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Temperature Controllers can be found in Section 13

# Instrumentation

# 12

section





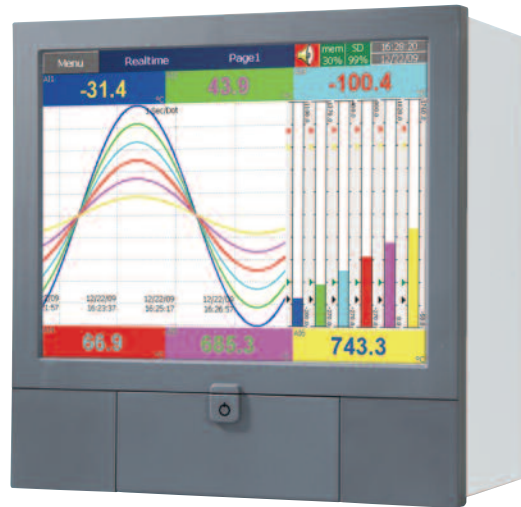
### PPS Series Videographic Data Recorders

**Now with Touch Screen Technology!**



PPS-1000

PPS-2000



PPS-3000

#### Product Overview

- \* The PPS Series is a major advance in the market for Paperless Videographic Data Recorders incorporating Touch Screen Technology for set-up and programming.
- \* **The PPS Series encompasses three models:**
  - The PPS-1000 for basic 3 or 6 channel recording on a 4.3" screen
  - The PPS-2000 for up to 24 channels on a 5.6" screen
  - The PPS-3000 expandable to 48 channels on a 12.1" screen
- \* The PPS Series displays data in real time on the touch screen.
- \* The PPS saves data to internal memory that can be exported to SD memory cards or USB ports as well as over a LAN using the optional Data Acquisition Software.
- \* Data logging supports notes being written directly on the Touch Screen that may be saved with the data files. The data files may be started and stopped as a batch operation with additional batch lot information.
- \* **The Basic PC software package included at No Charge provides:**
  - Historical Viewer/Configuration capability to view, print, export and archive PPS Series data files imported via SD card or USB drive
  - Create and edit PPS configurations to be downloaded back to the recorder
- \* Data Acquisition Studio software combined with the Basic package provides real time access from one or more PPS units via LAN, serial or Modbus with datalogging functions at the PC.
- \* Optional firmware packages include the Panel Studio development software to design custom displays including digital and analog tags and values with animation.



#### Design Features

- \* **Touch Screen Technology**
- \* **TFT high resolution color LCD**
- \* **100 millisecond sample rate and data logging**
- \* **High accuracy 24 bit A-D analog inputs**
- \* **16 bit A-D analog outputs**
- \* **Digital count inputs, maximum frequency 100 Hz**
- \* **Plug & Play I/O card/modules:**
  - Analog Input - 3 or 6 per card
  - Analog Output - 6 per card
  - Digital Input - 6 per card
  - Digital/Relay Output - 6 per card
  - Combo Card - 3 Digital Inputs + 3 Relay Outputs
- \* **SD Slot for internal memory expansion**
- \* **(2) USB host ports for downloading data or printer connection**
- \* **6.73"/171mm short panel depth**
- \* **Ethernet standard with optional RS-232 or RS422/485**
- \* **NEMA 4X / IP65 water resistant housing**





### PPS Series Videographic Data Recorders



PPS-2000 Front View

#### Front Panel Features

- \* **High resolution TFT LCD Color Touch Screen**
  - PPS-1000: 4.3", 480 × 272 resolution
  - PPS-2000: 5.6", 640 × 480 resolution
  - PPS-3000: 12.1", 1024 × 768 resolution
- \* **SD slot for external memory: 16G or 32G**
- \* **1st USB slot, for memory, auxillary or printer**
- \* **Reset - To Reset and Restore factory settings**
- \* **Start/Stop - To Start or Stop channel recording, or to turn the screen on or off**
- \* **Front Door - Key locked for security**

#### Back Panel Features

- \* **Multiple slots for Input/Output modules**
  - PPS-1000 4 slots, 6 analog channels maximum
  - PPS-2000 4 slots, 24 analog channels maximum
  - PPS-3000 16 slots, 48 analog channels maximum
- \* **Optional RS-232/422/485 Serial communications**
- \* **Ethernet port, standard for Internet/Intranet coms**
- \* **2nd USB slot for memory, auxillary or printer**
- \* **Power Switch**
  - Optional for panel style mounting
  - Standard for portable style mounting
- \* **Power Terminals, for input power connections**



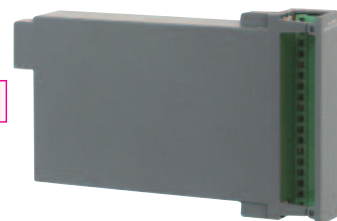
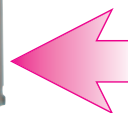
PPS-2000 Rear View

#### Input / Output Modules

\* **Input/Output modules can be added or removed to the rear of the unit easily. The modules are locked in with screws.**

\* **Input/Output module types are:**

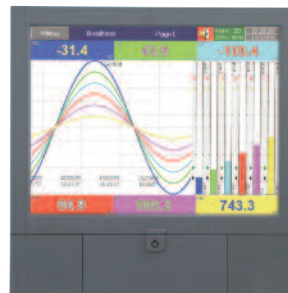
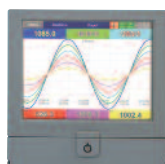
- 6 - channel Analog Inputs
- 3 - channel Analog Inputs
- 6 - Relay Outputs, 5A 240V, NO and NC
- 6 - Digital Inputs
- 3 - Relay Outputs and 3 - Digital Inputs
- 6 - Analog Outputs



I/O Modules for Simple Expansion



### PPS Series Videographic Data Recorders



**PPS-1000**

**PPS-2000**

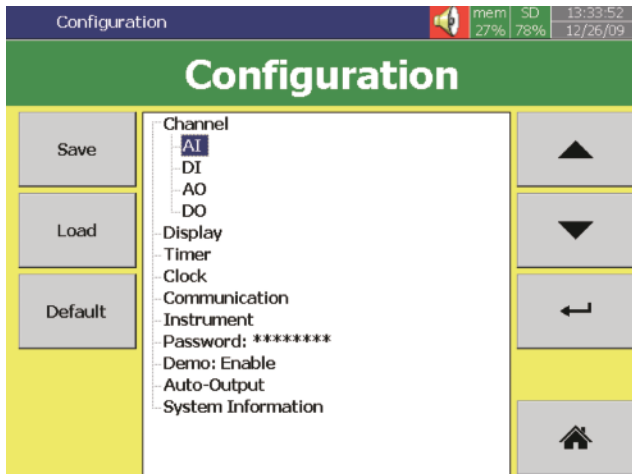
**PPS-3000**

<b>Analog Input Channels</b>	3 or 6	3, 6, 12, 18, or 24	6, 12, 18, 24, 30, 36,42 or 48
<b>Universal Analog Inputs</b>	<b>Thermocouples:</b> J, K, T, E, B, R, S, N, L, U, P, W5, W3, LR, A1, A2, A3, M; <b>Linear:</b> mA, mV, V <b>RTD:</b> Pt50, Pt100, Pt200, Pt500, Pt1000 ( $\alpha=0.00385$ ) Pt50, Pt100 ( $\alpha=0.00391$ ) JPt50, JPt100, JPt200, JPt500, JPt1000 ( $\alpha=0.003916$ ) Cu10, ( $\alpha=0.00427$ ), Cu50, Cu100 ( $\alpha=0.00426, 0.00428$ ) Ni100, Ni200, Ni500, Ni1000 ( $\alpha=0.00617$ )		
<b>Sampling Rate</b>	100mS, 24 bit Analog to Digital Converter		
<b>Math, External Channels, FDA 21 CFR part 11</b>	Available in optional Plus versions of the firmware.		
<b>Display, Touch Screen</b>	4.3" TFT Color LCD	5.6" TFT Color LCD	12.1" TFT Color LCD
<b>Resolution</b>	480 x 272	640 x 480	1024 x 768
<b>Email, Screen Saver</b>	Yes	Yes	Yes
<b>CPU</b>	ARM Cortex-A8, 1 GHz		ARM Cortex-A8, 1 GHz
<b>Internal Flash Memory</b>	256 MB		256 MB
<b>Internal RAM</b>	256 MB		256 MB
<b>Ethernet</b>	Modbus TCP/IP	Modbus TCP/IP	Modbus TCP/IP
<b>RS-232/422/485</b>	Optional RS-232 or RS-422/485 Modbus RTU in the rear		
<b>SD card slot, USB</b>	Standard SD and one USB in the front, one USB in the rear		
<b>Pulse Input</b>	Optional Digital Input Card for either logic or high frequency counter		
<b>START/STOP switch</b>	Start/Stop channel recording, and manually turn off the display		
<b>Calibration</b>	On site calibration or channel correction using Offset and Gain		
<b>Multilingual</b>	Programmable in Brazil Portuguese, Chinese (simplified and traditional), Czech, Danish, Dutch, English, French, German, Greek, Italian, Japanese, Korean, Polish, Portuguese, Russian, Spanish, Thai and Turkish		
<b>PC Software</b>	Configuration and Historical Viewer - Standard; Real Time monitoring and Data Acquisition Studio - Optional		
<b>Power Supply</b>	90-250 VAC or 11 - 36 VDC		
<b>Outer Dimensions (WxHxL)</b>	5.67" x 5.67" x 7.44" (144 x 144 x 189mm)	5.67" x 5.67" x 7.44" (144 x 144 x 189mm)	11.34" x 11.34" x 7.44" (288 x 288 x 189mm)
<b>Panel Mounting Depth</b>	6.73" (171mm)	6.73" (171mm)	6.73" (171mm)
<b>Panel Cutout</b>	5.39" x 5.39" (137 x 137mm)	5.39" x 5.39" (137 x 137mm)	11.06" x 11.06" (281 x 281mm)
<b>Protection Rating</b>	NEMA 4X / IP65 front; IP20 rear		
<b>Operating Temperature</b>	32° to 122°F (0° to 50°C)		
<b>Storage Temperature</b>	-22° to 158°F (-30° to 70°C)		
<b>Safety Standards</b>	cURus, RoHS		





