New 48 x 24-mm Basic Temperature Controller with Enhanced Functions and Performance. Improved Indication Accuracy and Preventive Maintenance Function.

- **Indication Accuracy**
  - Thermocouple input: ±0.3% of PV (previous models: ±0.5%)
  - Pt input: ±0.2% of PV (previous models: ±0.5%)
  - Analog input: ±0.2% FS (previous models: ±0.5%)
- Models are available with screw terminal blocks or screwless clamp terminal blocks.
- A PV/SV-status display function can be set to automatically alternate between displaying the status of the Temperature Controller (auto/manual, RUN/STOP, and alarms) and the PV or SV.
- Preventive maintenance for relays in the Temperature Controller using a Control Output ON/OFF Counter.
- Switch the PV display between three colors.
- Compatible with Support Software (CX-Thermo version 4.2 or higher).
- Eleven-segment displays.
- Models are available with one or two alarm outputs.

**Main I/O Functions**

<table>
<thead>
<tr>
<th>Event Inputs</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor Inputs</td>
<td>Universal thermocouple/Pt inputs (Models with temperature inputs)</td>
</tr>
<tr>
<td></td>
<td>Analog current/voltage inputs (Models with analog inputs)</td>
</tr>
<tr>
<td>Indication Accuracy</td>
<td>Thermocouple input: ±0.3% of PV</td>
</tr>
<tr>
<td></td>
<td>Pt input: ±0.2% of PV</td>
</tr>
<tr>
<td></td>
<td>Analog input: ±0.2% FS</td>
</tr>
<tr>
<td>Sampling Period</td>
<td>250 ms</td>
</tr>
</tbody>
</table>

- **Control Output 1**
  - Relay output
  - Voltage output (for driving SSR)
  - Current output

- **Auxiliary Outputs**
  - None
  - One
  - Two

- **Dual Display: PV and SV**
  - Auto/manual switching
  - Temperature Controller status display
  - Simple program function
  - Control output ON/OFF count alarm
  - PV change rate alarm
  - Models also available with RS-232C communications
  - Models also available with RS-485 communications

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This datasheet is provided as a guideline for selecting products. Be sure to refer to the following user manuals for application precautions and other information required for operation before attempting to use the product.

- E5CN/E5AN/E5EN/E5GN Digital Temperature Controllers User’s Manual Basic Type (Cat. No. H156)
- E5CN/E5AN/E5EN/E5GN Digital Temperature Controllers Communications Manual Basic Type (Cat. No. H158)
**Model Number Structure**

**Model Number Legend**

**Controllers**

E5GN-[]-[]-[]-[]-[]-

1. **Control Output 1**
   - R: Relay output
   - Q: Voltage output (for driving SSR)
   - C: Linear current output

2. **Auxiliary Outputs**
   - Blank: None
   - 1: One output
   - 2: Two outputs

3. **Option**
   - Blank: None
   - 01: RS-232C communications
   - 03: RS-485 communications
   - B: Two event inputs
   - H: Heater burnout/Heater short/Heater overcurrent detection (CT1)

**Input Type**
- T: Universal thermocouple/platinum resistance thermometer input
- L: Analog current/voltage input

**Power Supply Voltage**
- Blank: 100 to 240 VAC
- D: 24 VAC/VDC

**Terminal Type**
- Blank: Models with screw terminal block
- C: Models with screwless clamp terminal block

**Case Color**
- Blank: Black

**Communications Protocol**
- Blank: None
- FLK: CompoWay/F communications

**Note:** Models cannot be made for all combinations of options that are possible in the model number legend. Confirm model availability in Ordering Information before ordering.

* Auxiliary outputs are relay outputs that can be used to output alarms or processing results.
### Ordering Information

#### Controllers with Screw Terminal Blocks

#### Models with Temperature Inputs

#### Models with One Control Output and a 100 to 240-VAC Power Supply

<table>
<thead>
<tr>
<th>Case color</th>
<th>Control output</th>
<th>Control mode</th>
<th>No. of auxiliary outputs</th>
<th>Detection of heater burnout, SSR failure, and heater overcurrent</th>
<th>No. of event inputs</th>
<th>Transfer output</th>
<th>Communications</th>
<th>Previous model</th>
<th>New model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>Relay output</td>
<td>Standard</td>
<td>---</td>
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<td>---</td>
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<td>E5GN-RTC E5GN-RP E5GN-RT</td>
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<td>---</td>
<td>2</td>
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<td>E5GN-R1T</td>
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<td>Detection for single-phase heaters</td>
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<td>RS-485 E5GN-R03TC-FLK E5GN-R03P-FLK E5GN-R103T-FLK</td>
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<td>E5GN-R2T</td>
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<td>E5GN-R2BT</td>
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<td>Detection for single-phase heaters</td>
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<td>RS-485 E5GN-R03TC-FLK E5GN-R03P-FLK E5GN-R103T-FLK</td>
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<tr>
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<td>(for driving SSR)</td>
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<td>E5GN-Q2T</td>
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<td>E5GN-C11T</td>
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</table>

*1. If heating/cooling control mode is used, an auxiliary output is used as a control output for the cooling side. The number of auxiliary outputs that can be used will decrease by one. Also, the signal for the control output for the cooling side will be a relay output.

