

Model TEC-220 1/32 DIN Temperature Controller



Configurable for 3 Programmable Outputs!

Agency Approvals:

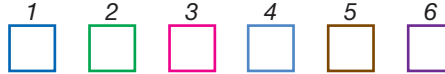


File #:
E244198

Design Features

- * 1/32 DIN size – 24 mm × 48 mm
- * Fuzzy Logic PID Autotune heat and cool control
- * Short panel depth – only 3-7/8" (98 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 programmed as output or alarm
- * NEMA 4X / IP65 gasketed front panel
- * Universal input power, 90-250 VAC or 11-26 VAC/VDC
- * Highly accurate universal input with 18 bit analog to digital converter
- * Bumpless transfer to manual mode during sensor failure
- * Wide variety of alarm mode selections
- * RS-485 and RS-232 data communications interface optional
- * Bright 0.40" (10 mm) LED display
- * High performance at a very low price

Hardware Code: TEC-220-



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

Power Input BOX 1

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

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

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

Output 2 / Alarm 1 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
- 8 = Isolated 20V @ 25 mA DC, Output Power Supply
- A = 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)
- B = Other

Communications BOX 5

- 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

Units – °F or °C BOX 6

- 1 = °F on faceplate
- 2 = °C on faceplate
- 3 = None (process units)



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: $\pm 0.24\%$ of span typical
Maximum Rating: -2 VDC minimum, 12 VDC maximum (1 minute for mA input)
Temperature Effect: $\pm 1.5 \mu V / ^\circ C$ for all inputs except mA input $\pm 3.0 \mu V / ^\circ C$ for mA input

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

Linear Output — Characteristics

Type	Zero	Span	Load
Tolerance	Tolerance	Capacity	
4-20 mA	3.6-4.0 mA	20-21 mA	500 Ω max
0-20 mA	0 mA	20-21 mA	500 Ω max
0-5 VDC	0 VDC	5-5.25 VDC	10 K Ω min
1-5 VDC	0.9-1.0 VDC	5-5.25 VDC	10 K Ω min
0-10 VDC	0 VDC	10-10.5 VDC	10 K Ω 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: $\pm 0.01\%$ of span/ $^\circ C$

Solid State Relay (Triac) Output

Rating: 1A / 240 VAC

Inrush Current: 20A for 1 cycle

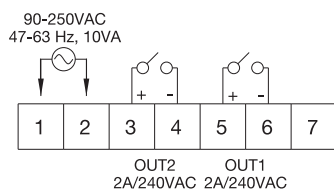
Min. Load Current: 50 mA rms

Max. Off-state Leakage: 3 mA rms

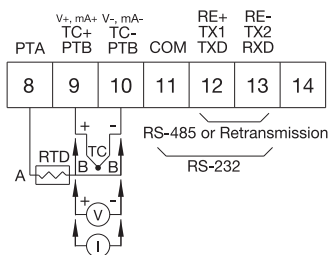
Max. On-state Voltage: 1.5 VAC rms

Insulation Resistance: 1000 Megohms minimum at 500 VDC

Dielectric Strength: 2500 VAC for 1 minute



Rear Terminal Connections



Output 2 / 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

Single 4-digit LED Display: 0.4" / 10 mm **Keypad:** 3 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, dead band -36.0 to 36.0% of PB

On-Off: 0.1 - 90.0 $^\circ F$ hysteresis control (P band = 0)

P or PD: 0 - 100.0% offset adjustment

PID: Fuzzy logic modified

Proportional band: 0.1 - 900 $^\circ F$

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 $^\circ F$ /min or 0 - 900 $^\circ F$ /hr ramp rate

Environmental and Physical

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

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

Humidity: 0 to 90% RH, non-condensing

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

Dimensions: 1-3/64 \times 2 \times 4-3/8" (26.5 \times 50 \times 110.5 mm) H \times W \times D
 Depth behind panel: 3-7/8" (98 mm)

Panel Cutout: 7/8 \times 1-25/32" (22 \times 45 mm) H \times W

Weight: 0.26 lb. (120 grams)

Approval Standards

Safety: UL61010C-1

EN61010-1 (IEC1010-1)

Protective Class: Front Panel: NEMA 4X / IP65

Housing and Terminals: IP 20

EMC: EN61326

Stock and Common Part Numbers (Power Input: 90-250 VAC, no data com)

Part Number	Signal Input	Out 1	Out 2 / Alarm 1	$^\circ F / ^\circ C$
TEC03001	tc	relay	none	$^\circ F$
TEC03002	tc	relay	relay	$^\circ F$
TEC03003	tc	4-20 mA	none	$^\circ F$
TEC03004	tc	DC pulse	none	$^\circ F$
TEC03005	RTD	relay	none	$^\circ F$
TEC03006	RTD	DC pulse	none	$^\circ F$
TEC03007	tc	relay	none	$^\circ C$
TEC03008	tc	4-20 mA	none	$^\circ C$
TEC03009	RTD	relay	none	$^\circ C$