



# Temperature Controllers

## Model TEC-8500 Specifications (1/8 DIN)

### Power Input

**Standard:** 90-264 VAC, 47-63 Hz, 15 VA, 7W maximum  
**Optional:** 11-26 VAC / VDC, 15 VA, 7W maximum

### Signal Input

#### Input 1

**Resolution:** 18 bits    **Sampling Rate:** 5 samples / second  
**Accuracy:**  $\pm 0.24\%$  of span typical  
**Maximum Rating:** -2 VDC minimum, 12 VDC maximum (1 minute for mA input)

**Temperature Effect:**  $\pm 1.5 \mu V / ^\circ C$  for all inputs except mA input  
 $\pm 3.0 \mu V / ^\circ C$  for mA input

**Sensor Lead Resistance Effect:** T/C:  $0.2 \mu V / \text{ohm}$   
 3-wire RTD:  $2.6^\circ C / \text{ohm}$  of resistance difference of two leads  
**Burn-out Current:** 200nA

**Common Mode Rejection Ratio (CMRR):** 120 dB

**Normal Mode Rejection Ratio (NMRR):** 55 dB

**Sensor Break Detection:** Sensor open for TC, RTD and mV inputs; sensor short for RTD input; below 1 mA for 4-20 mA input; below 0.25V for 1-5V input; unavailable for other inputs

**Sensor Break Response Time:** Within 4 seconds for TC, RTD and mV inputs; 0.1 second for 4-20 mA and 1-5 V inputs

#### Input 2

**Resolution:** 18 bits    **Sampling Rate:** 1.66 times per second

**Sensor Break Response Time:** 0.5 second

**Types:**    **Current Transducer:** 0 to 50 Amp  
 mA: -3 to 27 mA    **V:** -1.3 to 11.5 VDC

#### Input 3

**Event Input Functions:** Select 2nd setpoint, and/or PID, disable output 1 and/or output 2, remote lockout, reset alarm 1 and/or alarm 2

### Output 1 or Output 2

**Relay Rating:** 240 VAC, 2 Amp

**Pulsed Voltage:** Source voltage 5V, Current limiting resistance 66 $\Omega$

#### Linear Output — Characteristics

Type	Tolerance	Zero Tolerance	Span Capacity	Load
4-20 mA		3.6-4.0 mA	20-21 mA	500 $\Omega$ max
0-20 mA		0 mA	20-21 mA	500 $\Omega$ max
0-5 VDC		0 VDC	5-5.25 VDC	10 K $\Omega$ min
1-5 VDC		0.9-1.0 VDC	5-5.25 VDC	10 K $\Omega$ min
0-10 VDC		0 VDC	10-10.5 VDC	10 K $\Omega$ min

