

# Digital Temperature Controller

# E5GC (48 × 24 mm)

## Easy Operation and High Performance of the E5□C Series in a Compact 48 × 24-mm Body

- A compact body of 48 × 24 × 90 mm (W × H × D) that is ideal for small equipment, laboratory instruments, and others.
- White PV display with a height of 10.5 mm for high visibility even with the compact body.
- Removable terminal block to simplify maintenance. Select from screw terminals or screwless clamp terminals for the wiring method.
- High-speed sampling at 50 ms.
- Easy connections to a PLC with programless communications.
- Set up the Controller without wiring the power supply by connecting to the computer with a Communications Conversion Cable (sold separately). Setup is easy with the CX-Thermo (sold separately).



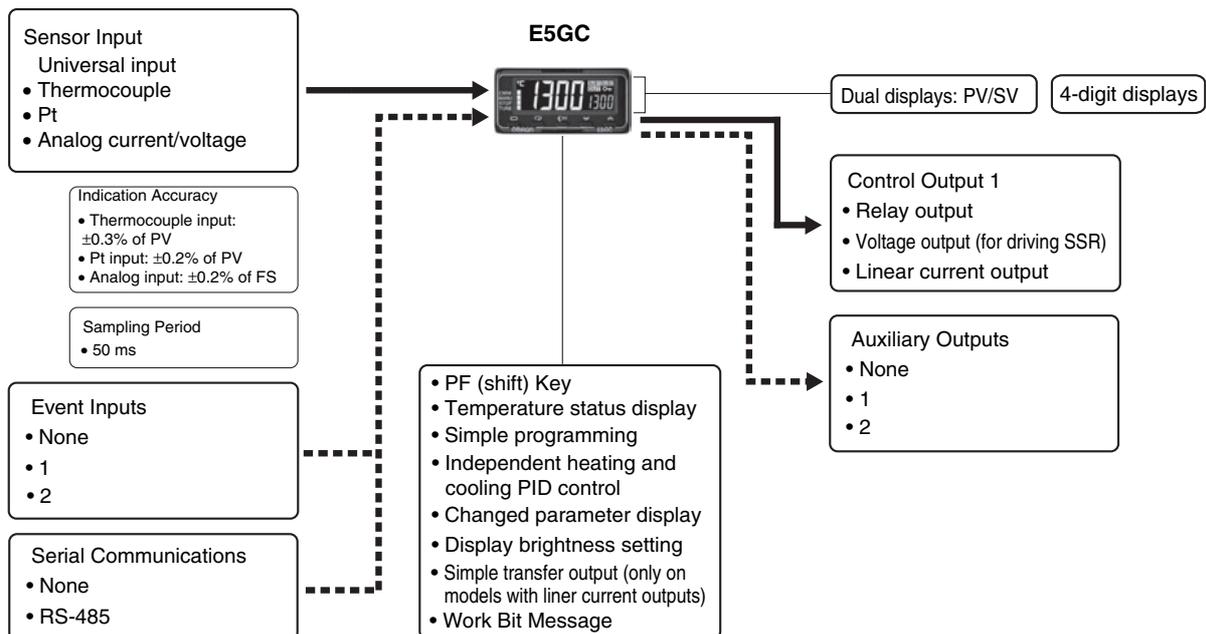
48 × 24 mm  
Models with Screw  
Terminal Blocks  
E5GC-□6

48 × 24 mm  
Models with Screwless  
Clamp Terminal Blocks  
E5GC-□C

Refer to your OMRON website for the most recent information on applicable safety standards.

Refer to *Safety Precautions* on page 104.

## Main I/O Functions



This datasheet is provided as a guideline for selecting products.

Be sure to refer to the following manuals for application precautions and other information required for operation before attempting to use the product.

E5□C Digital Temperature Controllers User's Manual (Cat. No. H174)

E5□C Digital Temperature Controllers Communications Manual (Cat. No. H175)

## Model Number Legend and Standard Models

### Model Number Legend

E5GC-□□ □ □ □ M-□□□□ (Example: E5GC-RX1A6M-015)

①
②
③
④
⑤
⑥

Model	①	②	③	④	⑤	⑥	Meaning		
	Control outputs 1 and 2	No. of auxiliary outputs	Power supply voltage	Terminal type	Input type	Options			
E5GC							48 × 24 mm		
							<b>Control output 1</b>	<b>Control output 2</b>	
	RX						Relay output	None	
	QX						Voltage output (for driving SSR)	None	
*1	CX						Linear current output	None	
		*2	0				None		
			1				1		
			2				2		
			A				100 to 240 VAC		
			D				24 VAC/DC		
				6			Screw terminals (with cover)		
				C			Screwless clamp terminals		
					M		Universal input		
							<b>HB alarm and HS alarm</b>	<b>Communications</b>	<b>Event inputs</b>
						000	---	---	---
						015	---	RS-485	---
						*3 016	---	---	1
						*3, *4 023	1	---	---
						*5 024	---	---	2

\*1 The control output can be used as a simple transfer output.

\*2 Only option 000 can be selected if an auxiliary output is zero.

\*3 Option 016 and 023 can be selected only if two auxiliary outputs are selected.

\*4 Option with HB and HS alarms (023) cannot be selected if a linear current output is selected for the control output.

\*5 Option 024 can be selected only if one auxiliary output is selected.

## Heating and Cooling Control

### ●Using Heating and Cooling Control

#### ① Control Output Assignment

An auxiliary output is used as the cooling control output.

#### ② Control

If PID control is used, you can set PID control separately for heating and cooling.

This allows you to handle control systems with different heating and cooling response characteristics.

## Optional Products (Order Separately)

### USB-Serial Conversion Cable

Model
E58-CIFQ2

### Communications Conversion Cable

Model
E58-CIFQ2-E

**Note:** Always use this product together with the E58-CIFQ2. This Cable is used to connect to the bottom-panel Setup Tool port.

### Current Transformers (CTs)

Hole diameter	Model
5.8 mm	E54-CT1
12.0 mm	E54-CT3

### Mounting Adapter

Model
Y92F-53 (2pcs)

**Note:** This Mounting Adapter is provided with the Digital Temperature Controller.

### Waterproof Packing

Model
Y92S-P12

**Note:** This Waterproof Packing is provided with the Digital Temperature Controller.

### Draw-out Jig

Model
Y92F-55

### CX-Thermo Support Software

Model
EST2-2C-MV4

**Note:** CX-Thermo version 4.62 or higher is required for the E5GC. For the system requirements for the CX-Thermo, refer to information on the EST2-2C-MV4 on the OMRON website ([www.ia.omron.com](http://www.ia.omron.com)).

