**Model TEC-4100 1/4 DIN Temperature Controller**

**Design Features**
- 1/4 DIN size – 96 mm x 96 mm
- Fuzzy Logic PID heat and cool control
- PID Control – Auto-tuning on cold or warm start
- Short panel depth – only 2" (53 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 0.55" (14 mm) red LED process display and 0.40" (10 mm) green LED setpoint display
- High performance at a low price

**Configurable for 4 Programmable Outputs and NEMA 4X/IP65 Front Panel!**

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

**Hardware Code**: TEC-4100-

**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**
- 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

**Agency Approvals**

**View Product Inventory @ www.tempco.com**

*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 - 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**: ±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 ±0.3 µV / °C for mA input
- **Sensor Lead Resistance Effect**: Below 0.25 V for 1-5 V input; unavailable for other inputs
- **Burn-out Current**: 3-wire RTD: 2.6°C/ohm of resistance difference of two leads

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

### Linear Output — Characteristics
- **Type Tolerance**:  
  - 4-20 mA  
  - 0-20 mA  
  - 0-5 VDC  
  - 0-10 VDC  
- **Zero Tolerance**:  
  - 3.6-4.0 mA  
  - 0 mA  
  - 0 VDC  
  - 0 VDC  
- **Span Capacity**:  
  - 20-21 mA  
  - 20 mA  
  - 5-5.25 VDC  
  - 5-10 VDC  
- **Load**:  
  - 500Ω max  
  - 5000Ω max  
  - 10 KΩ min  
  - 10 KΩ min  

### 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 — 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 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**: 0.55" (14 mm) Red Process  
- **0.40" (10 mm) Green Setpoint**
- **Keypad**: 4 keys

### 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 - 90.0°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**: 3-3/4 x 3-3/4 x 2-9/16" (96 x 96 ÷ 65 mm) HxWxD  
  - Depth behind panel: 2" (53 mm)  
- **Panel Cutout**: 3-5/8 x 3-5/8" (92 x 92 mm) HxW  
- **Weight**: 0.55 lb. (250 grams)

### Approval Standards
- **Safety Standard**: UL61010C-1  
  - CSA C22.2 No. 24-93  
  - EN61010-1 (IEC1010-1)  
- **Protective Class**: IP 50 front panel standard, all indoor use.  
  - NEMA 4X/IP65 front panel if specified.  
  - IP 20 housing and terminals with protective cover.
- **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>Input</th>
<th>Out 1</th>
<th>Out 2</th>
<th>Alarm</th>
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<tr>
<td>TEC56001</td>
<td>tc</td>
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<td>relay</td>
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<tr>
<td>TEC56002</td>
<td>tc</td>
<td>relay</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>TEC56003</td>
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<td>4-20 mA</td>
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<tr>
<td>TEC56004</td>
<td>dc pulse</td>
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<td>relay</td>
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<td>none</td>
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</tr>
</tbody>
</table>

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