

## Model TEC-7100 3/16 DIN Temperature Controller



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

Agency Approvals



### Design Features

- \* 3/16 DIN size – 72 mm × 72 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-485 communications interface
- \* Bright 0.40" (10 mm) red LED process display
- \* 0.31" (8 mm) green LED setpoint display
- \* High performance at a low price

### Power Input BOX 1

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

Hardware Code: TEC-7100-



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

**Standard lead time is stock to 2 weeks.**

### 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
- 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  $\mu\text{V} / ^\circ\text{C}$  for all inputs except mA input ±3.0  $\mu\text{V} / ^\circ\text{C}$  for mA input

**Sensor Lead Resistance Effect:** T/C: 0.2  $\mu\text{V}/\text{ohm}$   
 3-wire RTD: 2.6  $^\circ\text{C}/\text{ohm}$  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 66 $\Omega$

#### Linear Output — Characteristics

Type	Tolerance	Zero Tolerance	Span Capacity	Load
4-20 mA	3.6-4.0 mA	20-21 mA	500 $\Omega$ max	
0-20 mA	0 mA	20-21 mA	500 $\Omega$ max	
0-5 VDC	0 VDC	5-5.25 VDC	10 K $\Omega$ min	
1-5 VDC	0.9-1.0 VDC	5-5.25 VDC	10 K $\Omega$ min	
0-10 VDC	0 VDC	10-10.5 VDC	10 K $\Omega$ 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/ $^\circ\text{C}$

### 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

### Approval Standards

**Safety Standard:** UL61010C-1  
 CSA C22.2 No. 24-93  
 EN61010-1 (IEC1010-1)

**Protective Class:** IP65 front panel with additional option  
 IP 50 front panel without additional option, all indoor use  
 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	Signal Input	Out 1	Out 2	Alarm
TEC42001	tc	relay	none	none
TEC42002	tc	relay	relay	relay
TEC42003	tc	4-20 mA	none	none
TEC42004	tc	DC pulse	none	none
TEC42005	RTD	relay	none	none
TEC42006	RTD	DC pulse	none	none
TEC42007	RTD	DC pulse	relay	none
TEC42008	RTD	DC pulse	relay	relay

### Alarm 1 — Programmable

**Alarm 1 Relay:** Form A, (NO)

**Alarm 1 Relay:** Form A, (NC), 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-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 - 100.0 $^\circ\text{F}$  hysteresis control (P band = 0)

**P or PD:** 0 - 90.0% offset adjustment

**PID:** Fuzzy logic modified

**Proportional band:** 0.1 - 900 $^\circ\text{F}$

**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 $^\circ\text{F}/\text{min}$  or 0 - 900 $^\circ\text{F}/\text{hr}$  ramp rate

### Environmental and Physical

**Operating Temperature:** 14 to 122 $^\circ\text{F}$  (-10 to 50 $^\circ\text{C}$ )

**Storage Temperature:** -40 to 140 $^\circ\text{F}$  (-40 to 60 $^\circ\text{C}$ )

**Humidity:** 0 to 90% RH, non-condensing

**Dielectric Strength:** 2000 VAC, 50/60 Hz for 1 minute

**Dimensions:** 2-27/32  $\times$  2-27/32  $\times$  3" (72  $\times$  72  $\times$  78 mm) H $\times$ W $\times$ D  
 Depth behind panel: 2-9/16" (65 mm)

**Panel Cutout:** 2-11/16"  $\times$  2-11/16" (68  $\times$  68 mm) H $\times$ W

**Weight:** 0.44 lb. (200 grams)

### Rear Terminal Connections

