Model TEC-4100 1/4 DIN Temperature Controller

Design Features
- 1/4 DIN size – 96 mm × 96 mm
- Fuzzy Logic PID Autotune heat and cool control
- Short panel depth – only 2” (53 mm) required
- Universal input, field configurable (Type J T/C default, PT100, mA, V) with high accuracy 18-bit D-A
- 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

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
- 7 = Isolated 20V @ 25 mA DC, Output Power Supply
- 8 = Isolated 12V @ 40 mA DC, Output Power Supply
- 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 = Other

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

Power Input
- 1 = 90-250 VAC
- 2 = 11-26 VAC / VDC
- 9 = Other

Hardware Code: TEC-4100-

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.
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 ±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
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 1-5V 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
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>5000 max</td>
</tr>
<tr>
<td>0-20 mA</td>
<td>0 mA</td>
<td>20-21 mA</td>
<td>5000 max</td>
</tr>
<tr>
<td>0-5 VDC</td>
<td>0 VDC</td>
<td>5-25 VDC</td>
<td>10 KΩ min</td>
</tr>
<tr>
<td>1-5 VDC</td>
<td>0.9-1.0 VDC</td>
<td>5-25 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

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 - 90.0°F hysteresis control (P band = 0)
P or PD: 0 - 100.0% offset adjustment
PID: Fuzzy logic modified
  Proportional band: 0 - 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 × 3-3/4 × 2.9/16" (96 × 96 × 65 mm) HxWxD
Depth behind panel: 2" (53 mm)
Panel Cutout: 3-5/8" × 3-5/8" (92 × 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 20 housing and terminals with protective cover.
NEMA 4X/IP65 front panel if specified.
IP 50 front panel standard, all indoor use.
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>relay</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>TEC56008</td>
<td>RTD</td>
<td>DC pulse</td>
<td>none</td>
<td>none</td>
</tr>
</tbody>
</table>

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