### Firmware Features



Configuration in Indented Layout for easy operation

#### Standard Firmware Package

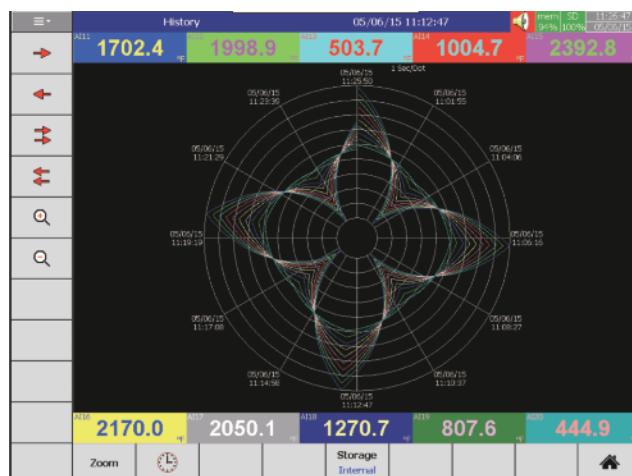
- **AI:** Analog Input is offered in various logging speeds of 100mS, 1, 2, 5, 10, 20, 30 Sec., 1, 2 minutes
- **DI:** Digital Input can be configured for Normal Logic or High Frequency Pulse
- **AO:** Analog Outputs can be configured in mA or Volts and it's function defined.
- **DO:** Digital/Relay Outputs can be enabled for process functions
- **Display:** Various display speeds can be set in 100mS, 1, 2, 5, 10, 20, 30, Sec., 1, 2, 10, 30 min./page, 1, 2, 4, 8, 12 hrs./page, 1 day/page
- **Timer:** Timer configured in Countdown, Repeat Countdown, Daily, Weekly, of Monthly base and various jobs can be defined
- **Clock:** Date Style of MM/dd/yy or dd/MM/yy, Time Synchronize via Internet, and Daylight Savings Time can be defined
- **Communications:** Web Server and E-mail functions
- **Instrument:** Brightness adjustment & Screen Saver
- **Password:** If Normal Security is chosen, then one password is offered. If the high security of CFR-21 is chosen, then 9 levels of passwords can be defined
- **Demo:** Built-in Demonstration of the instrument's features can be activated



Free hand note taking, directly on the screen

#### Optional Firmware Plus 1 Package

- Math, Counters and Totalizer functions within derived channels
- Derived Channels by Model Number:  
PPS-1000: 15 derived channels  
PPS-2000: 40 derived channels  
PPS-3000: 60 derived channels
- High frequency pulse inputs can be configured from digital inputs
- With the CFR 21 security feature enabled, the PPS Series meets the requirements for electronic data for FDA 21 CFR part 11
- External Channel Input: The PPS Series is configurable as a Master or Slave device with the number of external channels varying by Model. The External Channels require Modbus RTU protocol over either the TCP/IP Ethernet port or the optional serial RS232/485
- Data log Batch start/stop allows batch data file name, file duration, lot number and up to 3 comments to be stored as part of the file



Display simulates Circular Chart Recorder (PPS-3000 only)



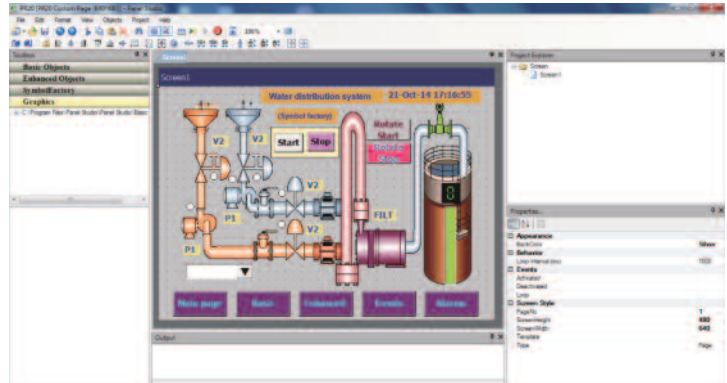


### Firmware Features

Continued from previous page...

#### Optional Firmware Plus 2 Package

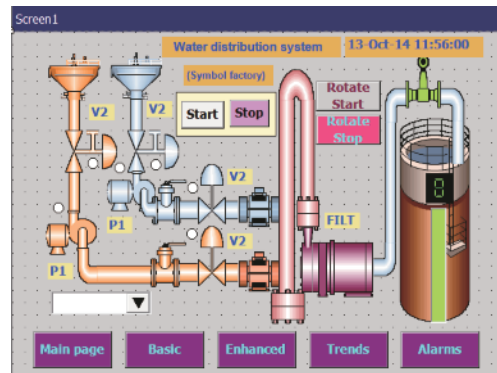
- Panel Studio development software allows the user to custom design display views that provide a graphical representation of the application including animation as well as digital and analog tags and values.
- The user can use Panel Studio to edit specific displays on the PC first and then download it onto the recorders.
- The custom edited displays will be added to the standard pages.



Create and edit the display on the PC

#### Optional Firmware Plus 3 Package

- This package is a combination of the Plus 1 and Plus 2 firmware features.
- It features Extended Math Functions, FDA 21 CFR part 11 compliance and Panel Studio development software.

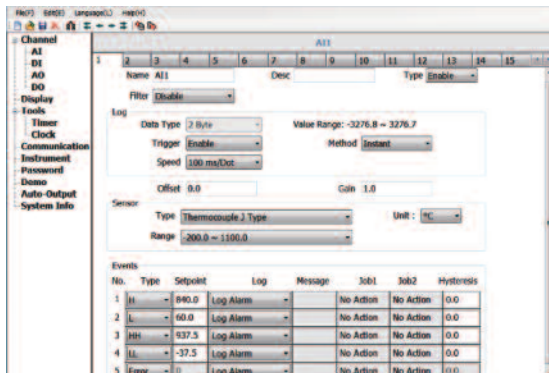


Download it into the Recorder

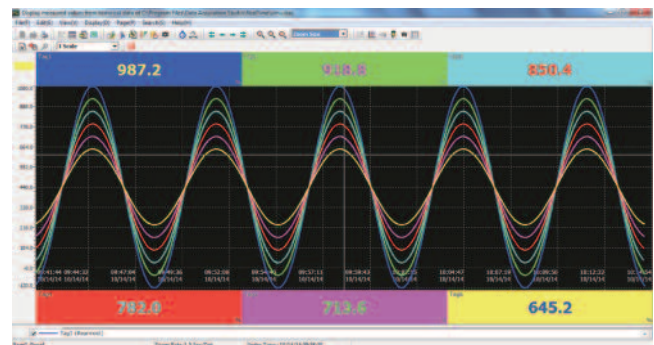
### Software Features

#### Standard Basic Software

- **Configuration:** Create and edit recorder configurations including projects, analog channels, external and math channels, Events, Inputs, and Outputs, Power, etc. and download the configuration back to the recorder via LAN, SD or USB cards.
- **Historical Viewer:** Provides the capability to view, print, export (csv.) and archive PPS Series data files imported via LAN, SD or USB cards.



Configuring an Analog Input Channel



Historical view of multiple channels

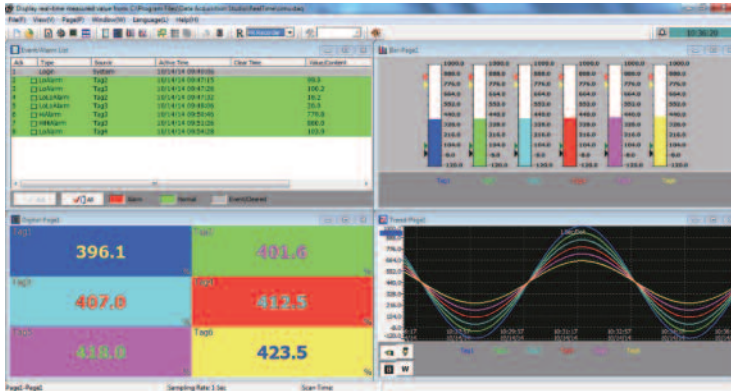




### Software Features (continued)

#### Optional Extensive Software Package

- In addition to the standard Historical Viewer Configuration software, the Extensive Software Package, includes the Data Acquisition Studio to provide Real Time Access from one to multiple PPS units (2,048 tags) via LAN or serial Modbus.
- Provides data logging functions within the software in the PC.
- The software allows real time viewing of standard screen views from specific PPS recorders, to download data log files and download/upload configuration files to the recorder via the LAN or serial Modbus.
- The PPS Data Acquisition Studio is fee based and requires a hardware dongle to be inserted into one of the PC's USB drives to fully function. Without the hardware dongle, the software may be installed and run for 1-hour and then it will stop functioning.



