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- *Potentiometer Setpoint*
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- *Potentiometer Setpoint*
- *Low Cost*

TEC-404 ($145.00)
- *Potentiometer Setpoint*
- *Process Digital Display*
- *Deviation Alarm Optional*

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- *High Limit Control*
- *External Reset Optional*
- *Retransmission Optional*
- *Latching Relay*

Model TEC-220 1/32 DIN Temperature Controller

What's New At Tempco

Design Features

- *1/32 DIN size – 24 mm x 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*
- *Bright 0.40" (10 mm) LED display*
- *High performance at a very low price*
- *Agency Approvals:*

Configurable for 3 Programmable Outputs!

List Prices Starting at $160.00
Quantity Discounts Available!

Ordering Code:

TEC-220- [1] [2] [3] [4] [5] [6]

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
B = Isolated 5V @ 80 mA DC, Output Power Supply
C = Pulse dc for SSR drive: 14 VDC (40 mA max)
9 = 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

Ordering Information

Model TEC-220 is offered with the options listed in the worksheet above. Create an ordering code by filling in the boxes with the appropriate number and/or letter designation for your requirements and a part number will be assigned, or choose from one of the part numbers listed.

Standard lead time is stock to 4 weeks.

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 pages 13-36 and 13-37.**

Product Inventory Available for Viewing and Selection @ 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

Accuracy: Thermocouple: ±0.10% of full scale, ±1 LSD at 77°F/25°C
RTD: ±0.07% of full scale, ±1 LSD at 77°F/25°C

Resolution: 18 bits

Sampling Rate: 5 times per second

Temperature Effect: ±1.5 μV / °C for all inputs except mA input
For mA input: ±3.0 μV / °C

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, below 1 mA for 4-20 mA input, below 0.25V for 1 - 5 VDC input, unavailable for other 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

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

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

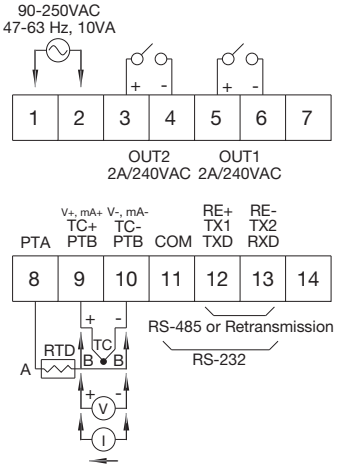
Dielectric Strength: 2000 VAC, 50/60 Hz for 1 minute

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)

Rear Terminal Connections



All Items Available from Stock

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

Model TEC-2500 1/32 DIN Temperature Controller

Configurable for 4 Programmable Outputs!

List Prices Starting at $225.00
Quantity Discounts Available!

Design Features

- *1/32 DIN size – 24 mm x 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*
- *Heater Break Alarm using 0-50 Amp current transformer*
- *Output 2 can be programmed as output or alarm*
- *NEMA 4X / IP65 gasketed front panel*
- *Alarm 1 – programmable 5 VDC logic output*
- *Universal input power, 90-264 VAC or 11-26 VAC/VDC*
- *Bumpless transfer to manual mode during sensor failure*
- *Wide variety of alarm mode selections*
- *RS-485 and RS-232 data communications interface*
- *Bright 0.40" (10 mm) LED display*
- *Fast input sample rate (5 samples/second)*
- *Automatic programming*
- *Differential control*
- *"Soft-Start" ramp and dwell timer*
- *Analog input for remote setpoint and current transformer*
- *Event input for changing functions and setpoint*
- *Hardware lockout plus remote lockout protection*
- *Loop break alarm*
- *Analog retransmission*
- *DC power supply outputs*
- *High performance at a low price*

Ordering Code:

TEC-2500- [1] [2] [3] [4] [5] [6] [7]

Power Input BOX 1
4 = 90-264 VAC
5 = 11-26 VAC / VDC
9 = Other

Signal Input — Universal, can be programmed in the field BOX 2
1 = Input 1 – Universal input (factory default = tc type J)
Thermocouple: J, K, T, E, B, R, S, N, L
RTD: PT100 DIN, PT100 JIS
Current: 4-20 mA, 0-20 mA
Voltage: VDC, 0-1, 0-5, 1-5, 0-10
Input 2 – not available if RS-232 is specified
CT: 0 - 50A AC current Transformer (factory default)
Voltage Input: 0-1V, 0-5V, 1-5V, 0-10V
Event Input
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
9 = Other

Output 2 / Alarm 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
A = Other

Alarm 1 BOX 5
1 = 5 VDC Logic Output
9 = Other

Transformer for Heater Break Alarm
(0-50 Amp current)
Part Number: TEC99999
Specifications on page 13-36

Communications 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

Units — °F or °C BOX 7
1 = °F on faceplate
2 = °C on faceplate

Agency Approvals: **RoHS**

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 pages 13-36 and 13-37.**

Ordering Information

Model TEC-2500 is offered with the options listed in the worksheet above. Create an ordering code by filling in the boxes with the appropriate number and/or letter designation for your requirements and a part number will be assigned, or choose from one of the part numbers listed.

Standard lead time is stock to 4 weeks.

Product Inventory Available for Viewing and Selection @ www.tempco.com

Model TEC-2500 Specifications (1/32 DIN)

Power Input
Standard: 90-264 VAC, 47-63 Hz, 15 VA, 7W maximum
Optional: 11-26 VAC / VDC, 15 VA, 7W maximum

Signal Input
Input 1
Accuracy: Thermocouple: ±0.10% of full scale, ±1 LSD at 77°F/25°C
RTD: ±0.07% of full scale, ±1 LSD at 77°F/25°C

Resolution: 18 bits

Sampling Rate: 5 times per second

Temperature Effect: ±1.5 μV / °C for all inputs except mA input
For mA input: ±3.0 μV / °C

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, below 1 mA for 4-20 mA input, below 0.25V for 1 - 5 V input, unavailable for other inputs.

Input 2
Resolution: 18 bits

Sampling Rate: 1.66 times per second

Sensor Break Response Time: 0.5 second

Types: **Current Transducer**: 0 to 50 Amp
mA: -3 to 27 mA
V: -1.3 to 11.5 VDC

Event Input Functions: Select 2nd setpoint, and/or PID, disable output 1 and/or output 2, remote lockout, reset alarm 1 and/or alarm 2

Output 1 or Output 2 / Alarm 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

Isolation Breakdown Voltage: 1000 VAC

Solid State Relay (Triac) Output
Rating: 1A / 240 VAC **Inrush Current**: 20A for 1 cycle

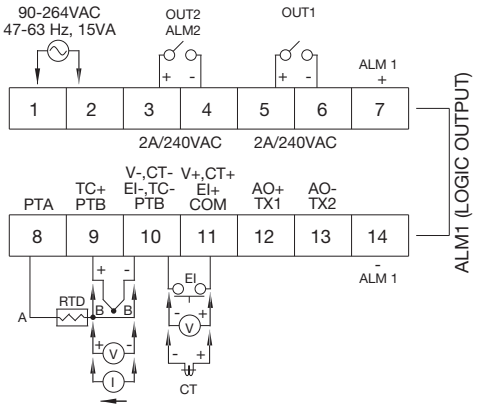
Min. Load Current: 50 mA rms

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


Alarm 1 / Alarm 2
Alarm 1: 5 VDC logic output

Alarm 2 Relay: Form A, (NO) **Maximum rating**: 240 VAC, 2 Amp

Alarm Functions:

Dwell timer	PV1-PV2 High / Low Alarm
Deviation Band High / Low Alarm	Loop Break Alarm
PV2 High / Low Alarm	Sensor Break Alarm

Alarm Mode: Normal, Latching, Hold, Latching / Hold

Dwell Timer: 0 - 6553.5 minutes

Data Communications
Interface: RS-232 (1 unit), RS-485 (up to 247 units)

Protocol: Modbus Protocol – RTU mode

User Interface
Single 4-digit LED Displays: 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 1-255% of PB

On-Off: 0.1 - 100.0°F hysteresis control (P band = 0)

P or PD: 0 - 100.0% offset adjustment

PID: Fuzzy logic modified
Proportional band: 0.1 - 900°F (500°C)
Integral: 0 - 1000 seconds **Derivative**: 0 - 360 seconds

Cycle Time: 0.1 - 100 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

Power Limit: 0 - 100% for output 1 and output 2

Remote Setpoint: Programmable range for voltage or current input

Digital Filter: Time constant: settable from 0.2 to 60 seconds

Analog Retransmission
Analog Retransmission Functions: PV1, PV2, PV1-PV2, PV2-PV1, setpoint, MV1, MV2, PV-SV deviation value

Output Signal: 4-20 / 0-20 mA, 0-1, 0-5, 1-5, 0-10 VDC

Accuracy : ±0.05 % of span, ±0.0025 %/°C

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 Standard: UL 3121-1, CSA C22.2 No. 24-93
EN61010-1 (IEC1010-1)

EMC: EN61325

Protective Class: Front Panel: NEMA 4X / IP65
Housing and Terminals: IP 20

Stock and Common Part Numbers
(Power Input: 90-264 VAC, w/ alarm 1, no data com)

Part Number	Signal Input	Out 1	Out 2/ Alarm 2	°F/°C
TEC02001	tc	relay	none	°F
TEC02002	tc	relay	relay	°F
TEC02003	tc	4-20 mA	none	°F
TEC02004	tc	4-20 mA	relay	°F
TEC02005	tc	dc pulse	none	°F
TEC02006	tc	relay	none	°C
TEC02007	tc	4-20 mA	none	°C
TEC02008	tc	dc pulse	none	°C

Model TEC-920 1/16 DIN Temperature Controller

Single Display, Configurable for 2 Programmable Outputs!

List Prices Starting at $155.00

Quantity Discounts Available!

Design Features

- *1/16 DIN size – 48 mm x 48 mm*
- *Fuzzy Logic PID heat and cool control*
- *PID Control – Auto-tuning on cold or warm start*
- *Short panel depth – only 3-3/8" (86 mm) required*
- *Universal programmable sensor input*
- *Highly versatile – 6 types of inputs available*
- *Output 2 can be programmed as output or alarm*
- *Universal input power – 90-264 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*
- *Optional RS-485 communications interface*
- *Bright 0.40" (10 mm) LED display*
- *High performance at a very low price*
- *Agency Approvals:*

Ordering Code:

Power Input BOX 1
4 = 90-250 VAC
5 = 11-26 VAC / VDC
9 = Other

TEC-920- [1] [2] [3] [4]

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
7 = RS-485 Data Interface
8 = Isolated 20V @ 25 mA DC, Output Power Supply
A = Isolated 12V @ 40 mA DC, Output Power Supply
B = Isolated 5V @ 80 mA DC, Output Power Supply
C = Pulse DC for SSR drive: 14 VDC (40 mA max)
9 = Other

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 pages 13-36 and 13-37.**

Ordering Information

Model TEC-920 is offered with the options listed in the worksheet above. Create an ordering code by filling in the boxes with the appropriate number and/or letter designation for your requirements and a part number will be assigned, or choose from one of the part numbers listed.

Standard lead time is stock to 4 weeks.

Product Inventory Available for Viewing and Selection @ www.tempco.com

Model TEC-920 Specifications (1/16 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

Accuracy: Thermocouple: ±0.10% of full scale, ±1 LSD at 77°F/25°C
RTD: ±0.07% of full scale, ±1 LSD at 77°F/25°C

Resolution: 18 bits

Sampling Rate: 5 times per second

Temperature Effect: ±1.5 μV / °C for all inputs except mA input
For mA input: ±3.0 μV / °C

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, below 1 mA for 4-20 mA input, below 0.25V for 1 - 5 VDC input, unavailable for other 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

Approval Standards

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

EMC: EN61326

Protective Class: Front Panel: IP30
Housing and Terminals: IP 20

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

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

Single 4-digit LED Displays: 0.4" / 10 mm **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, 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

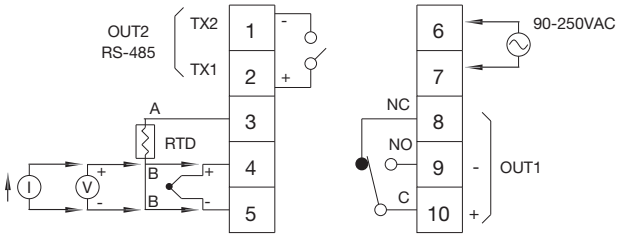
Dimensions: 1-7/8 × 1-7/8 × 3-3/4" (48 × 48 × 94 mm) H×W×D
Depth behind panel: 3-3/8" (86 mm)

Panel Cutout: 1-25/32 × 1-25/32" (45 × 45 mm) H×W

Weight: 0.31 lb. (140 grams)

All Items Available from Stock

Rear Terminal Connections



Stock and Common Part Numbers

(Power Input: 90-250 VAC)

Part Number	Signal Input	Out 1	Out 2/ Alarm1
TEC15001	tc	relay	none
TEC15002	tc	relay	relay
TEC15003	tc	4-20 mA	none
TEC15004	tc	dc pulse	none
TEC15005	RTD	relay	none
TEC15006	RTD	dc pulse	none
TEC15007	RTD	dc pulse	relay

Model TEC-9100 1/16 DIN Temperature Controller

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

Design Features

- *1/16 DIN size – 48 mm x 48 mm*
- *Fuzzy Logic PID heat and cool control*
- *PID Control – Auto-tuning on cold or warm start*
- *Short panel depth – only 4-1/8" (105 mm) required*
- *Universal programmable sensor input*
- *Highly versatile – 6 types of output available*
- *Output 2 can be programmed as output or alarm*
- *Universal input power – 90-250 VAC or 11-26 VAC/VDC*
- *Highly accurate universal input*
- *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 0.40" (10 mm) red LED process display 0.31" (8 mm) green LED setpoint display*
- *High performance at a very low price*
- *Agency Approvals:* **RoHS**

Ordering Code:

List Prices Starting at $170.00

Quantity Discounts Available!

TEC-9100- [1] [2] [3] [4] [5] [6] [7]

Power Input *BOX 1*
4 = 90-250 VAC
5 = 11-26 VAC / VDC
9 = Other

Alarm *BOX 5*
0 = None
1 = Relay: 2A / 240 VAC, SPDT
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

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 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

Case Options *BOX 7*
0 = Panel mount standard
1 = Panel mount with NEMA 4X/IP65 front panel
2 = DIN rail mount adapter

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

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 pages 13-36 and 13-37.**

Ordering Information

Model TEC-9100 is offered with the options listed in the worksheet above. Create an ordering code by filling in the boxes with the appropriate number and/or letter designation for your requirements and a part number will be assigned, or choose from one of the part numbers listed.

Standard lead time is stock to 4 weeks.

Product Inventory Available for Viewing and Selection @ www.tempco.com

Model TEC-9100 Specifications (1/16 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

Accuracy: Thermocouple: ±0.10% of full scale, ±1 LSD at 77°F/25°C
RTD: ±0.07% of full scale, ±1 LSD at 77°F/25°C

Resolution: 18 bits

Sampling Rate: 5 times per second

Temperature Effect: ±1.5 µV / °C for all inputs except mA input
For mA input: ±3.0 µV / °C

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, below 1 mA for 4-20 mA input, below 0.25V for 1 - 5 VDC input, unavailable for other 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

Approval Standards

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

EMC: EN61326

Protective Class: Front Panel: IP50, optional NEMA 4X/IP65
Housing and Terminals: IP 20

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

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, 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)

Humidity: 0 to 90% RH, non-condensing

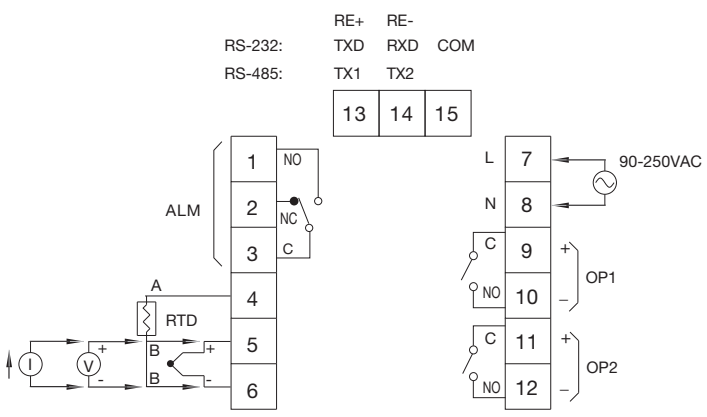
Dielectric Strength: 2000 VAC, 50/60 Hz for 1 minute

Dimensions: 1-7/8 × 1-7/8 × 4-9/16" (48 × 48 × 116 mm) H×W×D
Depth behind panel: 4-1/8" (105 mm)

Panel Cutout: 1-25/32 × 1-25/32" (45 × 45 mm) H×W

Weight: 0.33 lb. (150 grams)

Rear Terminal Connections



All Items Available from Stock

Stock and Common Part Numbers

(Power Input: 90-250 VAC, no data com, no NEMA 4X)

Part Number	Signal Input	Output 1	Output 2	Alarm
TEC14001	tc	relay	relay	none
TEC14002	tc	relay	none	none
TEC14003	tc	relay	none	relay
TEC14004	tc	4-20 mA	none	none
TEC14005	RTD	relay	none	none
TEC14006	RTD	relay	none	relay
TEC14007	RTD	dc pulse	none	none
TEC14008	RTD	dc pulse	none	relay

Model TEC-9090 1/16 DIN Temperature Controller

Dual Display. Configurable for 2 Programmable Outputs !

List Prices Starting at $180.00
Quantity Discounts Available!

Design Features

- *1/16 DIN size – 48 mm x 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" (86 mm) required*
- *Universal programmable sensor input*
- *Highly versatile – 6 types of inputs available*
- *Optional relay alarm output*
- *Universal input power 90-264 VAC, 20-32 VAC/VDC or 10-18 VDC*
- *Wide variety of alarm mode selections*
- *Bright 0.40" (10 mm) red LED process display 0.31" (8 mm) green LED setpoint display*
- *High performance at a low price*
- *Agency Approvals:*

Ordering Code:

TEC-9090- [1] [2] [3] [4] [5] [0] [7] [8] [9]

Power Input *BOX 1*
4 = 90-264 VAC
5 = 20-32 VAC / VDC
6 = 10-18 VDC
9 = Other

Signal Input — (hardware jumper change between TC & RTD) *BOX 2*
5 = Thermocouple: Universal Configurable: J, K, T, E, B, R, S, N (default: Type J)
6 = RTD: Universal Configurable: DIN or JIS (default: alpha 0.00385/DIN)
7 = Linear: mV or mA (default: 10mV to 60mV)
9 = Other

Range code *BOX 3*
1 = Field configurable (default – max per input type)
9 = Other

Control Mode *BOX 4*
3 = Field Configurable (default: PID reverse acting, °F)
9 = Other

Output 1 *BOX 5*
1 = Relay: 3A / 240 VAC
2 = Pulse DC for SSR drive: 24 VDC (20 mA max)
3 = 4-20 mA, linear (max load 500Ω)
4 = 0-20 mA, linear (max load 500Ω)
5 = 0-10 VDC, linear (min. impedance 10 KΩ)
6 = Triac-SSR output 1A / 240 VAC
9 = Other

Output 2 *BOX 6*
0 = None

Alarm *BOX 7*
0 = None
1 = Relay: 2A / 240 VAC, Field Configurable (default: process high alarm, 392°F)
9 = Other

Data Communications *BOX 8*
0 = None

Units — °F or °C *BOX 9*
1 = °F on faceplate
2 = °C on faceplate

Notes: **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 13-36.**

Ordering Information

Model TEC-9090 is offered with the options listed in the worksheet above. Create an ordering code by filling in the boxes with the appropriate number and/or letter designation for your requirements and a part number will be assigned, or choose from one of the part numbers listed.

Standard lead time is stock to 4 weeks.

Product Inventory Available for Viewing and Selection @ www.tempco.com

Model TEC-9090 Specifications (1/16 DIN)

Power Input

Standard: 90-264 VAC, 47-63 Hz, 5VA, 5W maximum
Optional: 20-32 VAC / VDC, 5VA, 5W maximum or
10-18 VDC, 5W maximum

Signal Input

Accuracy: Thermocouple: ±0.10% of full scale, ±1 LSD at 77°F/25°C
RTD: ±0.07% of full scale, ±1 LSD at 77°F/25°C

Sampling Rate: 3 times per second

Common Mode Rejection Ratio (CMRR): 120 dB

Normal Mode Rejection Ratio (NMRR): 60 dB

Sensor Break Detection: Sensor open for tc, RTD and mV inputs, below 1 mA for 4-20 mA input, below 0.25V for 1 - 5 VDC input, unavailable for other inputs.

Output 1

Relay Rating: 240 VAC, 3 Amp

Pulsed Voltage: Source voltage 24V (20 mA max)

Current: 4 - 20 mA, at 500Ω max

Current: 0 - 20 mA, at 500Ω max

Voltage: 0 - 10 VDC, at 10 KΩ min

Solid State Relay (Triac) Output

Rating: 1A / 240 VAC

Inrush Current: 20A for 1 cycle

Min. Load Current: 50 mA rms

Dielectric Strength: 2500 VAC for 1 minute

Approval Standards

Safety: UL873, CSA22.2/142-87, IEC1010-1

EMC Emmission: EN50081-1

EMC Immunity: EN50082-1

Protective Class: Front Panel: IP30
Housing and Terminals: IP 20

Alarm — Programmable

Alarm Relay: Form A, (NO)
Maximum rating: 240 VAC, 3 Amp

Alarm Functions: Dwell timer
Deviation High or Low Alarm
Deviation Band High or Low Alarm
Process High Alarm
Sensor Break Alarm

Dwell Timer: 0 - 6553.5 minutes

User Interface

Dual 4-digit LED Display: 0.40" (10 mm) Red Process Display
0.31" (8 mm) Green Setpoint Display

Keypad: 4 keys

Control Mode

Output 1: Reverse (heating) or direct (cooling) action

On-Off: 0 - 20% of span hysteresis control (P band = 0)

P or PD: 0 - 100.0% offset adjustment

PID: Fuzzy logic modified
Proportional band: 0.1 - 360°F (0 - 200°C)
Integral time: 0 - 3600 seconds
Derivative time: 0 - 1000 seconds

Cycle Time: 0 - 120 seconds

Auto-tuning: Cold start and warm start

Ramping Control: 0 - 360°F/min (200°C/min)

Environmental and Physical

Operating Temperature: 14 to 122°F (-10 to 50°C)

Humidity: 0 to 90% RH, non-condensing

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

Dimensions: 1-7/8 × 1-7/8 × 3-3/4" (48 × 48 × 94 mm) H×W×D
Depth behind panel: 3-3/8" (86 mm)

Panel Cutout: 1-25/32 × 1-25/32" (45 × 45 mm) H×W

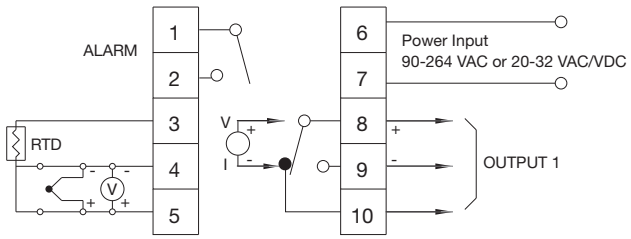
Weight: 0.37 lb. (170 grams)

All Items Available from Stock

Stock and Common Part Numbers
(Power Input: 90-264 VAC)

Part Number	Signal Input	Out 1	Dual Alarms
TEC11002	TC	relay	relay
TEC11001	TC	relay	none
TEC11007	TC	4-20 mA	none
TEC11003	TC	DC pulse	none
TEC11009	RTD	relay	none
TEC11010	RTD	DC pulse	none

Rear Terminal Connections



Model TEC-9300 1/16 DIN Temperature Controller

Configurable with 4 Programmable Outputs and Standard NEMA 4X/IP65 Front Panel!

Design Features

- *1/16 DIN size – 48 mm x 48 mm*
- *Fuzzy Logic PID heat and cool control*
- *PID Control – Auto-tuning on cold or warm start*
- *Short panel depth – only 3" (75 mm) required*
- *Universal programmable sensor input*
- *Heater Break Alarm using 0-50 Amp current transformer*
- *Output 2 can be programmed as output or alarm*
- *NEMA 4X / IP65 gasketed front panel*
- *Alarm 1 – programmable NO or NC relay*
- *Universal input power, 90-264 VAC or 11-26 VAC/VDC*
- *Bumpless transfer to manual mode during sensor failure*
- *Wide variety of alarm mode selections*
- *RS-485 and RS-232 data communications interface*
- *Bright 0.40" (10 mm) red LED process display, 0.31" (8 mm) green LED setpoint display*
- *Fast input sample rate (5 samples/second)*
- *Automatic programming*
- *Differential control*
- *"Soft-Start" ramp and dwell timer*
- *Analog input for remote setpoint and current transformer*
- *Event input for changing functions and setpoint*
- *Hardware lockout plus remote lockout protection*
- *Loop break alarm*
- *Analog retransmission*
- *DC power supply outputs*
- *Tempco's most highly featured 1/16 DIN control*

Ordering Code:

List Prices Starting at $215.00
Quantity Discounts Available!

TEC-9300- [1] [2] [3] [4] [5] [6]

Power Input *BOX 1*
4 = 90-264 VAC
5 = 11-26 VAC / VDC
9 = Other

Signal Input — Universal, can be programmed in the field *BOX 2*
1 = Input 1 – Universal input (factory default = tc type J)
Thermocouple: J, K, T, E, B, R, S, N, L
RTD: PT100 DIN, PT100 JIS
Current: 4-20 mA, 0-20 mA
Voltage: VDC, 0-1, 0-5, 1-5, 0-10
Input 2 – CT: 0 - 50A AC current Transformer (factory default)
Linear Input: 0-1V, 0-5V, 1-5V, 0-10V, 0-20mA, 4-20mA
Input 3 – Event Input, not available if RS-232 is specified
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
9 = Other

Output 2 / Alarm 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
A = Other

Alarm 1 *BOX 5*
0 = None
1 = Relay: 2A / 240 VAC (NO)
2 = Relay: 2A / 240 VAC (NC)
9 = Other

Communications *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

Transformer for Heater Break Alarm
(0-50 Amp current)
Part Number: TEC99999
Specifications on page 13-36

Agency Approvals: **RoHS**

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 pages 13-36 and 13-37.**

Ordering Information

Model TEC-9300 is offered with the options listed in the worksheet above. Create an ordering code by filling in the boxes with the appropriate number and/or letter designation for your requirements and a part number will be assigned, or choose from one of the part numbers listed.

Standard lead time is stock to 4 weeks.

Product Inventory Available for Viewing and Selection @ www.tempco.com

Model TEC-9300 Specifications (1/16 DIN)

Power Input
Standard: 90-264 VAC, 47-63 Hz, 15 VA, 7W maximum
Optional: 11-26 VAC / VDC, 15 VA, 7W maximum

Signal Input
Input 1
Accuracy: Thermocouple: ±0.10% of full scale, ±1 LSD at 77°F/25°C
RTD: ±0.07% of full scale, ±1 LSD at 77°F/25°C

Resolution: 18 bits

Sampling Rate: 5 times per second

Temperature Effect: ±1.5 μV / °C for all inputs except mA input
For mA input: ±3.0 μV / °C

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, below 1 mA for 4-20 mA input, below 0.25V for 1 - 5 V input, unavailable for other inputs.

Input 2
Resolution: 18 bits

Sampling Rate: 1.66 times per second

Sensor Break Response Time: 0.5 second

Types: **Current Transducer**: 0 to 50 Amp
mA: -3 to 27 mA
V: -1.3 to 11.5 VDC

Input 3
Event Input Functions: Select 2nd setpoint and/or PID, disable output 1 and/or output 2, remote lockout reset alarm 1 and/or alarm 2
Logic Low: -10V min., 0.8V max.
Logic High: 2V min., 10V max.
External Pull-Down Resistance: 400KΩ max
External Pull-Up Resistance: 1.5MΩ min

Output 1 or Output 2 / Alarm 2
Relay Rating: 240 VAC, 2 Amp

Pulsed Voltage: Source voltage 5V, Current limiting resistance 66Ω

Linear Output — Characteristics

Type	Zero	Span	
Tolerance	Tolerance	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

Isolation Breakdown Voltage: 1000 VAC

Solid State Relay (Triac) Output
Rating: 1A / 240 VAC **Inrush Current**: 20A for 1 cycle

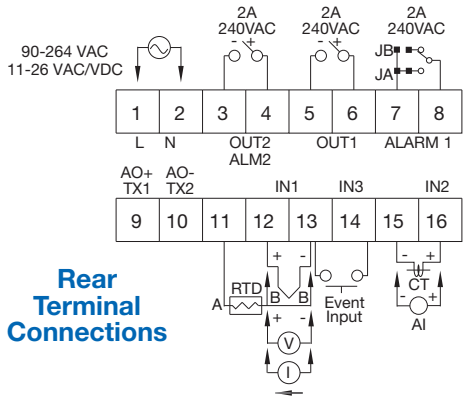
Min. Load Current: 50 mA rms

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

Alarm 1 / Alarm 2
Alarm 1 Relay: Form A, (NO) Maximum rating: 240 VAC, 2 Amp

Alarm 1 Relay: Form A, (NC) Maximum rating: 240 VAC, 2 Amp

Alarm Functions:
Dwell timer
Deviation Band High / Low Alarm
PV2 High / Low Alarm
PV1-PV2 High / Low Alarm
Loop Break Alarm
Sensor Break Alarm

Alarm Mode: Normal, Latching, Hold, Latching / Hold

Dwell Timer: 0 - 6553.5 minutes

Data Communications
Interface: RS-232 (1 unit), RS-485 (up to 247 units)

Protocol: Modbus Protocol – RTU mode

User Interface
Dual 4-digit LED Display: 0.40" (10 mm) Red Process Display

Keypad: 3 keys 0.31" (8 mm) Green Setpoint Display

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 1-255% of PB

On-Off: 0.1 - 100.0°F hysteresis control (P band = 0)

P or PD: 0 - 100.0% offset adjustment

PID: Fuzzy logic modified
Proportional band: 0.1 - 900°F (500°C)
Integral: 0 - 1000 seconds **Derivative**: 0 - 360 seconds

Cycle Time: 0.1 - 100 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

Power Limit: 0 - 100% for output 1 and output 2

Remote Setpoint: Programmable range for voltage or current input

Digital Filter: Time constant: settable from 0.2 to 60 seconds

Analog Retransmission
Analog Retransmission Functions: PV1, PV2, PV1-PV2, PV2-PV1, Setpoint, MV1, MV2, PV-SV deviation value

Output Signal: 4-20 / 0-20 mA, 0-1, 0-5, 1-5, 0-10 VDC

Accuracy: ±0.05 % of span, ±0.0025 %/°C

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: 2 × 2 × 3-1/2" (51 × 51 × 89 mm) H×W×D
Depth behind panel: 3" (75 mm)

Panel Cutout: 1-25/32 × 1-25/32" (45 × 45 mm) H×W

Weight: 0.33 lb. (150 grams)

Approval Standards
Safety Standard: UL3121-1 and CSA: C22.2 No. 24-93
EN61010-1 (IEC1010-1)

Protective Class: **Front panel**: NEMA 4X / IP65
Housing and Terminals: IP 20

EMC: EN61325

Stock and Common Part Numbers
(Power Input: 90-264 VAC, no data com)

Part Number	Signal Input	Out 1	Out 2/ Alarm 2	Alarm 1
TEC13001	tc-J	relay	none	none
TEC13002	tc-J	relay	relay	none
TEC13003	tc-J	4-20 mA	none	none
TEC13004	tc-J	4-20 mA	relay	none
TEC13005	tc-J	DC pulse	none	none
TEC13006	tc-J	DC pulse	relay	none

Model TEC-410 1/4 DIN & Model TEC-910 1/16 DIN High Limit Temperature Controls

FM Approved High Limit Control with External Reset!

List Prices Starting at $285.00 (410) & $180.00 (910)
Quantity Discounts Available!

Agency Approvals

Common Design Features

- *High Limit Control protects personnel, equipment and materials from over-temperature process conditions*
- *Universal programmable sensor input*
- *Versatile – 4 types of outputs available*
- *Highly accurate universal input with 18 bit analog to digital converter*
- *Wide variety of mode selections*
- *Bright 0.40" (10 mm) red LED process display*
- *Short panel depth required*
- *Output 2 can be programmed as output or input*

TEC-410 Design Features

- *Universal input power – 90-250 VAC or 11-26 VAC/VDC*
- *Event input for remote reset*
- *Two programmable outputs*
- *Optional RS-485 or RS-232 communications interface*
- *Optional retransmission*
- *Optional NEMA 4X/IP65 front face*

TEC-910 Design Features

- *Universal input power – 90-264 VAC or 11-26 VAC/VDC*
- *Optional event input for remote reset*
- *Optional RS-485 communications interface*
- *Output 2 can be programmed as output or input*

Ordering Code:

TEC-410- [1] [2] [3] [4] [5] [6]

TEC-910- [1] [2] [3] [4]

Power Input *BOX 1*

4 = 90-250 VAC (TEC-410)
90-264 VAC (TEC-910)
5 = 11-26 VAC / VDC

Signal Input — Universal, can be programmed in the field *BOX 2*

1 = Input 1 – Universal input (factory default = TC type J)
Thermocouple: J, K, T, E, B, R, S, N, L, C, P
RTD: PT100 DIN, PT100 JIS
mV: 0 to 60
2 = DC Voltage: 0-1
3 = DC Voltage: 0-10
4 = DC Current: 0-20 mA
5 = DC Voltage: 0-5 *(TEC-410 only)*
9 = Other

Output 1 *BOX 3*

1 = Relay: 2A / 240 VAC, Form C
2 = Pulse DC for SSR drive: 5 VDC (30 mA max)
6 = Triac-SSR output 1A / 240 VAC
C = Pulse DC for SSR drive: 14 VDC (40 mA max)
9 = Other

Output 2 *BOX 4*

For TEC-410
0 = None
1 = Relay: 2A / 240VAC, Form C
2 = Pulse DC for SSR drive — 5VDC (30mA max)
6 = Triac-SSR output 1A / 240VAC
7 = Isolated 20V @ 25mA DC, Output Power Supply
8 = Isolated 12V @ 40mA DC, Output Power Supply
9 = Isolated 5V @ 80mA DC, Output Power Supply
C = Pulsed voltage to drive SSR, 14V/40mA

For TEC-910
0 = None
1 = Form A Relay: 2A / 240 VAC
2 = Pulse voltage to drive SSR drive, 5V/30mA
6 = Triac Output 1A / 240VAC, SSR
7 = Isolated 20V @ 25mA DC Output Power Supply
8 = Isolated 12V @ 40mA DC Output Power Supply
9 = Isolated 5V @ 80mA DC Output Power Supply
A = RS-485
B = Event Input
C = Pulsed voltage to drive SSR, 14V/40mA
D = Retransmit 4-20mA/0-20mA
E = Retransmit 1-5V/0-5V
F = Retransmit 0-10V
H = Special order

Communications *BOX 5 (TEC-410 only)*

0 = None
1 = RS-485 Interface
2 = RS-232 Interface
3 = Retransmission 4-20 mA, 0-20 mA
4 = Retransmission 1-5 VDC, 0-5 VDC
5 = Retransmission 0-10 VDC
9 = Other

Mounting Option *BOX 6 (TEC-410 only)*

0 = Standard Mounting, IP50
1 = NEMA 4X/IP65

Ordering Information

Model TEC-410 and TEC-910 and are offered with the options listed in the worksheet above. Create an ordering code by filling in the boxes with the appropriate number and/or letter designation for your requirements and a part number will be assigned, or choose from one of the part numbers listed.

