

### One-board Multipoint Temperature Controller which can be Built into Communications Equipment

- A high-speed scanning operation of 0.5 s max. is possible.
- Detecting heater burnout and open- and short-mode SSR failures.
- Non-contact sensor input selection method assures high reliability and long life.
- Models with the suffix M incorporate connectors, thus assuring efficient operation.
- Heating- and cooling-output and fuzzy-control models are available.

### Ordering Information

#### ■ Temperature Controllers Standard Models

Sensor input connection	No. of points	Heater-burnout detection	Communications	Thermocouple	Resistance thermometers
Terminal block	4	No	RS-232C	E5ZD-4A01KP-E	E5ZD-4A01P-E
			RS-422	E5ZD-4A02KP-E	E5ZD-4A02P-E
			RS-485	E5ZD-4A03KP-E	E5ZD-4A03P-E
		Yes	RS-232C	E5ZD-4H01KP-E	E5ZD-4H01P-E
			RS-422	E5ZD-4H02KP-E	E5ZD-4H02P-E
			RS-485	E5ZD-4H03KP-E	E5ZD-4H03P-E
	6	No	RS-232C	E5ZD-6A01KP-E	E5ZD-6A01P-E
			RS-422	E5ZD-6A02KP-E	E5ZD-6A02P-E
			RS-485	E5ZD-6A03KP-E	E5ZD-6A03P-E
		Yes	RS-232C	E5ZD-6H01KP-E	E5ZD-6H01P-E
			RS-422	E5ZD-6H02KP-E	E5ZD-6H02P-E
			RS-485	E5ZD-6H03KP-E	E5ZD-6H03P-E
8	No	RS-232C	E5ZD-8A01KP-E	E5ZD-8A01P-E	
		RS-422	E5ZD-8A02KP-E	E5ZD-8A02P-E	
		RS-485	E5ZD-8A03KP-E	E5ZD-8A03P-E	
	Yes	RS-232C	E5ZD-8H01KP-E	E5ZD-8H01P-E	
		RS-422	E5ZD-8H02KP-E	E5ZD-8H02P-E	
		RS-485	E5ZD-8H03KP-E	E5ZD-8H03P-E	
Connector	8	Yes	RS-422	E5ZD-8H02KJM-E (see note)	E5ZD-8H02PM-E
			RS-485	E5ZD-8H03KJM-E (see note)	E5ZD-8H03PM-E

## Heating- and Cooling-output Models

Sensor input connection	No. of points	Heater-burnout detection	Communications	Thermocouple	Resistance thermometers
Terminal block	4	No	RS-232C	E5ZD-4VA01KP-E	E5ZD-4VA01P-E
			RS-422	E5ZD-4VA02KP-E	E5ZD-4VA02P-E
			RS-485	E5ZD-4VA03KP-E	E5ZD-4VA03P-E
		Yes	RS-232C	E5ZD-4VH01KP-E	E5ZD-4VH01P-E
			RS-422	E5ZD-4VH02KP-E	E5ZD-4VH02P-E
			RS-485	E5ZD-4VH03KP-E	E5ZD-4VH03P-E
	6	No	RS-232C	E5ZD-6VA01KP-E	E5ZD-6VA01P-E
			RS-422	E5ZD-6VA02KP-E	E5ZD-6VA02P-E
			RS-485	E5ZD-6VA03KP-E	E5ZD-6VA03P-E
		Yes	RS-232C	E5ZD-6VH01KP-E	E5ZD-6VH01P-E
			RS-422	E5ZD-6VH02KP-E	E5ZD-6VH02P-E
			RS-485	E5ZD-6VH03KP-E	E5ZD-6VH03P-E
	8	No	RS-232C	E5ZD-8VA01KP-E	E5ZD-8VA01P-E
			RS-422	E5ZD-8VA02KP-E	E5ZD-8VA02P-E
			RS-485	E5ZD-8VA03KP-E	E5ZD-8VA03P-E
Yes		RS-232C	E5ZD-8VH01KP-E	E5ZD-8VH01P-E	
		RS-422	E5ZD-8VH02KP-E	E5ZD-8VH02P-E	
		RS-485	E5ZD-8VH03KP-E	E5ZD-8VH03P-E	

