

# Temperature Controllers



Model TEC-7400 3/16 DIN

## Model TEC-7400 3/16 DIN Temperature Controller



### Design Features

- \* 3/16 DIN size – 72 mm × 72 mm
- \* Fuzzy Logic PID Autotune heat and cool control
- \* Universal input, field configurable (Type J T/C default, 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 using NFPA/IEC standard colors
- \* High performance with low cost

Agency Approvals:



RoHS, REACH, WEEE

Hardware Code: TEC-7400 - 1 2 3 4 5 6 7 8 9

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 = 90-250 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 and 3 BOX 4

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

#### Event Inputs BOX 5

- 0 = None
- 1 = 6 Event Inputs

#### Option 1 BOX 6

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

#### Option 2 BOX 7

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

#### Option 3 BOX 8

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

#### Option 4 BOX 9

- 0 = None
- 1 = Terminal Covers
- 2 = Ramp and Soak Firmware
- 3 = Terminal Covers and Ramp and Soak Firmware



**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

### Stock and Common Part Numbers

(All Stock Part Numbers Include Terminal Covers)  
(Default Type "J" Thermocouple Input)

Part Number	Output 1	Out 2/ Alm 1	Option 1
TEC45001	Relay	None	None
TEC45002	Relay	Relay	None
TEC45003	Relay	Relay	(2) Relays
TEC45004	Pulse DC	None	None
TEC45005	Pulse DC	Relay	None
TEC45006	Pulse DC	Relay	(2) Relays
TEC45007	4-20mA	None	None
TEC45008	4-20mA	Relay	(2) Relays



### Power Input

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

### 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

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

### CT Input

**CT type:** TEC99998  
**Accuracy:** ±2% of full scale reading, ± 1 digit maximum  
**Input Impedance:** 294Ω  
**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 66Ω  
**Linear Output Resolution:** 15 Bits  
**Isolation Breakdown Voltage:** 1000 V AC  
**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 Communications

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

### 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:** 0-22.2mA (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:** 3 **Upper Display Size:** 0.58" (15mm)  
**Lower Display Size:** 0.32" (8.3mm)

### 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 to 900.0°F / Minute or 0 to 900.0°F / Hour Ramp Rate

### Profiler

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

### Environmental and Physical Specifications

**Operating Temperature:** -10°C to 50°C  
**Storage Temperature:** -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 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 × H × D:** 2-27/32 × 2-27/32 × 2-3/8" (72 × 72 × 59 mm)  
**Depth Behind Panel:** 2" (50 mm)  
**Cut Out Dimensions:** 2-11/16 × 2-11/16" (68 × 68 mm)  
**Weight:** .7 oz (190 g)  
IP50 for the front panel, IP20 for rear terminals and housing.  
All indoor use.

### Rear Terminal Connections