## Specifications

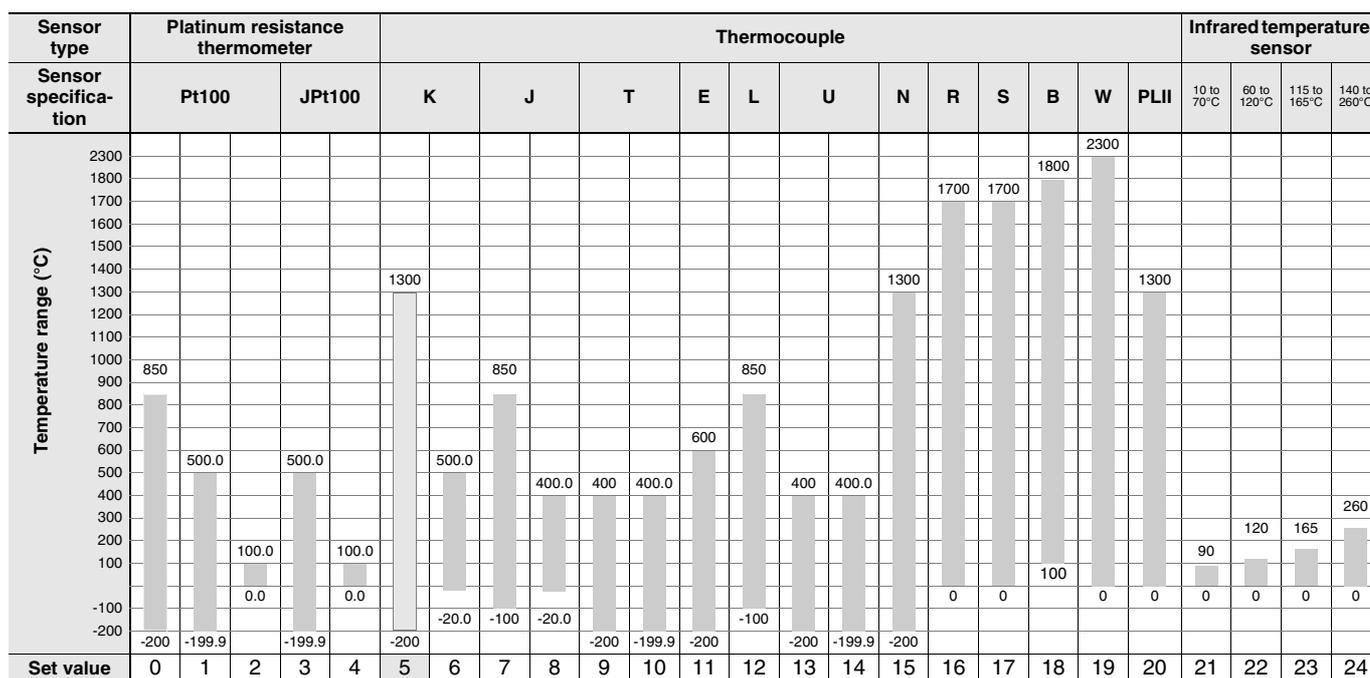
### Ratings

<b>Power supply voltage</b>	A in model number: 100 to 240 VAC, 50/60 Hz D in model number: 24 VAC, 50/60 Hz; 24 VDC	
<b>Operating voltage range</b>	85% to 110% of rated supply voltage	
<b>Power consumption</b>	5.9 VA max. at 100 to 240 VAC, and 3.2 VA max. at 24 VAC or 1.8 W max. at 24 VDC	
<b>Sensor input</b>	Temperature input Thermocouple: K, J, T, E, L, U, N, R, S, B, W, or PL II Platinum resistance thermometer: Pt100 or JPt100 Infrared temperature sensor (ES1B): 10 to 70°C, 60 to 120°C, 115 to 165°C, or 140 to 260°C Analog input 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	
<b>Input impedance</b>	Current input: 150 Ω max., Voltage input: 1 MΩ min. (Use a 1:1 connection when connecting the ES2-HB/THB.)	
<b>Control method</b>	ON/OFF control or 2-PID control (with auto-tuning)	
<b>Control output</b>	<b>Relay output</b>	SPST-NO, 250 VAC, 2 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA (reference value)
	<b>Voltage output (for driving SSR)</b>	Output voltage 12 VDC ±20% (PNP), max. Load current: 21 mA, with short-circuit protection circuit
	<b>Linear current output</b>	4 to 20 mA DC/0 to 20 mA DC, load: 500 Ω max., resolution: Approx. 10,000
<b>Auxiliary output</b>	<b>Number of outputs</b>	1 or 2 (depends on model)
	<b>Output specifications</b>	SPST-NO relay outputs, 250 VAC, 2 A (resistive load), Electrical life: 100,000 operations, Minimum applicable load: 10 mA at 5 V (reference value)
<b>Event input</b>	<b>Number of inputs</b>	1 or 2 (depends on model)
	<b>External contact input specifications</b>	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
<b>Setting method</b>	Digital setting using front panel keys	
<b>Indication method</b>	11-segment digital displays and individual indicators Character height: PV: 10.5 mm, SV: 5.0 mm	
<b>Multi SP</b>	Up to eight set points (SP0 to SP7) can be saved and selected using the event inputs, key operations, or serial communications.*	
<b>Bank switching</b>	None	
<b>Other functions</b>	Manual output, heating/cooling control, loop burnout alarm, SP ramp, other alarm functions, heater burn-out (HB) alarm (including SSR failure (HS) alarm), 40% AT, 100% AT, MV limiter, input digital filter, self tuning, robust tuning, PV input shift, run/stop, protection functions, extraction of square root, MV change rate limit, logic operations, temperature status display, simple programming, moving average of input value, display brightness setting, simple transfer output, and work bit message	
<b>Ambient operating temperature</b>	-10 to 55°C (with no condensation or icing), For 3-year warranty: -10 to 50°C with standard mounting (with no condensation or icing)	
<b>Ambient operating humidity</b>	25% to 85%	
<b>Storage temperature</b>	-25 to 65°C (with no condensation or icing)	
<b>Altitude</b>	2,000 m max.	
<b>Recommended fuse</b>	T2A, 250 VAC, time-lag, low-breaking capacity	
<b>Installation environment</b>	Installation Category II, Pollution Degree 2 (IEC 61010-1 compliant)	

\* Only four set points are selectable for event inputs.

## Input Ranges

### ● Thermocouple/Platinum Resistance Thermometer (Universal inputs)



Shaded settings are the default settings.

The applicable standards for the input types are as follows:

K, J, T, E, N, R, S, B: JIS C 1602-1995, IEC 60584-1

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

L: Fe-CuNi, DIN 43710-1985

Pt100: JIS C 1604-1997, IEC 60751

U: Cu-CuNi, DIN 43710-1985

PL II: According to Platinel II electromotive force charts from BASF (previously Engelhard)

W: W5Re/W26Re, ASTM E988-1990

### ● Analog input

Input type	Current		Voltage		
Input specification	4 to 20 mA	0 to 20 mA	1 to 5 V	0 to 5 V	0 to 10 V
Setting range	Usable in the following ranges by scaling: -1999 to 9999, -199.9 to 999.9, -19.99 to 99.99 or -1.999 to 9.999				
Set value	25	26	27	28	29

## Alarm Types

Each alarm can be independently set to one of the following 17 alarm types. The default is 2: Upper limit. (See note.)

Auxiliary outputs are allocated to alarms. ON delays and OFF delays (0 to 999 s) can also be specified.

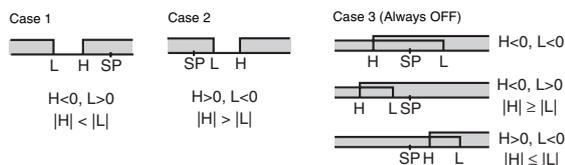
**Note:** In the default settings for models with HB or HS alarms, alarm 1 is set to a heater alarm (HA) and the Alarm Type 1 parameter is not displayed.

To use alarm 1, set the output assignment to alarm 1.

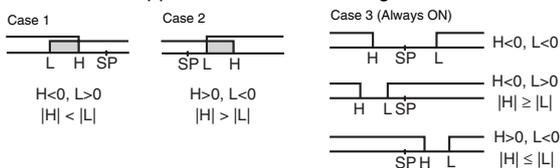
Set value	Alarm type	Alarm output operation		Description of function
		When alarm value X is positive	When alarm value X is negative	
0	Alarm function OFF	Output OFF		No alarm
1	Upper- and lower-limit *1		*2	Set the upward deviation in the set point for the alarm upper limit (H) and the lower deviation in the set point for the alarm lower limit (L). The alarm is ON when the PV is outside this deviation range.
2 (default)	Upper-limit			Set the upward deviation in the set point by setting the alarm value (X). The alarm is ON when the PV is higher than the SP by the deviation or more.
3	Lower-limit			Set the downward deviation in the set point by setting the alarm value (X). The alarm is ON when the PV is lower than the SP by the deviation or more.
4	Upper- and lower-limit range *1		*3	Set the upward deviation in the set point for the alarm upper limit (H) and the lower deviation in the set point for the alarm lower limit (L). The alarm is ON when the PV is inside this deviation range.
5	Upper- and lower-limit with standby sequence *1		*4	A standby sequence is added to the upper- and lower-limit alarm (1). *6
6	Upper-limit with standby sequence			A standby sequence is added to the upper-limit alarm (2). *6
7	Lower-limit with standby sequence			A standby sequence is added to the lower-limit alarm (3). *6
8	Absolute-value upper-limit			The alarm will turn ON if the process value is larger than the alarm value (X) regardless of the set point.
9	Absolute-value lower-limit			The alarm will turn ON if the process value is smaller than the alarm value (X) regardless of the set point.
10	Absolute-value upper-limit with standby sequence			A standby sequence is added to the absolute-value upper-limit alarm (8). *6
11	Absolute-value lower-limit with standby sequence			A standby sequence is added to the absolute-value lower-limit alarm (9). *6
12	LBA (alarm 1 type only)	-		*7
13	PV change rate alarm	-		*8
14	SP absolute-value upper-limit alarm			This alarm type turns ON the alarm when the set point (SP) is higher than the alarm value (X).
15	SP absolute-value lower-limit alarm			This alarm type turns ON the alarm when the set point (SP) is lower than the alarm value (X).
16	MV absolute-value upper-limit alarm *9	Standard Control	Standard Control	This alarm type turns ON the alarm when the manipulated variable (MV) is higher than the alarm value (X).
17	MV absolute-value lower-limit alarm *9	Heating/Cooling Control (Heating MV)	Heating/Cooling Control (Heating MV)	This alarm type turns ON the alarm when the manipulated variable (MV) is lower than the alarm value (X).
17	MV absolute-value lower-limit alarm *9	Always ON	Always ON	This alarm type turns ON the alarm when the manipulated variable (MV) is lower than the alarm value (X).

\*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 For Upper- and Lower-Limit Alarm Described Above at \*2

- In cases 1 and 2 above, the alarm is always OFF if the upper- and lower-limit hysteresis overlaps.
- In case 3, the alarm is always OFF.

\*5 Set value: 5, Upper- and lower-limit alarm with standby sequence The alarm is always OFF if upper- and lower-limit hysteresis overlaps.

\*6 Refer to the *E5GC Digital Temperature Controllers User's Manual* (Cat. No. H174) for information on the operation of the standby sequence.

\*7 Refer to the *E5GC Digital Temperature Controllers User's Manual* (Cat. No. H174) for information on the LBA.

\*8 Refer to the *E5GC Digital Temperature Controllers User's Manual* (Cat. No. H174) for information on the PV change rate alarm.

\*9 When heating/cooling control is performed, the MV absolute-value upper-limit alarm functions only for the heating operation and the MV absolute-value lower-limit alarm functions only for the cooling operation.

## Characteristics

<b>Indication accuracy (at the temperature of 23°C)</b>		Thermocouple: ( $\pm 0.3\%$ of indication value or $\pm 1^\circ\text{C}$ , whichever is greater) $\pm 1$ digit max.*1 Platinum resistance thermometer: ( $\pm 0.2\%$ of indication value or $\pm 0.8^\circ\text{C}$ , whichever is greater) $\pm 1$ digit max. Analog input: $\pm 0.2\%$ FS $\pm 1$ digit max. CT input: $\pm 5\%$ FS $\pm 1$ digit max.
<b>Influence of temperature *2</b>		Thermocouple input (R, S, B, W, PL II): ( $\pm 1\%$ of indication value or $\pm 10^\circ\text{C}$ , whichever is greater) $\pm 1$ digit max.
<b>Influence of voltage *2</b>		Other thermocouple input: ( $\pm 1\%$ of indication value or $\pm 4^\circ\text{C}$ , whichever is greater) $\pm 1$ digit max. *3 Platinum resistance thermometer: ( $\pm 1\%$ of indication value or $\pm 2^\circ\text{C}$ , whichever is greater) $\pm 1$ digit max. Analog input: $\pm 1\%$ FS $\pm 1$ digit max. CT input: $\pm 5\%$ FS $\pm 1$ digit max.
<b>Input sampling period</b>		50 ms
<b>Hysteresis</b>		Temperature input: 0.1 to 999.9°C or °F (in units of 0.1°C or °F) Analog input: 0.01% to 99.99% FS (in units of 0.01% FS)
<b>Proportional band (P)</b>		Temperature input: 0.1 to 999.9°C or °F (in units of 0.1°C or °F) Analog input: 0.1% to 999.9% FS (in units of 0.1% FS)
<b>Integral time (I)</b>		0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) *4
<b>Derivative time (D)</b>		0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) *4
<b>Proportional band (P) for cooling</b>		Temperature input: 0.1 to 999.9°C or °F (in units of 0.1°C or °F) Analog input: 0.1% to 999.9% FS (in units of 0.1% FS)
<b>Integral time (I) for cooling</b>		0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) *4
<b>Derivative time (D) for cooling</b>		0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) *4
<b>Control period</b>		0.1, 0.2, 0.5, 1 to 99 s (in units of 1 s)
<b>Manual reset value</b>		0.0% to 100.0% (in units of 0.1%)
<b>Alarm setting range</b>		-1,999 to 9,999 (decimal point position depends on input type)
<b>Influence of signal source resistance</b>		Thermocouple: 0.1°C/Ω max. (100 Ω max.), Platinum resistance thermometer: 0.1°C/Ω max. (10 Ω max.)
<b>Insulation resistance</b>		20 MΩ min. (at 500 VDC)
<b>Dielectric strength</b>		100 to 240 VAC: 3,000 VAC, 50/60 Hz for 1 min between terminals of different charge 24 VAC/DC: 2,300 VAC, 50/60 Hz for 1 min between terminals of different charge
<b>Vibration</b>	<b>Malfunction</b>	10 to 55 Hz, 20 m/s <sup>2</sup> for 10 min each in X, Y and Z directions
	<b>Resistance</b>	10 to 55 Hz, 20 m/s <sup>2</sup> for 2 hr each in X, Y, and Z directions
<b>Shock</b>	<b>Malfunction</b>	100 m/s <sup>2</sup> , 3 times each in X, Y, and Z directions
	<b>Resistance</b>	300 m/s <sup>2</sup> , 3 times each in X, Y, and Z directions
<b>Weight</b>		Controller: Approx. 80 g, Adapter: Approx. 4 g × 2
<b>Degree of protection</b>		Front panel: IP66, Rear case: IP20, Terminals: IP00
<b>Memory protection</b>		Non-volatile memory (number of writes: 1,000,000 times)
<b>Setup Tool</b>		CX-Thermo version 4.62 or higher
<b>Setup Tool port</b>		E5GC side panel: An E58-CIFQ2 USB-Serial Conversion Cable is used to connect a USB port on the computer. *5 E5GC bottom panel: An E58-CIFQ2 USB-Serial Conversion Cable and E58-CIFQ2-E Conversion Cable are used together to connect a USB port on the computer.*5
<b>Standards</b>	<b>Approved standards</b>	UL 61010-1, Korean Radio Waves Act (Act 10564)
	<b>Conformed standards</b>	EN 61010-1 (IEC 61010-1): Pollution Degree 2, overvoltage category II
<b>EMC</b>	EMI: Radiated Interference Electromagnetic Field Strength: Noise Terminal Voltage: EMS: ESD Immunity: Electromagnetic Field Immunity: Burst Noise Immunity: Conducted Disturbance Immunity: Surge Immunity: Voltage Dip/Interrupting Immunity:	EN61326 EN55011 Group 1, class A EN55011 Group 1, class A EN61326 EN61000-4-2 EN61000-4-3 EN61000-4-4 EN61000-4-6 EN61000-4-5 EN61000-4-11

