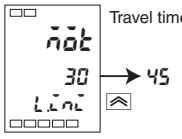
Select a position proportional control model, and perform floating control using a position proportional valve with a travel time (time from being totally open to being totally closed) of 45 seconds. Then, use the SP ramp function to make gradual changes to the process value at rates of 10.0°C/ minute. The relevant data and content of the settings are as shown below:

Direct/ reverse operation	= dir-r: Reverse operation (initial value)
Closed/ floating	= FLdt: Floating (initial value)
Travel time	= 45 seconds
SP ramp set values	= "10"

Here, the travel time and SP ramp values are set. Initial values are used for all others.

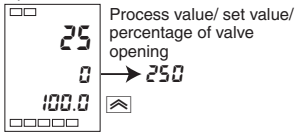


1. Press the ◯ key for at least 3 seconds to switch from the operation level to the initial setting level.



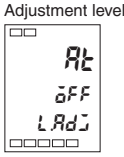
2. Press the ⇆ key multiple times, and select mdt: travel time. Press the ⌃ key, making the set value 45.

Operation level

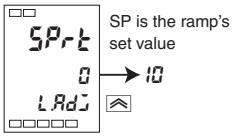


3. Press the ◯ key for at least 1 second, returning to the operation level. The process value/ set value/ percentage of valve opening will be displayed. Press the ⌃ key, setting the target value as 250.

Adjustment level



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



5. Press the ⇆ key multiple times, and select SPrt: SP ramp set value. Press the ⌃ key, making the set value 10.

■ Adjustment

For adjustments to PID, please execute AT.

■ Fixed Settings for Position Proportional Control

After selecting position proportional control, it is possible to use closed/ floating, electro-mechanical calibration, travel time, position proportional dead band, switch hysteresis, potentiometer input error, and process value dead band.

• Closed/ Floating

- Closed Control
  Connect the potentiometer to perform valve opening feedback control.
- Floating Control
  Control in which no feedback is provided by a potentiometer on the valve's opening, so that control can be performed without a potentiometer.

• Electro-Mechanical Calibration and Travel Time

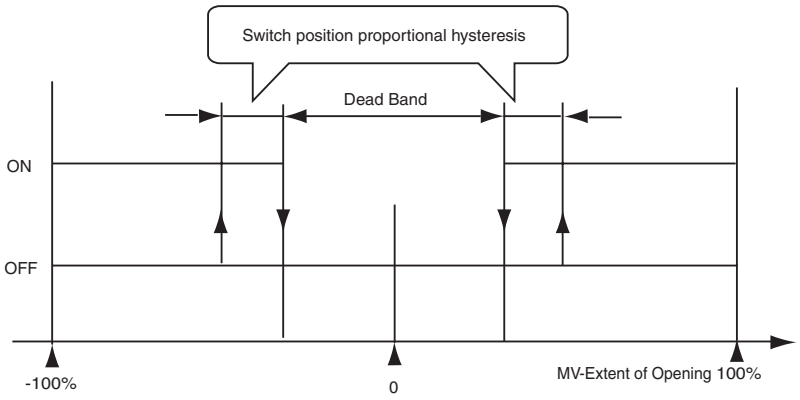
Just like in closed control, or in floating control where a valve's opening is to be monitored, electro-mechanical calibration is to be performed when a potentiometer is connected. The valve's travel time, from being completely open to being completely closed, is also set for self-measuring.

In cases of floating control where a potentiometer is not connected, it will be necessary to manually set the travel time. Set the time required for the valve to go from complete openness to complete closure under travel time.

• Position Proportion Dead Band Switch and Position Proportional Hysteresis

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

Its relationship with the extent of the valve's opening is as shown below:



• PV Dead Band

When the process value is within the PV dead band, control is controlled according to the logic that the process value = set value. This function is meant to prevent unnecessary output in cases where the process value approaches the set value.

• Potentiometer Input Error

When the potentiometer produces an error during closed control, this is a function that chooses to stop control or switch to floating control, allowing control to continue.

