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Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



Digital Temperature Controller

E5CD/E5ED

Next Generation Digital Temperature Controllers with Expanded Adaptive Control Functionality

E5CD (48 × 48 mm) and E5ED (48 × 96 mm)
Push-In Plus technology models reduce wiring work
E5CD-B (48 × 48 mm) and E5ED-B (48 × 96 mm)

Optimize control by detecting status changes.
Easily satisfy both productivity and quality.
Ideal for package sealing and water-cooled extrusion applications.

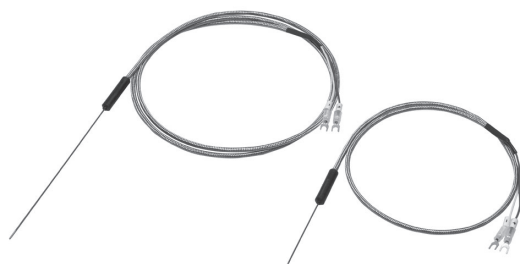


48 × 48 mm
E5CD/E5CD-B



48 × 96 mm
E5ED/E5ED-B

Accurately Measure Seal Temperatures
Temperature Sensors for Packaging Machines



Temperature Sensors
E52
Ferrule terminal type added

Digital Temperature Controller E5CD/E5CD-B (48 × 48 mm)

**Optimize Control by Detecting Status Changes.
Easily Satisfy Both Productivity and Quality.
Models with Push-In Plus Technology Available in the Lineup.**

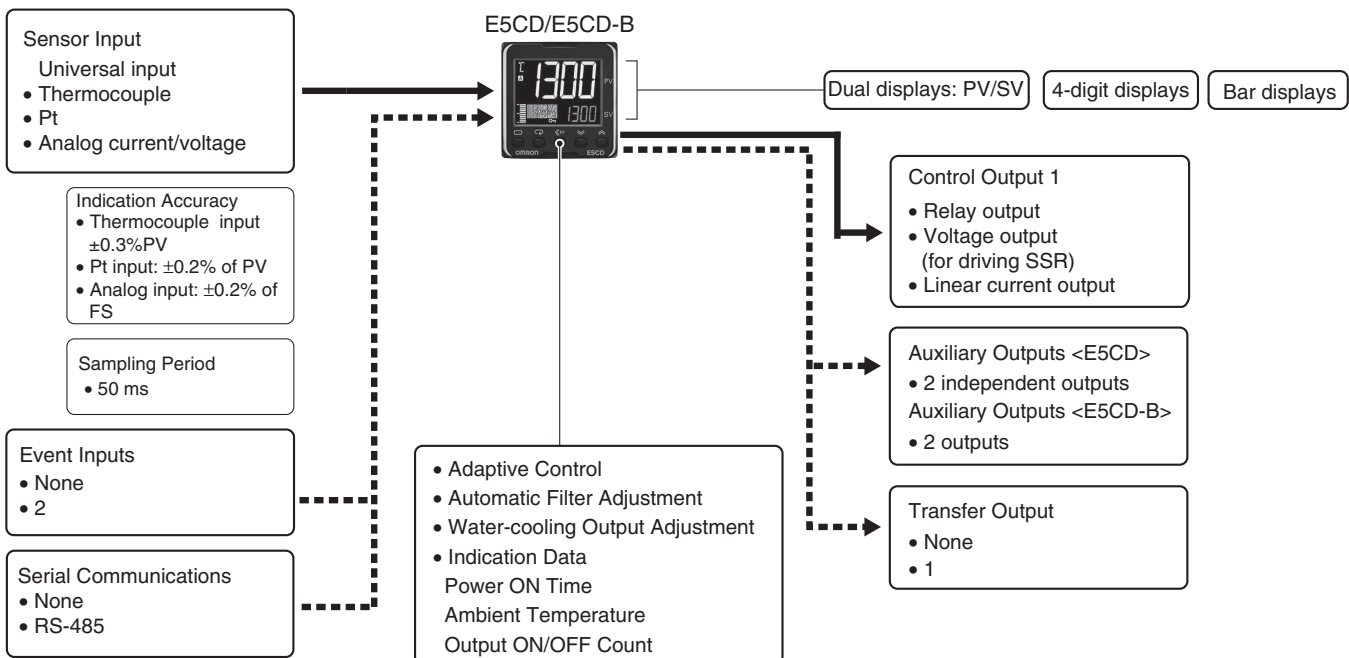
- Automatic optimization of control for changes in systems (Adaptive Control).
- Functions specialized for packaging machines (Temperature Sensors for Packaging Machines and Automatic Filter Adjustment).
- Function specialized for water-cooled extruders (Water-cooling Output Adjustment).
- Indication data (Power ON Time, Ambient Temperature, and Output ON/OFF Count).
- Basic performance is same as the E5□C standard models.
- Draw-out structure for easy maintenance. (Screw terminal blocks only)



For the most recent information on models that have been certified for safety standards, refer to your OMRON website.

Refer to *Safety Precautions* on 43.

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□D Digital Temperature Controllers User's Manual (Cat. No. H224)

E5□D Digital Temperature Controllers Communications Manual (Cat. No. H225)

Model Number Legend and Standard Models

Model Number Legend

Models with Screw Terminal Blocks

E5CD-□□ 2 □ 6 M-□□□ (Example: E5CD-RX2A6M-000)

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					
E5CD							48 × 48 mm				
							Control output 1		Control output 2		
	RX						Relay output		None		
	QX						Voltage output (for driving SSR)		None		
	CX						Linear current output		None		
		2					2 independent outputs				
			A				100 to 240 VAC				
			D				24 VAC/DC				
				6			Screw terminal blocks (with E53-COV23 Terminal Cover), draw-out structure				
					M		Universal input				
								HB alarm and HS alarm	Communications	Event inputs	Transfer Output
							000	---	---	---	---
					*1		001	1	---	2	---
					*1		002	1	RS-485	---	---
					*2		004	---	RS-485	2	---
					*2		006	---	---	2	Provided.

*1. This option can be selected when the control output is RX or QX.

*2. This option can be selected when the control output is CX.

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.

List of Models

Model	Model
E5CD-RX2A6M-000	E5CD-CX2A6M-000
E5CD-RX2D6M-000	E5CD-CX2D6M-000
E5CD-RX2A6M-001	E5CD-CX2A6M-004
E5CD-RX2D6M-001	E5CD-CX2D6M-004
E5CD-RX2A6M-002	E5CD-CX2A6M-006
E5CD-RX2D6M-002	E5CD-CX2D6M-006
E5CD-QX2A6M-000	
E5CD-QX2D6M-000	
E5CD-QX2A6M-001	
E5CD-QX2D6M-001	
E5CD-QX2A6M-002	
E5CD-QX2D6M-002	

Model Number Legend

Models with Push-In Plus Terminal Blocks

E5CD-□□ 2 □ B M -□□□ (Example: E5CD-RX2ABM-000)

① ② ③ ④ ⑤ ⑥

Model	① Control outputs 1 and 2	② No. of auxiliary outputs	③ Power supply voltage	④ Terminal type	⑤ Input type	⑥ Options	Meaning				
E5CD							48 × 48 mm				
							Control output 1		Control output 2		
	RX						Relay output		None		
	QX						Voltage output (for driving SSR)		None		
	CX						Linear current output		None		
		2					2 independent outputs				
			A				100 to 240 VAC				
			D				24 VAC/DC				
				B			Push-In Plus terminal block				
					M		Universal input				
								HB alarm and HS alarm	Communications	Event inputs	Transfer Output
							000	---	---	---	---
						*1	001	1	---	2	---
						*1	002	1	RS-485	---	---
						*2	004	---	RS-485	2	---
						*2	006	---	---	2	Provided.

*1. This option can be selected when the control output is RX or QX.

*2. This option can be selected when the control output is CX.

Heating and Cooling Control

Using Heating and Cooling Control

① Control Output Assignment

An auxiliary output is used as the cooling control output.

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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.

