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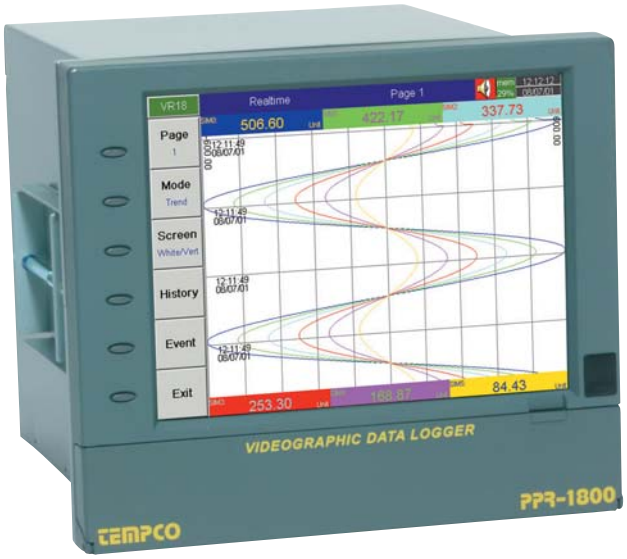
Temperature Controllers can be found in Section 13

Instrumentation

12 section

PPR-1800 Videographic Data Logger



The **PPR-1800** is a high specification graphic recorder capable of plotting up to 18 channels of analog input or 36 channels of digital data or a combination of both. Engineered in a heavy gauge sheet metal, the case is designed to meet the requirements of an industrial environment. The recorder is ideal for continuous and batch processes as well as test and QA environments.

Outstanding Hi-Tech Design Features

- ***6.4" Color TFT LCD with 640 x 480 VGA Resolution***
- ***Can be configured to comply with FDA 21 CER Part 11***
- ***Plug & Play Supported I/O Cards, 6 Slots in the rear***
  - User configurable I/O cards
    - Expandable modular architecture
      - Flexible screen configuration
- ***Agency approvals:***

"Most user-friendly interface in the industry!"

Design Features

- ***The Maximum Number of Channels***
  - Up to 18 isolated analog input channels (3 per analog card input) ***or***
    - Up to 36 isolated digital input/output channels (6 per digital input or output card)
- ***User Friendly***
  - Soft keys coupled with interactive dialog simplify setup and operation procedures.
    - Easy-to-access function keys.
- ***Infrared Detector – detects user within 16 ft./5m***
  - Automatically shuts down the LCD screen while not in use to prolong life and reduce power consumption.
- ***Save Space with Short Depth***
  - 6.9" / 174mm depth required behind the panel.
- ***Various Display Formats***
  - Display options include vertical trend, horizontal trend, bar graph, numerical or mixed formats.
- ***Permanent Data Storage in Flash ROM***
  - Data can be stored on the built-in CompactFlash™ Card or internal Flash ROM or be downloaded directly to a PC.
- ***Internal Data Communication Interface***
  - RS-232/422/485 or Ethernet interface available (no rear slot required).
- ***PC Software***
  - Observer I, supplied with the system, for transferring information to the PC via CompactFlash™ Memory Card.
    - Observer II, optional, includes Realtime Viewer for use when hardwiring for communications.
      - Minimum system requirements: 200 MHz Pentium® PC, with 64MB RAM. MS Windows® 98, NT, 2000, or XP compatible.
- ***The Highest Accuracy***
  - Powered by an 18 bit Analog to Digital converter
- ***Fast Sampling Rate***
  - Within 200 msec for all channels
    - Programmable Filter or Moving Average Sampling Method
- ***Math Functions***
  - Statistics with instant, average, and min/max values
- ***Programmable Alarms and Messages***

PPR-1800 Videographic Data Logger

"Plug and Play" Expandable Input and Output Cards

Analog Input Card

The PPR-1800 is equipped with 6 rear expansion slots, which work flexibly with the following input/output cards:

Analog Input Cards Different cards are available for 3, 2 or 1 channel analog input. Each input is isolated from the others to reduce noise and to ensure a stable measurement. The analog input is configured by dip switches and a jumper for each channel on the card before plugging it into a rear expansion slot.

Using all 6 expansion slots and six 3-channel Analog Input Cards, up to 18 channels can be recorded.

Digital/Relay Output Card Each card contains 6 alarm relays. The contacts are rated at 5 Amp/240V. Each alarm relay can be programmed to close on any channel variable.

Digital Input Card Each card includes 6 channels of digital inputs. They can be used for recording events or triggering the recorder to start. External devices such as relay/contact closure, transistor pull down or TTL logic can be connected.

Analog Current or Voltage Output Cards Each card includes 3 channels of Current (4-20mA, 0-20mA) or Voltage (0-5, 1-5, 0-10 Vdc). They can be used to retransmit data to other instrumentation such as PLCs.

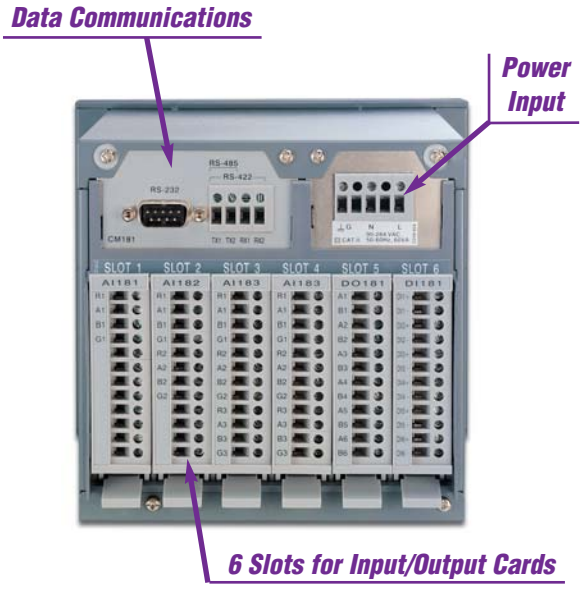
Digital/Relay Output Card

Communication and Software

Observer I software is supplied with the PPR-1800 and is used for transferring data manually between the recorder and a personal computer using the CompactFlash™ Memory Card. It has Configuration and Historical Viewer sections.

The optional Observer II software is used when the PPR-1800 is hardwired into an Ethernet network, or used independently with an RS232 / 422 / 485 interface. It has a Realtime Viewer in addition to the Configuration, and Historical Viewer sections.

After receiving the data in the Historical Viewer section, the Observer I or II software allows the user to export the data in MS Excel® format.



CompactFlash™ Memory Card Storage Media

The external memory of choice in an industrial environment with its inherent vibration and dirt is the CompactFlash™ Memory Card. The CF memory cards, with no moving parts, are advantageous over floppy drives, which are susceptible to failure in the industrial environment.

A 32MB capacity CF memory card is provided with the recorder. The memory port is located in the front of the unit behind the access door. This can be upgraded to 128MB, 256MB or 1GB CF card at a nominal fee. Alternatively, the user can purchase them locally. To ensure compatibility, Tempco recommends only SanDisk or Transcend brands.

Each data record uses 2 bytes of CF card memory. The following formula is provided to calculate how long a CF memory card could last before it is full, assuming 24-hour operation.

$$\text{\# of days} = \frac{\text{CF card capacity}}{\text{[(\# of channels x 172800) / reading interval in secs.]}}$$

Example: 6 analog channels, 128MB CF card, recording every 5 seconds.

$$617 \text{ days} = \frac{128{,}000{,}000}{\text{[(6 x 172800) / 5 seconds]}}$$

Firmware Option for Mathematics, Counter, Totalizer and FDA 21 CER Part II Compliance

Mathematical functions such as addition, subtraction, sine or cosine, etc. can be applied to an analog channel or channels and stored, or displayed on a "Math" defined channel.

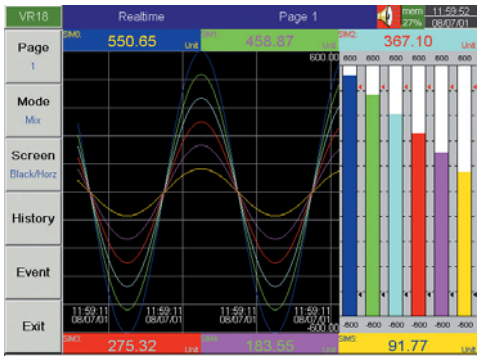
The Counter provides up to 6 counters with 2 actions/jobs per counter. Name, description, unit, preset value and type can be configured.

The Totalizer provides up to 6 totalizers with 2 actions/jobs per totalizer. Name, description, unit, period, preset value and type can be configured.

FDA 21 CER Part 11 compliance software is included with the Math Functions option. This software routine follows the rules for electronic historical documentation as established by the Food and Drug Administration (FDA). It allows the user to establish levels of security and authority for Administrators, Supervisors, and Operators. An audit trail function records the user, time, and type of work done.

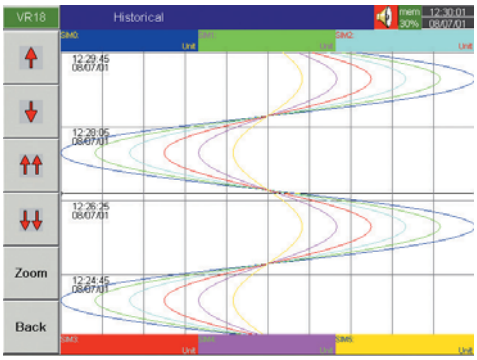
PPR-1800: Various Screen Examples

Mixed Mode



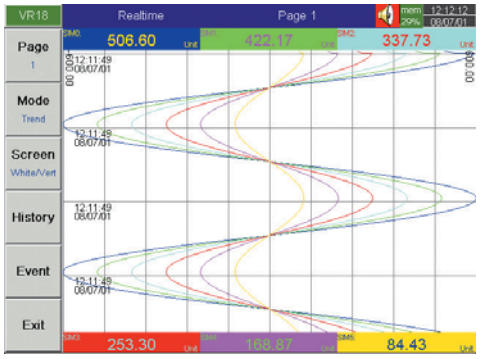
- View maximum of 6 mixed real-time data trends horizontally
- Display data in Bars and Digits together with Mixed Trends
- Recognize data trends easily by different colors and names
- Switch to other configured pages easily by "Page" function key
- Display current "Date/Time" information
- Remind the user of "Alarm" or "Memory Full"

Historical Mode



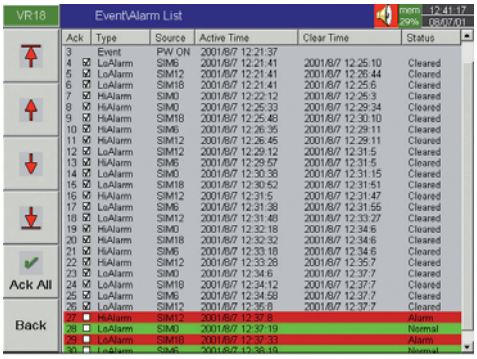
- Display maximum of 6 sets of historical data simultaneously
- View desired data section by "↑" and "↓" function keys
- Access precise data value at a point selected by moving the ruler
- "Zoom" to expand/contract the display time span
- View historical data trends and their respective data values

Trend Mode



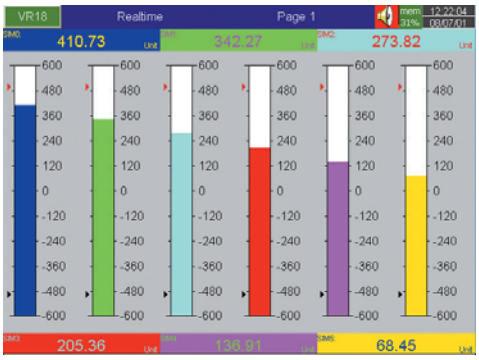
- View maximum of 6 mixed real-time data trends vertically
- Recognize data trends easily by different colors and names
- Switch to other configured pages easily by "Page" function key
- Display current "Date/Time" information
- Remind the user of "Alarm" or "Memory Full"

Alarm List



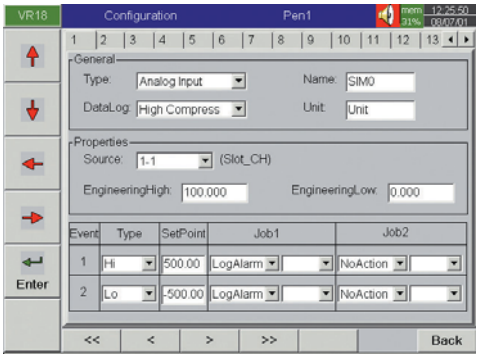
- List all the alarm records clearly with useful information
- Browse through the alarm list or "acknowledge" alarm easily by function keys on the vertical bar
- Remind the user of the alarm status in different colors

Bar Graph Mode



- View maximum of 6 mixed real-time data in Bar Graphs
- Scale individually by user in "configuration"
- Display data value and name in different colors per bar graph
- Mark "Hi/Lo" alarm limits

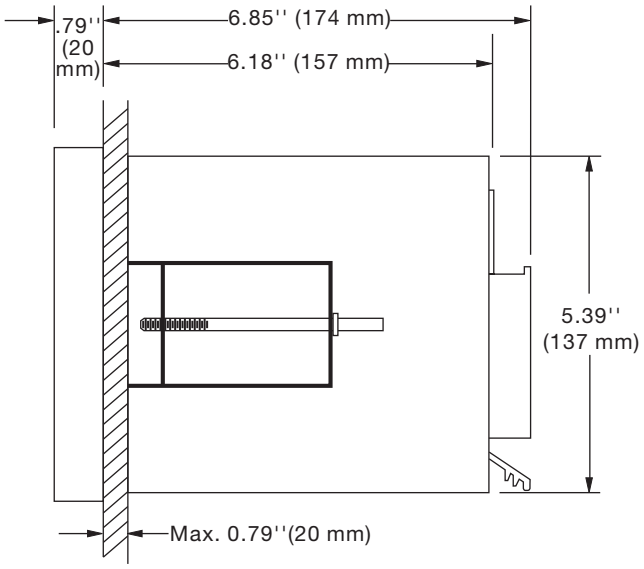
Configuration Mode



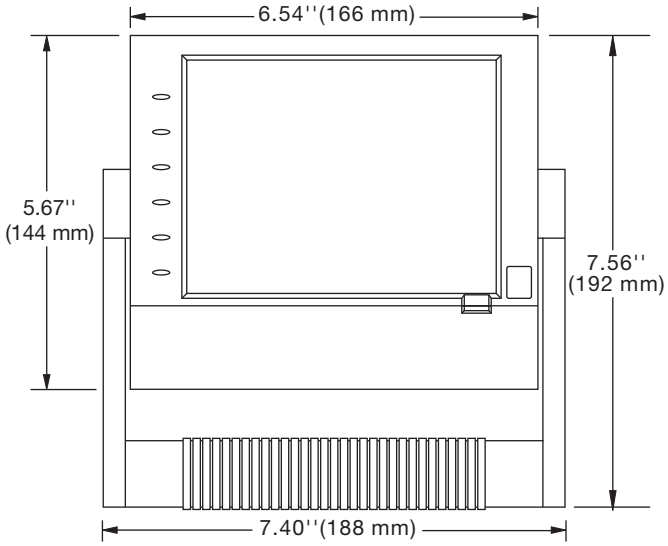
- Configure pen (input/output, pen name, event, job, etc.)
- Configure page (color, pen, decimal, pen width, etc.)
- Configure timer
- Configure instrument (storage media, display, communication, time/date, etc.)

Mechanical Dimensions

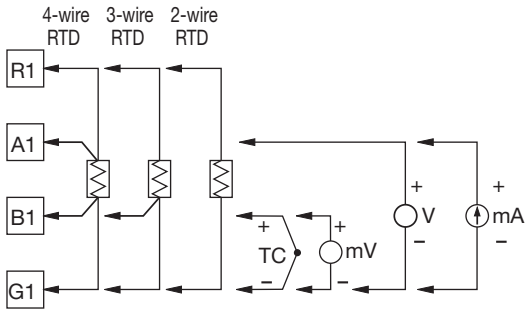
Panel Mount



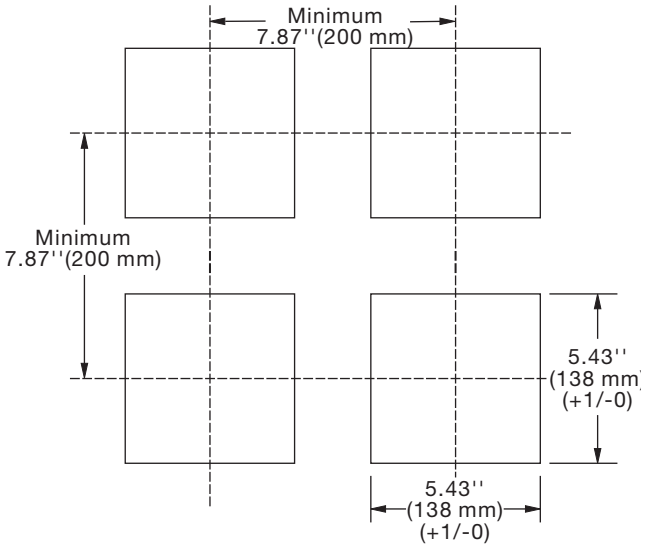
Bench Top/Portable



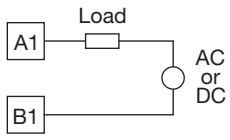
Analog Input Card



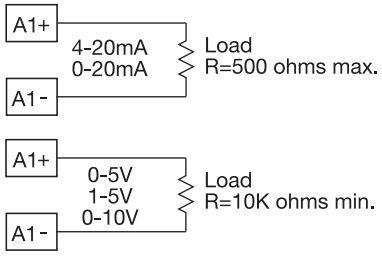
Panel Cutout



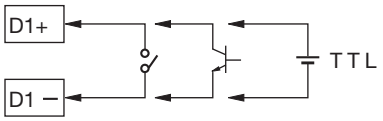
Relay Output Card



Analog Output Card



Digital Input Card



PPR-1800 Videographic Data Logger

Specifications for PPR-1800 Videographic Data Logger

Power
Standard: 90-250 VAC, 47-63 Hz, 60VA, 30W maximum
Optional: 11-18 VDC or 18-36 Vdc, 60VA, 30W maximum

Display: 6.4" TFT LCD, 640 x 480 VGA resolution, 256 colors

Memory
Internal: 8MB storage memory on board
Storage Media: 128MB, 256MB, 512MB or 1GB CompactFlash™ (CF) cards

Analog Input Card
Resolution: 18 bits
Sampling Rate: 5 times per second
Voltage Range: -2 Vdc to 12 Vdc
Temperature Effect: ±1.5μV / °C for all inputs except mA
±3.0μV / °C for mA inputs
Sensor Lead Resistance Effect:
tc: 0.2 μV/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 leads
Common Mode Rejection Ratio (CMRR): 120 db
Normal Mode Rejection Ratio (NMRR): 55 db
Isolation Breakdown Voltage: 430 Vac minimum
Sensor Break Detection: Sensor open for tc, RTD, and mV
Below 1 mA for 4-20 mA inputs
Below 0.25 Vdc for 1-5 Vdc inputs

Input Range Table

Type	Range	Accuracy @ 25°C	Input Impedance
J	-184 to 1832°F -120 to 1000°C	±2°F ±1°C	2.2 MΩ
K	-328 to 2498°F -200 to 1370°C	±2°F ±1°C	2.2 MΩ
T	-418 to 752°F -250 to 400°C	±2°F ±1°C	2.2 MΩ
E	-148to 1652°F -100to 900°C	±2°F ±1°C	2.2 MΩ
B	32 to 3308°F 0 to 1820°C	±4°F ±2°C	2.2 MΩ
R	32 to 3214°F 0 to 1767°C	±4°F ±2°C	2.2 MΩ
S	32 to 3214°F 0 to 1767°C	±4°F ±2°C	2.2 MΩ
N	-418 to 2372°F -250 to 1300°C	±2°F ±1°C	2.2 MΩ
L	-328 to 1652°F -200 to 900°C	±2°F ±1°C	2.2 MΩ
PT100 (DIN)	-346 to 1292°F -210 to 700°C	±0.7°F ±0.4°C	1.3 KΩ
PT100 (JIS)	-328 to 1112°F -200 to 600°C	±0.7°F ±0.4°C	1.3 KΩ
mV	-8 to 70mV	±0.05%	2.2 MΩ
mA	-3 to 27mA	±0.05%	70.5Ω
0-1Vdc	-0.12 to 1.15Vdc	±0.05%	32KΩ
0-5Vdc	-1.3 to 11.5Vdc	±0.05%	332KΩ
1-5Vdc	-1.3 to 11.5Vdc	±0.05%	332KΩ
0-10Vdc	-1.3 to 11.5Vdc	±0.05%	332KΩ

Digital Input Card
Channels: 6 per card
Logic Low: -5 to 0.8 VDC
Logic High: 2 to 5 VDC
External Pull Down Resistance: 1K ohm maximum
External Pull Up Resistance: 1.5M ohm minimum

Relay/Digital Output Card
Channels : 6 per card
Contact Form: N. O. (STST/form A)
Relay Rating: 5A / 240 Vac

Analog Output Cards
Output Signal: Current: 4-20mA, 0-20mA or
Voltage: 0-5V, 1-5V, 0-10VDC
Resolution: 15 bits
Accuracy: ±0.05% of span ±0.0025%/°C
Load Resistance: 0-500 ohms (for current output)
10K ohms minimum (for voltage output)
Output Setting Time: 0.1 sec (stable to 99.9%)
Isolation Breakdown Voltage: 1000 VAC minimum

Communication Interface Module
Interface: RS-232, RS-485, RS-422
Protocol: Modbus Protocol RTU mode
Address: 1 - 247
Baud Rate: 0.3 to 38.4 kbits/sec
Data Bits: 7 or 8 bits
Parity Bit: None, Even or Odd
Stop Bit: 1 or 2 bits

Ethernet Interface Module
Protocol: Modbus tcP/IP, 10 BaseT (auto polarity correction)
Ports: AUI and RJ-45 Auto-Detect capability

Infrared Detector
Distance: Detect moving human body within 6.5 ft. / 2m
Delay Time: 10, 20, 30, 40, 50 or 60 minutes set by customer