Standard lead time is stock to 4 weeks.

Product Inventory Available for Viewing and Selection @ www.tempco.com

Model TEC-410 & TEC-910 Specifications

Power Input

Standard: (TEC-410) 90-250 VAC, 47-63 Hz, 10 VA, 5W maximum
(TEC-910) 90-264 VAC, 47-63 Hz, 10 VA, 5W maximum

Optional: 11-26 VAC / VDC, 10 VA, 5W maximum

Signal Input

Accuracy: Thermocouple: ±0.10% of full scale, ±1 LSD at 77°F/25°C
RTD: ±0.07% of full scale, ±1 LSD at 77°F/25°C

Sampling Rate: 5 times per second

Temperature Effect: ±1.5 µV / °C

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, below 1 mA for 4-20 mA input, below 0.25V for 1 - 5V input, unavailable for other inputs.

Output 1 / Output 2

Relay Rating: 240 VAC, 2 Amp

Pulsed Voltage: Source voltage 5V, Current limiting resistance 66Ω

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

VDC Voltage Supply (Output 2 only)
20 VDC, ±0.5V, at 25 mA
12 VDC, ±0.3V, at 40 mA
5 VDC, ±0.15V, at 80 mA

Event Input (standard TEC-410, optional TEC-910)

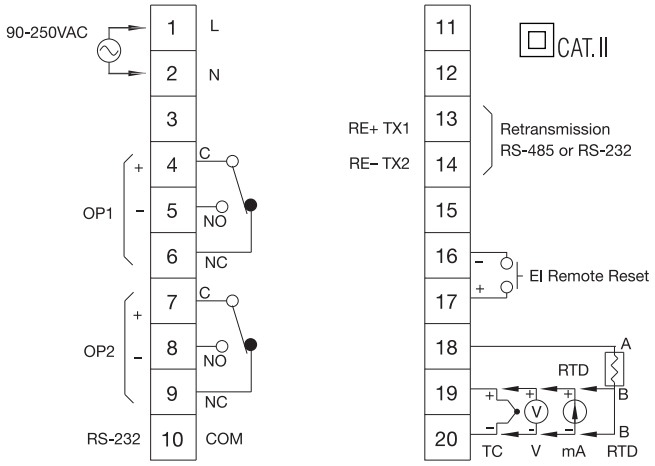
Resolution: 18 bits

Logic Low: -10 VDC minimum, 0.8 VDC maximum

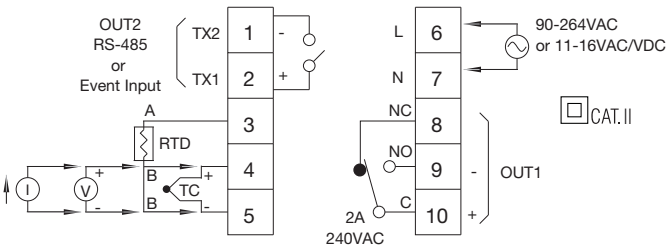
Logic High: 2 VDC minimum, 10 VDC maximum

Functions: Remote reset, remote lockout

TEC-410 1/4 DIN Rear Terminal Connections



TEC-910 1/16 DIN Rear Terminal Connections



Limit Control

Modes available: High Limit, Low Limit and High/Low Limit

Data Communications

Interface: RS-485 (up to 247 units), RS-232, *TEC-410 only*

Protocol: Modbus Protocol – RTU mode

Address: 1-247 **Baud Rate**: 0.3 - 38.4 Kbits/sec
Data Bits: 8 bits **Parity Bit**: None, Even or Odd
Stop Bit: 1 or 2 bits **Communication Buffer**: 50 bytes

User Interface

Single 4-digit LED Displays: 0.4" / 10 mm

Keypad: 4 keys

Programming Port: For automatic setup, calibration and testing

Environmental and Physical

Operating Temperature: 14 to 122°F (-10 to 50°C)

Humidity: 0 to 90% RH, non-condensing

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

Dimensions:

TEC-410: 3-3/4 × 3-3/4 × 2-9/16" (96 × 96 × 65 mm) H×W×D
Depth behind panel: 2" (53 mm)
Panel Cutout: 3-21/32" × 3-21/32" (93 x 93 mm) H×W
Weight: 0.55 lb. (250 grams)

TEC-910: 1-7/8 × 1-7/8 × 3-3/4" (48 × 48 × 94 mm) H×W×D
Depth behind panel: 3-3/8" (86 mm)
Panel Cutout: 1-25/32" × 1-25/32" (45 x 45 mm) H×W
Weight: 0.33 lb. (150 grams)

Approval Standards

Safety: FM Class 3545 (OCT. 1998)
CSA: C22.2 No. 24-93
EN61010-1 (IEC1010-1)
TEC-410: UL61010C-1
TEC-910: UL873

Protective Class: IP30 front panel, indoor use,
IP20 housing and terminals (with protective cover)

EMC: EN61326

TEC-410 Stock and Common Part Numbers

(Power Input: 90-264 VAC)

Part Number	Signal Input	Out 1	Out 2
TEC51001	tc	relay	none
TEC51002	tc	relay	relay
TEC51003	tc	5Vdc pulse	none
TEC51004	tc	5Vdc pulse	relay
TEC51005	tc	SSR-1A	none
TEC51006	tc	SSR-1A	relay

TEC-910 Stock and Common Part Numbers

(Power Input: 90-264 VAC)

Part Number	Signal Input	Out 1	Prog. I/O
TEC16001	tc	relay	event input
TEC16002	tc	dc pulse	event input
TEC16003	tc	SSR-1A	event input
TEC16004	tc	relay	none
TEC16005	tc	dc pulse	none
TEC16006	tc	SSR-1A	none

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 pages 13-36 and 13-37.**

Model TEC-4500 & TEC-9500

Model TEC-4500 1/4 DIN & Model TEC-9500 1/16 DIN Ramp & Soak Temperature Controls

Configurable for 5 Programmable Outputs

Configurable for 4 Programmable Outputs

List Prices Starting at $330.00 (4500) & $220.00 (9500)
Quantity Discounts Available!

Agency Approvals

Design Features

- *Ramp & Soak Programmable Control*
- *Nine recipes (profiles) available using 64 segments maximum per recipe*
- *Each recipe can be divided into 3 lengths: 16, 32 or 64 segments*
- *Event Input – one of 8 functions can be chosen: start run mode, hold mode, abort recipe, manual mode, failure transfer, turn off, segment advance, select 2nd set of PID parameters*
- *Event Output – 3 relays are available. Can be programmed to any segment or end of recipe*
- *Analog Retransmission – optional mA or VDC transfer of PV or SV values*
- *Highly accurate universal input with 18 bit analog to digital converter*
- *Bright 0.40" (10mm) red LED process display*
- *Fast sample rate – 200ms*
- *Fuzzy logic autotune PID – 2 sets of values can be used*
- *Optional RS-485 or RS-232 communications interface*
- *Programming port available for PC connection allowing quick set-up*
- *Lockout protection guards against unauthorized setting changes*
- *Bumpless transfer allows continued temperature setting if sensor fails*
- *Universal input power – 90-250 VAC or 11-26 VAC/VDC*
- *Short panel depth required*

Ordering Code:

TEC-4500-

1	2	3	4	5	6	7	8

TEC-9500-

1	2	3	4	5	6	7	8
					0		

Power Input *BOX 1*

4 = 90-250 VAC, 50-60 Hz
5 = 11-26 VAC / VDC

Signal Input — Universal, can be programmed in the field *BOX 2*

1 = Universal input (factory default = TC type J)
Thermocouple: J, K, T, E, B, R, S, N, L, C, P
RTD: PT100 DIN, PT100 JIS (0 to 60mV)
5 = Voltage: 0-10V, 0-5V, 1-5V, 0-1V
6 = DC Current: 0-20 mA (default), 4-20 mA
9 = Other

Output 1 *BOX 3*

1 = Relay: 2A / 240 VAC
2 = Pulse DC for SSR drive: 5 VDC (30 mA max)
3 = Isolated 4-20mA / 0-20 mA
4 = Isolated 1-5V / 0-5V/0-10VDC
6 = Triac-SSR output 1A / 240 VAC
C = Pulse DC for SSR drive: 14 VDC (40 mA max)
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 4-20mA / 0-20 mA
4 = Isolated 1-5V / 0-5V/0-10V
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
A = Isolated 5V @ 80 mA DC, Output Power Supply
C = Pulsed voltage to drive SSR, 14V/40mA
9 = Other

Output 3 *BOX 5*

0 = None
1 = Relay: 2A / 240 VAC
2 = Pulse DC for SSR drive — 5 VDC (30 mA max)
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
A = Isolated 5V @ 80 mA DC, Output Power Supply
C = Pulsed voltage to drive SSR, 14V/40mA
9 = Other

Output 4 *BOX 6 (TEC-4500 only)*

0 = None
1 = Relay: 2A / 240 VAC
2 = Pulse DC for SSR drive — 5 VDC (30 mA max)
3 = Retransmission 4-20mA (default), 0-20 mA
4 = Retransmission 1-5 VDC (default)/ 0-5VDC, 0-10 VDC
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
A = Isolated 5V @ 80 mA DC, Output Power Supply
C = Pulsed voltage to drive SSR, 14V/40mA
9 = Other

CONTINUED

Product Inventory Available for Viewing and Selection @ www.tempco.com

Output 5 *BOX 7*

0 = None
3 = Retransmission 4-20mA / 0-20 mA
4 = Retransmission 1-5V / 0-5V/0-10V
7 = Isolated 20V @ 25 mA DC, Output Power Supply
8 = Isolated 12V @ 40 mA DC, Output Power Supply
A = Isolated 5V @ 80 mA DC, Output Power Supply
D = Isolated RS-485 interface
E = Isolated RS-232 interface

Power Input

Standard: 90-250 VAC, 47-63 Hz, 12 VA, 5W maximum
Optional: 11-26 VAC / VDC, 12 VA, 5W maximum

Signal Input

Resolution: 18 bits

Sampling Rate: 5 times per second

Maximum Rating -2VDC minimum, 12VDC 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 Load Resistance Effect:
T/C: 0.2μV/ohm
3-wire RTD: 2.6°C/ohm of resistance difference of two leads
2-wire RTD: 2.6°C/ohm of resistance sum of two lead

Burn-out current: : 200 nA

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, below 1 mA for 4-20 mA input, below 0.25V for 1 - 5V input, unavailable for other inputs.

Sensor Break Responding Time: Within 4 seconds for TC, RTD and mV inputs,
0.1 second for 4-20 mA and 1-5 V inputs

Case Options *BOX 8*

0 = Panel mount standard
1 = Panel mount with NEMA 4X/IP65 front panel
2 = DIN rail mount (for TEC9500 only)

Recipe

Number of recipes: 9

Number of Segment per recipe:
Recipe 1, 2, 3, 4: 16
Recipe 5, 6, 7: 32
Recipe 8, 9: 64

Event Outputs: 3

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:

TEC-4500: 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 x 92 mm) H×W
Weight: .55 lb. (250 grams)

TEC-9500: 1-7/8 × 1-7/8 × 4-9/16" (48 × 48 × 116 mm) H×W×D
Depth behind panel: 4-1/8" (104.8 mm)
Panel Cutout: 1-25/32" × 1-25/32" (45 x 45 mm) H×W
Weight: .33 lb. (150 grams)

Approval Standards

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

Protective Class: IP30 front panel, indoor use,
IP65 front panel with option

EMC: EN61326

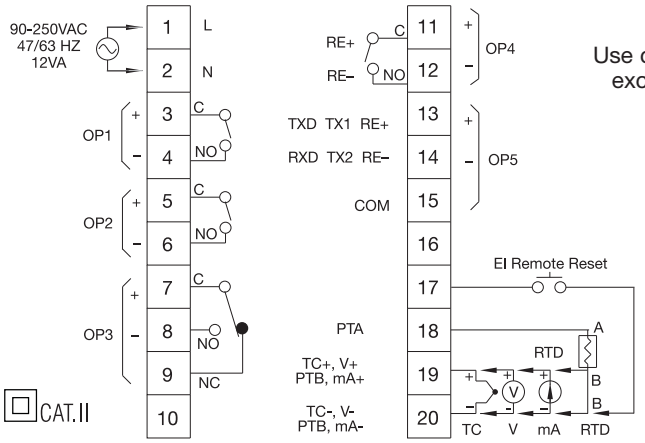
TEC-4500 Stock and Common Part Numbers
(Power Input: 90-250 VAC)

Part Number	Signal Input	Out 1	Out 2	Out 3
TEC58001	TC	relay	none	relay
TEC58002	TC	relay	relay	none
TEC58003	TC	relay	relay	relay
TEC58004	TC	4-20 mA	none	none
TEC58005	TC	4-20 mA	none	relay
TEC58006	TC	5VDC pulse	none	none
TEC58007	TC	5VDC pulse	none	relay

TEC-9500 Stock and Common Part Numbers
(Power Input: 90-250 VAC)

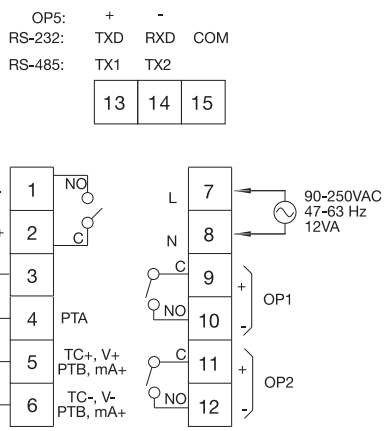
Part Number	Signal Input	Out 1	Out 2	Out 3
TEC18001	TC	relay	none	none
TEC18002	TC	relay	relay	none
TEC18003	TC	4-20 mA	none	none
TEC18004	TC	4-20 mA	relay	none
TEC18005	TC	5VDC pulse	none	none
TEC18006	TC	5VDC pulse	relay	none

TEC-4500 1/4 DIN Rear Terminal Connections



Use copper conductors, except on T/C input.

TEC-9500 1/16 DIN Rear Terminal Connections



Models TEC-905 & TEC-900 1/16 DIN

Model TEC-905 1/16 DIN Controller & Model TEC-900 1/16 DIN Indicator Only

List Prices Starting at $180.00
Quantity Discounts Available!

Simple Setpoint and Display!

Display only!

List Prices Starting at $155.00
Quantity Discounts Available!

Design Features

- *1/16 DIN size – 48 mm x 48 mm*
- *Short panel depth – only 3-3/8" (86 mm) required*
- *Laser trimmed ASIC components*
- *On-off or time proportional selections*
- *Wide selection of output options*
- *Universal power input, 90-264 VAC*
- *Sensor break protection*
- *Good performance at a very low price*
- *Model TEC-905 control with pushwheel setpoint*
- *Model TEC-900 indicator only*
- *Agency Approvals:*

c UL us CE

Ordering Code:

Temperature Controller TEC-905-

1	2	3	4	5	6	7	8
					0	0	0

Temperature Indicator Only TEC-900-

1	2	3	4	5	6	7	8
			0	0	0	0	0

Power Input *BOX 1*
4 = 90-264 VAC 50/60 Hz
9 = Other

Signal Input *BOX 2*
1 = Thermocouple: Type J
2 = Thermocouple: Type K
3 = RTD: 100 ohm PT, DIN 0.00385
4 = RTD: 100 ohm PT, JIS 0.00392
9 = Other

Range code (TEC-905 only) *BOX 3*
X = 0 to 499°F **C** = 0 to 299°C
V = 0 to 999°F **E** = 0 to 499°C
W = 0 to 1999°F **H** = 0 to 999°C
Other ranges are available for large volume orders. Consult Tempco for more information.

Range code (TEC-900 only) *BOX 3*
Thermocouple
A = 0 to 1200°F – Type J
B = 0 to 600°C – Type J
C = 0 to 2000°F – Type K
D = 0 to 1100°C – Type K
RTD
E = -32 to 752°F
F = 0 to 400°C

Control Mode *BOX 4*
(TEC-905 only)
1 = On - Off
2 = Proportional

Output 1 (TEC-905 only) *BOX 5*
1 = Relay: 5A / 240 VAC
2 = Pulse DC for SSR drive: 20 VDC (20 mA max)
3 = 4-20 mA, linear (max load 500 ohms)
4 = 0-20 mA, linear (max load 500 ohms)
5 = 0-10 VDC, linear (min. impedance 500K ohms)
9 = Other

Output 2 *BOX 6*
Alarm *BOX 7*
Communication *BOX 8*
0 = Not Available

Ordering Information

Models TEC-905 and TEC-900 are offered with the options listed in the worksheet above. Create an ordering code by filling in the boxes with the appropriate number and/or letter designation for your requirements and a part number will be assigned, or choose from one of the part numbers listed.

Standard lead time is stock to 4 weeks.

Product Inventory Available for Viewing and Selection @ www.tempco.com

Models TEC-905 & TEC-900 Specifications

Power Input
Standard: 90-264 VAC, 50/60 Hz, 5VA

Signal Input
Accuracy: ±1.0% of full scale at 77°F/25°C
Thermocouple: Type J or K
RTD: 3-wire Pt100 DIN or JIS
Sampling Rate: 3 times per second
Cold Junction Compensation: ±0.1°C / 1°C
Common Mode Rejection Ratio (CMRR): 120 dB
Normal Mode Rejection Ratio (NMRR): 60 dB
Sensor Break Protection: Upscale

Output 1 *(for TEC-905 only)*
Relay Rating: 240 VAC, 5 Amp
SSR drive: Pulsed DC, 20 V at 20 mA maximum
Current: 4 - 20 mA, 0 - 20 mA, maximum load: 500Ω
Voltage: 0 - 10 VDC, minimum load 500KΩ

Control *(for TEC-905 only)*
Proportional Band: 2.2% of span
ON-OFF Hysteresis: 1% of span
Cycle time: 20 seconds for relay output, 1 second for pulsed voltage output, 0.02 second for linear current or voltage output
Control Action: Reverse Action

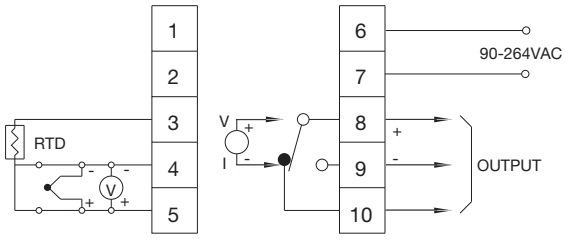
Approval Standards
Safety Standard: UL3121-1
Protective Class: **Front panel**: IP 30
Housing and Terminals: IP 20
EMC: EN61326

Adjustment *(for TEC-905 only)*
Setpoint: 3-digit or 4-digit thumbwheel switch
Manual Reset: Adjustable up to 2.6% of span
Setpoint Resolution: ± 1 Least Significant Digit
Accuracy of Setpoint: ±1% of span
Repeatability of Setpoint: ± 1 Least Significant Digit

Display
Process Indicator: 3-1/2 digit, 0.4" / 10 mm red LED display
Output Status Indicator: Red LED lamp (for TEC-905 only)

Environmental and Physical
Operating Temperature: 32 to 122°F (0 to 50°C)
Humidity: 0 to 90% RH, non-condensing
Dielectric Strength: 2000 VAC, 50/60 Hz for 1 minute
Vibration: 10 - 55 Hz, amplitude 1mm
Shock: 200 m/s² (20g)
Dimensions: 1-7/8 × 1-7/8 × 3-3/4" (48 × 48 × 94 mm) H×W×D
Depth behind panel: 3-3/8" (86 mm)
Panel Cutout: 1-25/32" × 1-25/32" (45 x 45 mm) H×W
Weight: 0.42 lb. (190 grams)

Rear Terminal Connections



NOTE: Terminals 8, 9 and 10 are not used for Model TEC-900.

All Items Available from Stock

TEC-905 Stock and Common Part Numbers
(Power Input: 90-264 VAC, Proportional mode)

Part Number	Signal Input	Range	Output
TEC17511	J tc	0-999°F	relay
TEC17512	J tc	0-499°F	relay
TEC17513	K tc	0-1999°F	relay
TEC17514	K tc	0-999°F	relay
TEC17515	J tc	0-499°C	relay
TEC17516	J tc	0-299°C	relay
TEC17517	K tc	0-999°C	relay
TEC17518	K tc	0-499°C	relay
TEC17519	RTD	0-999°F	relay
TEC17520	RTD	0-499°C	relay

TEC-900 Stock and Common Part Numbers
(Power Input: 90-264 VAC, Indicator Only)

Part Number	Signal Input	Range
TEC17021	J tc	0-1200°F
TEC17022	K tc	0-2000°F
TEC17023	J tc	0-600°C
TEC17024	K tc	0-1100°C
TEC17025	RTD	32-752°F
TEC17026	RTD	0-400°C

Models TEC-901 & TEC-902 (with Hi-Low LED Indicators) 1/16 DIN Temperature Controllers

List Prices Starting at $105.00
Quantity Discounts Available!

Non-Indicating Control!

Shows Process Temperature Deviation with Hi/Low LED's!

List Prices Starting at $115.00
Quantity Discounts Available!

Design Features

- *1/16 DIN size – 48 mm x 48 mm*
- *Short panel depth – only 3-3/8" (86 mm) required*
- *Laser trimmed ASIC components*
- *On-off or time proportional selections*
- *Wide selection of output options*
- *Dial/Potentiometer setpoint*
- *Sensor break protection*
- *Good performance at a very low price*
- *Model TEC-901 temperature control*
- *Model TEC-902 temperature control with process temperature Hi-Low LED indicators*
- *Agency Approvals:*

c UL us CE

Ordering Code:

	1	2	3	4	5	6	7	8
TEC-901-						0	0	0

With Hi-Low LED's

	1	2	3	4	5	6	7	8
TEC-902-						0	0	0

Power Input *BOX 1*
1 = 100-130 VAC, 50/60 Hz
2 = 200-240 VAC, 50/60 Hz

Control Mode *BOX 4*
1 = On - Off
2 = Proportional

Output 1 *BOX 5*
1 = Relay: 5A / 240 VAC
2 = Pulse dc for SSR drive: 20 VDC (20 mA max)
3 = 4-20 mA, linear (max load 500 ohms)
4 = 0-20 mA, linear (max load 500 ohms)
5 = 0-10 VDC, linear (min. impedance 500K ohms)
9 = Other

Signal Input *BOX 2*
1 = Thermocouple: Type J
2 = Thermocouple: Type K
3 = RTD: 100 ohm PT, DIN 0.00385
4 = RTD: 100 ohm PT, JIS 0.00392
9 = Other

Output 2 *BOX 6*
Alarm *BOX 7*
Communication *BOX 8*
0 = Not Available

Standard Range Code *BOX 3*

4 = 0 to 300°C	**C** = 50 to 550°F
6 = 0 to 600°C	**E** = 50 to 850°F

Below available for large volume orders. Consult Tempco for more information.

2 = 0 to 100°C	**A** = 50 to 200°F
3 = 0 to 200°C	**B** = 50 to 400°F
5 = 0 to 400°C	**D** = 50 to 750°F
7 = 0 to 800°C	**F** = 50 to 1100°F
8 = 0 to 1200°C	**G** = 50 to 1400°F
9 = Other	**H** = 0 to 2200°F

Ordering Information

Models TEC-901 and **TEC-902** are offered with the options listed in the worksheet above. Create an ordering code by filling in the boxes with the appropriate number and/or letter designation for your requirements and a part number will be assigned, or choose from one of the part numbers listed.

Standard lead time is stock to 4 weeks.

Product Inventory Available for Viewing and Selection @ www.tempco.com

Model TEC-901 & TEC-902 Specifications

Power Input
100 - 130 VAC, 50/60 Hz, 5VA
200 - 240 VAC, 50/60 Hz, 5VA

Signal Input
Accuracy: ±2.0% of full scale at 77°F/25°C
Thermocouple: Type J or K
RTD: 3-wire Pt100 DIN or JIS
Sampling Rate: 3 times per second
Cold Junction Compensation: ±0.1°C / 1°C
Common Mode Rejection Ratio (CMRR): 120 dB
Normal Mode Rejection Ratio (NMRR): 60 dB
Sensor Break Protection: Upscale

Output 1
Relay Rating: 240 VAC, 5 Amp
SSR drive: Pulsed DC, 24 V at 20 mA maximum
Current Loop: 4 - 20 mA, 0 - 20 mA, maximum load: 500Ω
Voltage: 0 - 10 VDC, minimum load 500KΩ

Control
Proportional Band: 2.2% of span
ON-OFF Hysteresis: 1% of span
Cycle time: 20 seconds for relay output, 1 second for pulsed voltage output, 0.02 second for linear current or voltage output
Control Action: Reverse Action

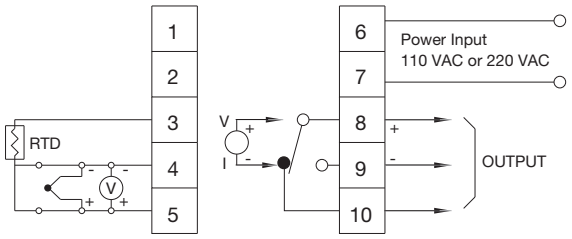
Approval Standards
Safety Standard: UL3121-1
Protective Class: **Front panel**: IP 30
Housing and Terminals: IP 20
EMC: EN61326

Adjustment
Setpoint: Single turn wirewound potentiometer
Setpoint Resolution: 0.2% of span
Accuracy of Setpoint: ±2% of span
Repeatability of Setpoint: ±0.1% of span

Display
Process Indicator: TEC-902: Hi/Lo LED indicators
TEC-901: None
Status Indicator: ON (red) LED lamp, OFF (green) LED lamp

Environmental and Physical
Operating Temperature: 32 to 122°F (0 to 50°C)
Humidity: 0 to 90% RH, non-condensing
Dielectric Strength: 2000 VAC, 50/60 Hz for 1 minute
Vibration: 10 - 55 Hz, amplitude 1 mm
Shock: 200 m/s² (20g)
Dimensions: 1-7/8 × 1-7/8 × 3-3/4" (48 × 48 × 94 mm) H×W×D
Depth behind panel: 3-3/8" (86 mm)
Panel Cutout: 1-25/32" × 1-25/32" (45 x 45 mm) H×W
Weight: 0.42 lb. (190 grams)

Rear Terminal Connections



All Items Available from Stock

Non-Indicating
TEC-901 Stock and Common Part Numbers
(Power Input: 200-240 VAC, Proportional mode)

Part Number	Signal Input	Range	Output
TEC17101	J tc	50-850°F	relay
TEC17102	J tc	50-550°F	relay
TEC17103	K tc	50-850°F	relay
TEC17104	K tc	50-550°F	relay
TEC17105	RTD	50-550°F	relay
TEC17106	J tc	0-300°C	relay
TEC17107	J tc	0-600°C	relay
TEC17108	K tc	0-300°C	relay
TEC17109	K tc	0-600°C	relay

With Hi/Low LED's
TEC-902 Stock and Common Part Numbers
(Power Input: 200-240 VAC, Proportional mode)

Part Number	Signal Input	Range	Output
TEC17201	J tc	50-850°F	relay
TEC17202	J tc	50-550°F	relay
TEC17203	K tc	50-850°F	relay
TEC17204	K tc	50-550°F	relay
TEC17205	RTD	50-550°F	relay
TEC17206	J tc	0-300°C	relay
TEC17207	J tc	0-600°C	relay
TEC17208	K tc	0-600°C	relay
TEC17209	RTD	0-300°C	relay

Model TEC-8100 1/8 DIN Temperature Controller

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

List Prices Starting at $195.00

Quantity Discounts Available!

Design Features

- *1/8 DIN size – 96 mm x 48 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 – 90-264 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 0.40" (10 mm) red LED process display, 0.31" (8 mm) green LED setpoint display*
- *High performance at a very low price*
- *Agency Approvals:*

Ordering Code:

TEC-8100- 1 2 3 4 5 6 7

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 0-60 mV
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 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

Alarm BOX 5
0 = None
1 = Relay: 2A / 240 VAC, SPDT
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

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 pages 13-36 and 13-37.**

Ordering Information

Model TEC-8100 is offered with the options listed in the worksheet above. Create an ordering code by filling in the boxes with the appropriate number and/or letter designation for your requirements and a part number will be assigned, or choose from one of the part numbers listed.

Standard lead time is stock to 4 weeks.

Product Inventory Available for Viewing and Selection @ www.tempco.com

Model TEC-8100 Specifications (1/8 DIN)

Power Input
Standard: 90-250 VAC, 47-63 Hz, 12 VA, 5W maximum
Optional: 11-26 VAC / VDC, 12 VA, 5W maximum

Signal Input
Accuracy: Thermocouple: ±0.10% of full scale, ±1 LSD at 77°F/25°C
RTD: ±0.07% of full scale, ±1 LSD at 77°F/25°C

Resolution: 18 bits

Sampling Rate: 5 times per second

Temperature Effect: ±1.5 μV / °C for all inputs except mA input
For mA input: ±3.0 μV / °C

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, below 1 mA for 4-20 mA input, below 0.25V for 1 - 5 VDC input, unavailable for other 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: 0.0% 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

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

Protective Class: **Front panel**: IP 50, optional NEMA 4X/IP65
Housing and Terminals: IP 20

EMC: EN61326

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: 0.40" (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 - 90°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

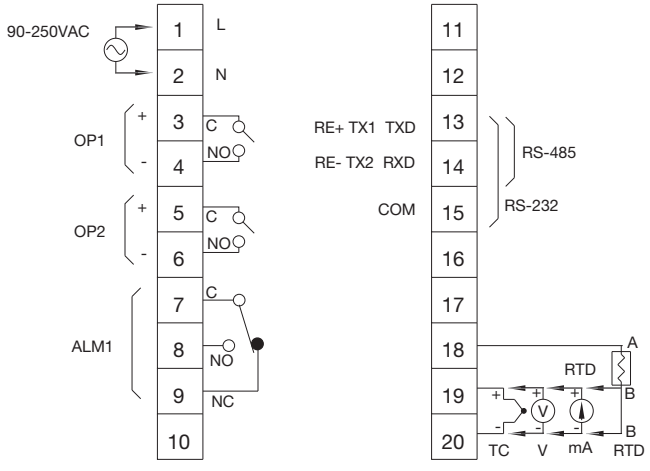
Dielectric Strength: 2000 VAC, 50/60 Hz for 1 minute

Dimensions: 3-3/4 × 1-7/8 × 3-1/8" (96 × 48 × 80 mm) H×W×D
Depth behind panel: 2-9/16" (65 mm)

Panel Cutout: 3-5/8" × 1-25/32" (92 x 45 mm) H×W

Weight: 0.46 lb. (210 grams)

Rear Terminal Connections



All Items Available from Stock

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
TEC34001	tc	relay	none	none
TEC34002	tc	relay	relay	relay
TEC34003	tc	4-20 mA	none	none
TEC34004	tc	dc pulse	none	none
TEC34005	RTD	relay	none	none
TEC34006	RTD	dc pulse	none	none
TEC34007	RTD	dc pulse	relay	none
TEC34008	RTD	dc pulse	relay	relay

Model TEC-8300 1/8 DIN Temperature Controller

Configurable for 5 Programmable Outputs!

List Prices Starting at $315.00

Quantity Discounts Available!

Design Features

- *1/8 DIN size – 48 mm x 96 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*
- *Heater Break Alarm using 0-50 Amp current transformer*
- *Output 2 can be programmed as cooling output only*
- *2 optional alarms – programmable NO or NC relay*
- *Wide variety of alarm mode selections*
- *Bumpless transfer to manual mode during sensor failure*
- *Universal input power, 90-264 VAC*
- *RS-485 and RS-232 data communications interface*
- *Bright 0.40" (10 mm) red LED process display 0.31", (8 mm) green LED setpoint display stabilized with a digital filter if required*
- *Fast input sample rate (5 samples/second)*
- *Automatic programming*
- *Differential control*
- *"Soft-Start" ramp and dwell timer*
- *Analog input for remote setpoint and current transformer*
- *Event input for changing functions and setpoint*
- *Hardware lockout plus remote lockout protection*
- *Loop break alarm*
- *Analog retransmission*
- *DC power supply outputs*
- *Tempco's most highly featured 1/8 DIN control*

Ordering Code:

TEC-8300- [1] [2] [3] [4] [5] [6] [7]

Power Input *BOX 1*
4 = 90-264 VAC
5 = 11-26 VAC / VDC
9 = Other

Signal Input — Universal, can be programmed in the field *BOX 2*
1 = Input 1 – Universal input (factory default = tc type J)
Thermocouple: J, K, T, E, B, R, S, N, L
RTD: PT100 DIN, PT100 JIS
Current: 4-20 mA, 0-20 mA
Voltage: VDC, 0-1, 0-5, 1-5, 0-10
Input 2 – CT: 0 - 50A AC current Transformer (factory default)
Linear Input: 0-1V, 0-5V, 1-5V, 0-10V, 0-20mA, 4-20mA
Input 3 – Event Input
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
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
A = Other

Alarm 1 *BOX 5*
0 = None
1 = Relay: 2A/240 VAC, SPDT
9 = Other

Alarm 2 *BOX 6*
0 = None
1 = Relay: 2A/240 VAC, SPST
9 = Other

Communications *BOX 7*
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

Transformer for Heater Break Alarm
(0-50 Amp current)
Part Number: TEC99999
Specifications on page 13-36

Agency Approvals

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 pages 13-36 and 13-37.**

Ordering Information

Model TEC-8300 is offered with the options listed in the worksheet above. Create an ordering code by filling in the boxes with the appropriate number and/or letter designation for your requirements and a part number will be assigned, or choose from one of the part numbers listed.

Standard lead time is stock to 4 weeks.

Product Inventory Available for Viewing and Selection @ www.tempco.com

Model TEC-8300 Specifications (1/8 DIN)

Power Input
Standard: 90-264 VAC, 47-63 Hz, 15 VA, 7W maximum
Optional: 11-26 VAC / VDC, 15 VA, 7W maximum

Signal Input
Input 1
Accuracy: Thermocouple: ±0.10% of full scale, ±1 LSD at 77°F/25°C
RTD: ±0.07% of full scale, ±1 LSD at 77°F/25°C

Resolution: 18 bits

Sampling Rate: 5 times per second

Temperature Effect: ±1.5 μV / °C for all inputs except mA input
For mA input: ±3.0 μV / °C

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, below 1 mA for 4-20 mA input, below 0.25V for 1 - 5 V input, unavailable for other inputs.