\*1 The indication accuracy of K thermocouples in the -200 to 1,300°C range, T and N thermocouples at a temperature of -100°C max., and U and L thermocouples at any temperature is  $\pm 2^\circ\text{C} \pm 1$  digit max. The indication accuracy of B thermocouples at a temperature of 400°C max. is not specified. The indication accuracy of B thermocouples at a temperature of 400 to 800°C is  $\pm 3^\circ\text{C}$  max.

The indication accuracy of R and S thermocouples at a temperature of 200°C max. is  $\pm 3^\circ\text{C} \pm 1$  digit max. The indication accuracy of W thermocouples is ( $\pm 0.3\%$  of PV or  $\pm 3^\circ\text{C}$ , whichever is greater)  $\pm 1$  digit max.

The indication accuracy of PLII thermocouples is ( $\pm 0.3\%$  of PV or  $\pm 2^\circ\text{C}$ , whichever is greater)  $\pm 1$  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.:  $\pm 10^\circ\text{C}$  max.

\*4 The unit is determined by the setting of the Integral/Derivative Time Unit parameter.

\*5 External serial communications (RS-485) and USB-Serial Conversion Cable communications can be used at the same time.

## USB-Serial Conversion Cable

<b>Applicable OS</b>	Windows XP/Vista/7/8
<b>Applicable software</b>	CX-Thermo version 4.62 or higher
<b>Applicable models</b>	E5□C-T Series, E5□C Series, and E5CB Series
<b>USB interface standard</b>	Conforms to USB Specification 2.0
<b>DTE speed</b>	38,400 bps
<b>Connector specifications</b>	Computer: USB (Type A plug) Digital Temperature Controller: Special serial connector
<b>Power supply</b>	Bus power (Supplied from the USB host controller) *
<b>Power supply voltage</b>	5 VDC
<b>Current consumption</b>	450 mA max.
<b>Output voltage</b>	4.7±0.2 VDC (Supplied from USB-Serial Conversion Cable to the Digital Temperature Controller.)
<b>Output current</b>	250 mA max. (Supplied from USB-Serial Conversion Cable to the Digital Temperature Controller.)
<b>Ambient operating temperature</b>	0 to 55°C (with no condensation or icing)
<b>Ambient operating humidity</b>	10% to 80%
<b>Storage temperature</b>	-20 to 60°C (with no condensation or icing)
<b>Storage humidity</b>	10% to 80%
<b>Altitude</b>	2,000 m max.
<b>Weight</b>	Approx. 120 g

Windows is a registered trademark of Microsoft Corporation in the United States and/or other countries.

\* Use a high-power port for the USB port.

**Note:** A driver must be installed on the computer. Refer to the *Instruction Manual* included with the Cable for the installation procedure.

## Communications Specifications

<b>Transmission line connection method</b>	RS-485: Multidrop
<b>Communications</b>	RS-485 (two-wire, half duplex)
<b>Synchronization method</b>	Start-stop synchronization
<b>Protocol</b>	CompoWay/F, or Modbus
<b>Baud rate*</b>	9,600, 19,200, 38,400, or 57,600 bps
<b>Transmission code</b>	ASCII
<b>Data bit length *</b>	7 or 8 bits
<b>Stop bit length *</b>	1 or 2 bits
<b>Error detection</b>	Vertical parity (none, even, odd) Block check character (BCC) with CompoWay/F or CRC-16 with Modbus
<b>Flow control</b>	None
<b>Interface</b>	RS-485
<b>Retry function</b>	None
<b>Communications buffer</b>	217 bytes
<b>Communications response wait time</b>	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.

## Communications Functions

<b>Programless communications</b>	You can use the memory in the PLC to read and write E5□C parameters, start and stop operation, etc. The E5□C automatically performs communications with PLCs. No communications programming is required. Number of connected Digital Temperature Controllers: 32 max. (Up to 16 for the FX Series) Applicable PLCs: OMRON PLCs CS Series, CJ Series, or CP Series Mitsubishi Electric PLCs MELSEC Q Series, L Series, or FX Series (compatible with the FX2 or FX3 (excluding the FX1S)) KEYENCE PLCs KEYENCE KV Series
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<b>Component Communications</b>	When Digital Temperature Controllers are connected, set points and RUN/STOP commands can be sent from the Digital Temperature Controller that is set as the master to the Digital Temperature Controllers that are set as slaves. Slope and offsets can be set for the set point. Number of connected Digital Temperature Controllers: 32 max. (including master)
<b>Copying*</b>	When Digital Temperature Controllers are connected, the parameters can be copied from the Digital Temperature Controller that is set as the master to the Digital Temperature Controllers that are set as slaves.

MELSEC is a registered trademark of Mitsubishi Electric Corporation.  
KEYENCE is a registered trademark of Keyence Corporation.

\* Both the programless communications and the component communications support the copying.

## Current Transformer (Order Separately) Ratings

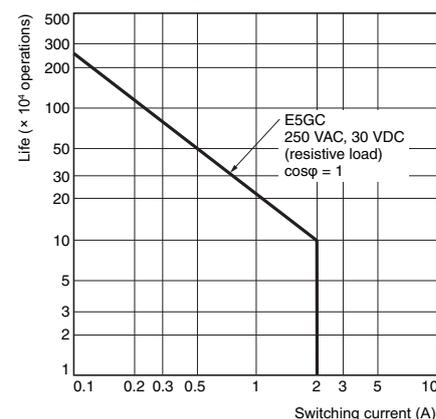
<b>Dielectric strength</b>	1,000 VAC for 1 min
<b>Vibration resistance</b>	50 Hz, 98 m/s <sup>2</sup>
<b>Weight</b>	E54-CT1: Approx. 11.5 g, E54-CT3: Approx. 50 g
<b>Accessories (E54-CT3 only)</b>	Armatures (2) Plugs (2)

## Heater Burnout Alarms and SSR Failure Alarms

<b>CT input (for heater current detection)</b>	Models with detection for single-phase heaters: One input
<b>Maximum heater current</b>	50 A AC
<b>Input current indication accuracy</b>	±5% FS ±1 digit max.
<b>Heater burnout alarm setting range *1</b>	0.1 to 49.9 A (in units of 0.1 A) Minimum detection ON time: 100 ms *3
<b>SSR failure alarm setting range *2</b>	0.1 to 49.9 A (in units of 0.1 A) Minimum detection OFF time: 100 ms *4

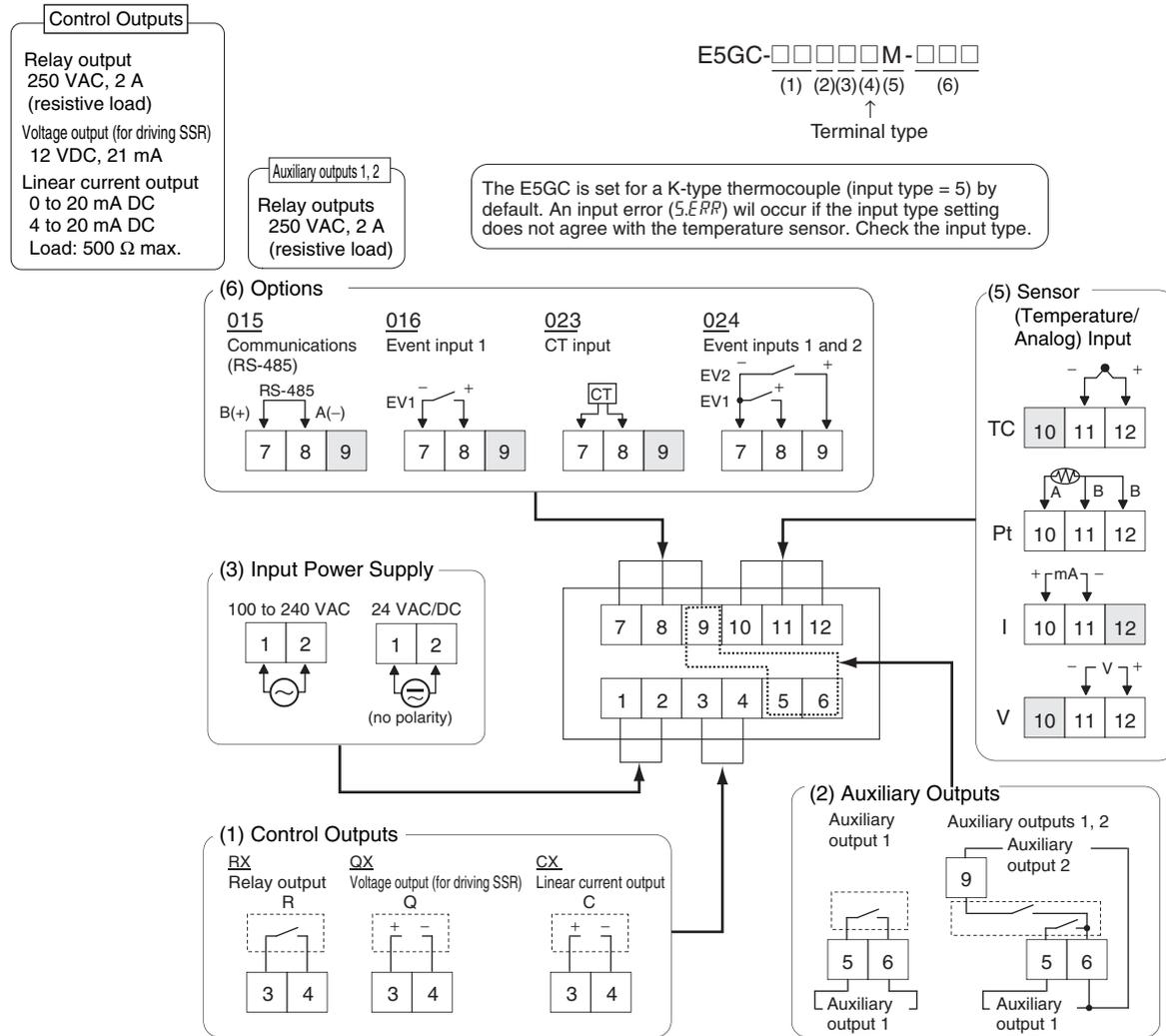
- \*1 For heater burnout alarms, the heater current will be measured when the control output is ON, and the output will turn ON if the heater current is lower than the set value (i.e., heater burnout detection current value).  
\*2 For SSR failure alarms, the heater current will be measured when the control output is OFF, and the output will turn ON if the heater current is higher than the set value (i.e., SSR failure detection current value).  
\*3 The value is 30 ms for a control period of 0.1 s or 0.2 s.  
\*4 The value is 35 ms for a control period of 0.1 s or 0.2 s.

