Digital Temperature Controller (48 x 96 mm)

E5EC-QX4DBM-008

Image

Digital Temperature Controller, 48 x 96 mm, Voltage output (for driving SSR), Auxiliary output: 4, Power supply voltage: 24 VAC/VDC, Universal inputs, HB alarm and HS alarm: 1, RS-485, 2 event inputs, Push-In Plus terminal block model

Shape	DIN 48 x 96
Terminal type	Push-In Plus Terminal Block
Input type	Thermocouple/Platinum resistance thermometer/Infrared Thermosensor/Analog input
Control output 1	Voltage output (for driving SSR)
Control output 2	None
Number of total auxiliary output	4 point
Power supply voltage	24 VAC (50/60 Hz) 24 VDC
Number of event input	2 point
Heater burnout /SSR failure detector	1 point
Communications method	RS-485 (two-wire, half duplex)

Ratings / Performance

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Ratings

Shape		DIN 48 x 96
Fixed/Programmable		Fixed
Power supply voltage		24 VAC (50/60 Hz) 24 VDC
Allowable voltage variable range		85 to 110% of the power supply voltage
Power consumption		3.2 W max. (at 24 VDC) 5.5 VA max. (at 24 VAC)
Input	**Number of input points**	1 point
	Temperature input	Thermocouple: K, J, T, E, L, U, N, R, S, B, C/W, PLII Platinum resistance thermometer: Pt100, JPt100 Infrared Thermosensor: 10 to 70 ℃, 60 to 120 ℃, 115 to 165 ℃, 140 to 260 ℃
	Analog input	4 to 20 mA, 0 to 20 mA, 1 to 5 V, 0 to 5 V, 0 to 10 V
	Input impedance	Current input: 150 Ω max., voltage input: 1 MΩ min. (Applicable when connecting 1:1 to ES2-HB-N/THB-N.)
Control method		ON/OFF or 2-PID control with auto-tuning
Control output	**Number of total control output**	1 point
	Control output 1	Voltage output (for driving SSR)

	Control output 2	None
	Voltage output (for driving SSR)	1 point 12 VDC±20%, Maximum load current: 40 mA, PNP, with short-circuit protection circuit
Auxiliary output	**Number of total auxiliary output**	4 point
	Relay output	SPST-NO, 250 VAC, 2 A (resistive load), electrical life: 100,000 operations (minimum applicable load: 5 V, 10 mA)
Event input		2 point Contact input: ON: 1 kΩ max., OFF: 100 kΩ min. No-contact input: ON: Residual voltage 1.5 V max., OFF: Leakage current 0.1 mA max. Current flow: Approx. 7 mA per point
Setting method		Digital setting using front panel keys
Indication method		11-segment digital display and individual indicators
Multi SP functions		Up to eight set points (SP0 to SP7) can be saved and selected using the event inputs, key operations, or serial communications.
Sampling period		50 ms
Hysteresis		Temperature input: 0.1 to 999.9 ℃ or °F (in units of 0.1 ℃ or °F) Analog input: 0.01 to 99.99% FS (in units of 0.01% FS)
Proportional band		Temperature input: 0.1 to 999.9 ℃ or °F (in units of 0.1 ℃ or °F) Analog input: 0.1% to 999.9% FS (in units of 0.1% FS)
Integral time		0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s)
Derivative time		0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s)
for cooling	**Proportional band (P)**	Temperature input: 0.1 to 999.9 ℃ or °F (in units of 0.1 ℃ 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)
	Derivative time (D)	0 to 9999 s (in units of 1 s), 0.0 to 999.9 s (in units of 0.1 s)
Control period		0.1 s, 0.2 s, 0.5 s, 1 to 99 s (in units of 1 s)
Manual reset value		0.0 to 100.0% (in units of 0.1%)
Insulation resistance		20 MΩ min. (at 500 VDC)
Dielectric strength		3,000 VAC 50/60 Hz 1 min (Between current-carrying terminals of different polarity)
Vibration resistance		Destruction: 10 to 55 Hz, 20 m/s^2 for 2 h each in X, Y, and Z directions Malfunction: 10 to 55 Hz, 20 m/s^2 for 10 min each in X, Y, and Z directions
Shock resistance		Destruction: 300 m/s^2, 3 times each in X, Y, and Z directions Malfunction: 100 m/s^2, 3 times each in X, Y, and Z directions
Ambient temperature (Operating)		-10 to 55 ℃ (with no freezing or condensation) For 3-year warranty with standard mounting: -10 to 50 ℃ (with no freezing or condensation)
Ambient temperature (Storage)		-25 to 65 ℃ (with no freezing or condensation)
Ambient humidity (Operating)		25 to 85 %
Altitude		2000 m max.
Degree of protection		Front panel: IP66, Rear case: IP20, Terminal section: IP00
Memory protection		Non-volatile memory (number of writes: 1,000,000)
Case color		Black
Terminal type		Push-In Plus Terminal Block
Accessories		Mounting adapter, Waterproof packing, Front Port Cover
Weight		Main Unit: Approx. 210 g Adapter: Approx. 4 g x 2