List of Models

Model	Model
E5CD-RX2ABM-000	E5CD-CX2ABM-000
E5CD-RX2DBM-000	E5CD-CX2DBM-000
E5CD-RX2ABM-001	E5CD-CX2ABM-004
E5CD-RX2DBM-001	E5CD-CX2DBM-004
E5CD-RX2ABM-002	E5CD-CX2ABM-006
E5CD-RX2DBM-002	E5CD-CX2DBM-006
E5CD-QX2ABM-000	
E5CD-QX2DBM-000	
E5CD-QX2ABM-001	
E5CD-QX2DBM-001	
E5CD-QX2ABM-002	
E5CD-QX2DBM-002	

Optional Products (Order Separately)

USB-Serial Conversion Cable

Model
E58-CIFQ2

Terminal Covers

(Cannot be used on a Push-In Plus terminal block type)

Model
E53-COV17
E53-COV23 (3pcs) *

Note: The E53-COV10 cannot be used.

Refer to page 14 for the mounted dimensions.

* E53-COV23 are provided with the Digital Temperature Controller.

Waterproof Packing

Model
Y92S-P8

Note: This 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

(Cannot be used on a Push-In Plus terminal block type)

Model
Y92F-52

Front Covers

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

Draw-out Jig

(Cannot be used on a Push-In Plus terminal block type)

Model
Y92F-58

CX-Thermo Support Software

Model
EST2-2C-MV4

Note: CX-Thermo version 4.66 or higher is required for the E5CD.
CX-Thermo version 4.67 or higher is required for the E5CD-B.
For the system requirements for the CX-Thermo, refer to information on the EST2-2C-MV4 on the OMRON website (www.ia.omron.com).

E5CD/E5CD-B

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	Models with option selection of 000:5.2 VA max. at 100 to 240 VAC, and 3.1 VA max. at 24 VAC or 1.6 W max. at 24 VDC All other models: 6.5 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/THB.)	
Control method	ON/OFF control or 2-PID control (with auto-tuning)	
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 or 0 to 20 mA DC, Load: 500 Ω max., Resolution: Approx. 10,000
Auxiliary output	Number of outputs	2
	Output specifications	SPST-NO relay outputs: 250 VAC, E5CD: 3 A (resistive load), E5CD-B: 2 A (resistive load) Electrical life: 100,000 operations, Minimum applicable load: 10 mA at 5 V (reference values)
Event input	Number of inputs	2
	External contact input specifications	Contact input: ON: 1 kΩ max., OFF: 100 kΩ min.
		Non-contact input: ON: Residual voltage: 1.5 V max., OFF: Leakage current: 0.1 mA max. Current flow: Approx. 7 mA per contact
Transfer Output	Number of outputs	1 (depends on model): Transfer output type
	Output specifications	Current output: 4 to 20 mA DC, Load: 500 Ω, Resolution: Approx. 10,000 Linear voltage output: 1 to 5 V DC, Load: 1 kΩ min., Resolution: Approx. 10,000
Setting method	Digital setting using front panel keys	
Indication method	11-segment digital display, individual indicators, and bar display Character height: PV: 14.9 mm, SV: 7.1 mm	
Multi SP *	Up to eight set points (SP0 to SP7) can be saved and selected using the event inputs, key operations, or serial communications.	
Bank switching	None	
Other functions	Adaptive control, automatic filter adjustment, water-cooling output adjustment, indication data (power ON time monitor, ambient temperature monitor, and control output ON/OFF count monitors), parameter masking, operation after power ON, manual output, heating/cooling control, loop burnout alarm, SP ramp, 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, run/stop, protection functions, extraction of square root, MV change rate limit, logic operations, temperature status display, simple programming, 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)	

*There can be up to four set points if event inputs are used to select them.

Input Ranges

Thermocouple/Platinum Resistance Thermometer (Universal inputs)

Sensor type	Platinum resistance thermometer				Thermocouple														Infrared temperature sensor												
	Pt100		JPt100		K	J	T	E	L	U	N	R	S	B	C/W	PLII	10 to 70°C	60 to 120°C	115 to 165°C	140 to 260°C											
Temperature range (°C)	850	500.0	100.0	500.0	100.0	1300	500.0	850	400.0	400	400.0	600	850	400	400.0	1300	1700	1700	1800	2300	1300	0	0	0	0	0	0	90	120	165	260
Set value	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24						

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 C1602-2015, 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.)

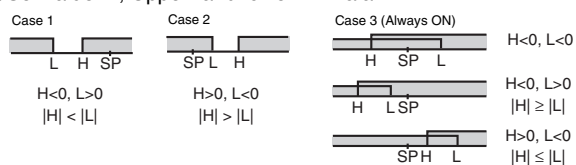
Auxiliary outputs are allocated for alarms. ON delays and OFF delays (0 to 999 s) can also be specified.

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.

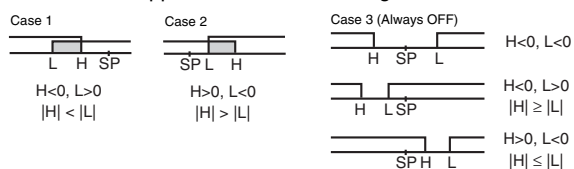
Set value	Alarm type	Alarm output operation		Description of function
		When alarm value X is positive	When alarm value X is negative	
0	Alarm function OFF	Output OFF		No alarm
1	Upper- and lower-limit *1		*2	Set the upward deviation in the set point for the alarm upper limit (H) and the lower deviation 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		
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		

*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 *E5□□ Digital Temperature Controllers User's Manual* (Cat. No. H224) for information on the operation of the standby sequence.

*7. Refer to the *E5□□ Digital Temperature Controllers User's Manual* (Cat. No. H224) for information on the loop burnout alarm (LBA).

*8. Refer to the *E5□□ Digital Temperature Controllers User's Manual* (Cat. No. H224) 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: ($\pm 0.3\%$ of indication value or $\pm 1^\circ\text{C}$, whichever is greater) ± 1 digit max. *1 Platinum resistance thermometer: ($\pm 0.2\%$ of indication value or $\pm 0.8^\circ\text{C}$, whichever is greater) ± 1 digit max. Analog input: $\pm 0.2\%$ FS ± 1 digit max. CT input: $\pm 5\%$ FS ± 1 digit max.
Transfer output accuracy		$\pm 0.3\%$ FS max.
Influence of temperature *2		Thermocouple input (R, S, B, C/W, PL II): ($\pm 1\%$ of indication value or $\pm 10^\circ\text{C}$, whichever is greater) ± 1 digit max. Other thermocouple input: ($\pm 1\%$ of indication value or $\pm 4^\circ\text{C}$, whichever is greater) ± 1 digit max. *3
Influence of voltage *2		Platinum resistance thermometer: ($\pm 1\%$ of indication value or $\pm 2^\circ\text{C}$, whichever is greater) ± 1 digit max.
Influence of EMS (at EN 61326-1)		Analog input: $\pm 1\%$ FS ± 1 digit max. CT input: $\pm 5\%$ 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
For adaptive control	SP response proportional band	Temperature input: 0.1 to 999.9°C or °F (in units of 0.1°C or °F)
	SP response integral time	0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) *4
	SP response derivative time	0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) *4
	Disturbance proportional band	Temperature input: 0.1 to 999.9°C or °F (in units of 0.1°C or °F)
	Disturbance integral time	0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s) *4
	Disturbance derivative time	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: $0.1^\circ\text{C}/\Omega$ max. (100 Ω max.) Platinum resistance thermometer: $0.1^\circ\text{C}/\Omega$ max. (10 Ω max.)
Insulation resistance		20 M Ω 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		E5CD: CX-Thermo version 4.66 or higher E5CD-B: CX-Thermo version 4.67 or higher
Setup Tool port		E5CD/E5CD-B 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)
	Conformed standards	EN 61010-1 (IEC 61010-1) and RCM standards
EMC	EMI:	EN 61326-1 *6
	Radiated Interference Electromagnetic Field Strength:	EN 55011 Group 1, class A
	Noise Terminal Voltage:	EN 55011 Group 1, class A
	EMS:	EN 61326-1 *6
	ESD Immunity:	EN 61000-4-2
	Electromagnetic Field Immunity:	EN 61000-4-3
	Burst Noise Immunity:	EN 61000-4-4
	Conducted Disturbance Immunity:	EN 61000-4-6
Surge Immunity:	EN 61000-4-5	
Voltage Dip/Interrupting Immunity:	EN 61000-4-11	