*2. A current control output can be used as the transfer output. In that case, an auxiliary output is used as the control output. (This is not possible for models without an auxiliary output.) The control output will be a relay output. The number of auxiliary outputs that can be used will decrease by one.
### Models with One Control Output and a 24-VAC/VDC Power Supply

<table>
<thead>
<tr>
<th>Case color</th>
<th>Control output</th>
<th>Control mode #1</th>
<th>No. of auxiliary outputs</th>
<th>Detection of heater burnout, SSR failure, and heater overcurrent</th>
<th>No. of event inputs</th>
<th>Transfer output #2</th>
<th>Communications</th>
<th>Previous model</th>
<th>New model</th>
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<tr>
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<tr>
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<td></td>
<td>Standard or heating/cooling</td>
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<td>---</td>
<td>2</td>
<td>RS-232C</td>
<td>---</td>
<td>E5GN-RTC</td>
<td>E5GN-R1BD</td>
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<td>Detection for single-phase heaters</td>
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<td>E5GN-R1BD</td>
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<td>RS-485</td>
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<td>E5GN-R1BD</td>
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<td>Voltage output (for driving SSR)</td>
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<td>E5GN-Q1BD</td>
<td>E5GN-Q1BD</td>
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<td>Detection for single-phase heaters</td>
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<td>E5GN-Q1BD</td>
<td>E5GN-Q1BD</td>
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<td>RS-485</td>
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<td>E5GN-Q1BD</td>
<td>E5GN-Q1BD</td>
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<tr>
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<td>Current output</td>
<td>Standard or heating/cooling</td>
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<td>---</td>
<td>2</td>
<td>RS-232C</td>
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<td>E5GN-C1TBD</td>
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<tr>
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<td>Transfer output using control output</td>
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<td>E5GN-C1TBD</td>
<td>E5GN-C1TBD</td>
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<td>---</td>
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<td>RS-485</td>
<td>---</td>
<td>E5GN-C1TBD</td>
<td>E5GN-C1TBD</td>
</tr>
</tbody>
</table>

### Notes

1. If heating/cooling control mode is used, an auxiliary output is used as a control output for the cooling side. The number of auxiliary outputs that can be used will decrease by one. Also, the signal for the control output for the cooling side will be a relay output.

2. A current control output can be used as the transfer output. In that case, an auxiliary output is used as the control output. (This is not possible for models without an auxiliary output.) The control output will be a relay output. The number of auxiliary outputs that can be used will decrease by one.
## Models with Analog Inputs

### Models with One Control Output and a 100 to 240-VAC Power Supply

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<thead>
<tr>
<th>Case color</th>
<th>Control output</th>
<th>Control mode #1</th>
<th>No. of auxiliary outputs</th>
<th>Detection of heater burnout, SSR failure, and heater overcurrent</th>
<th>No. of event inputs</th>
<th>Transfer output #2</th>
<th>Communications</th>
<th>Previous model</th>
<th>New model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>Relay output</td>
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<td></td>
<td></td>
<td>E5GN-R103L-FLK</td>
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<tr>
<td></td>
<td>Voltage output (for driving SSR)</td>
<td>Standard or heating/cooling</td>
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<td></td>
<td></td>
<td></td>
<td>E5GN-Q103L-FLK</td>
</tr>
<tr>
<td></td>
<td>Current output</td>
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<td></td>
<td>E5GN-C1L</td>
</tr>
</tbody>
</table>

**Note:** Models with analog inputs do not display the temperature unit.

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### Models with One Control Output and a 24-VAC/VDC Power Supply

<table>
<thead>
<tr>
<th>Case color</th>
<th>Control output</th>
<th>Control mode #1</th>
<th>No. of auxiliary outputs</th>
<th>Detection of heater burnout, SSR failure, and heater overcurrent</th>
<th>No. of event inputs</th>
<th>Transfer output #2</th>
<th>Communications</th>
<th>Previous model</th>
<th>New model</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Relay output</td>
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<td>E5GN-Q103LD-FLK</td>
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<tr>
<td></td>
<td>Current output</td>
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<td>E5GN-C1LD</td>
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</table>

*1. If heating/cooling control mode is used, an auxiliary output is used as a control output for the cooling side. The number of auxiliary outputs that can be used will decrease by one. Also, the signal for the control output for the cooling side will be a relay output.

