Model TEC-8300 1/8 DIN Temperature Controller

### Design Features
- 1/8 DIN size – 48 mm × 96 mm
- Fuzzy Logic PID heat and cool control
- PID Control – Auto-tuning on cold or warm start
- Short panel depth – only 2-9/16" (65 mm) required
- Universal programmable sensor input
- Heater Break Alarm using 0-50 Amp current transformer
- Output 2 can be programmed as cooling output only
- 2 optional alarms – programmable NO or NC relay
- Wide variety of alarm mode selections
- Bumpless transfer to manual mode during sensor failure
- Universal input power, 90-264 VAC

### Power Input
- 4 = 90-264 VAC
- 5 = 11-26 VAC / VDC
- 6 = Triac-SSR output 1A / 240 V AC
- 7 = Pulse DC for SSR drive: 14 VDC (40 mA max)

### Signal Input
- Universal, can be programmed in the field
- 1 = Input 1 – Universal input (factory default = tc type J)  
  Thermocouple: J, K, T, E, B, R, S, N, L  
  RTD: PT100 DIN, PT100 JIS  
  Current: 4-20 mA, 0-20 mA  
  Voltage: VDC, 0-1, 0-5, 1-5, 0-10
- 2 = CT: 0 - 50A AC current Transformer (factory default)  
  Linear Input: 0-1V, 0-5V, 1-5V, 0-10V, 0-20mA, 4-20mA
- 3 = Input 2 – Event Input
- 9 = Other

### Output 1
- 1 = Relay: 2A / 240 V AC
- 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 = Pulse DC for SSR drive: 14 VDC (40 mA max)
- 9 = Other

### Output 2
- 0 = None
- 1 = Relay: 2A / 240 V AC
- 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 = Isolated 5V @ 80 mA DC, Output Power Supply
- C = Pulse DC for SSR drive: 14 VDC (40 mA max)
- A = Other

### Alarm 1
- 0 = None
- 1 = Relay: 2A/240 VAC, SPDT
- 9 = Other

### Alarm 2
- 0 = None
- 1 = Relay: 2A/240 VAC, SPST
- 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

### Transformer for Heater Break Alarm
- (0-50 Amp current)
- Part Number: TEC99999

### Agency Approvals
- Transformer for Heater Break Alarm
- Part Number: TEC99999

### 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: 90-264 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: ±2.4% 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 ±3.0 μV / °C for mA input
- Sensor Lead Resistance Effect: T/C: 0.2 μV/ohm
- 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 (NMRR): 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
  - mA: -3 to 27 mA
  - V: -1.3 to 11.5 VDC

**Input 3**
- 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
- Relay Rating: 240 VAC, 2 Amp
- Pulsed Voltage: Source voltage 5V, Current limiting resistance 66Ω

#### Linear Output — Characteristics

<table>
<thead>
<tr>
<th>Type</th>
<th>Tolerance</th>
<th>Zero Tolerance</th>
<th>Span 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>0-20 mA</td>
<td>0 mA</td>
<td>20-21 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>5-5.25 VDC</td>
<td>10 KΩ min</td>
<td></td>
</tr>
<tr>
<td>0-10 VDC</td>
<td>0 VDC</td>
<td>10-10.5 VDC</td>
<td>10 KΩ min</td>
<td></td>
</tr>
</tbody>
</table>

- Resolution: 15 bit analog to digital converter
- Isolation Breakdown Voltage: 1000 VAC
- Solid State Relay (Triac) Output
  - 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 1 / Alarm 2
- Relay: 2 Amp, 240 VAC
- Alarm 1: SPDT
- Alarm 2: SPST (NO)
- Alarm Functions:
  - Dwell timer
  - PV1-PV2 High / Low Alarm
  - Deviation Band High / Low Alarm
  - Loop Break Alarm
  - PV2 High / Low Alarm
  - Sensor Break Alarm
- Alarm Mode: Normal, Latching, Hold, Latching / Hold
- Dwell Timer: 0 - 6553.5 minutes

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

### 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: 3-3/4” × 1-7/8” × 1-25/32” (92 × 45 mm) H × W × D
- Panel Cutout: 3-5/8” × 1-25/32” (92 × 45 mm) H × W × D
- Weight: 0.49 lb. (220 grams)

### Approval Standards
- Safety: UL873, CSA C22.2 No. 24-93
- EN61010-1 (IEC1010-1)
- Protective Class: IP 20 housing & terminals with protective covers
- EMC: EN61326

### Stock and Common Part Numbers
(For Power Input: 90-264 VAC, no Alarm 2, no data com)

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Signal Input</th>
<th>Out 1</th>
<th>Out 2</th>
<th>Alarm 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEC33001</td>
<td>tc</td>
<td>relay</td>
<td>none</td>
<td>relay</td>
</tr>
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<td>relay</td>
<td>relay</td>
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</table>