Input 2
Resolution: 18 bits

Sampling Rate: 1.66 times per second

Sensor Break Response Time: 0.5 second

Types: **Current Transducer**: 0 to 50 Amp
mA: -3 to 27 mA
V: -1.3 to 11.5 VDC

Input 3
Event Input Functions: Select 2nd setpoint, and/or PID, disable output 1 and/or output 2, remote lockout, reset alarm 1 and/or alarm 2

Output 1 or 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

Isolation Breakdown Voltage: 1000 VAC

Solid State Relay (Triac) Output
Rating: 1A / 240 VAC **Inrush Current:** 20A for 1 cycle

Min. Load Current: 50 mA rms

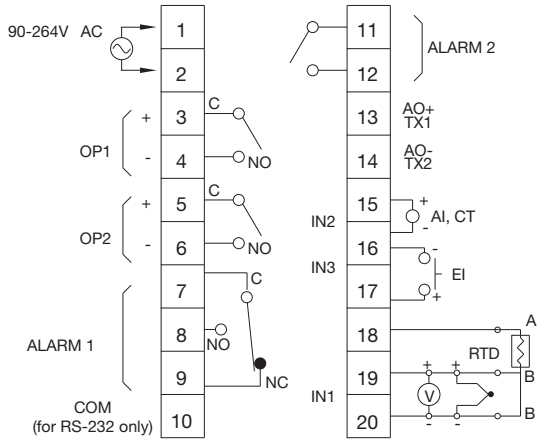
Max. Off-state Leakage: 3 mA rms

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



Alarm 1 / Alarm 2
Relay: 2 Amp, 240 VAC **Alarm 1**: SPDT **Alarm 2**: SPST (NO)

Alarm Functions:
- Dwell timer
- Deviation Band High / Low Alarm
- PV2 High / Low Alarm
- PV1-PV2 High / Low Alarm
- Loop Break Alarm
- Sensor Break Alarm

Alarm Mode: Normal, Latching, Hold, Latching / Hold

Dwell Timer: 0 - 6553.5 minutes

Data Communications
Interface: RS-232 (1 unit), RS-485 (up to 247 units)

Protocol: Modbus Protocol – RTU mode

User Interface
Dual 4-digit LED Display: 0.40" (10 mm) Red Process Display

Keypad: 3 keys 0.31" (8 mm) Green Setpoint Display

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 1 - 255% of PB

On-Off: 0.1 - 100.0°F hysteresis control (P band = 0)

P or PD: 0 - 100.0% offset adjustment

PID: Fuzzy logic modified
Proportional band: 0.1 - 900°F (500°C)
Integral: 0 - 1000 seconds **Derivative**: 0 - 360 seconds

Cycle Time: 0.1 - 100 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

Power Limit: 0 - 100% for output 1 and output 2

Remote Setpoint: Programmable range for voltage or current input

Digital Filter: Time constant: settable from 0.2 to 60 seconds

Analog Retransmission
Analog Retransmission Functions: PV1, PV2, PV1-PV2, PV2-PV1, Setpoint, MV1, MV2, PV-SV deviation value

Output Signal: 4-20 / 0-20 mA, 0-1, 0-5, 1-5, 0-10 VDC

Accuracy : ±0.05 % of span, ±0.0025 %/°C

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 × 1-7/8 × 3-1/8" (96 × 48 × 80 mm) H×W×D
Depth behind panel: 2-9/16" (65 mm)

Panel Cutout: 3-5/8" × 1-25/32" (92 x 45 mm) H×W

Weight: 0.49 lb. (220 grams)

Approval Standards
Safety: UL873, CSA C22.2 No. 24-93
EN61010-1 (IEC1010-1)

Protective Class: IP 20 housing & terminals with protective covers

EMC: EN61326

All Items Available from Stock

Stock and Common Part Numbers
(Power Input: 90-264 VAC, no Alarm 2, no data com)

Part Number	Signal Input	Out 1	Out 2	Alarm 1
TEC33001	tc	relay	none	relay
TEC33002	tc	relay	relay	none
TEC33003	tc	relay	relay	relay
TEC33004	tc	4-20 mA	none	none
TEC33005	tc	4-20 mA	none	relay
TEC33006	tc	dc pulse	none	none
TEC33007	tc	dc pulse	none	relay

Model TEC-805 1/8 DIN Temperature Controller

Simple Setpoint and Display!

List Prices Starting at $190.00
Quantity Discounts Available!

Design Features

- *1/8 DIN size – 48 mm x 96 mm*
- *Short panel depth – only 2-9/16" (65 mm) required*
- *Laser trimmed ASIC components*
- *On-off or time proportional selection*
- *Digital input by pushwheel switch*
- *Digital display on 0.4" (10 mm)*
- *Wide selection of output options*
- *Universal power input, 90-264 VAC*
- *Sensor break protection*
- *Good performance at a very low price*
- *Agency Approvals:*

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Ordering Code:

TEC-805- [1] [2] [3] [4] [5] [6] [7] [8]

[6] = 0, [8] = 0

Power Input *BOX 1*
4 = 90-264 VAC 50/60 Hz
9 = Other

Signal Input *BOX 2*
1 = Thermocouple: Type J
2 = Thermocouple: Type K
3 = RTD: 100 ohm PT, DIN 0.00385
4 = RTD: 100 ohm PT, JIS 0.00392
9 = Other

Range code *BOX 3*
X = 0 to 499°F
V = 0 to 999°F
W = 0 to 1999°F
C = 0 to 299°C
E = 0 to 499°C
H = 0 to 999°C
Other ranges are available for large volume orders. Consult Tempco for more information.

Control Mode *BOX 4*
1 = On - Off
2 = Proportional

Output 1 *BOX 5*
1 = Relay: 5A / 240 VAC
2 = Pulse dc for SSR drive: 20 VDC (20 mA max)
3 = 4-20 mA, linear (max load 500 ohms)
4 = 0-20 mA, linear (max load 500 ohms)
5 = 0-10 VDC, linear (min. impedance 500K ohms)
9 = Other

Output 2 *BOX 6*
0 = Not Available

Alarm *BOX 7*
0 = None
1 = Relay: 2A / 240 VAC Deviation alarm

Communication *BOX 8*
0 = Not Available

Ordering Information

Model TEC-805 is offered with the options listed in the worksheet above. Create an ordering code by filling in the boxes with the appropriate number and/or letter designation for your requirements and a part number will be assigned, or choose from one of the part numbers listed.

Standard lead time is stock to 4 weeks.

Product Inventory Available for Viewing and Selection @ www.tempco.com

Model TEC-805 Specifications (1/8 DIN)

Power Input
Standard: 90 - 264 VAC, 50/60 Hz, 5VA

Signal Input
Accuracy: ±1.0% of full scale at 77°F/25°C
Thermocouple: Type J or K
RTD: 3-wire Pt100 DIN or JIS
Sampling Rate: 3 times per second
Cold Junction Compensation: ±0.1°C / 1°C
Common Mode Rejection Ratio (CMRR): 120 dB
Normal Mode Rejection Ratio (NMRR): 60 dB
Sensor Break Protection: Upscale

Output
Relay Rating: 240 VAC, 5 Amp
SSR drive: Pulsed DC, 20 V at 20 mA maximum
Current: 4 - 20 mA, 0 - 20 mA, maximum load: 500Ω
Voltage: 0 - 10 VDC, minimum load 500KΩ

Control
Proportional Band: 2.2% of span
ON-OFF Hysteresis: 1% of span
Cycle time: 20 seconds for relay output, 1 second for pulsed voltage output, 0.02 second for linear current or voltage output
Control Action: Reverse Action

Approval Standards
Safety Standard: UL3121-1
Protective Class: **Front panel**: IP 30
Housing and Terminals: IP 20
EMC: EN61326

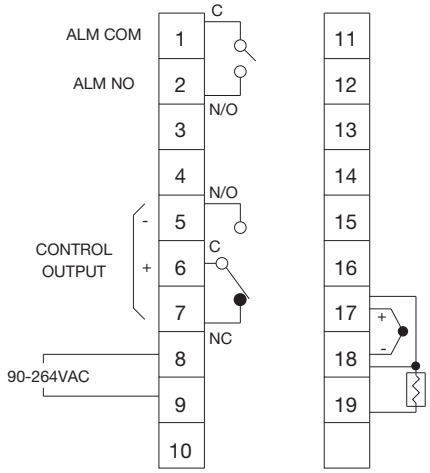
Adjustment
Setpoint: 3-digit or 4-digit thumbwheel switch
Manual Reset: Adjustable up to 2.6% of span
Setpoint Resolution: ± 1 Least Significant Digit
Accuracy of Setpoint: ±1% of span
Repeatability of Setpoint: ± 1 Least Significant Digit

Alarm
Type: Deviation ± 10% of span **Relay**: 2A / 240 VAC

Display
Process Indicator: 3-1/2 digit, 0.4" / 10 mm red LED display
Output Status Indicator: Red LED lamp
Alarm Status Indicator: Red LED lamp

Environmental and Physical
Operating Temperature: 32 to 122°F (0 to 50°C)
Humidity: 0 to 90% RH, non-condensing
Dielectric Strength: 2000 VAC, 50/60 Hz for 1 minute
Vibration: 10 - 55 Hz, amplitude 1 mm
Shock: 200 m/s² (20g)
Dimensions: 3-3/4 × 1-7/8 × 3-1/8" (96 × 48 × 80 mm) H×W×D
Depth behind panel: 2-9/16" (65 mm)
Panel Cutout: 3-5/8" × 1-25/32" (92 x 45 mm) H×W
Weight: 0.42 lb. (190 grams)

Rear Terminal Connections



All Items Available from Stock

Stock and Common Part Numbers
(Power Input: 90-264 VAC, Proportional mode)

Part Number	Signal Input	Range	Output	Alarm
TEC35521	J tc	0-999°F	relay	none
TEC35522	J tc	0-499°F	relay	none
TEC35523	K tc	0-1999°F	relay	none
TEC35524	K tc	0-999°F	relay	none
TEC35525	J tc	0-499°C	relay	none
TEC35526	J tc	0-299°C	relay	none
TEC35527	K tc	0-999°C	relay	none
TEC35528	K tc	0-499°C	relay	none
TEC35529	RTD	0-999°F	relay	none
TEC35530	RTD	0-499°C	relay	none

Model TEC-7100 3/16 DIN Temperature Controller

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

List Prices Starting at $210.00
Quantity Discounts Available!

Design Features

- *3/16 DIN size – 72 mm x 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 – 90-264 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*
- *Agency Approvals*

Ordering Code:

Power Input *BOX 1*
4 = 90-250 VAC
5 = 11-26 VAC / VDC
9 = Other

TEC-7100- [1] [2] [3] [4] [5] [6] [7]

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

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 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

NEMA 4X / IP65 *BOX 7*
0 = No
1 = Yes

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

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 pages 13-36 and 13-37.**

Ordering Information

Model TEC-7100 is offered with the options listed in the worksheet above. Create an ordering code by filling in the boxes with the appropriate number and/or letter designation for your requirements and a part number will be assigned, or choose from one of the part numbers listed.

Standard lead time is stock to 4 weeks.

Product Inventory Available for Viewing and Selection @ www.tempco.com

Model TEC-7100 Specifications (3/16 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

Accuracy: Thermocouple: ±0.10% of full scale, ±1 LSD at 77°F/25°C
RTD: ±0.07% of full scale, ±1 LSD at 77°F/25°C

Resolution: 18 bits

Sampling Rate: 5 times per second

Temperature Effect: ±1.5 µV / °C for all inputs except mA input
For mA input: ±3.0 µV / °C

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, below 1 mA for 4-20 mA input, below 0.25V for 1 - 5 VDC input, unavailable for other 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 Tolerance
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

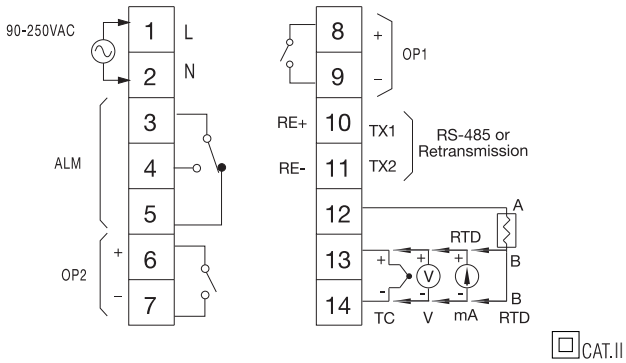
Approval Standards

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

Rear Terminal Connections



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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°F hysteresis control (P band = 0)

P or PD: 0 - 90.0% 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)

Humidity: 0 to 90% RH, non-condensing

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

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

Panel Cutout: 2-11/16" × 2-11/16" (68 x 68 mm) H×W

Weight: 0.44 lb. (200 grams)

All Items Available from Stock

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

Model TEC-704 3/16 DIN Temperature Controller

Simple Setpoint and Display!

Design Features

- *3/16 DIN size – 72 mm x 72 mm*
- *Laser trimmed ASIC components*
- *Short panel depth – only 2-9/16" (65 mm) required*
- *On-off or time proportional selection*
- *Digital display, 0.4" (10 mm) red LED's*
- *Wide selection of output options*
- *High precision wire wound dial/potentiometer setpoint*
- *Universal power input, 90-240 VAC*
- *Sensor break protection*
- *Good performance at a very low price*
- *Agency Approval:*

CE

List Prices Starting at $145.00

Quantity Discounts Available!

Ordering Code:

	1	2	3	4	5	6	7	8
TEC-704-						0		0

Power Input *BOX 1*
4 = 90-264 VAC 50/60 Hz
9 = Other

Signal Input *BOX 2*
1 = Thermocouple: Type J
2 = Thermocouple: Type K
3 = RTD: 100 ohm PT, DIN 0.00385
4 = RTD: 100 ohm PT, JIS 0.00392
9 = Other

Standard Range Code *BOX 3*
4 = 0 to 300°C
6 = 0 to 600°C
C = 50 to 550°F
E = 50 to 850°F
F = 50 to 1100°F

Available for large volume orders. Consult Tempco for more information.
2 = 0 to 100°C
3 = 0 to 200°C
5 = 0 to 400°C
7 = 0 to 800°C
8 = 0 to 1200°C
9 = Other
A = 50 to 200°F
B = 50 to 400°F
D = 50 to 750°F
G = 50 to 1400°F
H = 0 to 2200°F

Control Mode *BOX 4*
1 = On - Off
2 = Proportional

Output 1 *BOX 5*
1 = Relay: 5A / 240 VAC
2 = Pulse dc for SSR drive: 20 VDC (20 mA max)
3 = 4-20 mA, linear (max load 500 ohms)
4 = 0-20 mA, linear (max load 500 ohms)
5 = 0-10 VDC, linear (min. impedance 500K ohms)
9 = Other

Output 2 *BOX 6*
0 = Not Available

Alarm *BOX 7*
0 = None
1 = Relay: 2A / 240 VAC Deviation alarm

Communication *BOX 8*
0 = Not Available

Ordering Information

Model TEC-704 is offered with the options listed in the worksheet above. Create an ordering code by filling in the boxes with the appropriate number and/or letter designation for your requirements and a part number will be assigned, or choose from one of the part numbers listed.

Standard lead time is stock to 4 weeks.

Model TEC-704 Specifications (3/16 DIN)

Power Input
Standard: 90 - 264 VAC, 50/60 Hz, 5VA

Signal Input
Accuracy: ±1.0% of full scale at 77°F/25°C
Thermocouple: Type J or K
RTD: 3-wire Pt100 DIN or JIS
Sampling Rate: 3 times per second
Cold Junction Compensation: ±0.1°C / 1°C
Common Mode Rejection Ratio (CMRR): 120 dB
Normal Mode Rejection Ratio (NMRR): 60 dB
Sensor Break Protection: Upscale

Output
Relay Rating: 240 VAC, 5 Amp
SSR drive: Pulsed DC, 20 V at 20 mA maximum
Current: 4 - 20 mA, 0 - 20 mA, maximum load: 500Ω
Voltage: 0 - 10 VDC, minimum load: 500KΩ

Control
Proportional Band: 2.2% of span
ON-OFF Hysteresis: 1% of span
Cycle Time: 20 seconds for relay output, 1 second for pulsed voltage output, 0.02 second for linear current or voltage output
Control Action: Reverse Action

Approval Standards
Safety Standards: EN61326
Protective Class: **Front panel**: IP 30
Housing and Terminals: IP 20

Adjustment
Setpoint: Single turn wirewound potentiometer
Manual Reset: Adjustable up to 2.6% of span
Setpoint Resolution: 0.2% of span
Accuracy of Setpoint: ±2% of span
Repeatability of Setpoint: ± 0.1% of span

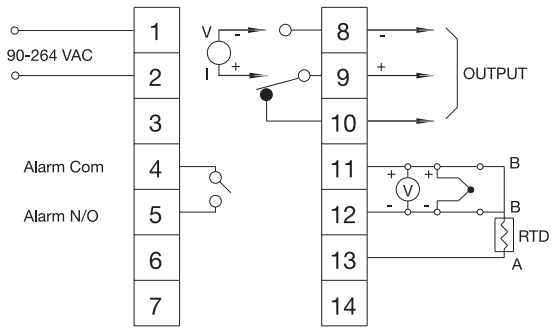
Alarm
Type: Deviation ± 10% of span **Relay**: 2A / 240 VAC

Display
Process Indicator: 3-1/2 digit, 0.4" / 10 mm red LED display
Output Status Indicator: Red LED lamp
Alarm Status Indicator: Red LED lamp

Environmental and Physical
Operating Temperature: 32 to 122°F (0 to 50°C)
Humidity: 0 to 90% RH, non-condensing
Dielectric Strength: 2000 VAC, 50/60 Hz for 1 minute
Vibration: 10 - 55 Hz, amplitude 1mm
Shock: 200 m/s² (20g)
Dimensions: 2-27/32 × 2-27/32 × 3" (72 × 72 × 78 mm) H×W×D
Depth behind panel: 2-9/16" (65 mm)
Panel Cutout: 2-11/16" × 2-11/16" (68 x 68 mm) H×W
Weight: 0.53 lb. (240 grams)

All Items Available from Stock

Rear Terminal Connections



Stock and Common Part Numbers
(Power Input: 90-264 VAC, Proportional mode)

Part Number	Signal Input	Range	Output	Alarm
TEC43401	J tc	50-850°F	relay	none
TEC43402	J tc	50-550°F	relay	none
TEC43403	K tc	50-850°F	relay	none
TEC43404	K tc	50-550°F	relay	none
TEC43405	J tc	50-850°F	relay	relay
TEC43406	K tc	50-850°F	relay	relay
TEC43407	RTD	50-550°F	relay	none
TEC43408	RTD	50-550°F	relay	relay
TEC43409	J tc	0-300°C	relay	none
TEC43410	J tc	0-600°C	relay	none
TEC43411	J tc	0-300°C	relay	relay
TEC43412	K tc	0-300°C	relay	none
TEC43413	K tc	0-600°C	relay	relay
TEC43414	RTD	0-300°C	relay	none
TEC43415	RTD	0-600°C	relay	relay

Model TEC-4100 1/4 DIN Temperature Controller

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

List Prices Starting at $235.00

Quantity Discounts Available!

Design Features

- *1/4 DIN size – 96 mm x 96 mm*
- *Fuzzy Logic PID heat and cool control*
- *PID Control – Auto-tuning on cold or warm start*
- *Short panel depth – only 2" (53 mm) required*
- *Universal programmable sensor input*
- *Highly versatile – 6 types of inputs available*
- *Output 2 can be used for cooling function*
- *Universal input power— 90-264 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*
- *Agency Approvals:*

Ordering Code:

TEC-4100- [1] [2] [3] [4] [5] [6] [7]

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

Alarm *BOX 5*
0 = None
1 = Relay: 2A / 240 VAC, SPDT
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 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

NEMA 4X / IP65 *BOX 7*
0 = No
1 = Yes

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

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 pages 13-36 and 13-37.**

Ordering Information

Model TEC-4100 is offered with the options listed in the worksheet above. Create an ordering code by filling in the boxes with the appropriate number and/or letter designation for your requirements and a part number will be assigned, or choose from one of the part numbers listed.

Standard lead time is stock to 4 weeks.

Product Inventory Available for Viewing and Selection @ www.tempco.com

Model TEC-4100 Specifications (1/4 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
Accuracy: Thermocouple: ±0.10% of full scale, ±1 LSD at 77°F/25°C
RTD: ±0.07% of full scale, ±1 LSD at 77°F/25°C

Resolution: 18 bits

Sampling Rate: 5 times per second

Temperature Effect: ±1.5 μV / °C for all inputs except mA input
For mA input: ±3.0 μV / °C

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, below 1 mA for 4-20 mA input, below 0.25V for 1 - 5 VDC input, unavailable for other 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

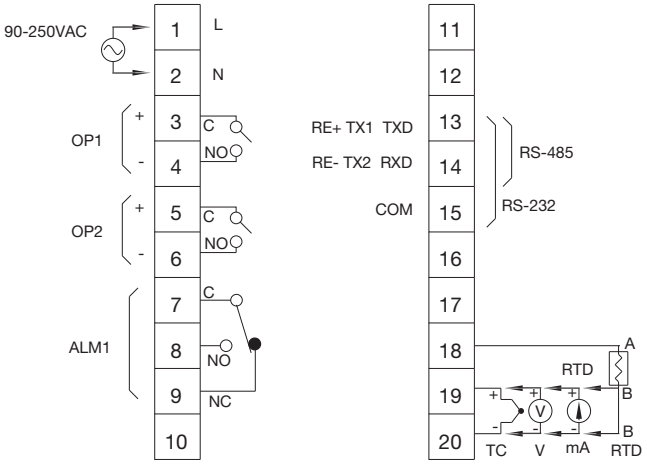
Max. Off-state Leakage: 3 mA rms

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



All Items Available from Stock

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 x 92 mm) H×W

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 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

Model TEC-4300 1/4 DIN Temperature Controller

Configurable for 5 Programmable Outputs!

List Prices Starting at $315.00
Quantity Discounts Available!

Design Features

- *1/4 DIN size – 96 mm x 96 mm*
- *Fuzzy Logic PID heat and cool control*
- *PID Control – Auto-tuning on cold or warm start*
- *Short panel depth – only 2" (53 mm) required*
- *Universal programmable sensor input*
- *Heater Break Alarm using 0-50 Amp current transformer*
- *Output 2 can be programmed as cooling output only*
- *2 optional alarms – programmable NO or NC relay*
- *Wide variety of alarm mode selections*
- *Bumpless transfer to manual mode during sensor failure*
- *Universal input power, 90-264 VAC or 11-26 VAC/VDC*
- *RS-485 and RS-232 data communications interface*
- *Bright 0.55" (14 mm) red LED process display 0.40" (10 mm) green LED setpoint display stabilized with a digital filter if required*
- *Fast input sample rate (5 samples/second)*
- *Differential control*
- *"Soft-Start" ramp and dwell timer*
- *Analog input for remote setpoint and current transformer*
- *Event input for changing functions and setpoint*
- *Hardware lockout plus remote lockout protection*
- *Loop break alarm*
- *Analog retransmission*
- *DC power supply outputs*
- *Tempco's most highly featured 1/4 DIN control*

Ordering Code:

TEC-4300- [1] [2] [3] [4] [5] [6] [7]

Power Input BOX 1
4 = 90-264 VAC
5 = 11-26 VAC / VDC
9 = Other

Signal Input — Universal, can be programmed in the field BOX 2
1 = Input 1 - Universal input (factory default = tc type J)
Thermocouple: J, K, T, E, B, R, S, N, L
RTD: PT100 DIN, PT100 JIS
Current: 4-20 mA, 0-20 mA
Voltage: VDC, 0-1, 0-5, 1-5, 0-10
Input 2 - CT: 0 - 50A AC current Transformer (factory default)
Linear Input: 0-1V, 0-5V, 1-5V, 0-10V, 0-20mA, 4-20mA
Input 3 - Event Input
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
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
A = Other

Alarm 1 BOX 5
0 = None
1 = Relay: 2A/240 VAC, SPDT
9 = Other

Alarm 2 BOX 6
0 = None
1 = Relay: 2A/240 VAC, SPST
9 = Other

Transformer for Heater Break Alarm
(0-50 Amp current)
Part Number: TEC99999
Specifications on page 13-36

Agency Approvals

Communications BOX 7
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

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 pages 13-36 and 13-37.**

Ordering Information

Model TEC-4300 is offered with the options listed in the worksheet above. Create an ordering code by filling in the boxes with the appropriate number and/or letter designation for your requirements and a part number will be assigned, or choose from one of the part numbers listed.

Standard lead time is stock to 4 weeks.

Product Inventory Available for Viewing and Selection @ www.tempco.com

Model TEC-4300 Specifications (1/4 DIN)

Power Input
Standard: 90 - 264 VAC, 47-63 Hz, 15 VA, 7W maximum
Optional: 11 - 26 VAC / VDC, 15 VA, 7W maximum

Signal Input
Accuracy: Thermocouple: ±0.10% of full scale, ±1 LSD at 77°F/25°C
RTD: ±0.07% of full scale, ±1 LSD at 77°F/25°C

Input 1
Resolution: 18 bits
Sampling Rate: 5 times per second
Temperature Effect: ±1.5 μV / °C for all inputs except mA input
For mA input: ±3.0 μV / °C
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, below 1 mA for 4-20 mA input, below 0.25V for 1 - 5 V input, unavailable for other inputs.

Input 2
Resolution: 18 bits
Sampling Rate: 1.66 times per second
Sensor Break Response Time: 0.5 second
Types: **Current Transducer**: 0 to 50 Amp
mA: -3 to 27 mA
V: -1.3 to 11.5 VDC

Input 3
Event Input Functions: Select 2nd setpoint, and/or PID, disable output 1 and/or output 2, remote lockout

Output 1 or Output 2
Relay Rating: 240 VAC, 2 Amp
Pulsed Voltage: Source voltage 5V, Current limiting resistance 66Ω

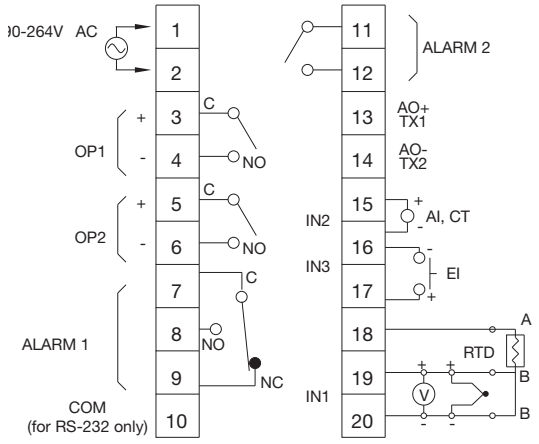
Linear Output — Characteristics

Type	Zero Tolerance	Span Capacity	Load
4-20 mA	3.8-4.0 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	0.95-1.0 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
Isolation Breakdown Voltage: 1000 VAC

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



Alarm 1 / Alarm 2
Relay: 2 Amp, 240 VAC **Alarm 1**: SPDT **Alarm 2**: SPST (NO)
Alarm Functions:
Dwell timer
Deviation Band High / Low Alarm
PV2 High / Low Alarm
PV1-PV2 High / Low Alarm
Loop Break Alarm
Sensor Break Alarm
Alarm Mode: Normal, Latching, Hold, Latching / Hold
Dwell Timer: 0 - 6553.5 minutes

Data Communications
Interface: RS-232 (1 unit), RS-485 (up to 247 units)
Protocol: Modbus Protocol – RTU mode

User Interface
Dual 4-digit LED Display: 0.55" (14 mm) Red Process Display
Keypad: 3 keys 0.40" (10 mm) Green Setpoint Display
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 255% of PB
On-Off: 0.1 - 100.0°F hysteresis control (P band = 0)
P or PD: 0 - 100.0% offset adjustment
PID: Fuzzy logic modified
Proportional band: 0.1 - 932°F (500°C)
Integral: 0 - 1000 seconds **Derivative**: 0 - 360 seconds
Cycle Time: 0.1 - 100 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
Power Limit: 0 - 100% for output 1 and output 2
Remote Setpoint: Programmable range for voltage or current input
Digital Filter: Time constant: settable from 0.2 to 60 seconds

Analog Retransmission
Analog Retransmission Functions: PV1, PV2, PV1-PV2, PV2-PV1, Setpoint, MV1, MV2, PV-SV deviation value
Output Signal: 4-20 / 0-20 mA, 0-1, 0-5, 1-5, 0-10 VDC
Accuracy : ±0.05 % of span, ±0.0025 %/°C

Environmental and Physical
Operating Temperature: 14 to 122°F (-10 to 50°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 x 92 mm) H×W
Weight: 0.56 lb. (255 grams)

Approval Standards
Safety: UL873, CSA C22.2 No. 24-93
EN61010-1 (IEC1010-1)
Protective Class: IP 20 housing & terminals with protective covers
EMC: EN61326

All Items Available from Stock

Stock and Common Part Numbers
(Power Input: 90-264 VAC, no alarm 2, no data com)

Part Number	Signal Input	Out 1	Out 2	Alarm 1
TEC55001	tc-J	relay	none	relay
TEC55002	tc-J	relay	relay	none
TEC55003	tc-J	relay	relay	relay
TEC55004	tc-J	4-20 mA	none	none
TEC55005	tc-J	4-20 mA	none	relay
TEC55006	tc-J	dc pulse	none	none
TEC55007	tc-J	dc pulse	none	relay

Models TEC-404 & TEC-405 1/4 DIN Temperature Controllers

List Prices Starting at $145.00
Quantity Discounts Available!

List Prices Starting at $205.00
Quantity Discounts Available!

With Dial or Pushbutton Setpoint and Display!

Design Features

- *1/4 DIN size – 96 mm x 96 mm*
- *Model TEC-404 Temperature Control with dial/potentiometer setpoint*
- *Model TEC-405 Temperature Control with pushbutton setpoint*
- *Laser trimmed ASIC components*
- *On-off or time proportional selection*
- *Short panel depth – only 2.0" (51 mm) required*
- *Digital display, 0.56" (14 mm) red LED*
- *Wide selection of output options*
- *Universal power input, 90-240 VAC or 20-32 VAC/VDC*
- *Sensor break protection*
- *Good performance at a very low price*
- *Agency Approvals:*

c UL us CE

Ordering Code:

	1	2	3	4	5	6	7	8
Potentiometer Setpoint TEC-404-						0		0
Pushbutton Setpoint TEC-405-						0		0

Power Input *BOX 1*
4 = 90-264 VAC 50/60 Hz
5 = 20-32 VAC 50/60 Hz, 20 - 32 VDC
9 = Other

Signal Input *BOX 2*
1 = Thermocouple: Type J
2 = Thermocouple: Type K
3 = RTD: 100 ohm PT, DIN 0.00385
4 = RTD: 100 ohm PT, JIS 0.00392
9 = Other

Standard Range Code (TEC-404 only) *BOX 3*
4 = 0 to 300°C
6 = 0 to 600°C
C = 50 to 550°F
E = 50 to 850°F

Below available for large volume orders. Consult Tempco for more information.
2 = 0 to 100°C
3 = 0 to 200°C
5 = 0 to 400°C
7 = 0 to 800°C
8 = 0 to 1200°C
9 = Other
A = 50 to 200°F
B = 50 to 400°F
D = 50 to 750°F
F = 50 to 1100°F
G = 50 to 1400°F
H = 0 to 2200°F

Range code (TEC-405 only) *BOX 3*
X = 0 to 499°F
V = 0 to 999°F
W = 0 to 1999°F
C = 0 to 299°C
E = 0 to 499°C
H = 0 to 999°C
Other ranges are available for large volume orders. Consult Tempco for more information.

Control Mode *BOX 4*
1 = On - Off
2 = Proportional

Output 1 *BOX 5*
1 = Relay: 5A / 240 VAC
2 = Pulse dc for SSR drive: 24 VDC (20 mA max)
3 = 4-20 mA, linear (max load 500 ohms)
4 = 0-20 mA, linear (max load 500 ohms)
5 = 0-10 VDC, linear (min. impedance 500K ohms)
9 = Other

Output 2 *BOX 6*
0 = Not Available

Alarm *BOX 7*
0 = None
1 = Relay: 3A / 240 VAC Deviation alarm

Communication *BOX 8*
0 = Not Available

Ordering Information

Models TEC-404 and **TEC-405** are offered with the options listed in the worksheet above. Create an ordering code by filling in the boxes with the appropriate number and/or letter designation for your requirements and a part number will be assigned, or choose from one of the part numbers listed.

Standard lead time is stock to 4 weeks.

Models TEC-404 & TEC-405 Specifications

Power Input

Standard: 90 - 264 VAC, 50/60 Hz, 5VA
Optional: 20 - 32 VAC 50/60 Hz, 20 - 32 VDC, 5VA

Signal Input

Accuracy: ±1.0% of full scale at 77°F/25°C
Thermocouple: Type J or K
RTD: 3-wire Pt100 DIN or JIS
Sampling Rate: 3 times per second
Cold Junction Compensation: ±0.1°C / 1°C
Common Mode Rejection Ratio (CMRR): 120 dB
Normal Mode Rejection Ratio (NMRR): 60 dB
Sensor Break Protection: Upscale

Output 1

Relay Rating: 5 Amp, 240 VAC
SSR drive: Pulsed DC, 24 V at 20 mA maximum
Current Loop: 4 - 20 mA, 0 - 20 mA, maximum load: 500Ω
Voltage: 0 - 10 VDC, minimum load 500 KΩ

Control

Proportional Band: 2.2% of span
ON-OFF Hysteresis: 1% of span
Cycle time: 20 seconds for relay output, 1 second for pulsed voltage output, 0.02 second for linear current or voltage output
Control Action: Reverse Action

Approval Standards

Safety Standard: UL3121-1
EN61326
Protective Class: **Front panel**: IP 30
Housing and Terminals: IP 20

Adjustment

Setpoint: Single turn wirewound potentiometer **(TEC-404)**
Setpoint Resolution: 0.2% of span
Accuracy of Setpoint: ±2% of span
Repeatability of Setpoint: ±0.1% of span

Setpoint: 3-digit or 4-digit thumbwheel switch **(TEC-405)**
Manual Reset: Adjustable up to 2.6% of span
Setpoint Resolution: ± 1 Least Significant Digit
Accuracy of Setpoint: ±1% of span
Repeatability of Setpoint: ± 1 Least Significant Digit

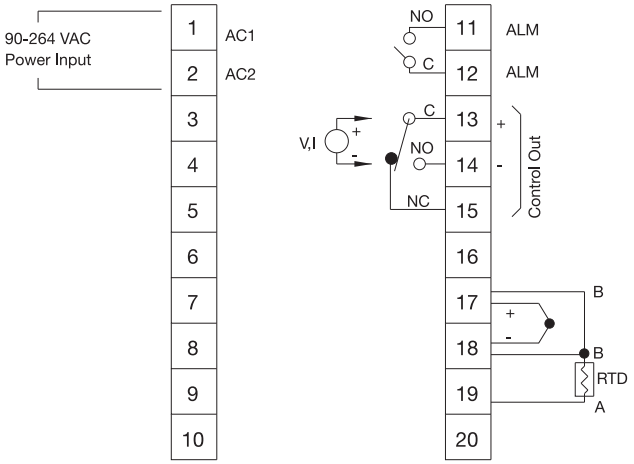
Display

Single 4-digit LED Display: 0.56" (14 mm) Red

Environmental and Physical

Operating Temperature: 32 to 122°F (0 to 50°C)
Humidity: 0 to 90% RH, non-condensing
Dielectric Strength: 2000 VAC, 50/60 Hz for 1 minute
Vibration: 10 - 55 Hz, amplitude 1 mm
Shock: 200 m/s2 (20g)
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 x 92 mm) H×W
Panel Cutout: 92 x 92 mm (3.62" x 3.62")
Weight: 0.55 lb. (250 grams)

Rear Terminal Connections



All Items Available from Stock

Potentiometer Setpoint
TEC-404 Stock and Common Part Numbers
(Power Input: 90-264 VAC, Proportional Mode)

Part Number	Signal Input	Range	Output	Alarm
TEC57401	J tc	50-850°F	relay	none
TEC57402	J tc	50-550°F	relay	none
TEC57403	K tc	50-850°F	relay	none
TEC57404	K tc	50-550°F	relay	relay
TEC57405	RTD	50-550°F	relay	none
TEC57406	J tc	0-300°C	relay	none
TEC57407	J tc	0-600°C	relay	none
TEC57408	K tc	0-300°C	relay	none
TEC57409	K tc	0-600°C	relay	none

Pushwheel Setpoint
TEC-405 Stock and Common Part Numbers
(Power Input: 90-264 VAC, Proportional Mode)

Part Number	Signal Input	Range	Output	Alarm
TEC57511	J tc	0-999°F	relay	none
TEC57512	J tc	0-499°F	relay	none
TEC57513	K tc	0-1999°F	relay	none
TEC57514	K tc	0-999°F	relay	none
TEC57515	J tc	0-499°C	relay	none
TEC57516	J tc	0-299°C	relay	none
TEC57517	K tc	0-999°C	relay	none
TEC57518	K tc	0-499°C	relay	none
TEC57519	RTD	0-999°F	relay	none
TEC57520	RTD	0-499°C	relay	none

Models TEC-402 & TEC-401 1/4 DIN Temperature Controllers

List Prices Starting at $115.00
Quantity Discounts Available!

