

# Temperature Controllers



Model TEC-2500 1/32 DIN

## Model TEC-2500 1/32 DIN Temperature Controller



### Configurable for 4 Programmable Outputs!

Agency Approvals: RoHS

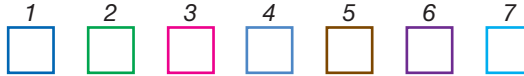


File #:  
E244198

### Design Features

- \* 1/32 DIN size – 24 mm × 48 mm
- \* Fuzzy Logic PID Autotune heat & cool control
- \* Short panel depth – only 3-7/8" (98 mm) required
- \* Universal input, field configurable (Type J T/C default, PT100, mA, V) with high accuracy 18-bit D-A
- \* Heater Break Alarm using 0-50 Amp current transformer
- \* Output 2 can be programmed as output or alarm
- \* NEMA 4X / IP65 gasketed front panel
- \* Alarm 1 – programmable 5 VDC logic output
- \* Universal input power, 90-264 VAC or 11-26 VAC/VDC
- \* Bumpless transfer to manual mode during sensor failure
- \* Power limiter output
- \* Wide variety of alarm mode selections
- \* RS-485 and RS-232 data communications interface
- \* Bright 0.40" (10 mm) LED display
- \* Fast input sample rate (5 samples/second)
- \* Automatic programming
- \* Differential control
- \* "Soft-Start" ramp and dwell timer
- \* Analog input for remote setpoint and current transformer
- \* Event input for changing functions and setpoint
- \* Hardware lockout plus remote lockout protection
- \* Loop break alarm
- \* Analog retransmission
- \* DC power supply outputs
- \* High performance at a low price

Hardware Code: TEC-2500-



A Part Number based on the hardware code and any software pre-programming will be issued at time of order.

#### Power Input BOX 1

- 4 = 90-264 VAC
- 5 = 11-26 VAC / VDC
- 9 = Other

#### Signal Input – Universal, can be programmed in the field BOX 2

- 1 = Input 1 – Universal input (factory default = tc type J)  
Thermocouple: J, K, T, E, B, R, S, N, L  
RTD: PT100 DIN, PT100 JIS  
Current: 4-20 mA, 0-20 mA  
Voltage: VDC, 0-1, 0-5, 1-5, 0-10
- Input 2 – not available if RS-232 is specified  
CT: 0 - 50A AC current Transformer (factory default)  
Voltage Input: 0-1V, 0-5V, 1-5V, 0-10V  
Event Input
- 9 = Other

#### Output 1 BOX 3

- 1 = Relay: 2A / 240 VAC
- 2 = Pulse DC for SSR drive: 5 VDC (30 mA max)
- 3 = Isolated, 4-20 mA (default), 0-20 mA
- 4 = Isolated, VDC, 1-5 (default), 0-5, 0-1
- 5 = Isolated, VDC, 0-10
- 6 = Triac-SSR output 1A / 240 VAC
- C = Pulse DC for SSR drive: 14 VDC (40 mA max)
- 9 = Other

#### Output 2 / Alarm 2 BOX 4

- 0 = None
- 1 = Relay: 2A / 240 VAC
- 2 = Pulse DC for SSR drive: 5 VDC (30 mA max)
- 3 = Isolated, 4-20 mA (default), 0-20 mA
- 4 = Isolated VDC, 1-5 (default), 0-5, 0-1
- 5 = Isolated VDC, 0-10
- 6 = Triac-SSR output 1A / 240 VAC
- 7 = Isolated 20V @ 25 mA DC, Output Power Supply
- 8 = Isolated 12V @ 40 mA DC, Output Power Supply
- 9 = Isolated 5V @ 80 mA DC, Output Power Supply
- C = Pulse DC for SSR drive: 14 VDC (40 mA max)
- A = Other

#### Alarm 1 BOX 5

- 1 = 5 VDC Logic Output
- 9 = Other

#### Communications BOX 6

- 0 = None
- 1 = RS-485 Interface
- 2 = RS-232 Interface
- 3 = Retransmission 4-20 mA (default), 0-20 mA
- 4 = Retransmission 1-5 VDC (default), 0-5 VDC
- 5 = Retransmission 0-10 VDC
- 9 = Other

#### Units – °F or °C BOX 7

- 1 = °F on faceplate
- 2 = °C on faceplate
- 3 = None (process units)



**Note:** Detailed information on features common to digital microprocessor-based TEC temperature controls and the complete Table of Input Range and Accuracy can be found on page 13-46.

#### Transformer for Heater Break Alarm

(0-50 Amp current)

Part Number: TEC99999

Specifications on page 13-47



### 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:** ±.24% of span typical  
**Maximum Rating:** -2 VDC minimum, 12 VDC maximum (1 minute for mA input)  
**Temperature Effect:** ±1.5 μV / °C for all inputs except mA input ±3.0 μV / °C for mA input

**Sensor Lead Resistance Effect:** T/C: 0.2μV/ohm  
 3-wire RTD: 2.6°C/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

**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

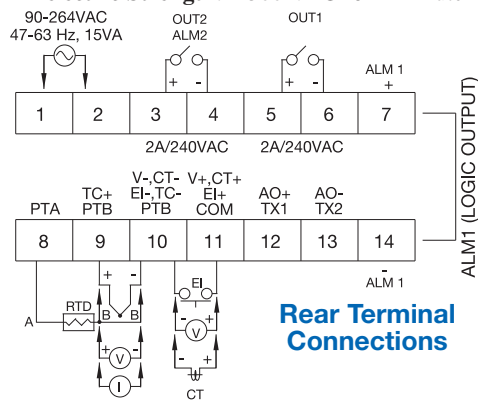
### Output 1 or Output 2 / Alarm 2

**Relay Rating:** 240 VAC, 2 Amp  
**Pulsed Voltage:** Source voltage 5V,  
 Current limiting resistance 66Ω

#### Linear Output — Characteristics

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

**Alarm 1:** 5 VDC logic output  
**Alarm 2 Relay:** Form A, (NO) **Maximum rating:** 240 VAC, 2 Amp  
**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

**Single 4-digit LED Displays:** 0.4" / 10 mm **Keypad:** 3 keys  
**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:** ±0.05 % of span, ±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:** 1-3/64 × 2 × 4-3/8" (26.5 × 50 × 110.5 mm) H×W×D  
 Depth behind panel: 3-7/8" (98 mm)  
**Panel Cutout:** 7/8 × 1-25/32" (22 × 45 mm) H×W  
**Weight:** 0.26 lb. (120 grams)

### Approval Standards

**Safety Standard:** UL 3121-1,  
 EN61010-1 (IEC1010-1)

**EMC:** EN61325

**Protective Class:** Front Panel: NEMA 4X / IP65  
 Housing and Terminals: IP 20

**Stock and Common Part Numbers**  
*(Power Input: 90-264 VAC, w/ alarm 1, no data com)*

Part Number	Signal Input	Out 1	Out 2 / Alarm 2	°F/°C
TEC02001	tc	relay	none	°F
TEC02002	tc	relay	relay	°F
TEC02003	tc	4-20 mA	none	°F
TEC02004	tc	4-20 mA	relay	°F
TEC02005	tc	DC pulse	none	°F
TEC02006	tc	relay	none	°C
TEC02007	tc	4-20 mA	none	°C
TEC02008	tc	DC pulse	none	°C