Environmental and Physical
Operating Temperature: 5 to 50°C (41 to 122°F)
Storage Temperature: -25 to 60°C (-13 to 140°F)
Humidity: 20 to 80% Relative Humidity (non-condensing)
Dielectric Strength: 1350 VAC, 50/60 Hz for 1 minute
Vibration Resistance: 10-55 Hz, 10m/s² for 2 hours
Shock Resistance: 30 m/s² (3g) for operation, 100g for transport
Dimensions: Panel Mount Style: 166mm(w) x 144mm(h) x 174mm(d)
6.54"(w) x 5.67"(h) x 6.85"(d)
Bench Top Style: 166mm(w) x 192mm(h) x 194mm(d)
6.54"(w) x 7.56"(h) x 7.64"(d)
Weight: 5 lbs. (2.6 kg)

Protective Class:
IP 30 front panel
IP 20 housing and terminals

Ordering Worksheet for PPR-1800 Videographic Data Logger

Ordering Code: PPR-1800 – [1] [2] [3] [4] [5] [6] [7] [8] [9] [10]

Power Input *BOX 1*
4 = 90-250 VAC, 47 - 63 Hz
5 = 11-18 VDC
6 = 18 - 36 VDC
8 = 20-28 VAC, 47 - 63 Hz
9 = Other (Specify)

Analog Input(s) *BOX 2*
0 = None
1 = 1 channel
2 = 2 channels
3 = 3 channels
4 = 4 channels
5 = 5 channels
6 = 6 channels
A = 9 channels
B = 12 channels
C = 15 channels
D = 18 channels

Digital Input Card *BOX 3*
0 = None
1 = 6 channels equipped
2 = 12 channels equipped
3 = 18 channels equipped
4 = 24 channels equipped

Digital/Relay Output Card *BOX 4*
0 = None
1 = 6 relays
2 = 12 relays
3 = 18 relays
4 = 24 relays

Communications *BOX 5*
0 = Standard Ethernet Interface
1 = RS-232/422/485 Interface and Ethernet
9 = Other (Specify)

Software *BOX 6*
0 = Basic function with Observer I PC software
1 = Advanced version, Observer II PC software
9 = Other (Specify)

Firmware *BOX 7*
0 = Basic Function
1 = With Mathematics, Counter and Totalizer and FDA 21 CFR part II compliance

Storage Media CF Drive *BOX 8*
3 = 128MB CompactFlash™ Card
5 = 256MB CompactFlash™ Card
7 = 512MB CompactFlash™ Card
6 = 1G CompactFlash™ Card
9 = Other (Specify)

Case / Mounting *BOX 9*
1 = Standard panel mounted style
2 = Bench top / portable style with handle and power cable for US
3 = Bench top / portable style with handle and power cable for Europe

Special Options *BOX 10*
0 = None
1 = 24 Vdc Auxiliary power supply – for transmitter
9 = Special Modification
2 = 3 channel current output
3 = 6 channel current output
4 = 9 channel current output
D = 3 channel voltage output
E = 6 channel voltage output
F = 9 channel voltage output
6 = Panel mounting with front power switch
8 = Item 1 & 6, 24 VDC auxiliary power supply with front power switch

Ordering Information

Videographic Data Logggers are offered with the options listed in the worksheet. 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 one of the basic systems. ***Standard lead time is stock to 3 weeks.***

Basic Systems *(Part Number & Description)*

PPR10001 6 Analog Input Channels, 90-250 Power Input, 6 Digital/Relay Outputs, No Digital Inputs, Communications – RS-232/422/485, Ethernet Interface, Observer II Software, 128MB CompactFlash™ Card storage, Panel Mount Style

PPR10002 6 Analog Input Channels, 90-250 Power Input, No Relay/Digital Outputs, No Digital Inputs, Communications – Standard Ethernet Interface, Observer I Software, 128MB CompactFlash™ Card storage, Panel Mount Style

PPR10003 12 Analog Input Channels, 90-250 Power Input, No Relay/Digital Outputs, No Digital Inputs, Communications – Standard Ethernet Interface, Observer I Software, 128MB CompactFlash™ Card storage, Panel Mount Style

PPR10004 12 Analog Input Channels, 90-250 Power Input, 6 Relay/Digital Outputs, No Digital Inputs, Communications – RS-232/422/485, Ethernet Interface, Observer II Software, 128MB CompactFlash™ Card storage, Portable Style with Handle

Accessories – PPR-1800

PPR10901 Analog Input Card – 3 channels
PPR10905 Analog Input Card – 2 channels
PPR10906 Analog Input Card – 1 channel
PPR10923 Analog Linear Input Card – 3 channels (±mA, ±V)
PPR10924 Analog Output Card – 3 channels (voltage output)
PPR10925 Analog Output Card – 3 channels (current output)
PPR10903 Digital Input Card – 6 channels
PPR10904 Relay/Digital Output Card – 6 relays

TEC-112-103 CompactFlash™ Memory Card – 128MB
TEC-112-105 CompactFlash™ Memory Card – 256MB
TEC-112-107 CompactFlash™ Memory Card – 512MB
TEC-112-106 CompactFlash™ Memory Card – 1GB
PPR10909 Observer I PC Software
PPR10910 Observer II PC Software, Minimum System Requirements: 200MHz Pentium PC with 64MB RAM. Windows 98, NT, 2000 or XP

RCR-3000 Chart Recorder

RCR-3000 Pen / Multi-Point 180 mm Chart Recorder

Design Features

- *Recording of 1, 2, 3 or 4 pens, or 6, 12, 24 or 30 points/channels*
- *180 mm chart paper size, 288 x 288 mm metal housing*
- *Universal & programmable inputs and ranges*
- *Wide range of power input voltages*
- *Individual scale plate assignments*
- *Both trend & data logging printouts*
- *Contact-free feedback potentiometer or input selector*
- *Optional communication interface for RS-232C, RS-485 or RS-422A*
- *Agency approval:* CE

Standard Functions

Function	Description
Analog Indication	Process variable indicated on a scale plate.
Analog Recording	Pen tracing (pen models) or printing by 6-color ribbon cartridge (multi-point models).
Unit Indication	Engineering unit indicated on the scale plate.
Digital Display	Indicates channel number, process variable, date, chart speed, alarm setpoint
Scaling	Indicates and prints process variable with setpoint.
Logging Print	Prints process variable, channel number, time and skip sign at a programmed time.
Calendar	Prints year and time at a programmed interval.
Time Print	Prints time at a programmed interval.
List Print	Prints type of input, range, engineering unit, alarm setpoint, date, time, chart speed, scaling & logging print status on the chart paper.
Programming	Chart speed, alarm setpoint, logging print interval, skip, date & time can be programmed.
Memory Backup	Backup for clock by lithium batteries and for program by non-volatile memory.
Key Lock	Enters automatically into data lock after 5 minutes of non-key operation.

Function	Description
Time Indicator	Indicates year, month, day, hour, minute. Adjusts for leap year automatically.
Self Diagnostics	Indicates “Error” and code when there is a fault.
Open Input Indication	Sets indicator at over 100% or 0% for an input.
Zone Recording	Recording on chart track ranged for a certain zone.
Alarm on Print	Prints time, input number, setting number, and type of alarm.
Alarm Recovery on Print	Prints recovered time, channels, setting number, type of alarm.
Damping	Digital filtering for measured data (process variable) in unsteady process (pen model only) Filter constant rangeability: 1.0000 - 0.0001 Formula: k = 0.64 / T1 k = Filter constant T1 = 99.5% damping
Alarm Hysteresis	Alarm hysteresis width can be set.

Specifications & Features– RCR-3000 Chart Recorder

Input Signal
Number of Inputs: 1, 2, 3 or 4 Pens, or 6, 12, 24 or 30 Points
Type of Inputs:
Thermocouple – J, K, T, E, B, S, R, G, C, N, U, L, Au-Fe
RTD – PT100, PT50, JPT100, CU10
DC Voltage – 4 mVdc minimum, 20 Vdc maximum
Current – 4–20 mA dc
Input Impedance:
mV/tc input – 10MW
Vdc input – 1MW, mA input - 100W

Performance
Recording Width: 180 mm calibrated
Recording Accuracy: ±0.5% maximum
Open Input/Burnout Protection: Up or down scale (T/C, RTD, mV, mA)
Input Sampling:
Pen model – 120 msec
Multi-point model – 5 sec per channel
Common Mode Rejection Ratio (CMRR): 140 db
Normal Mode Rejection Ratio (NMRR): 60 db
Clock Precision: ±50 ppm

Power Source
Power Input: 85 to 264 Vac, 45 to 65 Hz
Power Consumption: 65 VA
Dielectric Strength:
Power input/ground – 1500 Vac
Input/ground – 500 Vac

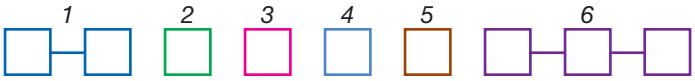
Recording and Printing
Chart Speed:
Pen model – 1 to 3600 mm/hr, 1 to 300 mm/hr
Multi-point model – 1 to 1800 mm/hr
Chart Paper: Z fold chart paper, 75 ft. (23 m) long
Pen Response: 1 sec. maximum to 90% of input step change
Recording Color:
Pen model – red, blue, green & purple
Multi-point model – purple, red, black, green, blue, brown
Dot Print Interval: 5 sec. per channel
Chart Feed Accuracy: ±0.1% maximum

Alarm-Input/Output
Alarm: 4 setpoints per channel
Alarm Output: 1 relay drive per setting, up to 8 relays
250 Vac 3A/ 30Vdc 3A/ 125Vdc 0.5A

Normal Operating Conditions
Operating Conditions: 32° to 122°F (0° to 50°C), 35 to 85% RH
Vibration Resistance: 1 m/s² maximum 10 - 60 Hz
Shock Resistance: 2 m/s² maximum

Structure
Dimensions: 288 x 288 x 340 mm
Mounting: Panel mount, allowable inclination - 30°
Panel Cutout: 282 × 282 mm (11.1" × 11.1")
Net Weight:
1 pen model – 31 lb. (14 kg)
2 pen model – 33 lb. (15 kg)
3 pen model – 35 lb. (16 kg)
4 pen model – 40 lb. (18 kg)
Multi-point model – 33 lb. (15 kg)

Ordering Code: RCR-3000 –



Pen or Multi-Point Recorder *BOX 1*
01 = 1 pen
02 = 2 pens
03 = 3 pens
04 = 4 pens
06 = 6 points, dotting
12 = 12 points, dotting
24 = 24 points, dotting
30 = 30 points, dotting

Communication Interface *BOX 2*
0 = None
1 = RS - 232C
2 = RS - 422A
3 = RS - 485

Digital Input / Output (DI/DO) *BOX 3*
0 = None
1 = 8 Alarms
2 = Digital Input options
3 = 8 alarms + DI remote options

Door Color *BOX 4*
1 = Standard Black

Custom Specifications *BOX 5*
0 = None
1 = Yes

Special Options *BOX 6*
000 = None

Ordering Information
The **RCR-3000** is offered with the options listed in the worksheet. 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 one of the basic systems.
Standard lead time is stock to 4 weeks.

Basic Systems

Part Number	Description
RCR50001	6-point dotting, no digital input/output, no communications or special options
RCR50002	6-point dotting, 8 alarms, no communications or special options
RCR50003	3-pen recording, no digital input/output, no communications or special options
RCR50004	3-pen recording, 8 alarms, no communications or special options

Accessories – RCR-3000

RCA50901 . . . . . Chart paper – Z fold style, 75 ft. (23 m) long
RCA50902 . . . . . Pens, 5 per pack
RCA50903 . . . . . Replacement ribbon for multi-point unit

RCR-600 6-Point 100 mm Chart Recorder

Design Features

- *6-Channel dotting recorder*
- *100 mm chart paper size*
- *144 x 144 mm metal housing*
- *Weighs only 3.3 lb. (1.5 Kg)*
- *NEMA 4 / IP65 Dustproof water resistant housing*
- *Universal settable input and range*
- *Optional 6 alarm-relay outputs*
- *Optional 3 digital inputs*
- *Optional communication interface for RS-232*
- *Agency approvals:*

Standard Functions

Function	Description
Analog Recording	Makes analog recording with 6 colored dots.
Digital Display	Indicates channel number, process variable, date, chart speed and alarm setpoint.
Logging Print	Prints date, time, scaling, chart speed, process variable, and engineering unit at a programmed interval.
List Print	Prints chart speed, sensor type, measurement range, engineering unit, alarm setting value comment, printing description, logging print and on/off zone.
Affix Print	Prints channel number by the analog recording.
Dot Print Skip	Skips recording of an unused channel.
Programming	Programs chart speed, alarm setting value, logging, dot point skip, date and time.
Memory	A built-in lithium battery protects the clock function backup.
Alarm	Sets 2 types–high and low–per channel for a total of 4 levels.
Clock	Indicates year, month, day, hour and minute.
Self Diagnostics	Indicates “Error” and code when there is a fault.

Function	Description
Open Input Indication	Sets indicator at over 100% or 0% for an input.
Tag Number	Sets a tag number by 7 figures every channel.
Copy Function	Copies a channel setup.
Setting Input Offset	Setting input offset is possible for every channel.
Zone Recording	Specifies a recording area for every channel to separate into tracks.
Alarm Print	Prints occurrence time, occurrence channel, setting number, and alarm type in purple at occurrence of alarm.
Alarm Recovery Print	Prints recovery time, recovery channel, setting number, and alarm type in purple at recovering of an alarm.
Alarm Hysteresis	Sets an alarm hysteresis width 0% full scale or 0.5% full scale.

Specifications & Features – RCR-600 Chart Recorder

Input Signal
Thermocouple: J, K, T, E, B, S, R, C, N, U, L, Au-Fe
RTD: PT100, JPT100
DC Voltage: ±10mV, 0-20mV, 0-50mV, ±1V, 1-5V
Current: 4-20 mA dc, with external 250W shunt resistor

Performance
Recording Width: 100 mm calibrated
Recording Accuracy: ±0.2% ±1 digit maximum for display/printing
Input Impedance: mV/tc input - 10MW
Vdc input - 1MW, mA input - 100W
Common Mode Rejection Ratio (CMRR): 140 db
Normal Mode Rejection Ratio (NMRR): 60 db
Dielectric Strength: Power input/ground - 1500 Vac
Input/ground - 500 Vac
Vibration Resistance: 1 m/s^2 maximum 10 - 60 Hz
Shock Resistance: 2 m/s^2 maximum
Chart Feed Accuracy: ±0.1% maximum
Clock Precision: ±50 ppm

Power Source
Power Input: 85 to 264 Vac
Frequency: 45 to 65 Hz
Power Consumption: 30 VA

Recording and Printing
Recording: Raster-scan printing
Printing: Dotting with 6-color ribbon
Dot Print Interval: 10.0 second / 6 channel maximum
Chart Paper: Length - 52.5 ft. (16m)
Chart Speed: 28 speeds, user selectable, from 10-1500 mm/hr
Printing Colors: Purple, red, green, blue, brown, black

Alarm - Input/Output
Outputs: 1 relay drive per setting, up to 6 relays
250 Vac 3A/ 30Vdc 3A/ 125Vdc 0.5A
Quantity per Channel: 4
Digital Inputs: Maximum of 3

Normal Operating Conditions
Ambient Temperature: 32° to 122°F (0° to 50°C)
Relative Humidity: 35 to 85%, non-condensing

Communications
Standard: RS-232C
Optional: RS-485 (Modbus RTU)

Structure
Dimensions: 144 × 144 × 175 mm (5.7" × 5.7" × 6.9")
Mounting: Panel mount, allowable inclination – 30°
Panel Cutout: 138 × 138 mm (5.43" × 5.43")

Ordering Code: RCR-600 – [1] [2] [3]

Digital input / output *BOX 1*
0 = None
1 = 6 Relay output
2 = 3 Digital inputs
3 = 3 Digital inputs + 6 relay outputs

Out of Paper Sensor *BOX 2*
0 = None
1 = Yes

Data Communications *BOX 3*
0 = RS - 232C Interface
1 = RS - 485 Interface

Ordering Information
The **RCR-600** is offered with the options listed in the worksheet. 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 one of the basic systems.

Standard lead time is stock to 4 weeks.

Basic Systems

Part Number	Description
RCR40001	6-point dotting, 6 relay/digital outputs, no out of paper sensor, with RS-232C data interface
RCR40002	6-point dotting, no relay/digital outputs, no out of paper sensor, with RS-232C data interface
RCR40003	6-point dotting, 6 relay/digital outputs & 3 digital inputs, no out of paper sensor, with RS-232C data interface
RCR40005	6-point dotting, 6 relay outputs, has out of paper sensor, with RS-232C data interface

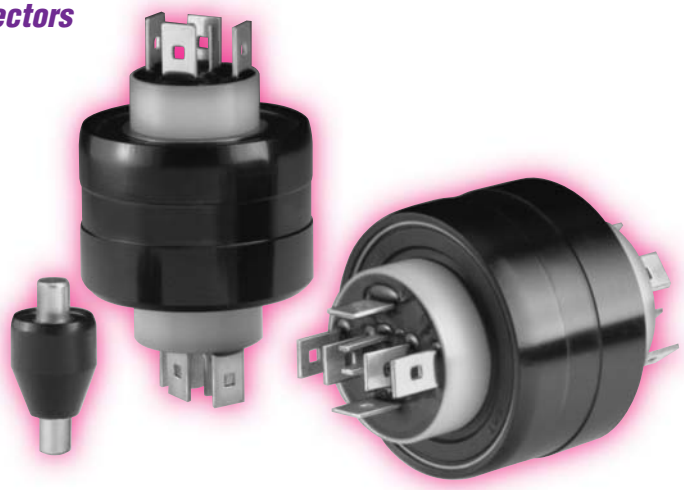
Accessories – RCR-600

RCA40901 . . . . . Chart paper – Z fold style, 52.5 ft. (16 m)
RCA40902 . . . . . Replacement Multi-Color Ribbon
RCA40903 . . . . . Precision Shunt Resistor, 250W
RCA40904 . . . . . Portable Case

Rotating Multi-Pin Electrical Connectors

Do you want a superior connection or an ordinary slip ring assembly?

Choose TEMPCO's Rotating Electrical Connectors for Higher Operating Efficiencies . . .



Design Features

- *Superior to conventional slip rings*
- *Extremely low electrical noise*
- *Less than 1 milliohm resistance*
- *Sealed, ball bearing construction*
- *Increased reliability, no maintenance*
- *Durable, compact, low cost*

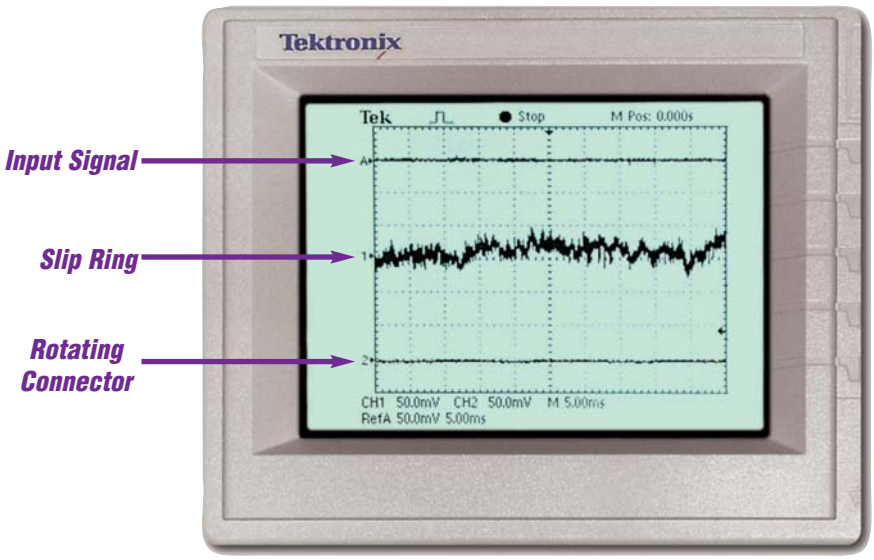
Multi-Pin Rotating Connectors Offer Superior Performance

Slip rings require maintenance and lose signal quality over time due to wear and debris on the brushes and commutator. Tempco's Rotating Electrical Connectors are maintenance free. They last much longer than slip ring assemblies, and the signal does not degrade over time.

Slip rings introduce electrical noise into the signal being transmitted, as shown on the oscilloscope below. Tempco's Rotating Electrical Connectors transmit with near zero electrical noise, so the same connector style can be used for power and signal transmission, saving money.

Slip rings typically last for a few million revolutions. Tempco's Rotating Electrical Connectors typically last hundreds of millions of revolutions. In many applications they can last over a billion revolutions.

The superior performance of Tempco's Rotating Electrical Connectors is attributable to the unique design of the connector. The electrical conduction path is a liquid metal that is molecularly bonded to the contacts. This creates a connection that is constant and unchanged for the life of the connector.



Typical Applications

- *Heating Elements*
- *Thermocouples*
- *Rotating Antennas*
- *Turntables*
- *Cable Reels*
- *Instrumentation*
- *Testing and Control Devices*
- *Lamps*
- *Signs*
- *Displays*
- *Packaging Equipment*
- *Robotics*
- *Strain Gauges*
- *Heated Rollers*

Ordering Information

Order by the part number of the rotating connector and accessories that match your requirements.

Standard lead time is stock to 3 weeks.

SINGLE CONDUCTOR

1 Conductor, 10 Amp — Model 110

Part No.	Conductors	Description	VOLTAGE AC/DC	AMP RATING AT 240 VAC	MAX FREQ. MHz	CONTACT RESISTANCE	MAX OP. RPM	TEMPERATURE Max.F(C) / Min.F(C)	ROTATION Torque (gm-cm)	CIRCUIT SEPARATION
MER00110	1	Standard Model	N/A	10	200	<1mΩ	3600	140(60)/-20(-29)	35	N/A
MER00112	1	Stainless Steel Bearing	N/A	10	200	<1mΩ	3600	140(60)/-20(-29)	35	N/A
MER00113	1	Low Torque	N/A	10	200	<1mΩ	1200	140(60)/-20(-29)	10	N/A

ACCESSORIES

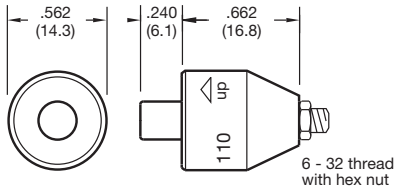
MER90002 one-contact receptacle

MER90003 one-contact receptacle w/ 6" wire

MER90001 one-contact cap w/solder lug

MER90004 ring terminal (12-10 AWG)

Receptacle used for mounting to rotating device.
Accessories required for wire connections. Order separately.