*1. The indication accuracy of K thermocouples in the -200 to $1,300^\circ\text{C}$ range, T and N thermocouples at a temperature of -100°C max., and U and L thermocouples at any temperatures is $\pm 2^\circ\text{C} \pm 1$ 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 $\pm 3^\circ\text{C}$ max. The indication accuracy of the 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 C/W thermocouples is ($\pm 0.3\%$ of PV or $\pm 3^\circ\text{C}$, whichever is greater) ± 1 digit max. The indication accuracy of PL II thermocouples is ($\pm 0.3\%$ of PV or $\pm 2^\circ\text{C}$, 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.: $\pm 10^\circ\text{C}$ 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. Industrial electromagnetic environment (EN/IEC 61326-1 Table 2)

USB-Serial Conversion Cable

Applicable OS	Windows XP/Vista/7/8/10 *1
Applicable software	CX-Thermo version 4.66 or higher (E5CD-B: version 4.67 or higher)
Applicable models	E5□C-T Series, E5□C Series, E5CB Series, and E5□D Series
USB interface standard	Conforms to USB Specification 2.0.
DTE speed	38,400 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 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 *	9,600, 19,200, 38,400, 57,600, or 115,200 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 E5CD/E5CD-B parameters, start and stop operation, etc. The E5CD/E5CD-B automatically performs communications with PLCs. No communications programming is required. Number of connected Digital Temperature Controllers: 32 max. (Up to 16 for the FX3) Applicable PLCs OMRON PLCs Mitsubishi Electric PLCs KEYENCE PLCs CS Series, CJ Series, CP Series, NJ Series, or NX1P MELSEC Q Series, L Series, FX3 Series, or iQ-R Series KEYENCE KV Series
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.
KEYENCE is a registered trademark of Keyence Corporation.

*Programless communications supports the copying function.

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
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

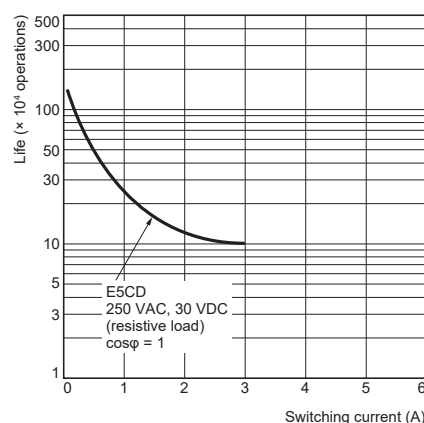
*1. For heater burnout alarms, the heater current will be measured when the control output is ON, and the output will turn ON if the heater current is lower than the set value (i.e., heater burnout detection current value).

*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 38 ms for a control period of 0.1 s or 0.2 s.

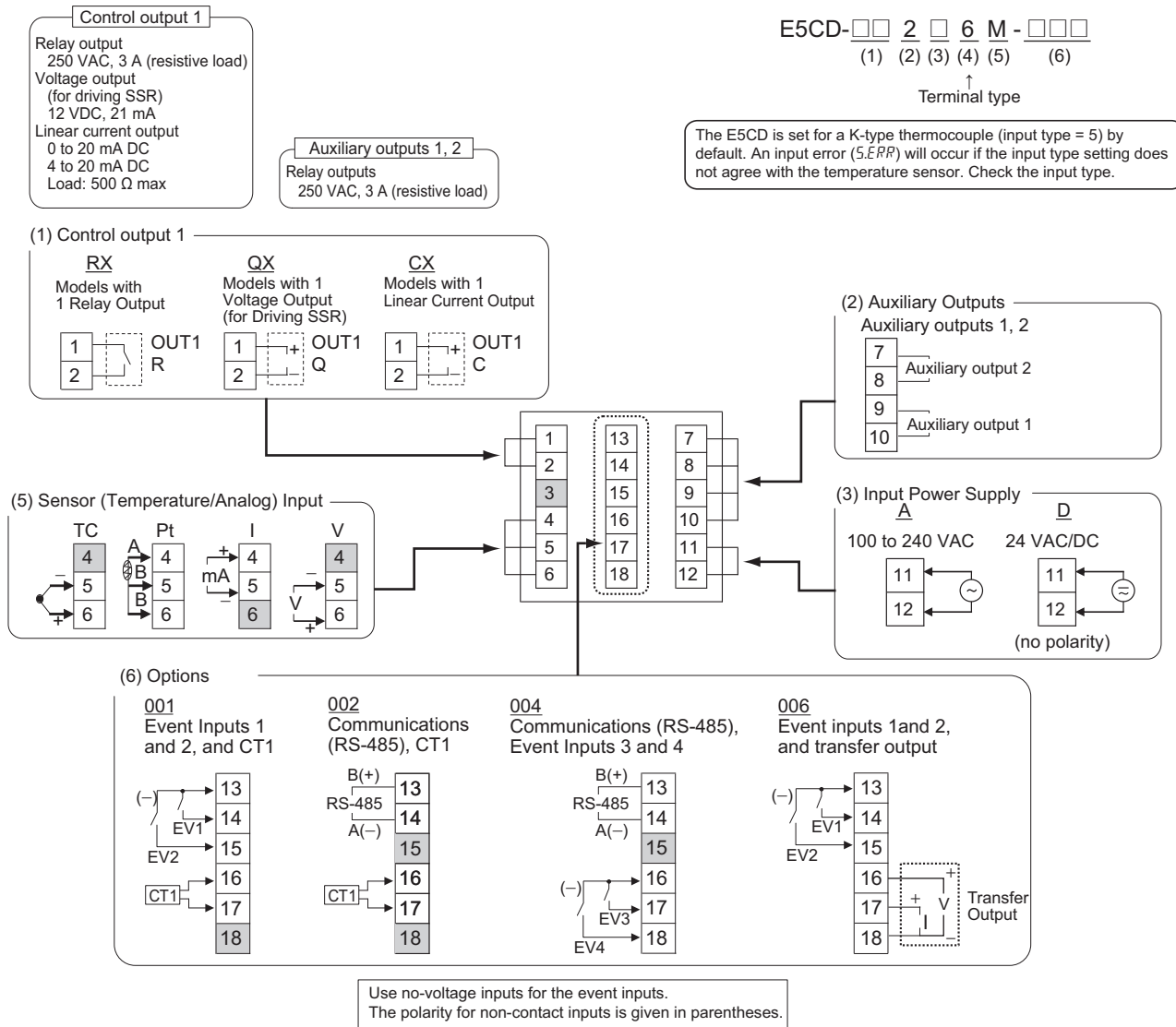
Electrical Life Expectancy Curve for Control Output Relay (Reference Values)