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Controllers with Screwless Clamp Terminal Blocks
Models with Temperature Inputs
Models with One Control Output and a 100 to 240-VAC Power Supply

<table>
<thead>
<tr>
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<th>Control output</th>
<th>Control mode #1</th>
<th>No. of auxiliary outputs</th>
<th>Detection of heater burnout, SSR failure, and heater overcurrent</th>
<th>No. of event inputs</th>
<th>Transfer output #2</th>
<th>Communications</th>
<th>Previous model</th>
<th>Resistance thermocouple input</th>
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<td>E5GN-RP</td>
<td>E5GN-RT-C</td>
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<td>---</td>
<td>E5GN-R1TC</td>
<td>E5GN-R1P</td>
<td>E5GN-R1T-C</td>
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<td>E5GN-R1BT-C</td>
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<td>RS-232C</td>
<td>E5GN-R03TC-FLK</td>
<td>E5GN-R03P-FLK</td>
<td>E5GN-R103T-FLK</td>
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<td>Current output</td>
<td>Standard or heating/cooling</td>
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<td>Transfer output using control output</td>
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<td>RS-232C</td>
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<td>E5GN-C10T-C-FLK</td>
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</tbody>
</table>

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<thead>
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<th>No. of event inputs</th>
<th>Transfer output #2</th>
<th>Communic</th>
<th>Previous model</th>
<th>New model</th>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Standard or heating/cooling</td>
<td>1</td>
<td>RS-232C</td>
<td>--</td>
<td>--</td>
<td>E5GN-Q2HTD-C</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>RS-485</td>
<td>E5GN-Q203TC-FLK</td>
<td>E5GN-Q203TD-C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Detection for single-phase heaters</td>
<td>2</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>E5GN-Q203TD-C</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Standard</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>E5GN-Q203TD-C</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Standard or heating/cooling</td>
<td>1</td>
<td>RS-232C</td>
<td>--</td>
<td>--</td>
<td>E5GN-Q203TD-C</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. If heating/cooling control mode is used, an auxiliary output is used as a control output for the cooling side. The number of auxiliary outputs that can be used will decrease by one. Also, the signal for the control output for the cooling side will be a relay output.

2. A current control output can be used as the transfer output. In that case, an auxiliary output is used as the control output. (This is not possible for models without an auxiliary output.) The control output will be a relay output. The number of auxiliary outputs that can be used will decrease by one.
### Models with Analog Inputs

Models with One Control Output and a 100 to 240-VAC Power Supply

<table>
<thead>
<tr>
<th>Case color</th>
<th>Control output</th>
<th>Control mode #1</th>
<th>No. of auxiliary outputs</th>
<th>Detection of heater burnout, SSR failure, and heater overcurrent</th>
<th>No. of event inputs</th>
<th>Transfer output #2</th>
<th>Communcations</th>
<th>Previous model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>Current output</td>
<td>Standard or heating/cooling</td>
<td>1</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>E5GN-C1L-C</td>
</tr>
</tbody>
</table>

**Note:** Models with analog inputs do not display the temperature unit.

*1. If heating/cooling control mode is used, an auxiliary output is used as a control output for the cooling side. The number of auxiliary outputs that can be used will decrease by one. Also, the signal for the control output for the cooling side will be a relay output.

*2. A current control output can be used as the transfer output. In that case, an auxiliary output is used as the control output. (This is not possible for models without an auxiliary output.) The control output will be a relay output. The number of auxiliary outputs that can be used will decrease by one.

Models with One Control Output and a 24-VAC/VDC Power Supply

<table>
<thead>
<tr>
<th>Case color</th>
<th>Control output</th>
<th>Control mode #1</th>
<th>No. of auxiliary outputs</th>
<th>Detection of heater burnout, SSR failure, and heater overcurrent</th>
<th>No. of event inputs</th>
<th>Transfer output #2</th>
<th>Communcations</th>
<th>Previous model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>Current output</td>
<td>Standard or heating/cooling</td>
<td>1</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>E5GN-C1LD-C</td>
</tr>
</tbody>
</table>

*1. If heating/cooling control mode is used, an auxiliary output is used as a control output for the cooling side. The number of auxiliary outputs that can be used will decrease by one. Also, the signal for the control output for the cooling side will be a relay output.

*2. A current control output can be used as the transfer output. In that case, an auxiliary output is used as the control output. (This is not possible for models without an auxiliary output.) The control output will be a relay output. The number of auxiliary outputs that can be used will decrease by one.

