

# Temperature Controllers



Model TEC-8400 & TEC-8450 1/8 DIN

## Model TEC-8400 & Model TEC-8450 1/8 DIN Temperature Controllers

Agency Approvals:



RoHS, REACH, WEEE



### Design Features

- \* 1/8 DIN size – 48 mm × 96 mm, horizontal: 96 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

Hardware Code:



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 (40 mA 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 (40 mA max)

### Alarm 2 to 3 BOX 4

- 0 = None
- 1 = Alarm 2: Relay: 2A / 240 VAC
- 2 = Alarm 2 & 3: Relays: 2A / 240 VAC

### Event Inputs BOX 5

- 0 = None
- 1 = 6 Event Inputs



**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.

### Option 1 BOX 6

- 0 = None
- 1 = RS-485 Interface & Remote Setpoint

### Option 2 BOX 7

- 0 = None
- 1 = 1 CT Input & Remote Setpoint
- 2 = 2 CT Inputs & Remote Setpoint

### Option 3 BOX 8

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

### Option 4 BOX 9

- 0 = None
- 1 = Terminal Covers
- 2 = 2 Programs each with 8 Segments of Ramp & Soak
- 3 = Terminal Covers and Ramp & Soak Firmware

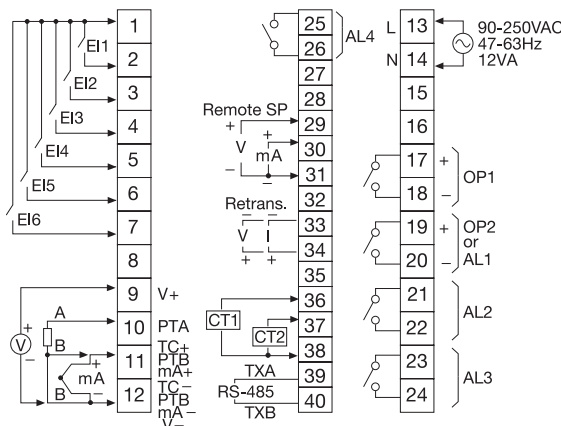
### Transformer for Heater Break Alarm

(0-50 Amp current)

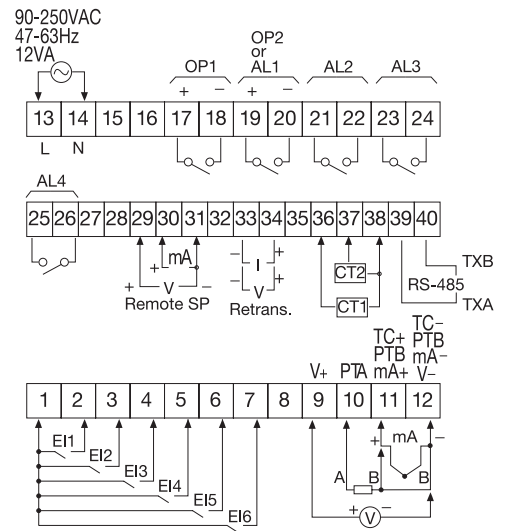
Part Number: TEC99998

Specifications on page 13-47

### TEC-8400 Rear Terminal Connections



### TEC-8450 Rear Terminal Connections





### Power Input

**Standard:** 90-250 VAC, 47-63 Hz, 8VA, 4W maximum  
**Optional:** 11-40 VDC / 20-8 VAC, 47-63 Hz, 10VA, 5W maximum  
 or 12VA, 6W maximum

### Signal Input

**Resolution:** 18 Bits      **Sampling Rate:** 5 Times/Sec. (200msec)  
**Maximum Rating:** -2VDC minimum, 12VDC maximum  
**Normal Mode Rejection Ratio (NMRR):** 55dB  
**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

### Remote Set Point Input

**Type:** Linear current, Linear voltage  
**Range:** -3-27mA, -1.3-11.5V      **Accuracy:** ±0.05 %  
**Input Impedance:** Current: 2.5Ω, Voltage: 1.5MΩ  
**Resolution:** 18 bits      **Sampling Rate:** 1.66 times/second  
**Maximum Rating:** 280mA maximum for current input, 12VDC maximum for voltage input  
**Temperature Effect:** ±1.5μV / °C for voltage input, ±3.0μV / °C for current input  
**Sensor Break Detection:** Below 1mA for 4-20mA input, below 0.25V for 1-5V input, not available for other inputs