Sold separately	USB Serial Conversion Cable: E58-CIFQ2 Communications Conversion Cable: E58-CIFQ2-E Waterproof packing: Y92S-P9 Waterproof Cover: Y92A-49N Front Port Cover: Y92S-P7 Adapter: Y92F-51 CX-Thermo Support Software: EST2-2C-MV4 Current Transformer (CT): E54-CT1/E54-CT1L/E54-CT3/E54-CT3L

Accuracy

Indication accuracy	Thermocouple: (±0.3% of indicated value or ±1 ℃, whichever is greater) ±1 digit max. Platinum resistance thermometer: (±0.2% of indicated value or ±0.8 ℃, whichever is greater) ±1 digit max. Analog input: ±0.2% FS ±1 digit max. (The indication accuracy of K thermocouples in the -200 to 1300 ℃ range, T and N thermocouples at a temperature of -100 ℃ max., and U and L thermocouples at any temperatures is ±2 ℃ ±1 digit max. B thermocouple at a temperature of 400 ℃ max. is not specified. B thermocouples in the 400 to 800 ℃ range is ±3 ℃ max. R and S thermocouples at a temperature of 200 ℃ max. is ±3 ℃ ±1 digit max. C/W thermocouples is (±0.3% PV or ±3 ℃, whichever is greater) ±1 digit max. PL II thermocouples is (±0.3% PV or ±2 ℃, whichever is greater) ±1 digit max.)
Influence of temperature/voltage	Thermocouple: R, S, B, C/W, and PLII: (±1% of indicated value or ±10 ℃, whichever is greater) ±1 digit max. Others: (±1% of indicated value or ±4 ℃, whichever is greater) ±1 digit max.. However K thermocouple at -100 ℃ max.: ±10 ℃ max. Platinum resistance thermometer: (±1% of indication value or ±2 ℃, whichever is greater) ±1 digit max. Analog input: ±1% FS ±1 digit max. CT input: ±5% FS ±1 digit max. Ambient temperature: -10 to 23 to 55 ℃, Voltage range: -15 to 10% of rated voltage
Influence of EMS.	Thermocouple: R, S, B, C/W, and PLII: (±1% of indicated value or ±10 ℃, whichever is greater) ±1 digit max. Others: (±1% of indicated value or ±4 ℃, whichever is greater) ±1 digit max.. However K thermocouple at -100 ℃ max.: ±10 ℃ max. Platinum resistance thermometer: (±1% of indication value or ±2 ℃, whichever is greater) ±1 digit max. Analog input: ±1% FS ±1 digit max.
Influence of signal source resistance	Thermocouple: 0.1℃/Ω max. (100 Ω max.) Platinum resistance thermometer: 0.1℃/Ω max. (10 Ω max.)

Communication characteristics

Transmission path connection	Multidrop (RS-485)
Communications method	RS-485 (two-wire, half duplex)
Synchronization method	Start-stop synchronization
Protocol	CompoWay/F, Modbus
Communication speed	9600, 19200, 38400, 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 CRC-16 Modbus
Flow control	None
Interface	RS-485
Retry function	None

Communications buffer	217 bytes
Communications response send delay	0 to 99 ms (Default: 20 ms)

Communication function

Programless communications function	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)
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.

Heater burnout /SSR failure detector

CT input (for heater current detection)	1 point
Max. heater current	Single-phase 50 A AC
Input current indication accuracy	±5% FS ±1 digit max.
Heater burnout alarm setting range	0.1 to 49.9 A (in units of 0.1 A) Minimum detection ON time: 100 ms (The value is 30 ms for a control period of 0.1 s or 0.2 s)
SSR failure detector alarm setting range	0.1 to 49.9 A (in units of 0.1 A) Minimum detection OFF time: 100 ms (The value is 35 ms for a control period of 0.1 s or 0.2 s)