E5CD/E5CD-B

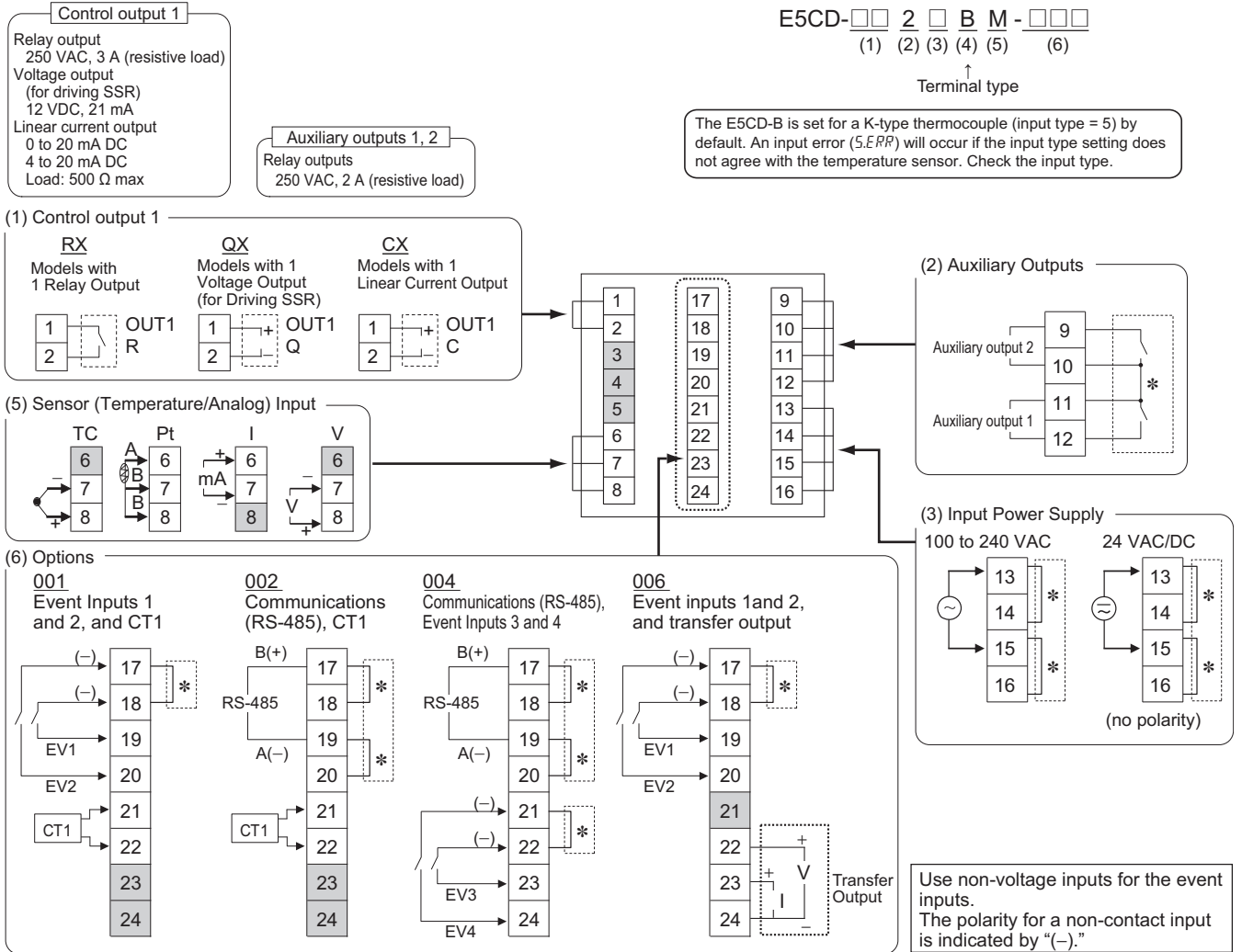
External Connections

E5CD (Screw Terminal Blocks)



- Note:**
1. The application of the terminals depends on the model.
 2. Do not wire the terminals that are shown with a gray background.
 3. 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.
 4. Connect M3 crimped terminals.
 5. Due to UL Listing requirements, use the E54-CT1L or E54-CT3L Current Transformer with the factory wiring (internal wiring). Use a UL category XOBA or XOBA7 current transformer that is UL Listed for field wiring (external wiring) and not the factory wiring (internal wiring).

E5CD-B (Push-In Plus Terminal Blocks)

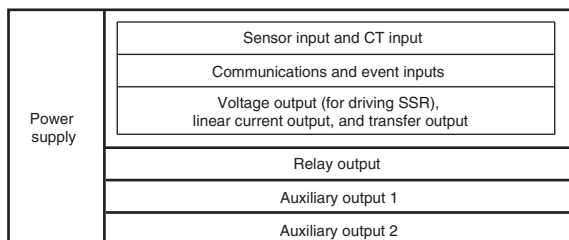


- Note:**
1. The application of the terminals depends on the model.
 2. Do not wire the terminals that are shown with a gray background.
 3. When complying with EMC standards, the cable that connects the sensor must be 30 m or less. If the cable length exceeds 30 m, compliance with EMC standards will not be possible.
 4. Refer to E5CD-B (Push-In Plus terminal block types) on page 48 for wire specifications and wiring methods.

5. Common terminals are indicated with asterisks (*). You can use the input power supply and communications common terminals for crossover wiring. Controllers given below if you use crossover wiring for the input power supply.
 - 100 to 240 VAC Controllers: 16 max.
 - 24 VAC/VDC Controllers: 8 max.
 6. Due to UL Listing requirements, use the E54-CT1L or E54-CT3L Current Transformer with the factory wiring (internal wiring). Use a UL category XOBA or XOBA7 current transformer that is UL Listed for field wiring (external wiring) and not the factory wiring (internal wiring).
- Wiring Example:**
-
- To another E5CD-B

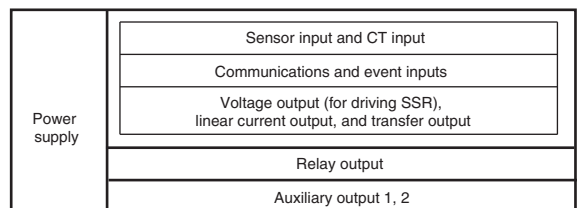
Isolation/Insulation Block Diagrams

E5CD



: Reinforced insulation
 : Functional isolation

E5CD-B

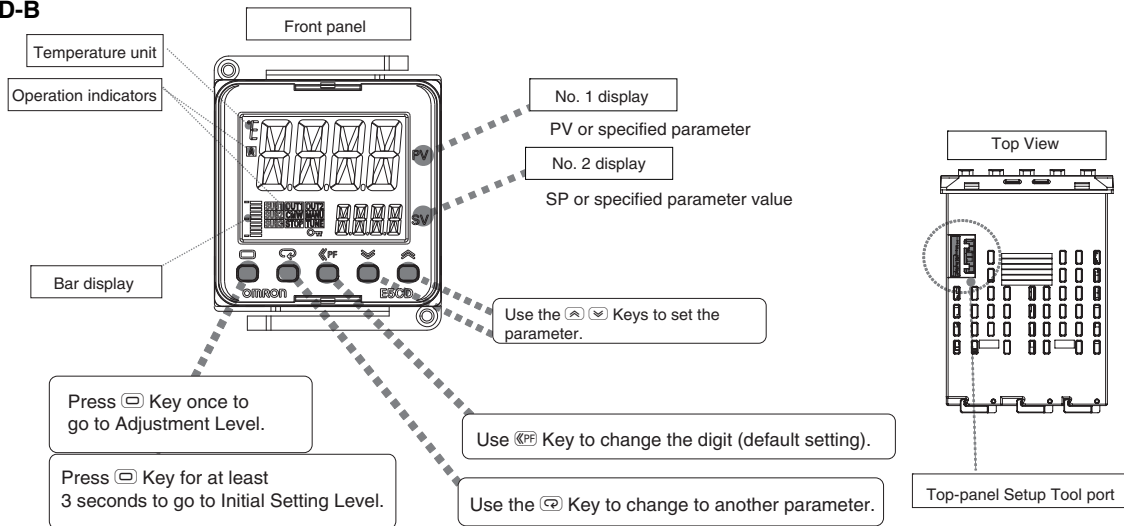


: Reinforced insulation
 : Functional isolation

E5CD/E5CD-B

Nomenclature

E5CD/E5CD-B

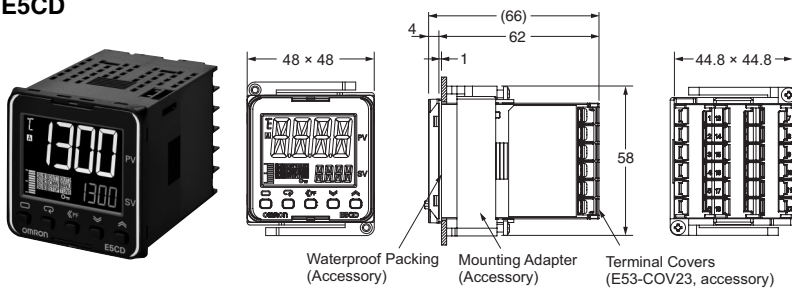


Dimensions

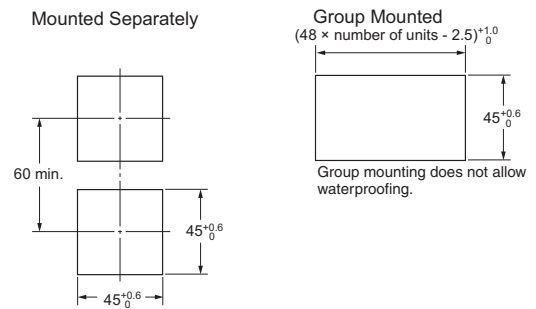
(Unit: mm)

