

## Model TEC-2400 1/32 DIN Temperature Controller



### Design Features

- \* 1/32 DIN size – 24 mm × 48 mm
- \* Fuzzy modified PID heat and cool control
- \* Universal input (TC, PT100, mA, V) with high accuracy 18-bit D-A
- \* Countdown display
- \* RS - 485 and Analog Retransmission Available
- \* Micro USB Programming Port
- \* Fast sampling rate (200 msec)
- \* Manual control & auto-tune function
- \* Wide range of alarm mode selection
- \* Lockout protection
- \* Bumpless transfer during failure mode
- \* Soft-start ramp & dwell timer
- \* Bright LCD display stabilized with digital filter
- \* High performance with low cost

Agency Approvals:



RoHS, REACH, WEEE

Hardware Code: TEC-2400 - 1 2 3 4 5

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

**Standard lead time is stock to 2 weeks.**

#### Power Input BOX 1

- 4 = 90-250 VAC
- 5 = 11-40 VDC / 20-28 VAC

#### Output 1 — BOX 2

- 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
- 5 = Isolated VDC, 0-10 scalable
- C = Pulse DC for SSR drive: 14 VDC (40mA max)

#### Output 2 / Alarm 1 BOX 3

- 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
- 5 = Isolated, VDC, 0-10 scalable
- C = Pulse DC for SSR drive: 14 VDC (40mA max)

#### Option 1 BOX 4

- 0 = None
- 1 = RS-485 Interface
- 2 = 1 Event Input
- 3 = 1 CT Input

#### Option 2 BOX 5

- 0 = None
- 1 = Retransmit: 4-20mA / 0-20mA
- 2 = Retransmit: 0-10VDC
- 3 = Alarm 2 Relay: 2A / 240 VAC



**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: TEC99998**

Specifications on page 13-47



### Power Input

**Standard:** 90-250 VAC, 47-63 Hz, 8VA, 4W maximum  
**Optional:** 11-40 VDC / 20-28 VAC, 47-63 Hz, 8VA, 4W maximum

### Signal Input

**Resolution:** 18 Bits  
**Sampling Rate:** 5 Times / Second (200msec)  
**Maximum Rating:** -2VDC minimum, 12VDC maximum  
**Sensor Break Detection:** Sensor open for Thermocouple and RTD inputs, sensor short for RTD input, below 1mA for 4-20mA input, below 0.25V for 1 - 5V input, not available for other inputs  
**Sensor break responding time:** Within 4 seconds for thermocouple and RTD inputs, 0.1 second for 4-20mA and 1-5V inputs

### Event Input

**Number of Event Inputs:** 1  
**Logic Low:** -10V minimum, 0.8V maximum  
**Logic High:** 2V minimum, 10V maximum

### CT Input

**CT type:** CT98-1  
**Accuracy:**  $\pm 2\%$  of full scale reading,  $\pm 1$  digit maximum  
**Input Impedance:** 294 $\Omega$   
**Measurement Range:** 0-50A AC  
**Output of CT:** 0-5V DC  
**CT Mounting:** Wall (Screw) mount  
**Sampling Rate:** 1 time/second

### Output 1 /Output 2

**Type:** Relay, pulsed voltage, linear voltage and linear current  
**Relay Rating:** 2A, 240V AC, 200000 life cycles for resistive load  
**Pulsed Voltage:** Source voltage 5V, Current limiting resistance 66 $\Omega$   
**Linear Output Resolution:** 15 Bits  
**Isolation Breakdown Voltage:** 1000 V AC  
**Load Capacity of Linear Output:** Linear current: 500 $\Omega$  maximum, Linear voltage: 10K $\Omega$  minimum

### Alarm

**Relay Type:** Form A  
**Maximum Rating:** 2A, 240VAC, 200000 life cycles for resistive load  
**Alarm Functions:** Dwell Timer, Deviation Low, Deviation High, Deviation Band Low, Deviation Band High, Process High, Process Low  
**Alarm Mode:** Latching, Hold, Normal, Latching/Hold  
**Dwell Timer:** 0.1-4553.6 minutes

### Data Communications

**Interface:** RS-485  
**Address:** 1-247  
**Parity Bit:** None, Even or Odd  
**Data Length:** 7 or 8 Bits  
**Protocol:** Modbus RTU  
**Baud Rate:** 2.8 - 115.2 Kbits/sec  
**Stop Bit:** 1 or 2 Bits  
**Communication Buffer:** 160 bytes