## Electrical Life Expectancy Curve for Control Output Relay (Reference Values)



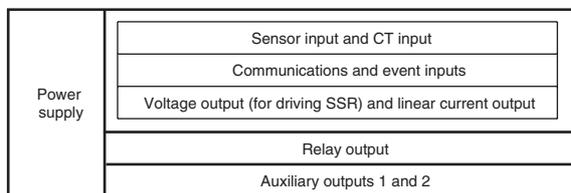
# External Connections

## E5GC



- Note:**
- The application of the terminals depends on the model.
  - Do not wire the terminals that are shown with a gray background.
  - When complying with EMC standards, the cable that connects the sensor must be 30 m or less. If the cable length exceeds 30 m, compliance with EMC standards will not be possible.
  - Connect M3 crimped terminals.

## Isolation/Insulation Block Diagrams

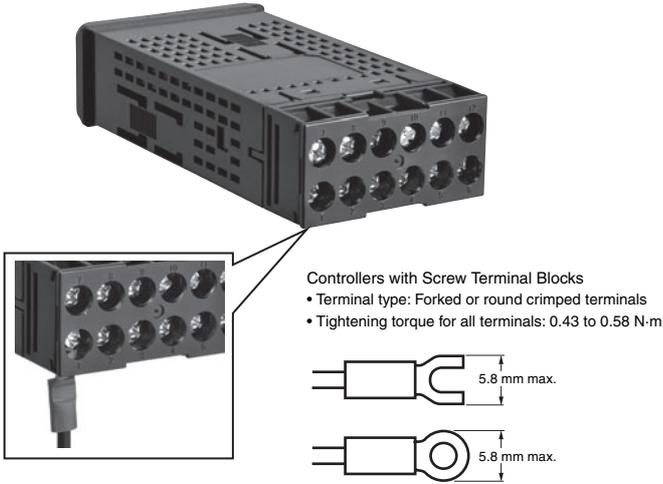


- : Reinforced insulation  
 : Functional isolation

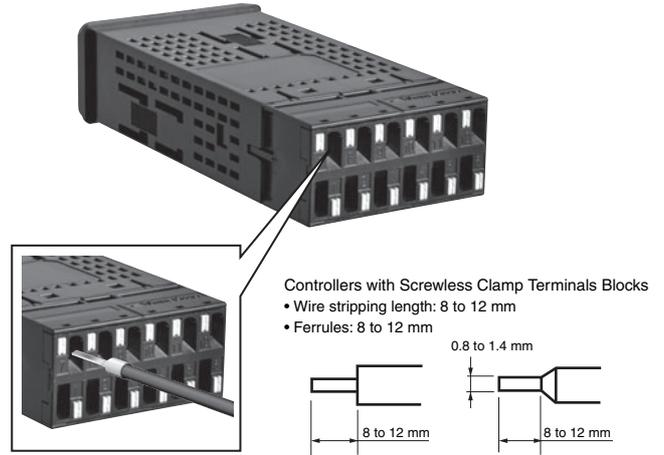
**Note:** Auxiliary outputs 1 to 2 are not insulated.

# Wiring Methods

## E5GC-□6 Controllers with Screw Terminal Blocks (M3 Screws)



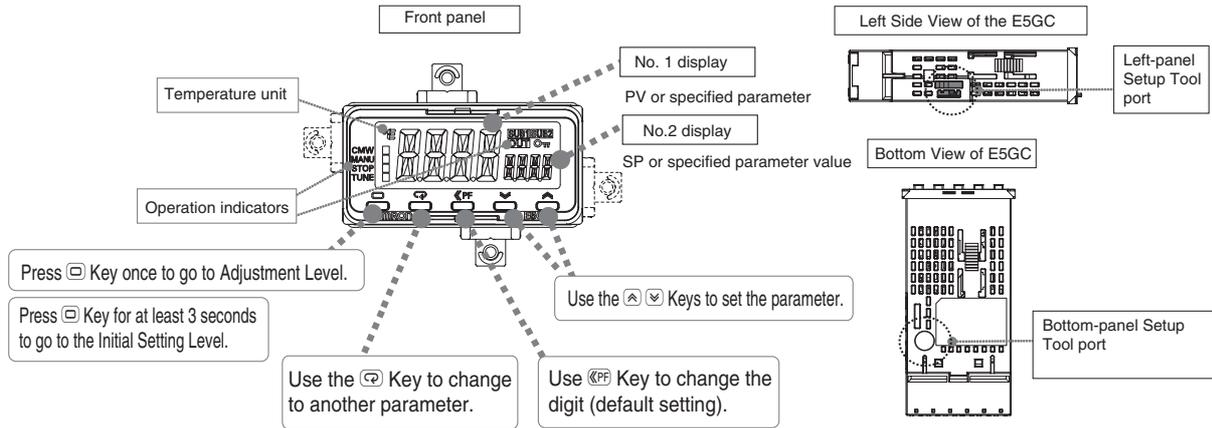
## E5GC-□C Controllers with Screwless Clamp Terminal Blocks



Wires: AWG24 to AWG18 (equal to a cross-sectional area of 0.205 to 0.823 mm<sup>2</sup>) braided or solid wires

# Nomenclature

## E5GC

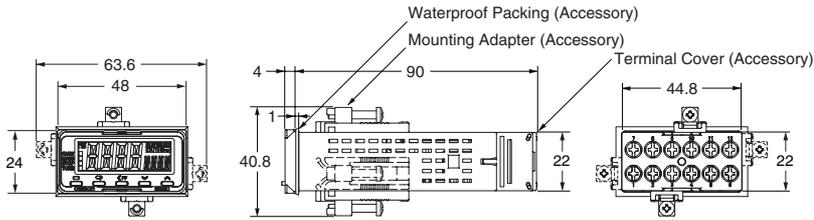


Dimensions

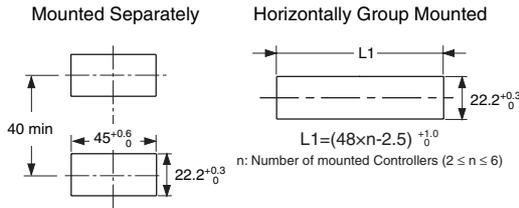
(Unit: mm)

Controllers

E5GC-□6  
Controllers with Screw  
Terminal Blocks



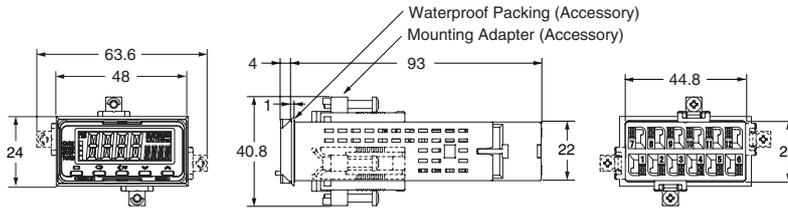
- Use two Mounting Adapters, either on the top and bottom or on the right and left.
- Setup Tool ports are provided as standard feature. Use these ports to connect a computer to the Digital Temperature Controller. The E58-CIFQ2 USB-Serial Conversion Cable is required to connect to the port on the side panel. The E58-CIFQ2 USB-Serial Conversion Cable and E58-CIFQ2-E Communications Conversion Cable are required to connect to the port on the bottom panel. (You cannot leave either port connected constantly during operation.)



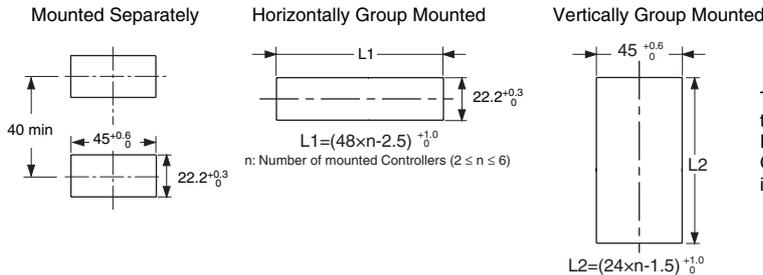
To mount the Temperature Controller so that it is waterproof, insert the Waterproof Packing onto the Temperature Controller. Group mounting does not allow waterproofing.

- To install the Temperature Controller, insert it into a square hole in a panel with a thickness of 1 to 8 mm, and then insert the enclosed adapter so that it locks into the grooves on the top and bottom or on the left and right of the rear case.
- Tighten the two mounting screws on the top and bottom or on the right and left of the Mounting Adapters alternately little by little to maintain a balance, and tighten them to a torque of between 0.29 and 0.39 N-m.
- When two or more Temperature Controllers are mounted, make sure that the surrounding temperature does not exceed the allowable operating temperature range given below.  
Horizontal group mounting: -10 to 55°C
- Use Temperature Controllers with Screwless Clamp Terminal Blocks for vertical group mounting.

E5GC-□C  
Controllers with Screwless  
Clamp Terminal Blocks



- Use two Mounting Adapters, either on the top and bottom or on the right and left.
- Setup Tool ports are provided as standard feature. Use these ports to connect a computer to the Digital Temperature Controller. The E58-CIFQ2 USB-Serial Conversion Cable is required to connect to the port on the side panel. The E58-CIFQ2 USB-Serial Conversion Cable and E58-CIFQ2-E Communications Conversion Cable are required to connect to the port on the bottom panel. (You cannot leave either port connected constantly during operation.)

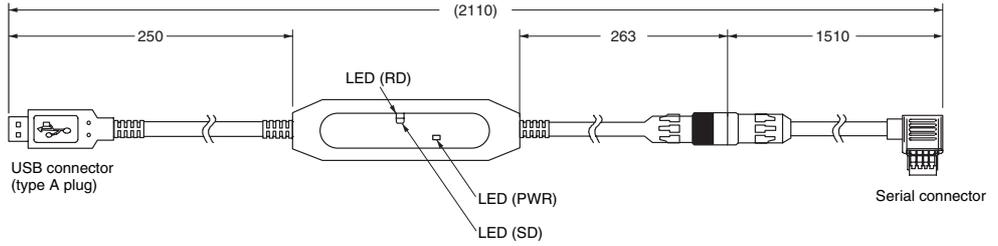


To mount the Temperature Controller so that it is waterproof, insert the Waterproof Packing onto the Temperature Controller. Group mounting does not allow waterproofing.

