# 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 output available
- Output 2 can be used for cooling function
- Universal input power— 90-264 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
- Agency Approvals:

### Ordering Code:

<table>
<thead>
<tr>
<th>Power Input BOX 1</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>= 90-250 VAC</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>= 11-26 VAC / VDC</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>= Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Signal Input — Universal, can be programmed BOX 2</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 = Thermocouple: *J, K, T, E, B, R, S, N, L</td>
<td>0-60mV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 = RTD: *PT100 DIN, PT100 JIS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 = 0-1 VDC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 = *0-5, 1-5 VDC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A = 0-10 VDC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B = *4-20, 0-20 mA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C = Pulse dc for SSR drive: 14 VDC (40 mA max)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* indicates default value</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Alarm BOX 5</th>
<th>0 = None</th>
<th>1 = Relay: 2A / 240 VAC, SPDT</th>
<th>9 = Other</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Communication BOX 6</th>
<th>0 = None</th>
<th>1 = RS-485 Interface</th>
<th>2 = RS-232 Interface</th>
<th>3 = Retransmission 4-20 mA (default), 0-20 mA</th>
<th>4 = Retransmission 1-5 VDC (default), 0-5 VDC</th>
<th>5 = Retransmission 0-10 VDC</th>
<th>9 = Other</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Output 1 BOX 3</th>
<th>1 = Relay: 2A / 240 VAC</th>
<th>2 = Pulse dc for SSR drive: 5 VDC (30 mA max)</th>
<th>3 = Isolated, 4-20 mA (default), 0-20 mA</th>
<th>4 = Isolated VDC, 1-5 (default), 0-5, 0-1</th>
<th>5 = Isolated VDC, 0-10</th>
<th>6 = Triac-SSR output 1A / 240 VAC</th>
<th>C = Pulse dc for SSR drive: 14 VDC (40 mA max)</th>
<th>9 = Other</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Output 2 BOX 4</th>
<th>0 = None</th>
<th>1 = Relay: 2A / 240 VAC</th>
<th>2 = Pulse dc for SSR drive: 5 VDC (30 mA max)</th>
<th>3 = Isolated, 4-20 mA (default), 0-20 mA</th>
<th>4 = Isolated VDC, 1-5 (default), 0-5, 0-1</th>
<th>5 = Isolated VDC, 0-10</th>
<th>6 = Triac-SSR output 1A / 240 VAC</th>
<th>7 = Isolated 20V @ 25 mA DC, Output Power Supply</th>
<th>8 = Isolated 12V @ 40 mA DC, Output Power Supply</th>
<th>9 = Isolated 5V @ 80 mA DC, Output Power Supply</th>
<th>C = Pulse dc for SSR drive: 14 VDC (40 mA max)</th>
<th>A = Other</th>
</tr>
</thead>
</table>

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**NEMA 4X / IP65 BOX 7**

0 = No
1 = Yes

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### 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 pages 13-36 and 13-37.

### Ordering Information

**Model TEC-4100** is offered with the options listed in the worksheet above. Create an ordering code by filling in the boxes with the appropriate number and/or letter designation for your requirements and a part number will be assigned, or choose from one of the part numbers listed.

**Standard lead time is stock to 4 weeks.**

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Product Inventory Available for Viewing and Selection @ www.tempco.com
Temperature Controllers

Model TEC-4100 Specifications (1/4 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
Accuracy: Thermocouple: ±0.10% of full scale, ±1 LSD at 77°F/25°C
RTD: ±0.07% of full scale, ±1 LSD at 77°F/25°C
Resolution: 18 bits
Sampling Rate: 5 times per second
Temperature Effect: ±1.5 μV / °C for all inputs except mA input
For mA input: ±3.0 μV / °C
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, below 1 mA for 4-20 mA input, below 0.25V for 1 - 5 VDC input, unavailable for other inputs.

Output 1 / 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</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>20 mA</td>
<td>0 mA</td>
<td>20-21 mA</td>
<td>500Ω max</td>
</tr>
<tr>
<td>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 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

<table>
<thead>
<tr>
<th>Terminal Connections</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>90-250VAC</td>
<td>Input Power</td>
</tr>
<tr>
<td>OP1</td>
<td>Relay 1</td>
</tr>
<tr>
<td>OP2</td>
<td>Relay 2</td>
</tr>
<tr>
<td>ALM1</td>
<td>Alarm 1</td>
</tr>
</tbody>
</table>

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
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 - 90.0°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 x 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>
</tr>
</thead>
<tbody>
<tr>
<td>TEC56001</td>
<td>tc</td>
<td>relay</td>
<td>none</td>
<td>relay</td>
</tr>
<tr>
<td>TEC56002</td>
<td>tc</td>
<td>relay</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>TEC56003</td>
<td>tc</td>
<td>4-20 mA</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>TEC56004</td>
<td>tc</td>
<td>dc pulse</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>TEC56005</td>
<td>RTD</td>
<td>relay</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>TEC56006</td>
<td>RTD</td>
<td>dc pulse</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>TEC56007</td>
<td>RTD</td>
<td>dc pulse</td>
<td>relay</td>
<td>none</td>
</tr>
<tr>
<td>TEC56008</td>
<td>RTD</td>
<td>dc pulse</td>
<td>none</td>
<td>relay</td>
</tr>
</tbody>
</table>

All Items Available from Stock