Real Time Viewer on the PC

### Rear Panel Layout



**PPS-1000**

4 slots, up to 6 Analog inputs



**PPS-2000**

4 slots, up to 24 Analog inputs



**PPS-3000**

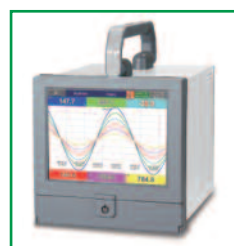
16 slots, up to 48 Analog inputs

### Portables

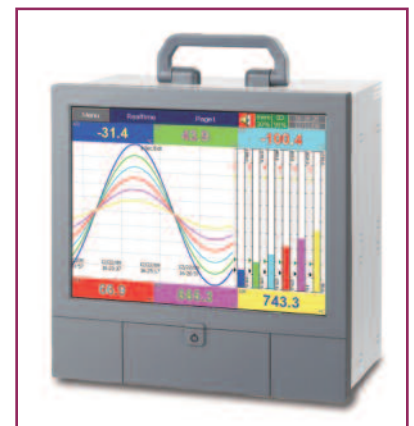
*The portable version of the PPS Series is supplied with a handle, 120VAC cordset, and rear mounted Power Switch.*



**PPS-1000**



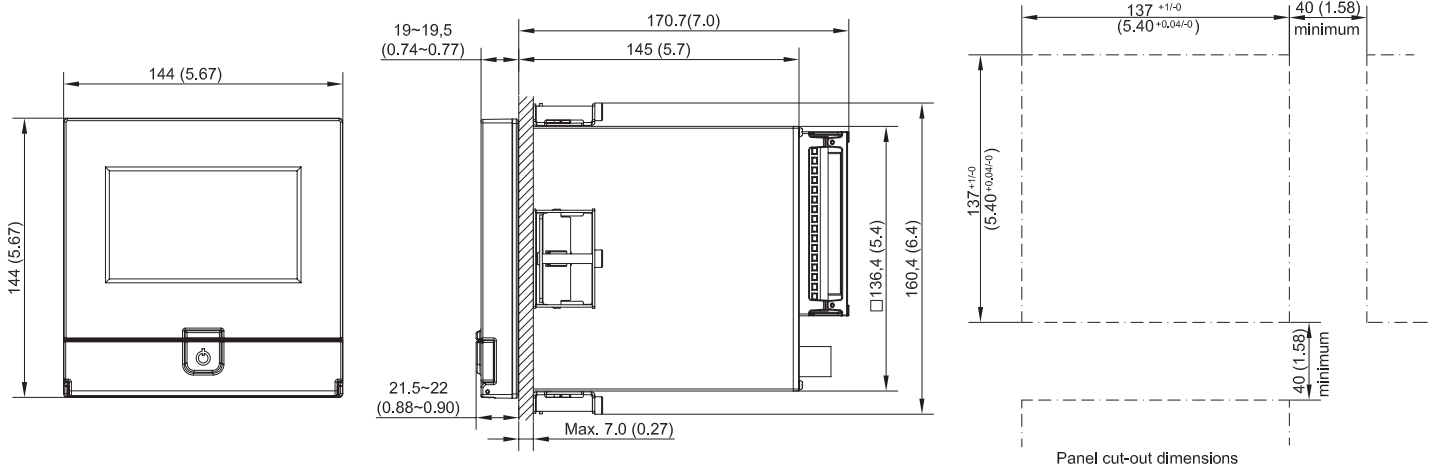
**PPS-2000**



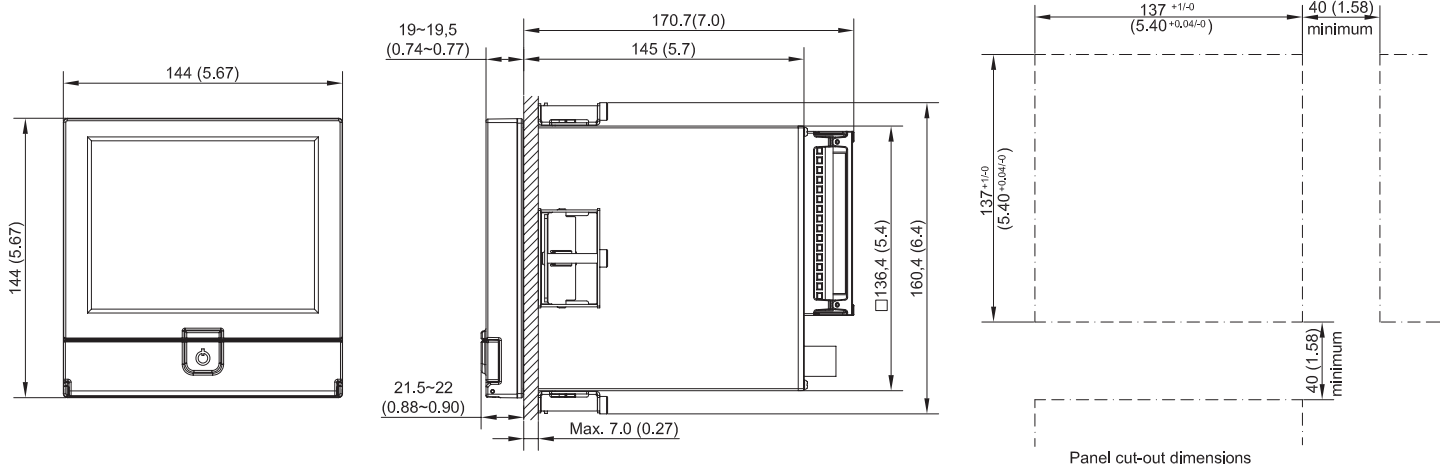
**PPS-3000**

### Dimensional Specifications: mm (in)

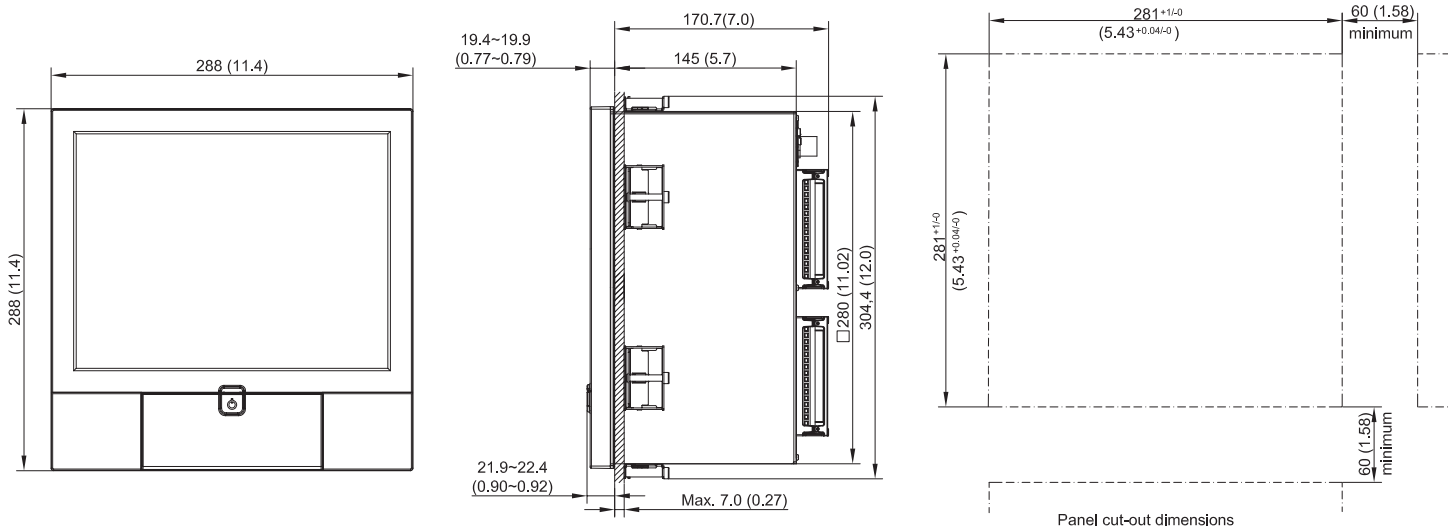
#### PPS-1000



#### PPS-2000



#### PPS-3000







# PPS Series Videographic Data Recorders

## PPS-1000 Ordering Information

Ordering Code: **PPS-1000** -  <sup>1</sup>          <sup>8</sup>

**Analog Inputs** BOX 1  
**03** = 3 Analog Input Channels

**I/O Options** BOX 2  
**0** = None  
**6** = 3 Relay Outputs and 3 Digital Inputs

**PC Software** BOX 6  
**1** = Basic software includes Historical Viewer and Configuration  
**2** = Extensive software Data Acquisition Studio includes RealTime Viewer & Historical Viewer and Configuration

**Analog Inputs** BOX 1  
**06** = 6 Analog input Channels

**I/O Options** BOX 2  
**0** = None  
**1** = 6 Relay Outputs  
**3** = 6 Digital Inputs  
**6** = 3 Relay Outputs and 3 Digital Inputs  
**7** = 6 Relay Outputs and 6 Digital Inputs

**Mounting Types, Power Cord & Switch** BOX 7  
**0** = Panel Mount, no power switch, no power cord  
**1** = Panel Mount, with power switch, no power cord  
**2** = Portable style, with UL/CSA power cord and switch  
**3** = Portable style, with VDE power cord and switch  
**4** = Portable style, with SAA power cord and switch  
**5** = Portable style, with BS power cord and switch

**Power** BOX 3  
**A** = 90 - 250 VAC, 50 - 60 Hz  
**D** = 11 - 36 VDC

**Firmware** BOX 5  
**0** = Standard version  
**1** = Plus version 1 with extra math, external channels, batch and FDA 21 CFR part 11  
**2** = Plus version 2 with custom edited display and editing software Panel Studio  
**3** = Plus version 3 includes Plus versions 1 and 2

**Removable Memory** BOX 8  
**00** = None  
**S1** = 16G SD Card  
**S2** = 32G SD Card

**Data Communications** BOX 4  
**0** = Standard Ethernet  
**1** = Ethernet and RS-232  
**2** = Ethernet RS-422/485

### Ordering Information

**Videographic Data Recorders** 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)

**PPS10001** 3 Analog Input Channels, no input/output, 90-250VAC Power Input, Standard Ethernet, Standard Firmware, Basic Software, Panel Mount, 16GB SD card

**PPS10003** 3 Analog Input Channels, 3 Digital Input and 3 Relay Outputs, 90-250VAC Power Input, Standard Ethernet, Standard Firmware, Basic Software, Panel Mount, 16GB SD card

**PPS10002** 6 Analog Input Channels, no input/output, 90-250VAC Power Input, Standard Ethernet, Standard Firmware, Basic Software, Panel Mount, 16GB SD card

**PPS10004** 6 Analog Input Channels, 3 Digital Input and 3 Relay Outputs, 90-250VAC Power Input, Standard Ethernet, Standard Firmware, Basic Software, Panel Mount, 16GB SD card

### Auxillary I/O Cards/Modules and Accessories (Part Number & Description)

**PPS90001** 6 Analog Input Channels  
**PPS90002** 3 Analog Input Channels  
**PPS90003** 6 Relay Outputs

**PPS90004** 6 Digital Inputs  
**PPS90005** 3 Relay Outputs and 3 Digital Inputs  
**PPS90006** 6 Analog Outputs  
**PPS90050** Spare Door Key