Inch
(mm)

1 Conductor, 10 Amp — Model 110-T

Part No.	Conductors	Description	VOLTAGE AC/DC	AMP RATING AT 240 VAC	MAX FREQ. MHz	CONTACT RESISTANCE	MAX OP. RPM	TEMPERATURE Max.F(C) / Min.F(C)	ROTATION Torque (gm-cm)	CIRCUIT SEPARATION
MER00111	1	Standard Model	N/A	10	200	<1mΩ	3600	140(60)/-20(-29)	35	N/A
MER00115	1	Stainless Steel Bearing	N/A	10	200	<1mΩ	3600	140(60)/-20(-29)	35	N/A
MER00114	1	Low Torque	N/A	10	200	<1mΩ	1200	140(60)/-20(-29)	10	N/A

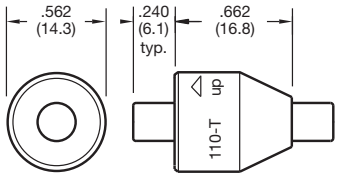
ACCESSORIES

MER90002 one-contact receptacle

MER90003 one-contact receptacle w/ 6" wire

MER90001 one-contact cap w/ solder lug

Receptacle used for mounting to rotating device.
Accessories required for wire connections. Order separately.



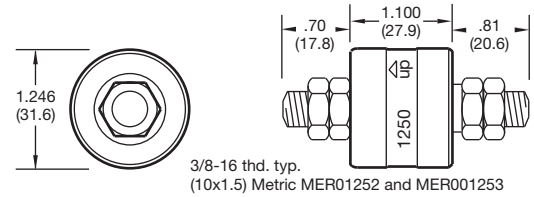
Inch
(mm)

1 Conductor, 250 Amp — Model 1250

Part No.	Conductors	Description	VOLTAGE AC/DC	AMP RATING AT 240 VAC	MAX FREQ. MHz	CONTACT RESISTANCE	MAX OP. RPM	TEMPERATURE Max.F(C) / Min.F(C)	ROTATION Torque (gm-cm)	CIRCUIT SEPARATION
MER01250	1	Standard Model	N/A	250	200	<1mΩ	1200	140(60)/-20(-29)	250	N/A
MER01251	1	Stainless Steel Bearing	N/A	250	200	<1mΩ	1200	140(60)/-20(-29)	250	N/A
MER01252	1	Metric Thread (10x1.5)	N/A	250	200	<1mΩ	1200	140(60)/-20(-29)	250	N/A
MER01253	1	Metric Thread & Stainless Steel Bearing	N/A	250	200	<1mΩ	1200	140(60)/-20(-29)	250	N/A
MER01254	1	Stainless Steel Body & Bearing	N/A	250	200	<1mΩ	1200	140(60)/-20(-29)	250	N/A
MER01255	1	Metric Thd., Stainless Steel Body & Bearing	N/A	250	200	<1mΩ	1200	140(60)/-20(-29)	250	N/A

ACCESSORIES

MER90106
Boot Kit
For dust and splash protection
IP51



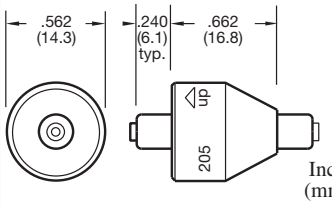
Inch
(mm)

3/8-16 thd. typ.
(10x1.5) Metric MER01252 and MER001253

2 & 3 CONDUCTORS

2 Conductors, 4 Amp — Model 205

Part No.	Conductors	Description	VOLTAGE AC/DC	AMP RATING AT 240 VAC	MAX FREQ. MHz	CONTACT RESISTANCE	MAX OP. RPM	TEMPERATURE Max.F(C) / Min.F(C)	ROTATION Torque (gm-cm)	CIRCUIT SEPARATION
MER00205	2	Standard Model	0-250	4	200	<1mΩ	2000	140(60)/45(7)	75	>25MΩ
MER00208	2	Stainless Steel Bearing	0-250	4	200	<1mΩ	2000	140(60)/45(7)	75	>25MΩ
MER00207	2	Low Torque/Low Temp.	0-250	4	200	<1mΩ	1200	140(60)/-20(-29)	20	>25MΩ
MER00210	2	Low Temp. Stainless Steel Bearing	0-250	4	200	<1mΩ	1200	140(60)/-20(-29)	75	>25MΩ
MER00206	2	High RPM	0-250	4	200	<1mΩ	3600	140(60)/45(7)	35	>25MΩ
MER00209	2	High RPM Stainless Steel Bearing	0-250	4	200	<1mΩ	3600	140(60)/45(7)	35	>25MΩ



Inch
(mm)

Accessories

MER90015 two-contact receptacle w/ one 6" wire

MER90005 two-contact receptacle w/ two 6" wires

MER90007 two-contact cap w/ solder lugs

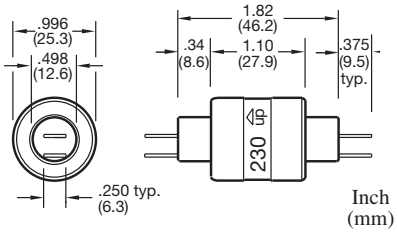
MER90006 two-contact receptacle w/ two solder holes

Receptacle used for mounting to rotating device.

Accessories required for wire connections. Order separately.

2 Conductors, 30 Amp — Model 230

Part No.	Conductors	Description	VOLTAGE AC/DC	AMP RATING AT 240 VAC	MAX FREQ. MHz	CONTACT RESISTANCE	MAX OP. RPM	TEMPERATURE Max.F(C) / Min.F(C)	ROTATION Torque (gm-cm)	CIRCUIT SEPARATION
MER00230	2	Standard Model	0-250	30	200	<1mΩ	1800	140(60)/-20(-29)	200	>25MΩ
MER00231	2	Stainless Steel Bearing	0-250	30	200	<1mΩ	1800	140(60)/-20(-29)	200	>25MΩ



Inch
(mm)

Includes (2) MER90009 and (2) MER90010

Accessories

MER90010
Terminal
16-14 AWG

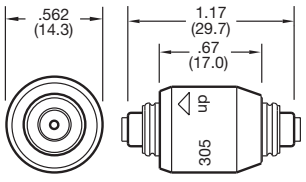
MER90101
Boot Kit
For dust and splash protection
IP51

MER90009 Terminal
16-14 AWG

Terminals for other wire gauges available.

3 Conductors, 4 Amp — Model 305

Part No.	Conductors	Description	VOLTAGE AC/DC	AMP RATING AT 240 VAC	MAX FREQ. MHz	CONTACT RESISTANCE	MAX OP. RPM	TEMPERATURE Max.F(C) / Min.F(C)	ROTATION Torque (gm-cm)	CIRCUIT SEPARATION
MER00305	3	Stainless Steel Bearing Standard	0-250	4	200	<1mΩ	1800	140(60)/45(7)	100	>25MΩ
MER00316	3	Low Temperature	0-250	4	200	<1mΩ	1000	140(60)/-20(-29)	100	>25MΩ



Inch
(mm)

Accessories

MER90014 three-contact receptacle w/ three 6" wires

MER90013 three-contact cap w/ solder lugs

Receptacle used for mounting to rotating device.

Accessories required for wire connections. Order separately.

3 & 4 CONDUCTORS

3 Conductors, Combination 4 Amp & 30 Amp — Model 331

Part No.	Conductors	Description	VOLTAGE AC/DC	AMP RATING AT 240 VAC	MAX FREQ. MHz	CONTACT RESISTANCE	MAX OP. RPM	TEMPERATURE Max.F(C) / Min.F(C)	ROTATION Torque (gm-cm)	CIRCUIT SEPARATION
MER00331	3	Standard Model	0-250	2@4/1@30	100	<1mΩ	1800	140(60)/-20(-29)	200	>25MΩ
MER00333	3	Stainless Steel Bearing	0-250	2@4/1@30	100	<1mΩ	1800	140(60)/-20(-29)	200	>25MΩ

ACCESSORIES

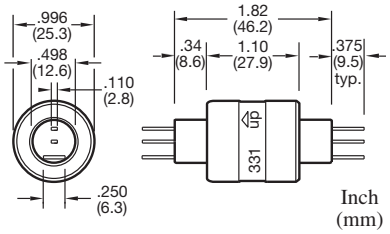
MER90010
Terminal
16-14 AWG

MER90101
Boot Kit
For dust and splash protection
IP51

MER90009 Terminal
16-14 AWG

MER90008 Terminal
22-18 AWG

Terminals for other wire gauges available.



Inch
(mm)

Includes (1) MER90010,
(1) MER90009 and (4) MER90008

3 Conductors, 30 Amp — Model 330

Part No.	Conductors	Description	VOLTAGE AC/DC	AMP RATING AT 240 VAC	MAX FREQ. MHz	CONTACT RESISTANCE	MAX OP. RPM	TEMPERATURE Max.F(C) / Min.F(C)	ROTATION Torque (gm-cm)	CIRCUIT SEPARATION
MER00330	3	Standard Model	0-250	30	100	<1mΩ	1200	140(60)/-20(-29)	300	>25MΩ
MER00332	3	Stainless Steel Bearing	0-250	30	100	<1mΩ	1200	140(60)/-20(-29)	300	>25MΩ

ACCESSORIES

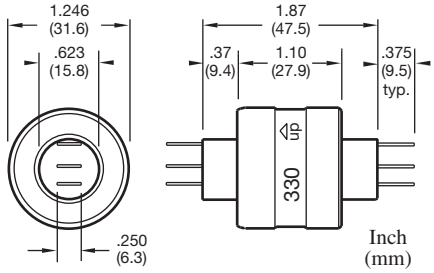
MER90010
Terminal
16-14 AWG

MER90102
Boot Kit
For dust and splash protection
IP51

MER90021
Shrink Tube

MER90019
Terminal 16-14 AWG

Terminals for other wire gauges available.



Inch
(mm)

Includes (3) MER90010,
(3) MER90019 and (3) MER90021

4 Conductors, Combination 4 Amp & 30 Amp — Model 430

Part No.	Conductors	Description	VOLTAGE AC/DC	AMP RATING AT 240 VAC	MAX FREQ. MHz	CONTACT RESISTANCE	MAX OP. RPM	TEMPERATURE Max.F(C) / Min.F(C)	ROTATION Torque (gm-cm)	CIRCUIT SEPARATION
MER00430	4	Standard Model	0-250	2@4/2@30	100	<1mΩ	1200	140(60)/-20(-29)	400	>25MΩ
MER00431	4	Stainless Steel Bearing	0-250	2@4/2@30	100	<1mΩ	1200	140(60)/-20(-29)	400	>25MΩ

ACCESSORIES

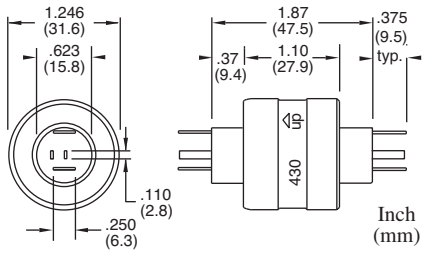
MER90022 Plug Assembly
12-in. wires, 14 AWG & 18 AWG
SUITABLE FOR UP TO 20 AMPS

MER90102
Boot Kit
For dust and splash protection
IP51

MER90010
16-14 AWG

MER90009, 16-14 AWG

MER90008, 22-18 AWG



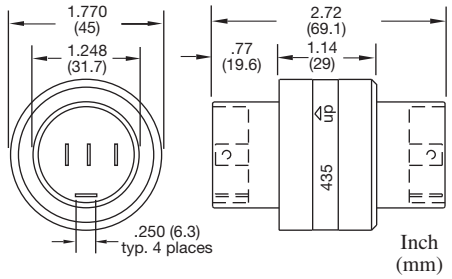
Inch
(mm)

Includes (2) MER90009,
(2) MER90010 and (4) MER90008

4, 6 & 8 CONDUCTORS

4 Conductors, 30 Amp, High Voltage — Model 435

Part No.	Conductors	Description	VOLTAGE AC/DC	AMP RATING AT 240 VAC	MAX FREQ. MHz	CONTACT RESISTANCE	MAX OP. RPM	TEMPERATURE Max.F(C) / Min.F(C)	ROTATION Torque (gm-cm)	CIRCUIT SEPARATION
MER00435	4	High Voltage Model	0-500	30	100	<1mΩ	300	140(60)/-20(-29)	850	>50MΩ
MER00436	4	High Voltage Stainless Steel Bearing	0-500	30	100	<1mΩ	300	140(60)/-20(-29)	850	>50MΩ



Includes (4) MER90009 and (4) MER90010

ACCESSORIES

MER90009
Terminal 16-14 AWG

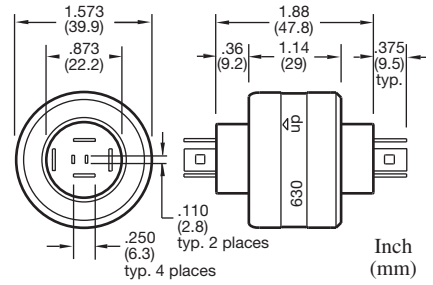
MER90010
Terminal
16-14 AWG

MER90103
Boot Kit
For dust and splash protection
IP51

Terminals for other wire gauges available.

6 Conductors, Combination 4 Amp & 30 Amp — Model 630

Part No.	Conductors	Description	VOLTAGE AC/DC	AMP RATING AT 240 VAC	MAX FREQ. MHz	CONTACT RESISTANCE	MAX OP. RPM	TEMPERATURE Max.F(C) / Min.F(C)	ROTATION Torque (gm-cm)	CIRCUIT SEPARATION
MER00630	6	Standard Model	0-250	2@4/4@30	100	<1mΩ	300	140(60)/-20(-29)	700	>25MΩ
MER00631	6	Stainless Steel Bearing	0-250	2@4/4@30	100	<1mΩ	300	140(60)/-20(-29)	700	>25MΩ



Includes (4) MER90008, (4) MER90010, (4) MER90019 and (4) MER90021

ACCESSORIES

MER90008
Terminal 22-18 AWG

MER90021
Shrink Tube

MER90019
Terminal 16-14 AWG

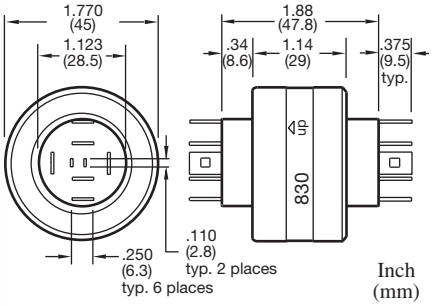
MER90010
Terminal
16-14 AWG

MER90104
Boot Kit
For dust and splash protection
IP51

Terminals for other wire gauges available.

8 Conductors, Combination 4 Amp & 30 Amp — Model 830

Part No.	Conductors	Description	VOLTAGE AC/DC	AMP RATING AT 240 VAC	MAX FREQ. MHz	CONTACT RESISTANCE	MAX OP. RPM	TEMPERATURE Max.F(C) / Min.F(C)	ROTATION Torque (gm-cm)	CIRCUIT SEPARATION
MER00830	8	Standard Model	0-250	2@4/6@30	100	<1mΩ	200	140(60)/-20(-29)	1000	>25MΩ
MER00831	8	Stainless Steel Bearing	0-250	2@4/6@30	100	<1mΩ	200	140(60)/-20(-29)	1000	>25MΩ



Includes (4) MER90008, (6) MER90010, (6) MER90019 and (6) MER90021

ACCESSORIES

MER90008
Terminal 22-18 AWG

MER90021
Shrink Tube

MER90019
Terminal 16-14 AWG

MER90010
Terminal
16-14 AWG

MER90105
Boot Kit
For dust and splash protection
IP51

Terminals for other wire gauges available.

TECHNICAL INFORMATION

MOUNTING

- Rotating connectors may be used in any position between vertical and 90° horizontal. The UP arrow should not point below horizontal.
- Model 110, 110-T, 205 and 305 connectors use the knurled receptacle inserted into the rotating member for mounting. This receptacle holds the rotating connector.
- Larger rotating connectors use either the body or the plastic collar for mounting to the rotating member.
- In horizontal applications, mount the connector with the body rotating to reduce mechanical loads on the bearing.
- Limit mounting eccentricity to a maximum of .005" TIR.
- Rotating connectors are not designed to carry mechanical loads. One end should be allowed to float, attached only by the connecting wires.

CONNECTION

- Use stranded wires of ample length and flexibility for the connection in order to avoid mechanical loads.
- Terminal accessories are push-on quick disconnects which crimp onto the connecting wires and push onto the connector tabs.
- Do not solder wires to the connector or bend tabs as such misuse will cause connector failure and void the warranty.
- Provide overload protection to the electrical circuit containing the rotating electrical connector.
- If wire wrapping occurs from too much connector torque, it is suggested to use a torque arm positioned to float against a fixed stop.

TEMPERATURE

- Provide thermal insulation where necessary to prevent the connector temperature from exceeding 140°F (60°C). Rotating electrical connectors contain plastic materials that are sensitive to heat.
- Overheating will cause connector failure and voids the warranty.

VIBRATION/SHOCK

- Vibration or mechanical shock will reduce connector life or cause failure.
- If vibration or shock is present, we suggest a flexible isolating mounting.

FOOD APPLICATIONS

- Rotating electrical connectors are factory sealed but do contain mercury and other fluids.
- As a precaution, a protective housing is suggested to isolate the rotating connector from the food product.

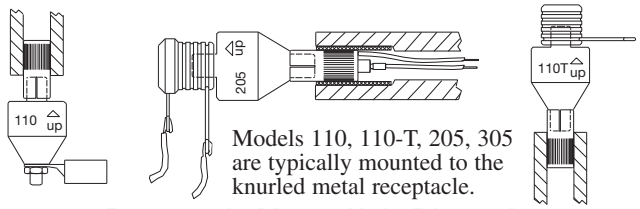
BOOT KIT

- The boot kit is not watertight or intended for waterproofing but is designed to give protection to the wire terminals from splashing water or dust. The protection rating is IP51.

RECYCLING

Rotating electrical connectors contain mercury and should not be disposed of in the trash but only through mercury recycling programs. Tempco offers a mercury recycling service for this purpose. Ship spent connectors to our facility by UPS ground enclosed in a plastic bag. Include paperwork stating, "for recycling" with your company name, phone and fax numbers. Do not send through the U.S. Mail.

Suggested Mounting Methods



Models 110, 110-T, 205, 305 are typically mounted to the knurled metal receptacle.

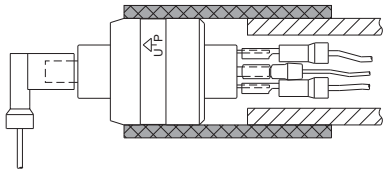
Receptacle Mount Hole Dimensions

MODEL	HOLE DIAMETER Ø	DEPTH
591, 592, 5920, 594	.283" (7.19)	.35" (8.89)
593	.408 (10.36)	.35" (8.89)

Inch (mm) Tolerances Ø $^{+.001"}_{-.000"}\left(^{+.025}_{-.000}\right)$

Typical Body Mount

Body Mount Hole Dimensions



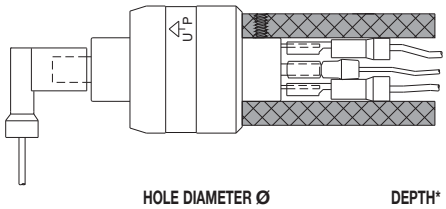
MODEL	HOLE DIAMETER Ø	DEPTH*
230, 331	.998" (25.35)	.80" (20)
330, 430, 1250	1.248" (31.70)	.80" (20)
630	1.575" (40.00)	.80" (20)
435, 830	1.772" (45.00)	.80" (20)

Inch (mm) Tolerances Ø $^{+.001"}_{-.000"}\left(^{+.025}_{-.000}\right)$

Minimum additional depth for disconnect clearance is 1.4" (35.5).

Typical Collar Mount

Collar Mount Hole Dimensions

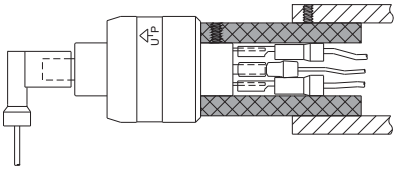


MODEL	HOLE DIAMETER Ø	DEPTH*
230, 331	.500" (12.70)	.40" (10)
330, 430	.625" (15.88)	.40" (10)
430 w/ plug	.625" (15.88)	1.40" (36)
630	.875" (22.23)	.40"(10)
830	1.125" (28.58)	.40" (10)
435	1.250" (31.75)	.80" (20)
1250 Stud	3/8"–16 UNC	.81" (20.5)
1250-metric Stud	10 x 1.5 metric	.81" (20.5)

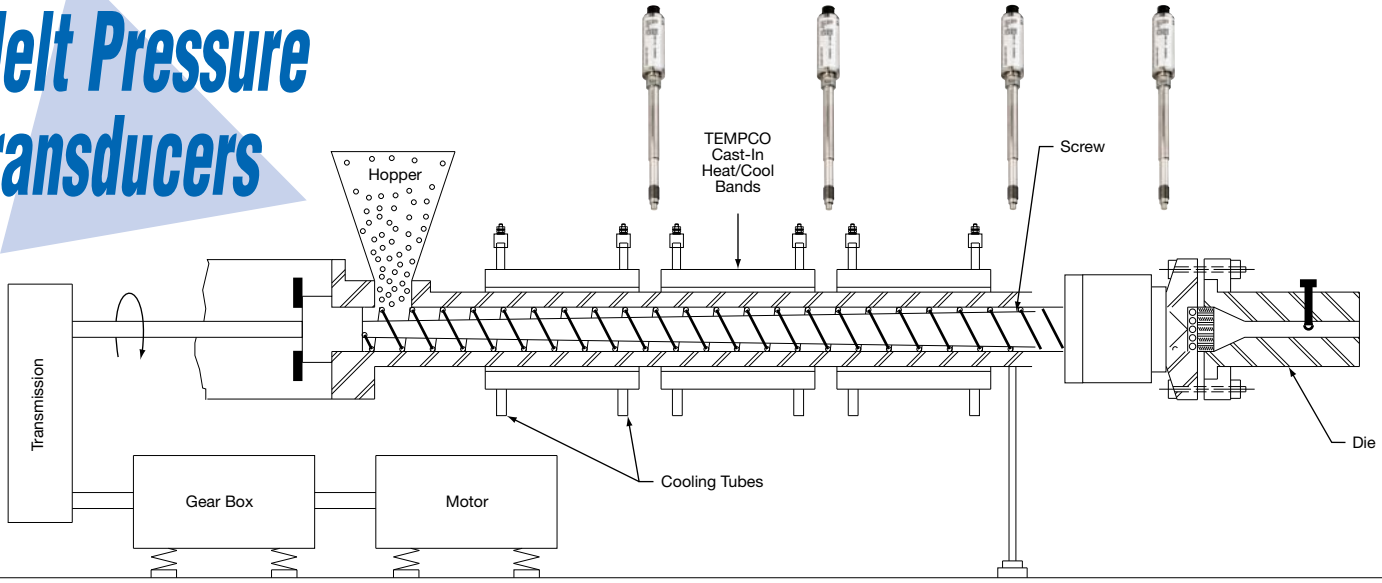
Inch (mm) Tolerances Ø $^{+.001"}_{-.000"}\left(^{+.025}_{-.000}\right)$

Minimum additional depth for disconnect clearance is 1.4" (35.5).

