Temperature Controllers

Model TEC-220 Specifications (1/32 DIN)

Power Input
Standard: 90-250 VAC, 47-63 Hz, 10 VA, 5W maximum
Optional: 11-26 VAC / VDC, 10 VA, 5W maximum

Signal Input
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 mV 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

Output 1 / Output 2
Relay Rating: 240 VAC, 2 Amp
Pulsed Voltage: Source voltage 5V, Current limiting resistance 66Ω

Input Characteristics
<table>
<thead>
<tr>
<th>Type</th>
<th>Linear Output</th>
<th>Zero</th>
<th>Span</th>
<th>Tolerance</th>
<th>Tolerance</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>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 mA</td>
<td>0 mA</td>
<td>20-21 mA</td>
<td>500Ω max</td>
<td></td>
<td></td>
<td></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>
<td></td>
<td></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>
<td></td>
<td></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>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Resolution: 15 bit analog to digital converter
Output Regulation: 0.02% for full load change
Output Settling 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
Alarm Mode: Normal, Latching, Hold, Latching / Hold
Dwell Time: 0 - 4553.6 minutes

Data Communications
Interface: RS-232 (1 unit), RS-485 (up to 247 units)
Protocol: Modbus Protocol – RTU mode
Address: 1-247
Baud Rate: 0.3 - 38.4 Kbits/sec
Data Bits: 7 or 8 bits
Parity Bit: None, Even or Odd
Stop Bit: 1 or 2 bits
Communication Buffer: 160 bytes

User Interface
Single 4-digit LED Display: 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 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: 1-3/64” x 2-3/4” x 4-3/8” (26.5 x 50 x 110.5 mm) H x W x D
Depth behind panel: 3-7/8” (98 mm)
Panel Cutout: 1-3/64” (22 mm) x 45 mm) H
Weight: 0.26 lb. (120 grams)

Approval Standards
Safety: UL61010-1, CSA C22.2 No. 24-93
EN61010-1 (IEC1010-1)
Protective Class: EN61326
Housing and Terminals: IP 20
EMC: EN61326

Stock and Common Part Numbers
(Power Input: 90-250 VAC, no data com)

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Signal Input</th>
<th>Out 1</th>
<th>Out 2 / Alarm 1</th>
<th>°F/°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEC03001</td>
<td>tc</td>
<td>relay</td>
<td>relay</td>
<td>°F</td>
</tr>
<tr>
<td>TEC03002</td>
<td>tc</td>
<td>relay</td>
<td>relay</td>
<td>°F</td>
</tr>
<tr>
<td>TEC03003</td>
<td>tc</td>
<td>4-20 mA</td>
<td>relay</td>
<td>°F</td>
</tr>
<tr>
<td>TEC03004</td>
<td>tc</td>
<td>DC pulse</td>
<td>relay</td>
<td>°F</td>
</tr>
<tr>
<td>TEC03005</td>
<td>RTD</td>
<td>relay</td>
<td>relay</td>
<td>°F</td>
</tr>
<tr>
<td>TEC03006</td>
<td>RTD</td>
<td>relay</td>
<td>relay</td>
<td>°F</td>
</tr>
<tr>
<td>TEC03007</td>
<td>tc</td>
<td>4-20 mA</td>
<td>relay</td>
<td>°F</td>
</tr>
<tr>
<td>TEC03008</td>
<td>RTD</td>
<td>relay</td>
<td>relay</td>
<td>°F</td>
</tr>
<tr>
<td>TEC03009</td>
<td>RTD</td>
<td>relay</td>
<td>relay</td>
<td>°F</td>
</tr>
</tbody>
</table>

(800) 323-6859  •  Email: sales@tempco.com