### Accessories (Order Separately)

#### USB-Serial Conversion Cable

<table>
<thead>
<tr>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>E58-CIFQ1</td>
</tr>
</tbody>
</table>

#### Waterproof Packing

<table>
<thead>
<tr>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y92S-32</td>
</tr>
</tbody>
</table>

**Note:** The Waterproof Packing is included with the Controller only for models with screw terminal blocks.

### Current Transformers (CTs)

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

### CX-Thermo Support Software

<table>
<thead>
<tr>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>EST2-2C-MV4</td>
</tr>
</tbody>
</table>

**Note:** The E5GN is supported by CX-Thermo version 4.2 and higher.
# Specifications

## Ratings

| Power supply voltage | No D in model number: 100 to 240 VAC, 50/60 Hz  
D in model number: 24 VAC, 50/60 Hz; 24 VDC |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating voltage range</td>
<td>85% to 110% of rated supply voltage</td>
</tr>
</tbody>
</table>
| **Power consumption** | **E5GN** Screw terminal block  
100 to 240 VAC: 5.5 VA (max.)  
24 VAC/VDC: 3 VA/2 W (max.) |
| **E5GN-** | **C Screwless clamp terminal block**  
100 to 240 VAC: 5.5 VA (max.)  
24 VAC/VDC: 3 VA/2 W (max.) |

## Sensor input

- Models with temperature inputs
  - Platinum resistance thermometer: Pt100 or JPt100
  - Infrared temperature sensor: 10 to 70°C, 60 to 120°C, 115 to 165°C, or 140 to 260°C
  - Voltage input: 0 to 50 mV

- Models with analog inputs
  - Current input: 4 to 20 mA or 0 to 20 mA  
  Voltage input: 1 to 5 V, 0 to 5 V, or 0 to 10 V

## Input impedance

- Current input: 150 Ω max., Voltage input: 1 MΩ min. (Use a 1:1 connection when connecting the ES2-HB.)

## Control method

- ON/OFF control or 2-PID control (with auto-tuning)

## Control outputs

- Relay output: SPST-NO, 250 VAC, 2 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA
- Voltage output (for driving SSR): Output voltage: 12 VDC ±15% (PNP), max. load current: 21 mA, with short-circuit protection circuit
- Current output: 4 to 20 mA DC/0 to 20 mA DC, load: 500 Ω max., resolution: approx. 10,000

## Auxiliary outputs

- Number of outputs: 1 or 2 max. (Depends on the model.)
- Output specifications: Relay output: SPST-NO, 250 VAC, 2 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA

## Event inputs

- Number of inputs: 2
- External contact input specifications: 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.
  Current flow: Approx. 7 mA per contact

## Setting method

- Digital setting using front panel keys

## Indication method

- 11-segment digital display and individual indicators (7-segment display also possible)
  Character height: PV: 7.5 mm, SV: 3.6 mm

## Multi SP

- Up to four set points (SP0 to SP3) can be saved and selected using event inputs, key operations, or serial communications.

## Bank switching

- Not supported

## Other functions

- Manual output, heating/cooling control, loop burnout alarm, SP ramp, other alarm functions, heater burnout detection, 40% AT, 100% AT, MV limiter, input digital filter, self-tuning, temperature input shift, run/stop, protection functions, control output ON/OFF counter, extraction of square root, MV change rate limit, logic operations, PV/SV status display, simple program, automatic cooling coefficient adjustment

## Ambient operating temperature

- −10 to 55°C (with no condensation or icing), for 3-year warranty: −10 to 50°C

## Ambient operating humidity

- 25% to 85%

## Storage temperature

- −25 to 65°C (with no condensation or icing)
## Input Ranges

### Thermocouple/Platinum Resistance Thermometer (Universal Inputs)

<table>
<thead>
<tr>
<th>Input Type</th>
<th>Platinum resistance thermometer</th>
<th>Thermocouple</th>
<th>Infrared temperature sensor</th>
<th>Analog input</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Pt100</td>
<td>JPt100</td>
<td>K, J, T, E, L, U, N, R, S, B, W</td>
<td>PL II</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10 to 70°C</td>
<td>60 to 120°C</td>
</tr>
<tr>
<td>Temperature range (°C)</td>
<td>2300</td>
<td>1800</td>
<td>1700</td>
<td>1600</td>
</tr>
<tr>
<td>Setting number</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

Shaded settings are the default settings.