- To install the Temperature Controller, insert it into a square hole in a panel with a thickness of 1 to 8 mm, and then insert the enclosed adapter so that it locks into the grooves on the top and bottom or on the left and right of the rear case.
- Tighten the two mounting screws on the top and bottom or on the right and left of the Mounting Adapters alternately little by little to maintain a balance, and tighten them to a torque of between 0.29 and 0.39 N-m.
- When two or more Temperature Controllers are mounted, make sure that the surrounding temperature does not exceed the allowable operating temperature range given below.  
Horizontal group mounting: -10 to 55°C  
Vertical group mounting of two Controllers: -10 to 45°C  
Vertical group mounting of three or more Controllers: -10 to 40°C
- If you use vertical group mounting, you cannot draw out the interior body of the Controller.

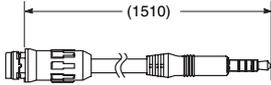
Accessories (Order Separately)

● USB-Serial Conversion Cable  
E58-CIFQ2

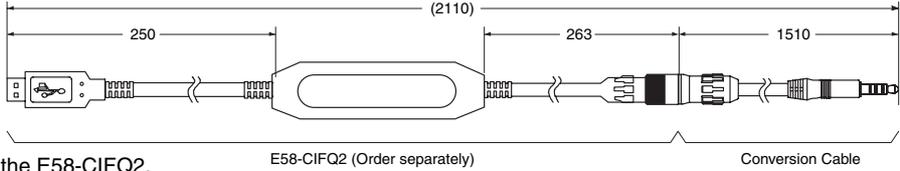


● Conversion Cable  
E58-CIFQ2-E

Conversion Cable



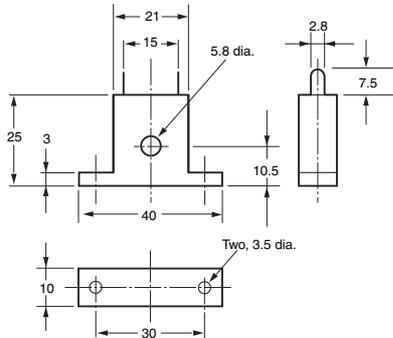
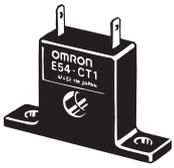
Connecting to the E58-CIFQ2 USB-Serial Conversion Cable



Note: Always use this product together with the E58-CIFQ2.

● Current Transformers

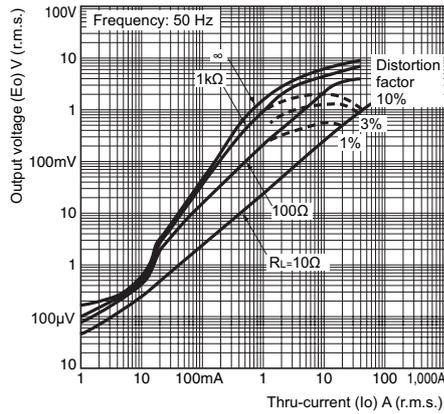
E54-CT1



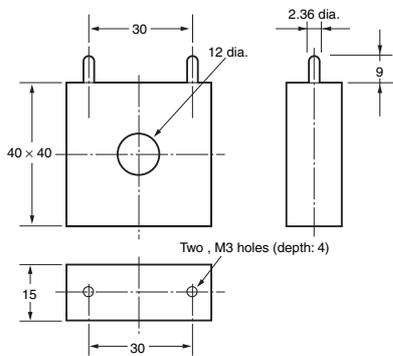
Thru-current (Io) vs. Output Voltage (Eo) (Reference Values)

E54-CT1

Maximum continuous heater current: 50 A (50/60 Hz)  
Number of windings: 400±2  
Winding resistance: 18±2 Ω



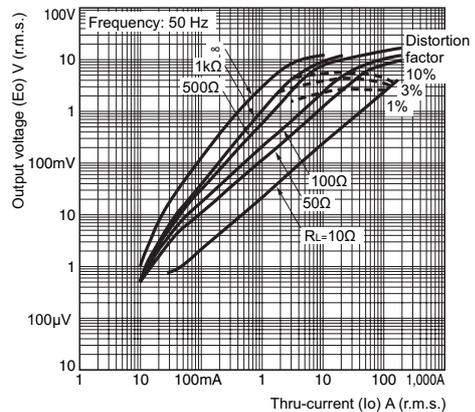
E54-CT3



Thru-current (Io) vs. Output Voltage (Eo) (Reference Values)

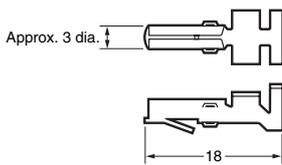
E54-CT3

Maximum continuous heater current: 120 A (50/60 Hz) (Maximum continuous heater current for an OMRON Digital Temperature Controller is 50 A.)  
Number of windings: 400±2  
Winding resistance: 8±0.8 Ω

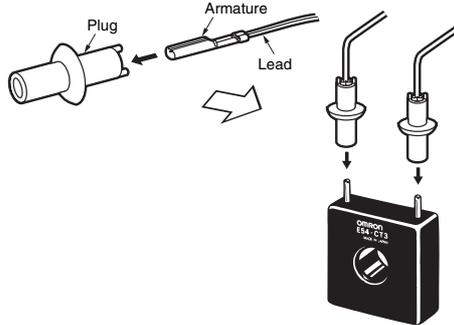


E54-CT3 Accessories

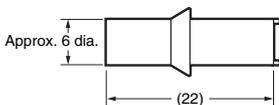
• Armature



Connection Example

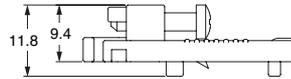
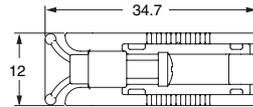
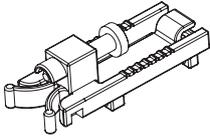


• Plug

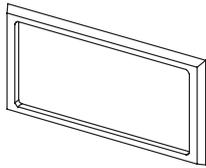


**● Mounting Adapter  
Y92F-53 (Two provided.)**

One pair is provided with the Temperature Controller. Order this Adapter separately if it becomes lost or damaged.



**● Waterproof Packing  
Y92S-P12**



The Waterproof Packing is provided with the Temperature Controller. Order the Waterproof Packing separately if it becomes lost or damaged.

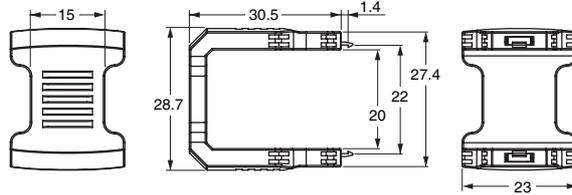
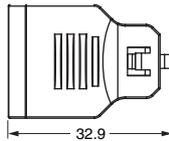
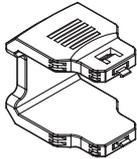
The Waterproof Packing can be used to achieve an IP66 degree of protection.

(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 three years a rough standard.)

The Waterproof Packing does not need to be attached if a waterproof structure is not required.

**● Draw-out Jig  
Y92F-55**

Use this Draw-out Jig to remove the interior body of the Digital Temperature Controller from the case to perform maintenance without removing the terminal wiring.

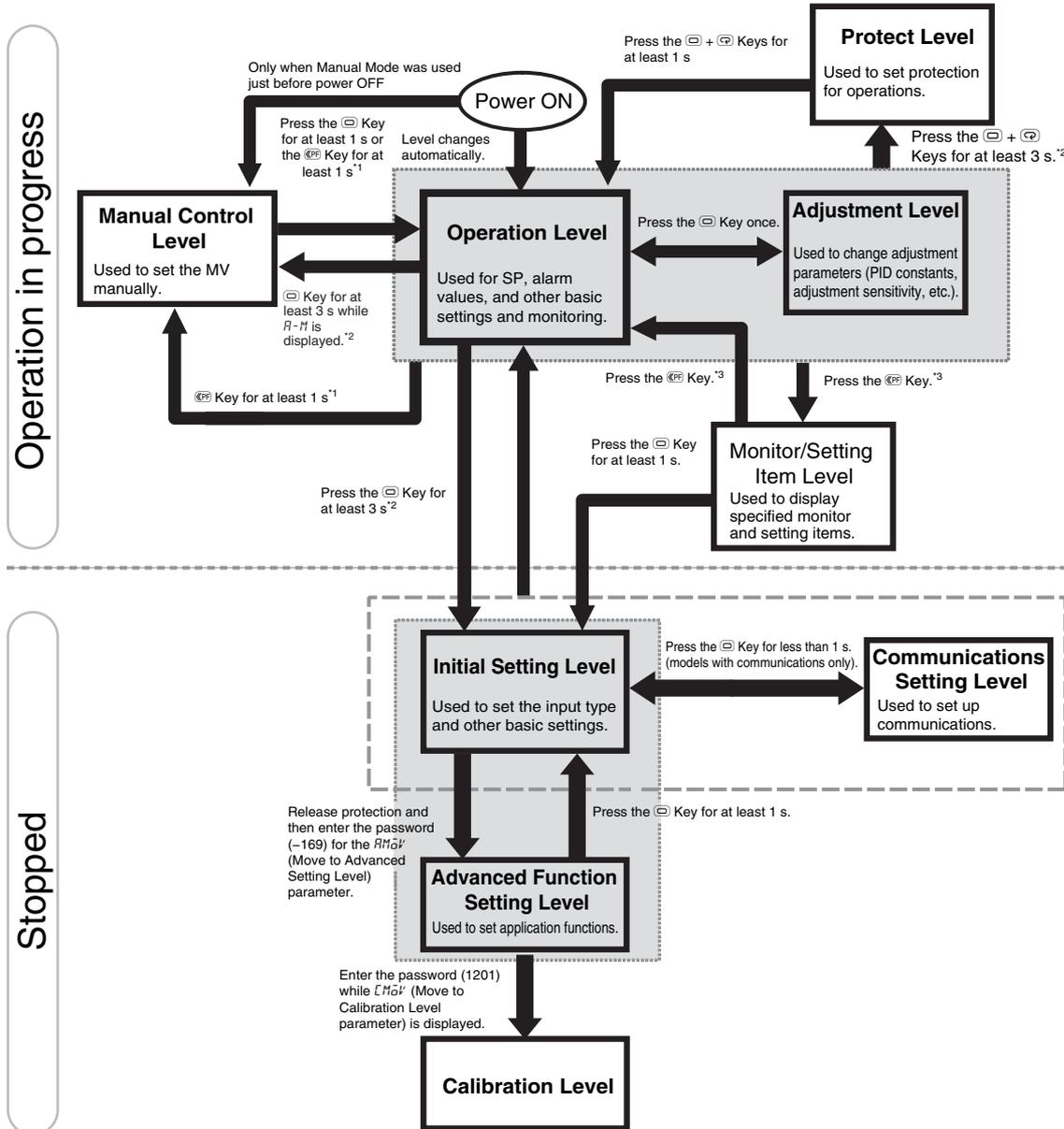


# Operation

## Setting Levels Diagram

### E5□C

This diagram shows all of the setting levels. To move to the advanced function setting level and calibration level, you must enter passwords. Some parameters are not displayed depending on the protect level setting and the conditions of use. Control stops when you move from the operation level to the initial setting level.