With Process Temperature Deviation Meter!

List Prices Starting at $105.00
Quantity Discounts Available!

Low Cost Non-Indicating Control!

Design Features

- *1/4 DIN size – 96 mm x 96 mm*
- *Model TEC-402 temperature control with deviation meter*
- *Model TEC-401 temperature control non-indicating*
- *Laser trimmed ASIC components*
- *Short panel depth – only 2.0" (51 mm) required*
- *On-off or time proportional selection*
- *Wide selection of output options*
- *Potentiometer setpoint*
- *Sensor break protection*
- *Good performance at a very low price*
- *Agency Approval:*

CE

Ordering Code:

With Deviation Meter TEC-402-

1	2	3	4	5	6	7	8
					0		0

Non-Indicating TEC-401-

1	2	3	4	5	6	7	8
					0	0	0

Power Input *BOX 1*
3 = 100-130 VAC, 50/60 Hz or 200-240 VAC, 50/60 Hz

Control Mode *BOX 4*
1 = On - Off
2 = Proportional

Output 1 *BOX 5*
1 = Relay: 5A / 240 VAC
2 = Pulse dc for SSR drive: 24 VDC (20 mA max)
3 = 4-20 mA, linear (max load 500 ohms)
4 = 0-20 mA, linear (max load 500 ohms)
5 = 0-10 VDC, linear (min. impedance 500K ohms)
9 = Other

Signal Input *BOX 2*
1 = Thermocouple: Type J
2 = Thermocouple: Type K
3 = RTD: 100 ohm PT, DIN 0.00385
4 = RTD: 100 ohm PT, JIS 0.00392
9 = Other

Output 2 *BOX 6*
0 = Not Available

Alarm (TEC-402) only *BOX 7*
0 = None
1 = Relay: 3A / 240 VAC deviation alarm

Standard Range Code *BOX 3*

4 = 0 to 300°C	**C** = 50 to 550°F
6 = 0 to 600°C	**E** = 50 to 850°F

Below available for large volume orders. Consult Tempco for more information

2 = 0 to 100°C	**A** = 50 to 200°F
3 = 0 to 200°C	**B** = 50 to 400°F
5 = 0 to 400°C	**D** = 50 to 750°F
7 = 0 to 800°C	**F** = 50 to 1100°F
8 = 0 to 1200°C	**G** = 50 to 1400°F
9 = Other	**H** = 0 to 2200°F

Communication *BOX 8*
0 = Not Available

Ordering Information

Models TEC-402 and **TEC-401** are offered with the options listed in the worksheet above. Create an ordering code by filling in the boxes with the appropriate number and/or letter designation for your requirements and a part number will be assigned, or choose from one of the part numbers listed.

Standard lead time is stock to 4 weeks.

Product Inventory Available for Viewing and Selection @ www.tempco.com

Models TEC-402 & TEC-401 Specifications

Power Input
100 - 130 VAC, 50/60 Hz, 5VA
200 - 240 VAC, 50/60 Hz, 5VA

Signal Input
Thermocouple: Type J or K
RTD: 3-wire Pt100 DIN or JIS
Sampling Rate: 3 times per second
Accuracy: ±2% of span
Cold Junction Compensation: ±0.1°C / 1°C
Common Mode Rejection Ratio (CMRR): 120 dB
Normal Mode Rejection Ratio (NMRR): 60 dB
Sensor Break Protection: Upscale

Output 1
Relay Rating: 5 Amp, 240 VAC
SSR drive: Pulsed DC, 24 V at 20 mA maximum
Current Loop: 4 - 20 mA, 0 - 20 mA, maximum load: 500Ω
Voltage: 0 - 10 VDC, minimum load 500 KΩ

Control
Proportional Band: 2.2% of span
ON-OFF Hysteresis: 1% of span
Cycle time: 20 seconds for relay output, 1 second for pulsed voltage output, 0.02 second for linear current or voltage output
Control Action: Reverse Action

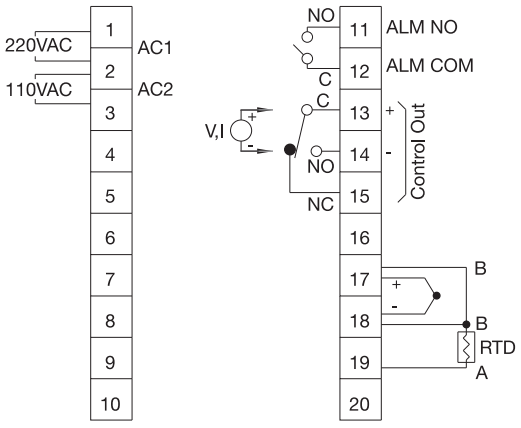
Approval Standards
Safety Standard: EN61326
Protective Class: **Front panel**: IP 30
Housing and Terminals: IP 20

Adjustment
Setpoint: Single turn wirewound potentiometer
Setpoint Resolution: 0.2% of span
Accuracy of Setpoint: ±2% of span
Repeatability of Setpoint: ±0.1% of span

Display
Deviation meter: ±10% of scale (TEC-402)
Non-Indicating (TEC-401)

Environmental and Physical
Operating Temperature: 32 to 122°F (0 to 50°C)
Humidity: 0 to 90% RH, non-condensing
Dielectric Strength: 2000 VAC, 50/60 Hz for 1 minute
Vibration: 10 - 55 Hz, amplitude 1 mm
Shock: 200 m/s² (20g)
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 x 92 mm) H×W
Weight: 0.79 lb. (360 grams)

Rear Terminal Connections



(For TEC-401 Pins 11 and 12 are not used)

All Items Available from Stock

With Deviation Meter
TEC-402 Stock and Common Part Numbers
(Proportional mode)

Part Number	Signal Input	Range	Output	Alarm
TEC57201	J tc	50-850°F	relay	none
TEC57202	J tc	50-550°F	relay	none
TEC57203	K tc	50-850°F	relay	none
TEC57204	K tc	50-550°F	relay	relay
TEC57205	RTD	50-550°F	relay	none
TEC57206	J tc	0-300°C	relay	none
TEC57207	J tc	0-600°C	relay	none
TEC57208	K tc	0-300°C	relay	none
TEC57209	K tc	0-600°C	relay	none

Non-Indicating
TEC-401 Stock and Common Part Numbers
(Proportional mode)

Part Number	Signal Input	Range	Output
TEC57101	J tc	50-850°F	relay
TEC57102	J tc	50-550°F	relay
TEC57103	K tc	50-850°F	relay
TEC57104	K tc	50-550°F	relay
TEC57105	RTD	50-550°F	relay
TEC57106	J tc	0-300°C	relay
TEC57107	J tc	0-600°C	relay
TEC57108	K tc	0-300°C	relay
TEC57109	K tc	0-600°C	relay

Table of Input Range and Accuracy

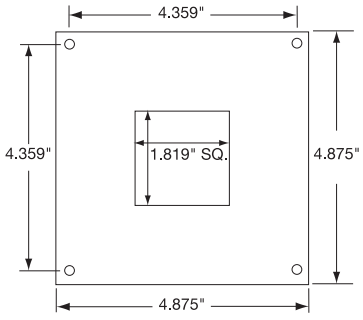
Input Range Table

For Models TEC-220, TEC-920, TEC-9100, TEC-8100, TEC-7100 TEC-4100,TEC-2500, TEC-9300, TEC-8300, TEC-4300

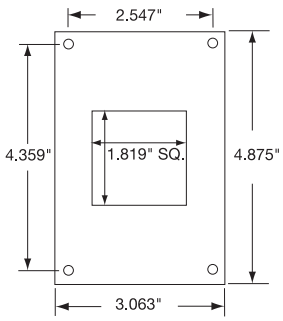
Type	Range	Accuracy @ 25°C	Input Impedance
J	-184 to 1832°F -120 to 1000°C	±3.6°F ±2.0°C	2.2MΩ
K	-328 to 2498°F -200 to 1370°C	±3.6°F ±2.0°C	2.2MΩ
T	-418 to 752°F -250 to 400°C	±3.6°F ±2.0°C	2.2MΩ
E	-148 to 1652°F -100 to 900°C	±3.6°F ±2.0°C	2.2MΩ
B	32 to 3272°F 0 to 1800°C	±3.6°F ±2.0°C	2.2MΩ
For Models TEC-2500, TEC-9300, TEC-8300, TEC-4300			
B	32 to 3308°F 0 to 1820°C	±3.6°F ±2.0°C	2.2MΩ
R	32 to 3214°F 0 to 1767°C	±3.6°F ±2.0°C	2.2MΩ
S	32 to 3214°F 0 to 1767°C	±3.6°F ±2.0°C	2.2MΩ
N	-418 to 2372°F -250 to 1300°C	±3.6°F ±2.0°C	2.2MΩ
L	-328 to 1652°F -200 to 900°C	±3.6°F ±2.0°C	2.2MΩ
PT100 (DIN)	-346 to 1292°F -210 to 700°C	±0.7°F ±0.4°C	1.3KΩ
PT100 (JIS)	-328 to 1112°F -200 to 600°C	±0.7°F ±0.4°C	1.3KΩ
mV	-8 to 70mV	±0.05%	2.2MΩ
mA	-3 to 27mA	±0.05%	70.5Ω
VDC	-1.3 to 11.5Vdc	±0.05%	650KΩ
For Models TEC-2500, TEC-9300, TEC-8300, TEC-4300			
VDC	-1.3 to 11.5Vdc	±0.05%	302KΩ

Adapter Plates

18 gauge Stainless Steel Adapter Plates with (4) #8 self-tapping sheet metal screws for mounting

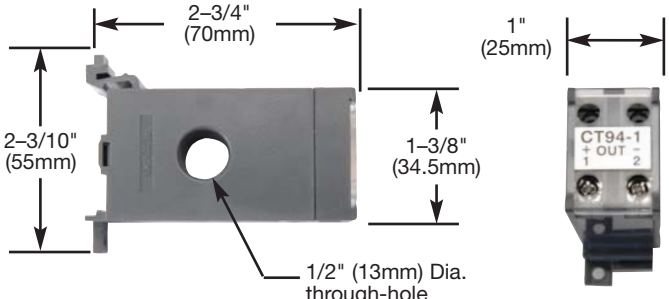


TEC99901
Adapts a 1/4 DIN cut-out to a 1/16 DIN cut-out.



TEC99902
Adapts a 1/8 DIN cut-out to a 1/16 DIN cut-out.

Model TEC 99999 Current Transformer/Transducer for use with Heater Break Alarm



Output
Term 1: +
Term 2: -

Design Features

- High Accuracy: ± 2% of Reading ± 0.2A
- Wide Measuring Range: 0 – 50 Amps AC
- DC Voltage Output: 0 – 10 VDC
- 35 mm DIN Rail Mount or Surface Mount
- 7/16" (12.5mm) diameter maximum cable size

Product Inventory Available for Viewing and Selection @ www.tempco.com

TEC Family of Controllers — Common Design Features

The Following Are Common Design Features on These Models:

1/32 DIN	**TEC-220, TEC-2500**
1/16 DIN	**TEC-920, TEC-9100, TEC-9300**
1/8 DIN	**TEC-8100, TEC-8300**
3/16 DIN	**TEC-7100**
1/4 DIN	**TEC-4100, TEC-4300**

High Accuracy
The TEC Series is manufactured with custom-designed ASIC (Application Specific Integrated Circuit) technology, which contains an 18-bit Analog to Digital converter for high resolution measurement (true 0.1°F resolution for thermocouple and PT100 RTDs) and a 15-bit D to A converter for linear current or voltage control outputs. The ASIC technology provides improved operating performance, low cost, enhanced reliability and higher component density.

Auto-Tune
The auto-tune function allows the user to simplify initial setup for a new system by automatically determining the optimum set of PID settings for the thermodynamic system. A unique algorithm is programmed into the microprocessor to obtain an optimal set of control parameters for the process, and it can be applied either as the process is warming up (cold start) or if the process has been in a steady state (warm start).

Fuzzy Logic Control
The function of Fuzzy Logic Control is to adjust the PID parameters from time to time in order to make the modulated output value more flexible and adaptive to various processes. The result is to enable a process to reach a predetermined setpoint in the shortest time, with the minimum of overshoot and undershoot during power-up or external load disturbances.

Digital Filter
A first-order low-pass digital filter with a programmable time constant is a standard function of the software developed for the TEC controllers. It is used to improve the stability of the process value, especially in electrically noisy environments.

Lockout Protection
According to the actual security requirements, one of four lockout levels can be selected to prevent the unit from being changed erroneously.
None: No parameter is locked.
Set: User data is accessible, but setup data is locked.
User: All user and setup parameters are locked, except setpoint.
All: All user and setup parameters are locked, including setpoint.

Bumpless Transfer
Bumpless transfer allows the controller to continue to control the process by using the last known good output percentage value if the temperature sensor should fail. Hence, the process transfers from feedback closed loop control to open loop control and the process can be kept running until the sensor can be replaced.

Soft Start Ramp
The ramping function is performed during power up as well as any time the setpoint is changed. It can be ramping up or ramping down. The process value will reach the setpoint with a predetermined constant rate of rise or fall.

Digital Communications
The units can be equipped with a RS-485 or RS-232 interface card to provide digital communications. By using only twisted pair wires, up to 247 controllers can be connected together via the RS-485 interface to a host computer.

Data Communication Accessories

TEC99001 — Smart Network Adaptor for third party SCADA software which converts 255 channels of RS-485 or RS-422 to RS-232 Network.

TEC99003 — Smart Network Adapter for connecting the TEC controller's programming port to the RS-232 PC serial port. Allows downloading and reading of configuration information directly from a personal computer.
Can be used with TEC-220, TEC-920, TEC-2500, TEC-4100, TEC-4300, TEC-7100, TEC-8100, TEC-8300, TEC-9100 and TEC-9300.

TEC99030 — "Tempco Config Set" PC software for use with TEC99003 Smart Network Adapter

Minimum System Requirements:
Microsoft Windows XP, 2000, NT, 98, 95
Pentium 200 MHz or faster
32 MB RAM (64 MB recommended)
Hard disk space: 2 MB

Note: *Can be downloaded at no charge from www.tempco.com*

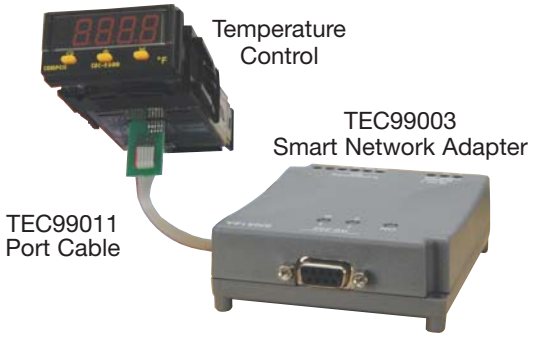
Programming Port Cables

TEC99011 — Used for models TEC-220, TEC-4100, TEC-7100, TEC-8100 and TEC-9100.

TEC99012 — Used for model TEC-920 only.

TEC99013 — Used for models TEC-2500, TEC-4300, TEC-8300 and TEC-9300.

TEC99014 — RS-232 interface cable for models TEC-220, TEC-920, TEC-4100, TEC-7100, TEC-8100 and TEC-9100.



Encapsulated Temperature Controller

Series TKZ Encapsulated Temperature Controller

Shown with
Optional Dial & Knob
with 24" Cord Length

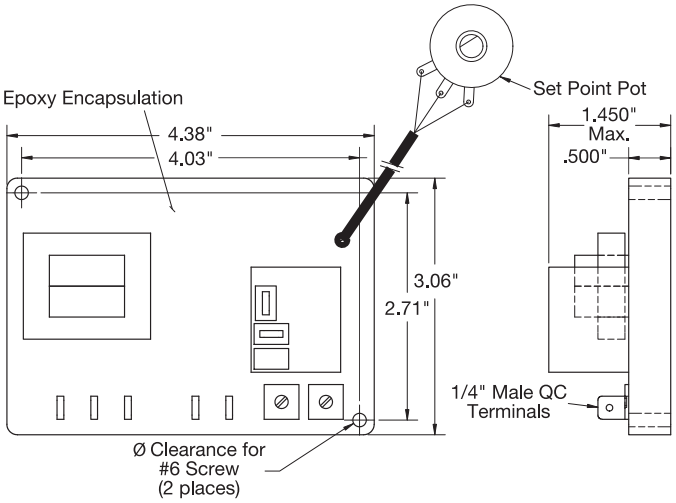
Tempco's Series TKZ temperature controllers small size and low cost make them ideal for OEM applications, or thermostat replacement requiring the accuracy, reliability and versatility only available in an electronic control. The control incorporates highly reliable state-of-the-art analog electronic circuitry in a very economical open board, potted design.

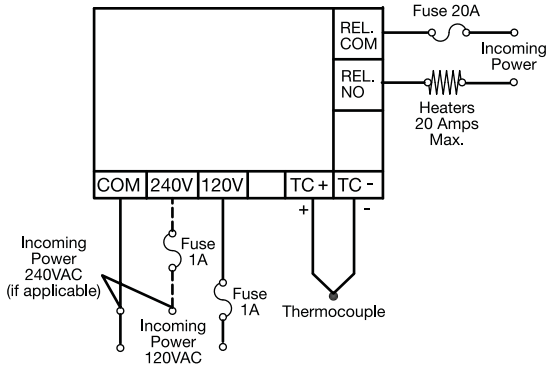
Design Features

- ***The Encapsulated Design allows for use in areas of high humidity and components are less likely to be damaged in handling***
- ***1/4"Quick Disconnect terminals make installation a snap***
- ***Heavy duty 30 Amp (UL rated 20 Amp) relay output***
- ***Compact footprint can easily fit into most commercial or industrial equipment: 3.625" x 2.625" (92 x 67 mm)***
- ***120/240VAC Field Selectable***
- ***Local, remote or fixed setpoint***

Typical Applications

- *Appliances*
- *Commercial Cooling*
- *Cooking Equipment*
- *Environmental Chambers*
- *Gas Analyzers*
- *Hot Stamping Machines*
- *Laboratory Baths*
- *Packaging Machines*
- *Refrigerators and Freezers*
- *Water Heaters*





Specifications

Power Input: 120/240 VAC ±10%, 50/60 Hz

Control Output: 30 Amp SPST Relay, UL rated 20 Amp, rated for 100,000 cycles

Control Mode: On-Off with 4° hysteresis typical; contact factory for other hysteresis values

Cold Junction Compensation: Automatic

Sensor Fault Protection: Output de-energizes (contacts open) on thermocouple break

Ambient Operating Temperature: 0 to 70°C

Field Wiring Terminals: .250" male quick connects

Agency Approvals: UL and C-UL Recognized

Stock Controllers

All controls listed below have 120/240 input voltage, remote setpoint with 24 " leads and a 30 Amp (UL rated 20 Amp) relay output.

Part Number	Signal Input	Dual Range
TKZ10001	J tc	32 to 500°F/0-260°C
TKZ10002	J tc	32 to 1000°F/0-550°C
TKZ10003	K tc	32 to 500°F/0-260°C
TKZ10004	K tc	32 to 1000°F/0-550°C

Stock Dials and Knobs (Dual Range °C/°F)

Part Number	Dual Range
TKZ99001	32 to 500°F/0-260°C
TKZ99002	32 to 1000°F/0-550°C

Ordering Information

Choose a Part Number from the stock list.

Tempco also welcomes large volume OEM inquires for TKZ controls built to your specific requirements (25 pc. minimum).

Product Inventory Available for Viewing and Selection @ www.tempco.com

Low Cost Temperature Control for Thermostat Replacement

Tempco's low cost temperature control is a well-qualified alternative to the use of electromechanical or pneumatic thermostats. This inexpensive control offers a degree of flexibility unavailable in other packaged thermostats.

With its use of standard thermocouple Type J, or PT1000 RTDs, the controller eliminates the problems of capillary tube kinking and breakage. The 1/4" quick connect terminals allow for fast installation and service.

When coupled with the optional liquid crystal display (LCD), Tempco can offer the convenience of digital indication of the process temperature directly from the temperature sensor. The optional LCD display is 3-1/2 digits with a resolution of 1°. An accuracy of 1%, ± one digit, meets most agency requirements for food storage.

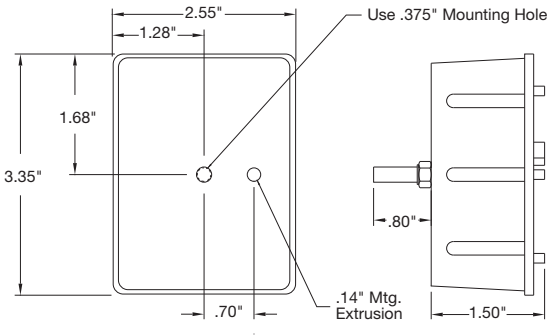
The control can be used where it is desirable to have accurate, repeatable temperature control through a narrow deadband (as close as ±1°). The result is better temperature control and a better product or process.

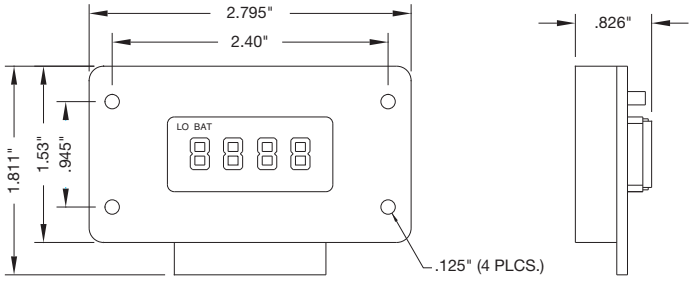
Optional LCD Display

The optional LCD, with its large 3/4" display, offers high readability in ambient light conditions and at wide viewing angles.

The remote mounting from the PC board provides a custom look to the control panel while still using a standard product. The mounting is a simple bezel arrangement.

Panel Cutout: 1.14" x 2.60"





Specifications

Input Voltage: 120 VAC ±10%, 50/60 Hz
208/240 VAC ±10%, 50/60 Hz

Stability: Better than ±1% of span or ±4°, whichever is greater

Static Deadband: ±1° nominal

Operating Conditions:
Ambient Temperature: 32 to 158°F (0 to 70°C)
Relative Humidity: 5% to 95%, noncondensing

Control Mode: On / Off

Relay Output: 20 Amps @ 120/240 VAC, resistive

Sensor Input: Type J or K thermocouple, PT1000 RTD

Control Mounting: Provided hex nut and lock washer on shaft of potentiometer, 0.375" dia. hole required

All Items Available from Stock

Controls

TST-113-102	Type J tc input	Range: 50 to 250°F
TST-113-103	PT1000 W input	Range: 50 to 250°F
TST-113-104	Type J tc input	Range: 150 to 550°F
TST-113-105	PT1000 W input	Range: 150 to 550°F

Accessories

TST-116-101	LCD Display with mounting bezel and 24" cable	
TST-116-102	Scale plate	Range: 50 to 250°F
TST-116-103	Scale plate	Range: 150 to 550°F
TST-116-104	Knob with line pointer	

Ordering Information

Choose the Part Number of the control and accessories that fit your requirements.

Refer to Section 14 for Temperature Sensors.

Benchtop Point-of-Use Temperature Control Consoles

2 CONSOLE TYPES

Type 1—Self Powered Output

Heater power is drawn from console input power.
Maximum current available for heaters: 8 Amps/console

Type 2—Switched Plug Output

Heater power is independent of console input power.
Maximum current available for heaters: 12 Amps/zone

Console Advantages

- *Cost Effective*
- *Compact Size*
- *Easy to Use*
- *Safe to Operate*
- *Portable*
- *Three Year Warranty*

Construction Characteristics

Tempco TPC Portable Temperature Control Consoles are quality built self-contained systems for monitoring and controlling process temperatures in a wide range of fixed or portable applications.

These 1 to 4 zone units use our reliable next generation TEC-9100 1/16 DIN auto-tuning fuzzy logic PID temperature controllers with user-friendly programming.

Typical Applications

- *Dryers*
- *Platen Heating*
- *Ovens and Furnaces*
- *Heating of Tanks*
- *R & D Laboratory*
- *Industrial Processes*
- *Educational Facilities*
- *Packaging Sealing Equipment*
- *Semiconductor Processing Equipment*
- *Plastics – Sprue or Nozzle Bushings*
- *Freeze and Moisture Protection*
- *Sterilizers/Pasteurizers*
- *Food Processing Equipment*

TPC-1000
1-Zone Control Console
4-7/8" H × 9" D × 5" W

TPC-2000
2-Zone Control Console
4-7/8" H × 9" D × 8-1/4" W

TPC-3000
3-Zone Control Console
4-7/8" H × 9" D × 11-1/4" W

Temperature Sensors are in Section 14

TPC-4000
4-Zone Control Console
4-7/8" H × 9" D × 14-13/16" W

Design Features

- *Front-mounted rocker panel switch*
- *Retractable legs for easy benchtop viewing*
- *Carrying handle*
- *72-inch-long power cord with standard U.S. straight-blade plug configuration for 120V or 240V*
- *Miniature jack and plug for temperature sensor input (one per zone)*
- *Power output plug (one per zone)*

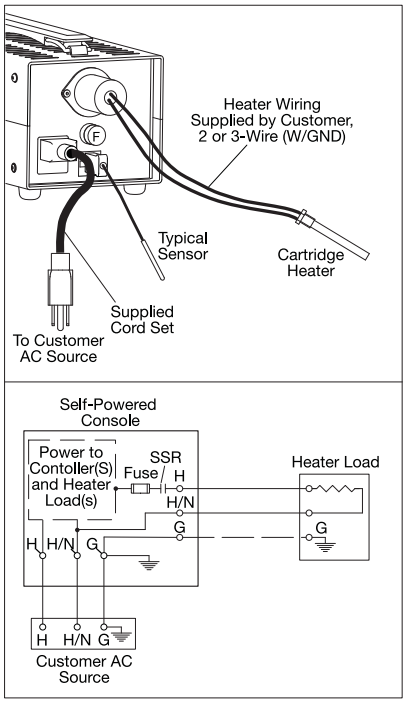
Supplied Power Cord and plugs

Typical Rear View Switched Plug Output

All Items Available from Stock

Product Inventory Available for Viewing and Selection @ www.tempco.com

Benchtop Point-of-Use Temperature Control Consoles



TYPE 1

Self Powered Output

(True Plug & Play Operation)

The heater power is drawn directly from the console's main line cord. The line cord is fused at 10 Amps, 240 VAC.

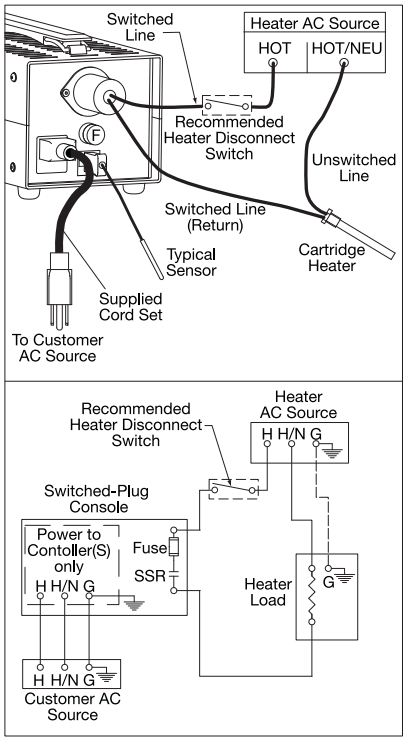
True Plug & Play Operation: The heater is simply wired to the supplied plug and plugged in to the rear mounted receptacle.

Self Powered Output Consoles

Heater Power is Drawn from Console Input Power

Zones	Console Voltage Input	Controlled Voltage per Zone	Controlled Amperage Output per Zone	Watts per Zone (max)	Part Number and Sensor Input Type J Input	Type K Input	RTD Input
1	120V	120V	8A	960W	*TPC10007	*TPC10008	TPC10009
1	240V	240V	8A	1920W	*TPC10010	TPC10011	TPC10012
2	120V	120V	4A	480W	*TPC20009	TPC20010	TPC20012
2	240V	240V	4A	960W	TPC20013	TPC20014	TPC20015
3	120V	120V	2.7A	324W	TPC30009	TPC30010	TPC30011
3	240V	240V	2.7A	648W	TPC30012	TPC30013	TPC30014
4	120V	120V	2A	240W	TPC40008	TPC40009	TPC40010
4	240V	240V	2A	480W	TPC40011	TPC40012	TPC40013

An * next to a part number indicates a stock item.
Custom Made Consoles. Custom consoles can be manufactured with electrical components to meet your specific requirements. Consult Tempco.



TYPE 2

Switched Plug Output Only

The heater power is independent of the console controller input power. Only a Solid State Relay closure is provided per zone for external control switching. Each zone is rated for a 12 Amp maximum load. External 120, 208 or 240 VAC must be provided to the heater power circuit.

CAUTION — You must install a switch into the heater circuit to disconnect power to the heater output when the console is not in use. The internal solid-state relay should not be relied on to disconnect heater power.

Switched Plug Output Consoles

Heater Power is Independent of Console Input Power

Zones	Console Voltage Input (max)	Controlled Voltage per Zone (max)	Controlled Amperage per Zone (max)	Watts per Zone (max)	Part Number and Sensor Input Type J Input	Type K Input	RTD Input
1	120V	240V	12A	2880W	*TPC10001	TPC10002	TPC10003
1	240V	240V	12A	2880W	*TPC10004	*TPC10005	TPC10006
2	120V	240V	12A	2880W	*TPC20001	*TPC20002	TPC20003
2	240V	240V	12A	2880W	*TPC20004	*TPC20005	TPC20006
3	120V	240V	12A	2880W	*TPC30001	TPC30002	TPC30003
3	240V	240V	12A	2880W	*TPC30004	TPC30005	TPC30006
4	120V	240V	12A	2880W	*TPC40001	TPC40002	TPC40003
4	240V	240V	12A	2880W	*TPC40004	TPC40005	TPC40006

An * next to a part number indicates a stock item.
Custom Made Consoles. Custom consoles can be manufactured with electrical components to meet your specific requirements. Consult Tempco.

Specifications

Output Power Switching: Solid State Relay with heat sink
Optional Sensor Inputs: Consult Tempco
Power Input: Rear panel mounted fused power inlet, cord supplied
Control Options: FM High Limit Controller, 2nd Output, Alarm, Data Communications or other special requirements, consult Tempco.

Ordering Information

Standard Consoles – Order by specifying part number. Standard lead time is Stock to 2 weeks.

Custom Made Consoles — Consult Tempco

Custom Engineered Process Control Panels

5 Control Panels Managing **5** Circulation Heating Systems

Application: Cleaning and applying chromate coating to aircraft parts

Tempco's process controllers provide integrated solutions to manage your thermal loop system.

Why spend your valuable time engineering, designing, sourcing components and building Industrial Power Control Panels? Our UL 508A Certified Panel Shop can meet all your requirements for a multitude of processing control applications, from the simplest single zone panel to the most complex thermal loop system.

We offer standard or custom engineered power control panels backed by over 35 years of experience in the process heating industry. We apply our vast knowledge and expertise to every system we design and manufacture.

Consult us with your requirements.
We welcome your inquiries

Assembly of two panels with temperature controllers and motor drives. Also includes Programmable Logic Controllers (PLC) with communication capabilities pre-programmed by our engineers.

Application: Industrial Processing System

Application: automated wood laminating press system

Control Panels are Engineered & Manufactured in our 508A Certified Panel Shop.

YOUR SATISFACTION IS GUARANTEED!

c UL us LISTED

Application: Outdoor Control Panel for a 1,000 gallon water holding tank with internal temperature control, NEMA 4 construction and enclosure heater

Application: paint curing for decorative landscaping rocks and stone.

Standard Designs
See Page 13-44

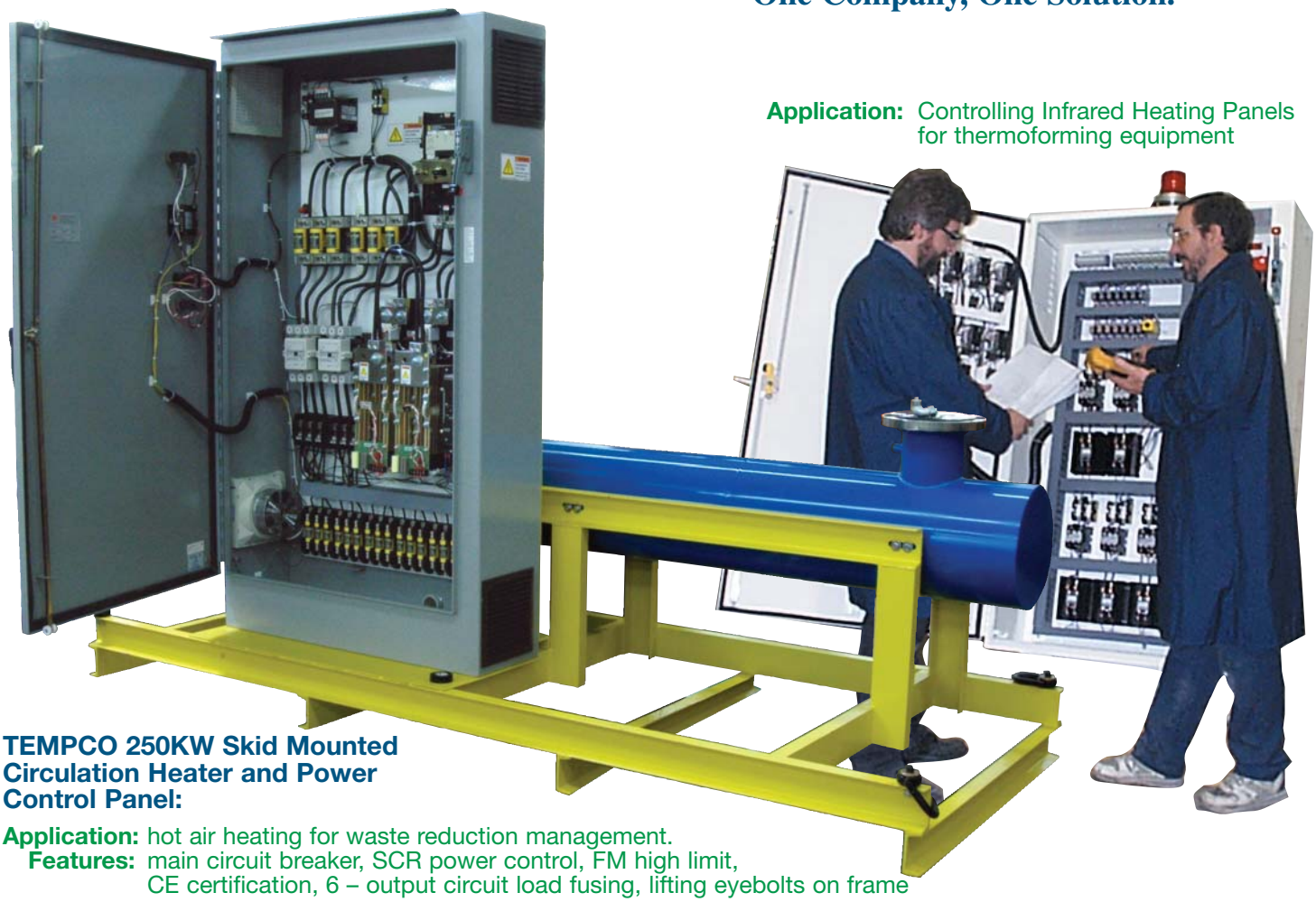
Custom Designs:
See Page 13-46

Enclosure Options:
See Page 13-49

Obtaining the leading edge process control panel that you need is one thing.