Controllers

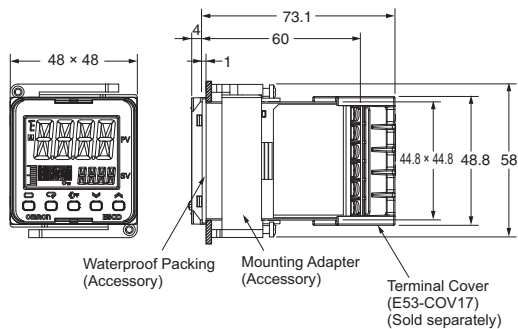
E5CD



Panel Cutout

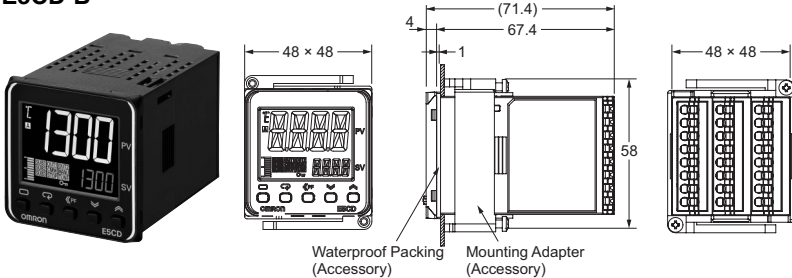


With Terminal Covers (E53-COV17, Sold separately) Mounted



- Recommended panel thickness is 1 to 5 mm.
- Group mounting is not possible in the vertical direction. (Maintain the specified mounting space between Controllers.)
- To mount the Controller so that it is waterproof, insert the waterproof packing onto the Controller.
- When two or more Controllers are mounted, make sure that the surrounding temperature does not exceed the allowable operating temperature specified in the specifications.
- Use a control panel thickness of 1 to 3 mm if the Y92A-48N and a USB-Serial Conversion Cable are used together.
- Use a control panel thickness of 1 to 3 mm if the Y92S-P8 and a USB-Serial Conversion Cable are used together.

E5CD-B



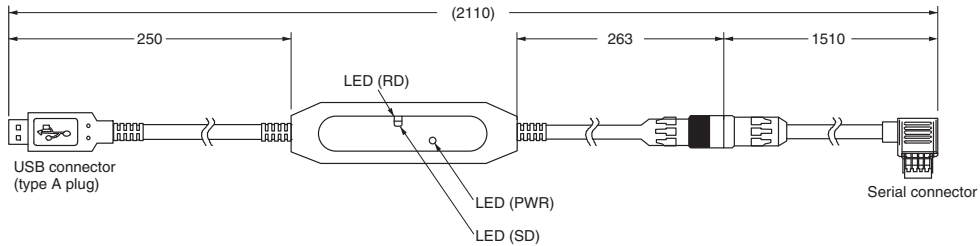
The Setup Tool port is on the top of the Digital Temperature Controller.
 It is used to connect the Digital Temperature Controller to the computer to use the Setup Tool.
 The E58-CIFQ2 USB-Serial Conversion Cable is required to make the connection.
 Refer to the instructions that are provided with the USB-Serial Conversion Cable for the connection procedure.

Note: Do not leave the USB-Serial Conversion Cable connected when you use the Digital Temperature Controller.

Accessories (Order Separately)

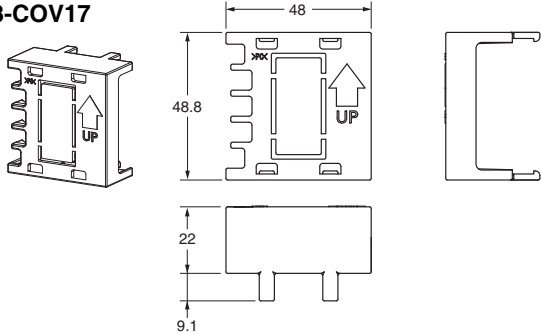
USB-Serial Conversion Cable

E58-C1FQ2



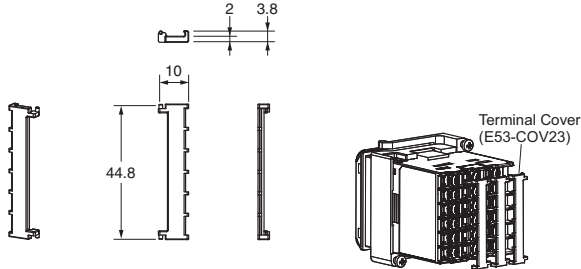
Terminal Covers (Cannot be used on a Push-In Plus terminal block type)

E53-COV17



Terminal Covers (Cannot be used on a Push-In Plus terminal block type)

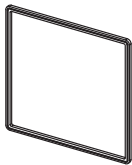
E53-COV23 (Three Covers provided.)



The Terminal Covers are provided with the Digital Temperature Controller. Order the Terminal Cover separately if it becomes lost or damaged.

Waterproof Packing

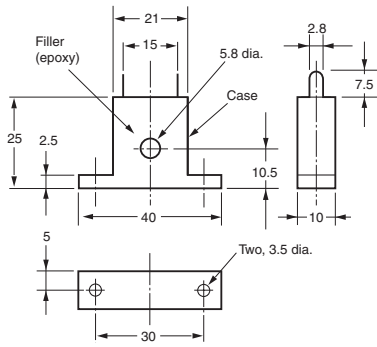
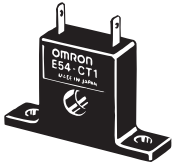
Y92S-P8 (for DIN 48 × 48)



The Waterproof Packing is provided with the Digital 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 as rough standard.)

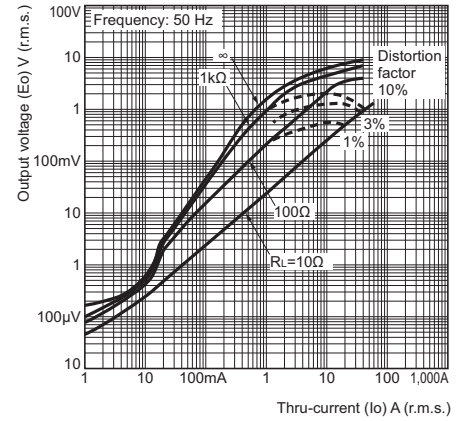
Current Transformers

E54-CT1

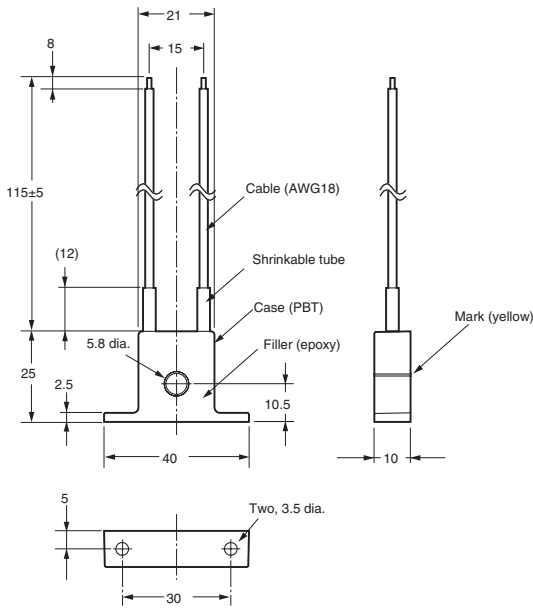
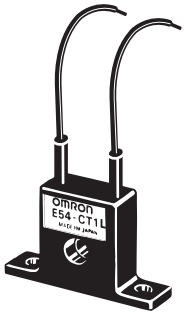


Thru-current (I_o) vs. Output Voltage (E_o)
(Reference Values)
E54-CT1 or E54-CT1L

