**Model TEC-8100 1/8 DIN Temperature Controller**

**Design Features**
- 1/8 DIN size – 96 mm × 48 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
- Highly versatile – 6 types of inputs available
- Output 2 can be used for cooling function
- Universal input power – 90-250 VAC or 11-26 VAC/VDC
- Optional NEMA 4X/IP65 front panel
- Bumpless transfer to manual mode during sensor failure
- Wide variety of alarm mode selections
- Optional RS-232 or RS-485 communications interface
- Bright 0.40” (10 mm) red LED process display, 0.31” (8 mm) green LED setpoint display
- High performance at a very low price

**Power Input**
- 4 = 90-250 VAC
- 5 = 11-26 VAC / VDC
- 9 = Other

**Hardware Code:** TEC-8100-

**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
  - 0-60 mV
  - 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**
- 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**
- 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**
- 0 = None
- 1 = Relay: 2A / 240 VAC, SPDT
- 9 = Other

**Communication**
- 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

**NEMA 4X / IP65**
- 0 = No
- 1 = Yes

**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-8100 Specifications (1/8 DIN)

Power Input
- Standard: 90-250 VAC, 47-63 Hz, 12 VA, 5W maximum
- Optional: 11-26 VAC / VDC, 12 VA, 5W maximum

Signal Input
- 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
- Sensor Lead Resistance Effect: 3-wire RTD: 2.6°C/ohm of resistance difference of two leads
- Sensor Break Response Time: 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 1-5 V 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 66 Ω

Linear Output — Characteristics

<table>
<thead>
<tr>
<th>Type 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>
</tr>
<tr>
<td>0-20 mA</td>
<td>0 mA</td>
<td>20-21 mA</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>
</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: 0.0% 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

Rear Terminal Connections

Alarm 1 — Programmable
- Alarm 1 Relay: Form A, (NO)
- Alarm Functions:
  - Maximum rating: 240 VAC, 2 Amp
  - 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 Timer: 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
- Dual 4-digit LED Display: 0.40” (10 mm) Red Process Display, 0.31” (8 mm) Green Setpoint Display
- 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
- On-Off: 0.1 - 90°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 - 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 x 1-7/8 x 3-1/8" (96 x 48 x 80 mm) HxWxD
- Panel Cutout: 3-5/8 x 1-25/32" (92 x 43 mm) H x W
- Weight: 0.46 lb. (210 grams)

Approval Standards
- Safety Standard: UL61010C-1 and CSA C22.2 No. 24-93
- Protective Class: Front panel: IP 50, optional NEMA 4X/IP65
- Housing and Terminals: IP 20
- EMC: EN61326

Stock and Common Part Numbers
(Power Input: 90-250 VAC, no data com, no NEMA 4X)

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Signal Input</th>
<th>Out 1</th>
<th>Out 2</th>
<th>Alarm</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEC34001</td>
<td>tc</td>
<td>relay</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>TEC34002</td>
<td>tc</td>
<td>relay</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>TEC34003</td>
<td>tc</td>
<td>4-20 mA</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>TEC34004</td>
<td>tc</td>
<td>DC pulse</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>TEC34005</td>
<td>RTD</td>
<td>relay</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>TEC34006</td>
<td>RTD</td>
<td>DC pulse</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>TEC34007</td>
<td>RTD</td>
<td>DC pulse</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>TEC34008</td>
<td>RTD</td>
<td>relay</td>
<td>none</td>
<td>none</td>
</tr>
</tbody>
</table>

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