The applicable standards for the input types are as follows:
- L: Fe-CuNi, DIN 43710-1985
- U: Cu-CuNi, DIN 43710-1985
- W: W5Re/W26Re, ASTM E988-1990
- Pt100: JIS C 1604-1997, IEC 751
- PL II: According to Platinel II electromotive force charts from BASF (previously Engelhard)

### Models with Analog Inputs

<table>
<thead>
<tr>
<th>Input Type</th>
<th>Current</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input specification</td>
<td>4 to 20 mA</td>
<td>0 to 20 mA</td>
</tr>
<tr>
<td>Setting range</td>
<td>Usable in the following ranges by scaling:</td>
<td>−1999 to 9999, −199.9 to 999.9, −19.99 to 99.99 or −1.999 to 9.999</td>
</tr>
<tr>
<td>Setting number</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Shaded settings are the default settings.
Alarm Outputs

Each alarm can be independently set to one of the following 13 alarm types. The default is 2: Upper limit. Auxiliary outputs are allocated for alarms. ON delays and OFF delays (0 to 999 s) can also be specified.

Note: For models with heater burnout, SSR failure, and heater overcurrent detection, alarm 1 will be an OR output of the alarm selected from the following alarm types and the alarms for heater burnout, SSR failure, and heater overcurrent. To output only a heater burnout alarm, SSR failure alarm, and heater overcurrent alarm for alarm 1, set the alarm type to 0 (i.e., no alarm function).

<table>
<thead>
<tr>
<th>Set value</th>
<th>Alarm type</th>
<th>Alarm output operation</th>
<th>Description of function</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Alarm function OFF</td>
<td>Output OFF</td>
<td>No alarm</td>
</tr>
<tr>
<td>1 *1</td>
<td>Upper- and lower-limit</td>
<td>*2</td>
<td>Set the deviation in the set point by setting the alarm upper limit (H) and alarm lower limit (L).</td>
</tr>
<tr>
<td>2</td>
<td>Upper-limit</td>
<td>*3</td>
<td>Set the upward deviation in the set point by setting the alarm value (X).</td>
</tr>
<tr>
<td>3</td>
<td>Lower-limit</td>
<td>*4</td>
<td>Set the downward deviation in the set point by setting the alarm value (X).</td>
</tr>
<tr>
<td>4 *1</td>
<td>Upper- and lower-limit range</td>
<td>*5</td>
<td>A standby sequence is added to the upper- and lower-limit alarm (1).</td>
</tr>
<tr>
<td>5 *1</td>
<td>Upper- and lower-limit with standby sequence</td>
<td>*6</td>
<td>A standby sequence is added to the upper- and lower-limit alarm (2).</td>
</tr>
<tr>
<td>6</td>
<td>Upper-limit with standby sequence</td>
<td>*7</td>
<td>A standby sequence is added to the upper-limit alarm (3).</td>
</tr>
<tr>
<td>7</td>
<td>Lower-limit with standby sequence</td>
<td>*8</td>
<td>A standby sequence is added to the lower-limit alarm (4).</td>
</tr>
<tr>
<td>8</td>
<td>Absolute-value upper-limit</td>
<td>*9</td>
<td>The alarm will turn ON if the process value is larger than the alarm value (X) regardless of the set point.</td>
</tr>
<tr>
<td>9</td>
<td>Absolute-value lower-limit</td>
<td>*10</td>
<td>The alarm will turn ON if the process value is smaller than the alarm value (X) regardless of the set point.</td>
</tr>
<tr>
<td>10</td>
<td>Absolute-value upper-limit with standby sequence</td>
<td>*11</td>
<td>A standby sequence is added to the absolute-value upper-limit alarm (5).</td>
</tr>
<tr>
<td>11</td>
<td>Absolute-value lower-limit with standby sequence</td>
<td>*12</td>
<td>A standby sequence is added to the absolute-value lower-limit alarm (6).</td>
</tr>
<tr>
<td>12</td>
<td>LBA (alarm 1 type only)</td>
<td>---</td>
<td>#7</td>
</tr>
<tr>
<td>13</td>
<td>PV change rate alarm</td>
<td>---</td>
<td>#8</td>
</tr>
</tbody>
</table>

*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."

*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

*6. Refer to the E5CN/E5AN/E5EN/E5GN Digital Temperature Controllers User's Manual Basic Type (Cat. No. H156) for information on the operation of the standby sequence.

*7. Refer to the E5CN/E5AN/E5EN/E5GN Digital Temperature Controllers User's Manual Basic Type (Cat. No. H156) for information on the operation of the standby sequence.

*8. Refer to the E5CN/E5AN/E5EN/E5GN Digital Temperature Controllers User's Manual Basic Type (Cat. No. H156) for information on the PV change rate alarm.

---

*Case 1 and 2: Always OFF when the upper-limit and lower-limit hysteresis overlaps.