\*1 Set the PF Setting parameter to R-M (Auto/Manual).

\*2 The No. 1 display will flash when the keys are pressed for 1 s or longer.

\*3 Set the PF Setting parameter to PFD (monitor/setting items).

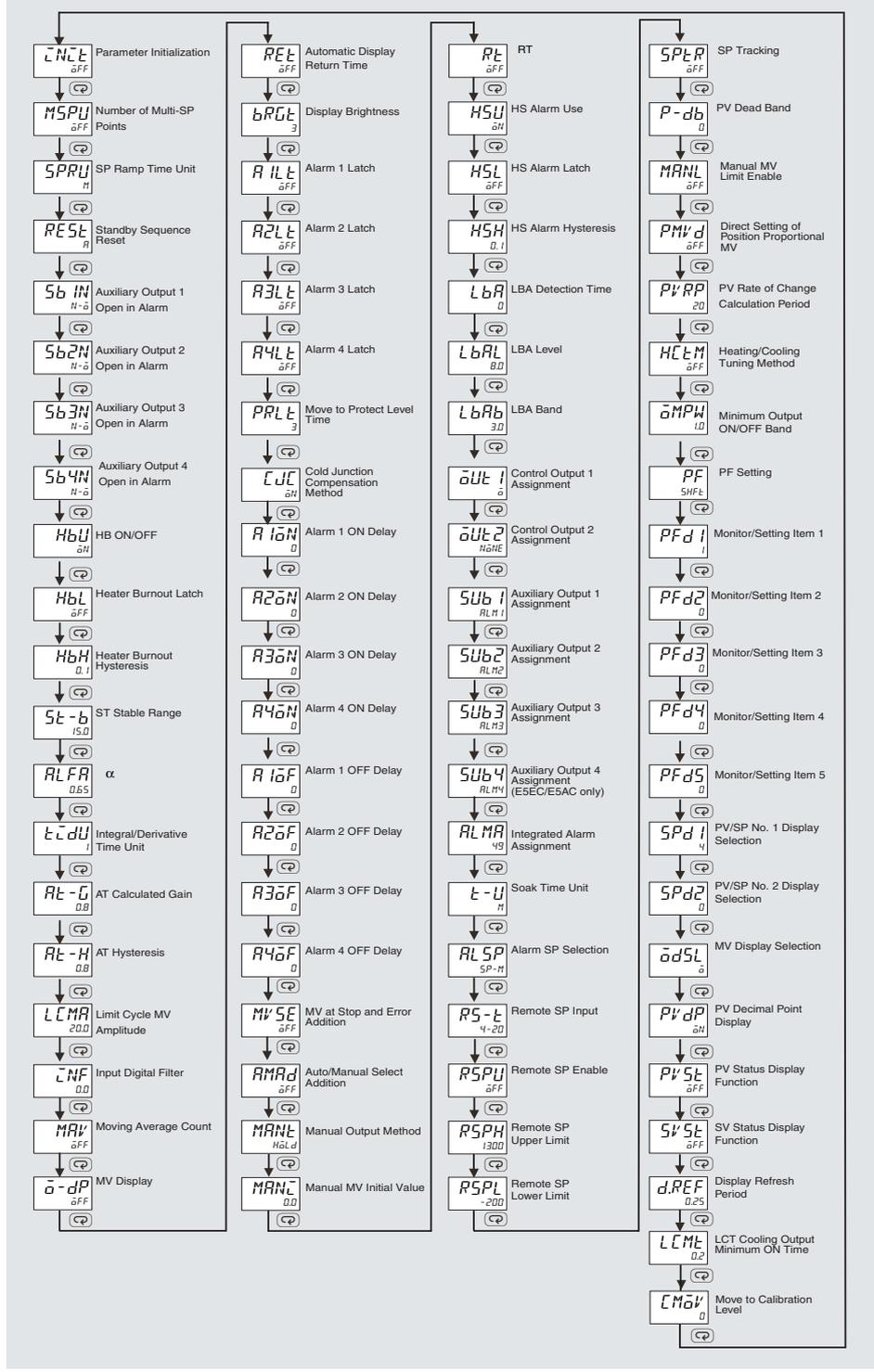
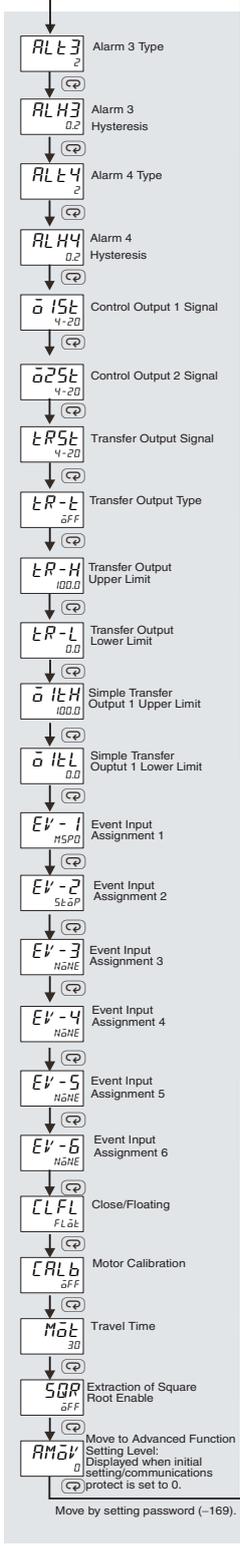


**Monitor/Setting Item Level**

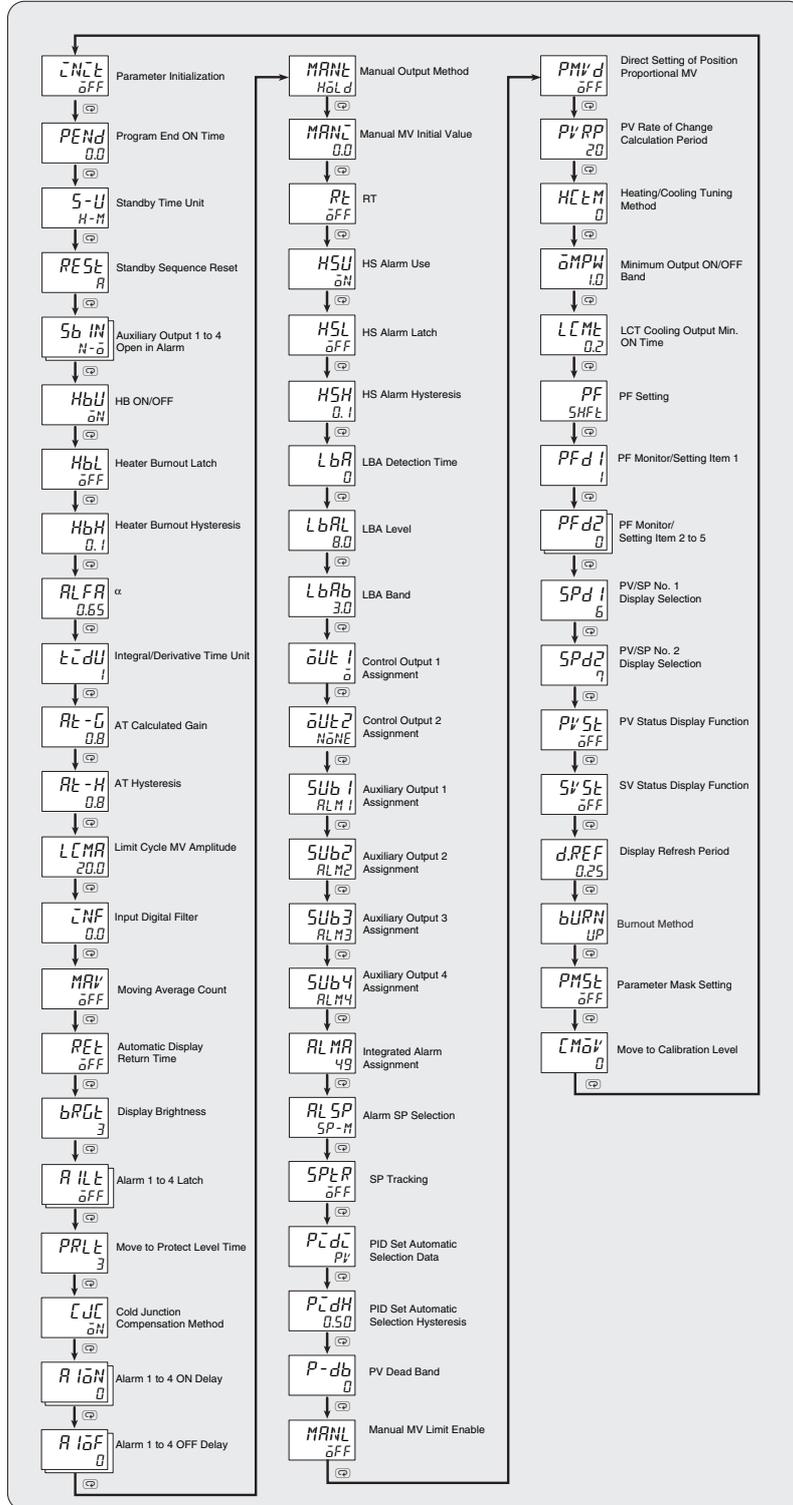


Press the  $\text{⏏}$  Key for at least 1 s.

**Advanced Function Setting Level**



Advanced Function Setting Level



## Error Displays (Troubleshooting)

When an error occurs, the No. 1 display or No. 2 display shows the error code.  
Take necessary measure according to the error code, referring the following table.