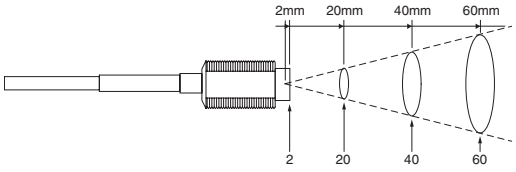
Meeting all of your temperature control needs in a wide range of applications

■ ES1B Infrared Temperature Sensor

Perform measurements with a contract-free sensor at minimal costs!

- Outputs electromotive forces identical to those of thermocouples, so that it can be connected directly to temperature controllers that generally use thermocouple input.
- 4 types of specifications. Can be used in all types of temperature measurements, from food products, packaging, and finished product, all the way to electrical engineering.
- 300ms high-speed response (63% response time), ±1% and PV's re-enactment capabilities, ensuring high-accuracy temperature measurements.
- Compared to thermocouples, this product has the advantage of being resistant to aging, and can maintain steady real-time control.

Note: For more detailed information, please refer to other ES1B-related materials.

Shape, visual features	Specifications (temperature testing range)	Type
	10 to 70°C	ES1B
	60 to 120°C	
	115 to 165°C	
	140 to 260°C	

■ ES1-L Series of Non-Contact Temperature Sensors

Able to measure temperatures without contact.
Damage-free, clean, and effective temperature management.

- Comes in two spot diameters: ϕ3mm and ϕ8mm.
- Recreation accuracy kept within ±0.5°C, with a response speed of 0.4 seconds (95%), along with high accuracy, realizing fast measurement.
- In addition to the original unit for use in medium temperatures (0 to +500°C), there are new models for use in medium to low temperatures (-50 to +500°C) and high temperatures (0 to +1000°C).
- New long distance types enable measuring from distances of 500mm and 1000mm.
- By using a programmer (sold separately), it is possible to monitor temperatures as well as make changes to the rate of emissions, switches between functions, and range of output.
  (The picture shows a programmer installed onto an ES1 unit)

Type	Range of temperature measurements	Spot dimensions (See note 2.)	Type
For use with high temperatures	0 to +1,000°C	ϕ35mm (distance of 1000mm)	ES1-LW100H
		Below ϕ40mm (distance of 500mm)	ES1-LW50H
For use with medium to low temperatures	-50 to +500°C (See note 1.)	ϕ35mm (distance of 1000mm)	ES1-LW100
		Below ϕ40mm (distance of 500mm)	ES1-LW50
For use with medium temperatures	0 to +500°C	ϕ3mm (distance of 30mm)	ES1-LP3
		ϕ8mm (distance of 100mm)	ES1-LP10

Note 1: At the time of shipment, the ES1-PRO model's range will have to be changed for 0 to +500°C, -50°C.
2: This value is based on the energy restriction of 90%. The actual item must be at least 1.5 times larger.

Note: For more detailed information, please refer to other ES1-L-related materials.

■ E52 Series of Temperature Sensors

Providing a diverse array of high-accuracy temperature sensors

- Used as a sensor for temperature controllers.
- Guaranteed that clients will be able to easily select the right model according to their temperature, location, and ambient operating conditions.
- Able to provide numerous models of various different categories, cases, lengths, and terminal shapes.
- Able to provide low-cost made-to-order models, as well as models for universal use.

Note: For more detailed information, please refer to other E52-related materials.

