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.

Model Number Structure

■ Model Number Legend

E5CZ-  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

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

■ Option Units

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

<table>
<thead>
<tr>
<th>Functions</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communications</td>
<td>E53-CNH03N</td>
</tr>
<tr>
<td>Communications</td>
<td>E53-CN03N</td>
</tr>
<tr>
<td>Heater burnout</td>
<td>E53-CNHB</td>
</tr>
<tr>
<td>Event inputs</td>
<td>E53-CNBN</td>
</tr>
<tr>
<td>Event inputs</td>
<td>E53-CNBN</td>
</tr>
</tbody>
</table>
## Accessories (Order Separately)

**Current Transformers (CTs)**

<table>
<thead>
<tr>
<th>Model</th>
<th>E54-CT1</th>
<th>E54-CT3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hole diameter</td>
<td>5.8 dia.</td>
<td>12.0 dia.</td>
</tr>
</tbody>
</table>

## Specifications

### Ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>E5CZ-E54-CT1</th>
<th>E5CZ-E54-CT3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply voltage</td>
<td>100 to 240 VAC, 50/60 Hz</td>
<td>24 VAC/VDC, 50/60 Hz</td>
</tr>
<tr>
<td>Operating voltage range</td>
<td>85% to 110% of rated supply voltage</td>
<td></td>
</tr>
<tr>
<td>Power consumption</td>
<td>7 VA</td>
<td>5 VA, 3 W</td>
</tr>
<tr>
<td>Platinum resistance thermometer</td>
<td>Pt100, JPt100</td>
<td></td>
</tr>
<tr>
<td>Infrared temperature sensor</td>
<td>10 to 70°C, 60 to 120°C, 115 to 165°C, 140 to 260°C</td>
<td></td>
</tr>
<tr>
<td>Voltage input</td>
<td>0 to 50 mV</td>
<td></td>
</tr>
<tr>
<td>Control output</td>
<td>SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations</td>
<td></td>
</tr>
<tr>
<td>Voltage output</td>
<td>12 VDC ±15%/−20% (PNP), max. load current: 21 mA, with short-circuit protection circuit</td>
<td></td>
</tr>
<tr>
<td>Current output</td>
<td>4 to 20 mA DC, load: 600 Ω max., resolution: approx. 2,600</td>
<td></td>
</tr>
<tr>
<td>Alarm output</td>
<td>SPST-NO, 250 VAC, 1 A (resistive load), electrical life: 100,000 operations</td>
<td></td>
</tr>
<tr>
<td>Event input</td>
<td>ON: 1 kΩ max., OFF: 100 kΩ min.</td>
<td></td>
</tr>
<tr>
<td>Non-contact input</td>
<td>ON: Residual voltage: 1.5 V max., OFF: Leakage current: 0.1 mA max.</td>
<td></td>
</tr>
<tr>
<td>Control method</td>
<td>2-PID control or ON/OFF control</td>
<td></td>
</tr>
<tr>
<td>Setting method</td>
<td>Digital setting using front panel keys</td>
<td></td>
</tr>
<tr>
<td>Indication method</td>
<td>7-segment digital display and single-lighting indicators</td>
<td></td>
</tr>
<tr>
<td>Character height</td>
<td>PV: 10.0 mm; SV: 6.5 mm</td>
<td></td>
</tr>
<tr>
<td>Other functions</td>
<td>According to Controller model</td>
<td></td>
</tr>
<tr>
<td>Ambient operating temperature</td>
<td>−10 to 55°C (with no condensation or icing)</td>
<td></td>
</tr>
<tr>
<td>Ambient operating humidity</td>
<td>25% to 85%</td>
<td></td>
</tr>
<tr>
<td>Storage temperature</td>
<td>−25 to 65°C (with no condensation or icing)</td>
<td></td>
</tr>
</tbody>
</table>

### Input Ranges

#### Platinum Resistance Thermometer Input

<table>
<thead>
<tr>
<th>Input type</th>
<th>PT100</th>
<th>JPt100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature range</td>
<td>−200 to −199.9°C, 0.0 to 100.0°C</td>
<td>−200 to −199.9°C, 0.0 to 100.0°C</td>
</tr>
<tr>
<td>Setting number</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

#### Thermocouple Input

<table>
<thead>
<tr>
<th>Input type</th>
<th>K</th>
<th>J</th>
<th>T</th>
<th>E</th>
<th>L</th>
<th>U</th>
<th>N</th>
<th>R</th>
<th>S</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature range</td>
<td>−200 to −199.9°C, 0.0 to 100.0°C</td>
<td>−200 to −199.9°C, 0.0 to 100.0°C</td>
<td>−200 to −199.9°C, 0.0 to 100.0°C</td>
<td>−200 to −199.9°C, 0.0 to 100.0°C</td>
<td>−200 to −199.9°C, 0.0 to 100.0°C</td>
<td>−200 to −199.9°C, 0.0 to 100.0°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Setting number</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
</tr>
</tbody>
</table>

Shaded setting indicates the default setting.