Mounting with an insulating collar may be required to insulate connector from conducted heat. Soft-mounting with rubber type material is needed if unit will be subjected to vibration.



INTRODUCTION TO Melt Pressure Transducers



Designed for Maximum Operating Efficiency

Tempco Melt Pressure Transducers are used to sense the pressure associated with the extrusion processing of plastic materials. They range in pressure from 0-500 PSI to 0-20,000 PSI with temperatures in the range of 70-750°F. Typical transducer outputs are 3.3 mV/V, 4-20 mA, 0-5 V, or 0-10 V (at full scale output).

APPLICATION

Plastic materials are formed to shape by a process defined as extrusion. This is accomplished by first softening the material with heat. Through the use of a drive screw, which is rotated by a motor, the material is forced toward and then through an opening, called a die, used to shape the plastic melt.

Various compounds, colorants and additives can be mixed with the plastic materials as they move along the screw path. The heated materials are shaped by the die and/or other post-extrusion equipment and then cooled to retain their shape.

WHERE AND WHY TRANSDUCERS ARE USED

Melt pressure transducers can be effectively used along many points of the extrusion process for a variety of reasons:

1. From a **quality control viewpoint,** a transducer should be located in the die. The measurement of the melt pressure at this point is used as an indication of flow rate.
2. To indicate when a **screen is in need of changing** and also to insure the safety of personnel and equipment alike, a transducer will be located somewhere ahead of the screen changer. This is most likely located either in the adapter or along the screw path within the barrel. An even more accurate determination of screen plugging can be made by reading the differential pressure between transducers located on either side of the screen, one being in the adapter, the other located in the barrel ahead of the screw tip.
3. For **research and development** purposes, Tempco transducers should be located at various points along the barrel in order to accurately monitor the pressure and mixing characteristics of the melt.
4. Transducers are also used for **pressure sensing on post-extrusion equipment** such as blow-molding heads, extrusion pumps and spinnerettes.
5. Locating transducers anywhere along the apparatus also serves to **improve the safety** of the extruder.

END PRODUCTS OF EXTRUSION PROCESS

The end results of the extrusion process can be found in various products. Some examples include:

1. The feedstock for other plastic packaging systems used for compounding and mixing.
2. Plastic film used to create bags and packaging materials.
3. Plastic tubing, hose, and pipe to contain water, gases or chemicals.
4. Insulated cable and wire housing.
5. Filaments used to create textiles, brushes, rope and twine.

Melt Pressure Transducer Data

Transducer and Gauge Standard Material Diaphragm and Options

The standard Tempco transducer diaphragm is machined out of a single piece of type 15-5 PH stainless steel (.0045") and then heat treated and finally Armoloy coated. This material gives Tempco transducers the transverse strength and toughness needed for most standard applications.

There are, however, certain extrusion processes that require different types of diaphragm materials and/or coatings. Tempco is able to supply customers with diaphragms and coatings specifically suited to their needs and applications.

HASTELLOY® TIP AND DIAPHRAGM

This option gives the transducer a Hastelloy® C-276 tip. This Hastelloy® tip extends along the stem and includes the 45° cone and threads. The diaphragm (.0045") is also manufactured of Hastelloy®. Hastelloy® should be used when the following chemicals are present in the process:

HCl	**Hydrochloric Acid**
HF	**Hydrofluoric Acid**
HBr	**Hydrogen Bromide**
HI	**Hydrogen Iodide**

For example, HCL is present when processing PVC and HF is present when processing Teflon®. If Hastelloy® is not used during these processes, the transducer diaphragm will fail prematurely due to stress cracks as a result of stress corrosion.

Recommended Use: Applications that are extremely corrosive.

SPECIAL DIAPHRAGM

Special 0.006" thick Inconel® diaphragm with a proprietary coating of Titanium Aluminum Nitride.

This special diaphragm is designed to be used in extremely abrasive environments. Superior to all other diaphragm materials for corrosion and abrasion resistance, examples of applications requiring this diaphragm option are ceramics or glass-filled nylon.

Recommended Use: Applications that are extremely abrasive.

INTERNAL RESISTANCE CALIBRATION TRACKING

An internal compensation circuit insures that the shunt calibration output will track any changes in pressure sensitivity (output) due to changes in temperature of the strain gauge housing. The simulated output, therefore, is 80%, ±0.25% of the full scale pressure output over the entire operating temperature range.

CHROMIUM NITRIDE COATED DIAPHRAGM

The chromium nitride diaphragm option gives the transducer an advantage in abusive environments. The chromium nitride offers abrasion resistance and corrosion resistance. This is due to a phenomenon called reduced skin friction. This material will also cut down on diaphragm failures due to adhesion of melt to diaphragm during the process.

There are two different versions of this diaphragm option available. The first is a standard thickness (0.0045") diaphragm made of 15-5 PH stainless steel and then coated with a 0.0002" chromium nitride coating. This version is applicable for use in any pressure range plastic extruder. The second version is a 0.0080" thick diaphragm made of 15-5 PH stainless steel coated with a 0.0002" chromium nitride coating. This version is applicable for use in plastic extruders with pressure ranges of 7,500 PSI and up.

TITANIUM NITRIDE DIAPHRAGM

The titanium nitride diaphragm is offered for its excellent abrasion resistance. Its abrasion resistance is superior to the chromium nitride coated diaphragm and like the latter diaphragm the titanium nitride diaphragm comes in two different versions. The first is a standard thickness (0.0045") diaphragm made of 15-5 PH stainless steel and then coated with a 0.0002" titanium nitride coating. This version is applicable for use in any pressure range plastic extruder. The second version is a 0.0080" thick diaphragm made of 15-5 PH stainless steel coated with a 0.0002" titanium nitride coating. This version is applicable for use in plastic extruders with pressure ranges of 7,500 PSI and up.

INTERNAL RESISTANCE CALIBRATION

Tempco strain gauge sensors rely on the small change in resistance of each strain gauge to generate an analog signal that is proportional to the applied physical input. This resistance change is generated by straining a structural element to which the gauges are attached. The same output can be accomplished by electrically offsetting the resistance of one of the strain gauges through a simple shunt resistor network. This offsetting resistance network is built into each Tempco transducer.

During manufacturing, each Tempco transducer is pressure calibrated using highly accurate pressure sources and instrumentation. The signal output versus pressure input characteristic is thereby precisely known. The internal resistance network is adjusted so that the output generated by the shunt resistor simulation method matches precisely the calibrated output of the transducer at a selected point on its calibration curve. The standard simulation value is 80% of the full range rating of each transducer but other values may be chosen.

Applications of Melt Pressure Transducers

Pressure monitoring is a fundamental quality control technique used in modern extrusion processing. Typical applications include:

Film Adaptable for either blown process or slit casting, pressure monitoring can help produce thinner, more uniform film at faster process speeds. The pressure transducer also provides primary process information helpful for maximizing productivity and minimizing start-up scrap.

Synthetic Fibers
Accurate, reliable pressure monitoring helps deliver greater consistency with less waste by reducing high speed variations, even with high performance fibers.

Wire Coating
Pressure monitoring right in the crosshead die where the wire is coated with plastic insulation improves throughput, quality, and profits. This process parameter has become even more important as wire take-up systems go to higher and higher speeds.

Pipe, Tubing, and Profile
A basic process parameter, pressure monitoring allows tighter tolerances, improves product quality and significantly improves cost effectiveness even for complex and multi-hollow extrusion.

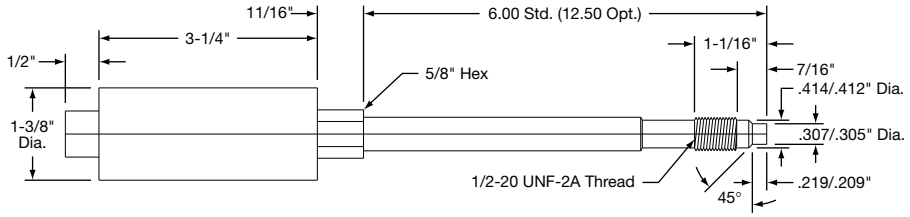
Melt Pressure Transducers

3 Styles of Melt Pressure Transducers for Extrusion Processing

Melt pressure transducers are specifically designed for accuracy, stability, and repeatability. They can be specified with a 0.5% or 0.25% combined error accuracy, a performance that equals or exceeds any other strain gauge melt pressure transducer on the market.

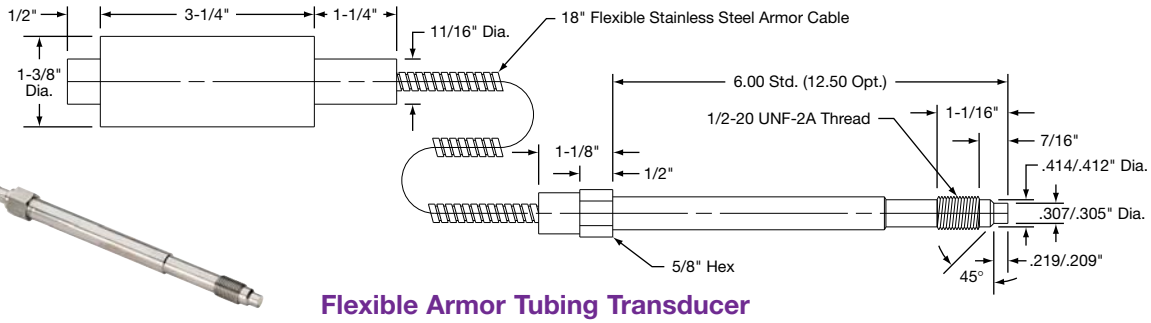
Design Features

- *Stainless Steel Construction*
- *Fully Interchangeable with all Existing Strain Gauge Melt Pressure Transducers*
- *Fluid Filled System for Temperature Stability*
- *80% Output Signal for Easy Calibration*
- *Resistance Calibration Tracking*
- *All Stainless Steel Construction*
- *Armoloy-Coated Diaphragm*
- *Compatible with all Strain Gauge Signal Conditioning & Readout Instrumentation*
- *6- or 8-Pin Bendix Style Connectors available*
- *CE Approved*



Rigid Stem Transducer

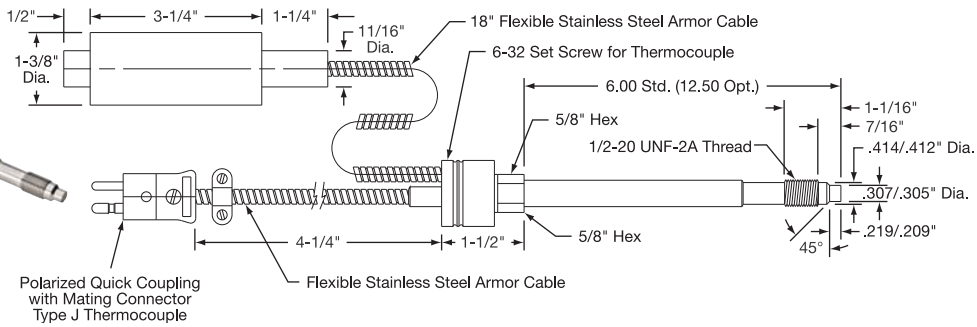
This model converts applied pressure at the point of measurement to a proportional voltage output signal using well established bonded strain gauge design principles. The small capillary tube, filled with a special medium, isolates sensitive strain gauges and electronics from potential thermal damage. The rigid stem makes installation fast and easy.



Flexible Armor Tubing Transducer

This model offers all the advantages of the rigid stem transducer, but incorporates an 18-inch flexible capillary tubing with a stainless steel armored jacket between the strain gauge housing and the stem.

This transducer is designed for applications requiring further thermal isolation or where installation would be otherwise difficult or impractical.



Pressure and Temperature Transducer

This model provides simultaneous measurement of pressure and temperature at a single point. Only one transducer mount is required for installation.

The temperature probe is protected from process hazards and can be replaced without interrupting the pressure signal. Pressure performance is identical to other models.

Melt Pressure Transducers for Extrusion Processing

DESIGN SPECIFICATIONS

Mechanical

Ranges

PSIG	BAR	PSIG	BAR	PSIG	BAR
0-500	0-35	0-3000	0-200	0-10000	0-700
0-750	0-50	0-5000	0-350	0-15000	0-1000
0-1000	0-75	0-7500	0-500	0-20000	0-1500
0-1500	0-100				

Combined Error/Error Band	±0.5% or ±0.25% of full-scale
Repeatability	±0.1% of full-scale
Hysteresis	0.1% of full-scale
Overload Capability	Up to 20,000 PSIG: 2 × full-scale Above 20,000 PSIG: 1.5 × full-scale
Mounting Torque	500 inch-pounds maximum
Diaphragm Material	15-5PH stn. stl. (Armoloy plated)

Electrical

Measuring Element	Strain gauge Wheatstone bridge
Element Resistance	350 ohm ±10%
Excitation Voltage	6-12 Volt DC (10 V rec.)
Sensitivity	3.33 millivolts/volt ±2%
Zero Balance	±5.0% full-scale output
Internal Resistance Cali. (Factory Adjusted)	Produces precise electrical signal which is 80% of full-scale within ±0.25%

Temperature on Strain Gauge Housing

Maximum Temperature	160°F or 70°C
Zero Drift	1.0%/100°F or 2.0%/100°C
Sensitivity Drift	1.0%/100°F or 2.0%/100°C

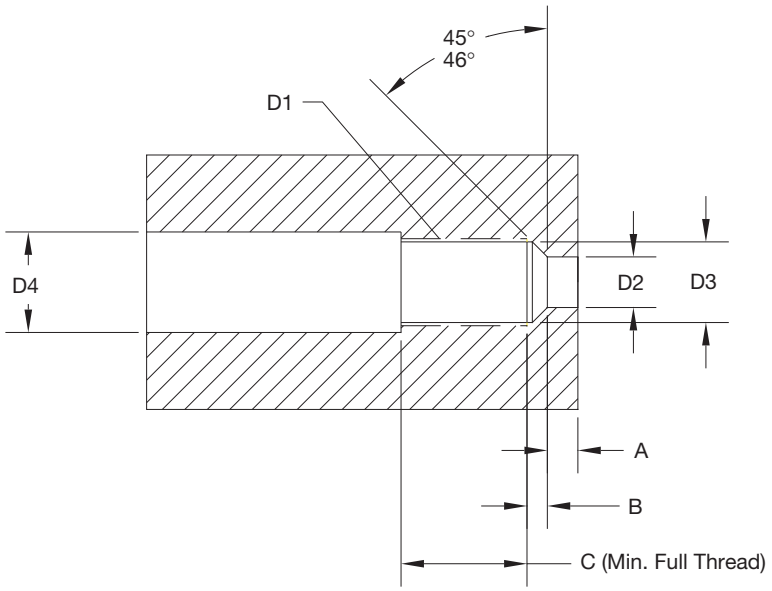
Temperature on Diaphragm

Max. Temp. (medium)	750°F or 400°C
Zero Shift	25 PSI/100°F or 45 PSI/100°C

Note: All temperature specifications relate to full-scale output or full pressure range output.

Standard Drill Pattern Specifications

D1	D2		D3		D4		A		B		C	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
1/2 - 20 UNF	.313 ± .001	7.95 ± .025	.454 ± .004	11.5 ± .10	.515 min	13 min	.225 min	5.7 min	.17 max	4.3 max	.75	19
M14 x 1.5	.319 ± .001	8.1 ± .025	.478 ± .004	12.1 ± .10	.630 min	16 min	.24 min	6.1 min	.16 max	4 max	.75	19
M18 x 1.5	.398 ± .01	10.1 ± .25	.634 ± .04	16.1 ± 1.0	.79 min	20 min	.24 min	6.1 min	.16 max	4 max	.99	25



Melt Pressure Transducers Standard Sizes and Ranges

Style	Combined Error	Connector	Pressure Range	Stem Length	Flex Length	Part Number
Rigid Stem	0.5% CE	6 Pin	0-5000	6"	None	PDD00101
Rigid Stem	0.5% CE	6 Pin	0-7500	6"	None	PDD00102
Rigid Stem	0.5% CE	6 Pin	0-10000	6"	None	PDD00103
Rigid Stem	0.5% CE	6 Pin	0-15000	6"	None	PDD00104
Flex Tube	0.5% CE	6 Pin	0-5000	6"	18"	PDD00105
Flex Tube	0.5% CE	6 Pin	0-7500	6"	18"	PDD00106
Flex Tube	0.5% CE	6 Pin	0-10000	6"	18"	PDD00107
Flex Tube	0.5% CE	6 Pin	0-15000	6"	18"	PDD00108
with T/C	0.5% CE	6 Pin	0-5000	6"	18"	PDD00109
with T/C	0.5% CE	6 Pin	0-7500	6"	18"	PDD00110
with T/C	0.5% CE	6 Pin	0-10000	6"	18"	PDD00111
with T/C	0.5% CE	6 Pin	0-15000	6"	18"	PDD00112

Ordering Code: PDD – [1] [2] [3] [4] [5] [6] [7]

Style *BOX 1*
A = Rigid Stem
B = Flexible Armor Tubing
C = Transducer with Type J Thermocouple

Type *BOX 2*
1 = 0.5% Combined Error (CE) *(Most Common)*
2 = 0.25% CE

Connector *BOX 3*
S = Six-Pin *(Most Common)*
E = Eight-Pin

Pressure Range (PSI) *BOX 4*
A = 0-500 (0.5% CE only)
B = 0-750 (0.5% CE only)
C = 0-1000 (0.5% CE only)
D = 0-1500
E = 0-3000
F = 0-5000
G = 0-7500
H = 0-10000
J = 0-15000
K = 0-20000

Bar Pressure Ranges Available Upon Request. Consult Tempco for Additional Information.

Stem Length *BOX 5*
1 = 6 inches *(Most Common)*
2 = 12.5 inches

Flex Length *BOX 6*
00 = None (Style A)
18 = 18 Inches* (Styles B & C)
**Other sizes can be made on special request.*

Diaphragms *BOX 7*
Standard Diaphragm Construction
A = Stainless Steel (.0045") with Armoloy coating *(Most Common)*

Optional Materials and Coatings
B = 0.0045" Hastelloy®
C = 0.008" Chromium Nitride
D = 0.0045" Chromium Nitride
E = 0.006" Inconel & w/Titanium Aluminum Nitride
F = 0.0045" Titanium Nitride
G = 0.008" Titanium Nitride

Note: Metric models available – Consult Tempco.

Ordering Information

Melt Pressure Transducers 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.

Part Numbers for commonly used Melt Pressure Transducers can be found in table above.

Standard lead time is stock to 3 weeks.

ADDITIONAL OPTIONS AVAILABLE...

Styles *(consult Tempco for information if you require one of these products)*

Exposed Capillary Transducer: for applications requiring a transducer capable of fitting into extremely tight places.

Plastic Melt Pressure Transmitter: 4-20 mA output, 12-36 Vdc input, available with or without thermocouple. FM approved model is also available; consult Tempco.

Connectors *(consult Tempco for information if you require one of these options)*

Gentran GT-76 compatible wiring: strain gauge connector is wired for compatibility with Gentran GT-76 connector.

Barber Coleman TD10 compatible wiring: strain gauge connector is wired for compatibility with Barber Coleman TD10 connector.

Industry CROSS Reference Part Numbers

When using this cross reference please note that the box(☐) in the Part Number is for the code for the pressure range. Since the pressure range differs from manufacturer to manufacturer enter the code letter for the pressure range that best fits your application from **Pressure Range Box 4 on page 12-22**.

Also, though some equipment listed in this cross reference may differ in appearance, the fit and function of the products is equivalent.

Description	TEMPCO	Dynisco	ISI	Gefran	Gentran
Basic Melt Pressure Transducer with 0.5% Error, Armoloy Coated Tip and 6-Pin Connector					
6" Rigid stem	PDD–A1S☐100A	PT460E☐-6	ISI 0100-☐T-6	M30-6-M-☐-1-4-0	GT-76/6D6☐zb
6" Rigid stem with 18" flexible armor tubing	PDD–B1S☐118A	PT462E☐-6/18	ISI 0101-☐T-6/18	M31-6-M-☐-1-4-D	GT-76/6D6Z1☐
Above transducer with Type J thermocouple	PDD–C1S☐118A	TPT463E☐-6/18	ISI 0102-☐T-6/18	M32-6-M-☐-1-4-D	GT-76/6JD6Z1☐
Melt Pressure Transducer with 0.5% Error, Armoloy Coated Tip and 8-Pin Connector					
6" Rigid stem	PDD–A1E☐100A	n/a	ISI 0160-☐T-6	M30-8-M-☐-1-4-0	GT-76/6D8☐
6" Rigid stem with 18" flexible armor tubing	PDD–B1E☐118A	n/a	ISI 0161-☐T-6/18	M31-8-M-☐-1-4-D	GT-76/6D8Z1☐
Above transducer with Type J thermocouple	PDD–C1E☐118A	n/a	ISI 0162-☐T-6/18	M32-8-M-☐-1-4-D	GT-76/6JD8Z1☐
Low Error Melt Pressure Transducer with 0.25% Error, Armoloy Coated Tip and 6-Pin Connector					
6" Rigid stem	PDD–A2S☐100A	PT420A-☐-6	ISI 0110-☐T-6	M30-6-H-☐-1-4-0	GT-72/6D6☐
6" Rigid stem with 18" flexible armor tubing	PDD–B2S☐118A	PT422A-☐-6/18	ISI 0111-☐T-6/18	M31-6-H-☐-1-4-D	GT-72/6D6Z1☐
Above transducer with Type J thermocouple	PDD–C2S☐118A	TPT432A-☐-6/18	ISI 0112-☐T-6/18	M32-6-H-☐-1-4-D	GT-72/6JD6Z1☐
Low Error Melt Pressure Transducer with 0.25% Error, Armoloy Coated Tip and 8-Pin Connector					
6" Rigid stem	PDD–A2E☐100A	n/a	ISI 0120-☐T-6	M30-8-H-☐-1-4-0	GT-72/6D8☐
6" Rigid stem with 18" flexible armor tubing	PDD–B2E☐118A	n/a	ISI 0121-☐T-6/18	M31-8-H-☐-1-4-D	GT-72/6D8Z1☐
Above transducer with Type J thermocouple	PDD–C2E☐118A	n/a	ISI 0122-☐T-6/18	M32-8-H-☐-1-4-D	GT-72/6JD8Z1☐
Mechanical Melt Pressure Gauge					
6" Rigid stem	PDG–A1☐100A	PG441R-☐-6	ISI 0150-☐T-6	M50-0-L-☐-1-4-0	GT-90/6D☐
6" Rigid stem with 18" flexible armor tubing	PDG–A2☐130A	PG442R-☐-6/30	ISI 0151-☐T-6/30	M51-0-L-☐-1-4-F	GT-95/6Z3☐
Above gauge with Type J thermocouple	PDG–A3☐130A	TPG443R-☐-6/30	ISI 0152-☐T-6/30	M52-0-L-☐-1-4-F	GT-95/6JZ3☐
Digital Melt Pressure Gauge					
6" Rigid stem	PDG–B1☐100A	PG541-☐-6	n/a	M60-0-L-☐-1-4-0	n/a
6" Rigid stem with 18" flexible armor tubing	PDG–B2☐130A	PG552-☐-6/30	n/a	M61-0-L-☐-1-4-F	n/a
Above gauge with Type J thermocouple	PDG–B3☐130A	TPG553-☐-6/30	n/a	M62-0-L-☐-1-4-F	n/a

Melt Pressure Gauges

Melt Pressure Gauge Styles for Extrusion Processing

Tempco's Melt Pressure Gauges provide highly reliable, maintenance free, local pressure indications for extrusion and other plastics processes. The sensing diaphragm is designed for minimum deflection, maximum durability, and maximum overload capability.