Safety Precautions

⚠ CAUTION	
Do not touch the terminals while power is being supplied. Doing so may occasionally result in minor injury due to electric shock.	
Operate the Temperature Controller properly. Improper operation may cause minor or moderate injury or property damage.	
Do not allow pieces of metal, wire clippings, or fine metallic shavings or filings from installation to enter the product. Doing so may occasionally result in electric shock, fire, or malfunction.	
Do not use the product where subject to flammable or explosive gas. Otherwise, minor injury from explosion may occasionally occur.	
Never disassemble, modify, or repair the product or touch any of the internal parts. Minor electric shock, fire, or malfunction may occasionally occur.	
CAUTION - Risk of Fire and Electric Shock a) This product is UL listed as Open Type Process Control Equipment. It must be mounted in an enclosure that does not allow fire to escape externally. b) More than one disconnect switch may be required to de-energize the equipment before servicing the product. c) Signal inputs are SELV, limited energy. (See note 1.) d) Caution: To reduce the risk of fire or electric shock, do not interconnect the outputs of different Class 2 circuits. (See note 2.)	
If the output relays are used past their life expectancy, contact fusing or burning may occasionally occur. Always consider the application conditions and use the output relays within their rated load and electrical life expectancy. The life expectancy of output relays varies considerably with the output load and switching conditions.	
Loose screws may occasionally result in fire. Tighten terminal screws to the specified torque of 0.74 to 0.90 N·m.	
Unexpected operation may result in equipment damage or accidents if the settings are not appropriate for the controlled system. Set the Temperature Controller as follows:	
A malfunction in the Temperature Controller may occasionally make control operations impossible or prevent alarm outputs, resulting in property damage. To maintain safety in the event of malfunction of the Temperature Controller, take appropriate safety measures, such as installing a monitoring device on a separate line.	
Be sure that the platinum resistance thermometer type and the input type set on the Temperature Controller are the same.	

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

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

Precautions for Safe Use

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

1. The product is designed for indoor use only. Do not use the product outdoors or in any of the following locations.
- Places directly subject to heat radiated from heating equipment.
- Places subject to splashing liquid or oil atmosphere.
- Places subject to direct sunlight.
- Places subject to dust or corrosive gas (in particular, sulfide gas and ammonia gas).
- Places subject to intense temperature change.
- Places subject to icing and condensation.
- Places subject to vibration and large shocks.

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

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

4. Use the specified size (M3.5, width of 7.2 mm or less) crimped terminals for wiring. To connect bare wires to the terminal block, use copper braided or solid wires with a gage of AWG24 to AWG18 (equal to a cross-sectional area of 0.205 to 0.832 mm^2). (The stripping length is 5 to 6 mm.) Up to two wires of the same size and type, or two crimp terminals can be inserted into a single terminal.

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

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

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

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

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

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

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

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

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

Precautions for Correct Use

Service Life

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

Measurement Accuracy

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

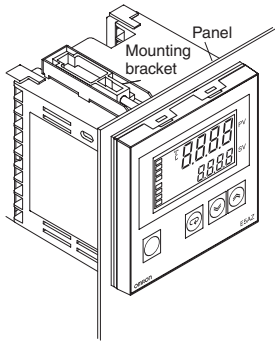
Operating Precautions

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

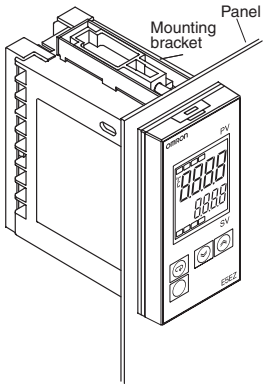
Mounting (E5AZ/E5EZ)

1. Insert the E5AZ/E5EZ into the mounting hole in the panel from the front.
2. Push the mounting bracket along the E5AZ/E5EZ body from the terminals up to the panel, and secure it temporarily.
3. Tighten the fixing screw on each mounting bracket alternately until the ratchet stops tightening.

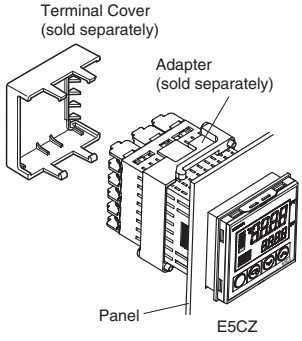
E5AZ



E5EZ



Mounting (E5CZ)



Mounting to a Panel

1. Insert the E5CZ into the mounting hole in the panel.
2. Push the adapter along the E5CZ body from the terminals up to the panel, and secure it temporarily.
3. Tighten the two fixing screws on the adapter. When tightening screws, tighten the two screws alternately keeping the torque to between 0.29 and 0.39 N·m (2.9 kgf·cm to 3.9 kgf·cm).