Display	Name	Meaning	Action	Operation
S.ERR	Input error	The input value exceeded the control range.* The input type is not set correctly. The sensor is disconnected or short-circuited. The sensor is not wired correctly. The sensor is not wired.  * Control Range Temperature resistance thermometer or thermocouple input: SP Lower Limit - 20°C to SP Upper Limit + 20°C (SP Lower Limit - 40°F to SP Upper Limit + 40°F) ESIB input: Same as specified input range. Analog input: Scaling range -5% to 105%	Check the wiring for input to be sure it is wired correctly, not broken, and not shorted. Also check the input type. If there are no problems in the wiring or input type settings, cycle the power supply. If the display remains the same, replace the Digital Temperature Controller. If the display is restored to normal, then the probable cause is external noise affecting the control system. Check for external noise.  <b>Note:</b> For a temperature resistance thermometer, the input is considered disconnected if the A, B, or B' line is broken.	After the error occurs and it is displayed, the alarm output will operate as if the upper limit was exceeded. It will also operate as if transfer output exceeded the upper limit. If an input error is assigned to a control output or auxiliary output, the output will turn ON when the input error occurs. The error message will appear in the display for the PV.  <b>Note:</b> 1. The heating and cooling control outputs will turn OFF. 2. When the manual MV, MV at stop, MV at reset, or MV at error is set, the control output is determined by the set value.
CCCC	Display range exceeded	Below -1,999	This is not an error. It is displayed when the control range is wider than the display range and the PV exceeds the display range. The PV is displayed for the range that is given on the left (the number without the decimal point).	-
KKKK		Above 9,999		
E333	A/D converter error	There is an error in the internal circuits.	After checking the input error, turn the power OFF then back ON again. If the display remains the same, the controller must be repaired. If the display is restored to normal, then a probable cause can be external noise affecting the control system. Check for external noise.	The control outputs, auxiliary outputs, and transfer outputs turn OFF. (A current output will be approx. 0 mA and a linear voltage output will be approx. 0V.)
E111	Memory error	There is an error in the internal memory operation.	First, cycle the power supply. If the display remains the same, the controller must be repaired. If the display is restored to normal, then a probable cause can be external noise affecting the control system. Check for external noise.	The control outputs, auxiliary outputs, and transfer outputs turn OFF. (A current output will be approx. 0 mA and a linear voltage output will be approx. 0V.)
FFFF	Overcurrent	This error is displayed when the peak current exceeds 55.0 A.	-	Control continues and operation is normal. The error message will appear for the following displays. Heater Current Value 1 Monitor Heater Current Value 2 Monitor Leakage Current Value 1 Monitor Leakage Current Value 2 Monitor
LE1 LE2 LCR1 LCR2	HB or HS alarm	If there is a HB or HS alarm, the No. 1 display will flash in the relevant setting level.	-	The No. 1 display for the following parameter flashes in Operation Level or Adjustment Level. Heater Current Value 1 Monitor Heater Current Value 2 Monitor Leakage Current Value 1 Monitor Leakage Current Value 2 Monitor However, control continues and operation is normal.
----	Potentiometer Input Error (Position-proportional Models Only)	"----" will be displayed for the Valve Opening Monitor parameter if any of the following error occurs. • Motor calibration has not been performed. • The wiring of the potentiometer is incorrect or broken. • The potentiometer input value is incorrect (e.g., the input is out of range or the potentiometer has failed).	Check for the above errors.	Close control: The control output is OFF or the value that is set for the MV at PV Error parameter is output. Floating control: Operation will be normal.

## Safety Precautions

- Be sure to read the precautions for all E5□C/E5□C-T models in the website at: <http://www.ia.omron.com/>.

### Warning Indications

 <b>CAUTION</b>	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or in property damage.
<b>Precautions for Safe Use</b>	Supplementary comments on what to do or avoid doing, to use the product safely.
<b>Precautions for Correct Use</b>	Supplementary comments on what to do or avoid doing, to prevent failure to operate, malfunction or undesirable effect on product performance.

### Meaning of Product Safety Symbols

	Used to warn of the risk of electric shock under specific conditions.
	Used for general prohibitions for which there is no specific symbol.
	Used to indicate prohibition when there is a risk of minor injury from electrical shock or other source if the product is disassembled.
	Used for general CAUTION, WARNING, or DANGER precautions for which there is no specified symbol. (This symbol is also used as the alerting symbol, but shall not be used in this meaning on the product.)
	Used for general mandatory action precautions for which there is no specified symbol.

### CAUTION

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

Electric shock may occur. Do not touch any cables or connectors with wet hands. 

Electric shock, fire, or malfunction may occasionally occur. Do not allow metal objects, conductors, cuttings from installation work, or moisture to enter the Digital Temperature Controller or the Setup Tool port or ports. Attach the cover to the front-panel Setup Tool port whenever you are not using it to prevent foreign objects from entering the port. 

Do not use the Digital Temperature Controller where subject to flammable or explosive gas. Otherwise, minor injury from explosion may occasionally occur. 

Not doing so may occasionally result in fire. Do not allow dirt or other foreign objects to enter the Setup Tool port or ports, or between the pins on the connectors on the Setup Tool cable. 

Minor electric shock or fire may occasionally occur. Do not use any cables that are damaged. 

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**

- This product is UL listed\*1 as Open Type Process Control Equipment. It must be mounted in an enclosure that does not allow fire to escape externally.
- More than one disconnect switch may be required to de-energize the equipment before servicing the product.
- Signal inputs are SELV, limited energy. \*2
- Caution: To reduce the risk of fire or electric shock, do not interconnect the outputs of different Class 2 circuits. \*3



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. 

Even if you replace only the Main Unit of the E5DC, check the condition of the Terminal Unit. If corroded terminals are used, contact failure in the terminals may cause the temperature inside the Digital Temperature Controller to increase, possibly resulting in fire. If the terminals are corroded, replace the Terminal Unit as well. 

Tighten the terminal screws to the rated torque of between 0.43 and 0.58 N•m. \*4  
Loose screws may occasionally result in fire. 

Set the parameters of the product so that they are suitable for the system being controlled. If they are not suitable, unexpected operation may occasionally result in property damage or accidents. 

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

\*1. E5CC, E5EC, E5AC, and E5DC Digital Temperature Controllers that were shipped through November 2013 are UL recognized.  
\*2. An SELV (separated extra-low voltage) system is one with a power supply that has double or reinforced insulation between the primary and the secondary circuits and has an output voltage of 30 V r.m.s. max. and 42.4 V peak max. or 60 VDC max.  
\*3. A class 2 circuit is one tested and certified by UL as having the current and voltage of the secondary output restricted to specific levels.  
\*4. The specified torque is 0.5 N•m for the E5CC-U.

## Precautions for Safe Use

Be sure to observe the following precautions to prevent malfunction or adverse affects on the performance or functionality of the product. Not doing so may occasionally result in faulty operation. Do not handle the Digital Temperature Controller in ways that exceed the ratings.

- This product is specifically designed for indoor use only. Do not use this product in the following places:
  - 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.
- Use and store the product within the rated ambient temperature and humidity. Gang-mounting two or more Digital Temperature Controllers, or mounting Digital Temperature Controllers above each other may cause heat to build up inside the Digital 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 Digital Temperature Controllers.
- To allow heat to escape, do not block the area around the Digital Temperature Controller. Do not block the ventilation holes on the Digital Temperature Controller.
- Be sure to wire properly with correct signal name and polarity of terminals.
- Use the specified size of crimped terminals (M3, width of 5.8 mm or less) to wire the E5CC, E5EC, E5AC, E5DC, or E5□C-T. To connect bare wires to the terminal block of the E5CC, E5EC, E5AC, E5DC, or E5□C-T, use copper braided or solid wires with a gage of AWG24 to AWG18 (equal to a cross-sectional area of 0.205 to 0.823 mm<sup>2</sup>). (The stripping length is 6 to 8 mm.) Up to two wires of the same size and type, or two crimped terminals can be inserted into a single terminal. Use the specified size of crimped terminals (M3.5, width of 7.2 mm or less) to wire the E5CC-U. To connect bare wires to the terminal block of the E5CC-U, use copper braided or solid wires with a gage of AWG24 to AWG14 (equal to a cross-sectional area of 0.205 to 2.081 mm<sup>2</sup>). (The stripping length is 5 to 6 mm.) Up to two wires of the same size and type, or two crimped terminals can be inserted into a single terminal. Use the specified size of crimped terminals (M3, width of 5.8 mm or less) to wire the E5GC.\* To connect bare wires to the terminal block of the E5GC, use copper braided or solid wires with a gauge of AWG24 to AWG18 (equal to a cross-sectional area of 0.205 to 0.823 mm<sup>2</sup>). (The stripping length for Digital Temperature Controllers with screw terminal blocks is 6 to 8 mm. The stripping length for Digital Temperature Controllers with screwless clamp terminal blocks is 8 to 12 mm.) Up to two wires of the same size and type, or two crimped terminals can be inserted into a single terminal. When connecting two wires into one terminal of a Digital Temperature Controller with a screwless clamp terminal block, use ferrules with a diameter of 0.8 to 1.4 mm and an exposed conductor length of 8 to 12 mm that two wires are crimped for a ferrule.\*
 

\* The Digital Temperature Controller with screwless clamp terminals underwent UL testing with one braided wire connected.
- Do not wire the terminals that are not used.
- Use a commercial power supply for the power supply voltage input to a Digital Temperature Controller with AC input specifications. Do not use the output from an inverter as the power supply. Depending on the output characteristics of the inverter, temperature increases in the Digital Temperature Controller may cause smoke or fire damage even if the inverter has a specified output frequency of 50/60 Hz.
- To avoid inductive noise, keep the wiring for the product's terminal block away from power cables carry high voltages or large currents. Also, do not wire power lines together with or parallel to product 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 product. Allow as much space as possible between the product and devices that generate powerful high frequencies (high-frequency welders, high-frequency sewing machines, etc.) or surge.
- Use this product within the rated load and power supply.
- Make sure that the rated voltage is attained within two seconds of turning ON the power using a switch or relay contact. If the voltage is applied gradually, the power may not be reset or output malfunctions may occur.
- Make sure that the Digital Temperature Controller has 30 minutes or more to warm up after turning ON the power before starting actual control operations to ensure the correct temperature display.
- When executing self-tuning with E5□C, turn ON power to the load (e.g., heater) at the same time as or before supplying power to the product. If power is turned ON to the product before turning ON power to the load, self-tuning will not be performed properly and optimum control will not be achieved.
- A switch or circuit breaker must be provided close to the product. The switch or circuit breaker must be within easy reach of the operator, and must be marked as a disconnecting means for this unit.
- Use a soft and dry cloth to clean the product carefully. Do not use organic solvent, such as paint thinner, benzine or alcohol to clean the product.
- Design the system (e.g., control panel) considering the 2 seconds of delay that the product's output to be set after power ON.
- The output may turn OFF when you move to the initial setting level. Take this into consideration when performing control operations.
- The number of non-volatile memory write operations is limited. Therefore, use RAM write mode when frequently overwriting data during communications or other operations.
- Always touch a grounded piece of metal before touching the Digital Temperature Controller to discharge static electricity from your body.
- Use suitable tools when taking the Digital Temperature Controller apart for disposal. Sharp parts inside the Digital Temperature Controller may cause injury.
- For compliance with Lloyd's standards, the E5CC, E5CC-U, E5EC, and E5AC must be installed under the conditions that are specified in *Shipping Standards*.
- For the Digital Temperature Controller with two Setup Tool ports (E5EC/E5AC/E5DC/E5GC), do not connect cables to both ports at the same time. The Digital Temperature Controller may be damaged or may malfunction.
- Do not place heavy object on the Conversion Cable, bend the cable past its natural bending radius, or pull on the cable with undue force.
- Do not disconnect the Communications Conversion Cable or the USB-Serial Conversion Cable while communications are in progress. Damage or malfunction may occur.
- Do not touch the external power supply terminals or other metal parts on the Digital Temperature Controller.
- Refer to the E5□C Digital Temperature Controllers User's Manual (Cat. No. H174) for information on the communications distances and cables for the E5□C. For details on the E5□C-T, refer to the *E5□C-T Digital Temperature Controllers Programmable Type User's Manual* (Cat. No. H185).
- Do not bend the communications cables past their natural bending radius. Do not pull on the communications cables.
- Do not turn the power supply to the Digital Temperature Controller ON or OFF while the USB-Serial Conversion Cable is connected. The Digital Temperature Controller may malfunction.
- Make sure that the indicators on the USB-Serial Conversion Cable are operating properly. Depending on the application conditions, deterioration in the connectors and cable may be accelerated, and normal communications may become impossible. Perform periodic inspection and replacement.
- Connectors may be damaged if they are inserted with excessive force. When connecting a connector, always make sure that it is oriented correctly. Do not force the connector if it does not connect smoothly.