**Resolution:** 15 bit analog to digital converter

**Isolation Breakdown Voltage:** 1000 VAC

#### Solid State Relay (Triac) Output

**Rating:** 1A / 240 VAC    **Inrush Current:** 20A for 1 cycle

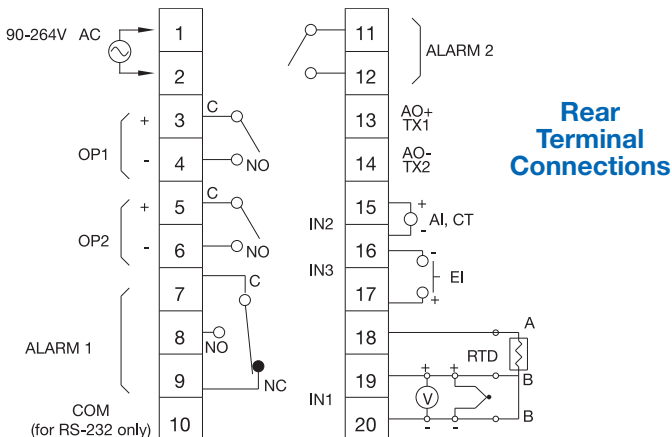
**Min. Load Current:** 50 mA rms

**Max. Off-state Leakage:** 3 mA rms

**Max. On-state Voltage:** 1.5 VAC rms

**Insulation Resistance:** 1000 Megohms minimum at 500 VDC

**Dielectric Strength:** 2500 VAC for 1 minute



**Rear Terminal Connections**

### Alarm 1 / Alarm 2

**Relay:** 2 Amp, 240 VAC    **Alarm 1:** SPDT    **Alarm 2:** SPST (NO)

#### Alarm Functions:

Dwell timer    PV1-PV2 High / Low Alarm  
 Deviation Band High / Low Alarm    Loop Break Alarm  
 PV2 High / Low Alarm    Sensor Break Alarm

**Alarm Mode:** Normal, Latching, Hold, Latching / Hold

**Dwell Timer:** 0 - 6553.5 minutes

### Data Communications

**Interface:** RS-232 (1 unit), RS-485 (up to 247 units)

**Protocol:** Modbus Protocol – RTU mode

### User Interface

**Dual 4-digit LED Display:** 0.40" (10 mm) Red Process Display

**Keypad:** 3 keys    0.31" (8 mm) Green Setpoint Display

**Programming Port:** For automatic setup, calibration and testing

### Control Mode

**Output 1:** Reverse (heating) or direct (cooling) action

**Output 2:** PID cooling control, cooling P band 1 - 255% of PB

**On-Off:** 0.1 - 100.0°F hysteresis control (P band = 0)

**P or PD:** 0 - 100.0% offset adjustment

**PID:** Fuzzy logic modified

**Proportional band:** 0.1 - 900°F (500°C)

**Integral:** 0 - 1000 seconds    **Derivative:** 0 - 360 seconds

**Cycle Time:** 0.1 - 100 seconds

**Manual Control:** Heat (MV1) and Cool (MV2)

**Auto-tuning:** Cold start and warm start

**Failure Mode:** Auto-transfer to manual mode with sensor break or A-D converter damage

**Ramping Control:** 0 - 900°F/min or 0 - 900°F/hr ramp rate

**Power Limit:** 0 - 100% for output 1 and output 2

**Remote Setpoint:** Programmable range for voltage or current input

**Digital Filter:** Time constant: settable from 0.2 to 60 seconds

### Analog Retransmission

**Analog Retransmission Functions:** PV1, PV2, PV1-PV2, PV2-PV1, Setpoint, MV1, MV2, PV-SV deviation value

**Output Signal:** 4-20 / 0-20 mA, 0-1, 0-5, 1-5, 0-10 VDC

**Accuracy:**  $\pm 0.05\%$  of span,  $\pm 0.0025\%$  /°C

### Environmental and Physical

**Operating Temperature:** 14 to 122°F (-10 to 50°C)

**Storage Temperature:** -40 to 140°F (-40 to 60°C)

**Humidity:** 0 to 90% RH, non-condensing

**Dielectric Strength:** 2000 VAC, 50/60 Hz for 1 minute

**Dimensions:** 3-3/4 x 1-7/8 x 3-1/8" (96 x 48 x 80 mm) HxWxD  
 Depth behind panel: 2-9/16" (65 mm)

**Panel Cutout:** 3-5/8" x 1-25/32" (92 x 45 mm) HxW

**Weight:** 0.49 lb. (220 grams)

### Approval Standards

**Safety:** UL873, CSA C22.2 No. 24-93

EN61010-1 (IEC1010-1)

**Protective Class:** IP 20 housing & terminals with protective covers

**EMC:** EN61326

### Stock and Common Part Numbers

(Power Input: 90-264 VAC, no Alarm 2, no data com)

Part Number	Signal Input	Out 1	Out 2	Alarm 1
TEC33001	tc	relay	none	relay
TEC33002	tc	relay	relay	none
TEC33003	tc	relay	relay	relay
TEC33004	tc	4-20 mA	none	none
TEC33005	tc	4-20 mA	none	relay
TEC33006	tc	DC pulse	none	none
TEC33007	tc	DC pulse	none	relay