## Fuzzy-control Models

Sensor input connection	No. of points	Heater-burnout detection	Communications	Thermocouple	Resistance thermometers
Terminal block	8	No	RS-232C	E5ZD-8FA01KP-E	E5ZD-8FA01P-E
			RS-422	E5ZD-8FA02KP-E	E5ZD-8FA02P-E
			RS-485	E5ZD-8FA03KP-E	E5ZD-8FA03P-E
		Yes	RS-232C	E5ZD-8FH01KP-E	E5ZD-8FH01P-E
			RS-422	E5ZD-8FH02KP-E	E5ZD-8FH02P-E
			RS-485	E5ZD-8FH03KP-E	E5ZD-8FH03P-E
Connector	8	Yes	RS-422	E5ZD-8FH02KJM-E (see note)	E5ZD-8FH02PM-E
			RS-485	E5ZD-8FH03KJM-E (see note)	E5ZD-8FH03PM-E

**Note:** A Terminal Block for thermocouple input is required when connecting a thermocouple to the E5ZD-8H02KJM-E, E5ZD-8H03KJM-E, E5ZD-8FH02KJM-E or E5ZD-8FH03KJM-E.

## ■ Temperature Range

Input		Thermocouples		Resistance thermometers	
		K (CA) Chromel vs. alumel/ J (IC) Iron vs. constantan		JPt100/Pt100	
Range	%C	0 to 400	0 to 600	-100.0 to 200.0	0 to 500
	%F	0 to 700	0 to 1,100	-100.0 to 390.0	0 to 930
Resolution (%C/%F)		1		0.1	1

**Note:** The temperature range of the E5ZD is factory set to a range of 0% C to 400% C (K(CA)) or -100.0% C to 200.0% C (JPt100) before shipping. Use the DIP switches of the E5ZD to change the temperature range.

**Model Number Legend:**

E5ZD - 

1	2	3	4	5	6	7	

 - E

1. No. of points
2. Standard, heating- and cooling-output, or fuzzy-control
3. Heater burnout detection
4. Communications function
5. Sensor input
6. Wiring
7. Language (English)

**Terminal Blocks**

Type	Model
For thermocouple input	E54-TR011 (4-point input)
For I/O	XW2B-20G4, XW2B-20G5

**Current Transformers (CT)**

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

**Note:** The above CTs are not provided with the E5ZD. The E54-CT2 provided with the E5EH, or E5EL cannot be used with the E5ZD.

**Recommended Power Supply****S82J Switching Power Supply**

Construction	Capacity	Output current		
		24 VDC	100 VAC input	200 VAC input
Open-frame	25 W	1.1 A	S82J-0224	S82J-2224
	50 W	2.1 A	S82J-0524	S82J-2524
	100 W	4.5 A	S82J-1024	S82J-2024
Covered	25 W	1.1 A	S82J-5224	S82J-6224
	50 W	2.1 A	S82J-5524	S82J-6524
	100 W	4.5 A	S82J-5024	S82J-6024

**Cable, Relay Terminal, Connector Terminal Conversion Unit, and Connectors****Cable**

l	Model
2,000 mm	G79-200C

**I/O Relay Terminal**

Classification	I/O points	Internal I/O circuit common	Rated voltage	Model
Output	16 points	NPN correspondence (+ common)	12, 24 VDC	G7TC-OC16-1

**Note:** The G7TC-OC16-1 is an UL- and CSA-approved model.

**Connector Terminal Conversion Unit**

Number of pins	Model
20	XW2B-20G5

**Connectors (CN1, CN2/CN301, CN302)**

Lead Wires	IDC Connector (64-contact)
Flat Cable	DIN Flat Cable Connector (64-contact)