### PPS-2000 Ordering Information

Ordering Code: **PPS-2000** -

**Analog Inputs** BOX 1  
**03** = 3 Analog Input Channels

**I/O Options** BOX 2  
**0** = None  
**6** = 3 Relay Outputs and 3 Digital Inputs  
**C** = 3 Relay Outputs and 3 Digital Inputs and 6 Analog Outputs

**Analog Inputs** BOX 1  
**06** = 6 Analog input Channels

**I/O Options** BOX 2  
**0** = None  
**1** = 6 Relay Outputs  
**3** = 6 Digital Inputs  
**5** = 6 Analog Outputs  
**6** = 3 Relay Outputs and 3 Digital Inputs  
**7** = 6 Relay Outputs and 6 Digital Inputs  
**A** = 6 Relay Outputs and 6 Analog Outputs  
**B** = 6 Digital Inputs and 6 Analog Outputs  
**C** = 3 Relay Outputs and 3 Digital Inputs and 6 Analog Outputs  
**D** = 6 Relay Outputs and 6 Digital Inputs and 6 Analog Outputs

**Analog Inputs** BOX 1  
**12** = 12 Analog input Channels

**I/O Options** BOX 2  
**0** = None  
**1** = 6 Relay Outputs  
**2** = 12 Relay Outputs  
**3** = 6 Digital Inputs  
**4** = 12 Digital Outputs  
**5** = 6 Analog Outputs  
**6** = 3 Relay Outputs and 3 Digital Inputs  
**7** = 6 Relay Outputs and 6 Digital Inputs  
**8** = 9 Relay Outputs and 3 Digital Inputs  
**9** = 3 Relay Outputs and 9 Digital Inputs  
**A** = 6 Relay Outputs and 6 Analog Outputs  
**B** = 6 Digital Inputs and 6 Analog Outputs  
**C** = 3 Relay Outputs and 3 Digital Inputs and 6 Analog Outputs

**Analog Inputs** BOX 1  
**18** = 18 Analog input Channels

**I/O Options** BOX 2  
**0** = None  
**1** = 6 Relay Outputs  
**3** = 6 Digital Inputs  
**5** = 6 Analog Outputs  
**6** = 3 Relay Outputs and 3 Digital Inputs

**Analog Inputs** BOX 1  
**24** = 24 Analog input Channels

**I/O Options** BOX 2  
**0** = None

**Power** BOX 3  
**A** = 90 - 250 VAC, 50 - 60 Hz  
**D** = 11 - 36 VDC

**Data Communications** BOX 4  
**0** = Standard Ethernet  
**1** = Ethernet and RS-232  
**2** = Ethernet RS-422/485

**Firmware** BOX 5  
**0** = Standard version  
**1** = Plus version 1 with extra math, external channels, batch and FDA 21 CFR part 11  
**2** = Plus version 2 with custom edited display and editing software Panel Studio  
**3** = Plus version 3 includes Plus versions 1 and 2

**PC Software** BOX 6  
**1** = Basic software includes Historical Viewer and Configuration  
**2** = Extensive software Data Acquisition Studio includes RealTime Viewer & Historical Viewer and Configuration

**Mounting Types, Power Cord & Switch** BOX 7  
**0** = Panel Mount, no power switch, no power cord  
**1** = Panel Mount, with power switch, no power cord  
**2** = Portable style, with UL/CSA power cord and switch  
**3** = Portable style, with VDE power cord and switch  
**4** = Portable style, with SAA power cord and switch  
**5** = Portable style, with BS power cord and switch

**Removable Memory** BOX 8  
**00** = None  
**S1** = 16G SD Card  
**S2** = 32G SD Card

### Ordering Information

**Videographic Data Recorders** 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)

**PPS20003** 12 Analog Input Channels, no input/output, 90-250VAC Power Input, Standard Ethernet, Standard Firmware, Basic Software, Panel Mount, 16GB SD card

**PPS20004** 18 Analog Input Channels, no input/output, 90-250VAC Power Input, Standard Ethernet, Standard Firmware, Basic Software, Panel Mount, 16GB SD card

**PPS20005** 12 Analog Input Channels, 6 Digital Input and 6 Relay Outputs, 90-250VAC Power Input, Standard Ethernet, Standard Firmware, Basic Software, Panel Mount, 16GB SD card

**PPS20006** 18 Analog Input Channels, 3 Digital Input and 3 Relay Outputs, 90-250VAC Power Input, Standard Ethernet, Standard Firmware, Basic Software, Panel Mount, 16GB SD card





### PPS-3000 Ordering Information

Ordering Code: **PPS-3000** -  <sup>1</sup>   <sup>2</sup>   <sup>3</sup>   <sup>4</sup>   <sup>5</sup>   <sup>6</sup>   <sup>7</sup>   <sup>8</sup>   <sup>9</sup>   <sup>10</sup>

#### Analog Inputs BOX 1

- 06** = 6 Analog Input Channels
- 12** = 12 Analog Input Channels
- 18** = 18 Analog Input Channels
- 24** = 24 Analog Input Channels
- 30** = 30 Analog Input Channels
- 36** = 36 Analog Input Channels
- 42** = 42 Analog Input Channels
- 48** = 48 Analog Input Channels

#### Analog Outputs BOX 4

- 0** = None
- 1** = 6 Analog Outputs
- 2** = 12 Analog Outputs

#### PC Software BOX 8

- 1** = Basic software includes Historical Viewer and Configuration
- 2** = Extensive software Data Acquisition Studio includes RealTime Viewer & Historical Viewer and Configuration

#### Relay Outputs BOX 2

- 0** = None
- 1** = 6 Output Relays
- 2** = 12 Output Relays
- 3** = 18 Output Relays
- 4** = 24 Output Relays

#### Power BOX 5

- A** = 90 - 250 VAC, 50 - 60 Hz
- D** = 11 - 36 VDC

#### Mounting Types, Power Cord & Switch BOX 9

- 0** = Panel Mount, no power switch, no power cord
- 1** = Panel Mount, with power switch, no power cord
- 2** = Portable style, with UL/CSA power cord and switch
- 3** = Portable style, with VDE power cord and switch
- 4** = Portable style, with SAA power cord and switch
- 5** = Portable style, with BS power cord and switch

#### Digital Inputs BOX 3

- 0** = None
- 1** = 6 Digital Inputs
- 2** = 12 Digital Inputs
- 3** = 18 Digital Inputs

#### Data Communications BOX 6

- 0** = Standard Ethernet
- 1** = Ethernet and RS-232
- 2** = Ethernet RS-422/485

#### Firmware BOX 7

- 0** = Standard version
- 1** = Plus version 1 with extra math, external channels, batch and FDA 21 CFR part 11
- 2** = Plus version 2 with custom edited display and editing software Panel Studio
- 3** = Plus version 3 includes Plus versions 1 and 2

#### Removable Memory BOX 10

- 00** = None
- S1** = 16G SD Card
- S2** = 32G SD Card

### Ordering Information

**Videographic Data Recorders** 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)

**PPS30001** 24 Analog Input Channels, no input/output, 90-250VAC Power Input, Standard Ethernet, Standard Firmware, Basic Software, Panel Mount, 16GB SD card

**PPS30002** 36 Analog Input Channels, no input/output, 90-250VAC Power Input, Standard Ethernet, Standard Firmware, Basic Software, Panel Mount, 16GB SD card

**PPS30003** 24 Analog Input Channels, 6 Digital Input and 6 Relay Outputs, 90-250VAC Power Input, Standard Ethernet, Standard Firmware, Basic Software, Panel Mount, 16GB SD card

**PPS30004** 36 Analog Input Channels, 6 Digital Input and 6 Relay Outputs, 90-250VAC Power Input, Standard Ethernet, Standard Firmware, Basic Software, Panel Mount, 16GB SD card



## RCR-600 Chart Recorder

### *RCR-600 6-Point 100 mm Chart Recorder*



#### Design Features

- \* 6-Channel dotting recorder
- \* 100 mm chart paper size
- \* 144 × 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
<b>Analog Recording</b>	Makes analog recording with 6 colored dots.
<b>Digital Display</b>	Indicates channel number, process variable, date, chart speed and alarm setpoint.
<b>Logging Print</b>	Prints date, time, scaling, chart speed, process variable, and engineering unit at a programmed interval.
<b>List Print</b>	Prints chart speed, sensor type, measurement range, engineering unit, alarm setting value comment, printing description, logging print and on/off zone.
<b>Affix Print</b>	Prints channel number by the analog recording.
<b>Dot Print Skip</b>	Skips recording of an unused channel.
<b>Programming</b>	Programs chart speed, alarm setting value, logging, dot point skip, date and time.
<b>Memory</b>	A built-in lithium battery protects the clock function backup.
<b>Alarm</b>	Sets 2 types—high and low—per channel for a total of 4 levels.
<b>Clock</b>	Indicates year, month, day, hour and minute.
<b>Self Diagnostics</b>	Indicates “Error” and code when there is a fault.

