

Programmable Temperature Controller (Digital Controller)

E5CC-T (48 × 48 mm)

Programmable Controllers Join the E5□C Series!
Program up to 256 segments can handle a wide variety of applications.

- Set up to 8 Programs (Patterns) with 32 Segments (Steps) Each
- The white PV display with a height of 15.2 mm improves visibility.
- High-speed sampling at 50 ms.
- Models are available with up to 3 auxiliary outputs, up to 4 event inputs, and a transfer output to cover a wide range of applications.
- Short body with depth of only 60 mm.
- 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).
- Easy connections to a PLC with programless communications. Use component communications to link Temperature Controllers to each other.



* CSA conformance evaluation by UL.

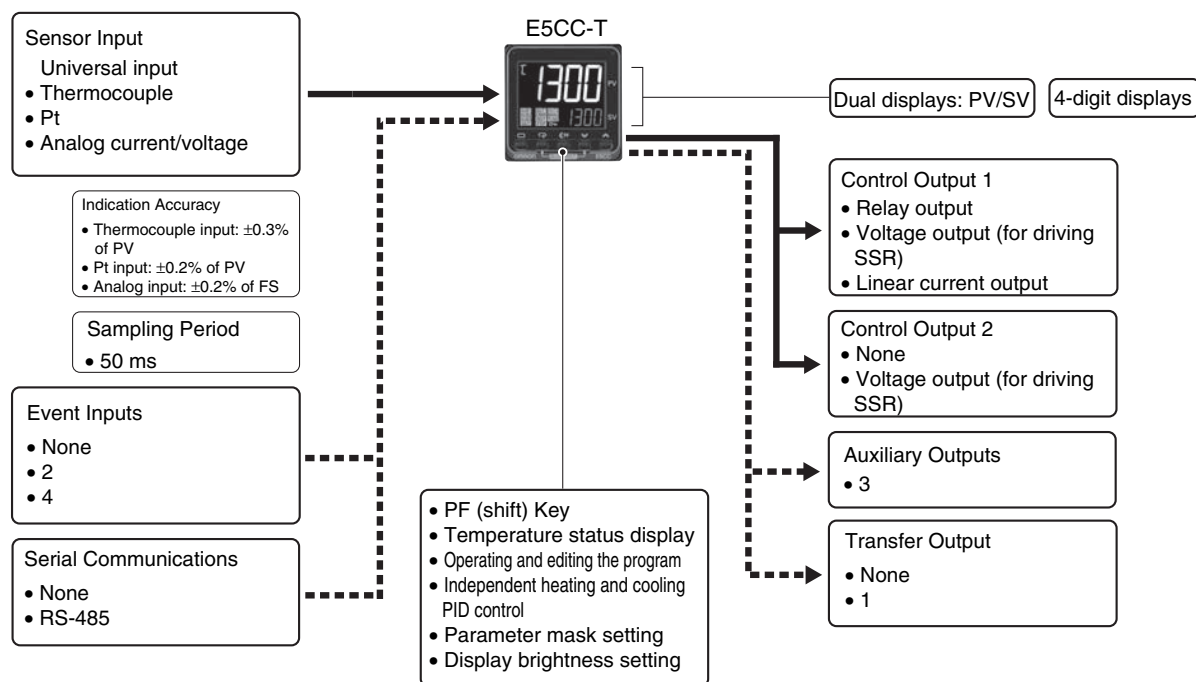


48 × 48 mm
E5CC-T

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

Refer to Safety Precautions on page 122.

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-T Digital Temperature Controllers Programmable Type User's Manual (Cat. No. H185)

E5□C-T Digital Temperature Controllers Programmable Type Communications Manual (Cat. No. H186)

Model Number Legend and Standard Models

Model Number Legend

Models with Screw Terminal Blocks

E5CC-T □□3 □5 M -□□□ (Example: E5CC-TRX3A5M-000)

① ②③④⑤ ⑥

Model	A	B	C	D	E	F	Meaning				
	Control outputs 1 and 2	No. of auxiliary outputs	Power supply voltage	Terminal type	Input type	Options					
E5CC-T							48 × 48 mm Programmable Type				
							Control output 1		Control output 2		
	RX						Relay output		None		
	QX						Voltage output (for driving SSR)		None		
*1	CX						Linear current output *2		None		
	QQ						Voltage output (for driving SSR)		Voltage output (for driving SSR)		
	CQ						Linear current output *2		Voltage output (for driving SSR)		
		3					3 (one common)				
			A				100 to 240 VAC				
			D				24 VAC/DC				
				5			Screw terminal blocks (with cover)				
					M		Universal input				
								HB alarm and HS alarm	Communications	Event inputs	Transfer output
							000	---	---	---	---
						*1	001	1	---	2	---
						*1	003	2 (for 3-phase heaters)	RS-485	---	---
						*3	004	---	RS-485	2	---
							005	---	---	4	---
							006	---	---	2	Provided.