# Specifications

## ■ Ratings

<b>Power supply voltage</b>	24 VDC
<b>Operating voltage range</b>	90% to 110% of rated supply voltage
<b>Power consumption</b>	E5ZD-4/-6___-E: Approx. 15 W E5ZD-8___-E: Approx. 20 W E5ZD-8_H_M-E: Approx. 17 W
<b>Input</b>	Thermocouple (K/J) or platinum resistance thermometer (Pt100/JPt100)
<b>Current Transformer input</b>	Connect a exclusive Current Transformer (E54-CT1 or E54-CT3)
<b>Control points</b>	4, 6, or 8 points
<b>Control outputs</b>	E5ZD-4/-6___-E Voltage: 40 mA, 12 VDC max. Open collector (NPN): 50 mA, 30 VDC max. E5ZD-8___-E Voltage: 30 mA, 12 VDC max. Open collector (NPN): 50 mA, 30 VDC max. E5ZD-8_H_M-E Open collector (NPN): 50 mA, 30 VDC max. E5ZD-4/-6V___-E Heating-control output Voltage: 40 mA, 12 VDC max. Open collector (NPN): 50 mA, 30 VDC max. Cooling-control output Open collector (NPN): 50 mA, 30 VDC max. E5ZD-8V___-E Heating-control output Voltage: 30 mA, 12 VDC max. Open collector (NPN): 50 mA, 30 VDC max. Cooling-control output Open collector (NPN): 50 mA, 30 VDC max.
<b>Alarm outputs</b>	Open collector (NPN), 50 mA, 30 VDC max.
<b>Control modes</b>	E5ZD-8F___-E: ON/OFF control or hybrid of fuzzy and PID control with feed-forward circuitry (with auto-tuning) Other models: ON/OFF control or PID control with feed-forward circuitry (with auto-tuning)
<b>Number of memory banks</b>	8
<b>Memory bank designation inputs</b>	Contact: ON: 1 kW max., OFF: 100 kW min. No-contact: ON: Residual voltage of 2 V max., OFF: Leakage current: 1 mA max.
<b>Ambient temperature</b>	Operating: -10°C to 55°C (with no icing) Storage: -25°C to 65°C (with no icing)
<b>Ambient humidity</b>	Operating: 35% to 85% (with no condensation)

## ■ Temperature Controller Characteristics

Setting accuracy	+0.5% FS +1 digit max.
Designation accuracy	+0.5% FS +1 digit max.
Hysteresis	Heating side: 0.0% C/%F to 99.9% C/%F Cooling side: 0.0% C/%F to 99.9% C/%F (see note 1)
Proportional band	Heating side: 0.0% C/%F to 999.9% C/%F Cooling side: Cooling coefficient x proportional band on the heating side (see note 1)
Integral time	0 to 3,999 s (for both heating and cooling)
Derivative time	0 to 3,999 s (for both heating and cooling)
Cooling coefficient	0.0 to 10.0 (see note 1)
Dead band/overlap band	-999% to 999% C/%F (see note 1)
Control period	Heating side: 1 to 99 s Cooling side: 1 to 99 s (see note 1)
Fuzzy intensity	0% to 99% (see note 2)
Fuzzy scale 1	0.2% C/%F to 999.9% C/%F (see note 2)
Fuzzy scale 2	0.02% C/%F to 99.99% C/s or %F/s (see note 2)
Alarm output setting range (alarms 1 and 2)	-999% C/%F to 1,999% C/%F (in units of 1% C/%F) -999.9% C/%F to 1,999.9% C/%F (in units of 0.1% C/%F)
Sampling period	E5ZD-4____-E: 0.4 s for 4 points E5ZD-6____-E: 0.5 s for 6 points E5ZD-8____-E: 0.5 s for 8 points
Input shift range	-99.9% C/%F to 99.9% C/%F
Insulation resistance	20 MW min. (at 500 VDC) between terminal block and sensor input terminal
Dielectric strength	500 VAC, 50/60 Hz for 1 min between terminal block and sensor input terminal
Memory protection	Non-volatile memory, 10 yrs., max. number of writes: 10,000
Weight	E5ZD-4/-6____-E: Approx. 550 g E5ZD-8____-E: Approx. 800 g E5ZD-8_H__M-E: Approx. 650 g

**Note:** 1. For heating- and cooling-output models only.  
2. For fuzzy-control models only.

## ■ Heater Burnout and SSR Failure Detection Characteristics (HB and HS Alarm Functions)

Max. heater current	50 A , single-phase
Input current monitoring accuracy	+5% FS +1 digit max. (between 0 and 50 A)
Heater burnout detection level setting range	0.1 to 50.0 A (in units of 0.1 A) (see note 1)
HS alarm detection current	0.5 A min.
HB alarm min. ON detection time	0.2 s (see note 2)
HS alarm min. OFF detection time	0.2 s (see note 3)

**Note:** 1. Heater burnout detection is canceled when the level is set to 0.0 A.  
2. Heater burnout detection and heater current measurement will not be made when control output is not ON for at least 0.2 seconds.  
3. Heater short-circuit detection will not be made when control output is not OFF for at least 0.2 seconds.