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



### Specifications & Features – RCR-600 Chart Recorder

#### DESIGN SPECIFICATIONS

##### 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 - 10MΩ

Vdc input - 1MΩ, mA input - 100Ω

**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<sup>2</sup> maximum 10 - 60 Hz

**Shock Resistance:** 2 m/s<sup>2</sup> 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 -

##### Digital input / output BOX 1

0 = None

1 = 6 Relay output

2 = 3 Digital inputs

3 = 3 Digital inputs + 6 relay outputs

##### Data Communications BOX 3

0 = RS - 232C Interface

1 = RS - 485 Interface

##### Out of Paper Sensor BOX 2

0 = None

1 = Yes

#### 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

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





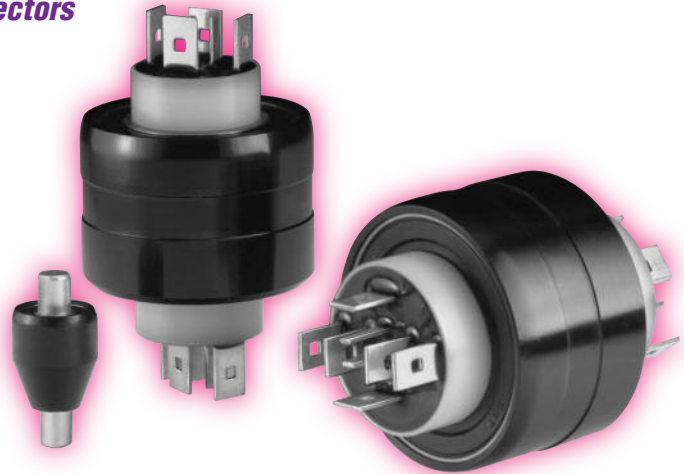
### Rotating Multi-Pin Electrical Connectors

*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



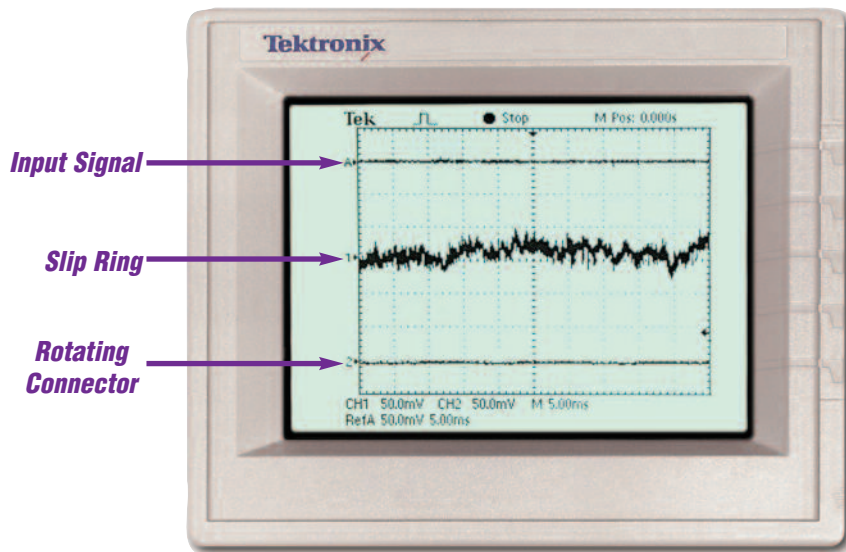
### Multi-Pin Rotating Connectors Offer Superior Performance

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
- ↔ Lamps
- ↔ Thermocouples
- ↔ Signs
- ↔ Rotating Antennas
- ↔ Displays
- ↔ Turntables
- ↔ Packaging Equipment
- ↔ Cable Reels
- ↔ Robotics
- ↔ Instrumentation
- ↔ Strain Gauges
- ↔ Testing and Control Devices
- ↔ 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 4 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



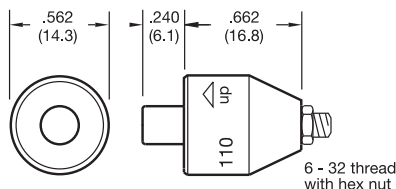
**MER90003** one-contact receptacle w/ 6" wire



**MER90004** ring terminal (12-10 AWG)

**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, 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



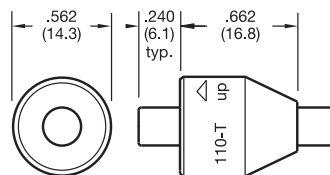
**MER90002** one-contact receptacle



**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

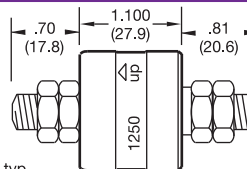
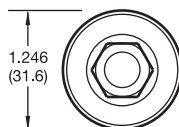
Part No.	Conductors	Description	VOLTAGE AC/DC	AMP RATING AT 240 VAC	MAX FREQ. MHz	CONTACT RESISTANCE	MAX OP. RPM	TEMPERATURE Max.F(C) / Min.F(C)	ROTATION Torque (gm-cm)	CIRCUIT SEPARATION
MER01250	1	Standard Model	N/A	250	200	<1mΩ	1200	140(60)/-20(-29)	250	N/A
MER01251	1	Stainless Steel Bearing	N/A	250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





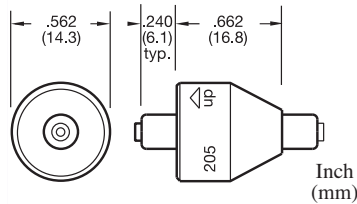
## Rotating Electrical Connectors

### 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



#### ACCESSORIES

**MER90015** two-contact receptacle w/ one 6" wire

**MER90005** two-contact receptacle w/ two 6" wires

**MER90006** two-contact receptacle w/ two solder holes

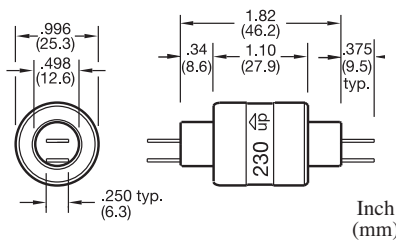
**MER90007** two-contact cap w/ solder lugs

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



Includes (2) MER90009 and (2) MER90010

#### ACCESSORIES

**MER90010** Terminal 16-14 AWG

**MER90101** Boot Kit For dust and splash protection IP51

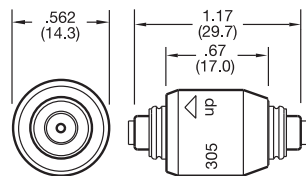
**MER90009** Terminal 16-14 AWG

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

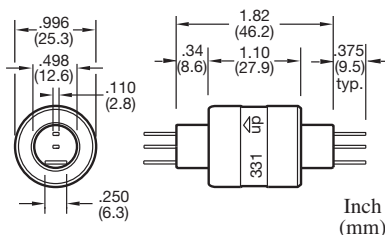


**MER90009** Terminal  
16-14 AWG



**MER90008** Terminal  
22-18 AWG

Terminals for other wire gauges available.



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

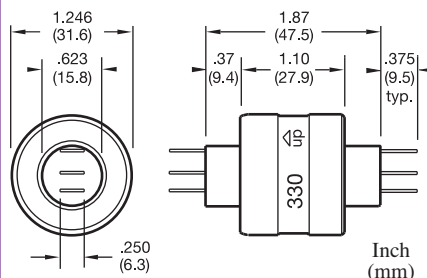


**MER90021**  
Shrink Tube



**MER90019**  
Terminal 16-14 AWG

Terminals for other wire gauges available.



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



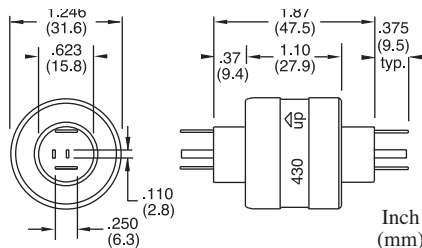
**MER90010**  
16-14 AWG



**MER90009**, 16-14 AWG



**MER90008**, 22-18 AWG



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





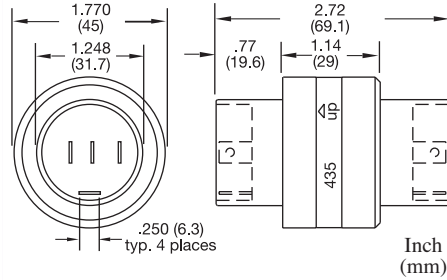
## Rotating Electrical Connectors

### 4, 6 & 8 CONDUCTORS

#### 4 Conductors, 30 Amp, High Voltage

#### Model 435

Part No.	Conductors	Description	VOLTAGE AC/DC	AMP RATING AT 500 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



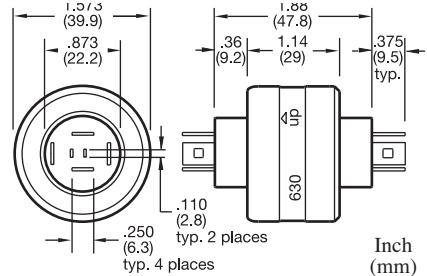
**MER90103**  
Boot Kit  
For dust and splash protection  
IP51

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

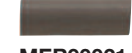


Includes (4) MER90008, (4) MER90010, (4) MER90019 and (4) MER90021

#### ACCESSORIES



**MER90008**  
Terminal 22-18 AWG



**MER90021**  
Shrink Tube



**MER90019**  
Terminal 16-14 AWG



**MER90010**  
Terminal 16-14 AWG



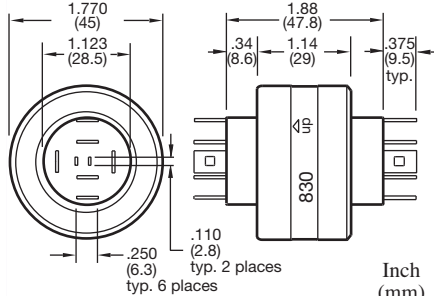
**MER90104**  
Boot Kit  
For dust and splash protection  
IP51

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

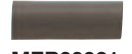


Includes (4) MER90008, (6) MER90010, (6) MER90019 and (6) MER90021

#### 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.

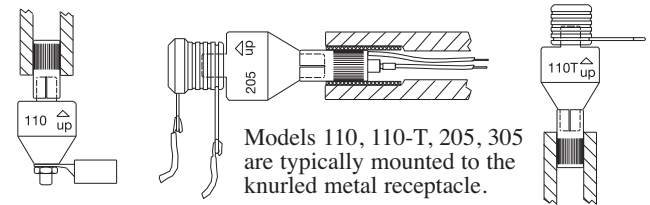
#### BOOT KIT

- 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.