*Case 3: Always OFF
## Characteristics

<table>
<thead>
<tr>
<th>Indication accuracy</th>
<th>Thermocouple: ±1°C (±0.3% of indicated value or ±1°C, whichever is greater) ±1 digit max. Platinum resistance thermometer input: (±0.2% of indicated value or ±0.8°C, whichever is greater) ±1 digit max. Analog input: ±0.2% FS ±1 digit max. CT input: ±5% FS ±1 digit max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influence of temperature #2</td>
<td>Thermocouple input (R, S, B, W, PL II): (±1% of PV or ±1°C, whichever is greater) ±1 digit max. Other thermocouple input: #3 (±1% of PV or ±4°C, whichever is greater) ±1 digit max.</td>
</tr>
<tr>
<td>Influence of voltage #2</td>
<td>Platinum resistance thermometer input: (±1% of PV or ±2°C, whichever is greater) ±1 digit max. Analog input: (±1% FS) ±1 digit max.</td>
</tr>
<tr>
<td>Input sampling period</td>
<td>250 ms</td>
</tr>
<tr>
<td>Hysteresis</td>
<td>Models with thermocouple/platinum resistance thermometer input (universal input): 0.1 to 999.9 EU (in units of 0.1 EU) #4 Models with analog input: 0.01 to 99.99% FS (in units of 0.01% FS)</td>
</tr>
<tr>
<td>Proportional band (P)</td>
<td>Models with thermocouple/platinum resistance thermometer input (universal input): 0.1 to 999.9 EU (in units of 0.1 EU) #4 Models with analog input: 0.1 to 999.9% FS (in units of 0.1% FS)</td>
</tr>
<tr>
<td>Integral time (I)</td>
<td>0 to 3999 s (in units of 1 s)</td>
</tr>
<tr>
<td>Derivative time (D)</td>
<td>0 to 3999 s (in units of 1 s) #5</td>
</tr>
<tr>
<td>Control period</td>
<td>0.5, 1 to 99 s (in units of 1 s)</td>
</tr>
<tr>
<td>Manual reset value</td>
<td>0.0 to 100.0% (in units of 0.1%)</td>
</tr>
<tr>
<td>Alarm setting range</td>
<td>−1999 to 9999 (decimal point position depends on input type)</td>
</tr>
<tr>
<td>Affect of signal source</td>
<td>Thermocouple: 0.1°C/µA max. (10 Ω max.) Platinum resistance thermometer: 0.1°C/Ω max. (10 Ω max.)</td>
</tr>
<tr>
<td>Insulation resistance</td>
<td>20 MΩ min. (at 500 VDC)</td>
</tr>
<tr>
<td>Dielectric strength</td>
<td>2,300 VAC, 50 or 60 Hz for 1 min (between terminals with different charge)</td>
</tr>
<tr>
<td>Vibration resistance</td>
<td>Malfunction: 10 to 55 Hz, 20 m/s² for 10 min each in X, Y, and Z directions Destruction: 10 to 55 Hz, 0.75-mm single amplitude for 2 hrs each in X, Y, and Z directions</td>
</tr>
<tr>
<td>Shock resistance</td>
<td>Malfunction: 100 m/s², 3 times each in X, Y, and Z directions Destruction: 300 m/s², 3 times each in X, Y, and Z directions</td>
</tr>
<tr>
<td>Weight</td>
<td>Controller: Approx. 90 g, Mounting Bracket: Approx. 10 g</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>Front panel: IP66, Rear case: IP20, Terminals: IP00</td>
</tr>
<tr>
<td>Memory protection</td>
<td>Non-volatile memory (number of writes: 1,000,000 times)</td>
</tr>
<tr>
<td>Setup Tool</td>
<td>CX-Thermo version 4.2 or higher</td>
</tr>
<tr>
<td>Setup Tool port</td>
<td>Provided on the side of the E5GN. Connect this port to the computer when using the Setup Tool. An E58-CIFG1 USB-Serial Conversion Cable is required to connect the computer to the port on the side of the E5GN. #6</td>
</tr>
<tr>
<td>Standards</td>
<td>UL 61010-1, CSA C22.2 No. 1010-1</td>
</tr>
<tr>
<td>Conformed standards</td>
<td>EN 61010-1 (IEC 61010-1): Pollution level 2, overcurrent category II</td>
</tr>
<tr>
<td>EMC</td>
<td>EMI: EN 61326 Radiated Interference Electromagnetic Field Strength: EN 55011 Group 1, class A Noise Terminal Voltage: EN 55011 Group 1, class A EMS: EN 61326 ESD Immunity: EN 61000-4-2 Electromagnetic Field Immunity: EN 61000-4-3 Burst Noise Immunity: EN 61000-4-4 Conducted Disturbance Immunity: EN 61000-4-6 Surge Immunity: EN 61000-4-5 Power Frequency Magnetic Field Immunity: EN 61000-4-8 Voltage Dip/Interrupting Immunity: EN 61000-4-11</td>
</tr>
</tbody>
</table>