Acquiring it at the cost and time you have in mind is quite another.

Achieve your goals with **TEMPCO.**
One Company, One Solution.



Application: Controlling Infrared Heating Panels for thermoforming equipment

TEMPCO 250KW Skid Mounted Circulation Heater and Power Control Panel:

Application: hot air heating for waste reduction management.
Features: main circuit breaker, SCR power control, FM high limit, CE certification, 6 – output circuit load fusing, lifting eyebolts on frame

Temperature Control Panels – Standard Design For Industrial Process Applications

Design Features

- *NEMA 12 enclosure*
- *Model TEC-4100 1/4 DIN or TEC-9100 1/16 DIN temperature control, dual display with auto-tuning*
- *Model TEC-410 1/4 DIN or TEC-910 1/16 DIN high limit control with FM approval and manual reset pushbutton switch*
- *Main Power: 240 or 480 VAC, single or three phase*
- *High limit safety contactor*
- *Fused turn handle disconnect*
- *Power on pilot lamp*
- *Control transformer, fused secondary*
- *Power output connections hardwired to fuse holders*
- *Sensor input connections at labeled terminal strips*
- *Ventilation fan and filter standard for systems over 15KW*
- *Tagging of door-mounted parts with 2-color engraved phenolic labels*
- *1 set of wiring schematics and control manuals*

Heater Power Output

- SCR output device and fused sub-circuits
- Solid state relays with individual relays per fused sub-circuit
- Mechanical or Mercury relays

These standard control panels range in capacity from 4.8KW through 332KW and use NEMA 12 enclosures.

The general purpose control panels are set up to run process heating systems such as circulation, duct heaters or any other resistive load.

All control panels are shipped factory pre-wired according to the National Electrical Code, eliminating the need by the customer to design your own control system, purchase separate components and construct your own working temperature control system.

The standard temperature control systems are supplied with the standard features listed. They are based on SCR power controls, solid state or mercury relays.

Silicone Controlled Rectifier (SCR) Power Controls are a solid state device that provides infinitely variable power to accurately maintain setpoint temperature and extends heater life by maintaining a stable process temperature.

- Single-phase systems use single-phase zero cross SCRs.
- Three-phase systems use 2-leg three-phase zero cross SCRs.

Solid State Relays offer many of the benefits of SCRs but often at a lower cost. Maintenance costs are potentially lower due to less costly SSRs used per control circuit.

Mercury Relays offer a low-cost alternative to SCRs and SSRs for process heating applications and provide longer life than a mechanical contactor due to their self renewing mercury contacts.

See page 13-47 for some of the more common control panel options.

See page 13-46 for Custom Control Panels

Standard Temperature Control Panels For Industrial Process Applications

Total per Phase Amps	Volts	Phase	Total KW	Number of Fused Sub-Circuits	Panel Size Code	Part Number with SCR	Part Number with SS Relays	Part Number with Mercury Relays
20	240	1	4.8	1	A	PCS20001	PCE20001	PCM20001
	480	1	9.6	1	A	PCS20002	PCE20002	PCM20002
	240	3	8.3	1	B	PCS20003	PCE20003	PCM20003
	480	3	16.6	1	B	PCS20004	PCE20004	PCM20004
30	240	1	7.2	1	A	PCS20005	PCE20005	PCM20005
	480	1	14.4	1	A	PCS20006	PCE20006	PCM20006
	240	3	12.4	1	C	PCS20007	PCE20007	PCM20007
	480	3	24.9	1	C	PCS20008	PCE20008	PCM20008
60	240	1	14.4	1	C	PCS20009	PCE20009	PCM20009
	240	1	14.4	2	C	PCS20010	PCE20010	PCM20010
	480	1	28.8	1	D	PCS20011	PCE20011	PCM20011
	480	1	28.8	2	D	PCS20012	PCE20012	PCM20012
	240	3	24.9	1	D	PCS20013	PCE20013	PCM20013
	240	3	24.9	2	E	PCS20014	PCE20014	PCM20014
	480	3	49.8	1	D	PCS20015	PCE20015	PCM20015
	480	3	49.8	2	E	PCS20016	PCE20016	PCM20016
100	240	3	41.5	1	F	PCS20017	—	PCM20017
	240	3	41.5	2	F	PCS20018	—	PCM20018
	240	3	41.5	3	G	PCS20019	—	PCM20019
	480	3	83.0	1	F	PCS20020	—	PCM20020
	480	3	83.0	2	G	PCS20021	—	PCM20021
	480	3	83.0	3	G	PCS20022	—	PCM20022
150	240	3	62.2	2	H	PCS20023	—	PCM20023
	240	3	62.2	3	I	PCS20024	—	PCM20024
	240	3	62.2	4	J	PCS20025	—	PCM20025
	480	3	124.5	2	H	PCS20026	—	PCM20026
	480	3	124.5	3	I	PCS20027	—	PCM20027
	480	3	124.5	4	J	PCS20028	—	PCM20028
200	240	3	83	2	K	PCS20029	—	PCM20029
	240	3	83	3	K	PCS20030	—	PCM20030
	240	3	83	4	L	PCS20031	—	PCM20031
	240	3	83	5	L	PCS20032	—	PCM20032
	480	3	166	2	K	PCS20033	—	PCM20033
	480	3	166	3	K	PCS20034	—	PCM20034
	480	3	166	4	L	PCS20035	—	PCM20035
	480	3	166	5	L	PCS20036	—	PCM20036
300	480	3	249	4	M	PCS20037	—	PCM20037
	480	3	249	5	M	PCS20038	—	PCM20038
	480	3	249	6	N	PCS20039	—	PCM20039
	480	3	249	7	N	PCS20040	—	PCM20040
400	480	3	332	5	O	PCS20041	—	PCM20041
	480	3	332	6	O	PCS20042	—	PCM20042
	480	3	332	7	P	PCS20043	—	PCM20043
	480	3	332	8	P	PCS20044	—	PCM20044
	480	3	332	9	P	PCS20045	—	PCM20045

Control Panel Dimension Code Specifications

Panel Code	Inches Height	Inches Width	Inches Depth	Millimeters Height	Millimeters Width	Millimeters Depth
A	20	16	8	510	405	205
B	20	20	8	510	510	205
C	24	24	10	760	610	255
D	30	24	12	915	610	305
E	36	24	12	915	610	305
F	36	30	12	915	760	305
G	36	36	12	915	915	305
H	42	30	12	1065	760	305

Panel Code	Inches Height	Inches Width	Inches Depth	Millimeters Height	Millimeters Width	Millimeters Depth
I	42	36	12	1065	915	305
J	48	36	12	1220	915	305
K	60	36	12	1525	915	305
L	72	30	12	1830	760	305
M	72	36	12	1830	915	305
N	72	30	16	1830	760	405
O	60	36	20	1525	915	510
P	72	30	20	1830	760	510

Ordering Information

See page 13-48

Custom Control Panels

Temperature Control Panels — Custom Designed/Manufactured for any Industrial Process Applications

Typical Design Features

- *NEMA, UL, CSA or IEC enclosure*
- *Choice of temperature controller*
- *Circuit breaker, fused or no disconnect enclosure*
- *Main Power: Any up to 600 VAC three phase*
- *Heater Power: Any up to 600 VAC three phase*
- *PLC based control with touch panel display*
- *Fan, heat-tube, air conditioning or other cooling*
- *Anti-condensation heating*
- *Outer sensor or power input connections at labeled terminal strips*
- *Higher Short Circuit Current Rating (SCCR) 5KA standard*

Tempco's made-to-order control panels are engineered to solve practically every process heating application including zoned infrared arrays for thermoforming and drying ovens.

Output power devices can be an SCR, solid state relays or mercury relays. It is recommended that for infrared arrays, only SCRs or solid state relays be used for the most stable element temperature. For halogen (tungsten) elements phase angle fired SCRs with soft start capability should be used.

All control panels are shipped factory pre-wired in accordance with the National Electrical Code, NFPA79, UL508A and any special local electrical codes required by the customer. UL508A certification available only when requested.

See page 13-47 for some of the more common custom control panel options.

Ordering Information

To request a quote see page 13-48

Custom Temperature Control Panels — Typical Options

1. Pre-wired outlets for heater power Female twist lock style panel mount connectors and male plugs can be added to the exterior of the enclosure for circuits of 480 VAC and 30 Amp and under.

2. Pre-wired panel jacks for temperature sensors Female panel mount jack connectors and plugs can be added to the exterior of the enclosure.

3. Other standard voltages such as 208, 380, 415, 575 or 600 VAC — Special single or three phase systems can be manufactured to customer requirements.

4. Current meter, single phase A current transformer and a door-mounted analog or digital meter reads the average load current.

5. Current meter, three phase A set of three current transformers, a door-mounted analog or digital meter and a four-position switch allows the customer to read the average load current on all three phases.

6. Voltage meter, single phase A door-mounted analog or digital meter reads the voltage applied to the main input of the control panel.

7. Voltage meter, three phase A door-mounted analog or digital meter and a four-position switch allows the customer to read the voltage applied to the main input on all three phases.

8. Optional controls The standard 1/16th DIN control can be replaced by 1/8 or 1/4 DIN size controls.

The options on this page can be ordered with most single or multi-zone temperature control panels.

Please specify when requesting a quote or entering an order.

9. Base—Load—Controller When used with a zero-fired SCR Power Controller, a base-load-controller can help eliminate light flicker normally associated with large zero-fired loads. High harmonics and low power factor caused by large phase-fired loads can also be improved using a base-load-controller.

10. Heater power lamp Door-mounted pilot lamp gives an indication of applied heater power.

11. Circuit breaker instead of main fused disconnect Replaces the standard fused disconnect with a circuit breaker to provide automatic overcurrent protection.

12. Individual sub-circuit circuit breakers instead of fusing Replaces the standard sub-circuit fusing with internally mounted circuit breakers.

13. Annunciation, audible horn Provides for an audible horn to sound based on the temperature control's alarm condition. An acknowledge pushbutton switch is included. The horn would be mounted on the exterior of the enclosure.

14. Annunciation, flashing beacon Provides for a flashing light to turn on based on the temperature control's alarm condition. An acknowledge pushbutton switch is included. The beacon would be mounted on the exterior of the enclosure.

15. Enclosure heater for outdoor use A silicone rubber heater with thermostat or ceramic bulb enclosure heater to prevent freeze and condensation protection is mounted inside the enclosure. It would be properly sized for the enclosure used.

16. Mechanical cooling For control systems that are used in hot environments or require complete enclosure sealing, active or passive cooling can be incorporated into the control panel. This includes cooling fans, air conditioners or vortex cooling.

17. Integral liquid level controls Basic one-level liquid level controls can be incorporated into the safety contactor circuit to turn off the heater if the tank reaches a dangerously low level. Multi-level liquid level switch systems can be incorporated to provide pump or valve controls to maintain required levels.

18. Chart recorder A strip chart recorder can be mounted in the door to provide historical data records of the process being controlled.

19. Special paint The enclosure can be custom painted to provide environmental protection or a unique color.

20. Tagging internal parts Engraved phenolic tags can be added to the subpanel to identify components as depicted on the drawings provided. The tags will be attached to the subpanel near the identified part.

21. Utility outlet 120 VAC for maintenance instruments, powered externally or internally. If powered internally, limited to 2 Amps.

22. Internal lighting package A useful option for routine maintenance or troubleshooting.

23. Floor stand kit This option provides a 12" stand kit for any wall-mounted enclosure, making it a free-standing floor model.

24. Enclosure mechanical options Miscellaneous options such as a drip or solar shield can be added to the enclosure.

25. Approval drawings This option is for when the customer requires approval drawings prior to release for manufacturing. (Standard documents are normally shipped with each control panel). With this option, Tempco will provide a copy of the proposed general layout drawing and electrical schematic for customer approval. The production process would not begin until after the *approval drawings* are signed and returned to Tempco.

Please Consult Tempco if the Option You Require is Not Listed.
We Welcome Your Inquiries!

Request for Quote

Temperature Control Panel Quote Request Worksheet

1. General Information: Customer: _____ Date:_____

Contact Person: _____ Phone _____ E-mail:_____

Quote Number:_____ Quoted By:_____ Date:_____

2. Operating Environment:

Description of Application: _____

Heated Medium (liquid, solid, vapor) & Name _____ Process temperature _____

Installation Environment: indoor, wet, dry _____ NEMA rating (if required) _____

Hazardous Location Rating (if required) Class, Division, Group, Zone _____

Minimum & Maximum Ambient Temperatures _____

3. Control Panel Requirements:

Tempco Catalog Number (if applicable) _____ Quantity _____ Drawing Available _____

Any Enclosure Size Limitations _____ Wall Mounted ☐ Floor Mounted ☐

Number of Controlled Zones _____ Heater Catalog Number _____

Heater Specifications: Watts _____ Volts _____ Phase_____ Amps_____ Number of Circuits _____ Quantity _____

Output Control Device: Magnetic Contactor ☐ SCR ☐ SSR ☐ Mercury Displacement Relay ☐

Temperature Controller Model Number _____ Temperature Controller Sensor Type _____

Maximum Available Short Circuit Current at Panel _____ KA (SSCR requirement)

FM High Limit Required (K t/c standard input)_____ Agency Approval(s) Required _____

4. Other Special Features Required: _____

_____

Ordering Information

Custom Engineered/Manufactured Power Control Panels Available From Tempco.

We Welcome Your Inquiries!

1. For **Standard Process Control Panels** with the standard list of features, match your heater requirements to the control panels listed on page 13-45. Verify that the number of circuits match between the process heater and control panel and the watts and volts are sufficient.

2. If you require a **Standard Control Panel with Optional Features**, fill out a copy of the Quote Request Worksheet and fax it to Tempco. We will review your requirements and return to you a quote for a temperature control system matched to your needs.

3. If you require a **Custom Control Panel**, fill out a copy of the Quote Request Worksheet and fax it to Tempco. Include as much information as you can regarding the heater and application requirements. We will review your requirements and return to you a quote for a temperature control system matched to your needs.

Product Inventory Available for Viewing and Selection @ www.tempco.com

Temperature Control Panels — Enclosure Options

Tempco's **Control Panels** are built using NEMA 12 manufactured enclosures. Tempco can also design and manufacture panels to other standard NEMA ratings as described below.

The **Standard NEMA Enclosure Definitions** are listed for your convenience. Also included are comparison charts for indoor and outdoor enclosures.

Include the **NEMA Enclosure Rating** required on your Request for Quote.

Standard: NEMA 12 — resistant to dirt, and dripping non-corrosive liquids

OPTIONAL:

Type 1	Type 3	Type 3R	Type 4	Type 4X	Type 7
general purpose	weather and wind blown dust resistant	weather resistant	moisture and wind blown dust resistant	moisture and corrosion resistant	explosion resistant

Standard NEMA (National Electrical Manufacturers' Association) Enclosure Ratings

Type 1

Enclosures are intended for indoor use primarily to provide a degree of protection against contact with the enclosed equipment in locations where unusual service conditions do not exist.

Type 3

Enclosures are intended for outdoor use primarily to provide a degree of protection against windblown dust, rain, and sleet; and to be undamaged by the formation of ice on the enclosure.

Type 3R

Enclosures are intended for outdoor use primarily to provide a degree of protection against falling rain and sleet, and to be undamaged by the formation of ice on the enclosure.

Type 4

Enclosures are intended for indoor or outdoor use primarily to provide a degree of protection against windblown dust and rain, splashing water, and hose-directed water; and to be undamaged by the formation of ice on the enclosure.

Type 4X

Enclosures are intended for indoor or outdoor use primarily to provide a degree of protection against corrosion, windblown dust and rain, splashing water, and hose-directed water; and to be undamaged by the formation of ice on the enclosure.

Type 7

Enclosures are capable of withstanding the pressures resulting from an internal explosion of specified gas, and containing such an explosion sufficiently that an explosive gas-air mixture existing in the atmosphere surrounding the enclosure will not be ignited.

Type 12

Enclosures are intended for indoor use primarily to provide a degree of protection against dust, falling dirt, and dripping non-corrosive liquids.

Comparison of Indoor Rated Enclosures

Provides a degree of protection against the following conditions:	Type of Enclosure 1	4	4X	7	12
Incidental contact with enclosed equipment	X	X	X	X	X
Falling dirt	X	X	X	X	X
Falling liquids and light splashing		X	X	X	X
Dust, lint, and fibers		X	X	X	X
Hosedown (hose directed water)		X	X	X	
Oil and coolant seepage				X	X
Corrosive agents			X	X	
Potentially explosive gas-air mixture				X	
Windblown Dust		X	X		

Comparison of Outdoor Rated Enclosures

Provides a degree of protection against the following conditions:	Type of Enclosure 3	3R	4	4X
Incidental contact with enclosed equipment	X	X	X	X
Rain, snow and sleet	X	X	X	X
Windblown dust	X		X	X
Hosedown (hose-directed water)			X	X
Corrosive agents				X

Note: CSA and IEC class enclosures are also available.

MX Hot Runner Controls

MX™ HOT RUNNER

Injection Molding Temperature Control Systems

Improve your injection molding output...switch to Tempco's *MX Hot Runner Temperature Control System*

The MX System includes:

- Mainframes
- 2 types of Temperature Control Modules
- Cables—Heater Power and Thermocouple
- Wiring Junction Boxes
- Input Connectors
- Floor Stands
- Accessories

Temperature Control Modules

Tempco's IMP Series Module provides one of the most technically advanced temperature controls available today. IMP modules use state-of-the-art microprocessor-based circuitry to perform all required PID functions. Units have built-in diagnostics and are fully self-tuning. Setpoint temperatures are maintained without the need to manually preset or adjust the control temperature. Merely set the desired temperature and turn the power on. The module will automatically sense the heat-up rate and control any setpoint temperature deviation.

Design Features

- *PID Control*
- *CompuStep® Soft Start*
- *CompuCycle®*
- *Manual Control*

Catalog Number: **TKA20001**

Specifications

Temperature Range: Ambient to 999°F (535°C)
Sensor Input: Type J thermocouple
Control Accuracy: ±1.0°F (±0.5°C), dependent on total thermal system
Calibration Accuracy: Better than 0.2% of full scale
Voltage: 240 VAC standard, 120 VAC available
Power Output: 15A @ 240 or 120 VAC 50/60 Hz
Output Switch: Internal zero cross triac
Fusing: High speed fuses on both sides of line
Setpoint Control: Precision 3-digit pushbutton
Manual Power Control: Single turn potentiometer
Mode Control:
3 Positions: Top—Manual mode; Middle—Auto mode; Bottom—Auto mode with soft start

Tempco's RMB Temperature Control Module represents the state of the art in Hot Runner temperature control technology. Virtually every feature a molder could want is contained in the module. The RMB's flexible microprocessor-based programming allows the user to modify 17 parameters via the front panel. Once entered, the non-volatile memory automatically saves the parameter modifications.

Design Features

- *CompuStep®*
- *CompuCycle® Soft Start*
- *Easy Start-Up Procedure*
- *High and Low Deviation Alarms*
- *Open Thermocouple Error Programming*
- *Dual Digital Display*
- *Advanced Diagnostics*
- *Current Monitor*

Catalog Number: **TKA20005**

Specifications

Temperature Range: 32 to 999°F (0 to 535°C)
Sensor Input: Type J or K thermocouple, switch selectable
Control Accuracy: ±0.1°F (±0.1°C) dependent on total thermal system
Calibration Accuracy: Better than 0.2% of full scale
Voltage: 115 to 230 VAC, ±10%
Power Output: 15A @ 240 or 120 VAC 50/60 Hz
Output Switch: Internal zero cross triac
Fusing: High speed fuses on both sides of line
Setpoint Control: two buttons—up and down
Manual Power Control: two buttons—up and down
Mode Control:
3 LEDs: Top/Manual mode
Middle—Auto mode
Bottom—Auto mode with soft start

Product Inventory Available for Viewing and Selection @ www.tempco.com

Improve your injection molding output...switch to Tempco's *MX Hot Runner Temperature Control System*

MX T.M. HOT RUNNER

Mainframes

The configurations illustrated below provide a wide selection of zone capacities to suit almost any control application. The 5, 8 and 12 zone frames use individual frame sections. The 16 through 48 zone frames use 2, 3 or 4 frame sections rigidly fastened together into one prewired integral unit which requires only one main AC power input connection. The Current/Voltage Monitor option will be factory installed and must be ordered at the same time as the mainframe.

Optional CV-Current/Voltage Monitor

The standard mainframe can be supplied with the CV monitor in place of the standard breaker/disconnect panel; this unit will provide the operator with additional information.

- Voltage supplied from each phase
- The ability to select an individual zone to monitor current

Ordering Information

The following mainframes are set up for 15 Amp per zone IMP or RMB control modules, 240 VAC 3-phase 60 Hz power input.

Other power configurations are available; consult Tempco for more information.

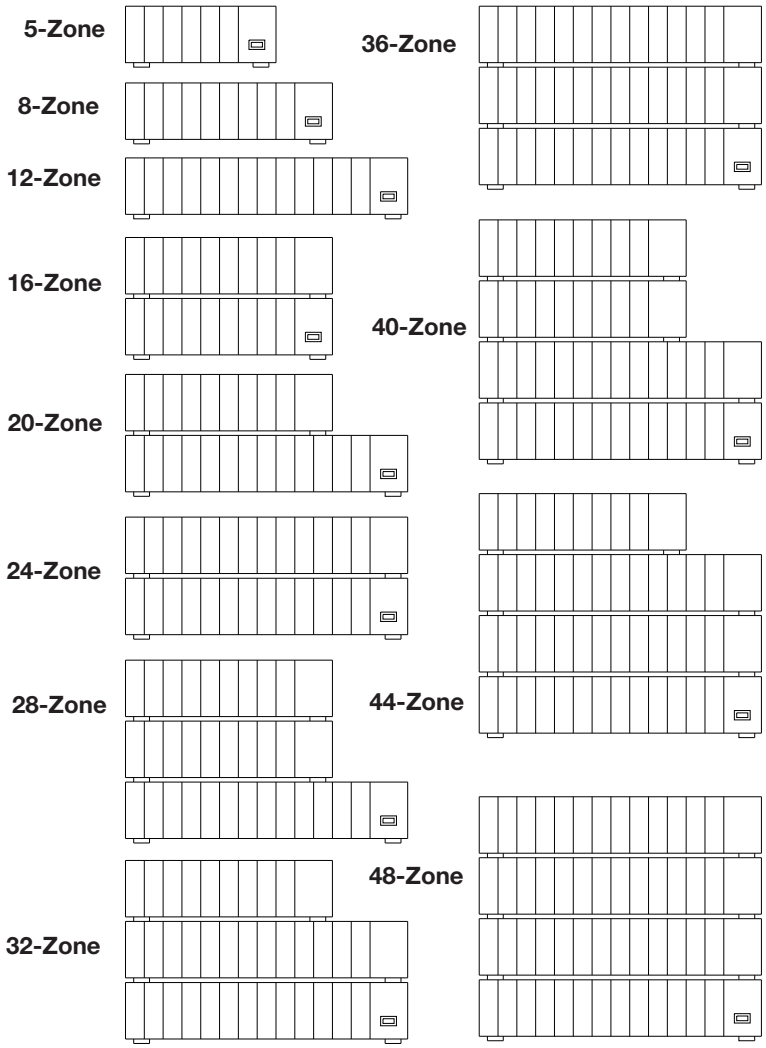
Standard lead time is 3 to 4 weeks.

Description	Standard	w/CV monitor
5-Zone	TKA21005	TKA21105
8-Zone	TKA21008	TKA21108
12-Zone	TKA21012	TKA21112
16-Zone	TKA21016	TKA21116
20-Zone	TKA21020	TKA21120
24-Zone	TKA21024	TKA21124
28-Zone	TKA21028	TKA21128
32-Zone	TKA21032	TKA21132
36-Zone	TKA21036	TKA21136
40-Zone	TKA21040	TKA21140
44-Zone	TKA21044	TKA21144
48-Zone	TKA21048	TKA21148

Note: **To order a complete *Hot Runner Control System* the following must be ordered separately:**

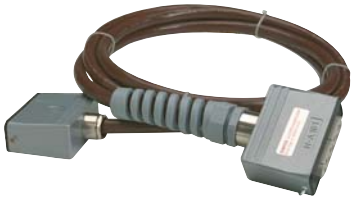
- ❒ Control Modules
- ❒ Mainframe
- ❒ Power Mold Cable
- ❒ Thermocouple Mold Cable
- ❒ Mold Wiring Junction Box (if required)

Mainframe Zone Configurations



MX HOT RUNNER Injection Mold Temperature Control Systems

Mold Cables



Power Cables

Used to connect the mainframe to the hot runner injection mold for heater power.

Number of control zones	10 ft.	20 ft.
5-Zone	TKA22105	TKA22205
8-Zone	TKA22108	TKA22208
12-Zone	TKA22112	TKA22212

Thermocouple Cables

Used to connect the mainframe to the hot runner injection mold for thermocouple signal.

Number of control zones	10 ft.	20 ft.
5-Zone	TKA23105	TKA23205
8-Zone	TKA23108	TKA23208
12-Zone	TKA23112	TKA23212

Mold Connectors

Power Connector

Used to connect the heater wiring to the power mold cable.

Mounts directly on the mold or a wiring junction box.

Part Number	
5-Zone	TKA24005
8-Zone	TKA24008
12-Zone	TKA24012

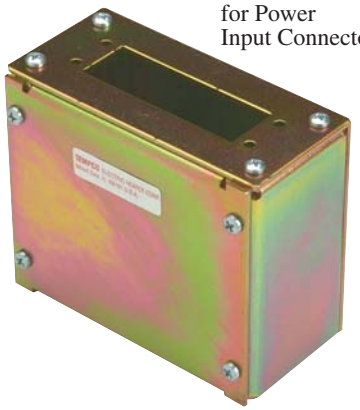
Thermocouple Connector

Used to connect the thermocouples to the thermocouple mold cable.

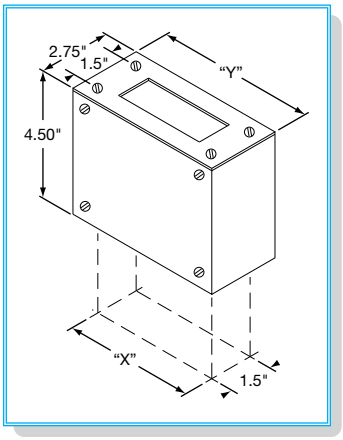
Mounts directly on the mold or a wiring junction box.

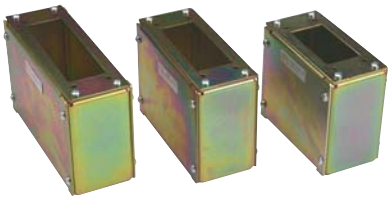
Part Number	
5-Zone	TKA24105
8-Zone	TKA24108
12-Zone	TKA24112

Mold Wiring Junction Boxes

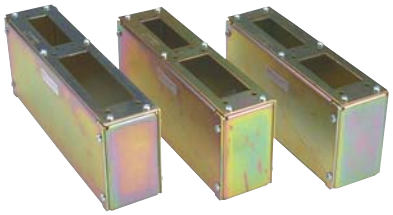


for Power Input Connectors





for Thermocouple Input Connectors



for Thermocouple and Power Input Connectors

Mold Wiring Junction Boxes are mounted directly on the injection mold. The heaters and thermocouples are wired to the connectors and are ordered separately.

Mold Wiring Junction Box for Power Input Connectors

(for 5-, 8- or 12-zone connectors)

Part Number	"X"	"Y"
TKA25001	4.250"	4.875"

Mold Wiring Junction Box for Thermocouple Input Connectors

Zones	Part Number	"X"	"Y"
5	TKA25005	4.250"	4.875"
8	TKA25008	4.990"	5.614"
12	TKA25012	6.052"	6.676"

Combination Mold Wiring Junction Box for Thermocouple and Power Input Connectors

Zones	Part Number	"X"	"Y"
5	TKA25105	8.031"	8.655"
8	TKA25108	8.843"	9.467"
12	TKA25112	9.906"	10.530"

Solid State Variable Power Controllers

Tempco's Solid State Variable Power Controllers are an excellent value for your power controlling needs. Used in an open loop, non-feedback control system, these power controllers regulate input versus output voltage for controlling any of a number of processes where a fixed applied voltage is desired. The solid state technology allows these controllers to be smaller and lighter than ever, and useful in areas where variable voltage transformers are not a viable choice.

Typical Applications

- *Heaters—Injection and Blow Molding*
- *Hot-Runner Mold Cartridge*
- *Motor Speed Control*
- *Machine Nozzle Heaters*
- *Other resistive loads*
- *Platen Heaters*

Surface Panel Mount *10 Amp Unit*

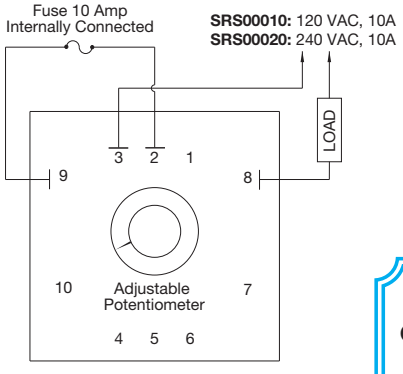
Design Features

- *2400 Watts @ 240 Volts*
- *Compact 2" Cube Size*
- *Two-Wire Termination*
- *Environmentally Protected*
- *1200 Watts @ 120 Volts*
- *One Hole Mounting*
- *High Thermal Efficiency*
- *Built-In Fuse for Protection*

Part Number: 120V **SRS00010**
240V **SRS00020**

Specifications

Input Voltage: 120V and 240V AC, single phase, 50/60 Hz
Current Rating: 10 Amps @ 75°C
Maximum Load: 120V-1200 Watts / 240V-2400 Watts
Output Voltage: 120V=0 to 118V / 240V=0 to 238V
Operating Temp. Range: -40 to 80°C
Dielectric Insulation: 1600 Volts RMS @ 80°C for 1 min.
Control Mode: Phase Angle



Recess Mount with Remote Knob *25 Amp Unit*

Design Features

- *Solid State Circuit*
- *Modified Transient Suppression*
- *Aluminum Heat Sink*
- *Knob and Dial Plate*
- *Remote Mounting Capabilities*

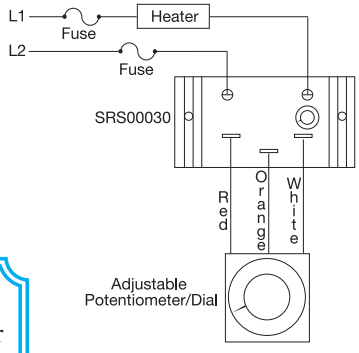
Part Number: **SRS00030**

Heatsink *(optional)*: Part number: **SRS00035**
3" x 5-1/4" x 2-3/8"H (76 x 133 x 60 mm)

Specifications

Input Voltage: 120V and 240V AC, single phase, 50/60 Hz
Current Rating: 15 Amps, 25 Amps with optional heatsink
Power Consumption: 50 Watts (maximum)
Output Voltage: Adjustable from 17 to 99% of applied voltage
Maximum Temperature: 167°F (75°C) @ base plate center
Dimensions: 3-1/2" x 2-1/2" x 2-1/8"H (89 x 63 x 54 mm)
Mounting Centers: 2-5/8" (137.5 mm)

All Items Available from Stock



Ordering Information

Choose the Part Number of the power controller that best suits the needs of your application.

Contract Manufacturing Through Tempco for Electronic OEM Control Systems

Is your company an OEM that utilizes Electronic Control Systems for the manufacturing of your products?
Are you interested in reducing your costs without compromising quality? Let Tempco help you achieve your goals!

We can provide you with Electronic Control Systems from Printed Circuit Board Assemblies to Full Blown Sub-Assemblies, including Metal Brackets, Injection Molded Parts, Wire Harnesses, and Connectors, through our overseas affiliated manufacturing partners. Taking advantage of the labor rates available globally, Tempco offers extremely competitive prices without compromising quality.

Tempco has had components manufactured internationally for years and has developed a network of qualified affiliated manufacturing partners. Let Tempco assume all of the responsibilities associated with doing business overseas, such as overcoming language barriers, controlling quality, and eliminating payment, importing and shipping problems.

OEM Advantages of working with Tempco:

- *Tempco will inventory the product locally*
- *Contracted delivery for one year or longer*
- *Just-in-Time shipping schedules*
- *Uninterrupted supply of product*

In order to develop a quote for your OEM Electronic Control System, Tempco requires a sample and any documentation you have, as described in the following section, to be submitted.

Confidentiality:

To protect your proprietary design information and product, Tempco will sign and honor a Non-Disclosure Agreement with your company.

Limited Sample of Manufacturing Capabilities

Full Range of Standard Test Equipment

Quality Control using Automated Test Equipment in a Clean Room Environment

Environmental Test Chamber for Product Burn-In

Information Required for Quote Request

In order to provide you with a quote on a contract manufacturing project, the following information should be provided to Tempco.

1. Physical Sample – Illustrates how the components of the assembly work together

2. Electronic Design Schematic – Defines how the components on the PCB are connected together

3. Bill of Material – Defines all the components used in the assembly from the parts on the PCB to brackets, switches, knobs, etc., in addition to the PCB assembly

4. Written Description of the Product Requirements and Specifications – Defines the purpose of the assembly

5. Written Description of all Functions and Background Information – Describes how the product requirements and specifications are to be accomplished

6. Wiring Diagram – Defines how the assembly fits into the rest of the system

7. Microprocessor Software Source Code – If the electronic assembly includes a microprocessor (single chip micro industrial computer) there is a software program to make it run, commonly referred to as the "source code." If the source code is not provided, engineering may be able to "lift it" from the sample for a fee. The source code is usually provided as a file on a disk.

8. Sources and Manufacturer's Part Numbers – A list for any required critical external connectors and required components such as knobs or switches to maintain continuity

9. Manufactured Mechanical Components – An engineering drawing that defines material, finish, dimensions for overall size, mounting hole locations, etc. for any required sheet metal bracket or faceplate to be manufactured

10. Artwork – Engineering artwork for any unique silkscreen printing, label or logos involved in the project (if no drawing is provided the sample may be copied)

11. Printed Circuit Board Drawing – An engineering drawing that defines material, overall size, mounting holes, etc.

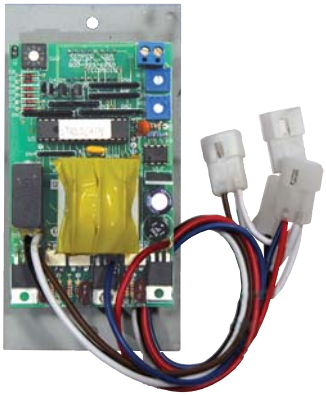
Any additional information provided to Tempco will assist us in reducing your cost and expediting the project by eliminating engineering time spent on redesigning components.

