Model TEC-2500 1/32 DIN

Temperature Controllers

Model TEC-2500 1/32 DIN Temperature Controller

Design Features

- 1/32 DIN size – 24 mm × 48 mm
- Fuzzy Logic PID Autotune heat & cool control
- Short panel depth – only 3-7/8" (98 mm) required
- Universal input, field configurable (Type J T/C default, PT100, mA, V) with high accuracy 18-bit D-A
- Heater Break Alarm using 0-50 Amp current transformer
- Output 2 can be programmed as output or alarm
- NEMA 4X / IP65 gasketed front panel
- Alarm 1 – programmable 5 VDC logic output
- Universal input power, 90-264 VAC or 11-26 VAC/VDC
- Bumpless transfer to manual mode during sensor failure
- Power limiter output
- Wide variety of alarm mode selections
- RS-485 and RS-232 data communications interface
- Bright 0.40" (10 mm) LED display
- Fast input sample rate (5 samples/second)
- Automatic programming
- Differential control
- "Soft-Start" ramp and dwell timer
- Analog input for remote setpoint and current transformer
- Event input for changing functions and setpoint
- Hardware lockout plus remote lockout protection
- Loop break alarm
- Analog retransmission
- DC power supply outputs
- High performance at a low price

Hardware Code: TEC-2500-

Output 1

- Relay: 2A / 240 VAC
- Isolated, 0-50 mA (default), 0-50 mA
- Triac-SSR output 1A / 240 VAC
- Transformer for Heater Break Alarm
- 0-50 Amp current
- Part Number: TEC99999
- Specifications on page 13-46

Output 2 / Alarm 2

- 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
- 4 = Isolated VDC, 1-5 (default), 0-5, 0-1
- 5 = Isolated VDC, 0-10
- 6 = Triac-SSR output 1A / 240 VAC
- 7 = Isolated 20V @ 25 mA DC, Output Power Supply
- 8 = Isolated 12V @ 40 mA DC, Output Power Supply
- 9 = Other

Communications

- 0 = None
- 1 = RS-485 Interface
- 2 = RS-232 Interface
- 3 = Retransmission, 4-20 mA (default), 0-20 mA
- 4 = Retransmission, 1-5 VDC (default), 0-5 VDC
- 5 = Retransmission 0-10 VDC
- 9 = Other

Units — °F or °C

- 1 = °F on faceplate
- 2 = °C on faceplate
- 3 = None (process units)

Transformer for Heater Break Alarm

(0-50 Amp current)

Part Number: TEC99999

Specifications on page 13-46

Output 1

- Relay: 2A / 240 VAC
- Isolated, 4-20 mA (default), 0-20 mA
- Triac-SSR output 1A / 240 VAC
- Transformer for Heater Break Alarm
- 0-50 Amp current
- Part Number: TEC99999
- Specifications on page 13-46

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Rev 2 (2-20)
### Power Input
- **Standard**: 90-264 VAC, 47-63 Hz, 15 VA, 7W maximum
- **Optional**: 11-26 VAC / VDC, 15 VA, 7W maximum

### Signal Input

#### Input 1
- **Resolution**: 18 bits
- **Sampling Rate**: 5 samples / second
- **Accuracy**: ±24% of span typical
- **Maximum Rating**: -2 VDC minimum, 12 VDC maximum (1 minute for mA input)
- **Temperature Effect**: ±1.5 µV / °C for all inputs except mA input
- **Input**: 3-wire RTD: 2.6°C/ohm of resistance difference of two leads
- **Burn-out Current**: 200mA
- **Common Mode Rejection Ratio (CMRR)**: 120 dB
- **Normal Mode Rejection Ratio (NMR)**: 55 dB
- **Sensor Break Detection**: Sensor open for TC, RTD and mA inputs; sensor short for RTD input; below 1 mA for 4-20 mA input; below 0.25V for 1-5V input; unavailable for other inputs
- **Sensor Break Response Time**: Within 4 seconds for TC, RTD and mA inputs; 0.1 second for 4-20 mA and 1-5 V inputs

#### Input 2
- **Resolution**: 18 bits
- **Sampling Rate**: 1.66 times per second
- **Sensor Break Response Time**: 0.5 second
- **Types**: Current Transducer: 0 to 50 Amp
  - mA: -3 to 27 mA
  - V: 0 to 11.5 VDC
- **Event Input Functions**: Select 2nd setpoint and/or PID, disable output 1 and/or output 2, remote lockout, reset alarm 1 and/or alarm 2

### Output 1 or Output 2 / Alarm 2
- **Relay Rating**: 240 VAC, 2 Amp
- **Pulsed Voltage**: Source voltage 5V.
- **Current limiting resistance 66Ω**