*1. Options with HB and HS alarms (001 and 003) cannot be selected if a linear current output is selected for the control output.

*2. The linear current output cannot be used as a transfer output.

*3. Option 004 can be selected only when "CX" is selected for the control outputs.

Heating and Cooling Control

Using Heating and Cooling Control

① Control Output Assignment

If there is no control output 2, an auxiliary output is used as the cooling control output.

If there is a control output 2, the two control outputs are used for heating and cooling.

(It does not matter which output is used for heating and which output is used for cooling.)

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

Terminal Covers

Model
E53-COV17
E53-COV23 (3pcs)

Note: The Terminal Covers E53-COV23 are provided with the Digital Temperature Controller. The E53-COV10 cannot be used. Refer to page 89 for the mounted dimensions.

Waterproof Packing

Model
Y92S-P8

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

Current Transformers (CTs)

Hole diameter	Model
5.8 mm	E54-CT1
5.8 mm	E54-CT1L*
12.0 mm	E54-CT3
12.0 mm	E54-CT3L*

*Lead wires are included with these CTs. If UL certification is required, use these CTs.

Adapter

Model
Y92F-45

Note: Use this Adapter when the panel has already been prepared for an E5B□ Controller.

Waterproof Cover

Model
Y92A-48N

Mounting Adapter

Model
Y92F-49

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

DIN Track Mounting Adapter

Model
Y92F-52

Front Covers

Type	Model
Hard Front Cover	Y92A-48H
Soft Front Cover	Y92A-48D

CX-Thermo Support Software

Model
EST2-2C-MV4

Note: CX-Thermo version 4.61 or higher is required for the E5CC-T. For the system requirements for the CX-Thermo, refer to information on the EST2-2C-MV4 on the OMRON website (www.ia.omron.com).