Mounting the Terminal Cover

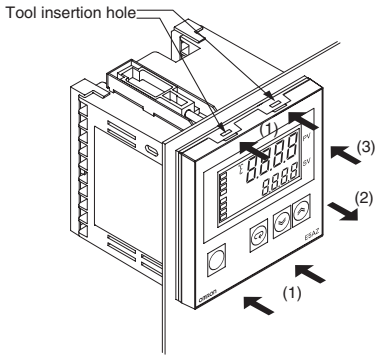
Make sure the “UP” characters on the Cover are in the correct position and insert the E53-COV10 Terminal Cover into the holes at the top and bottom. The terminal block of the E5CZ cannot be removed.

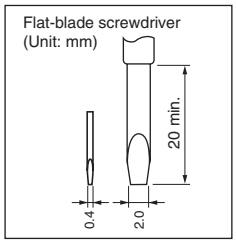
Removing the Temperature Controller from the Case

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

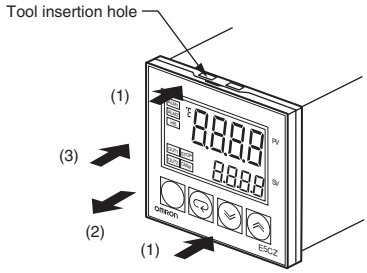
1. Insert the tools (see drawing above) into the slots (one on the top and one on the bottom) and release the hooks.
2. Insert the tool in the space between the front and rear panels and slightly pull out the front panel. Hold the top and bottom of the front panel and pull toward yourself to remove it.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

E5AZ

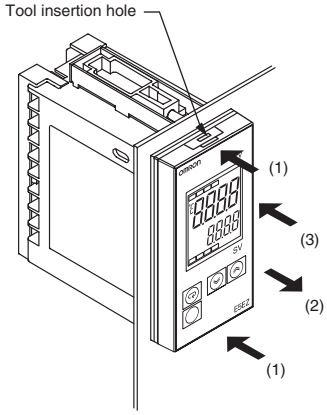




E5CZ



E5EZ/E5EZ-PRR



Setting Up Option Units (E5CZ)

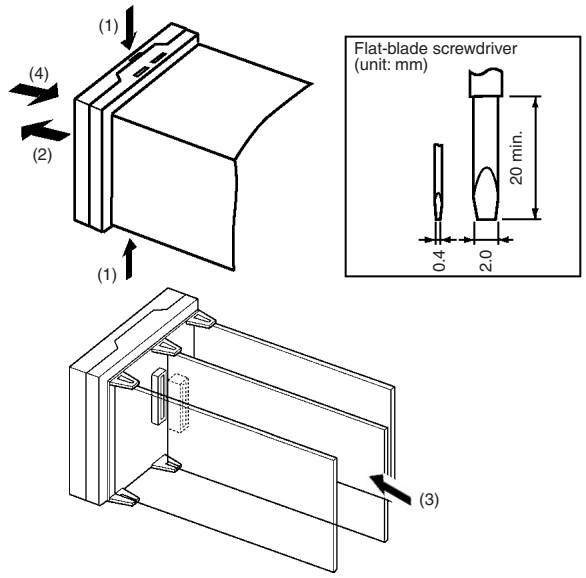
If communications, event input, or heater burnout functions are required, mount the E53-CNH03N/E53-CN03N Communications Unit or the E53-CNHBN/E53-CNBN Event Input Unit. The heater burnout function is supported on either of these two Option Units.

Option Units

Model
E53-CNH03N E53-CN03N
E53-CNHBN E53-CNBN

Note: Terminal label: x1

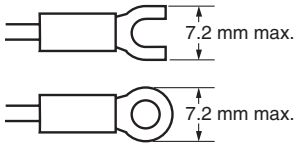
Assembling a Unit



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

Precautions when Wiring

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



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

Warranty and Application Considerations

Read and Understand This Catalog

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

Warranty and Limitations of Liability

WARRANTY

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.

Take all necessary steps to determine the suitability of the product for the systems, machines, and equipment with which it will be used.

Know and observe all prohibitions of use applicable to this product.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

Disclaimers

PERFORMANCE DATA

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

CHANGE IN SPECIFICATIONS

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

DIMENSIONS AND WEIGHTS

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

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

Cat. No. H201-E1-01 **In the interest of product improvement, specifications are subject to change without notice.**

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