Two models are available with three styles each:

- **Mechanical Gauge Model**
- **Digital Gauge Model with alarm and retransmission**

Style 1 A 6" rigid stem unit for standard installations

Style 2 A 30" flexible capillary with stainless steel armored jacket between the gauge housing and the stem to allow greater installation flexibility in tight places or for easier viewing and durability.

Style 3 The third style provides all the features of the 30" flexible capillary model with the addition of a thermocouple (J-type) output for temperature. (Not displayed directly on digital models.)

All models are rugged, totally self contained and allow extrusion processors to benefit from the significantly improved efficiency that goes with pressure monitoring—at about half the cost of strain gauge melt pressure transducers for the mechanical gauge.

Optional diaphragm materials are available for applications that require extra abrasion and/or corrosion resistance. Refer to page 12-19 for available material options.

Mechanical Melt Pressure Gauge

Design Features

- ✳ *No Power (or Wiring) Required*
- ✳ *No Maintenance, No Grease*
- ✳ *Electron Beam Welded*
- ✳ *150% Overload Capability without Damage*
- ✳ *Greater than 180° Movement for Optimum Readability*
- ✳ *Stainless Steel Construction*
- ✳ *5.44"/138.2mm Diameter Face*
- ✳ *An Economical Alternative for Many Applications*

Specifications

Linearity, Repeatability, Hysteresis: . . . .L<± 1.0% FSO
Measurement Range: . . . . . .0-5000 PSI / 0-350 bar to 0-10000 PSI / 0-700 bar
Maximum overpressure: . . . . . .1.5 x FSO
Measurement principle: . . . . . .Bourdon tube
Maximum housing temperature: . . . . . .185°F / 85°C
Maximum diaphragm temperature: . . . .750°F / 400°C
Standard diaphragm material: . . . . . .15-5 PH Stainless Steel with Armoloy coating
Standard style 3 thermocouple: . . . . . .Type J (isolated junction)

Digital Melt Pressure Gauge

Design Features

- ✳ *Better than ±0.50% Accuracy*
- ✳ *Economically Priced vs. Separate Transducer and Display*
- ✳ *Electron Beam Welded*
- ✳ *200% Overload Capability without Damage*
- ✳ *15-5 Stainless Steel Diaphragm with Armoloy coating standard*
- ✳ *Alarm Provides no/nc, 5A 115/240Vac High Pressure Only Relay*
- ✳ *115 VAC standard, 230 VAC Optional*
- ✳ *5.44"/138.2mm Diameter Face*
- ✳ *An Economical Alternative for many Applications*
- ✳ *Standard 4-20 mA Retransmission*

Specifications

Linearity, Repeatability, Hysteresis: . . . .M<± 0.50% FSO
Measurement Range: . . . . . .See ordering chart
Maximum overpressure: . . . . . .2 x FSO
Measurement principle: . . . . . .Strain gauge / bridge circuit
Power supply: . . . . . .115 or 220 VAC (factory set)
Pressure retransmission: . . . . . .4-20 ma (650W max. load)
Maximum housing temperature: . . . . . .130°F / 55°C
Maximum diaphragm temperature: . . . .750°F / 400°C
Standard diaphragm material: . . . . . .15-5 PH Stainless Steel with Armoloy coating
below 1000 PSI/70 bar: . . . . . .17-7 PH SS Ti Ni coated
Standard style 3 thermocouple: . . . . . .Type J (isolated junction)
Alarm: . . . . . .High only, no/nc, 5A 115/240Vac

Melt Pressure Gauges Standard Sizes and Ranges

Mechanical Gauges

Part Number	Style	Pressure Range	Stem Length
PDG00104	6" Rigid	0-5000	6 in.
PDG00105	6" Rigid	0-10000	6 in.
PDG00102	Armor cable	0-5000	6 in.
PDG00103	Armor cable	0-10000	6 in.
PDG00106	Armor / J tc	0-5000	6 in.
PDG00107	Armor / J tc	0-10000	6 in.

Digital Readout Gauges

Part Number	Style	Pressure Range	Stem Length
PDG00501	6" Rigid	0-5000	6 in.
PDG00502	6" Rigid	0-10000	6 in.
PDG00503	Armor cable	0-5000	6 in.
PDG00504	Armor cable	0-10000	6 in.
PDG00505	Armor / J tc	0-5000	6 in.
PDG00506	Armor / J tc	0-10000	6 in.

Note: All standard flexible armor cable units are 30" long.

Gauges have standard 1/2-20UNF drill pattern; see page 12-21.

Ordering Code: PDG – 1 2 3 4 5

Model and Style *BOX 1*

A1 = Mechanical, Rigid Stem
A2 = Mechanical, Rigid + Flexible Armor Tubing
A3 = Mechanical gauge with Type J Thermocouple
B1 = Digital, Rigid Stem
B2 = Digital, Rigid + Flexible Armor Tubing
B3 = Digital Gauge with Type J Thermocouple

Pressure Range *BOX 2*

Mechanical

PSI
A = 0-5000
B = 0-10000

Bar
C = 0-350
D = 0-700

Digital - PSI
A = 0-500
B = 0-750
C = 0-1000
D = 0-1500
E = 0-3000
F = 0-5000
G = 0-7500
H = 0-10000
J = 0-15000
K = 0-20000

Bar Pressure Ranges Available Upon Request. Consult Tempco for Additional Information.

Stem Length *BOX 3*

1 = 6 inches *(Most Common)*
2 = 12.5 inches

Flex Length *BOX 4*

00 = None *(Styles A1 & B1)*
30 = 30 Inches*

**Other sizes can be made on special request.*

Diaphragms *BOX 5*

Standard Diaphragm Construction

A = Stainless Steel (.0045") with Armoloy coating *(Most Common)*

Optional Materials and Coatings

B = 0.0045" Hastelloy®
C = 0.008" Chromium Nickel
D = 0.0045" Chromium Nickel
E = 0.006" Inconel® with Titanium Aluminum Nitride
F = 0.0045" Titanium Nitride
G = 0.008" Titanium Nitride

Note: All digital gauges have one alarm and pressure retransmission.

Ordering Information

Melt Pressure Gauges 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.

Part Numbers for commonly used Melt Pressure gauges can be found in table above.

Standard lead time is stock to 3 weeks.

Melt Pressure Display and Alarm Indicators For Extrusion

Design Features

- *1/8 DIN Size Front Panel*
- *2 Alarms, Programmable Relay Outputs*
- *ISO 9001 Certified, CE Approved*
- *Economically Priced*
- *4-Digit LED Display for Pressure*
- *3 Keys for Programming*
- *Touch-Type Keypad*
- *Easy to Calibrate with Sensitivity Auto Ranging*
- *Built-In Strain Gauge Bridge Excitation – 10Vdc*
- *Filter for Digit Stabilization*
- *Coded Access for User Lockout*

Model Number: PDA05010

Series 772 *Melt Pressure Indicator*

Design Features

- *1/4 DIN Size Front Panel*
- *NEMA 4X - IP65 Front Panel Protection*
- *10-point Red LED Bar Graph*
- *ISO 9001 Certified, CE Approved*
- *2 Alarms, Programmable Relay Outputs*
- *Calibration Output*
- *Retransmission – Programmable for 0 - Vdc, 0 - 20 or 4 - 20mA*
- *Multiple Programming Levels with Coded Access*
- *Peak Value Memory*
- *4-Key Touch-Type Keypad*
- *Built-In Strain Gauge Bridge Excitation – 10Vdc*
- *Filter for Digit Stabilization*
- *RS-232 & RS-485 Communication Available; Consult Factory for More Information*

Model Number: PDA05020

Series 882 *Melt Pressure Indicator*

Design Features

- *1/4 DIN Size Front Panel*
- *Displays Pressure & Temperature Simultaneously on two 4-Digit LED Displays*
- *ISO 9001 Certified, CE Approved*
- *NEMA 4X - IP65 Front Panel Protection*
- *2 Alarms with Adjustable Setpoint for Temperature or Pressure*
- *Calibration Output*
- *Retransmission – Programmable for 0 - Vdc, 0 - 20 or 4 - 20mA*
- *10-point Red LED Bar Graph*
- *Multiple Programming Levels with Coded Access*
- *4-key Touch-Type Keypad*
- *Built-In Strain Gauge Bridge Excitation – 10 Vdc*
- *Filter for Digit Stabilization*
- *RS-232 & RS-485 Communication Available; Consult Factory for More Information*

Model Number: PDA05030

Series 992 *Melt Pressure and Temperature Indicator*

Melt Pressure Display and Alarm Indicators For Extrusion

SPECIFICATIONS			
Part Number:	**772 Series – 1/8 DIN** **PDA05010**	**882 Series – 1/4 DIN** **PDA05020**	**992 Series – 1/4 DIN** **PDA05030**
Electrical			
Power:	120 Vac ±10% or 230 Vac ±10% (50/60 Hz) Optional: 11-27 Vac/Vdc for PDA05010 and 20-27 Vac/Vdc for PDA05020/PDA05030		
Operating Temp.:	+32°F to +130°F (0° to 55°C)		
Noise Immunity:	VDE 0843 & IEC 801		
Fascia Seal Rating:	N/A	NEMA 4X – IP65	
Termination:	Screw clamp terminals		
Signal Input			
Type:	350 Ω strain gauge bridge		
Input Sensitivity:	3.3 mV/V	1.5 to 7.5 mV/V	
Accuracy:	±0.2% of full scale ±1 digit		
Sensor Excitation:	10 Vdc @ 120 mA		
Calibration:	Will accept transducers with internal shunt calibration values from 40%–100% or external calibration resistors		
Housing	1/8 DIN (48 × 96 × 160 mm)	1/4 DIN (96 × 96 × 160 mm)	
Panel Cutout	1.75 × 3.62 in. (44.5 × 92 mm)	3.62 × 3.62 in. (92 × 92 mm)	
Display			
Type:	4-digit LED display	Two 4-digit LED displays Red: Pressure Green: Temperature	
Ranges:	User programmable: –999 to +9999		Pressure: –999 to +9999 Temperature: Standard T/C limits
Units:	PSI, kg/cm², BAR, kPa, Pa, MPa	PSI, kg/cm², BAR, °F, °C	
Decimal:	Selectable from keyboard		
Set-up Prompts:	Displays program steps and error conditions		
Alarms			
Type:	2 SPDT: In the event of a power failure relays go into alarm condition		
Mode:	Absolute, relative with direct or inverse functions can be set via front panel keyboard		
Set Point Range:	0-100% full scale		
Hysteresis:	Configurable per output		
Contact Rating:	5A @ 250 Vac for each alarm output		
Auxiliary Output			
Retransmission:	N/A	0-10 Vdc or 0/4-20ma	
Resolution:	N/A	4000 steps	
Isolation:	N/A	1500V	

Ordering Information: Order by the part number of the display that meets your requirements.

Standard lead time is stock to 3 weeks.

Melt Pressure Transducer Kit

Melt Pressure Transducer Package

Melt Pressure Transducer Packages

Special Melt Pressure Transducer Packages have been prepared by Tempco for sale at a discounted price. These packages contain all the components necessary for monitoring your extruder melt pressures.

The package contains:

- One [1] .5% combined error 6" rigid stem MELT PRESSURE TRANSDUCER and a standard Armoloy diaphragm tip in a variety of pressure ranges (see table below)

  or

  One [1] 18" flexible armor cable MELT PRESSURE TRANSDUCER with a 6-pin connector, 6" stem length, and a standard Armoloy diaphragm tip in a variety of pressure ranges. (see table below)
- One [1] model 772 MELT PRESSURE INDICATOR
- One [1] 25-foot-long TRANSDUCER CABLE assembly for a 6-pin connector

COST SAVINGS WHEN ORDERED AS A KIT!

DISCOUNT PACKAGE Part Number		
Transducer Style		Pressure
Rigid/Flex	Rigid Only	Range (psi)
PDA05101	PDA05201	0-500
PDA05102	PDA05202	0-750
PDA05103	PDA05203	0-1000
PDA05104	PDA05204	0-1500
PDA05105	PDA05205	0-3000
PDA05106	PDA05206	0-5000
PDA05107	PDA05207	0-7500
PDA05108	PDA05208	0-10000
PDA05109	PDA05209	0-15000
PDA05110	PDA05210	0-20000

GENERAL ACCESSORIES	
Description	Part Number
3-Piece Cleaning Tool Kit (½-20 thread)	PDA00251
Transducer Mount Drill Kit	PDA00253
Transducer Pressure Simulator—6-Pin	PDA00254
Transducer Pressure Simulator—8-Pin	PDA00255
Mounting Bracket	PDA00256

ACCESSORIES

Connectors and Cable Assemblies

6-and 8-Pin Transducer Cables

These connectors and cable assemblies are designed to be compatible with the 6-pin and 8-pin connectors used on Tempco's line of melt pressure transducers.

The cable assemblies come with a female connector on one end to connect to the transducer, and the other end has 6 or 8 braided wire leads to connect to input and output sources, displays or controllers.

The connector offered is the female mating connector with no cable or wiring attached.

TRANSDUCER MATING CONNECTORS (hardware only)	
6-Pin Part Number	8-Pin Part Number
PDA00215	PDA00213

THERMOCOUPLE MATING CONNECTORS (hardware only)
Part Number
PDA00214

Thermocouple Cables

These connectors and cable assemblies are designed to be compatible with the connectors used on Tempco's line of transducers with thermocouples.

The cable assemblies come without any connectors attached; however, a female connector comes with each thermocouple or transducer ordered.

The connector offered is a two-lead polarized female connector designed to mate with the male thermocouple connector.

THERMOCOUPLE CABLE ASSEMBLIES	
Size	Part Number
25 feet	PDA00209
50 feet	PDA00210
75 feet	PDA00211
100 feet	PDA00212

TRANSDUCER CABLE ASSEMBLIES		
Size	6-Pin Part Number	8-Pin Part Number
25 feet	PDA00201	PDA00205
50 feet	PDA00202	PDA00206
75 feet	PDA00203	PDA00207
100 feet	PDA00204	PDA00208

Ordering Information

Order by the part number of the product that meets your requirements. ***Standard lead time is stock to 3 weeks.***

Rupture Disks for Plastic Extrusion Protection

Custom Pressure Relief Solutions for your Extrusion Equipment

Construction Characteristics

Tempco's Extruder Rupture Discs are pressure relief devices designed for overpressure protection of plastic extruders. A rupture disc is soldered or welded to the end of a threaded hollow bolt to fit flush in the extruder barrel. This prevents plastic buildup and hardening that might render the rupture disc ineffective. Tempco carries a number of sizes to fit standard thermocouple wells to serve as replacements for expended units.

Design Features

- *303 Stainless Steel Body*
- *Inconel® Rupture Disk*
- *3/16" Burst Diameter*
- *Rupture Tolerance ±5%*
- *NPT Fittings for Discharge Available*
- *Designed to Fit Common Thermocouple or Transducer Drill Pattern*
- *Select a Pressure Rating Exceeding your Normal Operating Pressure by 1.4 Times without Exceeding the Manufacturer's High Pressure Specifications*

1-13/16" Long 1/2-20 UNF Threaded with a Screwdriver Slot at 300°F (149°C)

Pressure (PSI)	Part Number
3500	ERD01001
5000	ERD01002
5500	ERD01003
6000	ERD01004
6500	ERD01005
7000	ERD01006

Pressure (PSI)	Part Number
7500	ERD01007
8000	ERD01008
8500	ERD01009
9000	ERD01010
9500	ERD01011
10000	ERD01012

6" Insertion Length 1/2-20 UNF Threaded at 550°F (288°C)

With Wrench Flat

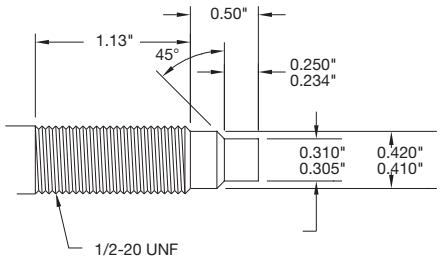
With Hex Head Adaptor

With Hex Head and 1/4-18 NPT Male Fitting

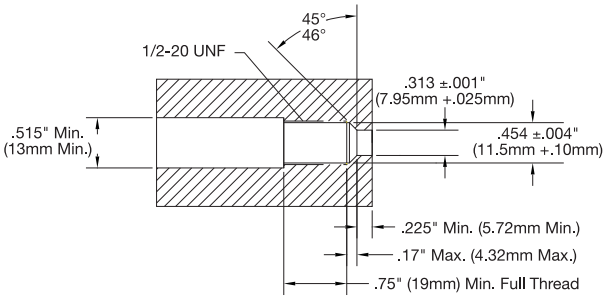
Pressure (PSI)	Part Number		
	Wrench Flat	Hex Head	1/4 NPT
2500	ERD02001	ERD03001	ERD04001
3000	ERD02002	ERD03002	ERD04002
3500	ERD02003	ERD03003	ERD04003
4000	ERD02004	ERD03004	ERD04004
5000	ERD02005	ERD03005	ERD04005
5500	ERD02006	ERD03006	ERD04006
7000	ERD02007	ERD03007	ERD04007
7500	ERD02008	ERD03008	ERD04008
8000	ERD02009	ERD03009	ERD04009
8500	ERD02010	ERD03010	ERD04010
9000	ERD02011	ERD03011	ERD04011
9500	ERD02012	ERD03012	ERD04012
10000	ERD02013	ERD03013	ERD04013

Installation Data

Rupture Disk Critical Mounting Dimensions



Standard Drill Pattern



Ordering Information

Select the Rupture Disk style, pressure and temperature rating that matches your application requirements. Alternate pressure, temperature and physical configurations are possible; consult TEMPCO with your requirements. ***Standard lead time is stock to 4 weeks.***

Beam-A-Temp™ Wide Range Mini-Infrared Thermometer

Measures non-contact surface temperature up to 1000°F/538°C

Temperature range from -58 to 1000°F (-50 to 538°C)!

Design Features

- *Compact thermometer with wide temperature range from -58 to 1000°F (-50 to 538°C)*
- *Audible and visible overrange indicators*
- *Built-in laser identifies target area*
- *8:1 distance to target ratio*
- *Backlighting illuminates display for taking measurements at night or in areas with low background light levels*
- *High resolution of 0.1° up to 199.9°*
- *Automatic Data Hold when trigger released*
- *Fixed 0.95 emissivity covers 90% of surface applications*
- *Auto power off*
- *Complete with 9V battery and carrying case*
- *3 year warranty*

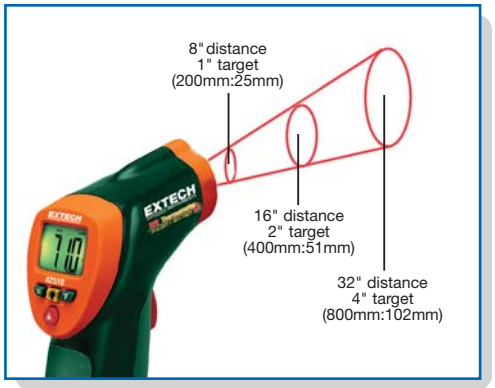
Specifications

Range: . . . . . -58 to 1000°F (-50 to 538°C)
Basic Accuracy: . . . . . ±2% of reading or ±4°F/±2°C (whichever is greater)
Maximum Resolution: . . . . . 0.1°F/°C: 1°F/°C
Emissivity:. . . . . 0.95 fixed
Field of View (Distance to Target): 8:1
Dimensions: . . . . . 3.2 × 1.6 x 6.3" (82 × 42 × 160mm)
Weight: . . . . . 6.4 oz. (180g)

Agency Approval: CE

Applications

- Measure the surface temperature of objects difficult to reach or unsafe to touch.
- Scan for hot spots on motors, electrical panels, electrical circuits and other equipment.
- Used extensively in processes where glass, iron and steel, non-ferrous materials, and minerals must be monitored.



8:1 distance to target ratio

Ordering Information

Part Number REB30010 Wide Range Mini-IR Thermometer
Part Number REB32010 Wide Range Mini-IR Thermometer with NIST Certificate

Standard lead time is stock to 3 weeks.

Beam-A-Temp™ Wide Range Infrared Thermometer with Type K input

Measures both non-contact and contact temperature with type K thermocouple input

Memory stores up to 20 readings!

REB30020 with Type K temperature probe (included range -4 to 482°F/-20 to 250°C) for contact temperature measurements. Compatible with other Type K thermometers with sub-miniature connector for higher temperature measurements up to 2498°F (1370°C).