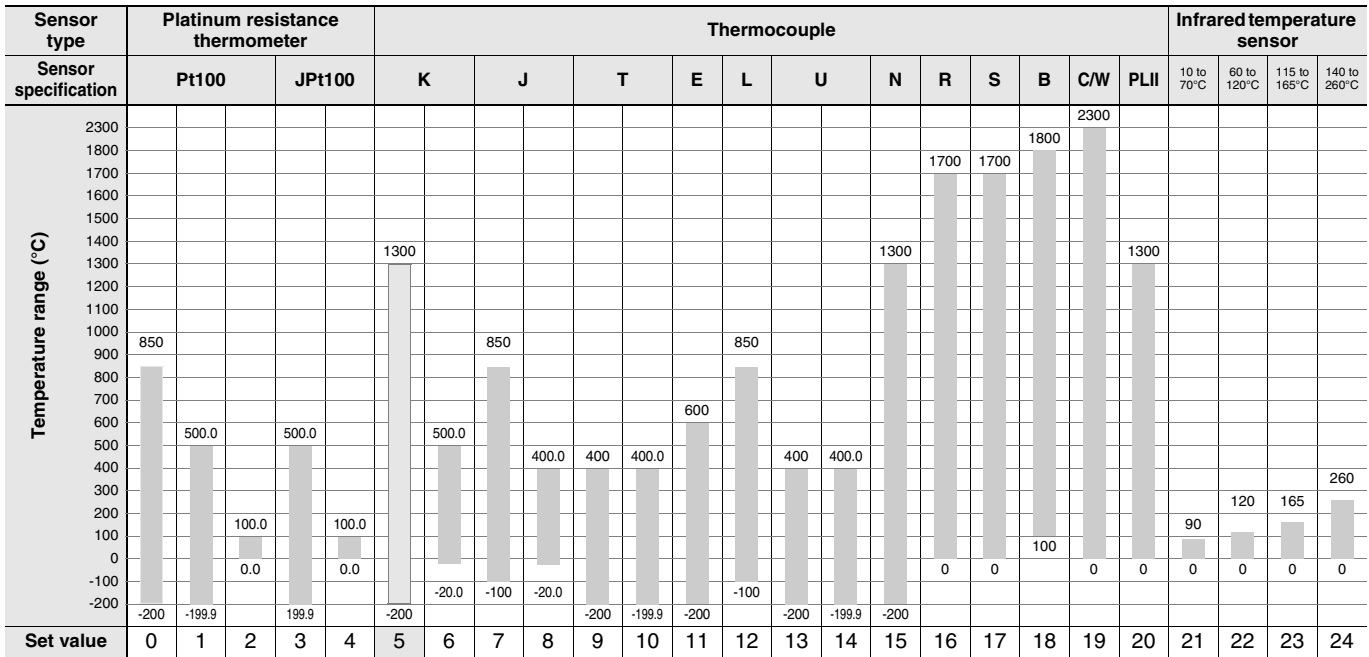
Specifications

Ratings

Power supply voltage	A in model number: 100 to 240 VAC, 50/60 Hz D in model number: 24 VAC, 50/60 Hz; 24 VDC	
Operating voltage range	85 to 110% of rated supply voltage	
Power consumption	7.5 VA max. at 100 to 240 VAC, and 4.1 VA max. at 24 VAC or 2.3 W max. at 24 VDC	
Sensor input	Temperature input Thermocouple: K, J, T, E, L, U, N, R, S, B, C/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	
Input impedance	Current input: 150 Ω max., Voltage input: 1 MΩ min. (Use a 1:1 connection when connecting the ES2-HB-N/THB-N.)	
Control method	2-PID control (with auto-tuning) or ON/OFF control	
Control output	Relay output	SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA (reference value)
	Voltage output (for driving SSR)	Output voltage: 12 VDC ±20% (PNP), max. load current: 21 mA, with short-circuit protection circuit
	Linear current output	4 to 20 mA DC/0 to 20 mA DC, load: 500 Ω max., resolution: approx. 10,000
Auxiliary output	Number of outputs	3
	Output specifications	SPST-NO relay outputs, 250 VAC, Models with 3 outputs: 2 A (resistive load), Electrical life: 100,000 operations, Minimum applicable load: 10 mA at 5 V (reference value)
Event input	Number of inputs	2 or 4 (depends on model)
	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
Transfer output	Number of outputs	1 (only on models with a transfer output)
	Output specifications	Current output: 4 to 20 mA DC, load: 500 Ω max., resolution: approx. 10,000 Linear voltage output: 1 to 5 VDC, load: 1 kΩ min., resolution: Approx. 10,000
Setting method	Digital setting using front panel keys	
Indication method	11-segment digital display and individual indicators Character height: PV: 15.2 mm, SV: 7.1 mm	
Bank switching	None	
Other functions	Manual output, heating/cooling control, loop burnout alarm, other alarm functions, heater burnout (HB) alarm (including SSR failure (HS) alarm), 40% AT, 100% AT, MV limiter, input digital filter, robust tuning, PV input shift, protection functions, extraction of square root, MV change rate limit, logic operations, temperature status display, moving average of input value, and display brightness setting	
Ambient operating temperature	-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)	
Ambient operating humidity	25 to 85%	
Storage temperature	-25 to 65°C (with no condensation or icing)	
Altitude	2,000 m max.	
Recommended fuse	T2A, 250 VAC, time-lag, low-breaking capacity	
Installation environment	Overvoltage category II, Pollution Degree 2 (EN/IEC/UL 61010-1)	

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 1602-2015, 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)

C/W: W5Re/W26Re, JIS C 1602-2015, 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.)

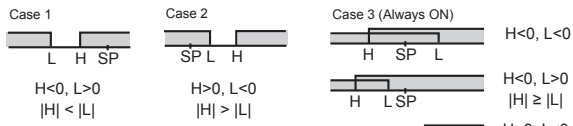
Auxiliary outputs are allocated for alarms. ON delays and OFF delays (0 to 999 s) can also be specified.

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.