We Welcome Your Inquiries!

Product Inventory Available for Viewing and Selection @ www.tempco.com

Modular Temperature Process Control Boards

Product Examples



Organic Fuel Cooking Controller

- *Temperature Adjustment by Selector Switch*
- *Multiple Outputs for Heater Ignitor, Feed Motor and Ventilation Fan*
- *3 - Digit LED Display*
- *Input Connector for 1000 ohm RTD Temperature Sensor*
- *120 and 240 VAC Versions*

Specialized Industrial Process Controller

- *PID Temperature Control*
- *2 Motor Control Outputs*
- *4 Alarm Relay Outputs*
- *3 Sensor Inputs*
- *3 Proximity Switch Inputs*
- *3 Internal Timer Circuits*
- *Emergency Modem Connection*

Industrial Equipment Digital Controller

- *High Precision and Wide Range*
- *Wide Timer*
- *LED Display with Clock Setting*
- *Memory Back-Up and Auto Resume*

Commercial Furnace Controller

- *Membrane Switch Front Panel Overlay with LED Windows*
- *Heat/Temperature Setting*
- *Fan Speed Setting*
- *2 Printed Circuit Board Assemblies*
- *3-Part Injection Molded Housing*
- *Shipped Completely Assembled*

Environmental Test Chamber

- *Heat or Cool Setting*
- *Blower Speed Setting*
- *Digital Temperature Display*
- *Set Back/Sleep Mode*
- *Multiple Relay Outputs*

This represents a small portion of the various projects Tempco has provided to our customers. We welcome your inquiries!

Introduction to Silicon Controlled Rectifier (SCR) Power Controllers

Features and Benefits of SCRs

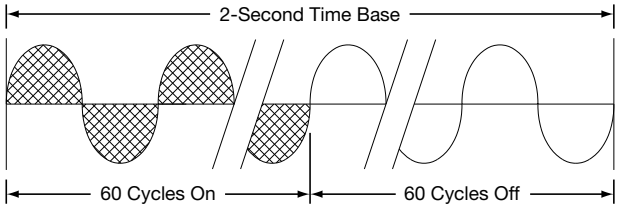
- **High reliability**
  Because the SCR power controller is a solid-state device, it provides virtually limitless, trouble-free operation with a minimum of maintenance.
- **Infinite resolution**
  Power, current or voltage can be controlled from zero to 100% with infinite resolution.
- **Extremely fast response**
  The SCR controller can toggle-load power on and off rapidly, providing the means to respond quickly to command, load and power supply changes.

The SCR

The SCR has two states, *On* and *Off,* and allows current to flow in only one direction. An SCR unit is composed of two SCRs arranged to control AC power. SCRs can remain in the off state even though the applied potential may be several thousand volts; in the on state, they can pass several thousand amperes. When a small signal is applied the SCR will turn on in 10-100 microseconds. Once turned on it will remain on until the current through it is reduced below a very low value called the holding current.

Basically, an SCR power controller consists of the following:

- Semiconductor power devices (SCRs and diodes)
- A control circuit normally referred to as the firing circuit
- A means to dissipate the generated heat
- Protective circuits (fuses and transient suppressors)

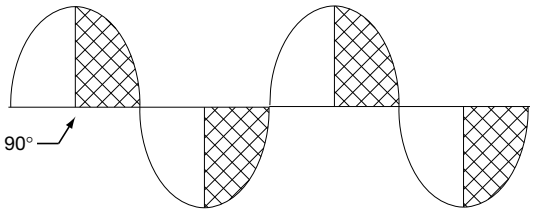


60 of 120 Cycles On = 50% Power Output

Distributive Zero-Cross Control

The term zero-cross or synchronous operation of SCRs is derived from the fact that the SCRs are turned on only when the instantaneous value of the AC sinusoidal waveform is zero. Zero-cross controllers can provide two rather distinctively different types of control: time proportioning control, and distributive control.

The Distributive Control Technique combines power pulses of short duration to obtain the exact power level proportional to the command signal or setpoint.



Phase Angle of Triggering = 90°
Power = 50%

Phase-Angle Control

In phase-angle control the SCR unit is turned on at a certain phase angle of the AC power supply that provides the correct percentage of power. Power is regulated by advancing or delaying the point at which the SCR is turned on within each half cycle. Shown is an example of this for 50% power output.

Phase-angle control provides a very fine resolution of power and is used to control fast responding loads such as tungsten-filament lamps or loads in which the resistance changes as a function of temperature. Phase-angle control is required if the load is transformer-coupled or inductive.

Phase-angle controllers are typically more expensive than zero-cross controllers because the phase-angle circuit requires more sophistication than a zero-cross circuit. Phase-angle control of three-phase power requires SCRs in all three legs and is appreciably more expensive than zero-cross control, which only requires SCR's in two of the three legs.

Optional (SCR) Features

True Power Regulation / Current Limit It uses output voltage, current, conduction angle, phase shift, and power factor to monitor and regulate the output. It will provide output power that is constant, regulated and linear to the command signal. This option includes an RMS current limit (adjustable from 35 to 125% of the unit's rating) and has a 0-5 VDC output that is proportional to the load power.

Over-Current Trip Tempco's over-current trip is peak current sensing. The circuit will shut down the SCR within a half-cycle of AC current. It includes an automatic or manual reset that allows the user to select the reset mode after an alarm. A relay output is available for alarming or shutdown. Adjustable from 100 to 300% of the unit's rating.

RMS Current Regulation / Over-Current Trip It will hold the output current constant regardless of the load resistance, based upon the command signal input. This option includes an RMS current trip adjustable from 35 to 125% of the unit's rating.

RMS Current Limit / Over-Current Trip The output current can be adjusted to automatically limit or clamp the maximum RMS current available from the SCR power control. It is settable from 35 to 125% of the unit's rating. This option includes an RMS current trip adjustable from 35 to 125% of the unit's rating.

Over-Temperature Thermostat These are bi-metal snap action thermostats that open or close when the heat sink's temperature exceeds its maximum operating temperature. Standard on all SCR power controls starting at 90 Amps. Specify NO or NC when ordering, or a NO thermostat will be included.

Load Unbalance Alarm The unbalance alarm monitors and compares the current in each of the three phases. If the current deviates more than the setpoint allows, an alarm relay is actuated.

SCR Module Failure Alarm This option monitors the voltage drop across each of the SCRs. Since most SCRs fail shorted (zero voltage drop) this is the most accurate method to detect a failed SCR module. A relay output is provided.

SCR Power Control "A" Series — Single Phase 15 through 70 Amp

Design Features

- *Electrically Isolated Heat Sink*
- *Conservative Thermal Design*
- *Voltage Squared Linearity*
- *Transient Voltage Protection*
- *Multi-Turn Zero & Span Adjustments*
- *UL, cUL, CE Compliant*

The **"A" Series SCR Power Controls** are a compact and economical power control solution for industrial applications that require high reliability and long life. The fast solid state switching provides superior performance over relays, contactors and other slower cycling controllers by reducing temperature variations associated with the longer on-off cycles of those devices. The result is a more precise control of the heating process and extended heater life.

- Fast Cycling Distributive Zero Cross or Phase Angle Firing Control Modes
- Line Voltage Compensation
- Compact Size; Diagnostic LED; Increased Heater Life

10-40 Amp

70 Amp

Specifications

Command Signals: 4-20mA; 0-5 VDC; 0-10 VDC; potentiometer

Control Mode: Distributive Zero Cross; Phase Angle Firing

Load Current: 15, 25, 40 or 70 Amps

Line Voltage: 120, 240, 480, or 575 VAC; +10% -20% 50/60 Hz

Zero and Span: Factory pre-set. User adjustable over a range of 20% of span.

Transient Voltage and dv/dt: 200 volts/microsecond minimum. Uses a dv/dt snubber and a metal oxide varistor. (MOV)

Control Range
Zero Cross: 0 to 100% of line voltage
Phase Angle Firing: 0 to 97% of line voltage

Linearity
Zero Cross: Linear with respect to the command signal
Phase Angle Firing: RMS load voltage is linear within 2% of the command signal.

Temperature
Operating: 32 to 122°F (0 to 50°C)
Storage: 14 to 198°F (-10 to 70°C)

Cooling: Convection

Mounting: Panel mount with heat sink fins vertical

Dimensions
10-40 Amp units: 4.5"H × 4.35"W × 3.1"D
70 Amp units: 10.0"H × 8.5"W × 5"D

Note: Fusing – Not included; Class T fuses are recommended

"A" Series SCR Power Controls are offered with the options listed in the worksheet below. Fill in the boxes with the appropriate number and/or letter designation for your requirements and a part number will be assigned.

Ordering Code: SRSA – [1] [2][2] [3] [4] [5] [6]

Control Mode *BOX 1*
Z: Distributive Zero Cross
P: Phase Angle Fire

Load Current *BOX 2*
xx: **15**, **25**, **40** or **70** Amps

Line Voltage *BOX 3*
1: 120 VAC
2: 240 VAC
3: 480 VAC
4: 575 VAC

Control Input *BOX 4*
A: 4 to 20 mA
B: 0 to 5 VDC
C: 0 to 10 VDC
D: Potentiometer
Note: All configurations require 24 VAC except zero cross with 4-20mA input

Options (up to two) *BOXES 5, 6*
(for zero cross or phase angle fire models)
E: Over-Temperature Thermostat – N.O. Contacts
F: Over-Temperature Thermostat – N.C. Contacts
N: None
(for phase angle fire models only)
C: RMS Current Limit
J: Over-Current Trip

COMMON CONFIGURATIONS — "A" SERIES
240 VAC; 1-phase; 4-20 mA input

	Part Number	
Load Current:	**Zero Cross**	**Phase Angle**
15 Amp	SRS01101	SRS02101
25 Amp	SRS01102	SRS02102
40 Amp	SRS01103	SRS02103
70 Amp	SRS01104	SRS02104

Standard lead time is 2 to 3 weeks.

Potentiometer Kit *(ordered separately)*: 5KΩ potentiometer and knob
Part number: **SRS99001**

Multi-Tap Transformer **Input:** 120/240V, 400V, 480V or 575V
Output: 24V
Part number: **SRS99002**

SCR Power Control "B" Series—Single Phase 60 through 1200 Amp

The **"B" Series SCR Power Controls** are a compact and economical power control solution for industrial applications that require high reliability and long life. The fast solid state switching provides superior performance over relays, contactors and other slower cycling controllers by reducing temperature variations associated with the longer on-off cycles of those devices. The result is a more precise control of the heating process and extended heater life.

Design Features

- *Conservative Thermal Design*
- *Compact Size*
- *Voltage Squared Linearity*
- *Line Voltage Protection*
- *Includes Semiconductor I^2T Fuses*
- *Diagnostic Indicators*
- *Multi-Turn Zero & Span Adjustments*
- *UL, cUL Compliant*

Specifications

Command Signals: 4-20mA; 0-5 VDC; 0-10 VDC; potentiometer

Control Mode: Distributive Zero Cross; Phase Angle Firing

Load current: Zero Cross or Phase Angle Fire Output
Amperage Ratings: 60, 90, 120, 180, 225, 350, 500, 650, 800, 1000, 1200

Line Voltage: 120, 240, 480, or 575 VAC; 10% to 20% 50/60 Hz

Zero and Span: Factory pre-set. User adjustable over a range of 20% of span.

Transient Voltage and dv/dt: 200 volts/microsecond minimum. Uses a dv/dt snubber and a metal oxide varistor (MOV).

Control Range
Zero Cross: 0 to 99.5% of line voltage
Phase Angle Firing: 0 to 97% of line voltage

Linearity
Zero Cross: Linear with respect to the command signal
Phase Angle Firing: RMS load voltage is linear within 2% of the command signal.

Temperature
Operating: 32 to 122°F (0 to 50°C)
Storage: 14 to 158°F (-10 to 70°C)

Cooling: 60 Amp convection; all others fan cooled

Mounting: Panel mount with heat sink fins vertical

Dimensions
60 through 225 Amp units: 16.25"H × 9.5"W × 9.25"D
350 through 500 Amp units: 14.75"H × 20.125"W × 8.5"D
600 Amp units: 16.75"H × 23"W × 11.5"D
800 through 1200 Amp units: 14.75"H × 20.125"W × 8.50"D

Weight
60 through 225 Amp units: 22 lbs
350 through 500 Amp units: 24 lbs
600 Amp units: 47 lbs
800 through 1200 Amp units: 71 lbs

"B" Series SCR Power Controls are offered with the options listed in the worksheet below. Fill in the boxes with the appropriate number and/or letter designation for your requirements and a part number will be assigned.

Ordering Code: SRSB – □ □□□ □ □ □ □ □

1 2 3 4 5 6 7

Control Mode *BOX 1*
Z: Distributive Zero Cross
P: Phase Angle Fire

Load Current *BOX 2*
xxxx: **60**, **90**, **120**, **180**, **225**, **350**, **500**, **650**, **800**, **1000**, **1200** Amps

Line Voltage *BOX 3*
1: 120 VAC
2: 240 VAC
3: 480 VAC
4: 575 VAC

Control Input *BOX 4*
A: 4 to 20 mA
B: 0 to 5 VDC
C: 0 to 10 VDC
D: Potentiometer

Options (up to three) *BOXES 5, 6, 7*
(for zero cross models only)
E: Over Temperature Thermostat – Normally Open
F: Over Temperature Thermostat – Normally Closed
(for phase angle fire models only)
A: True Power Regulation / Current Limit
B: Over-Current Trip
C: RMS Current Regulation / Over-Current Trip
D: RMS Current Limit / Over-Current Trip
E: Over Temperature Thermostat – N.O. Contacts
F: Over Temperature Thermostat – N.C. Contacts
N: None

Note: Over-Temperature Thermostat is standard on 90 Amp controls and over — Specify N.O or N.C. when ordering

COMMON CONFIGURATIONS — "B" SERIES
240 VAC; 1 phase; 4-20 mA control input; Includes Over Temperature Thermostat – N.O. for controls 90 Amp and over.

Load Current:	Part Number Zero Cross	Phase Angle
60 Amp	SRS03101	SRS04101
90 Amp	SRS03102	SRS04102
120 Amp	SRS03103	SRS04103
180 Amp	SRS03104	SRS04104
225 Amp	SRS03105	SRS04105
350 Amp	SRS03106	SRS04106

Standard lead time is 3 to 4 weeks.

Potentiometer Kit *(ordered separately)*: 5KΩ potentiometer and knob – Part Number: **SRS99001**

Product Inventory Available for Viewing and Selection @ www.tempco.com

SCR Power Control "C" Series — Three Phase 15 through 70 Amp (2-Leg – Zero Cross)

Design Features

- *Electrically Isolated Heat Sink*
- *Conservative Thermal Design*
- *Voltage Squared Linearity*
- *Transient Voltage Protection*
- *Multi-Turn Zero & Span Adjustments*
- *UL, cUL, CE Compliant*
- *Ideal for: Electric Ovens, Furnaces and Kilns, Environmental Chambers and Extruders*

The **"C" Series SCR Power Controls** are two-leg zero cross SCR power controllers that linearly control, proportional to the command signal, the power applied to a 3-phase electrical load.

The controller consists of a master and slave assembly. Each assembly consists of a heat sink and an SCR module. The master assembly contains the control circuit card which controls the on-off cycles for both assemblies.

Specifications

Command Signals: 4-20mA; 0-5 VDC; 0-10 VDC; potentiometer

Control Mode: Distributive Zero Cross

Load Current: 15, 25, 40 or 70 Amps

Line Voltage: 208, 240, 277, 480 or 575 VAC; 10% to 20% 50/60 Hz

Zero and Span: Factory pre-set. User adjustable over a range of 20% of span.

Transient Voltage and dv/dt: 500 volts/microsecond minimum. Uses a dv/dt snubber and a metal oxide varistor (MOV).

Control Range: 0 to 100% of line voltage

Linearity: Average load voltage is linear within 1% of the command signal.

Temperature
Operating: 32 to 122°F (0 to 50°C)
Storage: 14 to 158°F (-10 to 70°C)

Cooling: Convection

Mounting: Panel mount with heat sink fins vertical

Dimensions
10 to 40 Amp units: each assembly 9.215"H × 6"W × 3.1"D
70 Amp units: each assembly 17.25"H × 10" W × 5" D

Note: Fusing – Not included; Class T fuses are recommended

"C" Series SCR Power Controls are offered with the options listed in the worksheet below. Fill in the boxes with the appropriate number and/or letter designation for your requirements and a part number will be assigned.

Ordering Code: SRTC – [1] [2][2] [3] [4] [5]

Control Input *BOX 1*
A: 4 to 20 mA
B: 0 to 5 VDC
C: 0 to 10 VDC
D: Potentiometer
Note: B, C or D require 24 VAC

Load Current *BOX 2*
xx: **15**, **25**, **40** or **70** Amps

Line Voltage *BOX 3*
1: 120 VAC
2: 240 VAC
3: 480 VAC
4: 575 VAC

Options (up to two) *BOXES 4, 5*
E: Over Temperature Thermostat – N.O. Contacts
F: Over Temperature Thermostat – N.C. Contacts
G: Load Unbalance Alarm
H: SCR Failure Alarm
N: None

COMMON CONFIGURATIONS — "C" SERIES
240 VAC; 3-phase; 2-leg; Zero cross firing; 4-20 mA input

Load Current:	Part Number
15 Amp	SRT01101
25 Amp	SRT01102
40 Amp	SRT01103
70 Amp	SRT01104

Standard lead time is 2 to 3 weeks.

Potentiometer Kit *(ordered separately)*: 5KΩ potentiometer and knob
Part number: **SRS99001**

Multi-Tap Transformer **Input:** 120/240V, 400V, 480V or 575V
Output: 24V
Part number: **SRS99002**

SCR Power Control "D" Series — Three-Phase 60 through 1200 Amp (2-leg – Zero Cross)

The **"D" Series SCR Power Controls** are two-leg zero cross SCR power controls that linearly control, proportional to the command signal, the power applied to a 3-phase electrical load.

The Series "D" controller features a compact design, a single plug-in circuit card for ease of operation and an electrically isolated heat sink. All three leads are fused.

Design Features

- *Hinged Cover for Easy Access to Components*
- *Back to Back SCRs*
- *Includes 3 Semiconductor I^2T fuses*
- *Line Voltage Compensation*
- *Diagnostic Indicators (Control Power, Command Signal, Blown Fuse)*
- *Fan Cooled on 90 Amp and higher units*
- *Transient Voltage Protection*
- *Voltage Squared Linearity*
- *Electrically Isolated Heat Sink*
- *Multi-Turn Zero & Span Adjustments*
- *UL, cUL, CE Compliant*

Specifications

Command Signals: 4-20 mA; 0-5 VDC; 0-10 VDC; potentiometer

Control Mode: Distributive Zero Cross

Load Current per Leg: 60, 90, 120, 180, 225, 350, 500, 650, 800, 1000, 1200 Amps

Line Voltage: 208, 240, 480 or 575 VAC; 10% to 20% 50/60 Hz

Zero and Span: Factory pre-set. User adjustable over a range of 20% of span.

Transient Voltage and dv/dt: 200 volts/microsecond minimum. Uses a dv/dt snubber and a metal oxide varistor (MOV).

Control Range: 0 to 99.5% of line voltage

Linearity: Average load voltage is linear within 2% of the command signal.

Temperature
Operating: 32 to 122°F (0 to 50°C)
Storage: 14 to 158°F (-10 to 70°C)

Cooling: 60A convection; all others fan cooled

Mounting: Panel mount with heat sink fins vertical

Dimensions
60 through 225 Amp units: 12.5"H × 16.25"W × 9.25"D
350 through 500 Amp units: 19.0"H × 20.125"W × 8.5"D
650 Amp units: 24"H × 23"W × 11.25"D
800 through 1200 Amp units: 27.0"H × 29"W × 11.75"D

Weights
60 through 225 Amp units: 31 lbs.
350 through 500 Amp units: 41 lbs.
650 Amp units: 87 lbs.
800 through 1200 Amp units: 180 lbs.

Ordering Code: SRTD – □ □–□□ □ □ □

(1) (2) (3) (4) (5)

"D" Series SCR Power Controls are offered with the options listed in the worksheet at right. Fill in the boxes with the appropriate number and/or letter designation for your requirements and a part number will be assigned.

COMMON CONFIGURATIONS — "D" SERIES
240 VAC; 3-phase; 2-leg; zero cross firing; 4-20 mA control input; Includes Over-Temperature Thermostat – N.O. for controls 90 Amp and over

Load Current:	Part Number
60 Amp	SRT02101
90 Amp	SRT02102
120 Amp	SRT02103
180 Amp	SRT02104
225 Amp	SRT02105
350 Amp	SRT02106

Standard lead time is 3 to 4 weeks.

Control Input *BOX 1*
A: 4-20 mA
B: 0-5 VDC
C: 0-10 VDC
D: Potentiometer

Line Voltage *BOX 3*
8: 208 VAC
2: 240 VAC
3: 480 VAC
4: 575 VAC

Load Current *BOX 2*
xxxx: **60, 90, 120, 180, 225, 350, 500, 650, 800, 1000, 1200** Amps

Note: Over-temperature thermostat is standard on 90 Amp controls and over — Specify N.O or N.C. when ordering

Options (up to two) *BOX 4, 5*
E: Over-Temperature Thermostat – N.O. Contacts
F: Over-Temperature Thermostat – N.C. Contacts
G: Load Unbalance Alarm
H: SCR Failure Alarm
N: None

Potentiometer Kit *(ordered separately)*:
5KΩ potentiometer and knob
Part number: **SRS99001**

Product Inventory Available for Viewing and Selection @ www.tempco.com

SCR Power Control "E" Series — Three-Phase 60 through 1200 Amp (3-leg – Phase Angle Fire)

The **"E" Series SCR Power Controls** are three-phase, six SCR, phase angle power controls. 5 LEDs monitor line, command signal, 3-line current. They are ideal for electric ovens, furnaces and kilns, silicone carbide, transformer coupled loads.

Design Features

- *Hinged Cover for Easy Access to Components*
- *Back to Back SCRs*
- *Includes 3 Semiconductor I^2T Fuses*
- *Line Voltage Compensation*
- *Diagnostic Indicators (Control Power, Command Signal, Blown Fuse)*
- *Fan Cooled on 90 Amp and Higher Units*
- *Transient Voltage Protection*
- *Voltage Squared Linearity*
- *Electrically Isolated Heat Sink*
- *Multi-Turn Zero & Span Adjustments*
- *UL, cUL, CE Compliant*

Specifications

Command Signals: 4-20 mA; 0-5 VDC; 0-10 VDC; potentiometer

Control Mode: 3-Leg – Phase Angle Fire

Load Current: 60, 90, 120, 180, 225, 350, 500, 650, 800, 1000, 1200 Amps

Line Voltage: 120, 208, 240, 380, 415, 480 or 575 VAC; 10 to 20% 50/60 Hz

Zero and Span: Factory pre-set. User adjustable over a range of 25% of span.

Transient Voltage and dv/dt: 200 volts/microsecond minimum. Uses a dv/dt snubber and a metal oxide varistor (MOV).

Control Range: 0 to 98% of line voltage

Linearity: Average load voltage is linear within 2% of the command signal.

Options Available: See Ordering Box

Temperature
Operating: 32 to 122°F (0 to 50°C)
Storage: 14 to 158°F (-9 to 70°C)

Cooling: 60A convection; All others fan cooled

Mounting: Panel mount with heat sink fins vertical, or any position if fan cooled

Dimensions
60 through 225 Amp units: 16.25"H × 17.50"W × 9.25"D
350 through 500 Amp units: 19.0"H × 31.0"W × 8.5"D
650 Amp units: 24"H × 34.75"W × 11.25"D
800 through 1200 Amp units: 27.0"H × 38.75"W × 11.75"D

Weights
60 through 225 Amp units: 40 lbs.
350 through 500 Amp units: 60 lbs.
650 Amp units: 126 lbs.
800 through 1200 Amp units: 231 lbs.

Ordering Code: SRTE – [1] [2][2][2] [3] [4] [5] [6]

Series "E" SCR Power Controls are offered with the options listed in the worksheet at right. Fill in the boxes with the appropriate number and/or letter designation for your requirements and a part number will be assigned.

COMMON CONFIGURATIONS — "E" SERIES
240 VAC; 3-phase; Phase Angle Firing; 4-20 mA control input; Includes Over-Temperature Thermostat – N.O. for controls 90 Amp and over.

Load Current:	Part Number
60 Amp	SRT03101
90 Amp	SRT03102
120 Amp	SRT03103
180 Amp	SRT03104
225 Amp	SRT03105
350 Amp	SRT03106

Standard lead time is 3 to 4 weeks.

Control Input *BOX 1*
A: 4-20 mA
B: 0-5 VDC
C: 0-10 VDC
D: Potentiometer

Load Current *BOX 2*
xxxx: **60**, **90**, **120**, **180**, **225**, **350**, **500**, **650**, **800**,**1000**, **1200** Amps

Line Voltage *BOX 3*
1: 120 VAC
8: 208 VAC
2: 240 VAC
3: 480 VAC
4: 575 VAC
5: 415 VAC

Note: Over-temperature thermostat is standard on 90 Amp controls and over — Specify N.O or N.C. when ordering

Options (up to three) *BOXES 4, 5, 6*
A: True Power Regulation/Current Limit
B: Over-Current Trip
C: RMS Current Regulation/Over-Current Trip
D: RMS Current Limit/Over-Current Trip
E: Over-Temperature Thermostat – N.O. Contacts
F: Over-Temperature Thermostat – N.C. Contacts
G: Load Unbalance Alarm
H: SCR Failure Alarm
N: None

Potentiometer Kit *(ordered separately)*:
5KΩ potentiometer and knob
Part number: **SRS99001**

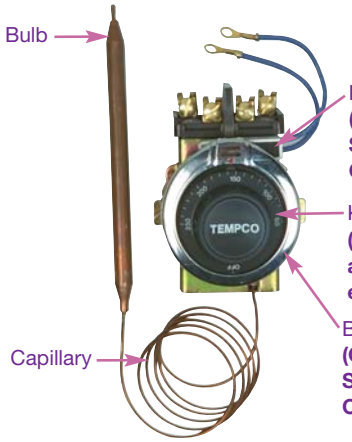
Thermostat Styles and Selection

Construction Characteristics

This type of control operates by expansion and contraction of a liquid in response to temperature change. Liquid contained within the sensing bulb and capillary flexes a diaphragm, causing the opening and closing of a snap-action switch. For heating applications the contacts are normally closed and open on temperature rise. See Page 16-11 for typical wiring diagrams.

Style A
Single-Pole Thermostat

- *General purpose thermostat recommended for most applications.*
- *Capable of controlling loads from 120V/22A up to 480V/20A*



Style B
Double-Pole Thermostat

- *Recommended for directly controlling high wattage loads due to its heavy duty contacts.*
- *Capable of controlling loads up to 30 Amps at 277 VAC*

Style C
Double-Pole Thermostat

- *Secondary high limit circuit with manual reset*
- *High limit tracks 25°F above setpoint temperature*
- *High limit latches open until manual reset is pushed in the event that temperature goes up to 25°F above setpoint*
- *Capable of controlling loads up to 30 Amps at 277 VAC*

Style D
Single-Pole Thermostat

- *General purpose thermostat recommended for most applications*
- *Capable of controlling loads up to 25 Amps at 240 VAC*

All Items Available from Stock

Thermostat Electrical Ratings: Normally Closed, Open on Temperature Rise – Adjustable

Control Type	Style	Temp Range °F	Ampacity at Line Voltage 120V	240V	277V	480V	Bulb Dia. in.	Bulb Length in.	Capillary Length in.	Terminal/ Leads in.	Thermostat Part Number	Optional Thermostat Parts Knob	Bezel	Pilot Lamp
SPST	A	60–250	30	30	30	20	.265	6.0	12	screw	TST-101-112	TST-104-106	n/a	n/a
		150–560	30	30	30	20	.326	3.7	12	screw	TST-101-113	TST-104-109	n/a	n/a
DPST	B	30–110	30	30	30	10	.375	6.312	36	screw	TST-110-101	TST-104-110	TST-111-101	EHD-109-103
		60–250	30	30	30	10	.380	3.88	60	screw	TST-110-102	TST-104-103	TST-111-101	EHD-109-103
		100–550	30	30	30	10	.380	3.88	48	screw	TST-110-103	TST-104-104	TST-111-101	EHD-109-103
DPST	C	60–250	30	30	30	—	.375	4.5	72	screw	TST-110-113	TST-104-103	TST-111-102	EHD-109-103
SPDT	D	60-250	25	25	22	—	.265	4.1	12	screw	TST-101-116	TST-104-114	n/a	n/a
SPST	D	60-250	25	25	—	—	.280	3.0	12	6" leads	TST-101-101	TST-104-101	n/a	n/a
		60-250	25	25	—	—	.260	3.35	70	¼" quick disconnect	TST-101-111	TST-104-101	n/a	n/a
		60-180	22	22	18	—	.280	4.2	6	6" leads	TST-101-105	screw adj.	n/a	n/a
		55-115	25	25	—	—	.260	3.7	42	6" leads	TST-101-118	TST-104-102	n/a	n/a
		47–107	25	25	25	—	.322	2.85	8	6" leads	TST-101-106	TST-104-102	n/a	n/a
		40-107	25	25	—	—	.265	5.88	6	6" leads	TST-101-119	TST-104-102	n/a	n/a
		20–120	25	25	—	—	.260	4.15	24	6" leads	TST-101-109	TST-104-105	n/a	n/a

Notes:
1. Knobs, Bezels and Pilot Lamps are optional and must be ordered separately from the thermostat. For part numbers refer to Optional Thermostat Parts in the chart above.
2. Knob **TST-104-105** is a plain pointer knob, not calibrated for the range.
3. Knob **TST-104-102** is printed with 4 through 10, not calibrated for the range.
4. For Thermostat Enclosures refer to the following page

Product Inventory Available for Viewing and Selection @ www.tempco.com

Stock Thermostat Accessories

Thermostat Kits

Double-Pole Thermostat Kits include the following components:

Kit Number TSTR-1008 with Style B Thermostat	
TST-110-103	Thermostat with 100 to 550°F Range
TST-104-104	Knob
EHD-109-103	Pilot lamp
TST-111-101	Bezel
—	Mounting Hardware

Kit Number TSTR-1009 with Style B Thermostat	
TST-110-102	Thermostat with 60 to 250°F Range
TST-104-103	Knob
EHD-109-103	Pilot lamp
TST-111-101	Bezel
—	Mounting Hardware

Thermostat Enclosures

NEMA 1 Enclosure
For Single-Pole Thermostats
Size: 4-1/4"H × 3"W × 2"D with 1/2" trade size knockout
Part Number: **HSGR-1003**

NEMA 1 Enclosure
For Double-Pole Thermostats
Size: 5-3/4"H × 3"W × 2"D with 1/2" trade size knockout
Part Number: **HSGR-1004**

Stuffing Box Assembly

The Stuffing Box Assembly is used to seal the thermostat capillary when the sensing bulb is immersed directly in a liquid rather than in a thermowell. The Stuffing Box consists of six slotted washers used to compress a graphite packing into a 3/8" NPT male pipe thread fitting.

Assembly Instructions
Feed sensing bulb through hole in upper and lower fitting. Insert washers and packing into top cavity of lower fitting. Upper fitting then screws into lower fitting, creating the seal.

Part Number: TST-109-101

Thermostat Installation Warnings & Recommendations

CAUTION

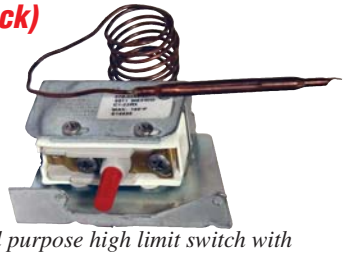
1. ***Do not use the thermostat as a power switch. Use some other means of disconnecting power to the heater for servicing.***
2. ***Thermostats are not a fail-safe device. Use an approved high temperature limit control and/or pressure limit control for safe operation.***
3. ***Avoid kinking or bending the capillary tube too sharply as this will alter the calibration and/or render the thermostat inoperable.***
4. ***Excess capillary tube should be coiled neatly in junction box.***
5. ***The capillary tube must never touch the thermostat contacts as this will create an electrical short capable of harming personnel and/or equipment.***

For wiring Examples See Section 16 – Engineering

Style F Temperature High Limit Switch with Manual Reset (Stock)

Style F High Limits – Manual Reset, Normally Closed, Open on Temperature Rise, Fixed Temperature

Control Type	Style	Temp Range °F	Ampacity at Line V 120V	240V	277V	480V	Bulb Dia. in.	Bulb Length in.	Capillary Length in.	Terminal Leads in.	Thermostat Part Number
SPST	F	118 ±3	30	30	20	20	0.23	3	8	screw	TST-103-102
SPST	F	200 ±5	30	30	20	20	0.25	4	12	screw	TST-103-104
SPST	F	165 ±15	30	30	20	20	0.20	2.75	30	screw	TST-103-107
SPST	F	125 ±2	30	30	20	20	0.25	3.37	36	screw	TST-103-108
SPST	F	118 ±4	30	30	20	20	0.26	3.5	6	screw	TST-103-109



- *General purpose high limit switch with manual reset*
- *Once fixed trip point is reached, the high limit switch will remain open until the manual reset button is pushed*

Thermowells *(Stainless Steel or Plain Steel)*

Thermowells provide protection for bulb and capillary sensors.

They are supplied with a 1/2" NPT male thread for mounting and a 3/8" NPT internal thread that can be used with the stuffing box assembly to secure the capillary to the well.

ID: 0.50", OD: 0.56"

Immersed Length in	Immersed Length mm	Part Number Steel	Part Number Stainless Steel
12	305	*MPT-120-101	*MPT-121-101
18	457	MPT-120-102	MPT-121-102
24	610	MPT-120-103	MPT-121-103
36	914	MPT-120-104	MPT-121-104

An * indicates a stock item.

See pages 14-76 through 14-83 for other thermowell styles.

Surface Mount Thermostats

Conduction Type Thermostats B2 Series — Surface Mounted

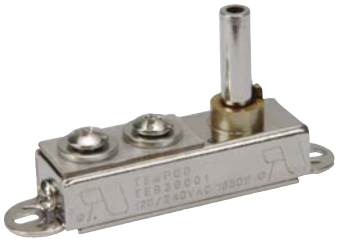
Tempco Conduction Thermostats do not use a bonded bimetal strip. The contacts are opened and closed by the expansion and contraction of the base plate in conjunction with the thermal strip. Single pole, single throw contacts open with temperature rise, providing minimum overshoot, smaller cycling differential and faster response to heat load.

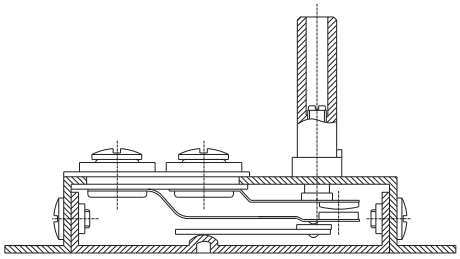
Installation Note: The heat-sensitive base plate of the thermostat must be mounted in full contact with the heated surface. This surface should be flat and smooth, and screws should be used for mounting.