#### ES1B Infrared Temperature Sensor

<table>
<thead>
<tr>
<th>Input type</th>
<th>10 to 70°C</th>
<th>60 to 120°C</th>
<th>115 to 165°C</th>
<th>140 to 260°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature range</td>
<td>0 to 90°C</td>
<td>0 to 120°C</td>
<td>0 to 165°C</td>
<td>0 to 260°C</td>
</tr>
<tr>
<td>Setting number</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
</tr>
</tbody>
</table>
Analog Input

<table>
<thead>
<tr>
<th>Input type</th>
<th>0 to 50 mV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting range</td>
<td>Usable in the following ranges by scaling: −1999 to 9999 or −199.9 to 999.9</td>
</tr>
<tr>
<td>Setting number</td>
<td>21</td>
</tr>
</tbody>
</table>

Applicable standards by input type are as follows:
- K: GB/T 2814-98
- J: GB/T 4994-98
- L: GB/T 4994-98
- T: GB/T 2903-98
- 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: GB/T 5977-99
- Pt100: GB/T 5977-99

■ Characteristics

<table>
<thead>
<tr>
<th>Indication accuracy</th>
<th>Thermocouple: (±0.5% of indicated value or ±1°C, whichever is greater) ±1 digit max. (See note 1.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Platinum resistance thermometer: (±0.5% of indicated value or ±1°C, whichever is greater) ±1 digit max.</td>
</tr>
<tr>
<td></td>
<td>Analog input: ±0.5% FS±1 digit max.</td>
</tr>
<tr>
<td></td>
<td>CT input: ±5% FS±1 digit max.</td>
</tr>
</tbody>
</table>

Influence of temperature

- R, S, and B thermocouple inputs: (±1% of PV or ±4°C, whichever is greater) ±1 digit max.
- Other thermocouple inputs: (±1% of PV or ±4°C, whichever is greater) ±1 digit max.
- 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 1 min (between current-carrying terminals of different polarity)

Vibration resistance

10 to 55 Hz, 20 m/s² for 10 min in X, Y and Z directions

Shock resistance

100 m/s², 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 signal line (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
  - Approx. 3 dia.

- Plug
  - Approx. 4 dia.
  - 30 mm long

Connection Example

Current Transformers

E54-CT1

E54-CT3

E54-CT3 Accessories

- Contact
  - Approx. 3 dia.

- Plug
  - Approx. 4 dia.
  - 30 mm long

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.

Option Units

E53-CNHB0N
Event Inputs/Heater Burnout Detection

E53-CNBN
Event Inputs

E53-CN03N
Communications/Heater Burnout Detection

E53-CNH03N
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.

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**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.

---

**Mode Key**

Press this key to select parameters within each level.

**Level + Mode Keys**

This key combination sets the E5AZ to the "protect level."
### Operation Indicators

1. **ALM1 (alarm 1)**
   - Lights when the alarm 1 output is ON.

2. **HV (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."
PID Control Using Autotuning

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

Operation level

Press key for at least one second.
Press key for less than one second.

Set input specifications
Set control specifications
Self-tuning
Check control period
Check alarm type

Process value/
set point

Press key for at least three seconds.

Control stops.

Press key for at least one second.

Press key for less than one second.

Press key for less than one second.

Set to on for executing AT and to off for stopping AT.

Alarm value 1

Recommended settings: 20 seconds for the relay output and 2 seconds for the SSR output.

Set operation status
Set alarm values
Start operation

Changing Parameters

Changing Set Values

Display

E5AZ

E5EZ

E5CZ

No. 1 display

No. 2 display

No. 1 display

No. 2 display

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

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

PV/SP: Operation

After AT execution.

During AT execution.

While AT is being executed, SP will flash.

After AT execution.

Alarms

Press keys to select input type.

Press keys to select PID control.

Press keys to set ST to OFF.