*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 temperatures is ±2°C ±1 digit max. The indication accuracy of the B thermocouple at a temperature of 400°C max. is not specified. The indication accuracy of B thermocouples in the 400 to 800°C range is ±3°C max. The indication accuracy of the R and S thermocouples at a temperature of 200°C max. is ±3°C ±1 digit max. The indication accuracy of W thermocouples is ±0.3 of PV or ±3°C, whichever is greater, ±1 digit max. The indication accuracy of PL II thermocouples is ±0.3 of PV or ±2°C, whichever is greater, ±1 digit max. |

*2. Ambient temperature: −10°C to 23°C to 55°C. Voltage range: −15% to 10% of rated voltage |

*3. K thermocouple at −100°C max.: ±10°C max. |

*4. “EU” stands for Engineering Unit and is used as the unit after scaling. For a temperature sensor, the EU is °C or °F. |

*5. When robust tuning (RT) is ON, the differential time is 0.0 to 999.9 (in units of 0.1 s). |

*6. External serial communications (RS-232C or RS-485) and cable communications for the Setup Tool can be used at the same time.
USB-Serial Conversion Cable

Applicable OS  Windows 2000, XP, or Vista
Applicable software  CX-Thermo version 4 or higher
Applicable models  E5AN/E5EN/E5CN/E5CN-U/E5AN-H/E5EN-H/E5CN-H/E5GN
USB interface standard  Conforms to USB Specification 1.1.
DTE speed  38400 bps
Connector specifications  Computer: USB (type A plug)
                       Temperature Controller: Setup Tool port
                       (on bottom of Controller)
Power supply  Bus power (Supplied from USB host controller.)
Power supply voltage  5 VDC
Current consumption  70 mA
Ambient operating temperature  0 to 55°C (with no condensation or icing)
Ambient operating humidity  10% to 80%
Storage temperature  –20 to 60°C (with no condensation or icing)
Storage humidity  10% to 80%
Altitude  2,000 m max.
Weight  Approx. 100 g

Note: A driver must be installed in the personal computer. Refer to installation information in the operation manual for the Conversion Cable.

Communications Specifications

Transmission line connection method  RS-485: Multipoint
                                 RS-232C: Point-to-point
Communications  RS-485 (two-wire, half duplex), RS-232C
Synchronization method  Start-stop synchronization
Protocol  CompoWay/F, SYSWAY, or Modbus
Baud rate  1200, 2400, 4800, 9600, 19200, 38400, or 57600 bps
Transmission code  ASCII
Data bit length  7 or 8 bits
Stop bit length  1 or 2 bits
Error detection  Vertical parity (none, even, odd)
                Frame check sequence (FCS) with SYSWAY
                Block check character (BCC) with
                CompoWay/F or CRC-16 Modbus
Flow control  None
Interface  RS-485, RS-232C
Retry function  None
Communications buffer  217 bytes
Communications response wait time  0 to 99 ms
Default: 20 ms

* The baud rate, data bit length, stop bit length, and vertical parity can be individually set using the Communications Setting Level.

Current Transformer (Order Separately)

Ratings

Dielectric strength  1,000 VAC for 1 min
Vibration resistance  50 Hz, 98 m/s²
Weight  E54-CT1: Approx. 11.5 g,
        E54-CT3: Approx. 50 g
Accessories  (E54-CT3 only)
              Armatures (2)
              Plugs (2)

Heater Burnout Alarms, SSR Failure Alarms, and Heater Overcurrent Alarms

CT input (for heater current detection)  Models with detection for single-phase heaters: One input
Maximum heater current  50 A AC
Input current indication accuracy  ±5% FS ±1 digit max.
Heater burnout alarm setting range #1  0.1 to 49.9 A (in units of 0.1 A)
Minimum detection ON time: 100 ms
SSR failure alarm setting range #2  0.1 to 49.9 A (in units of 0.1 A)
Minimum detection OFF time: 100 ms
Heater overcurrent alarm setting range #3  0.1 to 49.9 A (in units of 0.1 A)
Minimum detection ON time: 100 ms

#1. For heater burnout alarms, the heater current will be measured when the control output is ON, and the output assigned to the alarm 1 function will turn ON if the heater current is lower than the set value (i.e., heater burnout detection current value).

#2. For SSR failure alarms, the heater current will be measured when the control output is OFF, and the output assigned to the alarm 1 function will turn ON if the heater current is higher than the set value (i.e., SSR failure detection current value).

