Model TEC-8300 1/8 DIN Temperature Controller

Design Features

- 1/8 DIN size – 48 mm × 96 mm
- Fuzzy Logic PID Autotune heat and cool control
- Short panel depth – only 2-9/16” (65 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 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 limiter output
- RS-485 and RS-232 data communications interface
- Bright 0.40” (10 mm) red LED process display, 0.31” (8 mm) green LED setpoint display stabilized with a digital filter if required
- 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
- Tempo’s most highly featured 1/8 DIN control

Power Input BOX 1
4 = 90-264 VAC
5 = 11-26 VAC / VDC
9 = Other

Signal Input — Universal, can be programmed in the field BOX 2
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
Input 2 – CT: 0 - 50A AC current Transformer (factory default)
Linear Input: 0-1V, 0-5V, 1-5V, 0-10V, 0-20mA, 4-20mA
Input 3 – Event Input
9 = Other

Output 1 BOX 3
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
C = Pulse DC for SSR drive: 14 VDC (40 mA max)
9 = Other

Output 2 BOX 4
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 = Isolated 5V @ 80 mA DC, Output Power Supply
C = Pulse DC for SSR drive: 14 VDC (40 mA max)
A = Other

Alarm 1 BOX 5
0 = None
1 = Relay: 2A/240 VAC, SPDT
9 = Other

Alarm 2 BOX 6
0 = None
1 = Relay: 2A/240 VAC, SPST
9 = Other

Communications BOX 7
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
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.

View Product Inventory @ www.tempco.com
Temperature Controllers

Model TEC-8300 Specifications (1/8 DIN)

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 ±3.0 μV/°C for mA input
Sensor Lead Resistance Effect: T/C: 0.2μV/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: 0 to 50 Amp
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 Load</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>500Ω max</td>
</tr>
<tr>
<td>0-20 mA</td>
<td>0 mA</td>
<td>20-21 mA</td>
<td>500Ω max</td>
<td>500Ω max</td>
</tr>
<tr>
<td>0-5 VDC</td>
<td>0 VDC</td>
<td>5-5.25 VDC</td>
<td>10 KΩ min</td>
<td>10 KΩ min</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>10 KΩ min</td>
</tr>
<tr>
<td>0-10 VDC</td>
<td>0 VDC</td>
<td>10-10.5 VDC</td>
<td>10 KΩ min</td>
<td>10 KΩ min</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

User Interface
Dual 4-digit LED Display: 0.40" (10 mm) Red Process Display
Keypad: 3 keys  0.31" (8 mm) Green Setpoint Display
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 % 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 50°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 × 3-1/8" (96 × 48 × 80 mm) H×W×D
Depth behind panel: 2-9/16" (65 mm)
Panel Cutout: 3-5/8 × 1-25/32" (92 × 45 mm) H×W
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
(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>
<tr>
<td>TEC33002</td>
<td>tc</td>
<td>relay</td>
<td>relay</td>
<td>none</td>
</tr>
<tr>
<td>TEC33003</td>
<td>tc</td>
<td>relay</td>
<td>relay</td>
<td>none</td>
</tr>
<tr>
<td>TEC33004</td>
<td>tc</td>
<td>4-20 mA</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>TEC33005</td>
<td>tc</td>
<td>4-20 mA</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>TEC33006</td>
<td>tc</td>
<td>DC pulse</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>TEC33007</td>
<td>tc</td>
<td>DC pulse</td>
<td>none</td>
<td>relay</td>
</tr>
</tbody>
</table>