Check the control period.

Check alarm type.

Set input specifications
Set control specifications
Self-tuning
Check control period
Check alarm type

Operation level

Press key for at least one second.

Adjustment level

Execute AT (auto-tuning).

To execute AT

Press key for less than one second.

Set the set point

AT execution

During AT execution.

During run

During AT execution.

Make sure that set point is 150°C.

Alarm value 1

Press keys to set alarm value to 30°C.

Make sure that control is running

Recommended settings: 20 seconds for the relay output and 2 seconds for the SSR output.
### 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.

#### 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 once for less than one second.

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.

**Protector Level**

To select this level, simultaneously press the and keys for at least 3 seconds. This level is for preventing 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.
**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.

To return to the operation level, press 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.

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Set Value</th>
<th>Input Temperature Range</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Platinum resistance thermometer input</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pt100</td>
<td>0</td>
<td>−200 to 850 °C/−300 to 1500 °F</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>−199.9 to 500.0 °C/−199.9 to 900.0 °F</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0.0 to 100.0 °C/0.0 to 210.0 °F</td>
</tr>
<tr>
<td>JPt100</td>
<td>3</td>
<td>−199.9 to 500.0 °C/−199.9 to 900.0 °F</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>0.0 to 100.0 °C/0.0 to 210.0 °F</td>
</tr>
<tr>
<td><strong>Thermocouple input</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>5</td>
<td>−200 to 1300 °C/−300 to 2300 °F</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>−20.0 to 500.0 °C/0.0 to 900.0 °F</td>
</tr>
<tr>
<td>J</td>
<td>7</td>
<td>−100 to 850 °C/−100 to 1500 °F</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>−20.0 to 400.0 °C/0.0 to 750.0 °F</td>
</tr>
<tr>
<td>T</td>
<td>9</td>
<td>−200 to 400 °C/−300 to 700 °F</td>
</tr>
<tr>
<td></td>
<td>22</td>
<td>−199.9 to 400.0 °C/199.9 to 700.0 °F</td>
</tr>
<tr>
<td>E</td>
<td>10</td>
<td>0 to 600 °C/0 to 1100 °F</td>
</tr>
<tr>
<td>L</td>
<td>11</td>
<td>−100 to 850 °C/−100 to 1500 °F</td>
</tr>
<tr>
<td>U</td>
<td>12</td>
<td>−200 to 400 °C/−300 to 2300 °F</td>
</tr>
<tr>
<td></td>
<td>23</td>
<td>−199.9 to 400.0 °C/199.9 to 700.0 °F</td>
</tr>
<tr>
<td>N</td>
<td>13</td>
<td>−200 to 1300 °C/−300 to 2300 °F</td>
</tr>
<tr>
<td>R</td>
<td>14</td>
<td>0 to 1700 °C/0 to 3000 °F</td>
</tr>
<tr>
<td>S</td>
<td>15</td>
<td>0 to 1700 °C/0 to 3000 °F</td>
</tr>
<tr>
<td>B</td>
<td>16</td>
<td>100 to 1800 °C/300 to 3200 °F</td>
</tr>
<tr>
<td><strong>Infrared Temperature Sensor (ESTB)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 to 70°C</td>
<td>17</td>
<td>0 to 90 °C/0 to 190 °F</td>
</tr>
<tr>
<td>80 to 120°C</td>
<td>18</td>
<td>0 to 120 °C/0 to 240 °F</td>
</tr>
<tr>
<td>115 to 165°C</td>
<td>19</td>
<td>0 to 165 °C/0 to 320 °F</td>
</tr>
<tr>
<td>140 to 260°C</td>
<td>20</td>
<td>0 to 260 °C/0 to 500 °F</td>
</tr>
<tr>
<td><strong>Analog input</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 to 50 mV</td>
<td>21</td>
<td>One of the following ranges depending on the results of scaling: 1999 to 9999, 199.9 to 999.9</td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>Set Value</th>
<th>Alarm Type</th>
<th>Alarm Output Operation</th>
<th>When X is positive</th>
<th>When X is negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Alarm function OFF</td>
<td></td>
<td>Output OFF</td>
<td></td>
</tr>
<tr>
<td>1 (See note 1.)</td>
<td>Upper- and lower-limit (deviation)</td>
<td></td>
<td>ON L H OFF</td>
<td>(See note 2.)</td>
</tr>
<tr>
<td>2</td>
<td>Upper-limit (deviation)</td>
<td></td>
<td>ON X OFF</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Lower-limit (deviation)</td>
<td></td>
<td>ON X OFF</td>
<td></td>
</tr>
<tr>
<td>4 (See note 1.)</td>
<td>Upper- and lower-limit range (deviation)</td>
<td></td>
<td>ON L H OFF</td>
<td>(See note 3.)</td>
</tr>
<tr>
<td>5 (See note 1.)</td>
<td>Upper- and lower-limit with standby sequence (deviation)</td>
<td></td>
<td>ON L H OFF</td>
<td>(See note 4.)</td>
</tr>
<tr>
<td>6</td>
<td>Upper-limit with standby sequence (deviation)</td>
<td></td>
<td>ON X OFF</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Lower-limit with standby sequence (deviation)</td>
<td></td>
<td>ON X OFF</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Absolute-value upper-limit</td>
<td></td>
<td>ON X OFF</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Absolute-value lower-limit</td>
<td></td>
<td>ON X OFF</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Absolute-value upper-limit with standby sequence</td>
<td></td>
<td>ON X OFF</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Absolute-value lower-limit with standby sequence</td>
<td></td>
<td>ON X OFF</td>
<td></td>
</tr>
</tbody>
</table>