### Analog Retransmission

**Output Signal:** 4-20 mA, 0-20 mA, 0-10V  
**Resolution:** 15 Bits  
**Accuracy:**  $\pm 0.05\%$  of span  $\pm 0.0025\%$  /  $^{\circ}\text{C}$   
**Load Resistance:** 0-500 $\Omega$  for current output, 10K $\Omega$  minimum for voltage output  
**Isolation Breakdown:** 1000VAC minimum  
**Integral Linearity Error:**  $\pm 0.005\%$  of span  
**Linear Output Ranges:** 0-22.2mA (0-20mA / 4-20mA), 0-5.55V (0-5V, 1-5V), 0-11.1V (0-10V)

### User Interface

**Keypad:** 4 Keys  
**Display Type:** 4 digit LCD display  
**No. of Display:** 2  
**Upper Display Size:** 0.4" (10mm)  
**Lower Display Size:** 0.19" (4.8mm)

### Programming Port

**Interface:** Micro USB  
**PC Communication Function:** Automatic Setup, Calibration and Firmware Upgrade

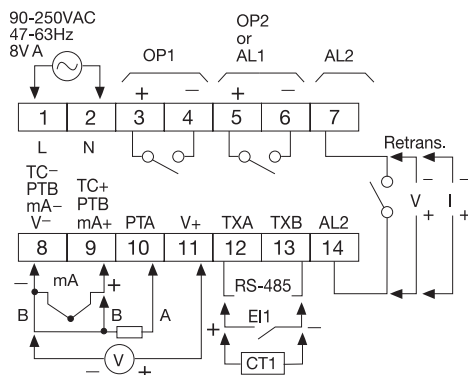
### Control Mode

**Output 1:** Reverse (Heating) or Direct (Cooling) Action  
**Output 2:** PID cooling control, Cooling P band 50~300% of PB, Dead band -36.0 ~ 36.0 % of PB  
**ON-OFF:** 0.1-90.0 ( $^{\circ}\text{F}$ ) hysteresis control (P band = 0)  
**P or PD:** 0-100.0 % offset adjustment  
**PID:** Fuzzy logic modified Proportional band 0.1 ~ 900.0 $^{\circ}\text{F}$ , Integral time 0~3600 seconds, Derivative time 0-360.0 seconds  
**Cycle Time:** 0.1-90.0 seconds  
**Manual Control:** Heat (MV1) and Cool (MV2)  
**Failure Mode:** Auto transfer to manual mode while sensor break or A-D Converter damage  
**Ramping control:** 0 to 900.0 $^{\circ}\text{F}$  / Minute or 0 to 900.0 $^{\circ}\text{F}$  / Hour Ramp Rate

### Environmental and Physical Specifications

**Operating Temperature:** -10 $^{\circ}\text{C}$  to 50 $^{\circ}\text{C}$   
**Storage Temperature:** -40 $^{\circ}\text{C}$  to 60 $^{\circ}\text{C}$   
**Humidity:** 0 to 90 % RH (Non-Condensing)  
**Insulation Resistance:** 20M $\Omega$  minimum (@500V DC)  
**Dielectric Strength:** 2000V AC, 50/60 Hz for 1 Minute  
**Vibration Resistance:** 10 to 55 Hz, 10m/s<sup>2</sup> for 2 Hours  
**Shock Resistance:** 200 m / s<sup>2</sup> (20g)  
**Moldings:** Flame retardant polycarbonate  
**Mounting:** Panel  
**Dimensions W x H x D:** 15/16 x 1-7/8 x 3-13/16" (48 x 24 x 92 mm)  
**Depth Behind Panel:** 3-15/16" (84 mm)  
**Cut Out Dimensions:** 7/8 x 1-25/32" (22 x 45 mm)  
**Weight:** .26 lbs (160 g)

### Rear Terminal Connections



### Stock and Common Part Numbers

(Default Type "J" Thermocouple Input)

| Part Number | Output 1 | Out 2/ Alm 1 | Option 1    |
|-------------|----------|--------------|-------------|
| TEC04001    | Relay    | None         | None        |
| TEC04002    | Relay    | Relay        | None        |
| TEC04003    | Relay    | Relay        | Event Input |
| TEC04004    | Pulse DC | None         | None        |
| TEC04005    | Pulse DC | Relay        | None        |
| TEC04006    | Pulse DC | Relay        | Event Input |
| TEC04007    | 4-20mA   | none         | none        |
| TEC04008    | 4-20mA   | Relay        | Event Input |