

## 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

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

Agency Approvals:



File #: E244198

#### Power Input BOX 1

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

**Hardware Code:** TEC-4100- 1 2 3 4 5 6 7

A Part Number based on the hardware code and any software pre-programming will be issued at time of order.

#### Signal Input — Universal, can be programmed in the field for item 5 or 6 BOX 2

- 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

#### Alarm BOX 5

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

#### Output 1 BOX 3

- 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

#### Communication BOX 6

- 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

#### Output 2 BOX 4

- 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

#### NEMA 4X / IP65 BOX 7

- 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:** ±.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:** 200nA

**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 mV 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

Type	Tolerance	Zero Tolerance	Span Capacity	Load
4-20 mA		3.6-4.0 mA	20-21 mA	500Ω max
0-20 mA		0 mA	20-21 mA	500Ω max
0-5 VDC		0 VDC	5-5.25 VDC	10 KΩ min
1-5 VDC		0.9-1.0 VDC	5-5.25 VDC	10 KΩ min
0-10 VDC		0 VDC	10-10.5 VDC	10 KΩ min

**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

### 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 × 3-3/4 × 2-9/16" (96 × 96 × 65 mm) H×W×D  
 Depth behind panel: 2" (53 mm)

**Panel Cutout:** 3-5/8" × 3-5/8" (92 × 92 mm) H×W

**Weight:** 0.55 lb. (250 grams)

### Approval Standards

**Safety Standard:** UL61010C-1

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)

Part Number	Input	Out 1	Out 2	Alarm
TEC56001	tc	relay	none	relay
TEC56002	tc	relay	none	none
TEC56003	tc	4-20 mA	none	none
TEC56004	tc	dc pulse	none	none
TEC56005	RTD	relay	none	none
TEC56006	RTD	DC pulse	none	none
TEC56007	RTD	DC pulse	relay	none
TEC56008	RTD	DC pulse	none	relay

### Rear Terminal Connections