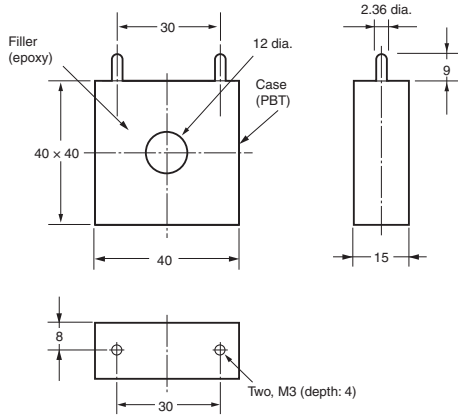
Maximum continuous heater current: 50 A (50/60 Hz)
Number of windings: 400±2
Winding resistance: 18±2 Ω



E54-CT1L

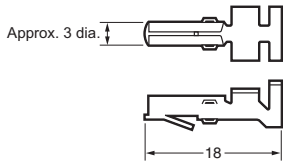


E54-CT3

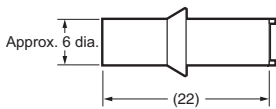


E54-CT3 Accessories

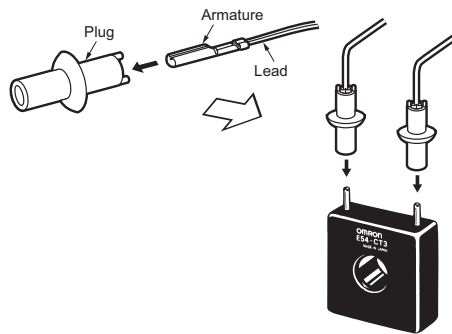
• **Armature**



• **Plug**



Connection Example



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

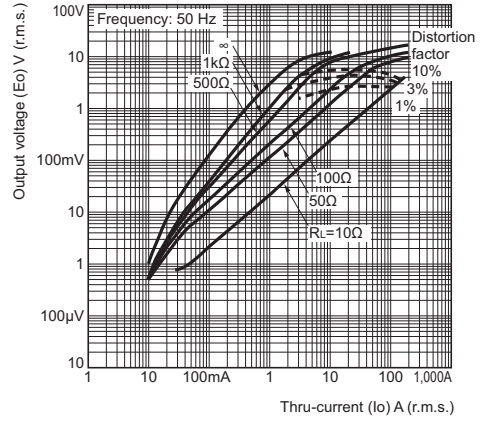
E54-CT3 or E54-CT3L

Maximum continuous heater current: 120 A (50/60 Hz)

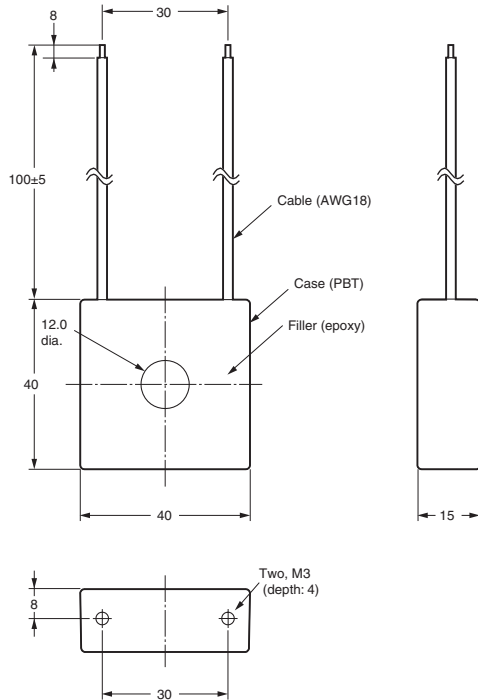
(Maximum continuous heater current for an OMRON Digital Temperature Controller is 50 A.)

Number of windings: 400±2

Winding resistance: 8±0.8 Ω



E54-CT3L

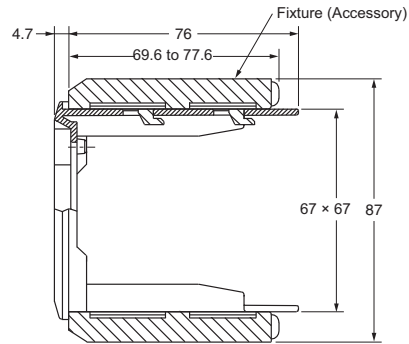
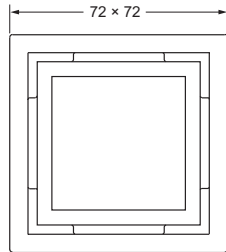
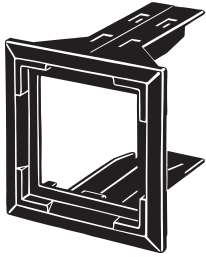


E5CD/E5CD-B

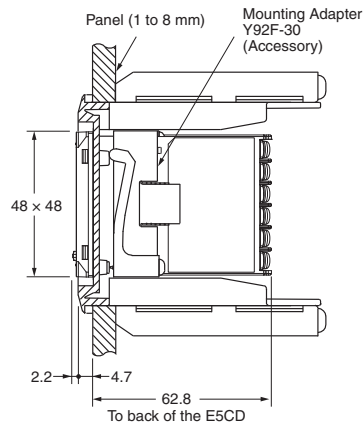
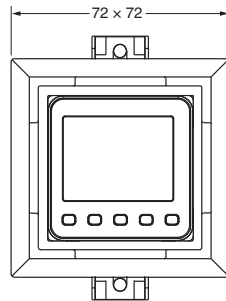
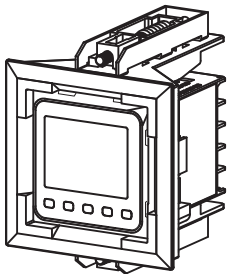
Adapter

Y92F-45

- Note:**
1. Use this Adapter when the Front Panel has already been prepared for the E5B□.
 2. Only black is available.
 3. You cannot use the E58-CIFQ2 USB-Serial Conversion Cable if you use the Y92F-45 Adapter. To use the USB-Serial Conversion Cable to make the settings, do so before you mount the Digital Temperature Controller in the panel.
 4. You cannot use it together with the Y92F-49 Adapter that is enclosed with the Controller.



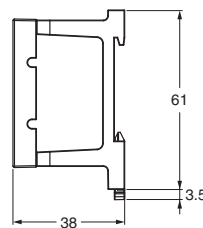
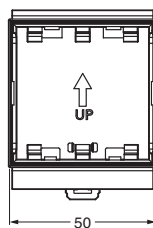
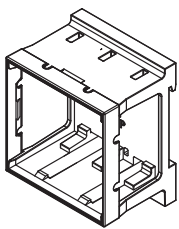
Mounting Example



DIN Track Mounting Adapter (Cannot be used on a Push-In Plus terminal block type)

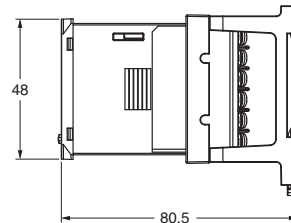
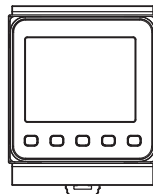
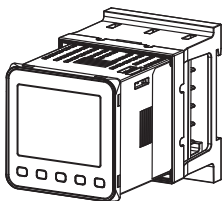
Y92F-52

- Note:** This Adapter cannot be used together with the Terminal Cover.
Remove the Terminal Cover to use the Adapter.

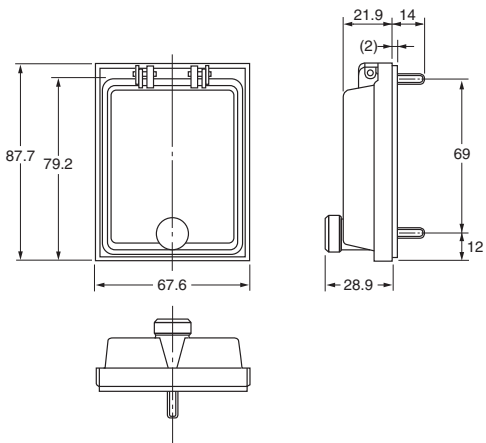


This Adapter is used to mount the E5CD to a DIN Track.
If you use the Adapter, there is no need for a plate to mount in the panel or to drill mounting holes in the panel.