**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

<table>
<thead>
<tr>
<th>Case 1</th>
<th>Case 2</th>
<th>Case 3 (Always ON)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L H SP</td>
<td>SP L H</td>
<td>H&lt;0, L&gt;0</td>
</tr>
<tr>
<td>H&gt;0, L&lt;0</td>
<td>H &gt;</td>
<td>H &lt; L</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Case 1</th>
<th>Case 2</th>
<th>Case 3 (Always OFF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L H SP</td>
<td>SP L H</td>
<td>H&lt;0, L&gt;0</td>
</tr>
<tr>
<td>H&gt;0, L&lt;0</td>
<td>H &gt;</td>
<td>H &lt; L</td>
</tr>
</tbody>
</table>

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

Same as for the upper- and lower-limit alarm. However, when the upper-limit and lower-limit hysteresis overlaps: Always OFF

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

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

No. 1 display

No. 2 display

E5EZ

No. 1 display

No. 2 display

E5CZ

No. 1 display

No. 2 display

Note: To select advanced function setting level, you must enter the password ("−169") in the initial setting level.
Note: These diagrams show all the parameters that may be displayed. Depending on the specifications of the model used, there may be some parameters that are not displayed.

Input Shift

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

Example

<table>
<thead>
<tr>
<th>Input shift setting</th>
<th>Temperature measured by sensor</th>
<th>Temperature display</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 (no shift)</td>
<td>100°C</td>
<td>100°C</td>
</tr>
<tr>
<td>10 (shifted +10°C)</td>
<td>100°C</td>
<td>110°C</td>
</tr>
<tr>
<td>−10 (shifted −10°C)</td>
<td>100°C</td>
<td>90°C</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>Level</th>
<th>Set value</th>
</tr>
</thead>
<tbody>
<tr>
<td>operation level</td>
<td>0 1 2 3</td>
</tr>
<tr>
<td>PV</td>
<td>❍❍❍❍</td>
</tr>
<tr>
<td>PV/SP</td>
<td>❍❍❍❍</td>
</tr>
<tr>
<td>Other</td>
<td>❍❍ X X</td>
</tr>
<tr>
<td>adjustment level</td>
<td>❍❍ X X</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Set value</th>
<th>Initial setting level</th>
<th>Communications setting level</th>
<th>Advanced function setting level</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>❍</td>
<td>❍</td>
<td>❍</td>
</tr>
<tr>
<td>1</td>
<td>❍</td>
<td>❍</td>
<td>❍</td>
</tr>
<tr>
<td>2</td>
<td>❍ X</td>
<td>❍ X</td>
<td>❍ X</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Set value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>Setup can be changed by key operation.</td>
</tr>
<tr>
<td>ON</td>
<td>Setup cannot be changed by key operation. (The protect level, can be changed.)</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Displayed characters</th>
<th>Set (monitor) value</th>
<th>Set value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communications unit No.</td>
<td>u-no</td>
<td>0 to 99</td>
<td>0 to 99</td>
</tr>
<tr>
<td>Baud rate</td>
<td>bPS</td>
<td>1.2/2.4/4.8/9.6/19.2 (kbps)</td>
<td>1.2/2.4/4.8/9.6/19.2</td>
</tr>
<tr>
<td>Data bits</td>
<td>LEn</td>
<td>7/8 (bit)</td>
<td>7/8 (bit)</td>
</tr>
<tr>
<td>Stop bits</td>
<td>Sbck</td>
<td>1/2</td>
<td>1/2</td>
</tr>
<tr>
<td>Parity</td>
<td>PrCRY</td>
<td>None, even, odd</td>
<td>None, even, odd</td>
</tr>
</tbody>
</table>