## ■ Current Transformer Ratings

Hole diameter	E54-CT1: 5.8 dia.; E54-CT3: 12 dia.
Max. continuous heater current	50 A
Dielectric strength	1,000 VAC for 1 min
Vibration resistance	50 Hz (approx. 10G)
Weight	E54-CT1: approx. 11.5 g, E54-CT3: approx. 50 g
Accessories (E54-CT3)	Contacts: 2, Plugs: 2

## ■ Communications

Item	RS232C, RS422	RS485
Transmission method	4-wire, half-duplex	2-wire, half-duplex
Synchronization method	Start-stop synchronization	
Baud rate	150/300/600/1,200/2,400/4,800/9,600 bps	
Transmission code	ASCII (7-bit)	
Communications	Set temperature, process value, set alarms 1 and 2, alarm modes 1 and 2, hysteresis, proportional band, integral time, derivative time, input shift, output variable, Auto-tuning (AT) start/stop, non-reversed and reversed operating mode, heater burnout detection setting, control start/stop, control memory bank, set value initialization, non-volatile memory set value transfer, status (see note 4), cooling coefficient, fuzzy intensity.	

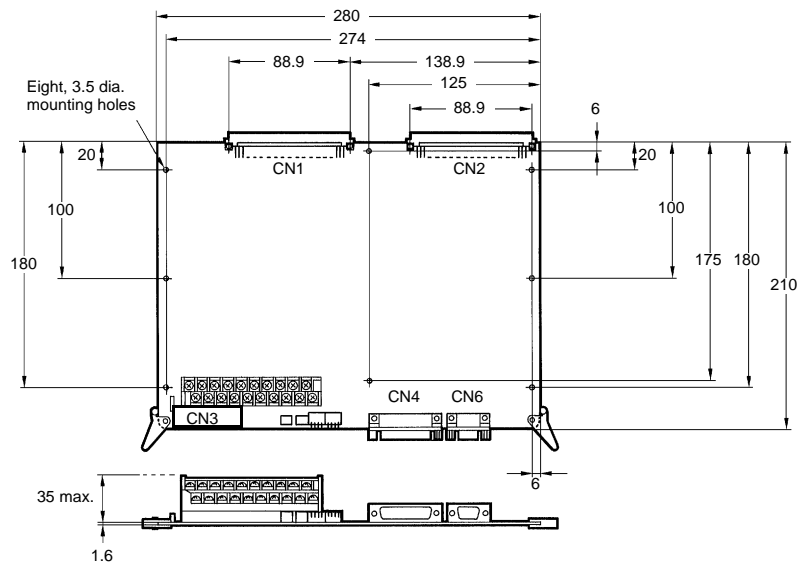
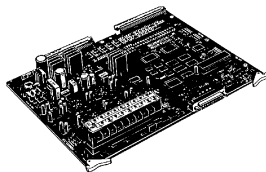
- Note:**
- The maximum total cable length must not exceed the following limits.  
RS-422: 500 m, RS-232C: 15 m, RS-485: 200 m
  - Recommended connectors:  
RS-485, RS-422: XM2\_D Sub Connector (9 pin)  
RS-232C: XM2\_D Sub Connector (25 pin)
  - A maximum of 16 Temperature Controllers can be connected to one host computer using serial communications (RS-422 or RS-485).
  - The following table indicates the possible status of the E5ZD.

Function	Bit status		Function	Bit status	
	1	0		1	0
Control	Controlled	Not controlled	Sensor error	Abnormal	Normal
Control operation	Normal operation	Reversed operation	Abnormal output status of temperature controller	ON	OFF
Auto-tuning	Executing	Not executing	Output status of alarm 1	ON	OFF
Heater current overflow	Abnormal	Normal	Output status of alarm 2	ON	OFF
Measured temperature underflow	Abnormal	Normal	Output status of HB alarm	ON	OFF
Measured temperature overflow	Abnormal	Normal	Output status of HS alarm	ON	OFF