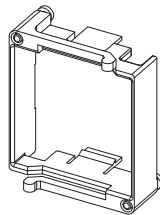
Mounting Example



Waterproof Cover
Y92A-48N



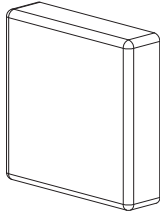
Mounting Adapter
Y92F-49



The Mounting Adapter is provided with the Digital Temperature Controller. Order this Adapter separately if it becomes lost or damaged.

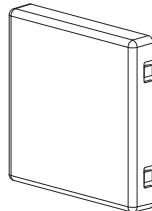
Front Cover
Y92A-48D

Note: This Front Cover cannot be used if the Waterproof Packing is installed.



This Front Cover is soft type. It is able to operate the controller with using this cover.

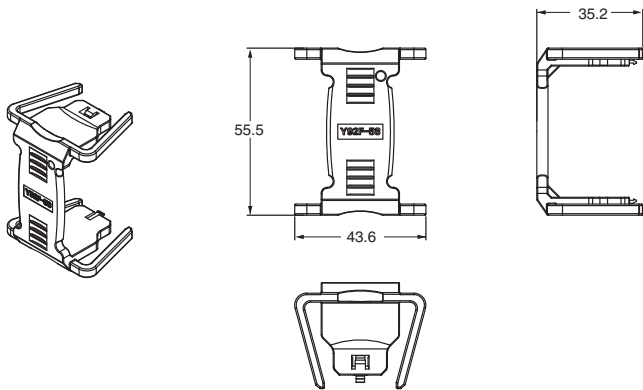
Front Cover
Y92A-48H



This Front Cover is hard type. Please use it for the mis-operation prevention etc.

Draw-out Jig (Cannot be used on a Push-In Plus terminal block type)
Y92F-58

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.



Digital Temperature Controller E5ED/E5ED-B (48 × 96 mm)

**Optimize Control by Detecting Status Changes.
Easily Satisfy Both Productivity and Quality.
Models with Push-In Plus technology Available in the Lineup.**

- Automatic optimization of control for changes in systems (Adaptive Control).
- Functions specialized for packaging machines (Temperature Sensors for Packaging Machines and Automatic Filter Adjustment).
- Function specialized for water-cooled extruders (Water-cooling Output Adjustment).
- Indication data (Power ON Time, Ambient Temperature, and Output ON/OFF Count).
- Basic performance is same as the E5□C standard models.
- Draw-out structure for easy maintenance. (Screw terminal blocks only)



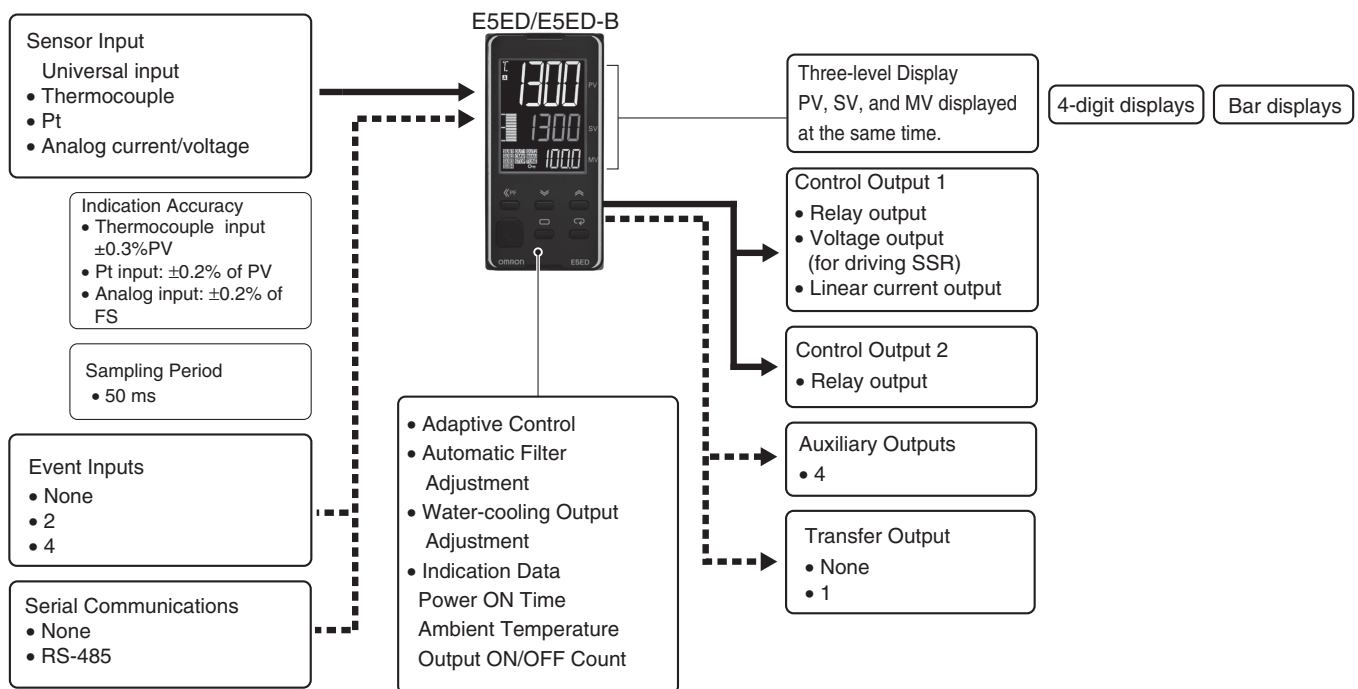
48 × 96 mm
Screw Terminal Blocks
E5ED

48 × 96 mm
Push-In Plus Terminal Blocks
E5ED-B

For the most recent information on models that have been certified for safety standards, refer to your OMRON website.

Refer to *Safety Precautions* on 43.

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□D Digital Temperature Controllers User's Manual (Cat. No. H224)

E5□D Digital Temperature Controllers Communications Manual (Cat. No. H225)

Model Number Legend and Standard Models

Model Number Legend

Models with Screw Terminal Blocks

E5ED-□□ 4 □ 6 M-□□□ (Example: E5ED-RX4A6M-000)

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						
E5ED							48 × 96 mm					
							Control output 1		Control output 2			
	RX						Relay output		None			
	QX						Voltage output (for driving SSR)		None			
	CX						Linear current output		None			
	QR						Voltage output (for driving SSR)		Relay output			
	RR						Relay output		Relay output			
		4					4 (auxiliary outputs 1 and 2 with same common and auxiliary outputs 3 and 4 with same common)					
			A				100 to 240 VAC					
			D				24 VAC/DC					
				6			Screw terminal blocks (with E53-COV24 Terminal Cover), draw-out structure					
					M		Universal input					
								HB alarm and HS alarm	Communications	Event inputs	Transfer Output	
								000	---	---	---	
						*1		004	---	RS-485	2	---
						*2		008	1	RS-485	2	---
						*3		010	1	---	4	---
						*1		022	---	RS-485	4	Provided.

*1. This option can be selected when the control output is CX.

*2. This option can be selected when the control output is RX, QX, QR, or RR.

*3. This option can be selected when the control output is RX or QX.

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.