### Event Input

**No. of Event Inputs:** 6      **Logic Low:** -10Vmin., 0.8V max.  
**Logic High:** 2V min., 10V max.

### CT Input

**CT Type:** CT98-1      **Accuracy:** ±2% of full scale reading, ± 1 digit max.  
**Input Impedance:** 294Ω      **Measurement Range:** 0-50A AC  
**Output of CT:** 0-5V DC      **CT Mount:** 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 66Ω  
**Linear Output Resolution:** 15 Bits  
**Isolation Breakdown Voltage:** 1000 VAC  
**Load Capacity of Linear Output:** Linear current: 500Ω maximum, Linear voltage: 10KΩ 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 Communication

**Interface:** RS-485      **Protocol:** Modbus RTU  
**Address:** 1-247      **Baudrate:** 2.8-115.2 KBPS  
**Parity Bit:** None, Even or Odd      **Stop Bit:** 1 or 2 bits  
**Data Length:** 7 or 8 bits      **Communication Buffer:** 160 bytes

### Stock and Common Part Numbers (8400)

(Default Type "J" Thermocouple Input)

Part Number	Output 1	Out 2/ Alm 1	Alarm 2 & 3
TEC36001	Relay	None	None
TEC36002	Relay	Relay	None
TEC36003	Relay	Relay	(2) Relays
TEC36004	Pulse DC	None	None
TEC36005	Pulse DC	Relay	None
TEC36006	Pulse DC	Relay	(2) Relays
TEC36007	4-20mA	none	none
TEC36008	4-20mA	Relay	(2) Relays



**Note:** All Stock Part Numbers Include Terminal Covers

### Analog Retransmission

**Output signal:** 4-20 mA, 0-20 mA, 0-10V  
**Resolution:** 15 bits      **Accuracy:** ±0.05% of span ± 0.0025%/°C  
**Load Resistance:** 0-500Ω for current output, 10KΩ minimum for voltage output  
**Isolation Breakdown:** 1000VAC minimum  
**Integral Linearity Error:** ±0.005% of span  
**Linear Output Ranges:** 0-2.2mA (0-20mA/4-20mA), 0-5.55V (0-5V, 1-5V), 0-1.1V (0-10V)

### User Interface

**Keypad:** 4 Keys      **Display Type:** 4 digit LCD display  
**No. of Display:** 3      **Upper Display Size:** 0.7" (17.7mm)  
**Lower Display Size:** 0.4" (11.2mm)

### 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 (°F) hysteresis control ( P band = 0)  
**P or PD:** 0-100.0 % offset adjustment  
**PID:** Fuzzy logic modified Proportional band 0.1 ~ 900.0°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:** 0-900.0°F/Minute or 0-900.0°F/Hour Ramp Rate

### Profiler

**Availability:** Option      **No. of Segments/ Program:** 4 / 8 / 16

### Environmental and Physical Specifications

**Operating Temp.:** -10°C to 50°C      **Storage Temp:** -40°C to 60°C  
**Humidity:** 0 to 90 % RH (Non-condensing)  
**Insulation Resistance:** 20MΩ minimum (@500V DC)  
**Dielectric Strength:** 2000V AC, 50/60 Hz for 1 minute  
**Vibration Resistance:** 10-55 Hz, 10m/s<sup>2</sup> for 2 hours  
**Shock Resistance:** 200 m/s<sup>2</sup> (20g)  
**Moldings:** Flame retardant polycarbonate  
**Mounting:** Panel

	TEC-8400	TEC-8450
<b>Dimensions H x W x D:</b>	3-3/4 x 1-7/8 x 2-3/8" (96 x 48 x 59 mm)	1-7/8 x 3-3/4 x 2-3/8" (48 x 96 x 59 mm)
<b>Depth Behind Panel:</b>	2" (50 mm)	2" (50 mm)
<b>Panel Cutout:</b>	1-25/32 x 3-5/8" (45 x 92 mm)	3-5/8 x 1-25/32" (92 x 45 mm)
<b>Weight:</b>	.48 lbs. (220 g)	.48 lbs. (220 g)

### Stock and Common Part Numbers (8450)

(Default Type "J" Thermocouple Input)

Part Number	Output 1	Out 2/ Alm 1	Option 1
TEC37001	Relay	None	None
TEC37002	Relay	Relay	None
TEC37003	Relay	Relay	(2) Relays
TEC37004	Pulse DC	None	None
TEC37005	Pulse DC	Relay	None
TEC37006	Pulse DC	Relay	(2) Relays
TEC37007	4-20mA	none	none
TEC37008	4-20mA	Relay	(2) Relays