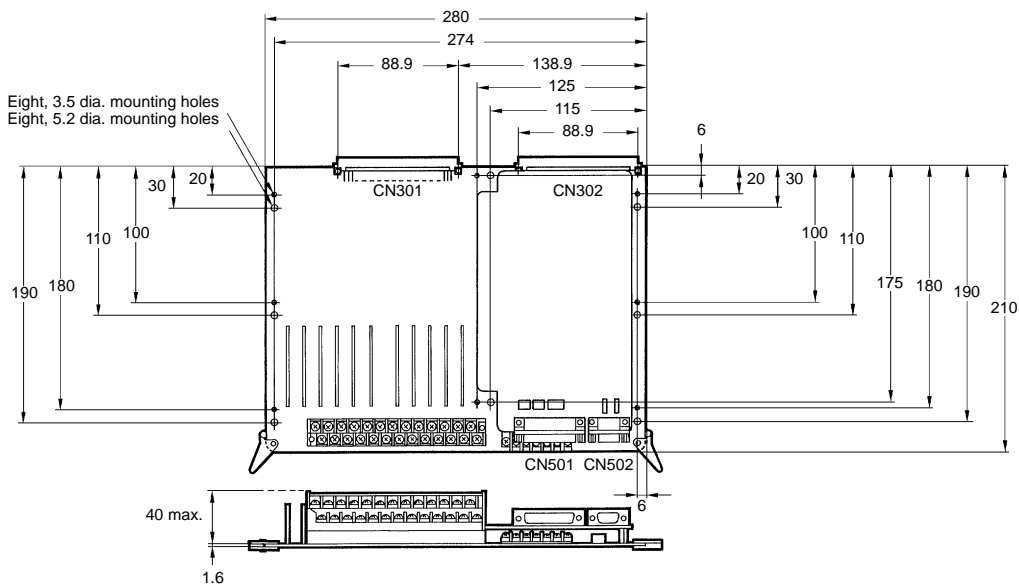
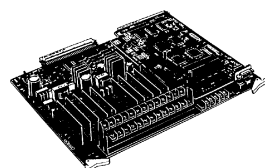
## Dimensions

**Note:** All units are in millimeters unless otherwise indicated.

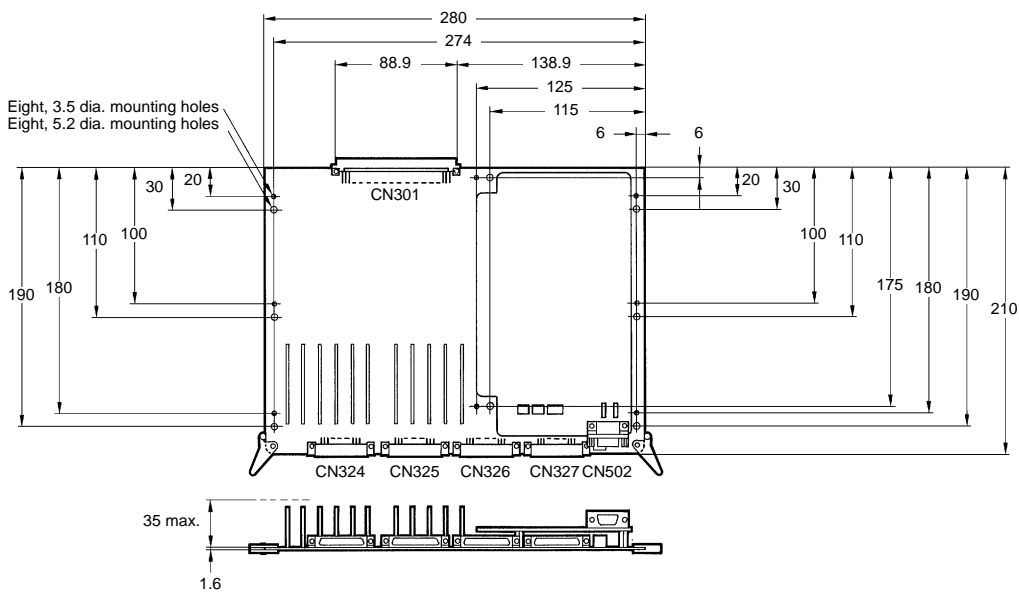
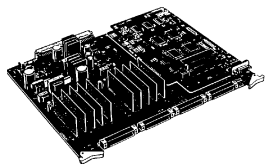
E5ZD-4\_\_-E/E5ZD-6\_\_-E



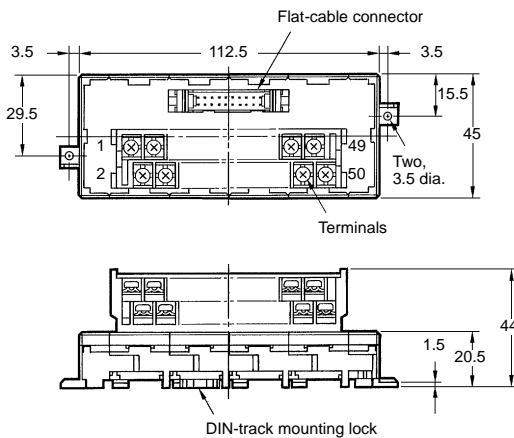
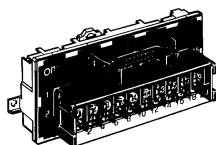
E5ZD-8\_\_-E



E5ZD-8H\_\_M-E



E54-TR011



**ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.**

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. H060-E1-1A In the interest of product improvement, specifications are subject to change without notice.

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