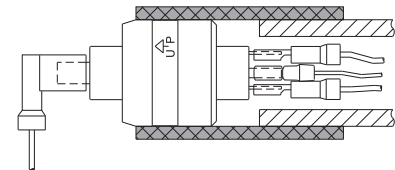
#### Receptacle Mount Hole Dimensions

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  $+0.011^{(+0.025)}$   
 $-0.000^{(-0.000)}$

### Typical Body Mount

#### Body Mount Hole Dimensions



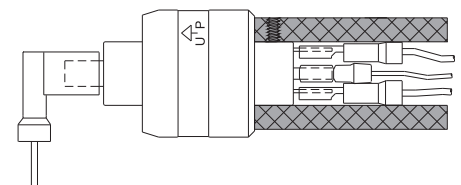
MODEL	HOLE DIAMETER Ø	DEPTH*
230, 331	.998" (25.35)	.80" (20)
330, 430, 1250	1.248" (31.70)	.80" (20)
630	1.575" (40.00)	.80" (20)
435, 830	1.772" (45.00)	.80" (20)

Inch (mm) Tolerances Ø  $+0.011^{(+0.025)}$   
 $-0.000^{(-0.000)}$

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

### Typical Collar Mount

#### Collar Mount Hole Dimensions



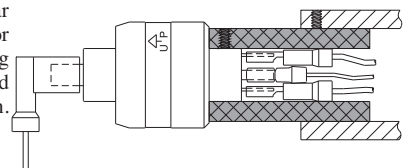
MODEL	HOLE DIAMETER Ø	DEPTH*
230, 331	.500" (12.70)	.40" (10)
330, 430	.625" (15.88)	.40" (10)
430 w/ plug	.625" (15.88)	1.40" (36)
630	.875" (22.23)	.40" (10)
830	1.125" (28.58)	.40" (10)
435	1.250" (31.75)	.80" (20)
1250 Stud	3/8"-16 UNC	.81" (20.5)
1250-metric Stud	10 x 1.5 metric	.81" (20.5)

Inch (mm) Tolerances Ø  $+0.011^{(+0.025)}$   
 $-0.000^{(-0.000)}$

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

### Insulating Collar Mount

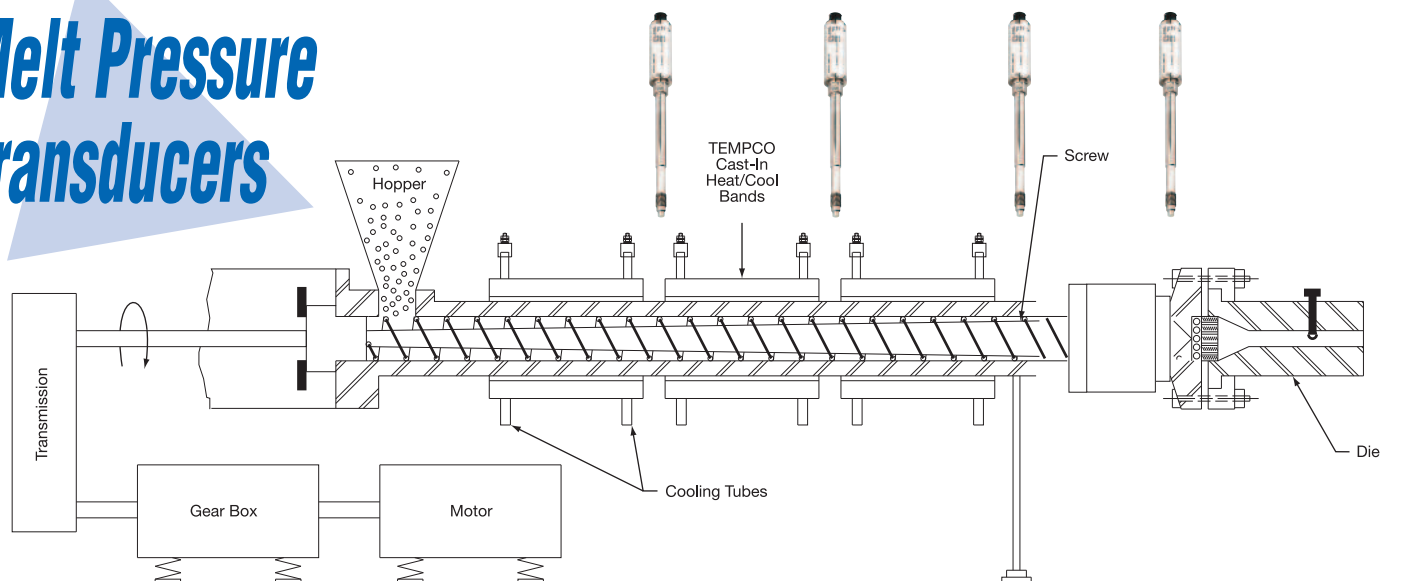
Mounting with an insulating collar may be required to insulate connector from conducted heat. Soft-mounting with rubber type material is needed if unit will be subjected to vibration.





### 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:

<b>HCl</b>	<b>Hydrochloric Acid</b>
<b>HF</b>	<b>Hydrofluoric Acid</b>
<b>HBr</b>	<b>Hydrogen Bromide</b>
<b>HI</b>	<b>Hydrogen Iodide</b>

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.

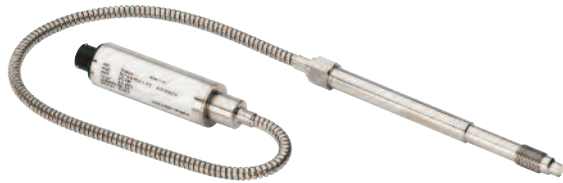
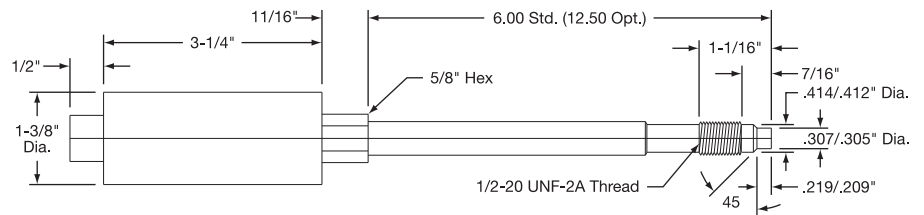
#### Design Features

- \* *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

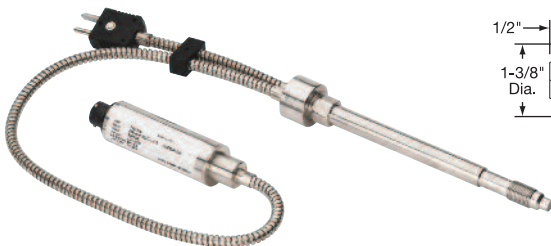
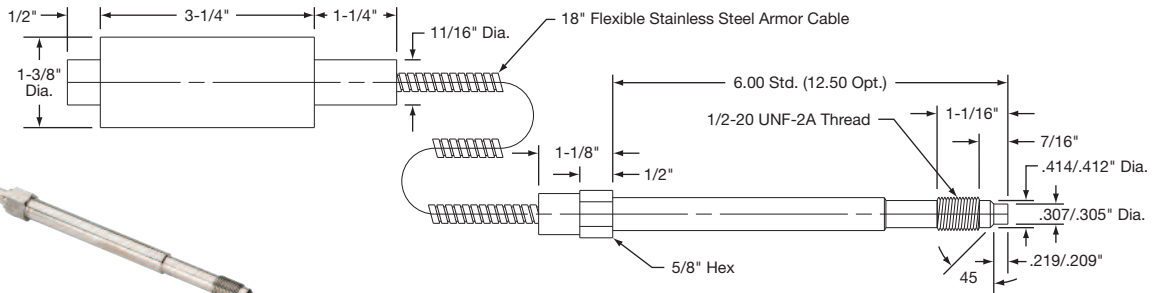
This model converts applied pressure at the point of measurement to a proportional voltage output signal using well established bonded strain gauge design principles. The small capillary tube, filled with a special medium, isolates sensitive strain gauges and electronics from potential thermal damage.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

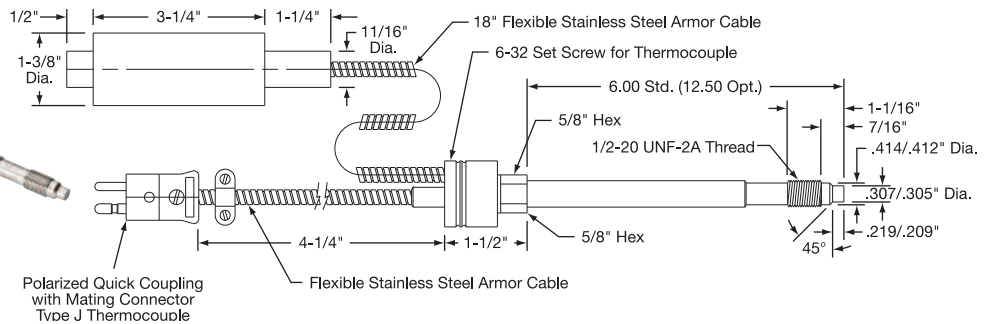
This transducer is designed for applications requiring further thermal isolation or where installation would be otherwise difficult or impractical.



#### 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	0-70	0-7500	0-500	0-20000	0-1400
0-1500	0-100				

**Combined Error/Error Band**  $\pm 0.5\%$  or  $\pm 0.25\%$  of full-scale

**Repeatability**  $\pm 0.1\%$  of full-scale

**Hysteresis** 0.1% of full-scale

**Overload Capability** Up to 20,000 PSIG: 2  $\times$  full-scale  
Above 20,000 PSIG: 1.5  $\times$  full-scale

**Mounting Torque** 500 inch-pounds maximum

**Diaphragm Material** 15-5PH stn. stl. (Armoly plating)

##### Electrical

**Measuring Element** Strain gauge Wheatstone bridge

**Element Resistance** 350 ohm  $\pm 10\%$

**Supply Voltage** for 3.33 mV/V output, 6-12VDC (10VDC rec.)  
for 4-20mA output, 12-30VDC (24VDC rec.)  
for VDC output, 15-30VDC (24VDC rec.)