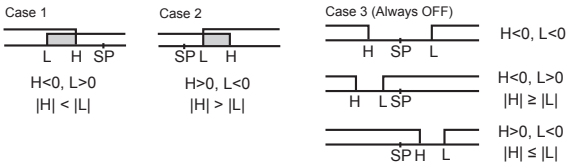
Set value	Alarm type	Alarm output operation		Description of function
		When alarm value X is positive	When alarm value X is negative	
0	Alarm function OFF	Output OFF		No alarm
1	Upper- and lower-limit *1		*2	Set the upward deviation in the set point for the alarm upper limit (H) and the lower deviation 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	*5	*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).
		Heating/Cooling Control (Heating MV) 	Heating/Cooling Control (Heating MV) 	
		Always ON 	Always ON 	
17	MV absolute-value lower-limit alarm *9	Standard Control 	Standard Control 	This alarm type turns ON the alarm when the manipulated variable (MV) is lower than the alarm value (X).
		Heating/Cooling Control (Cooling MV) 	Heating/Cooling Control (Cooling MV) 	
		Always ON 	Always ON 	

*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 *2

- Case 1 and 2
- Always OFF when the upper-limit and lower-limit hysteresis overlaps.
- Case 3: Always OFF

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

*6. Refer to the *E5CC-T Digital Temperature Controllers Programmable Type User's Manual* (Cat. No. H185) for information on the operation of the standby sequence.

*7. Refer to the *E5CC-T Digital Temperature Controllers Programmable Type User's Manual* (Cat. No. H185) for information on the loop burnout alarm (LBA).

*8. Refer to the *E5CC-T Digital Temperature Controllers Programmable Type User's Manual* (Cat. No. H185) for information on the PV change rate alarm.

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

Characteristics

Indication accuracy (at the ambient temperature of 23°C)	Thermocouple: (±0.3% of indication value or ±1°C, whichever is greater) ±1 digit max. *1 Platinum resistance thermometer: (±0.2% of indication 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.	
Transfer output accuracy	±0.3% FS max.	
Influence of temperature *2	Thermocouple input (R, S, B, C/W, PL II): (±1% of indication value or ±10°C, whichever is greater) ±1 digit max.	
Influence of voltage *2	Other thermocouple input: (±1% of indication value or ±4°C, whichever is greater) ±1 digit max. *3 Platinum resistance thermometer: (±1% of indication value or ±2°C, whichever is greater) ±1 digit max.	
Influence of EMS. (at EN 61326-1)	Analog input: ±1%FS ±1 digit max. CT input: ±5% FS ±1 digit max.	
Input sampling period	50 ms	
Hysteresis	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)	
Proportional band (P)	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)	
Integral time (I)	0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) *4	
Derivative time (D)	0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) *4	
Proportional band (P) for cooling	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)	
Integral time (I) for cooling	0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) *4	
Derivative time (D) for cooling	0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) *4	
Control period	0.1, 0.2, 0.5, 1 to 99 s (in units of 1 s)	
Manual reset value	0.0 to 100.0% (in units of 0.1%)	
Alarm setting range	-1999 to 9999 (decimal point position depends on input type)	
Influence of signal source resistance	Thermocouple: 0.1°C/Ω max. (100 Ω max.) Platinum resistance thermometer: 0.1°C/Ω max. (10 Ω max.)	
Insulation resistance	20 MΩ min. (at 500 VDC)	
Dielectric strength	3,000 VAC, 50/60 Hz for 1 min between terminals of different charge	
Vibration	Malfunction	10 to 55 Hz, 20 m/s ² for 10 min each in X, Y, and Z directions
	Resistance	10 to 55 Hz, 20 m/s ² for 2 hrs each in X, Y, and Z directions
Shock	Malfunction	100 m/s ² , 3 times each in X, Y, and Z directions
	Resistance	300 m/s ² , 3 times each in X, Y, and Z directions
Weight	Controller: Approx. 120 g, Mounting Adapter: Approx. 10 g	
Degree of protection	Front panel: IP66, Rear case: IP20, Terminals: IP00	
Memory protection	Non-volatile memory (number of writes: 1,000,000 times)	
Setup Tool	CX-Thermo version 4.61 or higher	
Setup Tool port	E5CC-T top panel: An E58-CIFQ2 USB-Serial Conversion Cable is used to connect to a USB port on the computer. *5	
Standards	Approved standards	cULus: UL 61010-1/CSA C22.2 No.61010-1, Korean wireless regulations (Radio law: KC Mark) (Some models only.) *6
	Conformed standards	EN 61010-1 (IEC 61010-1), RCM
EMC	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:	EN 61326-1 *7 EN 55011 Group 1, class A EN 55011 Group 1, class A EN 61326-1 *7 EN 61000-4-2 EN 61000-4-3 EN 61000-4-4 EN 61000-4-4 EN 61000-4-6 EN 61000-4-5 EN 61000-4-11

*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 at a temperature of 400 to 800°C 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 C/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. The unit is determined by the setting of the Integral/Derivative Time Unit parameter.

