Model TEC-220 1/32 DIN Temperature Controller

Configurable for 3 Programmable Outputs!

Agency Approvals:

Design Features

- *1/32 DIN size – 24 mm × 48 mm*
- *Fuzzy Logic PID heat and cool control*
- *PID Control – Auto-tuning on cold or warm start*
- *Short panel depth – only 3-7/8" (98 mm) required*
- *Universal programmable sensor input*
- *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-

1	2	3	4	5	6

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.

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.**

View Product Inventory @ www.tempco.com

Model TEC-220 Specifications (1/32 DIN)

Power Input
Standard: 90-250 VAC, 47-63 Hz, 10 VA, 5W maximum
Optional: 11-26 VAC / VDC, 10 VA, 5W maximum

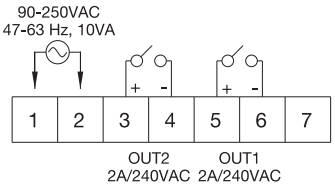
Signal Input
Resolution: 18 bits
Sampling Rate: 5 samples / second
Accuracy: ±.24% of span typical
Maximum Rating: -2 VDC minimum, 12 VDC maximum (1 minute for mA input)
Temperature Effect: ±1.5 μV / °C for all inputs except mA input ±3.0 μV / °C for mA input
Sensor Lead Resistance Effect: T/C: 0.2μV/ohm
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

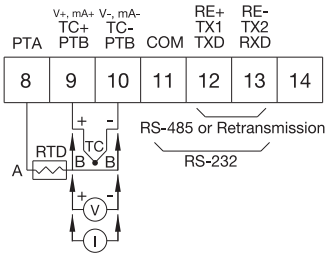
Linear Output — Characteristics

Type	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



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°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: 1-3/64 × 2 × 4-3/8" (26.5 × 50 × 110.5 mm) H×W×D
Depth behind panel: 3-7/8" (98 mm)
Panel Cutout: 7/8 × 1-25/32" (22 × 45 mm) H×W
Weight: 0.26 lb. (120 grams)

Approval Standards
Safety: UL61010C-1, CSA C22.2 No. 24-93
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	°F/°C
TEC03001	tc	relay	none	°F
TEC03002	tc	relay	relay	°F
TEC03003	tc	4-20 mA	none	°F
TEC03004	tc	DC pulse	none	°F
TEC03005	RTD	relay	none	°F
TEC03006	RTD	DC pulse	none	°F
TEC03007	tc	relay	none	°C
TEC03008	tc	4-20 mA	none	°C
TEC03009	RTD	relay	none	°C