#3. For heater overcurrent alarms, the heater current will be measured when the control output is ON, and the output assigned to the alarm 1 function will turn ON if the heater current is higher than the set value (i.e., heater overcurrent detection current value).

Electrical Life Expectancy Curve for Relays (Reference Values)
External Connections

• A voltage output (control output, for driving SSR) is not electrically insulated from the internal circuits. When using a grounding thermocouple, do not connect any of the control output terminals to ground. (If the control output terminals are connected to ground, errors will occur in the measured temperature values as a result of leakage current.)

E5GN Controllers

Wiring

E5GN

Models with Screw Terminal Blocks (M3 Screws)

E5GN-□-C

Models with Screwless Clamp Terminal Blocks

The E5GN is set for a K thermocouple (input type of 5) by default. If a difference sensor is used, an input error (s.err) will occur. Check the setting of the input type parameter.

A heater burnout alarm, heater short alarm, heater overcurrent alarm, or input error is sent to the output to which the alarm 1 function is assigned.

Auxiliary outputs 1 and 2

Relay outputs
250 VAC, 2 A (resistive load)

Voltage output (for driving SSR)
12 VDC, 21 mA

Current output
0 to 20 mA DC
4 to 20 mA DC

Load: 500 Ω max.

Relay output
250 VAC, 2 A (resistive load)

RS-485 communications

RS-232C communications

CT input

Event input

Universal TC/Pt input

Auxiliary output 2 connection screws

M3 Screw Terminal Blocks

• Crimp terminal shape: Forked or round
• Tightening torque for all terminals: 0.5 N·m

5.8 mm max.

0.8 mm max.

Wire stripping: 10 mm
Ferrules: 8 to 12 mm

0.8 to 1.4 mm

10 mm
8 to 12 mm

0.8 mm max.
Nomenclature

E5GN
The front panel is the same for the E5GN.

Dimensions (Unit: mm)

E5GN
Models with Screw Terminal Blocks

Panel Cutout
Mounted Separately
Group Mounted

- Recommended panel thickness is 1 to 5 mm.
- Group mounting is not possible in the vertical direction. (Maintain the specified mounting space between Controllers.)
- To mount the Controller so that it is waterproof, insert the waterproof packing onto the Controller.
- When two or more Controllers are mounted, make sure that the surrounding temperature does not exceed the allowable operating temperature specified in the specifications.

E5GN-C
Models with Screwless Clamp Terminal Blocks

Panel Cutout
Mounted Separately
Group Mounted

- Recommended panel thickness is 1 to 5 mm.
- Group mounting is not possible in the vertical direction. (Maintain the specified mounting space between Controllers.)
- When two or more Controllers are mounted, make sure that the surrounding temperature does not exceed the allowable operating temperature specified in the specifications.

Accessories (Order Separately)

USB-Serial Conversion Cable
E58-CIFQ1

omron

Waterproof Packing
Y92S-32 (for DIN 48 × 24)

Order the Waterproof Packing separately if it becomes lost or damaged.
The Waterproof Packing can be used to achieve an IP66 degree of protection.
(Deterioration, shrinking, or hardening of the waterproof packing may occur depending on the operating environment. Therefore, periodic replacement is recommended to ensure the level of waterproofing specified in IP66. The time for periodic replacement depends on the operating environment. Be sure to confirm this point at your site. Consider one year a rough standard. OMRON shall not be liable for the level of water resistance if the customer does not perform periodic replacement.)
The Waterproof Packing does not need to be attached if a waterproof structure is not required.

Current Transformers

E54-CT1

E54-CT3

E54-CT3 Accessory
- Armature
- Plug

Connection Example

E54-CT1
Thru-current (Io) vs. Output Voltage (Eo) (Reference Values)
Maximum continuous heater current: 50 A (50/60 Hz)
Number of windings: 400±2
Winding resistance: 18±2 Ω

**Thru-current (Io) A (r.m.s.)**

- 100 mV
- 100 µV
- 10 mV
- 100 µV

**Output voltage (Eo) V (r.m.s.)**

- 100 V
- 100 Hz

**Distortion factor**

- 10%
- 3%
- 1%

**RL = 10 Ω**

- ∞

**E54-CT3**
Thru-current (Io) vs. Output Voltage (Eo) (Reference Values)
Maximum continuous heater current: 120 A (50/60 Hz)
(Maximum continuous heater current for the Temperature Controller is 50 A.)
Number of windings: 400±2
Winding resistance: 8±0.8 Ω

**Thru-current (Io) A (r.m.s.)**

- 100 mV
- 100 µV
- 10 mV
- 100 µV

**Output voltage (Eo) V (r.m.s.)**

- 100 V
- 100 Hz

**Distortion factor**

- 10%
- 3%
- 1%
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