Design Features

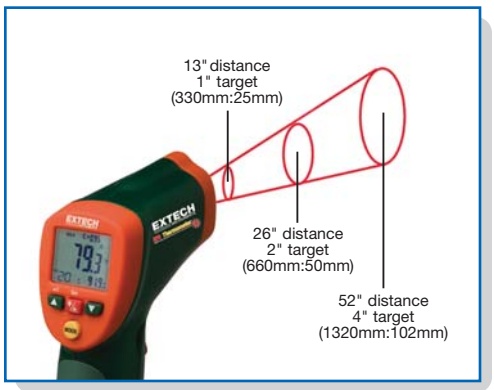
- *Wide temperature range for IR temperature and type K thermocouple instruments*
- *Automatic emissivity adjustment (for temperatures 212°F or higher)*
- *Memory stores up to 20 readings*
- *Large LCD display with bright backlight for easy-to-read measurements and programming parameters*
- *Laser pointer provides better aim and accuracy*
- *Auto-hold activates when the measurement trigger is released*
- *Adjustable high/low alarm alerts user visually and audibly when temperature exceeds programmed limits*
- *MAX/MIN/AVG/DIF features display highest, lowest, average, and MAX minus MIN values*
- *Data Hold, Auto Power Off, and low battery indication*
- *Switches built into handle allow for °C/°F display selection, auto power off defeat, and alarm on/off control*
- *Complete with 9V battery, type K thermocouple sensor (-4 to 482°F / -20 to 250°C), and carrying case*
- *1 year warranty*

Specifications

Display Counts: . . . 4000 count backlit display
Range: . . . . . Infrared: -58 to 1472°F (-50 to 800°C)
Type K: -58 to 2498°F (-50 to 1370°C)
Basic Accuracy: . . . Infrared: ±2% of reading or ±4°F/±2°C (whichever is greater)
<932°F/500°C±(2.5% reading+5°) >932°F/500°C
Type K: (±1.5% of reading + 5°F or 3°C)

Maximum Resolution: . . 0.1°F/°C
Emissivity: . . . . . Adjustable 0.10 to 1.00
Field of View: . . . . . 13:1 distance to target ratio
Dimensions: . . . . . 3.2 × 1.6 x 6.3" (82 × 42 × 160mm)
Weight: . . . . . 6.4 oz. (180g)

Agency Approval: CE



13:1 distance to target ratio

Ordering Information

Part Number REB30020 Wide Range IR Thermometer + Type K
Part Number REB32020 Wide Range IR Thermometer with NIST Certificate

Standard lead time is stock to 3 weeks.

Beam-A-Temp™ High Temperature Infrared Thermometer

Measures surface temperature up to 1400°F/760°C

Temperature range from -58 to 1400°F (-50 to 760°C)!

Design Features

- *Wide temperature range from -58 to 1400°F (-50 to 760°C)*
- *High 16 to 1 distance to target ratio measures smaller surface areas at greater distances*
- *Adjustable emissivity from 0.1 to 1.00 increases measurement accuracy for different surfaces*
- *Adjustable High/Low setpoints alarm with audible alarm alerts user when temperature exceeds the programmed setpoints*
- *Data Hold, MAX/MIN/AVG plus differential between MAX – MIN*
- *Built-in laser identifies target area*
- *Backlit LCD display*
- *High resolution of 0.1° up to 199.9°*
- *Auto power off*
- *Complete with 9V battery and hard carrying case*
- *3 year warranty*

Specifications

Range: . . . . . -58 to 1400°F (-50 to 760°C)
Basic Accuracy: . . . . . ±2% +2°<932°F (500°C); ±2.5% +5°C>932°F (500°C)
Maximum Resolution: . . . . . 0.1°F/°C
Emissivity:. . . . . 0.1 to 1.00 Adjustable
Field of View (Distance to Target): 16:1
Dimensions: . . . . . 3.9 × 2.2 x 9" (100 × 56 × 230mm)
Weight: . . . . . 10.2 oz. (290g)

Agency Approval: CE

Applications

- Measure the surface temperature of objects difficult to reach or unsafe to touch.
- Scan for hot spots on motors, electrical panels, electrical circuits and other equipment.
- Used extensively in processes where glass, iron and steel, non-ferrous materials, and minerals must be monitored.

16:1 distance to target ratio

Ordering Information

Part Number REB30030 High Temperature IR Thermometer
Part Number REB32030 High Temperature IR Thermometer with NIST Certificate

Standard lead time is stock to 3 weeks.

Beam-A-Temp™ Portable Infrared Thermometer

Measures up to 1832°F/1000°C with 50 to 1 distance to target ratio

Temperature range from -58 to 1832°F (-50 to 1000°C)!

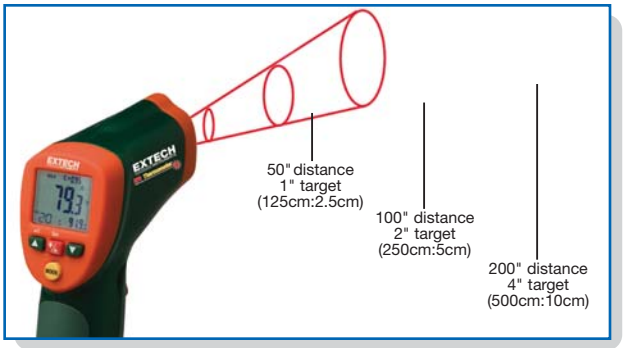
Design Features

- *Built-in laser identifies target area*
- *High and low alarms*
- *Adjustable emissivity increases measurement accuracy for different surfaces*
- *Adjustable High/Low setpoints alarm with audible alarm alerts user when temperature exceeds the programmed setpoints*
- *MAX/MIN/AVG plus differential between MAX – MIN*
- *Backlighting illuminates display for taking measurements at night or in areas with low background light levels*
- *High resolution of 0.1° up to 199.9°*
- *Automatic Data Hold when trigger released*
- *Auto power off*
- *Wide temperature range from -58 to 1832°F (-50 to 1000°C)*
- *High 50 to 1 distance to target ratio measures smaller surface areas at greater distances*
- *Complete with 9V battery and carrying case*
- *3 year warranty*

Specifications

Range: . . . . . -58 to 1832°F (-50 to 1000°C)
Basic Accuracy: . . . . . ±2% of reading or +4°F/2°C
Maximum Resolution: . . . . . 0.1°F/°C
Emissivity:. . . . . Adjustable
Field of View (Distance to Target): 50:1
Dimensions: . . . . . 3.9 × 2.2 x 9" (100 × 56 × 230mm)
Weight: . . . . . 10.2 oz. (290g)

Agency Approval: CE



50:1 distance to target ratio

Ordering Information

Part Number REB30040 Portable IR Thermometer
Part Number REB32040 Portable IR Thermometer with NIST Certificate

Standard lead time is stock to 3 weeks.

Noncontact Infrared Temperature Measurement System — NCIT-LC Plus Series

Design Features

- *-40°F to 1132°F (-40° to 600°C)*
- *Compact and Rugged*
- *5-digit backlit LCD User Interface*
- *Designed for Online Monitoring and Control*
- *Ultra-Fast Response Time - 150 mSec*
- *Stainless Steel Sensing Head*
- *10:1 Optics*
- *0/4 - 20 mA, 0 - 5vdc, J or K thermocouple outputs*
- *Choice of 3 ft. or 10 ft. cable*
- *Mounting Hardware Included*
- *12-24 VDC Powered*

Common Industrial Applications

- *Plastics*
- *Paper and Pulp Converting*
- *Chemicals*
- *Food Processing*
- *Pharmaceutical*
- *Electronics*
- *Construction*
- *Industrial Maintenance*

Proven Technology

PRECISION INFRARED TEMPERATURE MEASUREMENT *has been around for years to increase productivity, reduce costs and improve product quality. Microfabrication techniques have allowed us to reduce the size and cost of our sensors, bringing the benefits of this technology to a new group of users.*

Many of the NCIT-LC Plus's features are only available on larger and more expensive units and offer more flexibility through remote monitoring and control of all sensor variables.

World's Smallest IR Sensors

The NCIT-LC Plus is a versatile two-piece system with a miniature sensing head and separate electronics. The sensor is small enough to be installed just about anywhere, yet it performs as well as much larger systems.

The sensor is housed in rugged stainless steel to ensure long-term performance, even in harsh environments with ambient temperatures up to 85°C (185°F). And the NCIT-LC Plus's response time is as fast or faster than many high-end systems.

Rugged, Reliable, Practical Features

The NCIT-LC Plus's electronics include: Emissivity and selectable Peak Hold, Valley Hold, and Averaging, all of which (including output type) are programmable on the 5-digit/3-button LCD user interface.

Accessories, including an air purge jacket, air cooling jacket, and mounting adapters, ensure accuracy in applications ranging from plastics manufacturing to food processing.

Optional Communications for PC Interfacing

Even more features are available with optional RS-232 or RS-485 communications and the new DataTemp® Multidrop Software. These features include remote control and monitoring of all sensor variables, a 5V alarm signal triggered by a target temperature or head ambient temperature. Also included is an 8-position "recipe" table that can be easily interfaced to an external control system, an external reset signal input for signal processing, and even external inputs for analog emmissivity adjustment or reflected energy compensation.

Lower cost sensors are available with fixed emissivity; consult Tempco for further details.

Noncontact Infrared Temperature Measurement System — NCIT-LC Plus Series

Measurement Specifications

Temperature Range:	-40 to 1112°F (-40 to 600°C)
Spectral Response:	8 to 14 μm
Optical Resolution:	10:1
System Accuracy:	±1% or ±1°C, whichever is greater
Repeatability:	±0.5% or ±0.5°C, whichever is greater
Response Time:	150 ms, 95% of final reading
Emissivity:	Digitally adjustable, 0.1 to 1.10 by increments of 0.001 steps
Signal Processing:	Peak hold, Valley hold, Variable averaging filter, adjustable up to 998 sec.

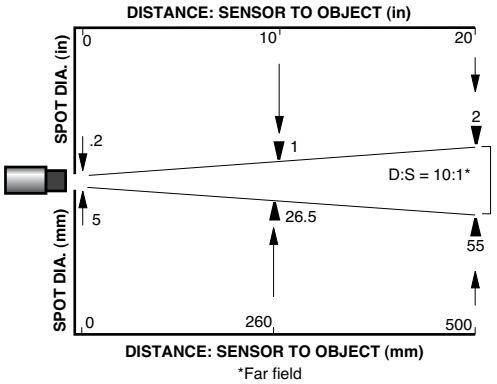
Electrical Specifications

Programmable Outputs:	0/4 - 20 mA, 0 - 5 Vdc (scalable) J or K thermocouple 10 mV / °C head ambient signal
Power (user to supply unit):	12 - 24 Vdc @ 100 mA
Max. Loop Impedance:	500 W with 24 Vdc power supply

Sensor Specifications

Environmental Rating:	NEMA 4 (IP65)
Max.Ambient Temperature:	Sensing head: 32° to 185°F (0 to 85°C) with air cooling up to 392°F (200°C) Elec. housing: 32° to 149°F (0 to 65°C)
Relative Humidity:	10 to 95%, non-condensing
Weight:	Sensing head: 50g w/cable, stainless steel Electronics housing: 270g, Zinc, die-cast

Note: The basic system includes the sensing head and nut, die cast housing with pre-mounted electronic board, 3m (10 ft.) cable, and operator manual.



*Far field

Model Numbers

Part Number	Optical Resolution	Cable Length	Range Type
REN00150	10 : 1	10 ft. / 3 m	LT - low temp
REN00155	10 : 1	3 ft. / 1 m	LT - low temp
REN00170	22 : 1	10 ft. / 3 m	LT - low temp
REN00175	22 : 1	3 ft. / 1 m	LT - low temp
with RS485 data interface			
REN00151	10 : 1	10 ft. / 3 m	LT - low temp
REN00156	10 : 1	3 ft. / 1 m	LT - low temp
REN00171	22 : 1	10 ft. / 3 m	LT - low temp
REN00176	22 : 1	3 ft. / 1 m	LT - low temp

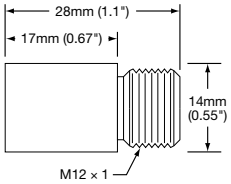
Communication Accessory Connection Kits are required for setup and monitoring of extended multi-drop features. One kit can service multiple sensors. These kits contain DataTemp® Multi-Drop software and connectors to provide for simple setup of analog/digital inputs and outputs of the optional RS232 or RS485 interface via a PC.

REN00306 — RS485 2-wire connection kit provides for setup and monitoring via DataTemp® Multi-Drop software and a RS485/RS232 converter provided with 110Vac power supply

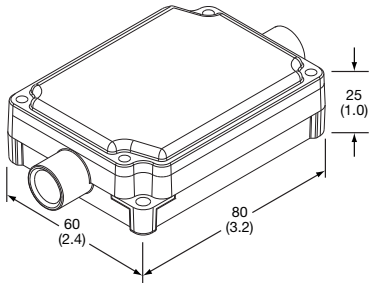
REN00307 — RS232 connection kit provides for setup and monitoring via DataTemp® Multi-Drop software and a 3-wire RS232 connection

REN00209 — Power supply 12 Vdc at 200 mA, 120 Vac input

Sensor head

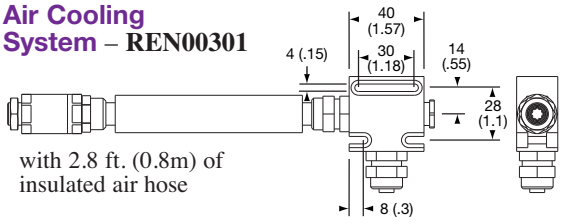


Electronics Enclosure



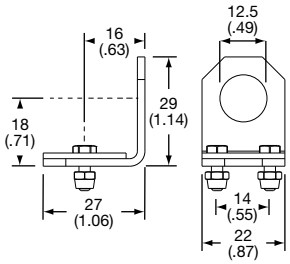
Dim.= $\frac{\text{mm}}{\text{(in)}}$

Air Cooling System – REN00301

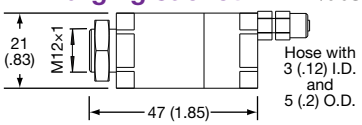


with 2.8 ft. (0.8m) of insulated air hose

Adjustable Mounting Bracket – REN00303



Optical Lens Air Purging Jacket – REN00302



Ordering Information

Choose the **NCIT-LC Plus, accessories, and/or options** desired, and order by the associated Part Number.

Standard lead time is stock to 3 weeks.

Noncontact Infrared Temperature Measurement System — NCIT Plus Series

If temperature is a factor in your quality and manufacturing yield, then put this technology to work for you.

Design Features

- *0° to 1000°F (-18 to 538°C)*
- *Compact 1/8 DIN digital monitor with large 4-digit display*
- *User defined thermocouple or 4-20 mA output*
- *Universal 110-220 VAC power input*
- *Adjustable emissivity at ambient parameters*
- *Adjustable dual setpoints and deadband alarm outputs*
- *Choice of sensing head to match application*
- *Standard and close focus optics available*
- *Accessories for cooling and air purging*
- *Field interchangeable sensing heads*

Common Industrial Applications

- *Plastics*
- *Paper and Pulp Converting*
- *Chemicals*
- *Food Processing*
- *Pharmaceutical*
- *Electronics*
- *Construction*
- *Industrial Maintenance*

Noncontact Temperature Measurement for Industrial Processes

The NCIT Plus Series is a versatile, two-piece temperature monitoring system that combines a compact, value-priced monitor with an infrared sensing head. The heart of the system is the 1/8 DIN NCIT Plus Monitor which provides advanced infrared processing capabilities including peak and valley hold, averaging, and user-adjustable offset.

Advances in optical and electronic design, originally developed for high-end infrared systems, have been adapted to this low-cost line without compromise in performance when compared to infrared sensors that cost twice as much just a few years ago.

The **NCIT Plus** models can't scratch, tear, smear or contaminate because they don't make contact with your product. They are easier and safer to install and maintain because they can be positioned away from hot and hazardous processes and moving products.

They remain accurate over a longer period of time because they're not subjected to the abuse that a contact device receives. And they deliver much faster response time than contact thermocouples, while rivaling their accuracy and repeatability.

In the long run, noncontact temperature measurement can help you improve quality, speed production, and save money.

1/8 DIN NCIT Plus Monitor

Along with its large 4-digit LED display, the monitor provides a user-defined 4-20mA or thermocouple output. Two adjustable setpoints/deadbands control 5V alarm outputs or optional 3A mechanical relays. The **NCIT Plus Monitor** accepts universal 110-220 Vac power input and provides a 24 Vdc / 50 mA excitation voltage for loop power to external sensors. All monitor functions are configured via the front panel, including °C/°F switching.

The **NCIT Plus Monitor** provides adjustable emissivity and ambient compensation when used with the **NCIT Plus Standard** infrared sensing heads.

Standard Sensing Heads

These high performance, 8-14 micron sensors combine current loop driven signals with high resolution optics.

The **NCIT Plus Standard w/ Laser** sensing head comes equipped with laser sighting for alignment in hard to reach locations, or to small or distant targets. The 50:1 distance to spot (D:S) ratio provides the capability of measuring a spot size of 1.2" at a distance of 5 ft.

The **NCIT Plus Standard** sensing head's D:S ratio of 35:1 allows a spot size of 1.7" at a distance of 5 ft.

Proven Technology

Noncontact infrared temperature sensors have proven advantageous and reliable in many industries for over 25 years. Tempco brings this technology to you at a price competitive with thermocouples.

Noncontact Infrared Temperature Measurement System — NCIT Plus Series

Measurement Specifications

Temperature Range (All Sensor Heads): 0 to 1000°F (-18 to 538°C)

Spectral Response: Standard & Laser 8 to 14 µm

Optical Resolution:
Laser 50:1 close focus 45:1
Standard 35:1 close focus 30:1

System Accuracy: ±1% or ±2°F (±1°C), whichever is greater

System Repeatability: ±0.5% or ±2°F (±1°C), whichever is greater

Response Time – (95% of final reading): Standard & Laser: 500 mSec

Emissivity: Digitally adjustable, 0.1 to 1.09 by increments of 0.01 steps

Signal Processing: Peak and valley hold (up to 998 sec, 999 = infinite hold with external reset), Variable averaging filter (up to 60 sec), T-ambient: fixed background ambient temperature compensation

Electrical Specifications

Power Supply: 110 /220 VAC, ±20%, 50-60 Hz

Inputs: User configurable inputs for Laser or Standard sensing heads, any 5-0 Vdc or 4-20 mA sensor, or thermocouple (J, K, E, N, R, S, T)
External reset input to reset peak/valley hold

Outputs-Signal: 4-digit, LED display, °F/°C selectable. User configurable 4-20 mA current or thermocouple output (J, K, E, N, R, S, T)

Alarm Output: Two adjustable setpoints with deadbands controlling +5 Vdc alarm outputs or optional 3A mechanical relays

DC Supply Output: 24 Vdc / 50 mA excitation voltage for powering external sensors

Sensor Specifications

Environmental Rating: Monitor Front Panel: NEMA 12 (IP54)
Laser/Standard Head: NEMA 12 (IP65)

Ambient Temperature:
Monitor 32° to 120°F (0 to 50°C)
Laser/Standard Head 32° to 150°F (0 to 65°C)
laser shuts off automatically at 120°F (50°C)
with water cooling 32° to 350°F (0 to 177°C)
with air cooling 32° to 250°F (0 to 120°C)

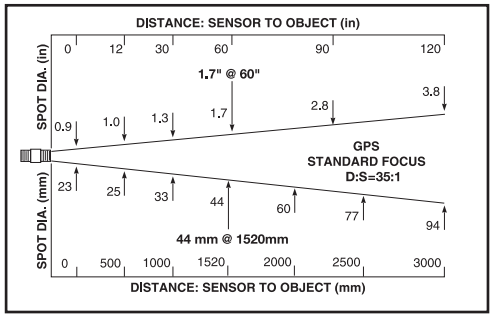
Relative Humidity: 10 to 95%, non-condensing

Monitor Dimensions: 1/8 DIN, 96 x 48 x 120 mm
1.9" x 3.78" x 4.75"

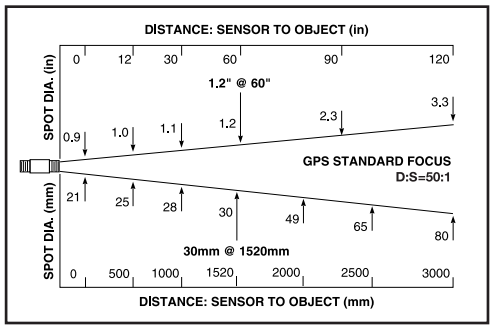
Cutout Dimensions: 1.75" x 3.63" (92 x 44 mm)

Weight: Monitor: 320g (0.7 lb.)

