Model TEC-9400 1/16 DIN Temperature Controller

**Design Features**

- 1/16 DIN size – 48 mm × 48 mm
- Fuzzy Logic PID Autotune heat and cool control
- Universal input, field configurable (Type J TC 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

**Hardware Code:** TEC-9400 -

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** BOX 4

- 0 = None
- 1 = Relay: 2A / 240 VAC

**Option 1** BOX 5

- 0 = None
- 1 = RS-485 Interface

**Option 2** BOX 6

- 0 = None
- 1 = 2 Event Inputs
- 2 = 1 Event Input and 1 CT Input
- 3 = 2 CT Inputs

**Option 3** BOX 7

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

**Option 4** BOX 8

- 0 = None
- 1 = Terminal Cover

**Transformer for Heater Break Alarm**

- (0-50 Amp current)
- Part Number: TEC99998
- Specifications on page 13-47

**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.
**Power Input**
Standard: 90-250 VAC, 47-63 Hz; 10 VA, 5W max.
Optional: 11-40 VDC / 20 to 28 VAC, 47-63 Hz; 10 VA, 5W max.

**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 Response 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: 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**
Relay Rating: 2A,240V AC, 200000 Life Cycles for Resistive Load
Linear Voltage: 10K
Linear Current: 500
Isolation Breakdown: 1000V AC
Load Capacity of Linear Output: 0.1 to 4553.6 Minutes

**Alarm**
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 to 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: 2
Upper Display Size: 0.58" (15mm)
Lower Display Size: 0.3" (7.8mm)

**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 °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

**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/s2 for 2 Hours
Shock Resistance: 200 m / s² (20g)
Mountings: Flame retardant polycarbonate
Moldings: Flame retardant polycarbonate
Flame Retardant Polycarbonate
Shock Resistance: 200 m / s2 (20g)
Ramping Control: 0 to 900.0°F / Minute or 0 to 900.0°F / Hour Ramp Rate

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

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Output 1</th>
<th>Out 2/Alm 1</th>
<th>Option 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEC19001</td>
<td>Relay</td>
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<td>None</td>
</tr>
<tr>
<td>TEC19002</td>
<td>Relay</td>
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<td>None</td>
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<tr>
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<td>Relay</td>
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<td>None</td>
</tr>
<tr>
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<td>Pulse DC</td>
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<td>None</td>
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<tr>
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<td>Pulse DC</td>
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<td>None</td>
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<tr>
<td>TEC19006</td>
<td>Pulse DC</td>
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<td>None</td>
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<tr>
<td>TEC19007</td>
<td>4-20mA</td>
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<td>None</td>
</tr>
<tr>
<td>TEC19008</td>
<td>4-20mA</td>
<td>Relay</td>
<td>Relay</td>
</tr>
</tbody>
</table>

**Rear Terminal Connections**

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