- 30.Noise may enter on the USB-Serial Conversion Cable, possibly causing equipment malfunctions. Do not leave the USB-Serial Conversion Cable connected constantly to the equipment.
- 31.For the E5DC, when you attach the Main Unit to the Terminal Unit, make sure that the hooks on the Main Unit are securely inserted into the Terminal Unit.
- 32.For the E5CC-U, when you attach the Main Unit to the socket, make sure that the hooks on the socket are securely inserted into the Main Unit.
- 33.Install the DIN Track vertically to the ground.
- 34.For the E5DC, always turn OFF the power supply before connecting the Main Unit to or disconnecting the Main Unit from the Terminal Unit, and never touch nor apply shock to the terminals or electronic components. When connecting or disconnecting the Main Unit, do not allow the electronic components to touch the case.
- 35.Observe the following precautions when you remove the terminal block or pulling out the interior of the product of the E5GC.
  - Always follow the instructions provided in the E5□C Digital Temperature Controllers User's Manual (Cat. No. H174).
  - Turn OFF the power supply before you start and never touch nor apply shock to the terminals or electric components. When you insert the interior body of the Digital Temperature Controller, do not allow the electronic components to touch the case.
  - Check for any corrosion on the terminals.
  - When you insert the interior body into the rear case, confirm that the hooks on the top and bottom are securely engaged with the case.

## Shipping Standards

The E5CC, E5CC-U, E5EC, and E5AC comply with Lloyd's standards. When applying the standards, the following installation requirements must be met in the application.

## Application Conditions

### ● Installation Location

The E5CC, E5CC-U, E5EC, and E5AC comply with installation category ENV1 and ENV2 of Lloyd's standards. Therefore, they must be installed in a location equipped with air conditioning. They cannot be used on the bridge or decks, or in a location subject to strong vibration.

## 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 Digital 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 Digital Temperature Controller.
3. When two or more Digital 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 Digital 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 Digital 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.

### ● Waterproofing (Not applicable to the E5CC-U/ E5DC.)

The degree of protection is as shown below. Sections without any specification on their degree of protection or those with IP□0 are not waterproof.

Front panel: IP66, Rear case: IP20, Terminal section: IP00  
 When waterproofing is required, insert the Waterproof Packing on the backside of the front panel. Keep the Port Cover on the front-panel Setup Tool port of the E5EC/E5AC/E5EC-T/E5AC-T securely closed. The degree of protection when the Waterproof Packing is used is IP66. To maintain an IP66 degree of protection, the Waterproof Packing and the Port Cover for the front-panel Setup Tool port must be periodically replaced because they may deteriorate, shrink, or harden depending on the operating environment. The replacement period will vary with the operating environment. Check the required period in the actual application. Use 3 years or sooner as a guideline. If the Waterproof Packing and Port Cover are not periodically replaced, waterproof performance may not be maintained. If a waterproof structure is not required, then the Waterproof Packing does not need to be installed.

### ● Operating Precautions

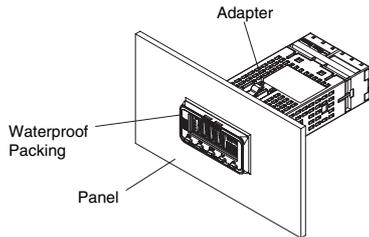
1. When using self-tuning, turn ON power for the load (e.g., heater) at the same time as or before supplying power to the Digital Temperature Controller. If power is turned ON for the Digital Temperature Controller before turning ON power for the load, self-tuning will not be performed properly and optimum control will not be achieved.  
 When starting operation after the Digital 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 Digital Temperature Controller OFF and ON again, switching from STOP mode to RUN mode can also be used.)
2. Avoid using the Digital Temperature 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.

### ● Others

1. Do not Connect or disconnect the Conversion Cable connector repeatedly over a short period of time.  
 The computer may malfunction.
2. After connecting the Conversion Cable to the computer, check the COM port number before starting communications. The computer requires time to recognize the cable connection. This delay does not indicate failure.
3. Do not connect the Conversion Cable through a USB hub. Doing so may damage the Conversion Cable.
4. Do not use an extension cable to extend the Conversion Cable length when connecting to the computer. Doing so may damage the Conversion Cable.

## ● Mounting

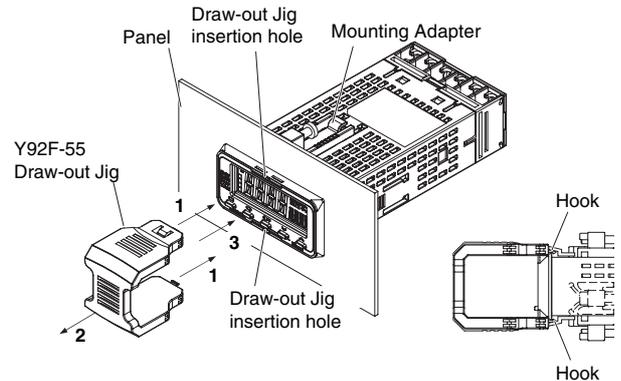
### Mounting to a Panel E5GC



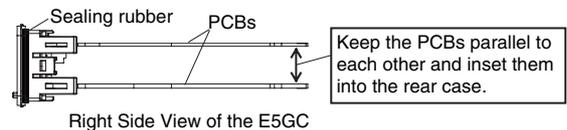
1. For waterproof mounting, waterproof packing must be installed on the Digital Temperature Controller. Waterproofing is not possible when group mounting several Digital Temperature Controllers. Waterproof packing is not necessary when there is no need for the waterproofing function.
2. Insert the E5GC into the mounting hole in the panel.
3. Use two Mounting Adapters, either on the top and bottom or on the right and left.
4. Push the Adapters from the terminals up to the panel, and temporarily fasten the E5GC.
5. Tighten the two fastening screws on the Adapter. Alternately tighten the two screws little by little to maintain a balance. Tighten the screws to a torque of 0.29 to 0.39 N·m.

### Removing the Digital Temperature Controller from the case E5GC

You can use the Y92F-55 Draw-out Jig to remove the interior body of the Digital Temperature Controller from the case to perform maintenance without removing the terminal wiring. This is possible only for the E5GC. It is NOT possible for the E5CC, E5CC-U, E5EC, E5AC, E5DC, or E5□C-T. Check the specifications of the case and Digital Temperature Controller before removing the Digital Temperature Controller from the case.



1. Insert the Y92F-55 Draw-out Jig securely into the Draw-out Jig insertion holes (one hole each on the top and bottom) and press it in firmly until the hooks engage on the top and bottom.
2. Pull out the Y92F-55 Draw-out Jig together with the front panel. Do not apply unnecessary force.
3. When inserting the body of the Temperature Controller into the case, make sure the PCBs are parallel to each other, make sure that the sealing rubber is in place, and press the E5GC toward the rear case into position. While pushing the E5GC into place, push down on the hooks on the top and bottom surfaces of the rear case so that the hooks are securely locked in place. Be sure that electronic components do not come into contact with the case.



# E5GC

## ● Precautions when Wiring

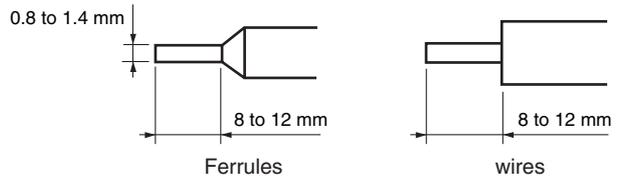
- Separate input leads and power lines in order to prevent external noise.
- Use a shielded, AWG24 to AWG18 (cross-sectional area of 0.205 to 0.8231 mm<sup>2</sup>) twisted-pair cable. Use a shielded, AWG24 to AWG14 (cross-sectional area of 0.205 to 2.081 mm<sup>2</sup>) twisted-pair cable for the E5CC-U. The stripping length is 6 to 8 mm for the E5CC, E5EC, E5AC, E5DC, or E5CC-T and 5 to 6 mm for the E5CC-U.
- The E5GC stripping length is 6 to 8 mm for models with screw terminal blocks and 8 to 12 mm for models with screwless clamp terminal blocks.
- Use crimp terminals when wiring the terminals.
- Use the suitable wiring material and crimp tools for crimp terminals.
- Tighten the terminal screws to a torque of 0.43 to 0.58 N·m. The specified torque is 0.5 N·m for the E5CC-U.
- For the E5GC, E5CC, E5EC, E5AC, E5DC, or E5□C-T, use the following types of crimp terminals for M3 screws.



- For the E5CC-U, use the following types of crimp terminals for M3.5 screws.



- For E5GC Controllers with screwless clamp terminal blocks, use braided or solid wires with a gauge of AWG24 to AWG18 (equal to a cross-sectional area of 0.205 to 0.823 mm<sup>2</sup>). The length of the conductive portion inserted into the terminal must be 8 to 12 mm. Ferrules must be 0.8 to 1.4 mm in diameter..



- Recommended Ferrules for E5GC Screwless Clamp Terminals

Manufacturer		Model number
Altech Corp.		2623.0
Daido Solderless Terminal Mfg. Co.		AVA-0.5
J.S.T. Mfg. Co.		TUB-0.5
Nichifu Co.	Single (1 wire)	TGNTC-1.25-9T
		TGVTC-1.25-11T
		TGNTC-1.25-11T
		TC0.3-9.5
		TC1.25-11S-ST
		TC1.25-11S
		TC2-11S
	Double (2 wires)	TGWVTC-1.25-9T
		TGWVTC-1.25-11T

## Three-year Guarantee

### ● Period of Guarantee

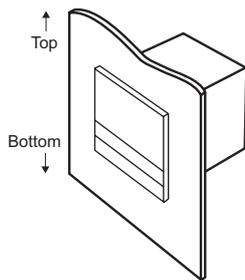
The guarantee period of the Unit is three years starting from the date the Unit is shipped from the factory.

### Scope of Guarantee

The Unit is guaranteed under the following operating conditions.

1. Average Operating Temperature (see note): -10°C to 50°C
2. Mounting Method: Standard mounting

**Note:** Average Operating Temperature  
Refer to the process temperature of the Unit mounted to a control panel and connected to peripheral devices on condition that the Unit is in stable operation, sensor input type K is selected for the Unit, the positive and negative thermocouple input terminals of the Unit are short-circuited, and the ambient temperature is stable.



Should the Unit malfunction during the guarantee period, OMRON shall repair the Unit or replace any parts of the Unit at the expense of OMRON.

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