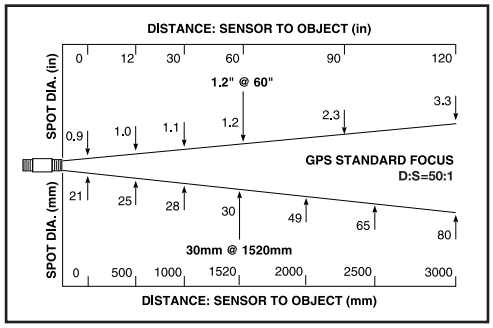
Distance to spot ratio–Standard



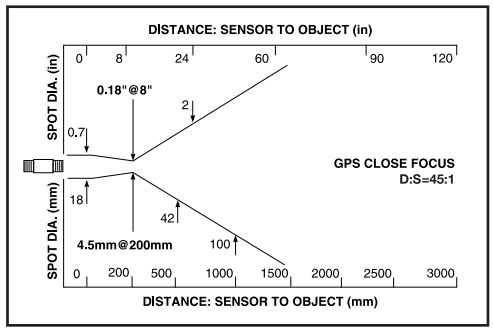
Distance to spot ratio–Standard Close Focus



Distance to spot ratio–Laser



Distance to spot ratio–Laser Close Focus



Infrared Temperature Measurement — NCIT Plus Series

NCIT Plus Monitor

REN01001	1/8 DIN Panel Meter 110/220VAC w/ 5 Vdc alarm outputs
REN01003	1/8 DIN Panel Meter 110/220VAC with optional 3A relays for alarm outputs
REN01002	Light duty aluminum mounting bracket to allow for sub-panel mounting

NCIT Plus Standard Sensing Heads

(includes mounting bracket and nut)

REN01101	Standard focus infrared sensing head, 35:1 optics
REN01102	Standard – close focus infrared sensing head, 30:1 optics
REN01120	NIST/DKD calibration certificate (also for water cooled) *Must be ordered with unit.*

With Water Cooled Housing and Lens Air Purge Collar

REN01110	Standard focus infrared sensing head
REN01111	Standard – close focus infrared sensing head

NCIT Plus Standard with Laser Sight Sensing Heads

(includes an adjustable mounting bracket and nut, 13 ft. (4m) cable for between the sensor and the laser switch box, and 26 ft. (8m) cable to connect the laser switch box to the NCIT Plus Monitor)

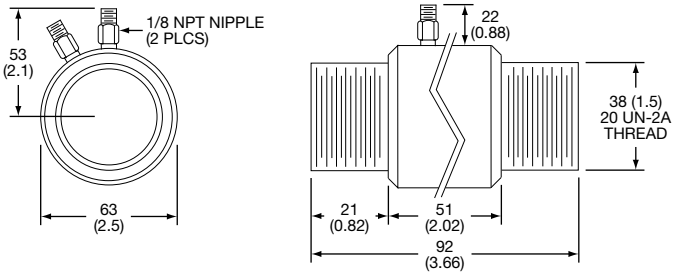
REN01103	Standard focus infrared sensing head, 50:1 optics
REN01104	Standard – close focus infrared sensing head, 45:1 optics
REN01121	NIST/DKD calibration certificate (also for water cooled) *Must be ordered with unit.*

With Water Cooled Housing and Lens Air Purge Collar

REN01112	Standard focus infrared sensing head
REN01113	Standard – close focus infrared sensing head

Air/Water Cooled Sensing Head

The Air/Water-Cooled Housing option allows the laser or standard sensor to be used in ambient temperatures **up to 250°F (121°C) with air cooling**, or **350°F (177°C) with water cooling.** It is supplied with two 1/8" NPT brass fittings.



Air flow at **77°F (25°C)** should be **3 to 5 cfm** (1.4 to 2.4 liters/sec) with a pressure drop across the housing of 2 to 5 PSIG (0.14 to 0.35 kg/cm^2). Water flow should be approximately **0.5 gallons (2 liters) per minute**; water temperature should be 50 to 80°F (10 to 27°C) for efficient cooling.

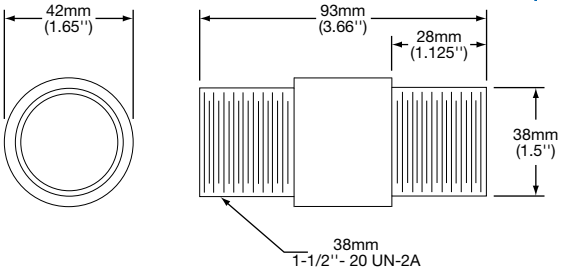
All units ordered with the Air/Water-Cooled Housing include the Air Purge Collar to avoid condensation and lens damage.

Note: The laser-equipped standard sensing head is 125 mm (4.92") long. The laser shuts off automatically at 120°F (50°C).

Standard / Laser Sensing Heads

All Standard sensors are supplied with a fixed bracket and a mounting nut. Alternatively, the sensor may be mounted through a hole, on a customer-supplied bracket, with the pipe adapter, or with other accessories. Avoid installing the sensor cable in noisy electrical environments. In this environment, it is recommended to install the cable in conduit. A conduit adapter accessory is available for this purpose.

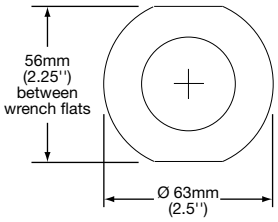
Note: The laser-equipped standard sensing head is 125 mm (4.92") long.



Infrared Temperature Measurement — NCIT Plus Series Accessories

Pipe Adapter:

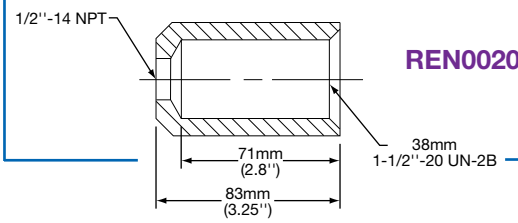
The Pipe Adapter is used to connect the Standard or Laser Head to a 1.5 inch NPT pipe thread.



REN00206

Conduit Adapter

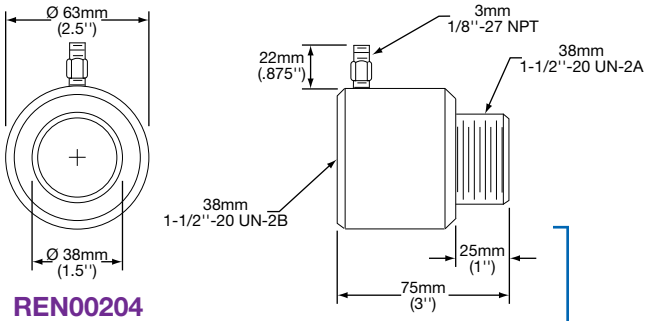
The Pipe Adapter is used to connect the Standard or Laser Head to a 1/2-inch NPT conduit fitting.



REN00205

Lens Air Purge Collar:

The Air Purge Collar accessory is used to keep dust, moisture, airborne particles and vapors away from the lens. It may be installed before or after the bracket. Air flow should be a maximum of 1-3 cfm (0.5-1.5 liters/sec). Clean or "instrument" air is recommended to avoid contaminants from settling on the lens.



REN00204

NCIT Plus Standard Sensing Head Cable Accessories

REN01201	13 ft. (4m) – Regular temperature
REN01202	13 ft. (4m) – High temperature for Air/Water cooled Sensing Head
REN01203	26 ft. (8m) – Regular temperature
REN01204	26 ft. (8m) – High temperature for Air/Water cooled Sensing Head

5 conductor cables for connecting the standard sensing head to the panel meter

Additional Accessories

REN00208	Fixed mounting bracket for the regular sensing head
REN00213	Adjustable mounting bracket for the regular sensing head
REN00207	Mounting nut

Used in conjunction with the Standard Laser sensing head

Ordering Information

Choose the **NCIT Plus, accessories, and/or options** desired, and order by the associated Part Number.

Standard lead time is stock to 3 weeks.

2-Wire Miniature Universal Temperature/Process Transmitters

Available from Stock

PROGRAMMABLE
in the field with your PC and easy to use software!!

Common Miniature Temperature Transmitters

Part Number	Isolation	Input	Range zero	Range span	unit
ETM20103	no	K tc	0	200	°F
ETM20104	no	J tc	0	200	°F
ETM20105	yes	RTD	0	200	°F
ETM20106	no	K tc	0	500	°F
ETM20107	no	J tc	0	500	°F
ETM20108	yes	RTD	0	400	°F
ETM20109	no	K tc	0	200	°C
ETM20110	no	J tc	0	200	°C
ETM20111	no	K tc	0	400	°C
ETM20112	no	J tc	0	400	°C

Ordering Code

E T M

Input/Output:
ETM1 = Non-Isolated
ETM2 = Isolated

Input Signal:
R = RTD-Pt100
S = RTD-D100
T = Thermocouple
M = mV
P = Potentiometer

Range (Minimum)

Range (Maximum)

Units:
F = °F
C = °C
M = mV

If **thermocouple input**, enter **type code**; if not enter **0**
AE, B, E, J, K, L, N, R, S, T, U

Un-Programmed Miniature Transmitters

ETM20001	For Non-Isolated version
ETM20002	For Isolated version

Universal Field Programming Kit

For programming ETM miniature head mounted and ETR din rail mounted non-isolated and isolated Temperature Transmitters for sensor type and range. Includes all cables required and software. Connects to a USB port on the PC. Compatible with Windows operating systems 2000, XP, Vista and Windows 7.

Part Number: ETM90006

Temperature transmitters are used for a variety of reasons. The use of temperature transmitters can eliminate the need for long costly runs of thermocouple wire, vs. less expensive copper signal wire. When the environment is electrically noisy, sending a 4-20 mA signal to the control panel reduces the chance of error.

The **Tempco ETM Series** of 2-wire transmitters offers both isolated and non-isolated versions. They are designed to fit in a standard aluminum or iron industrial connection head.

Design Features:

- *Accepts T/C and 2- or 3-wire RTD sensors*
- *Field programmable with easy to use MS Windows®-based configuration software and a PC*
- *Consistent sensor break function*
- *Full access to all features while in operation*
- *Temperature linear output*
- *NAMUR-compliant*
- *Configuration, editing & reading without external power*
- *Easy wiring with a large center hole*

Additional Design Features for the Isolated Version:

- *Fully universal, linearized and isolated 3/4 wire RTD, T/C, mV and Ohm*
- *Sensor and system error correction*
- *Low sensor isolation detection*
- *Simplified loop check up with calibration output*

The **ETM Transmitters** are built using surface mount components and employ digital technology with non-volatile memory to retain the configuration after programming and the cable is removed.

Specifications

		Non-Isolated	Isolated
Isolation:		--	1500 Vac
Input-RTD (PT100 or D100):		2 or 3 wire	3 or 4 wire
• **TC:**		AE, B, E, J, K, L, N, R, S, T, U	
• **Potentiometer / resistance:**		--	0 to 2000 Ω
• **Voltage:**		--	-10 to 500 mVdc
Sensor Current:		~ 0.4 mA	
Max. sensor:	**RTD:**	25 Ω per wire	
Wire resistance:	**T/C:**	500 Ω (total loop)	
Sensor Failure:		Upscale, Downscale or Off	
Adjustments - Zero:		Any value within range limits	
Adjustments-Span:	**RTD:**	18°F/10°C	18°F/10°C
	T/C:	2 mV	2 mV
	Resistance:	--	10 Ω
Cold Junction Compensation T/C:		± 0.9°F / ± 0.5°C	
Supply Voltage:		8 - 36 Vdc	6.5 to 36 Vdc
Operating Temperature:		-40° to +185°F/–40° to +70°C	
Humidity:		0 to 95% non-condensing	
Typical Accuracy:		±0.2% of span	±0.1% of span

Note:
For RTD:
PT100 = IEC751, α = 0 .00385,
D100 = JIS1604, α = 0 .003916

Ordering Information

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 a pre-assigned configuration.

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

2-Wire Panel Rail Mount Universal Temperature/Process Transmitters

PROGRAMMABLE
in the field with your PC and easy to use software!!

Temperature transmitters are used for a variety of reasons. The use of temperature transmitters can eliminate the need for long costly runs of thermocouple wire vs. less expensive copper signal wire. When the environment is electrically noisy, sending a 4-20 mA signal to the control room reduces the chance of error.

The **Tempco ETR Series** of 2-wire transmitters offers both isolated and non-isolated versions. They are designed to fit directly on a standard 35mm DIN Rail.

Design Features:

- *Accepts T/C and 2- or 3-wire RTD sensors*
- *Field programmable with easy to use MS Windows®-based configuration software and a PC*
- *Consistent sensor break function*
- *Current loop test function*
- *Full access to all features while in operation*
- *Temperature linear output*
- *NAMUR-compliant*
- *Configuration, editing & reading without external power*
- *Easy wiring with a large center hole*

Additional Design Features for the Isolated Version:

- *Fully universal, linearized and isolated 3/4 wire RTD, T/C, mV and Ohm*
- *Sensor and system error correction*
- *Low sensor isolation detection*
- *Simplified loop check up with calibration output*

The **ETR Transmitters** are built using surface mount components and employ digital technology with non-volatile memory to retain the configuration after programming and the cable is removed.

Common Panel Rail Mount Temperature Transmitters

Part Number	Isolation	Input	Range zero	Range span	unit
ETR20101	no	K tc	0	200	°F
ETR20102	no	J tc	0	200	°F
ETR20103	yes	RTD	0	200	°F
ETR20104	no	K tc	0	500	°F
ETR20105	no	J tc	0	500	°F
ETR20106	yes	RTD	0	400	°F
ETR20107	no	K tc	0	200	°C
ETR20108	no	J tc	0	200	°C
ETR20109	no	K tc	0	400	°C
ETR20110	no	J tc	0	400	°C

Ordering Code

E T R

Input/Output:
ETR1 = Non-Isolated
ETR2 = Isolated

Input Signal:
R = RTD-Pt100
S = RTD-D100
T = Thermocouple
M = mV
P = Potentiometer

Units:
F = °F
C = °C
M = mV
O = Ohm

Range (Maximum)

Range (Minimum)

If **thermocouple input**, enter **type code**; if not enter **0**
AE, B, E, J, K, L, N, R, S, T, U

Specifications

Same as Miniature Transmitters – See Previous Page

Un-Programmed Rail Mount Transmitters

ETR20001	For Non-Isolated version
ETR20002	For Isolated version

Universal Field Programming Kit

For programming ETM miniature head mounted and ETR din rail mounted non-isolated and isolated Temperature Transmitters for sensor type and range. Includes all cables required and software. Connects to a USB port on the PC. Compatible with Windows operating systems 2000, XP, Vista and Windows 7.

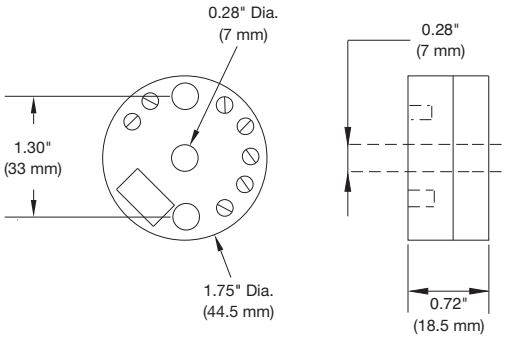
Part Number: ETM90006

Note:
For dimensions and wiring information, see page 12-42.

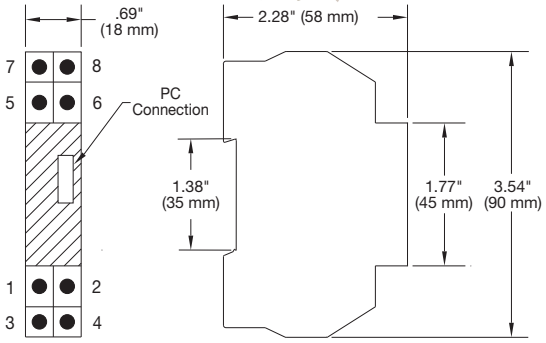
All Items Available from Stock

2-Wire Miniature Head and Rail Mount Temperature/Process Transmitters

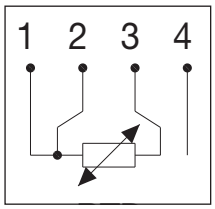
Miniature Sensor Head Mount



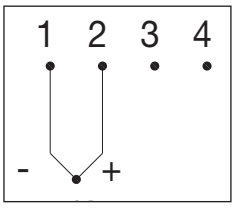
Panel Rail Mount



Input Connections — Common to both miniature and panel mount

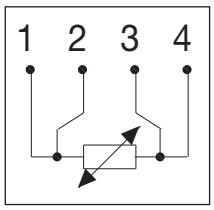


Pt100 2 or 3 wire

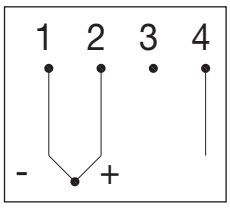


Thermocouple

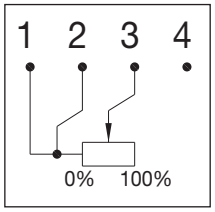
Additional inputs for the isolated version



Pt100 4 wire

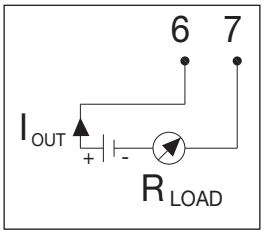


Thermocouple / mV

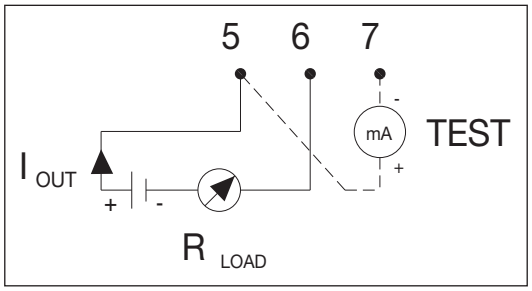


Potentiometer 3-wire

Miniature Transmitter Output Connections



Panel Mount Transmitter Output Connections



Handheld Digital Thermometers — Heavy Duty, Accurate

Type J or K Thermometers with single or dual input, with direct or differential measurements to 0.1°

Design Features:

- ✳ *Rugged design for field use — includes rubber holster.*
- ✳ *Displays Maximum reading and Data Hold at the touch of a button.*
- ✳ *Single or dual input models available.*
- ✳ *Dual input model provides differential readings.*
- ✳ *Accurate to 0.3%, °F/°C switchable on the front panel.*
- ✳ *Includes: 9V battery, holster with stand, wrist strap and bead-style temperature probe.*

All Items Available from Stock

DTM11010

DTM11020

DTM11030

Specifications	DTM11010	DTM11020	DTM11030
Thermocouple:	Single Type K	Dual Type K	Dual Type J or K
Temperature Range:	-58° to 2000°F (-50° to 1300°C)		**J** -328° to 1922°F (-200° to 1050°C) **K** -328° to 2498°F (-200° to 1370°C)
Basic Accuracy:	± 0.3% of reading		± 0.05% of reading
Display Counts:	2000		20,000
Resolution:	0.1° / 1°		0.2°F / 0.1°C
Dimensions:	6.5" × 3" × 1.7" (165 × 76 × 43mm)		7.6" × 3.6" × 2.1" (192 × 91 × 53mm)
Weight:	14.2 oz (403g)		13 oz (365g)

Temperature Probes – Thermocouple Type K

All probes shown come with 39" of cable and a mini-type plug.

DTA11015

- ✳ *Surface Probe*
- ✳ *Straight Shaft*
- ✳ *6" (152 mm) long, Ceramic Tip*
- ✳ *Maximum Temperature: 1472°F / 800°C*

DTA11025

- ✳ *Blunt-end Probe*
- ✳ *4" (102 mm) long, 0.130" dia. rounded tip*
- ✳ *Type K T/C*
- ✳ *Maximum Temperature: 1292°F / 700°C*

DTA11035

- ✳ *Piercing-end Probe*
- ✳ *4" (102 mm) long, 0.130" dia. rounded tip*
- ✳ *Type K T/C*
- ✳ *Maximum Temperature: 1292°F / 700°C*

Portable 6-Station Temperature Monitor

Design Features

- *Thermocouple calibrations available are K, or J linearized in four sections for good accuracy.*
- *RTD Cold Junction compensates accurately for ambient temperature changes as fast as 2°/min.*
- *High Impedance Circuit allows use of probes with up to 1000 ft. of 24 ga. wire; several transformer-isolated monitors can connect to the same probe.*
- *1/2" High LCD Display is sunlight readable.*
- *Powered by 9V alkaline "transistor" battery.*
- *Durable Rotary Selector for displaying 6 thermocouple inputs.*
- *Large Pointer Selector Knob clearly indicates the monitored location.*
- *Polymer-Coated Circuit will perform indefinitely even in high humidity environments.*
- *Made in the United States and warranted against material or workmanship defects for 1 year.*

Multi-Station Portable Thermocouple Monitors

These thermocouple monitors were designed to assist field technicians with testing or calibrating HVAC/refrigeration systems, baking/curing ovens, motors, engines, and much more. Instant response circuits allow a technician to compare up to 6 temperature probes quickly.

These circuits have been optimized to deliver accuracy and stability over a wide environmental range. The durable carrying case is compact and features a compartment for storing wire and probes.

TEMPERATURE MONITORS

No. of Inputs	Scale	Thermocouple J	Thermocouple K
6	°F	DTM30010	DTM30015
6	°C	DTM30020	DTM30025

Specifications

Display Range:	–199 to 1999 °F or °C
Measuring Accuracy:	±1/2% of reading ±1°
Ambient Oper. Temp.:	–5° to 140°F (–21° to 60°C)
Relative Humidity:	90% max. no condensation
Cold Junction Offset:	1° max. for 32° to 110°F (0° to 43°C)
Display Updates:	3 times per second
LCD Height:	0.5" (12.7 mm) high
Construction:	High-density polyethylene case, aluminum panel with meter and miniature thermocouple jacks
Dimensions:	12" × 8" × 3"
Power Requirement:	9 Vdc (9V "transistor" alkaline battery)
Weight:	2.0 lb. (0.9 kg.)

DISPLAY RANGE

	°F		°C	
Thermocouple Type	**Min.**	**Max.**	**Min.**	**Max.**
J-Fe/Constantan	–60	1400	–50	750
K-Chromel™/Alumel™	–60	1999	–50	1100

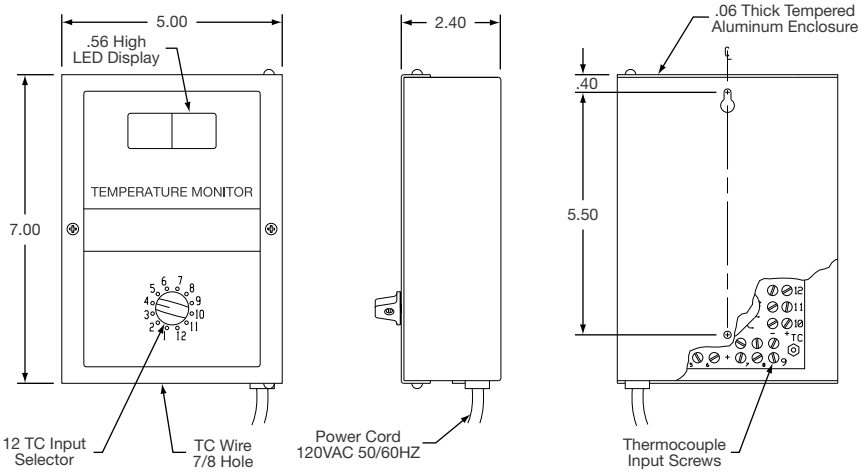
Ordering Information

Choose the Part Number of the **Temperature Monitor** that best fits the needs of your application.

A **120 Vac model** (with optional LED display) is available; please consult Tempco for order information.

Standard lead time is stock to 3 weeks.