List of Models

Model	Model
E5ED-RX4A6M-000	E5ED-CX4A6M-000
E5ED-RX4D6M-000	E5ED-CX4D6M-000
E5ED-RX4A6M-008	E5ED-CX4A6M-004
E5ED-RX4D6M-008	E5ED-CX4D6M-004
E5ED-RX4A6M-010	E5ED-CX4A6M-022
E5ED-RX4D6M-010	E5ED-CX4D6M-022
E5ED-QX4A6M-000	E5ED-RR4A6M-000
E5ED-QX4D6M-000	E5ED-RR4A6M-008
E5ED-QX4A6M-008	E5ED-QR4A6M-000
E5ED-QX4D6M-008	E5ED-QR4A6M-008
E5ED-QX4A6M-010	
E5ED-QX4D6M-010	

Model Number Legend

Models with Push-In Plus Terminal Blocks

E5ED-□□ 4 □ B M-□□□ (Example: E5ED-RX4ABM-000)

① ② ③ ④ ⑤ ⑥

Model	① Control outputs 1 and 2	② No. of auxiliary outputs	③ Power supply voltage	④ Terminal type	⑤ Input type	⑥ Options	Meaning				
E5ED							48 × 96 mm				
							Control output 1		Control output 2		
	RX						Relay output		None		
	QX						Voltage output (for driving SSR)		None		
	CX						Linear current output		None		
	QR						Voltage output (for driving SSR)		Relay output		
	RR						Relay output		Relay output		
		4					4 (auxiliary outputs 1 and 2 with same common and auxiliary outputs 3 and 4 with same common)				
			A				100 to 240 VAC				
			D				24 VAC/DC				
				B			Push-In Plus terminal block				
					M		Universal input				
								HB alarm and HS alarm	Communications	Event inputs	Transfer Output
							000	---	---	---	---
						*1	004	---	RS-485	2	---
						*2	008	1	RS-485	2	---
						*3	010	1	---	4	---
						*1	022	---	RS-485	4	Provided.

*1. This option can be selected when the control output is CX.

*2. This option can be selected when the control output is RX, QX, QR, or RR.

*3. This option can be selected when the control output is RX or QX.

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.

List of Models

Model	Model
E5ED-RX4ABM-000	E5ED-CX4ABM-000
E5ED-RX4DBM-000	E5ED-CX4DBM-000
E5ED-RX4ABM-008	E5ED-CX4ABM-004
E5ED-RX4DBM-008	E5ED-CX4DBM-004
E5ED-RX4ABM-010	E5ED-CX4ABM-022
E5ED-RX4DBM-010	E5ED-CX4DBM-022
E5ED-QX4ABM-000	E5ED-RR4ABM-000
E5ED-QX4DBM-000	E5ED-RR4ABM-008
E5ED-QX4ABM-008	E5ED-QR4ABM-000
E5ED-QX4DBM-008	E5ED-QR4ABM-008
E5ED-QX4ABM-010	
E5ED-QX4DBM-010	

Optional Products (Order Separately)

USB-Serial Conversion Cable

Model
E58-CIFQ2

Communication Conversion Cable

Model
E58-CIFQ2-E

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

Terminal Covers

(Cannot be used on a Push-In Plus terminal block type)

Model
E53-COV24 (3pcs)

Note: Terminal Covers are provided with the Digital Temperature Controller.

Waterproof Packing

Model
Y92S-P9

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

Waterproof Cover

Model
Y92A-49N

Front Port Cover

Model
Y92S-P7

Note: This Front Port Cover is provided with the Digital Controller.

Mounting Adapter

Model
Y92F-51 (2pcs)

Note: This Mounting Adapter 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.

Draw-out Jig

(Cannot be used on a Push-In Plus terminal block type)

Model
Y92F-59

CX-Thermo Support Software

Model
EST2-2C-MV4

Note: CX-Thermo version 4.66 or higher is required for the E5ED. CX-Thermo version 4.67 or higher is required for the E5ED-B. For the system requirements for the CX-Thermo, refer to information on the EST2-2C-MV4 on the OMRON website (www.ia.omron.com).

E5ED/E5ED-B

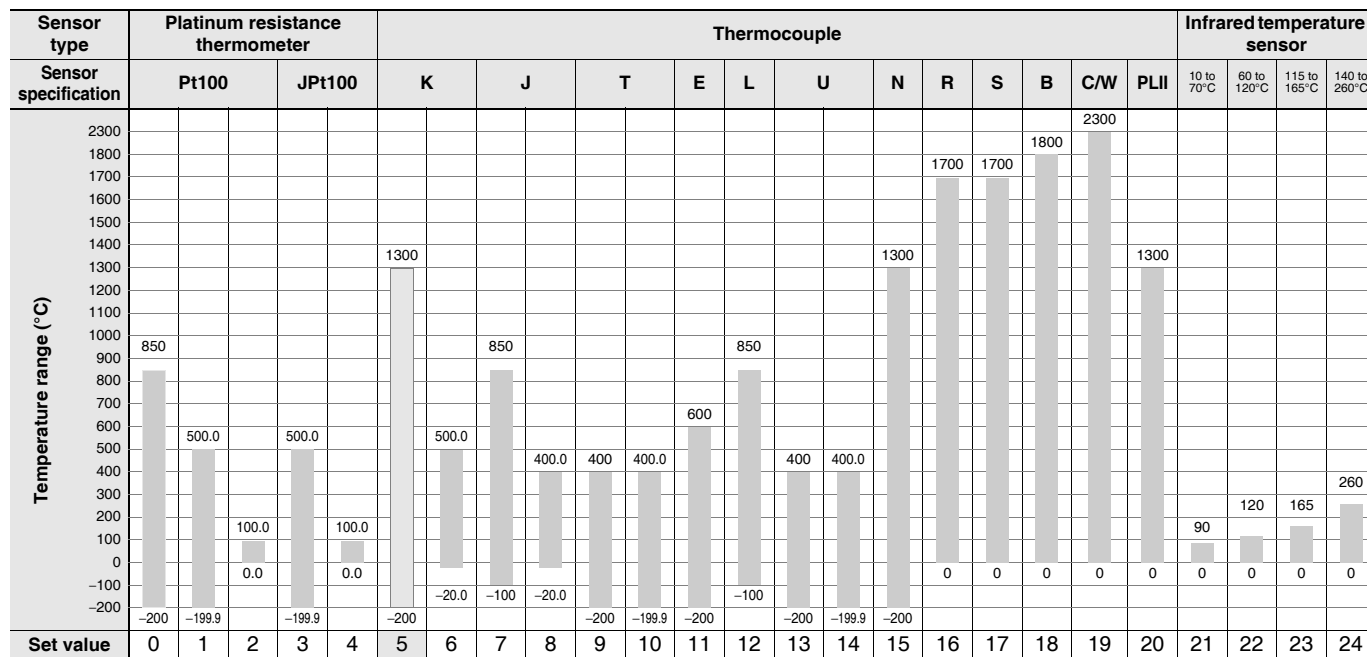
Specifications

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	Models with option selection of 000: 6.6 VA max. at 100 to 240 VAC, and 4.1 VA max. at 24 VAC or 2.3 W max. at 24 VDC All other models: 8.3 VA max. at 100 to 240 VAC, and 5.5 VA max. at 24 VAC or 3.2 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/THB.)	
Control method	ON/OFF control or 2-PID control (with auto-tuning)	
Control output	Relay output	SPST-NO, 250 VAC, 5 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: 40 mA, with short-circuit protection circuit (The maximum load current is 21 mA for models with two control outputs.)
	Linear current output	4 to 20 or 0 to 20 mA DC, Load: 500 Ω max., Resolution: Approx. 10,000
Auxiliary output	Number of outputs	4
	Output specifications	SPST-NO relay outputs, 250 VAC, 2 A (resistive load) Electrical life: 100,000 operations, Minimum applicable load: 10 mA at 5 V (reference values)
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 (depends on model): Transfer output type
	Output specifications	Current output: 4 to 20 mA DC, Load: 500 Ω, Resolution: Approx. 10,000 Linear voltage output: 1 to 5 V DC, Load: 1 kΩ min., Resolution: Approx. 10,000
Setting method	Digital setting using front panel keys	
Indication method	11-segment digital display, individual indicators, and bar display Character height: PV: 18.0 mm, SV: 11.0 mm, MV: 7.8 mm Three displays Contents: PV/SV/MV, PV/SV/Multi-SP, PV/SV/Remaining soak time, etc. Numbers of digits: 4 digits each for PV, SV, and MV displays	
Multi SP	Up to eight set points (SP0 to SP7) can be saved and selected using the event inputs, key operations, or serial communications.	
Bank switching	None	
Other functions	Adaptive control, automatic filter adjustment, water-cooling output adjustment, indication data (power ON time monitor, ambient temperature monitor, and control output ON/OFF count monitors), parameter masking, operation after power ON, manual output, heating/cooling control, loop burnout alarm, SP ramp, 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, run/stop, protection functions, extraction of square root, MV change rate limit, logic operations, temperature status display, simple programming, 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 C1602-2015, 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