**Zero Balance**  $\pm 5.0\%$  full-scale output

**Internal Resistance Cali. (Factory Adjusted)** Produces precise electrical signal which is 80% of full-scale within  $\pm 0.25\%$

##### 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

##### Thermocouple (if ordered)

**Thermocouple Type** Type J

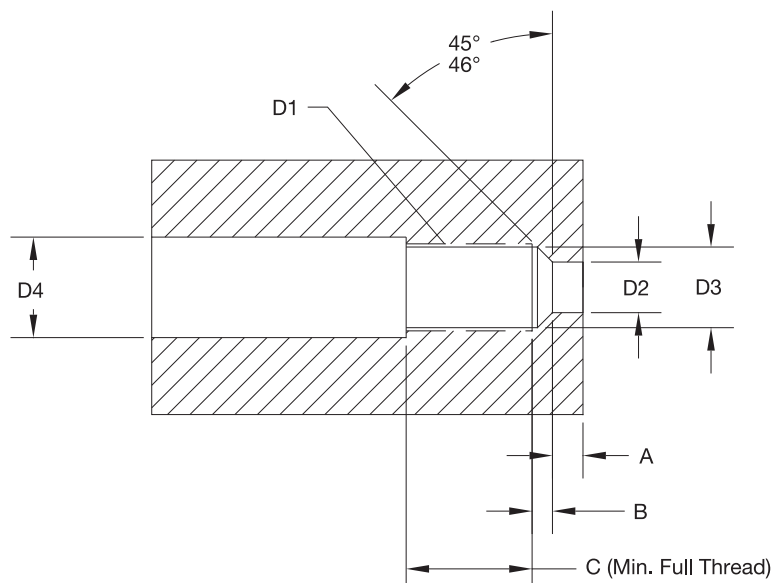
**Connector** Standard Size Male



**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 $\pm$ .001	7.95 $\pm$ .025	.454 $\pm$ .004	11.5 $\pm$ .10	.515 min	13 min	.225 min	5.7 min	.17 max	4.3 max	.75	19
M14 x 1.5	.319 $\pm$ .001	8.1 $\pm$ .025	.478 $\pm$ .004	12.1 $\pm$ .10	.630 min	16 min	.24 min	6.1 min	.16 max	4 max	.75	19
M18 x 1.5	.398 $\pm$ .01	10.1 $\pm$ .25	.634 $\pm$ .04	16.1 $\pm$ 1.0	.79 min	20 min	.24 min	6.1 min	.16 max	4 max	.99	25





## Melt Pressure Transducers

### Melt Pressure Transducers Standard Sizes and Ranges

Style	Combined Error	Connector	Pressure Range	Output	Stem Length	Flex Length	Part Number
Rigid Stem	0.5% CE	6 Pin	0-5000	3.33 mV/V	6"	None	PDD00101
Rigid Stem	0.5% CE	6 Pin	0-7500	3.33 mV/V	6"	None	PDD00102
Rigid Stem	0.5% CE	6 Pin	0-10000	3.33 mV/V	6"	None	PDD00103
Rigid Stem	0.5% CE	6 Pin	0-15000	3.33 mV/V	6"	None	PDD00104
Rigid/Flex Armor	0.5% CE	6 Pin	0-5000	3.33 mV/V	6"	18"	PDD00105
Rigid/Flex Armor	0.5% CE	6 Pin	0-7500	3.33 mV/V	6"	18"	PDD00106
Rigid/Flex Armor	0.5% CE	6 Pin	0-10000	3.33 mV/V	6"	18"	PDD00107
Rigid/Flex Armor	0.5% CE	6 Pin	0-15000	3.33 mV/V	6"	18"	PDD00108
Rigid/Flex Armor with T/C	0.5% CE	6 Pin	0-5000	3.33 mV/V	6"	18"	PDD00109
Rigid/Flex Armor with T/C	0.5% CE	6 Pin	0-7500	3.33 mV/V	6"	18"	PDD00110
Rigid/Flex Armor with T/C	0.5% CE	6 Pin	0-10000	3.33 mV/V	6"	18"	PDD00111
Rigid/Flex Armor with T/C	0.5% CE	6 Pin	0-15000	3.33 mV/V	6"	18"	PDD00112

Ordering Code: **PDD** -

#### Style BOX 1

- A** = Rigid Stem
- B** = Flexible Armor Tubing
- C** = Transducer with Type J Thermocouple

#### Error Tolerance 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
- X** = Special

#### Pressure Range BOX 4

- A** = 0-500 PSI (0.5% CE only)
- B** = 0-750 PSI (0.5% CE only)
- C** = 0-1000 PSI (0.5% CE only)
- D** = 0-1500 PSI
- E** = 0-3000 PSI
- F** = 0-5000 PSI
- G** = 0-7500 PSI
- H** = 0-10000 PSI
- J** = 0-15000 PSI
- K** = 0-20000 PSI
- L** = 0-35 BAR (0.5% CE only)
- M** = 0-50 BAR (0.5% CE only)
- N** = 0-70 BAR (0.5% CE only)
- P** = 0-100 BAR
- Q** = 0-200 BAR
- R** = 0-350 BAR
- S** = 0-500 BAR
- T** = 0-700 BAR
- U** = 0-1000 BAR
- V** = 0-1400 BAR

#### Stem Length BOX 5

- 1** = 6 inches (*Most Common*)
- 2** = 12.5 inches
- 3** = 3 inches
- 0** = Other

#### Flex Length BOX 6

- 00** = None (Style A)
- 18** = 18 Inches\* (Styles B & C)
- 24** = 24 Inches\* (Styles B & C)
- 30** = 30 Inches\* (Styles B & C)

\*Other sizes can be made on special request.

#### Diaphragms BOX 7

- A** = Stainless Steel, 0.0045" (Standard) with GTP+ Coating 750°F/400°C
- B** = 0.0045" Hastelloy® 570°F/300°C
- C** = 0.0045" Chromium Nitride
- D** = 0.008" Chromium Nitride (7500 PSI & up only) 570°F/300°C
- E** = 0.006" Inconel with Titanium Aluminum Nitride 1000°F/538°C
- F** = 0.0045" Titanium Nitride
- G** = 0.008" Titanium Nitride (7500 PSI & up only) 1000°F/538°C
- X** = Other

#### Output BOX 8

- 0** = Custom
- 1** = 3.33 mV/V (Standard)
- 2** = 4 to 20 ma
- 3** = 0 to 5 Vdc
- 4** = 0 to 10 Vdc
- 5** = 0.5 to 9.5 Vdc

#### Capillary Fill Material BOX 9

- A** = Mercury (Standard) 750°F/400°C
- B** = Oil-FDA approved 600°F/315°C
- C** = NaK (Sodium Potassium) 1000°F/528°C

#### Thread BOX 10

- 1** = 1/2-20 (Standard)
- 2** = M18 x 1.5
- X** = Other

#### ADDITIONAL OPTIONS AVAILABLE...

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

**Connectors** (*consult Tempco 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.

### 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.**

**View Product Inventory @ [www.tempco.com](http://www.tempco.com)**



### 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.

NOTE: All transducers listed include 3.3mV/V output, mercury fill and 1/2-20 thread

Description	TEMPCO	Dynisco	ISI	Gefran	Gentran
<b>Basic Melt Pressure Transducer with 0.5% Error, Armoloy Coated Tip and 6-Pin Connector</b>					
6" Rigid stem	PDD-A1S□100A1A1	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□118A1A1	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□118A1A1	TPT463E□-6/18	ISI 0102-□T-6/18	M32-6-M-□-1-4-D	GT-76/6JD6Z1□
<b>Melt Pressure Transducer with 0.5% Error, Armoloy Coated Tip and 8-Pin Connector</b>					
6" Rigid stem	PDD-A1E□100A1A1	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□118A1A1	n/a	ISI 0161-□T-6/18	M31-8-M-□-1-4-D	GT-76/6D8Z1□
Above transducer with Type J thermocouple	PDD-C1E□118A1A1	n/a	ISI 0162-□T-6/18	M32-8-M-□-1-4-D	GT-76/6JD8Z1□
<b>Low Error Melt Pressure Transducer with 0.25% Error, Armoloy Coated Tip and 6-Pin Connector</b>					
6" Rigid stem	PDD-A2S□100A1A1	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□118A1A1	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□118A1A1	TPT432A-□-6/18	ISI 0112-□T-6/18	M32-6-H-□-1-4-D	GT-72/6JD6Z1□
<b>Low Error Melt Pressure Transducer with 0.25% Error, Armoloy Coated Tip and 8-Pin Connector</b>					
6" Rigid stem	PDD-A2E□100A1A1	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□118A1A1	n/a	ISI 0121-□T-6/18	M31-8-H-□-1-4-D	GT-72/6D8Z1□
Above transducer with Type J thermocouple	PDD-C2E□118A1A1	n/a	ISI 0122-□T-6/18	M32-8-H-□-1-4-D	GT-72/6JD8Z1□
<b>Mechanical Melt Pressure Gauge</b>					
6" Rigid stem	PDG-A1□100A1A1	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□130A1A1	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□130A1A1	TPG443R-□-6/30	ISI 0152-□T-6/30	M52-0-L-□-1-4-F	GT-95/6JZ3□
<b>Digital Melt Pressure Gauge</b>					
6" Rigid stem	PDG-B1□100A1A1	PG541-□-6	n/a	M60-0-L-□-1-4-0	n/a
6" Rigid stem with 18" flexible armor tubing	PDG-B2□130A1A1	PG552-□-6/30	n/a	M61-0-L-□-1-4-F	n/a
Above gauge with Type J thermocouple	PDG-B3□130A1A1	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



Rigid Stem Style Shown

#### 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 $\pm$  1.0% FSO

Measurement Range: . . . . . 0-5000 PSI / 0-350 bar to 0-10000 PSI / 0-700 bar

Maximum overpressure: . . . . . 1.5  $\times$  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



Rigid Stem Style Shown

#### Design Features

- \* Better than  $\pm 0.50\%$  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 $\pm$  0.50% FSO

Measurement Range: . . . . . See ordering chart

Maximum overpressure: . . . . . 2  $\times$  FSO

Measurement principle: . . . . . Strain gauge / bridge circuit

Power supply: . . . . . 115 or 220 VAC (factory set)

Pressure retransmission: . . . . . 4-20 ma (650 $\Omega$  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
PDG00104	6" Rigid Stem	0-5000
PDG00105	6" Rigid Stem	0-10000
PDG00102	6" Rigid/30" Armor Cable	0-5000
PDG00103	6" Rigid/30" Armor Cable	0-10000
PDG00106	6" Rigid/30" Armor Cable with J tc	0-5000
PDG00107	6" Rigid/30" Armor Cable with J tc	0-10000

#### Digital Readout Gauges

Part Number	Style	Pressure Range
PDG00501	6" Rigid Stem	0-5000
PDG00502	6" Rigid Stem	0-10000
PDG00503	6" Rigid/30" Armor Cable	0-5000
PDG00504	6" Rigid/30" Armor Cable	0-10000
PDG00505	6" Rigid/30" Armor Cable with J tc	0-5000
PDG00506	6" Rigid/30" Armor Cable with J tc	0-10000



**Note:** All standard flexible armor cable over the pressure sense capillary include a 6" rigid stem and 30" of flexible armor. If a type J thermocouple is specified, a standard size type J plug is provided, similar to the Melt Pressure Transducer shown on page 12-20.