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Dimensions

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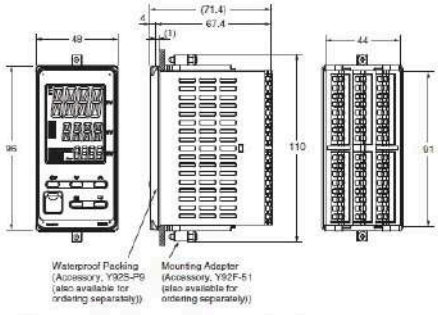
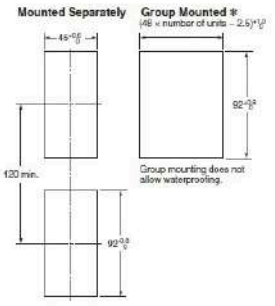


- Setup Tool ports are provided as standard feature. Use these ports to connect a computer to the Digital Temperature Controller. The E58-CIFQ2 USB-Serial Conversion Cable is required to connect to the port on the top panel. The E58-CIFQ2 USB-Serial Conversion Cable and E58-CIFQ2-E Communications Conversion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



- Recommended panel thickness is 1 to 8 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.

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Connection diagram

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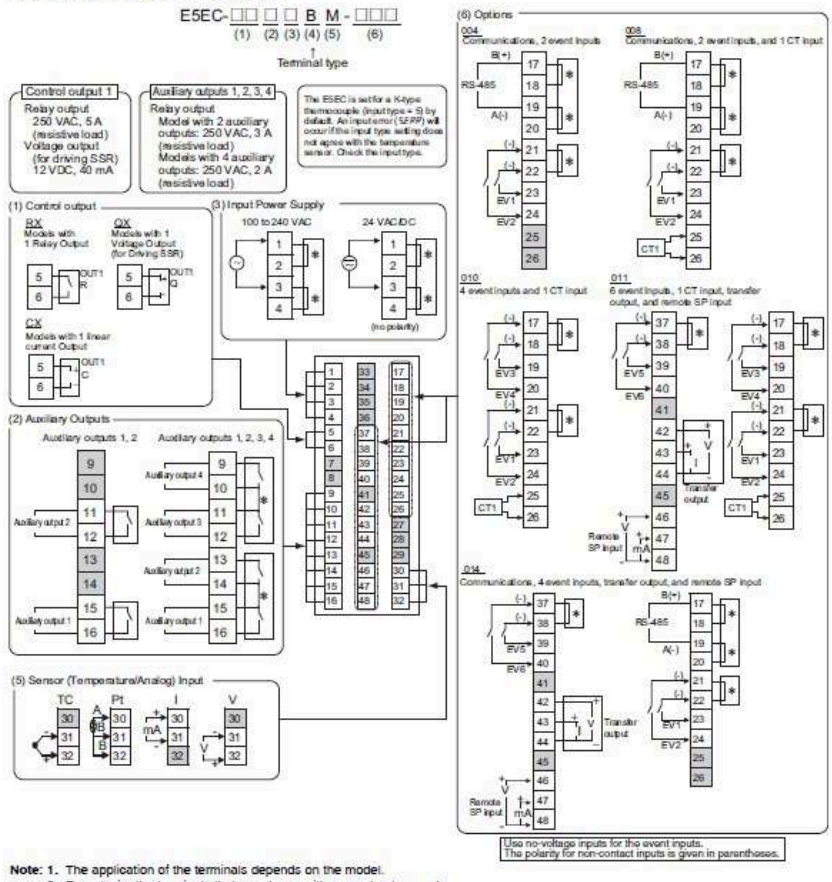
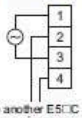
E5EC-B (Push-In Plus Terminal Blocks)



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 *Wiring Precautions for E5□C-B (Controllers with Push-In Plus Terminal Blocks)* on page 126 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. Do not exceed the maximum number of Temperature 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.

Wiring Example:



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).

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Input ranges list

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Thermocouple/Platinum Resistance Thermometer (Universal inputs)

Sensor type	Platinum resistance thermometer					Thermocouple														Infrared temperature sensor			
Sensor specification	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	90	120	165	260
	-200	-199.9	0.0	-199.9	0.0	-200	-20.0	-100	-20.0	-200	-199.9	-200	-100	-200	-199.9	-200	0	0	100	0	0	0	0	0	0
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
L: Fe-CuNi, DIN 43710-1985
U: Cu-CuNi, DIN 43710-1985
C/W: W5Re/W26Re, JIS C 1602-2015, ASTM E988-1990
JPt100: JIS C 1604-1989, JIS C 1606-1989
Pt100: JIS C 1604-1997, IEC 60751
PL II: According to Platinel II electromotive force charts from BASF (previously Engelhard)

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

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