12-Station Temperature Monitor



Design Features

- *Thermocouple calibrations available are T, K, J, or E linearized in four sections for good accuracy.*
- *RTD Cold Junction compensates accurately for ambient temperature changes as fast as 2°/min.*
- *1/2" high Red LED Display provides excellent readability.*
- *Large Pointer Selector Knob clearly indicates the monitored 1 of 12 locations.*
- *Polymer-Coated Circuit will perform indefinitely even in high humidity environments.*
- *Made in the United States and warranted against material or workmanship defects for 1 year.*

12-Station Temperature Monitor

DISPLAY RANGE

Thermocouple Type	°F Min.	°F Max.	°C Min.	°C Max.
J-Fe/Constantan	–60	1400	–50	750
K-Chromel™/Alumel™	–60	1999	–50	1100

These thermocouple monitors were designed for industrial or commercial applications that require monitoring of up to 12 locations economically. The circuits have been optimized to deliver accuracy and stability over a wide environmental range. Typical applications include monitoring HVAC systems, baking/curing ovens, food or medical freezers, solar installations, refrigeration equipment, motor bearings, engines, etc.

Specifications

Display Range:	–199 to 1999 °F or °C
Measuring Accuracy:	±1/2% of reading ±1°
Ambient Oper. Temp.:	–15° to 130°F (-26° to 54°C)
Relative Humidity:	90% max., no condensation
Cold Junction Offset::	1° max. for 32° to 110°F (0° to 43°C)
Display Updates:	3 times per second
LED Height:	0.56" (14 mm) high
Construction:	Aluminum enclosure, surface mounting with swing-out front panel
Power Requirement:	120 or 230 Vac, 50/60 Hz.
Power Cord Length:	5 ft.
Weight:	1.7 lb. (0.8 kg.)

Typical Applications

- *Monitoring HVAC Systems*
- *Food or Medical Freezers*
- *Industrial Process Equipment*
- *Motor Bearings*
- *Baking/Curing Ovens*
- *Molding Machines*
- *Refrigeration Equipment*
- *Engines*

TEMPERATURE MONITORS			
Volts AC	Scale	Thermocouple J	Thermocouple K
120	°F	DTM20010	DTM20015
120	°C	DTM20020	DTM20025
230	°F	DTM20030	DTM20035
230	°C	DTM20040	DTM20045

Note: 230V units have internal terminal connections for AC power input.

Ordering Information

Choose the Part Number of the **Temperature Monitor** that best fits the needs of your application.

If calibrations of type E or T are required, consult Tempco for part number.

Standard lead time is stock to 3 weeks.

Bimetal Dial Thermometers for Industrial Applications

Typical Applications

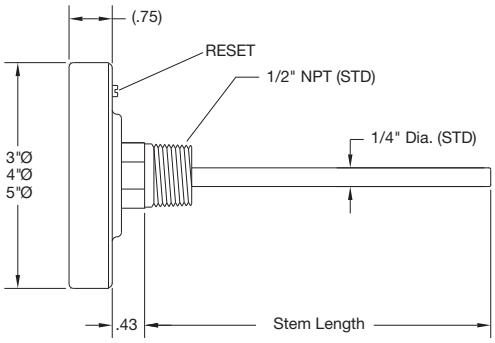
- *Oil, Gas & Petrochemical*
- *Waste Water*
- *Pharmaceutical*
- *Compost*
- *Food & Beverage*
- *Military*
- *Paper and Pulp*
- *Dairy*
- *Mining*
- *Power Generation*
- *Utilities*
- *Refrigeration*
- *Marine*
- *and Many More !!!*

Bimetal Dial Thermometers are ideal for when you need a simple, "local" temperature display. Tempco offers 2 styles: Backmounted and Adjustable Angle, each available with either 3" or 5" dials.

Backmounted Bimetal Dial Thermometers

Design Features

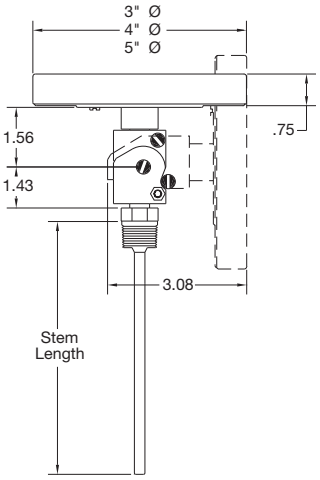
- *All Stainless Steel Construction*
- *Hermetically Sealed (ASME B40.3)*
- *Accurate to 1% of Full Scale*
- *Standard External Reset*
- *Silicone Fillable for Vibration Resistance*
- *1/2" NPT Connection Standard*
- *Selected 3" and 5" Dial Thermometers Available from Stock*



Adjustable Angle Bimetal Dial Thermometers

Design Features

- *Complete 180° Adjustability*
- *360° Case Rotation*
- *All Stainless Steel Construction*
- *Hermetically Sealed (ASME B40.3)*
- *Accurate to 1% of Full Scale*
- *Standard External Reset*
- *Silicone Fillable for Vibration Resistance*
- *1/2" NPT Connection Standard*
- *Selected 3" and 5" Dial Thermometers Available from Stock*



Backmounted Bimetal Dial Thermometers Standard Sizes and Ranges

1/2" NPT Connection Standard

Dial Dia. (in)	Stem Length (in)	Part Number by Temperature Range					
		-40 to 160°F	0 to 100°F	0 to 200°F	0 to 250°F	50 to 300°F	50 to 550°F
3	2.5	BMT10001	BMT10004	BMT10007	BMT10010	BMT10013	BMT10016
	4	BMT10002	BMT10005	BMT10008	BMT10011	BMT10014	BMT10017
	6	BMT10003	BMT10006	✻BMT10009	BMT10012	BMT10015	BMT10018
5	2.5	BMT10019	BMT10022	BMT10025	BMT10028	BMT10031	BMT10034
	4	BMT10020	BMT10023	BMT10026	BMT10029	✻BMT10032	BMT10035
	6	BMT10021	BMT10024	BMT10027	BMT10030	BMT10033	BMT10036

An asterisk (✻) next to the Part Number guarantees in-stock availability for same-day shipping when ORDERED BY 2 PM CST

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

Adjustable Angle Bimetal Dial Thermometers Standard Sizes and Ranges

1/2" NPT Connection Standard

Dial Dia. (in)	Stem Length (in)	Part Number by Temperature Range					
		-40 to 160°F	0 to 100°F	0 to 200°F	0 to 250°F	50 to 300°F	50 to 550°F
3	2.5	BMT20001	BMT20004	BMT20007	*BMT20010	BMT20013	BMT20016
	4	BMT20002	BMT20005	BMT20008	BMT20011	BMT20014	*BMT20017
	6	BMT20003	BMT20006	BMT20009	BMT20012	BMT20015	BMT20018
5	2.5	BMT20019	BMT20022	BMT20025	BMT20028	BMT20031	BMT20034
	4	BMT20020	BMT20023	BMT20026	BMT20029	BMT20032	BMT20035
	6	*BMT20021	BMT20024	BMT20027	BMT20030	BMT20033	*BMT20036

An asterisk (*) next to the Part Number guarantees in-stock availability for same-day shipping when ORDERED BY 2 PM CST

Ordering Code

BMT – [1] [2] [3]–[4] [5] [6]–[7]

Dial Diameter *BOX 1*

Standard: **3** = 3"
5 = 5"

Special: **4** = 4"
9 = Other (Specify)

Dial Mounting Style *BOX 2*

A = Adjustable Angle
B = Back Mounted

Stem Length *BOX 3*

Whole inches + tenths
Standard Stem Lengths are:
025 = 2.5" **040** = 4" **060** = 6"
090 = 9" **120** = 12"

Note: For special order, lengths from 2.5" (025) to 80" (800) are available;
Consult Tempco with your requirements.

Mounting/Fitting *BOX 4*

Standard: **1** = 1/2" NPT

Special: **5** = 3/4" NPT adapter
U = 1/2" NPT union (female conversion)
C = 1-1/2" Sanitary Tri-Clamp
L = 2" Sanitary Tri-Clamp
M = 3/4" Sanitary Tri-Clamp

Others available; consult TEMPCO with your requirements.

Temperature Scale *BOX 5*

Standard: **F** = Fahrenheit

Special: **C** = Celsius
D = Dual

Temperature Ranges *BOX 6*

	Code	Fahrenheit	Celsius	Dual (°F & °C)
Standard:				
	23 =	-40/160°F		
	35 =	0/100°F		
	43 =	0/200°F		
	47 =	0/250°F		
	63 =	50/300°F		
	67 =	50/500°F		
Special:				
	23 =		-40/70°C	-40/160°F & -40/70°C
	55 =	25/125°F	0/50°C	25/125°F & -5/50°C
	43 =		0/100°C	0/200°F & -10/90°C
	47 =		-20/120°C	0/250°F & -20/120°C
	63 =		0/150°C	50/300°F & 10/150°C
	67 =		0/250°C	50/500°F & 10/260°C
	69 =	50/550°F	0/300°C	50/550°F & 10/290°C
	81 =	150/750°F	50/400°C	150/750°F & 70/400°C
	85 =	200/1000°F	100/500°C	200/1000°F & 100/500°C

Others ranges available; consult Tempco with your requirements.

Special Options *BOX 7*

PS = Pointed Stem
SF = Silicone Fill
SS = 316 SS Stem
F3 = 3/8" Stem Diameter
PC = Acrylic Window
PY = Polycarbonate Window
TG = Tempered Glass Window
MM = Min/Max Pointer
Consult Tempco with your requirements.

Ordering Information

Bimetal Thermometers 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.

Part Numbers for commonly used Bimetal Thermometers can be found in table above.

Standard lead time is stock to 3 weeks.

Current Indicators

Wire-Mounted Current Indicators

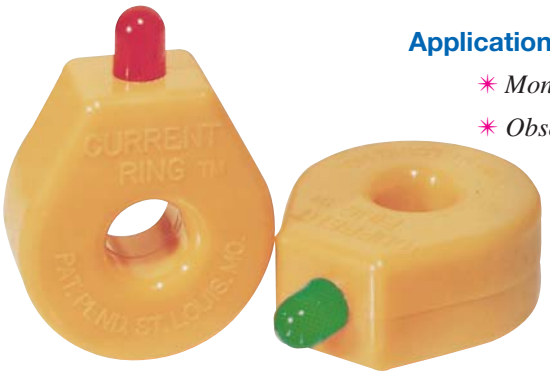
Tempco's wire-mounted electrical current indicators provide an effective method of monitoring electrical current. The indicator is attached directly to a current-carrying wire. When the current exceeds the turn-on point, the LED will illuminate to indicate the presence of current.

Red LED Indicator
Part Number: CTT00001

Green LED Indicator
Part Number: CTT00002

Panel Mounting Bracket
Part Number: CTT00003

Wire Passes	Turn-On Point (A) Red	Green	Max. Wire Dia. (in.)
1	2	2.5	.29
2	1	1.25	.14
3	.66	.83	.13
N	2 ÷ N	2.5 ÷ 2	–

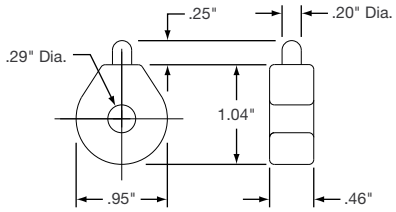


Design Features

- *Self Powered*
- *Easy to Install*
- *Supplied with Plastic Tie*
- *Indicates Current from 2 to 100 Amps (1 Wire Pass)*

Applications

- *Monitor Heater Element Status*
- *Observe Remote Loads*



Remote Current Indicators

The Tempco remote current sensing transformer is installed around the current-carrying wire and is connected directly to the LED panel indicator. When the current exceeds the turn-on point of the sensing transformer, the LED illuminates to indicate the presence of current. Two sizes of remote current sensing transformers are available for use with either of two types of LED indicators listed below at right.

Typical Applications

- *Indicate Open Heater Elements*
- *Observe Remote Loads*
- *Indicate Phase Loss*
- *Monitor Motor Operation*

All Items Available from Stock

Specifications
Max. Wire Dia.: .29 inches
Indicating Range: 2 to 100A
Max. Transient Current: 150A for 5 sec.
Working Class: 600 Volts, 50-60 Hz
Lead Wire Length: 12"
Max. Operating Temperature: 140°F/60°C

Part Number: CTT00004

Specifications
Max. Wire Dia.: .55 inches
Indicating Range: 2.5 to 100A
Max. Transient Current: 150A for 5 sec.
Working Class: 600 Volts, 50-60 Hz
Lead Wire Length: 24"
Max. Operating Temperature: 140°F/60°C

Part Number: CTT00005

Surface Mounting Bracket
For use on model CTT00005 only

Dimensions: 1.37" × 1.25"
Mounting Dims.: (2) #6 screws .87" apart

Part Number: CTT00006

Panel LED Indicators for Remote Current Transformers

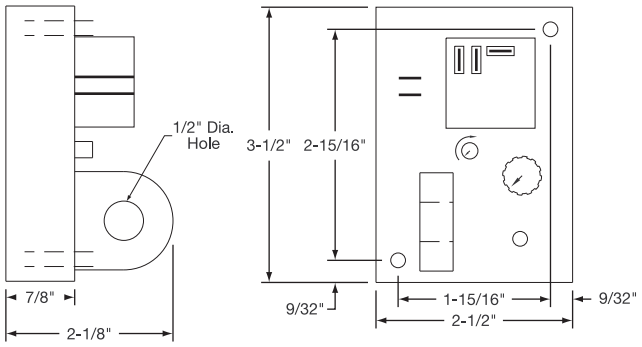
Press-In Panel LED Indicator with 12" leads

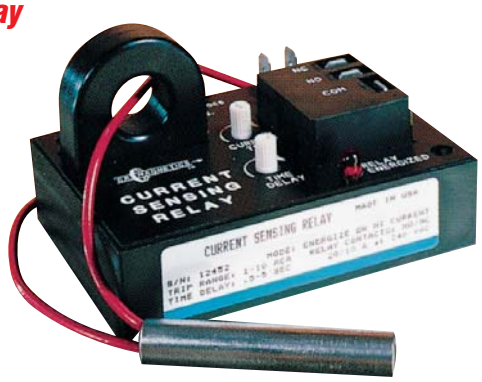
Splash-Proof Panel LED Indicator with 12" leads

Press-In LED Panel Indicator
LED Type: T-1-3/4", Red Bipolar
Mounting Hole: .250"
Part Number: CTL00001

Splash-Proof LED Indicator
Supplied with rubber sealing washer LED Type: T-1-1/4", Red Bipolar
Mounting Hole: .312"
Part Number: CTL00002

Current Sensing Relay





Specifications

Mounting: 2-3/16" dia. clearance holes on 1-15/16" by 2-15/16" centers
Environmental:
Operating Temperature: -30°C to +60°C
Storage Temperature: -55°C to +125°C
Power-On Delay: 100 ms max.
Hysteresis: 5% max.
Input Power Supply: 120 or 240Vac, 24 Vdc (Tolerance ±10%)
Input Terminals: 2-1/4" Male Quick Connect
Operating Class: 600 V
Sensed Current:
Max. Continuous: 200% Full Scale
Frequency: 60-400 Hz
Output Relay:
Arrangement: 1 Form C (SPDT)
Terminals: 3-1/4" Male Quick Connect
Contact Rating: NO-120/240 Vac: 20A, NC-120/240 Vac: 10A

Common Configurations

(with Calibrated Dial & Standard Relay)

Part Number	Trip Status	Supply Voltage	Trip Range (Amps)	Delay (sec)
CTR00201	LC	120	1 to 10	2 to 25
CTR00202	LC-Latch	120	1 to 10	2 to 25
CTR00203	LC	240	3 to 30	2 to 25
CTR00204	LC-Latch	240	3 to 30	2 to 25
CTR00205	LC	240	10 to 100	2 to 25
CTR00206	LC-Latch	240	10 to 100	2 to 25

The TEMPCO series of **Current Sensing Relays** provides an effective and highly stable method for monitoring electrical current. The current-carrying wire is routed through the opening extending from the top of the case. When current reaches the level set by the trip point adjustment, the electromechanical relay is energized. An adjustable timer is provided to delay activation of the relay. A precision voltage reference circuit ensures a highly repeatable trip point. Design of the power-on delay circuitry allows the supply power to be repeatedly cycled on and off without affecting the stability of the current sensing operation.

Design Features

- *Variable Trip Point and Time Delay*
- *Monitors Currents from 10 mA to 100 AC Amps*
- *Output Relay Rated Up to 20 Amps*
- *LED Relay Status Indicator*
- *Dead Band Prevents Relay Chatter*
- *Calibrated Dial*
- *Electrical Isolation Between Circuits*

Typical Applications

- *Monitor Electrical Heater Elements*
- *Sense Motor Over/Under Loads*
- *Detect Lamp Burnout*
- *Indicate Phase Loss*

Ordering Code

C T R

Relay Trip Status
1 = Relay Energized on High Current (above trip point)
2 = Relay Energized on Low Current (below trip point)
3 = Latch on High Current
4 = Latch on Low Current
Note: For 3 and 4 relay remains latched until supply power is removed

Supply Voltage
1 = 120 Vac
2 = 240 Vac
3 = 24 Vdc

Trip Ranges
3 = 1.0 to 10 AC Amps
4 = 3.0 to 30 AC Amps
5 = 6.0 to 60 AC Amps
6 = 10 to 100 AC Amps

Time-On Delay
A = .5 to 6 Sec.
B = 2 to 25 Sec.
C = .1 to 1 Sec.
X = None

Trip Point Dial
NC = Non-Calibrated Dial
CD = Calibrated Dial
FP = Fixed Setpoint
(specify required value)

Output Options
R = Standard Relay
N = Isolated NPN Transistor
T = Isolated Triac

Ordering Information

Current Relays 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 a common configuration. ***Standard lead time is stock to 3 weeks.***

Digital Multimeter — For Volts, Amps, Ohms and Temperature

Design Features

- *True RMS Autoranging DMM*
- *Type K thermocouple built-in for air or water temperature measurements*
- *Input fuse protection and misconnection warnings*
- *Auto Power-Off conserves battery life*
- *Data Hold for AC/DC voltage and current*
- *Relative function for establishing a base line reference*
- *Advanced measurements include Capacitance, Frequency and Duty Cycle*
- *Low current capability — measure down to* 0.1µA
- *CE, UL, CAT III – 600V*
- *3-year warranty*

Specifications

Display: 4000 counts, backlit
Basic Accuracy: ±0.3%
DC Voltage: 0.1mV to 1000V
AC Voltage: 0.1mV to 750V
DC Current: 0.1µV to 20A
AC Current: 0.1µV to 20A
Resistance: 0.1 to 40MΩ
Capacitance: 0.01nF to 100µF
Frequency: 0.001Hz to 10MHz
Temperature Type K: -4° to 1382°F (-20 to 750°C)
Duty Cycle: 0.1 to 99.9%
Diode/Continuity: Yes

Part Number: EMV00018

Complete with CAT III test leads, multi-position tilt stand and velcro strip for hanging, protective holster with test lead holder, bead wire temperature probe and 9 Vdc battery.

All Items Available from Stock

400 Amp Clamp-On Multimeter with Dual Display Plus Temperature and µA Current

Design Features

- *High-contrast 4000 count LCD display for clamp input and separate 4000 count display for multimeter test lead input*
- *Measure AC/DC Voltage to 600 V and Resistance to 40MW*
- *Type K thermocouple temperature measurements*
- *Autoranging with AC Current, Data Hold and Auto Power Off*
- *Complete with CAT III test leads, batteries and carrying case temperature probe*
- *Provides AC/DC µA measurements with high 0.1µA resolution – ideal for HVAC applications.*
- *Fast Continuity Beeper and Diode Test*
- *Overrange and Low Battery indications*
- *Compact size allows measurements in tight locations*
- *CAT III-600V, CE, UL Listed*
- *1-year warranty*

Specifications	Range	Maximum Resolution	Basic Accuracy
AC Current:	400A	0.01A	±(1.9%+5d)
AC/DC µA:	2000µA	0.1µA	±(2%+8d)
DC Voltage:	600V	0.1mV	±(0.5% rdg+3d)
AC Voltage:	600V	1 mV	±(1.5%+5d)
Resistance W:	40MW	0.1W	(0.6%+4d)
Capacitance:	3000uF	0.1nF	±(3.5%+6d)
Frequency:	5Hz to 100kHz	0.001Hz	±(0.5%+4d)
Temperature:	-4° to 572°F (-20 to 300°C), Type K tc	1°F/°C	±(2%+6°F or 3°C)
Diode Test:	0.25mA, <1.6V		
Power:	Two CR2032 button batteries		
Dimensions:	7.5" × 2.25" × 1.25" (190 × 63 × 32 mm)		
Weight:	0.45 lbs. (187g)		

Part Number: EMV00060

The EMV00060 is the perfect meter for plant maintenance or HVAC repair. Two displays allow simultaneous readings of current plus voltage, temperature or resistance. Additional functions like capacitance, frequency and µA current makes this the perfect all-in-one service tool.

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

Megohmmeter/ Insulation Tester

Design Features:

- *Three test ranges:*
  200MΩ/1000VDC
  200MΩ/500VDC
  200MΩ/250VDC
- *Power lock for 3-minute test*
- *Auto power off and Data Hold*
- *No voltage drop at low resistance*
- *Full function indication and Overload Protection*
- *Measures resistance to 200Ω and Volts to 750VAC*
- *1mA test current ensures 1000V/500V/250V rating*
- *Complete with 6 AA batteries, test leads and case with neck strap*

Part Number: EMM00010

Specifications	Range
Insulation Voltage:	250/500/1000
Insulation Resistance (accuracy):	200/2000MΩ (3% +5 digits)
Output short circuit current:	≤ 2.5mA
Resistance (accuracy):	200Ω (1% rdg)
Overload Protection:	2200 V (<1 min)
Dimensions:	3.8" × 6.3" × 2.3" (97 × 160

All Items Available from Stock

Digital Multimeter Temperature Adapter

Design Features

- *Type K thermocouple adapter is switchable with 1mV per 1° output*
- *±3% accuracy up to 223°F and ±5% accuracy for higher temperatures*
- *Complete with bead wire Type K thermocouple probe and 9V battery Max: 650°F/343°C*
- *Range: 0 to 2000°F (-20° to 1370°C)*
- *Dimensions: 3" × 2" × 1" (76 × 51 × 25mm)*

Part Number: EMT00052

AC Line Separator/Splitter

Design Features

- *Provides an easy and safe measurement of current without the need to cut off the plug and separate the conductors.*
- *Two clamp-on positions: x1 for direct readings*
  x10 for actual reading multiplied by 10
- *Dimensions: 5.25" × 2" × 1" (133 × 51 × 25mm)*

Part Number: EMV00065