### Output Signal — Characteristics

<table>
<thead>
<tr>
<th>Type</th>
<th>Tolerance</th>
<th>Zero Span</th>
<th>Capacity</th>
<th>Load</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-20 mA</td>
<td>3.6-4.0 mA</td>
<td>20-21 mA</td>
<td>500Ω max</td>
<td></td>
</tr>
<tr>
<td>20 mA</td>
<td>20 mA</td>
<td>20 mA</td>
<td>500Ω max</td>
<td></td>
</tr>
<tr>
<td>0-5 VDC</td>
<td>0 VDC</td>
<td>5-5.25 VDC</td>
<td>10 KΩ min</td>
<td></td>
</tr>
<tr>
<td>1-5 VDC</td>
<td>0.9-1.0 VDC</td>
<td>5.25 VDC</td>
<td>10 KΩ min</td>
<td></td>
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<tr>
<td>0-10 VDC</td>
<td>0 VDC</td>
<td>10-10.5 VDC</td>
<td>10 KΩ min</td>
<td></td>
</tr>
<tr>
<td>Resolution:</td>
<td>15 bit analog to digital converter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Isolation Breakdown Voltage:</td>
<td>1000 VAC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solid State Relay (Triac) Output</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
- **Rating**: 1A / 240 VAC
- **Inrush Current**: 20A for 1 cycle
- **Min. Load Current**: 50 mA rms
- **Max. Off-state Leakage**: 3 mA rms
- **Max. On-state Voltage**: 1.5 VAC rms
- **Insulation Resistance**: 1000 Megohms minimum at 500 VDC
- **Dielectric Strength**: 2500 VAC for 1 minute

### Alarm Functions
- **Alarm 1**: 5 VDC logic output
- **Alarm 2 Relay**: Form A (NO) Maximum rating: 240 VAC, 2 Amp
- **Alarm Functions**: Dwell timer, PV1-PV2 High / Low Alarm, Deviation Band High / Low Alarm, Loop Break Alarm, PV2 High / Low Alarm, Sensor Break Alarm

### Data Communications
- **Interface**: RS-232 (1 unit), RS-485 (up to 247 units)
- **Protocol**: Modbus Protocol – RTU mode

### User Interface
- **Single 4-digit LED Displays**: 0.4" / 10 mm
- **Keypad**: 3 keys
- **Programming Port**: For automatic setup, calibration and testing

### Control Mode
- **Output 1**: Reverse (heating) or direct (cooling) action
- **Output 2**: PID cooling control, cooling P band 1-255% of PB
- **On-Off**: 0.1 - 100.0°F hysteresis control (P band = 0)
- **P or PD**: 0 - 100.0% offset adjustment
- **PID**: Fuzzy logic modified
- **Proportional band**: 0.1 - 900°F (500°C)
- **Integral**: 0 - 1000 seconds
- **Derivative**: 0 - 360 seconds
- **Cycle Time**: 0.1 - 100 seconds
- **Manual Control**: Heat (MV1) and Cool (MV2)
- **Auto-tuning**: Cold start and warm start
- **Failure Mode**: Auto-transfer to manual mode with sensor break or A-D converter damage
- **Ramping Control**: 0 - 900°F/min or 0 - 900°F/hr ramp rate
- **Power Limit**: 0 - 100% for output 1 and output 2
- **Remote Setpoint**: Programmable range for voltage or current input
- **Digital Filter**: Time constant: settable from 0.2 to 60 seconds

### Analog Retransmission
- **Analog Retransmission Functions**: PV1, PV2, PV1-PV2, PV2-PV1, setpoint, MV1, MV2, PV-SV deviation value
- **Output Signal**: 4-20 / 0-20 mA, 0-1, 0.5, 1-5, 0-10 VDC
- **Accuracy**: ±0.05 % of span, ±0.0025 %/°C

### Environmental and Physical
- **Operating Temperature**: 14 to 122°F (-10 to 50°C)
- **Storage Temperature**: -40 to 140°F (-40 to 60°C)
- **Humidity**: 0 to 90% RH, non-condensing
- **Dielectric Strength**: 2000 VAC, 50/60 Hz for 1 minute
- **Dimensions**: 1-3/4 × 9/16 × 4-3/8" (26.5 × 50 × 110.5 mm) HxWxD Depth behind panel: 3-7/8" (98 mm)
- **Panel Cutout**: 7/8 × 1-25/32" (22 × 45 mm) HxW
- **Weight**: 0.26 lb. (120 grams)

### Approval Standards
- **Safety Standard**: UL 3121-1, CSA C22.2 No. 24-93
- **EMC**: EN61010-1 (IEC1010-1)
- **Housing and Terminals**: IP 20
- **Rear Panel**: NEMA 4X / IP65

### Protective Class
- **Front Panel**: NEMA 4X / IP65

### Part Numbers
- **Power Input**: 90-264 VAC, w/ alarm 1, no data com

### Rear Terminal Connections

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**Stock and Common Part Numbers**

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