Model TEC-9400 1/16 DIN Temperature Controller

**Design Features**
- 1/16 DIN size – 48 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 using NFPA/IEC standard colors
- High performance with low cost

**Agency Approvals:**
RoHS, REACH, WEEE

**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**: 7 or 8 Bits
- **Input Type**: Process High, Process Low
- **CT Mounting**: 2A, 240V AC, 200000 Life cycles for resistive load
- **CT Terminals**: 2V minimum, 10V maximum
- **CT Current**: 10KΩ minimum
- **CT Rating**: 10KΩ minimum

**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

**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>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>TEC19002</td>
<td>Relay</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>TEC19003</td>
<td>Relay</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>TEC19004</td>
<td>Pulse DC</td>
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<td>None</td>
</tr>
<tr>
<td>TEC19005</td>
<td>Pulse DC</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>TEC19006</td>
<td>Pulse DC</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>TEC19007</td>
<td>4-20mA</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>TEC19008</td>
<td>4-20mA</td>
<td>Relay</td>
<td>Relay</td>
</tr>
</tbody>
</table>

**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), 0-5.5V (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**: 0.1-100.0 % offset adjustment
- **PID**: Fuzzy logic modified Proportional band 0.1 ~ 900.0°F, Integral time 0–3600 seconds
- **Dead band**: 0.01-90.0 % of PB
- **Sample Rate**: 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)
- **Mounting**: Panel
- **Dimensions H×WxD**: 1-7/8 × 1-7/8 × 2-3/8" (48 × 48 × 59 mm)
- **Depth Behind Panel**: 2" (50 mm)
- **Cut Out Dimensions**: 1-25/32 × 1-25/32" (45 × 45 mm)
- **Weight**: .35 lbs. (160 g)

**Fire Rated Terminal Connections**

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