Agency Approvals: c UL us File Number E224645

Typical Applications

- *Flat Irons*
- *Ironers*
- *Deep Fryers*
- *Roasters*
- *Solder Pots*
- *Vulcanizers*
- *Sealing Machines*
- *Sealing Irons*
- *Ovens*
- *Hot Plates*
- *Industrial and Laboratory Applications*





Specifications

Voltage: 120 VAC @ 13.75A / 240 VAC @ 6.87A
Wattage: 1650
Temperature Tolerance: ±5°F /2.7°C
Operation Range: 50 to 570°F (10 to 300°C)
Wiring: Tapped for #6-32 screws (included)
Endurance: 100,000 cycles

Contact Tempco for your OEM requirements such as special range calibrations or shaft lengths.

Screwdriver Adjustment (optional preset calibration)

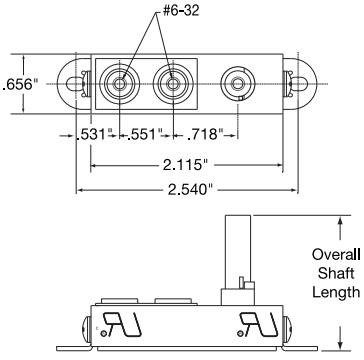
Available with factory preset temperature calibration. This feature is optional—if required, specify temperature setting from 72°F (22°C) to 570°F (300°C).

The screw-adjust thermostat is offered in three temperature ranges:

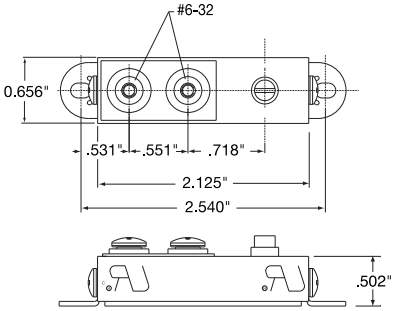
Part Number	Range		Pre-Set Tolerance
TEB32000	50 to 249°F	10 to 121°C	±10°F / 6°C
TEB33000	250 to 399°F	121 to 204°C	±15°F / 8°C
TEB34000	400 to 570°F	204 to 300°C	±20°F / 11°C

Standard Models with Shaft

Designed for installation with the base plate in full contact with heated surface. Pre-drilled holes facilitate mounting.



All Items Available from Stock



Temperature Range °F	Temperature Range °C	Amp Rating @ 120 VAC	Amp Rating @ 240 VAC	Temperature Adjustment Type	Overall Shaft Length	Part Number
50 to 525	10 to 274	13.75	6.87	Shaft	1.5"	TEB30001
50 to 425	10 to 218	13.75	6.87	Shaft	1.5"	TEB30002
50 to 525	10 to 274	13.75	6.87	Shaft	2.5"	TEB30003
50 to 249	10 to 121	13.75	6.87	Screw	—	TEB32000
250 to 399	121 to 204	13.75	6.87	Screw	—	TEB33000
400 to 570	204 to 300	13.75	6.87	Screw	—	TEB34000

Ordering Information

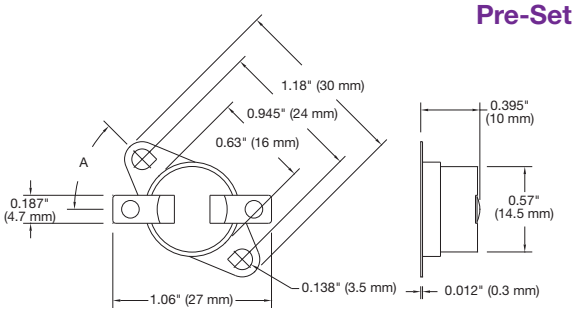
Choose the ***Part Number*** of the conduction thermostat that is correct for your application.

For pre-set TEB32XXX thermostats consult Tempco with your desired setpoint for a Part Number.

Product Inventory Available for Viewing and Selection @ www.tempco.com

Surface Mount 1/2" Disc Thermostats

Pre-Set Snap Action Thermostats



Typical Applications

- *Vacuum Cleaners*
- *Food Service Equipment*
- *Fireplaces*
- *Hot Plates*
- *Laboratory Applications*

Construction Characteristics

This line of highly reliable switches utilizes a temperature sensitive disc, electrically isolated from the switch. Contacts will open when surface or ambient temperatures increase to the snap point of the calibrated bimetal disc. The entire switch is enclosed in a phenolic dust-free housing. The bimetal disc is retained by a metal heat-conducting end cap.

The CA/OA thermostats are used in a variety of applications. They are produced in an ISO 9000 certified factory to insure safe and reliable operation. All models are 100% factory inspected for temperature, continuity and function.

All Items Available from Stock

Specifications

Electrical Ratings Type S: 125 VAC, 15 Amps, Resistive
250 VAC, 10 Amps, Resistive
100,000 Cycles

Inductive Load Ratings: 120 VAC, 5.8FLA, 34.8LRA
240 VAC, 2.9FLA, 17.4LRA
6,000 Cycles

Operating Temp. Range: 50 to 300°F (10 to 149°C)

Differential: 15 to 100°F (8 to 56°C)

Environmental Temp.: 32 to 350°F (0 to 177°C)

Insulation Resistance: 100M ohms or more (500 VDC megger)

Circuit Resistance: 50m ohms or less (initial value)

Dielectric Strength: 1,500 VAC / 1 minute

Approvals: UL, cUL, CSA, VDE, Demko

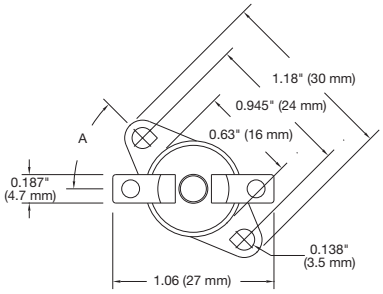
Standard Stock Surface Mount Disc Thermostat Temperature Ratings

Open °F	Close °F	Open °C	Close °C	Mounting	Terminals	Dim A	TEMPCO Part Number
50 ±5	32 ±10	10.0 ±2.8	0 ±5.6	Surface Mount	Solder Tab	45°	TST-112-105
60 ±5	40 ±7	15.6 ±2.8	4.4 ±3.9	Surface Mount	Solder Tab	45°	TST-112-106
80 ±5	50 ±9	26.7 ±2.8	10.0 ±5.0	Surface Mount	Vertical, 0.250 quick connect	90°	TST-112-107
120 ±5	90 ±10	48.9 ±2.8	32.2 ±5.6	Surface Mount	Solder Tab	45°	TST-112-108
130 ±5	100 ±10	54.4 ±2.8	37.8 ±5.6	Surface Mount	Solder Tab	45°	TST-112-109
140 ±5	110 ±10	60.0 ±2.8	43.4 ±5.6	Surface Mount	Solder Tab	45°	TST-112-101
150 ±5	120 ±10	65.6 ±2.8	48.9 ±5.6	Surface Mount	Solder Tab	45°	TST-112-110
160 ±5	130 ±10	71.1 ±2.8	54.4 ±5.6	Surface Mount	Solder Tab	45°	TST-112-111
175 ±5	145 ±10	79.4 ±2.8	62.8 ±5.6	Surface Mount	Vertical, 0.250 quick connect	45°	TST-112-112
180 ±5	150 ±10	82.2 ±2.8	65.6 ±5.6	Surface Mount	Solder Tab	45°	TST-112-113
190 ±5	160 ±10	87.8 ±2.8	71.1 ±5.6	Surface Mount	Solder Tab	45°	TST-112-114
200 ±5	170 ±10	93.3 ±2.8	76.7 ±5.6	Surface Mount	Solder Tab	45°	TST-112-115
210 ±5	180 ±10	98.9 ±2.8	82.2 ±5.6	Surface Mount	Horizontal, 0.187 quick connect	45°	TST-112-116
230 ±7	200 ±10	110.0 ±3.9	93.3 ±5.6	Surface Mount	Vertical, 0.250 quick connect	90°	TST-112-117
250 ±7	220 ±10	121.1 ±3.9	104.4 ±5.6	Surface Mount	Solder Tab	45°	TST-112-118
300 ±7	220 ±14	148.9 ±3.9	104.4 ±7.8	Rotating Bracket	Vertical, 0.250 quick connect	N/A	TST-112-119

High Limit Surface Mount Disc Thermostats with Manual Reset

Construction Characteristics

This line of highly reliable switches utilizes a snap-action bimetal disc, electrically and thermally isolated from the switch. The contacts are normally closed and open on rise when surface or ambient temperature setpoint is reached. The circuit will remain open until the manual reset button is depressed at approximately 30% below its operating temperature. All models are 100% temperature tested and can be calibrated to your specification at the factory. Many popular settings are available from stock.



CONTINUED

High Limit Surface Mount Disc Thermostats with Manual Reset (continued)

Specifications

Electrical Ratings Type U: 125 VAC, 15 Amps, Resistive
250 VAC, 10 Amps, Resistive
6,000 Cycles

Inductive Load Ratings: 120 VAC, 5.8FLA, 34.8LRA, 12 Amps
250 VAC, 2.9FLA, 17.4LRA
6,000 Cycles

Operating Temp. Range: 50 to 320°F (10 to 160°C)

Differential: 15 to 100°F (8 to 56°C)

Environmental Temp.: 32 to 350°F (0 to 177°C)

Insulation Resistance: 100M ohms or more (500 VDC megger)

Circuit Resistance: 50m ohms or less (initial value)

Dielectric Strength: 1,500 VAC / 1 minute

Approvals: UL, cUL, CSA

Typical Applications

- *Vacuum Cleaners*
- *Food Service Equipment*
- *Fireplaces*
- *Hot Plates*
- *Laboratory Applications*

Ordering Information

Choose the ***Part Number*** of the 1/2" Thermostat from the tables on pages 13-65 and 13-66 that match the needs for your application.

We also offer other styles of 1/2" Thermostats with alternate setpoints. Consult Tempco for availability.

Standard lead time is stock to 3 weeks.

Standard Stock High Limit Manual Reset Thermostats

Open °F	Open °C	Mounting	Terminals	Dim A	TEMPCO Part Number
150 ±10	65.6 ±5.6	Rotating Bracket	Vertical, 0.250 quick disconnect	N/A	TST-115-101
160 ±10	71.1 ±5.6	Surface Mount	Solder tabs	45°	TST-115-102
194 ±10	90.0 ±5.6	Surface Mount	Solder tabs	90°	TST-115-103
212 ±10	100.0 ±5.6	Rotating Bracket	Horizontal, 0.250 quick disconnect	N/A	TST-115-104
250 ±10	121.1 ±5.6	Surface Mount	Solder tabs	45°	TST-115-105
302 ±10	150.0 ±5.6	Surface Mount	Vertical, 0.250 quick disconnect	45°	TST-115-106
320 ±10	160.0 ±5.6	Surface Mount	Horizontal, 0.250 quick disconnect	45°	TST-115-107

Available from Stock

Note: **"Rotating Bracket"** mounting indicates that the mounting holes can be rotated vs. the solder tabs and for **"Surface Mount"** they are fixed.

One Shot Thermal Cutoffs

Standard Stock Thermal Cutoff Temperature Ratings

Cutoff Temp. °F	°C	TEMPCO Part Number
151	66	TST-106-104
162	72	TST-106-110
170	77	TST-106-111
183	84	TST-106-112
196	91	TST-106-113
208	98	TST-106-114
219	104	TST-106-101
230	110	TST-106-106
250	121	TST-106-107 †
262	128	TST-106-109
286	141	TST-106-115
291	144	TST-106-116 ○
306	152	TST-106-117
333	167	TST-106-105 †
363	184	TST-106-119
378	192	TST-106-120
421	216	TST-106-121 ⁝
464	240	TST-106-122

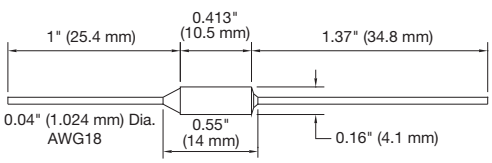
Agency Approvals:
UL, CSA, VDE

Exceptions as noted:
† No agency approvals
○ UL and CSA approved only
⁝ VDE approved only

Available from Stock

Thermal cutoffs are designed to provide upper limit temperature protection for many electronic products. Under normal operating temperature, the solid pellet compresses a spring which holds the star contact against the isolated lead. When a fault temperature is reached, the pellet melts and the circuit is opened permanently.

It is important to allow sufficient time to determine the proper and best location for a thermal cutoff. The location will affect the cutoff's ability to protect your product. Placement in the highest temperature area is usually best. Use a thermal cutoff that is higher than your target operating temperature, as a thermal cutoff is supposed to be a failsafe to protect the system from catastrophic failure.



Design Features

- ***Low cost***
- ***Excellent contact rating***
- ***Quick & easy installation***

Typical Applications

- *Personal Care*
- *Appliances*
- *Motors*

Ordering Information

Choose the ***Part Number*** of the thermal cutoff that best meets the requirements on your application from the chart above.

Standard lead time is stock to 3 weeks.

Specifications

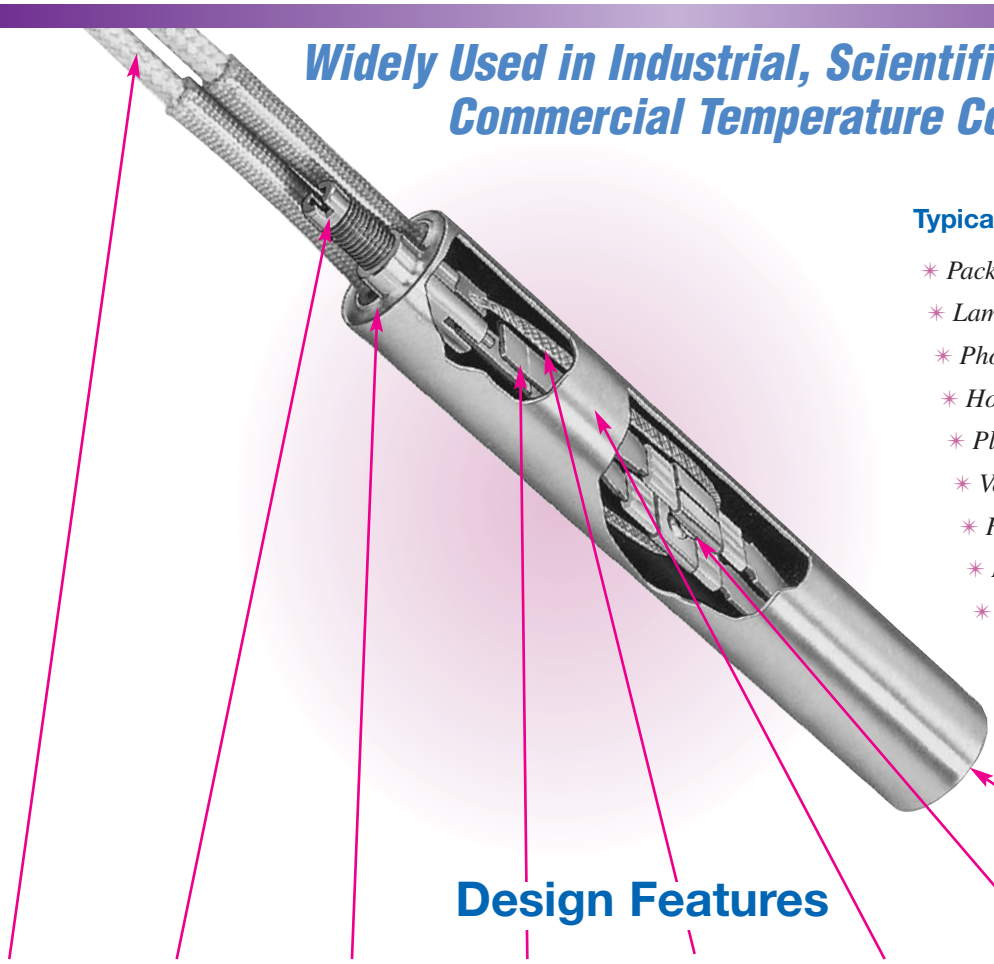
Electrical ratings: 120/250 VAC, 10 Amps, Continuous duty
120/250 VAC, 15 Amps, Interrupting current

Temperature tolerance: +0°C/-4°C (+0°F/-7°F)

Approvals: UL, CSA, VDE

Differential Expansion Cartridge Type Thermostats

Widely Used in Industrial, Scientific and Commercial Temperature Control Applications



Typical Applications

- *Packaging Machinery*
- *Laminating Equipment*
- *Photographic Processing*
- *Hot Stamping*
- *Plastic Processing Machines*
- *Vending Machines*
- *Food Service Equipment*
- *Medical & Dental Equipment*
- *Code Dating Equipment*

Design Features

A	B	C	D	E	F	G	H
Flexible leads externally connected to terminal pins provide high pull strength, eliminating pulled out leads.	Setpoint adjustment allows the setting of the temperature required without transmitting force to the contact mechanism, which can interfere with the accuracy of the unit.	Terminals are embedded in fused glass, providing a seal and strain relief to eliminate lead tension that can interfere with the accuracy of the unit.	One-piece strut made from low expansion alloy is assembled under tension. The strut and contacts operate by slow make and break, responding to the smallest temperature changes, accounting for quick response and sensitivity to within ±1.0°F.	Wire braid provides the flexibility required in order to withstand the expansion and contraction of the outer shell without interfering with the ability of the unit to handle the load capacity under maximum operating temperature.	The expanding shell is the heat sensing component and not just a housing, being responsive to the slightest temperature changes and leading the strut by an interval that varies with the range of temperature.	Silver alloy contacts mounted on a one-piece strut. They open and close by the expansion and contraction of the outer shell, instantaneously responding to temperature changes.	Heli-arc welded end disc provides a positive seal against moisture and other contaminants.

Cartridge Type Thermostats

Thermostatic Cartridge Type Temperature Controls

Tempco Thermostatic Temperature Controls are proven, simple, sensitive temperature controls with an adjustable setpoint. The sheath is a temperature sensor that responds to the temperature of its environment by expanding and contracting, thereby mechanically actuating a set of contacts within. Use to accurately control temperature on hundreds of applications.

Specifications

Temperature Range:
1/4" dia. models: -100 to 500°F (-73 to 260°C)
1/2" and 5/8" dia. models: -100 to 600°F (-73 to 315°C)

Tube Shell Diameters:
1/4" dia. model: 0.249" +.000/-.004" actual
1/2" dia. model: 0.499" +.000/-.004" actual
5/8" dia. model: 0.625" +.000/-.004" actual

Contact Action: Slow make and break

External Materials: 304 Stainless Steel

Agency Approvals:

Sensitivity:
1/4" dia. model: As low as 1°F depending on application
1/2" and 5/8" dia. models: As low as 0.5°F depending on application

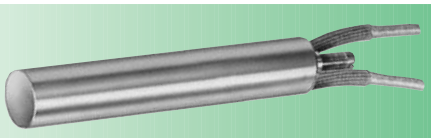
Accuracy: Dependent on application

Standard Termination:
1/4" dia. model: 8" long - #26 ga silver plated copper with Teflon® insulation
1/2" dia. model: 8" long - #20 ga stranded nickel clad copper with fiberglass insulation
5/8" dia. model: 8" long - #16 ga stranded nickel clad copper with fiberglass insulation

Standard Stock Thermostatic Controls

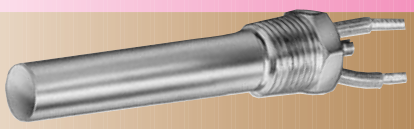
Dia.	Insert Length	Contact Action on Temp. Rise	Electric Rating (Amp-Volts)	Part Number
5/8"	3½"	Open (NC) Close (NO)	10A-120, 5A-240	TEV01500 TEV01501
1/2"	2⅜"	Open (NC) Close (NO)	5A-120, 3A-240	TEV01400 TEV01401
1/4"	1⅞"	Open (NC) Close (NO)	1A-120	TEV01200 TEV01201
5/8"	3⅜"	Open (NC) Close (NO)	10A-120, 5A-240	TEV02500 TEV02501
1/2"	2¼"	Open (NC) Close (NO)	5A-120, 3A-240	TEV02400 TEV02401
5/8"	2⅞"	Open (NC) Close (NO)	10A-120, 5A-240	TEV03500 TEV03501
1/2"	1⅞"	Open (NC) Close (NO)	5A-120, 3A-240	TEV03400 TEV03401
1/4"	¾"	Open (NC) Close (NO)	1A-120	TEV03200 TEV03201
5/8"	2⅞"	Open (NC) Close (NO)	10A-120, 5A-240	TEV04500 TEV04501
1/2"	1⅞"	Open (NC) Close (NO)	5A-120, 3A-240	TEV04400 TEV04401
1/4"	¾"	Open (NC) Close (NO)	1A-120	TEV04200 TEV04201
5/8"	3⅝"	Open (NC) Close (NO)	10A-120, 5A-240	TEV05500 TEV05501
1/2"	2⅜"	Open (NC) Close (NO)	5A-120V, 3A-240V	TEV05400 TEV05401
1/4"	1¼"	Open (NC) Close (NO)	1A-120V	TEV05200 TEV05201

SELECTION GUIDE

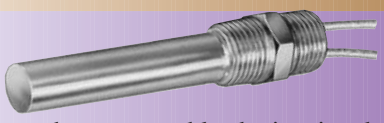


Type S Cartridge
Temperature controller for applications in metal, air, gas and many other mediums.

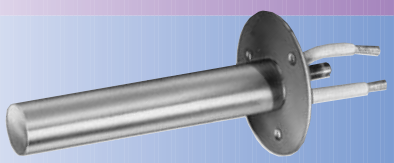
Type B Block Head
The block head style allows the thermostat to be mounted without the use of bushings. Also excellent for making right-angle connections.



Type P Pipe Thread
Designed for mounting in tanks for temperature control of liquids or gases. A stainless steel bushing affords ease of mounting and a positive seal.



Type C Coupling Head
Designed to accept conduit or plumbing fittings to protect the screw and lead wires in adverse conditions.



Type F Flange
Designed to mount directly to duct or oven wall for the sensing of air or gas temperatures.

All Items Available from Stock

Ordering Information

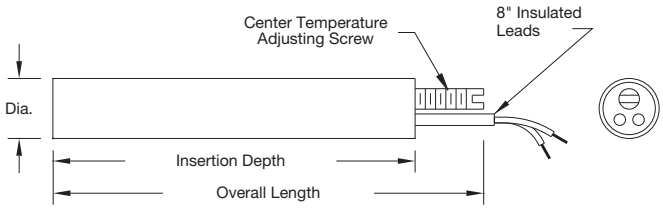
State part number and special features if required.
For special Thermostatic Controls, consult Tempco.

Design Features

- *The 1/2" and 5/8" dia. models are UL recognized.*
- *The 5/8" dia. model is CSA certified.*
- *Factory pre-set temperature setpoint. Specify temperature setpoint.*
- *Extra lead length; specify length required.*
- *Extended shell length, with sensitivity at the top or bottom; specify length required and sensitivity.*
- *Flexible armor cable over leads; blockhead style B only. Specify length required.*
- *Moisture resistant seal.*
- *Moisture resistant or explosion resistant, N7, attached to a type C coupling head thermostat; specify requirements.*
- *Ground wire attached to the shell; specify length required.*

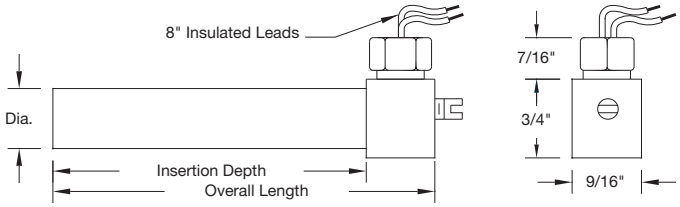
Product Inventory Available for Viewing and Selection @ www.tempco.com

Dimensional Specifications



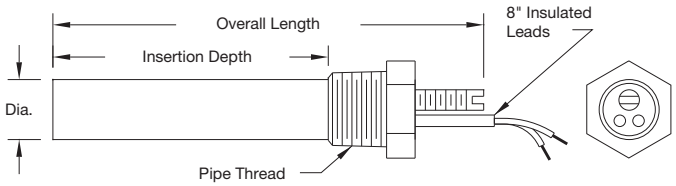
Type S — Cartridge Style

Diameter	Overall Length	Insertion Depth
5/8"	4-3/8"	3-5/8"
1/2"	3-1/4"	2-1/2"
1/4"	1-5/8"	1-7/16"



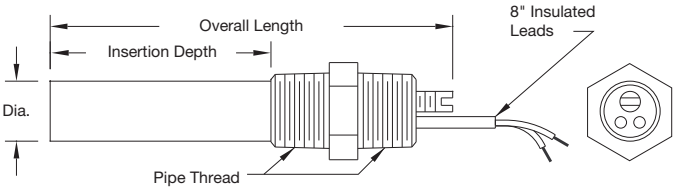
Type B — Block Head Style

Diameter	Overall Length	Insertion Depth	Block Thk.
5/8"	4-1/8"	3-3/8"	9/16"
1/2"	3"	2-1/4"	9/16"
1/4"	Not Available		



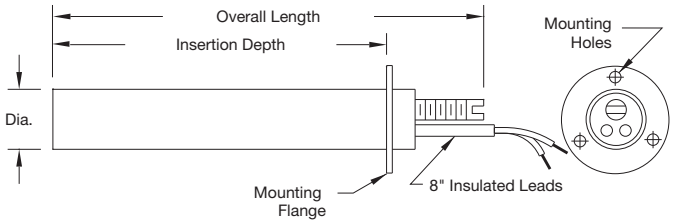
Type P — Pipe Thread

Diameter	Overall Length	Insertion Depth	Pipe Thread
5/8"	4-3/8"	3"	1/2"-14 NPT
1/2"	3-1/4"	2"	3/8"-18 NPT
1/4"	1-5/8"	3/4"	1/8"-27 NPT



Type C — Coupling Head

Diameter	Overall Length	Insertion Depth	Pipe Thread
5/8"	4-1/2"	3"	1/2"-14 NPT
1/2"	3-1/4"	2"	3/8"-18 NPT
1/4"	1-3/4"	3/4"	3/8"-27 NPT



Type F — Flange

Diameter	Overall Length	Insertion Depth	Flange Dia.	Mounting Holes (3)
5/8"	4-3/8"	3-5/16"	1-3/4"	.156" dia. on a 1.25" DBC
1/2"	3-1/4"	2-5/16"	1-1/2"	.156" dia. on a 1" DBC
1/4"	1-5/8"	1-1/4"	1"	.144" dia. on a 5/8" DBC

Installation Guidelines and Observations

1. Do not expose the thermostat to more than 100°F / 55°C above the setpoint temperature.
2. On 1/2" and 5/8" diameter thermostats, do not turn the adjusting screw more than 7 revolutions in either direction from room temperature.
3. On 1/4" diameter thermostats, do not turn the screw more than 1/4 revolution in either direction from room temperature without checking temperature setpoint.
4. Removal of the adjusting screw may render the thermostat inoperative.
5. System vibration can cause contact bounce. The addition of a capacitor will reduce the bouncing and overshooting. The recommended capacitor is 0.1 µF rated at 600VDC for 120 VAC applications and 1000VDC for 240 VAC applications. The capacitor should be attached parallel across the thermostat's leads.
6. Optimum performance will result when the amperage load is half of the maximum rating.
7. Do not attempt to seal the lead end with silicone materials such as caulking or grease.

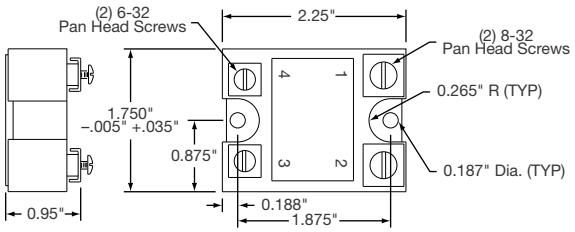
Single-Phase Solid State Relays (SSRs)

Tempco's Solid State Relays are a highly reliable alternative to mechanical or mercury contactors in high amperage or harsh environments. They offer years of trouble-free service and millions of cycles with no moving parts to wear out.

- ✳ 1-phase normally open models – current ratings from 10 Amp through 75 Amp
- ✳ Zero-cross outputs for general applications
- ✳ UL/cUL Recognized, CE Compliant
- ✳ Back-to-back SCR output stage
- ✳ AC or DC control inputs
- ✳ 240 or 480 Volt Outputs

➤ Select a ***DC control*** input relay to work with a temperature control having an ***SSR drive output.***

➤ Choose an ***AC control*** input relay to work with a temperature control having a ***mechanical relay output.***



All Items Available from Stock

Ordering Information

Choose the **Part Number** of the relay from the table above that matches the needs for your application. We also offer other styles of Solid State Relays, such as random turn on; consult Tempco with your requirements. ***Standard lead time is stock to 3 weeks.***

Standard Stock Single-Phase Relays

Nominal Output Voltage	240 VAC		480 VAC		Load Current
Control Input	DC	AC	DC	AC	
Part Number	RLS02110	RLS02210	RLS04110	RLS04210	10A
	RLS02125	RLS02225	RLS04125	RLS04225	25A
	RLS02145	RLS02245	RLS04150	RLS04250	50A
	RLS02175	RLS02275	RLS04175	RLS04275	75A
Min. Input Current (mA)	7		5		
Max. Line Voltage (VAC, rms)	280		660		
Min. Line Voltage (VAC, rms)	24		48		
Max. Off-State Voltage (Vpeak)	±600		±1200		

Max. Off-State Leakage (mA rms) 0.25 — **On-State Voltage Drop** (Vpeak) 1.35
Static (Off-State) Δv/Δt (V/μS) 500 — **Min. On-State Current** (mA) 100
Operating Temp. Range (°C) -20 to +80, (°F) -4 to +176 — **Line Frequency Range** (Hz) 47 to 63

Notes:

1. DC control input = 3-32 VDC **2.** AC control input = 90-280 VAC

3. Adequate heat sinking, including consideration of air temperature and flow, is essential to the proper operation of a solid state relay.

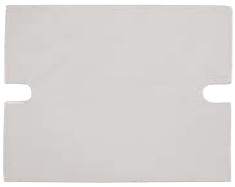
Accessories

For solid state relays Tempco offers a snap-on cover made of high impact, flame retardant polycarbonate that will provide "finger-safe" operation.

Snap-on Cover
For 1-phase SSR: **RLS90001**

Thermal Compound: RLS90003
2-ounce container

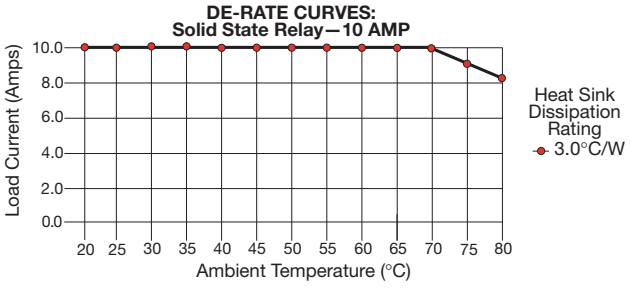
Thermal Heat Transfer Pads:
For 1-Phase SSR: **RLS90004**
For 3-Phase SSR: **RLS90005**

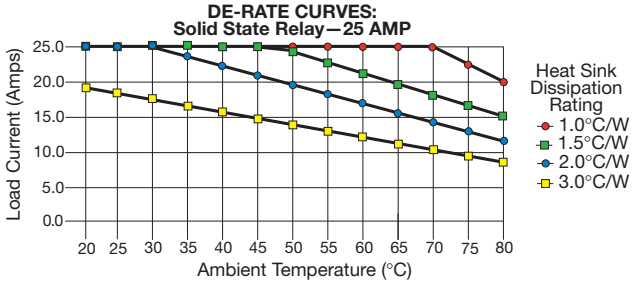


De-Rating Curves for Single Phase Solid State Relays

CAUTION

Solid state relay de-rating curves are used to determine the actual current the relay is capable of carrying vs. the ambient temperature in the enclosure. It also indicates the heat sink required to dissipate the heat the relay produces at the ambient temperature. Failure to dissipate the internally generated heat will result in solid state relay failure.

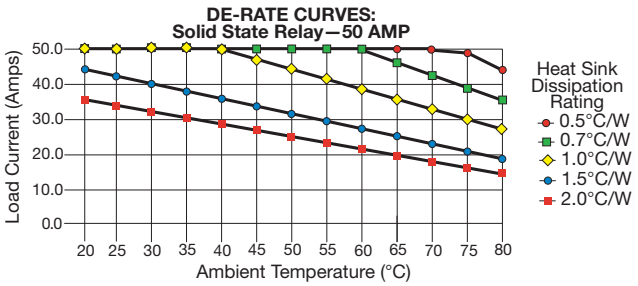


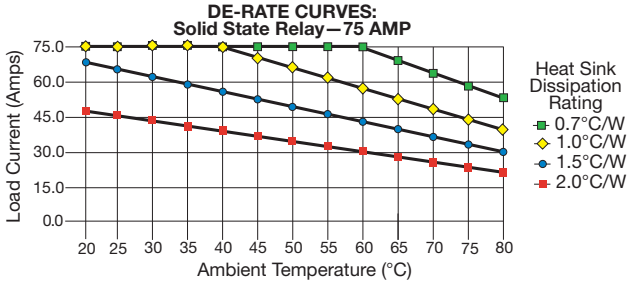


CONTINUED

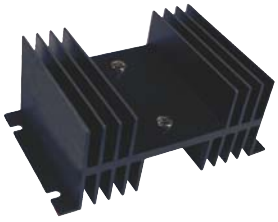
Product Inventory Available for Viewing and Selection @ www.tempco.com

De-Rating Curves for Single-Phase Solid State Relays (continued)



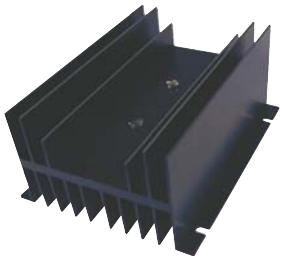


Standard Stock Heat Sinks for Solid State Relays



Part Number: RLS90012
Size: 3.0"W × 4.45"L × 2.0"H
Rating: 2.0°C/W
Pre-drilled for 1-phase SSR

Part Number: RLS90013
Size: 3.0"W × 4.43"L × 2.62"H
Rating: 1.5°C/W
Pre-drilled for 1-phase SSR



Part Number: RLS90015
Size: 4.35"W × 6.0"L × 2.63"H
Rating: 0.7°C/W
Pre-drilled for 1-phase SSR

DIN Rail Mount

Part Number: RLS90016
Size: 3.0"W × 5.2"L × 2.375"H
Rating: 0.8°C/W
Pre-drilled for 3-phase SSR

Three-Phase Solid State Relays (SSRs)

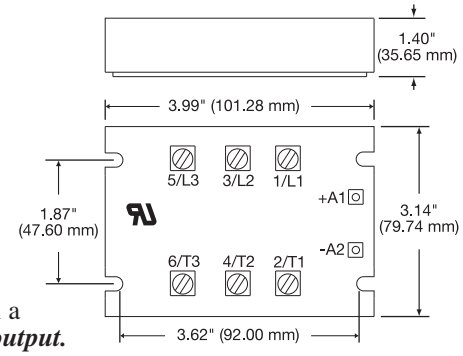
All Items Available from Stock

Tempco's Three-phase Solid State Relays are a highly reliable alternative to mechanical or mercury contactors in high amperage or harsh environments. They offer years of trouble-free service and millions of cycles with no moving parts to wear out.