*5. External communications (RS-485) and USB-serial conversion cable communications can be used at the same time.

*6. Refer to your OMRON website for the most recent information on applicable models.

*7. Industrial electromagnetic environment (EN/IEC 61326-1 Table 2)

Program Control

Number of programs (patterns)		8
Number of segments (steps)		32
Segment setting method		Time setting (Segment set with set point and time.)
		Slope setting (Segment set with segment type, set point, slope, and time.)
Segment times		0 h 0 min to 99 h 59 min
		0 min 0 s to 99 min 59 s
Alarm setting		Set separately for each program.
Reset operation		Select either stopping control or fixed SP operation.
Startup operation		Select continuing, resetting, manual operation, or run mode.
PID sets	Number of sets	8
	Setting method	Set separately for each program (automatic PID group selection also supported).
Alarm SP function		Select from ramp SP and target SP.
Program status control	Segment operation	Advance, segment jump, hold, and wait
	Program operation	Program repetitions and program links
Wait operation	Wait method	Waiting at segment ends
	Wait width setting	Same wait width setting for all programs
Time signals	Number of outputs	2
	Number of ON/OFF Operations	1 each per output
	Setting method	Set separately for each program.
Program status output		Program end output (pulse width can be set), run output, stage output
Program startup operation	PV start	Select from segment 1 set point, slope-priority PV start
	Standby	0 h 0 min to 99 h 59 min
		0 day 0 h to 99 day 23h
Operation end operation		Select from resetting, continuing control at final set point, and fixed SP control.
Program SP shift		Same program SP shift for all programs

USB-Serial Conversion Cable

Applicable OS	Windows XP/Vista/7/8/10 *1
Applicable software	CX-Thermo version 4.61 or higher
Applicable models	E5□C-T Series, E5□C Series, and E5CB Series
USB interface standard	Conforms to USB Specification 2.0.
DTE speed	38400 bps
Connector specifications	Computer: USB (type A plug) Digital Temperature Controller: Special serial connector
Power supply	Bus power (Supplied from USB host controller.) *2
Power supply voltage	5 VDC
Current consumption	450 mA max.
Output voltage	4.7±0.2 VDC (Supplied from USB-Serial Conversion Cable to the Digital Temperature Controller.)
Output current	250 mA max. (Supplied from USB-Serial Conversion Cable to the Digital Temperature Controller.)
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. 120 g

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

*1. CX-Thermo version 4.65 or higher runs on Windows 10.

*2. 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

Transmission line connection method	RS-485: Multidrop
Communications	RS-485 (two-wire, half duplex)
Synchronization method	Start-stop synchronization
Protocol	CompoWay/F, or Modbus
Baud rate *	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) Block check character (BCC) with CompoWay/F or CRC-16 Modbus
Flow control	None
Interface	RS-485
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.

Communications Functions

Programless communications *	You can use the memory in the PLC to read and write E5□C-T parameters, start and reset operation, etc. The E5□C-T automatically performs communications with PLCs. No communications programming is required. Number of connected Digital Temperature Controllers: 32 max. Applicable PLCs OMRON PLCs CS Series, CJ Series, CP Series, NJ Series, or NX1P Mitsubishi Electric PLCs MELSEC Q Series, L Series, or iQ-R Series
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Component Communications	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)
Copying *	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.

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

Current Transformer (Order Separately) Ratings

	E54-CT1 E54-CT3	E54-CT1L E54-CT3L
Dielectric strength	1,000 VAC for 1 min	1,500 VAC for 1 min
Vibration resistance	50 Hz, 98 m/s ²	
Weight	E54-CT1: Approx. 11.5 g E54-CT3: Approx. 50 g	E54-CT1L: Approx. 14 g E54-CT3L: Approx. 57 g
Accessories	E54-CT3 Only Armatures (2) Plugs (2)	None

Heater Burnout Alarms and SSR Failure Alarms

CT input (for heater current detection)	Models with detection for single-phase heaters: One input Models with detection for singlephase or three-phase heaters: Two inputs
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 *3
SSR failure alarm setting range *2	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 Relays (Reference Values)