**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 \[ \text{key} \] for at least three seconds in the “operation level.” The level moves to the “initial setting level.”
2. Press the \[ \text{key} \] for less than one second. The “initial setting level” moves to the “communications setting level.”
3. Pressing the \[ \text{key} \] advances the parameters as shown in the following figure.
4. Press the or \[ \text{keys} \] to change the parameter setups.

![Communications Setting Level Table](image)

**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.

<table>
<thead>
<tr>
<th>No. 1 display</th>
<th>Contents</th>
<th>Countermeasure</th>
<th>Output status</th>
</tr>
</thead>
<tbody>
<tr>
<td>$E Err \text{(S. Err)}$</td>
<td>Input error (See note.)</td>
<td>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.)</td>
<td>Control output: OFF, Alarm output: Handled as abnormally high temperature</td>
</tr>
<tr>
<td>A/D converter error (See note.)</td>
<td>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.</td>
<td>OFF, OFF</td>
<td></td>
</tr>
<tr>
<td>$E111$ (E111)</td>
<td>Memory error</td>
<td>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.</td>
<td>OFF, OFF</td>
</tr>
<tr>
<td>$H Err$ (H. Err)</td>
<td>HB error (See note.)</td>
<td></td>
<td>OFF, OFF</td>
</tr>
</tbody>
</table>

**Note 1.** If the input is within the range for which control is possible but outside the displayable range (-1999 to 9999), $E Err$ will be displayed if the value is less than -1999, and $E Err$ will be displayed if it is greater than 9999. 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.

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 (Sbck)**

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

**Communications parity (PrCRY)**

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

Temperature Sensor / SSR
Connection Example with SSR

**Temperature Sensor / SSR Connection Example with SSR**

- **Temperature Controller**
  - Voltage output terminal (for driving SSR)
  - Direct connection possible

- **SSR**
  - INPUT
  - LOAD
  - Heater
  - Load power

- **Load**
  - Heater

**Connection Diagram**

**Number of Connectable SSRs**

<table>
<thead>
<tr>
<th>Type</th>
<th>A: G3PB (Single-phase)</th>
<th>B: G3PB (Three-phase)</th>
<th>C: G3NA (See note.)</th>
<th>D: G3NE</th>
<th>E: G3NH</th>
</tr>
</thead>
<tbody>
<tr>
<td>E5AZ/EZ</td>
<td>5 units</td>
<td>4 units</td>
<td>5 units</td>
<td>2 units</td>
<td>4 units</td>
</tr>
<tr>
<td>E5CZ</td>
<td>3 units</td>
<td>2 units</td>
<td>3 units</td>
<td>1 unit</td>
<td>8 units</td>
</tr>
</tbody>
</table>

**Note:** 480 VAC models: 4 units
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   d. Delivery and shipping dates are estimates only; and
   e. Omron will package Products as it deems proper for protection against normal handling and extra charges apply to special conditions.

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Certain Precautions on Specifications and Use

1. Suitability of Use. Omron Companies shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the Product in the Buyer’s application or use of the Product. At Buyer’s request, Omron will provide applicable third party certification documents identifying recognized limits and limitations with respect to the application. Any use of the Product which is not within such recognized limits and limitations is not sufficient for a complete determination of the suitability of the Product and combination with the end product, machine, system, or other application or use. Buyer shall be solely responsible for determining appropriateness of the particular Product with respect to Buyer’s application, product, or system. Buyer’s sole application responsibility is in all of the following: (i) any non-exhaustive list of applications for which particular attention must be given: (i) indoor or outdoor use, (ii) use involving potential chemical contamination or electrical interference, or conditions or uses not described in this document. (ii) Use in consumer products or any use in significant quantities.

2. Change in Specifications. Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our practice to change part numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the Product may be changed without any notice. When in doubt, special part numbers may be assigned to fix or establish key specifications for your application. Please contact us to confirm actual specifications of purchased Product.

Ensure and Omissions. Information Omron Companies has been checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical or proofreading errors or omissions.