Model TEC-920 1/16 DIN Temperature Controller

Design Features
- 1/16 DIN size – 48 mm × 48 mm
- Fuzzy Logic PID heat and cool control
- PID Control – Auto-tuning on cold or warm start
- Short panel depth – only 3-3/8” (86 mm) required
- Universal programmable sensor input
- Highly versatile – 6 types of inputs available
- Output 2 can be programmed as output or alarm
- Universal input power – 90-250 VAC or 11-26 VAC/VDC
- Highly accurate universal input with 18 bit analog to digital converter
- Bumpless transfer to manual mode during sensor failure
- Wide variety of alarm mode selections
- Optional RS-485 communications interface
- Bright 0.40” (10 mm) LED display
- High performance at a very low price

Signal Input— Universal, can be programmed in the field for item 5 or 6
- 5 = Thermocouple: *J, K, T, E, B, R, S, N, L
- 0-60mV
- 6 = RTD; *PT100 DIN, PT100 JIS
- 7 = 0-1 VDC
- 8 = 0-5, 1-5 VDC
- A = 0-10 VDC
- B = 4-20, 0-20 mA
- 9 = Other * indicates default value

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 / Alarm 1 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 = RS-485 Data Interface
- 8 = Isolated 20V @ 25 mA DC, Output Power Supply
- A = 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)
- B = Other

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.
Output 1 / Output 2

<table>
<thead>
<tr>
<th>Type</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>5000 Ω max</td>
</tr>
<tr>
<td>0-20 mA</td>
<td>0 mA</td>
<td>20-21 mA</td>
<td>5000 Ω max</td>
</tr>
<tr>
<td>0-5 VDC</td>
<td>0 VDC</td>
<td>5-5.25 VDC</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>
</tr>
<tr>
<td>0-10 VDC</td>
<td>0 VDC</td>
<td>10-10.5 VDC</td>
<td>10 KΩ min</td>
</tr>
</tbody>
</table>

Resolution: 15 bit analog to digital converter
Output Regulation: 0.02% for full load change
Output Setting Time: 0.1 sec. (stable to 99.9%)
Isolation Breakdown Voltage: 1000 VAC
Temperature Effect: ±0.01 % of span/°C

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

Output 2 / Alarm 1 — Programmable

Alarm 1 Relay: Form A, (NO)
Maximum rating: 240 VAC, 2 Amp
Alarm Functions:
- Dwell timer
- Deviation High / Low Alarm
- Deviation Band High / Low Alarm
- Process High / Low Alarm
- Sensor Break Alarm
Dwell Timer: 0 - 4553.6 minutes

Protocol: Modbus Protocol — RTU mode
Address: 1-247
Parity: None, Even or Odd
Data Bits: 7 or 8 bits
Baud Rate: 0.3 - 38.4 Kbits/sec

User Interface
Single 4-digit LED Displays: 0.4" / 10 mm
Keypad: 4 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 50-300% of PB, dead band -36.0 to 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°F
Integral time: 0 - 1000 seconds
Derivative time: 0 - 360 seconds
Cycle Time: 0.1 - 90 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

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: 1-7/8" × 1-7/8" × 3-3/4" (48 × 48 × 94 mm) H×W×D
Panel Cutout: 1-25/32 × 1-25/32" (45 × 45 mm) H×W
Weight: 0.31 lb. (140 grams)

Approval Standards
Safety: UL61010C-1, CSA C22.2 No. 24-93
EN61010-1 (IEC1010-1)
EMC: EN61326
Protective Class: Front Panel: IP30
Housing and Terminals: IP 20

Stock and Common Part Numbers
(Power Input: 90-250 VAC)

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Signal Input</th>
<th>Out 1</th>
<th>Out 2 / Alarm 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEC15001</td>
<td>tc</td>
<td>relay</td>
<td>none</td>
</tr>
<tr>
<td>TEC15002</td>
<td>tc</td>
<td>relay</td>
<td>none</td>
</tr>
<tr>
<td>TEC15003</td>
<td>4-20 mA</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>TEC15004</td>
<td>DC pulse</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>TEC15005</td>
<td>RTD</td>
<td>relay</td>
<td>none</td>
</tr>
<tr>
<td>TEC15006</td>
<td>RTD</td>
<td>DC pulse</td>
<td>none</td>
</tr>
<tr>
<td>TEC15007</td>
<td>RTD</td>
<td>DC pulse</td>
<td>relay</td>
</tr>
</tbody>
</table>