- 3-phase normally open models—current ratings 25 Amp and 50 Amp
- Zero-cross outputs for general applications
- UL recognized, CSA certified and CE compliant
- Back-to-back SCR output stages
- AC or DC control inputs
- Single output type for 48 through 530 VAC

➤ Select a ***DC control*** input relay to work with a temperature control having an ***SSR drive output.***

➤ Choose an ***AC control*** input relay to work with a temperature control having a ***mechanical relay output.***



Standard Stock Three-Phase Relays

Nominal Output Voltage	48 through 530 VAC			Load Current
Control Input	4-32 VDC	90-140 VAC	180-260 VAC	
Part Number	RLS36125 RLS36150	RLS36226 RLS36250	RLS36227 RLS36251	25A 50A
Max. Line Voltage Range (VAC, rms)	48 through 530 VAC			
Max. Off-State Voltage (Vpeak)	±1100			
Control Current (mA)	24	7		
Max. Off-State Leakage (mA rms)	3.0	On-State Voltage Drop (Vpeak)	1.35	
Static (Off-State) Δv/Δt (V/μS)	500	Min. On-State Current (mA)	100	
Operating Temp. Range (°C)	-20 to 80	Line Frequency Range (Hz)	47 to 63	
(°F)	-4 to 176			

Note:

1. Adequate heat sinking, including consideration of air temperature and flow, is essential to the proper operation of a solid state relay.

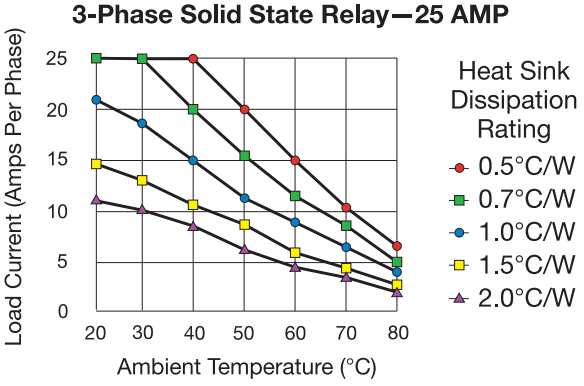
CONTINUED

De-Rating Curves for 3-Phase Solid State Relays

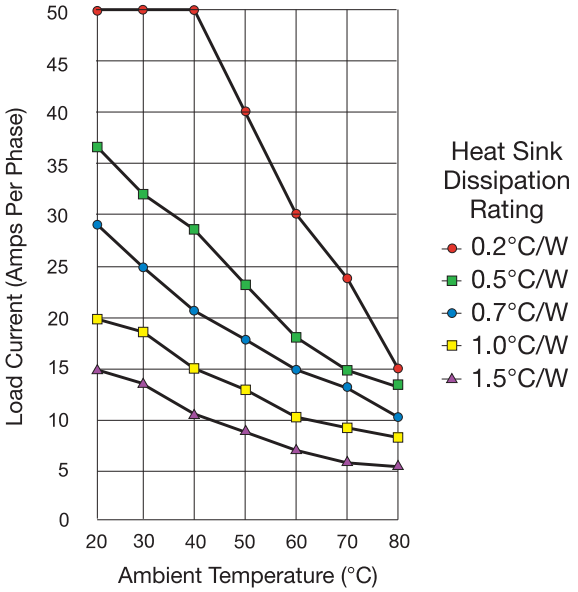
CAUTION

Solid state relay de-rating curves are used to determine the actual current the relay is capable of carrying vs. the ambient temperature in the enclosure. It also indicates the heat sink required to dissipate the heat the relay produces at the ambient temperature. Failure to dissipate the internally generated heat will result in solid state relay failure.

DE-RATING CURVES:
3-Phase Solid State Relay—25 AMP



DE-RATING CURVES:
3-Phase Solid State Relay—50 AMP



"Power Pack" DIN Rail Mount Solid State Relay Modules

The **Power Pack** combines in one easy-to-use compact package the traditional hockey puck style solid state relay and required heat sink. This combination eliminates having to mount the SSR to a separate heat sink. It also incorporates the finger-safe cover into the housing's design. Each Power Pack takes up much less room than the standard SSR and heat sink combination.

Available from Stock

Design Features

- *Self-Contained Solid State Relay and Heat Sink*
- *Standard 35mm DIN Rail or Panel Mount*
- *1-phase Units with Zero-Cross Firing Output*
- *3-Phase Units Control All 3 Phases*
- *Current Ratings from 12 through 35 Amp*
- *3 Compact Sizes: 22.5mm, 45.0mm, and 90.0mm*
- *Triac or Back-to-Back SCR Outputs*
- *UL, cUL Recognized*

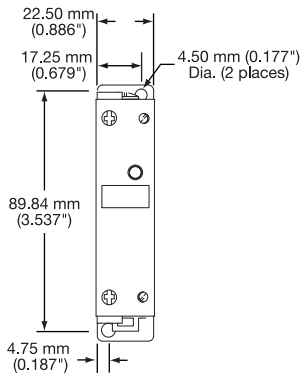
Standard Stock DIN Rail Relays

Size	Output Current	Output Voltage	Control Input	Output Type	Max. Turn On Time	Max. Turn Off Time	Min. On State Cur.	Peak On Vol. drop	Part Number
One-Phase Models									
22.5 mm	10A	24-280 VAC	4-32 VDC	Triac	8.33 mS	8.33 mS	19 mA	1.5 Vpk	RLS80001
			90-140 VAC		20 mS	30 mS	23 mA		RLS80005
			180-280 VAC		20 mS	30 mS	23 mA		RLS80006
	20A	48-600 VAC	4-32 VDC	B/B SCR	8.33 mS	8.33 mS	19 mA	1.35 Vpk	RLS80003
			90-140 VAC		20 mS	30 mS	23 mA		RLS80007
			180-280 VAC		20 mS	30 mS	23 mA		RLS80008
	30A	48-600 VAC	4-32 VDC	B/B SCR	8.33 mS	8.33 mS	19 mA	1.35 Vpk	RLS80009
			90-140 VAC		20 mS	30 mS	23 mA		RLS80010
			180-280 VAC		20 mS	30 mS	23 mA		RLS80011
45.0 mm	35A	48-660 VAC	4-32 VDC	B/B SCR	8.33 mS	8.33 mS	19 mA	1.35 Vpk	RLS80101
			90-140 VAC		20 mS	30 mS	23 mA		RLS80103
			180-280 VAC		20 mS	30 mS	23 mA		RLS80104
	45A	48-660 VAC	4-32 VDC	B/B SCR	8.33 mS	8.33 mS	19 mA	1.35 Vpk	RLS80105
			90-140 VAC		20 mS	30 mS	23 mA		RLS80106
			180-280 VAC		20 mS	30 mS	23 mA		RLS80107
Three-Phase Models									
90.0 mm	25A	48-660 VAC	4-32 VDC	B/B SCR	8.33 mS	8.33 mS	19 mA	1.35 Vpk	RLS80201
			90-140 VAC		20 mS	30 mS	23 mA		RLS80203
			180-280 VAC		20 mS	30 mS	23 mA		RLS80204

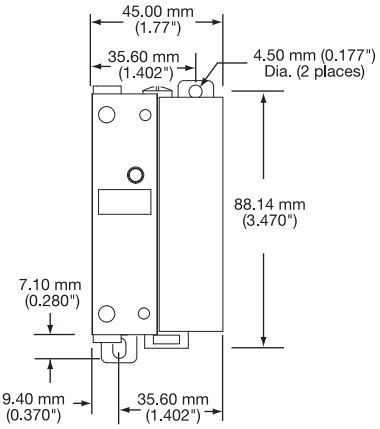
Product Inventory Available for Viewing and Selection @ www.tempco.com

Specifications and De-Rating Curves for Power Pack DIN Rail Relay Modules

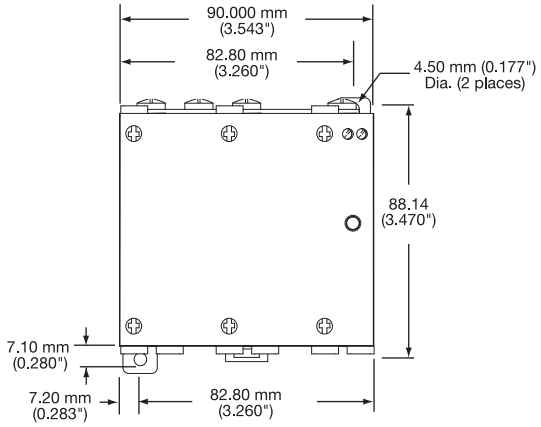
Dimensional Specifications mm (inches)



Depth 120.75 mm (4.754")



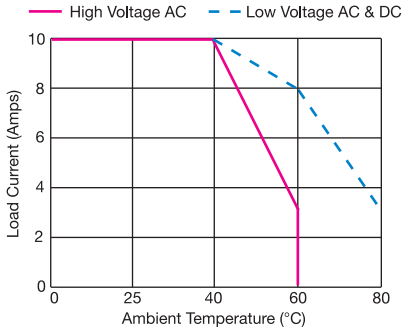
Depth
120.66 mm (4.750")



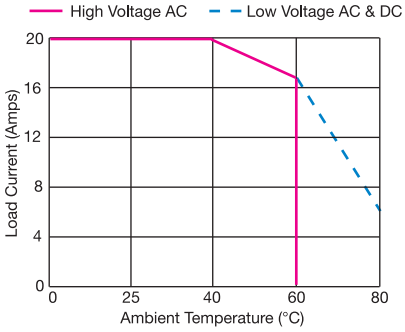
Depth
123.40 mm (4.858")

Derating Curve — 22.5 mm size

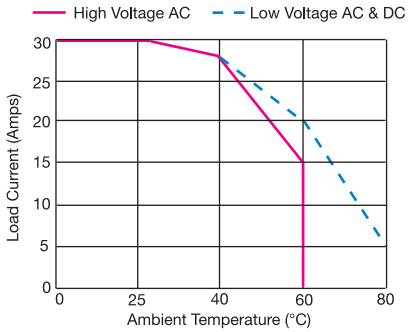
10 AMP Series Derate Curves



20 AMP Series Derate Curves

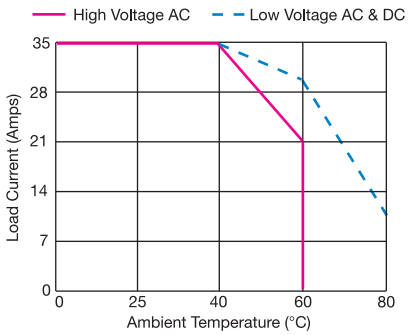


30 AMP Series Derate Curves

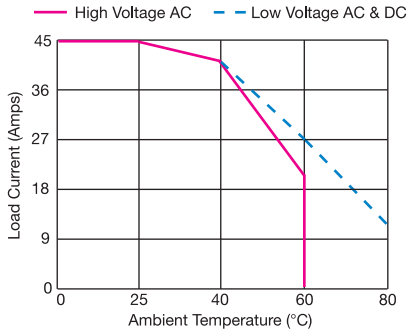


Derating Curve — 45 mm size

35 AMP Series Derate Curves

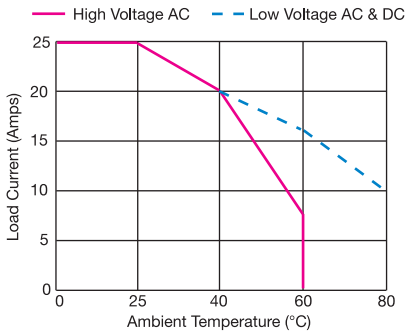


45 AMP Series Derate Curves



Derating Curve — 90 mm size

25 AMP-3 Phase Series Derate Curves



Ordering Information

Choose the **Part Number** of the relay from the table above that matches the needs for your application. Tempco also offers a complete line of SCR Power Controls, Mechanical Relays, and Mercury Relays for your power handling needs. ***Standard lead time is stock to 3 weeks.***

Mercury Displacement Relays — 35 & 60 Amp Resistive Loads

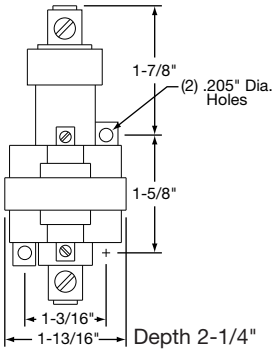
Tempco's Mercury Displacement Relays are specifically designed for resistive loads typical of heating and process equipment. These mercury relays are available in 35 and 60 amp models with single, double and triple pole configurations. Coil voltages range from 24 to 480 Volts AC at 50/60 Hz and 24 Volts DC.

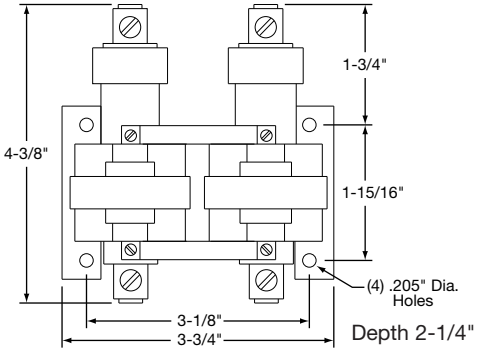
Features

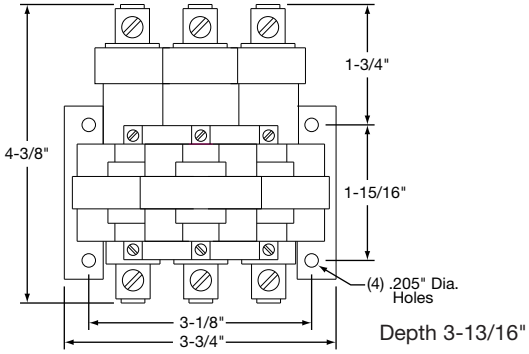
Mercury contact action relays are superior to open contact electro-mechanical relays. Mercury relays do not contain springs or button contacts, which tend to wear, weld and burn out. Mercury contacts are capable of rapid on-off cycling in excess of 6 times per minute under resistive loads. This provides more precise process temperature control, and eliminates the noise from the on-off operating cycles of electro-mechanical relays and contactors.

Typical Applications

- *Industrial Process Equipment Utilizing Resistive Loads*
- *Plastic Injection and Extrusion Machinery*
- *Industrial Ovens*
- *Food Processing Equipment*
- *Duct Heaters*







Stock and Standard (Non-Stock) Mercury Relay Specifications

Type	35 AMP RELAYS Coil Volts	Coil Current	Cross Reference MDI	TEMPCO Part Number	Coil Resistance (ohms)	60 AMP RELAYS Coil Current	Cross Reference MDI	TEMPCO Part Number
1 Pole Normally Open	24 VDC	136 mA	35NO-24D	RLY01355	176	136 mA	60NO-24D	RLY01605
	24 VAC	242 mA	35NO-24A	RLY01353	50	259 mA	60NO-24A	RLY01603
	120 VAC	53 mA	35NO-120A	*RLY01351	1250	48 mA	60NO-120A	*RLY01601
	220 VAC	28 mA	35NO-220A	RLY01352	4800	27 mA	60NO-220A	RLY01602
	277 VAC	20 mA	35NO-277A	RLY01356	7900	19 mA	60NO-277A	RLY01606
	480 VAC	12 mA	35NO-480A	RLY01354	20000	12 mA	60NO-480A	RLY01604
2 Poles Normally Open	24 VDC	272 mA	235NO-24D-18	RLY02355	88	272 mA	260NO-24D-18	RLY02605
	24 VAC	484 mA	235NO-24A-18	RLY02353	25	518 mA	260NO-24A-18	RLY02603
	120 VAC	106 mA	235NO-120A-18	*RLY02351	625	96 mA	260NO-120A-18	*RLY02601
	220 VAC	56 mA	235NO-220A-18	RLY02352	2400	54 mA	260NO-220A-18	RLY02602
	277 VAC	40 mA	235NO-277A-18	RLY02356	3950	38 mA	260NO-277A-18	RLY02606
	480 VAC	24 mA	235NO-480A-18	RLY02354	10000	24 mA	260NO-480A-18	RLY02604
3 Poles Normally Open	24 VDC	408 mA	335NO-24D-18	RLY03355	59	408 mA	360NO-24D-18	RLY03605
	24 VAC	726 mA	335NO-24A-18	RLY03353	17	777 mA	360NO-24A-18	RLY03603
	120 VAC	159 mA	335NO-120A-18	*RLY03351	417	144 mA	360NO-120A-18	*RLY03601
	220 VAC	84 mA	335NO-220A-18	RLY03352	1600	81 mA	360NO-220A-18	RLY03602
	277 VAC	60 mA	335NO-277A-18	RLY03356	2633	57 mA	360NO-277A-18	RLY03606
	480 VAC	36 mA	335NO-480A-18	RLY03354	6667	36 mA	360NO-480A-18	RLY03604

***Note:** The 220 VAC coil is used from 208 to 240 VAC.*

SPECIFICATIONS

Operate Time: 50 mSec **Release Time:** 80 mSec
Contact Rating: 35 Amp – 600 VAC, 60 Amp – 480 VAC
Contact Resistance: 35 Amp – .003Ω, 60 Amp – .002Ω
Temperature Range: -31 to 185°F (-35 to 85°C)
Dielectric Strength: 2500 VAC RMS

Ordering Information

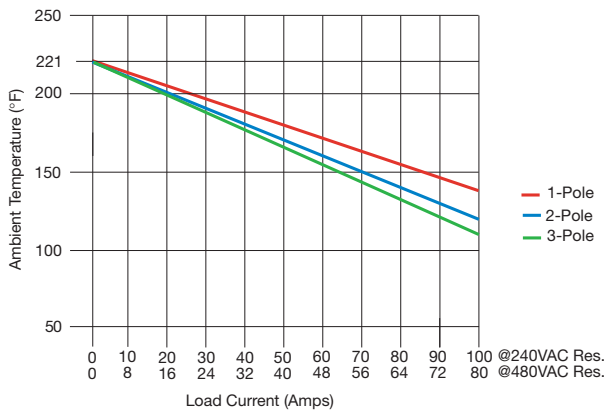
Choose the **Part Number** of the relay from the table above that matches the needs for your application. We also offer other styles of Mercury Relays—consult Tempco with your requirements.

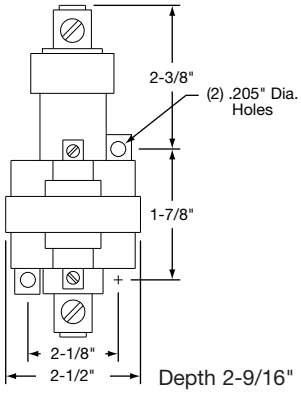
Standard lead time is stock to 5 days.

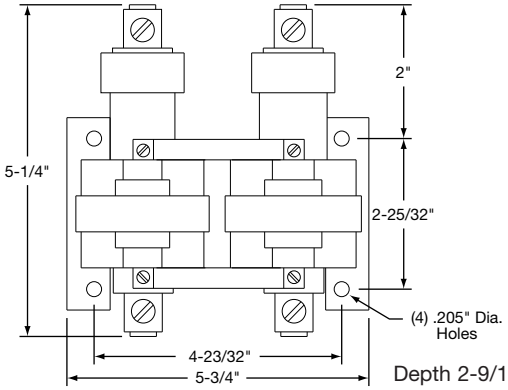
Product Inventory Available for Viewing and Selection @ www.tempco.com

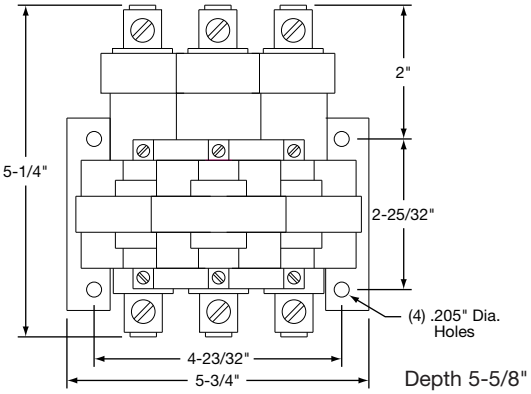
Mercury Displacement Relays — 100 Amp Resistive Loads

DERATING CURVES:
100 AMP Normally Open









Stock and Standard (Non-Stock) Mercury Displacement Relay Specifications

Type	100 AMP RELAYS Coil Volts	Coil Current	Cross Reference MDI	Coil Resistance (ohms)	TEMPCO Part Number
1 Pole Normally Open	24 VDC	369 mA	100NO-24D	65	RLY90030
	24 VAC	646 mA	100NO-24A	16	RLY90031
	120 VAC	137 mA	100NO-120A	380	*RLY90032
	220 VAC	73 mA	100NO-220A	1400	RLY90033
	277 VAC	55 mA	100NO-277A	2400	RLY90034
	480 VAC	35 mA	100NO-480A	6300	RLY90035
2 Poles Normally Open	24 VDC	738 mA	2100NO-24D-18	33	RLY90036
	24 VAC	1292 mA	2100NO-24A-18	8	RLY90037
	120 VAC	274 mA	2100NO-120A-18	190	*RLY90023
	220 VAC	146 mA	2100NO-220A-18	700	RLY90038
	277 VAC	110 mA	2100NO-277A-18	1200	RLY90039
	480 VAC	70 mA	2100NO-480A-18	3150	RLY90040
3 Poles Normally Open	24 VDC	1107 mA	3100NO-24D-18	22	RLY90041
	24 VAC	1938 mA	3100NO-24A-18	5.3	RLY90042
	120 VAC	411 mA	3100NO-120A-18	127	*RLY90019
	220 VAC	219 mA	3100NO-220A-18	467	RLY90013
	277 VAC	165 mA	3100NO-277A-18	800	RLY90043
	480 VAC	105 mA	3100NO-480A-18	2100	RLY90044

Note: *The 220 VAC coil is used from 208 to 240 VAC.*

An asterisk (*) next to the Part Number guarantees in-stock availability for same-day shipping when ORDERED BY 2 PM CST

SPECIFICATIONS

Operate Time: 50 mSec **Release Time:** 80 mSec
Contact Rating: 240 VAC – 100 Amp, 480 VAC – 80 Amp
Contact Resistance: .001Ω
Temperature Range: -31 to 185°F (-35 to 85°C)
Dielectric Strength: 2500 VAC RMS

Ordering Information

Choose the **Part Number** of the relay from the table above that matches the needs for your application. We also offer other styles of Mercury Relays—consult Tempco with your requirements.

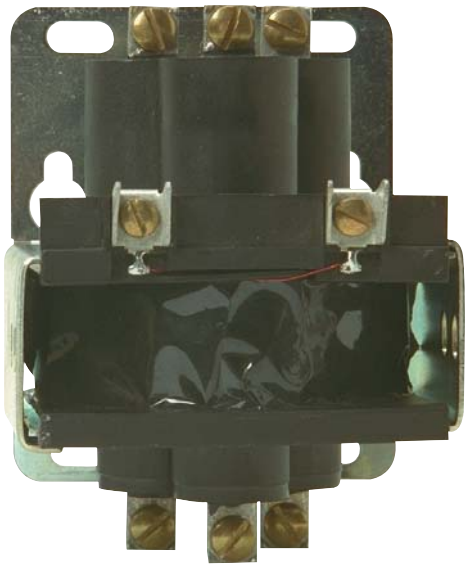
Standard lead time is stock to 5 days.

High Performance Economical Mercury Relays — 30 Amp Resistive Loads

The 30 Amp model is designed to save space and simplify mounting methods. It is also extremely economical due to the use of a single coil for 1-, 2- or 3-pole relays.

The universal mounting bracket used on the 2- and 3-pole relays has various mounting holes and keyhole slots to meet a variety of mounting centers.

The 30 Amp Series is a more compact line with a well-proven switch, which is the heart of mercury relays. It is the same switch design that drives our 35 and 60 Amp encapsulated **Mercury Displacement Relays**, which have withstood the test of time and millions of cycles in many different applications.



Stock and Standard (Non-Stock) HIgh Performance Mercury Relay Specifications

Type	30 AMP RELAYS Coil Volts	Coil Current	Coil Resist. (ohms)	Cross Reference MDI	TEMPCO Part Number
1 Pole N.O.	24 VDC	113 mA	213	30NO-24DU	RLY11305
	24 VAC	216 mA	55	30NO-24AU	RLY11303
	120 VAC	65 mA	725	30NO-120AU	*RLY11301
	220 VAC	28 mA	3380	30NO-220AU	RLY11302
2 Poles N.O.	24 VDC	260 mA	92	230NO-24DU	RLY12305
	24 VAC	580 mA	15	230NO-24AU	RLY12303
	120 VAC	115 mA	367	230NO-120AU	*RLY12301
	220 VAC	53 mA	1550	230NO-220AU	RLY12302
3 Poles N.O.	24 VDC	217 mA	110	330NO-24DU	RLY13305
	24 VAC	815 mA	7.6	330NO-24AU	RLY13303
	120 VAC	140 mA	215	330NO-120AU	*RLY13301
	220 VAC	66 mA	766	330NO-220AU	RLY13302

Note: *The 220 VAC coil is used from 208 to 240 VAC.*

An asterisk (*) next to the Part Number guarantees in-stock availability for same-day shipping when ORDERED BY 2 PM CST

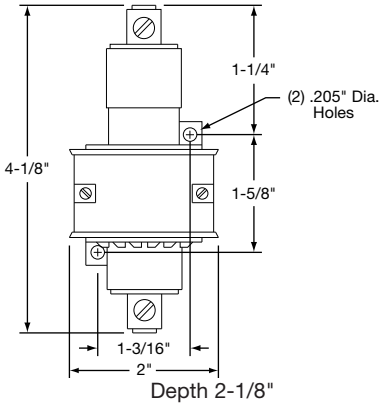
Ordering Information

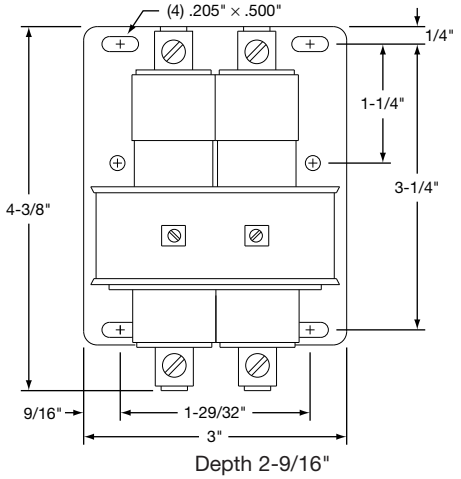
Choose the **Part Number** of the relay from the table above that matches the needs for your application.

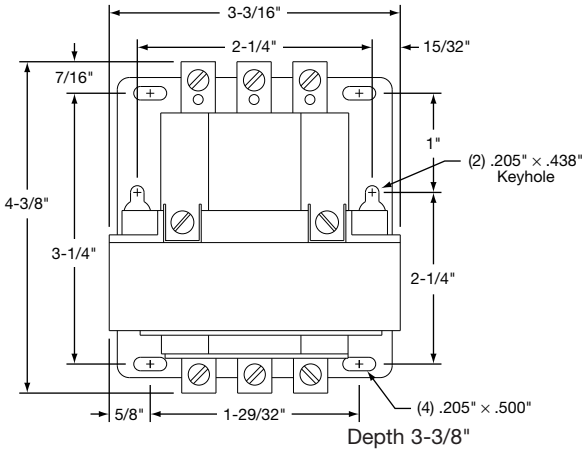
Standard lead time is stock to 5 days.

Specifications

Pull In Voltage: 90% of nominal (Min. AC)
Operate (pull in) Time: 50 mSec
Release Time: 80 mSec
Operating Ambient Temperature Range: -35 to 85°C (-31 to185°F)
Typical Contact Resistance: 3 mΩ
Contact Rating: 30 Amps
Dielectric Breakdown: 2500 VAC RMS
Mount: Vertical ±10°
Coil terminals: #6 binding head screws
Load terminals: #8 binding head screws
UL Listing: #E62767
CSA Listing: #LR41198

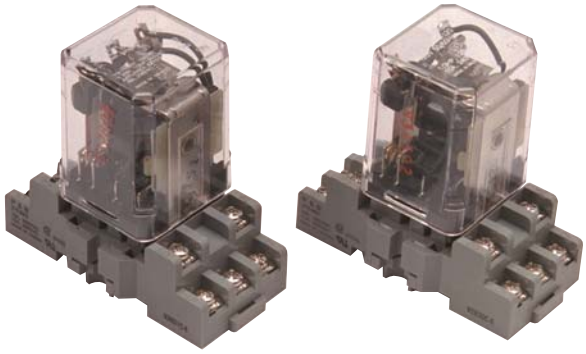






Product Inventory Available for Viewing and Selection @ www.tempco.com

DIN Rail Mounted Mechanical Relays



Design Features

- *10 and 15 Amp Models with 24 VDC, 120 and 240 VAC Coils*
- *Sockets Mount on Standard 35 mm DIN Track*
- *Silver-Cadmium Oxide Contacts*
- *Socket and Relay Separation Fast and Easy*
- *UL and CSA Component Recognition*
- *Compact for Easy DIN Rail Installation*
- *Contact Arrangement Up to 3PDT*
- *Enclosed to Prevent Contamination*

Standard DIN Rail Mount Relay Specifications

Common Usage @ 240VAC	Coil Voltage	Poles	Potter & Brumfield Cross Reference Number	TEMPCO Part Number
10A	24 VDC	1	KUP-5D15-24	RLM01103
10A	120 VAC	1	KUP-5A15-120	RLM01101
10A	240 VAC	1	KUP-5A15-240	RLM01102
10A	24 VDC	2	KUP-11D15-24	RLM02103
10A	120 VAC	2	KUP-11A15-120	RLM02101
10A	240 VAC	2	KUP-11A15-240	RLM02102
10A	24 VDC	3	KUP-14D15-24	RLM03103
10A	120 VAC	3	KUP-14A15-120	RLM03101
10A	240 VAC	3	KUP-14A15-240	RLM03102
15A	24 VDC	2	KUMP-11D18-24	RLM02153
15A	120 VAC	2	KUMP-11A18-120	RLM02151
15A	240 VAC	2	KUMP-11A18-240	RLM02152
15A	24 VDC	3	KUMP-14D18-24	RLM03153
15A	120 VAC	3	KUMP-14A18-120	RLM03151

Electrical Contact Ratings

Type	UL/CSA Ratings	Exp. Life
1-2 Pole KUP KUMP	10 Amps @ 28 VDC or 240 VAC, 80% PF 5 Amp tungsten @ 120 VAC, 3A 600 VAC, 1/2 Amp @ 120 VDC	100,000 cycles
	1/3 HP @ 120 VAC, 1/2 HP @ 240, 480, and 600 VAC, 10 FLA 30 LRA @ 120 VAC, 5 FLA, 15 LRA @ 250 VAC (FLA ratings covered by 30,000 operations)	
KUMP	15 Amp @ 277 VAC, 80% PF KUM KUMP	100,000 cycles
3-Pole KUP	10 Amp @ 28 VDC or 120 VAC, 80% PF, 6-2/3 Amp @ 240 VAC, 80% PF	100,000 cycles

Universal Rail Mounted Socket

Universal socket for mounting 1- to 3-pole relays to a 35mm DIN rail track or surface mounted directly to a panel. A spring-loaded latch allows for easy installation or removal from a DIN mounting track. High strength, durable plastic body with 3/16" quick connect/solder; silver-cadmium oxide terminals for relay mounting.

Dimensions with Relay (approximate): 3" × 1-1/2" × 3"

Part Number: RLM90001

Part Number: RLM90004 — Relay Hold Down Spring

Ordering Information

Choose the **Part Number** of the Relays and accessories that best fit the needs of your application.

Standard lead time is stock to 5 days.

Universal 35mm DIN Rail Track

Made out of extruded aluminum with holes on 6" centers. Holes accept #8 screws and the rail accepts the offered socket as a simple clip-on mount.

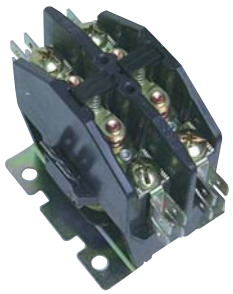
Dimensions: 36" (914mm) long

Part Number: RLM90002

Definite Purpose Magnetic Contactors

- UL and CSA Component Recognition
- Short Stroke Magnets and Silver Cadmium Oxide Contacts for Long Service
- Compact for Side-By-Side Installation
- Front Assembly Pressure Type Line and Load Connectors
- Consult Tempco for Units Over 50 Amps or for Optional NEMA 1 Enclosure

Contacts rated for 600 VAC



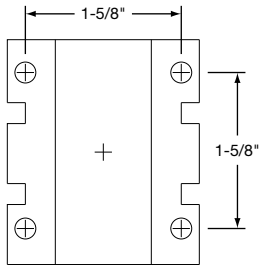
2-Pole, 30-50 Amp

3-Pole, 30-40 Amp

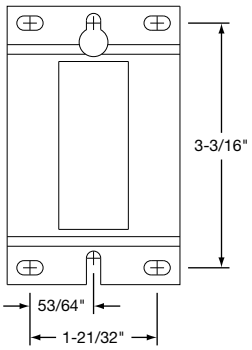
3-Pole, 50 Amp

Note: 4-pole model not shown

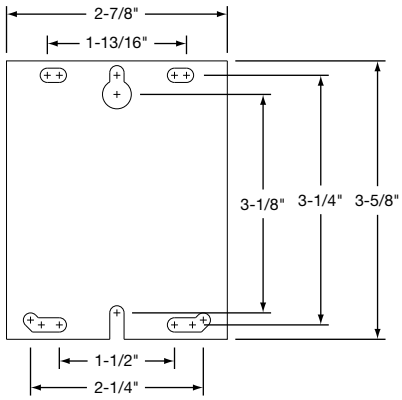
MOUNTING PLATE DIMENSIONS



2-Pole, 30-50 Amp



3-Pole, 30-40 Amp



3-Pole, 50 Amp

Standard Definite Purpose Contactor Specifications

Resistive Amperage	Poles	Phase	Dimensions (in) Length	Width	Depth	Furnas Cross Reference	TEMPCO Part Number
30	2	1	3⅜	2	2 27/32	45CG20A__	RLM1230__
35	2	1	3⅜	2	2 27/32	45DG20A__	RLM1235__
40	2	1	3⅜	2	2 27/32	45EG20A__	RLM1240__
35	3	3	3 31/32	2¼	3	42AF35A__	RLM1335__
40	2	1	3⅜	2	2 27/32	42BF15A__	RLM1241__
40	3	3	3 31/32	2¼	3	42BF35A__	RLM1340__
40	4	3	3 31/32	2⅞	3	42BF25A__	RLM1440__
50	2	1	3⅜	2	2 27/32	42CF15A__	RLM1250__
50	3	3	3 31/32	2¼	3	42CF35A__	RLM1350__
50	4	3	3 31/32	2⅞	3	42CF25A__	RLM1450__

COIL VOLTAGE TABLE

Voltage 60 Hz	Voltage 50 Hz	Coil Code
24	24	1
110-120	110	2
200-208	N/A	3
208-240	190-220	4
277	240	5
440-480	440	6
550-600	575	7

Ordering Information

Take the **Part Number** for the appropriate unit (proper amps, poles, and phase) and fill in the blank with the corresponding **Coil Voltage Code** from the table above to match your application needs.

Standard lead time is stock to 5 days.

Product Inventory Available for Viewing and Selection @ www.tempco.com