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

Ordering Code: **PDG** -  <sup>1</sup>   <sup>2</sup>   <sup>3</sup>    <sup>4</sup>   <sup>5</sup>

#### 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

#### 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.

#### Pressure Range BOX 2

##### Mechanical

- PSI**
- A** = 0-5000      **C** = 0-350
- B** = 0-10000    **D** = 0-700

##### Digital - PSI      Bar

- 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
- L** = 0-35
- M** = 0-50
- N** = 0-70
- P** = 0-100
- Q** = 0-200
- R** = 0-350
- S** = 0-500
- T** = 0-700
- U** = 0-1000

#### 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
<b>Electrical</b>			
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		
<b>Signal Input</b>			
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		
<b>Housing</b>	1/8 DIN (48 × 96 × 160 mm)	1/4 DIN (96 × 96 × 160 mm)	
<b>Panel Cutout</b>	1.75 × 3.62 in. (44.5 × 92 mm)	3.62 × 3.62 in. (92 × 92 mm)	
<b>Display</b>			
Type:	4-digit LED display	Two 4-digit LED displays Red: Pressure Green: Temperature	
Ranges:	User programmable for pressure and temperature: –999 to +9999		Pressure: –999 to +9999 Temperature: Standard T/C limits
Units:	PSI, kg/cm <sup>2</sup> , BAR, kPa, Pa, MPa	PSI, kg/cm <sup>2</sup> , BAR, °F, °C	
Decimal:	Selectable from keyboard		
Setup Prompts:	Displays program steps and error conditions		
<b>Alarms</b>			
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		
<b>Auxiliary Output</b>			
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 Kits

### Melt Pressure Transducer Packages

#### 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 Range (psi)
Rigid/Flex	Rigid Only	
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

### Ordering Information

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

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

#### Thermocouple Cables

The cable assemblies and connector are designed to be compatible with the connectors used on Tempco's line of melt pressure transducers with Type J thermocouples.

The cable assemblies come with a Type J female connector on one end to mate with the Transducer/Thermocouple assembly and leads on the other end.

The mating connector offered is a Type J two-pin female connector designed to mate with the male thermocouple connector on the Transducer/Thermocouple assembly.

#### TRANSDUCER MATING CONNECTORS (hardware only)

6-Pin Part Number	8-Pin Part Number
PDA00215	PDA00213

#### THERMOCOUPLE MATING CONNECTOR (Standard Size, Female Type J)

Part Number
TCA-102-101

#### THERMOCOUPLE CABLE ASSEMBLIES

Size	Part Number
25 feet	ECA00057
50 feet	ECA00058
75 feet	ECA00059
100 feet	ECA00060

#### TRANSDUCER CABLE ASSEMBLIES

Size	6-Pin Part Number	8-Pin Part Number
10 feet	PDA00216	—
25 feet	PDA00201	PDA00205
50 feet	PDA00202	PDA00206
75 feet	PDA00203	PDA00207
100 feet	PDA00204	PDA00208

#### GENERAL ACCESSORIES

Description	Part Number
3-Piece Cleaning Tool Kit (1/2-20 thread)	PDA00251
Transducer Mount Drill Kit	PDA00253
Transducer Pressure Simulator—6-Pin	PDA00254
Transducer Pressure Simulator—8-Pin	PDA00255
Mounting Bracket	PDA00256





### Rupture Disks for Plastic Extrusion Protection

#### Custom Pressure Relief Solutions for your Extrusion Equipment

##### Construction Characteristics

Tempco's Extruder Rupture Disks 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 Pressure 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) to 750°F (399°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" Overall Length 1/2-20 UNF Threaded at 300°F (149°C) to 750°F (399°C)



With Wrench Flat



With Hex Head Adapter

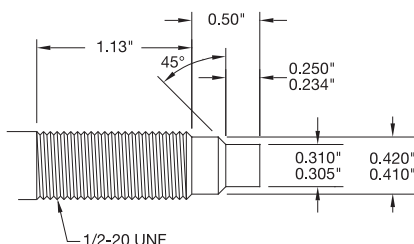


With Hex Head and 1/4-18 NPT Male Fitting

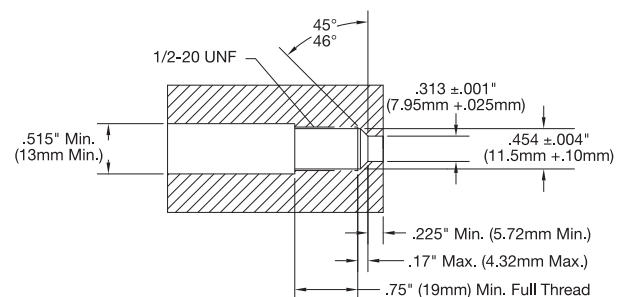
Pressure (PSI)	Part Number		
	Wrench Flat	Hex Head	1/4 NPT
2500	ERD02001	ERD03001	ERD04001
3000	ERD02002	ERD03002	ERD04002
3500	ERD02003	ERD03003	ERD04003
4000	ERD02004	ERD03004	ERD04004
5000	ERD02005	ERD03005	ERD04005
5500	ERD02006	ERD03006	ERD04006
7000	ERD02007	ERD03007	ERD04007
7500	ERD02008	ERD03008	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 1200°F/650°C



Temperature range from  
-58 to 1200°F (-50 to 650°C)

#### Design Features

- \* 12:1 distance to target ratio.
- \* Compact thermometer measures temperature from -58 to 1200°F (-50 to 650°C) with 0.1° resolution up to 999.9°.
- \* Adjustable High/Low setpoints with audible alarm alerts user when temperature exceeds the programmed setpoints.
- \* Adjustable emissivity for better accuracy on different surfaces.
- \* Built-in laser pointing identifies target area.
- \* Backlighting illuminates display for taking readings in low light areas.
- \* Data Hold and Min/Max.
- \* Over-range indicator.
- \* Complete with 9V battery and pouch case.

#### Specifications

Temperature Range:	..... -58 to 1200°F (-50 to 650°C)
Basic Accuracy:	..... ±(1% of reading + 2°F/1°C)
Maximum Resolution:	..... 0.1°F/°C; 1°F/°C
Emissivity:	..... 0.10 to 1.00 adjustable
Repeatability:	..... ±0.5% or ±1.8°F/°C
Field of View:	..... 12:1
Dimensions:	..... 3.2 × 1.6 × 6.3" (82 × 42 × 160 mm)
Weight:	..... 6.4 oz. (180g)

Agency Approval: **CE**

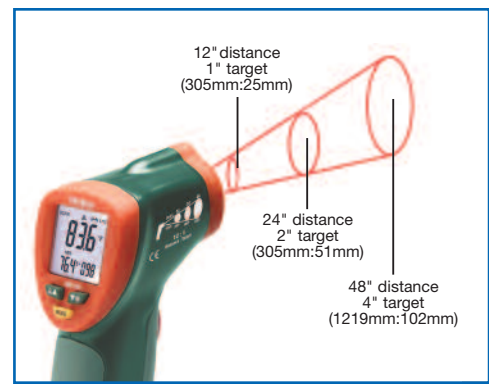
#### Applications

- ➔ 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.

#### Ordering Information

Part Number **REB30012** Wide Range Mini-IR Thermometer  
Part Number **REB32012** Wide Range Mini-IR Thermometer  
with NIST Certificate

**Standard lead time is stock to 3 weeks.**



**12:1 distance to target ratio**



### **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

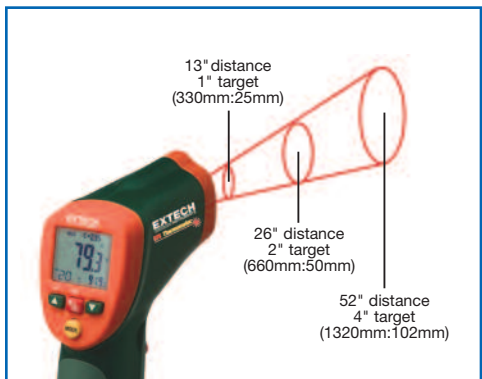
- \* Wide temperature range for IR temperature and type K thermocouple instruments.
- \* Automatic emissivity adjustment (for temperatures 212°F or higher).
- \* Memory stores up to 20 readings.
- \* Large LCD display with bright backlight for easy-to-read measurements and programming parameters.
- \* 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  
 Type K: (±1.5% of reading +2°F/1°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 × 6.3" (82 × 42 × 160 mm)  
**Weight:** . . . . . 6.4 oz. (180g)

Agency Approval:



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 16:1 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% of reading or 4°F/2°C <932°F (500°C); ±(2.5% of reading +5°) >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 × 9" (100 × 56 × 230 mm)  
**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.

#### 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.**



**16:1 distance to target ratio**





### **Beam-A-Temp™ Portable Infrared Thermometer**

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

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



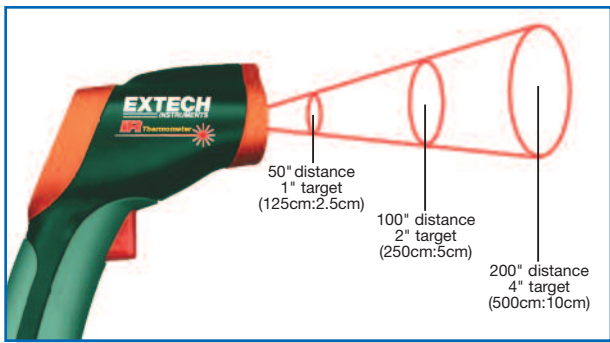
#### **Design Features**

- \* 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 50:1 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 × 9" (100 × 56 × 230 mm)  
 Weight: . . . . . 10.2 oz. (290g)

Agency Approval:



50:1 distance to target ratio

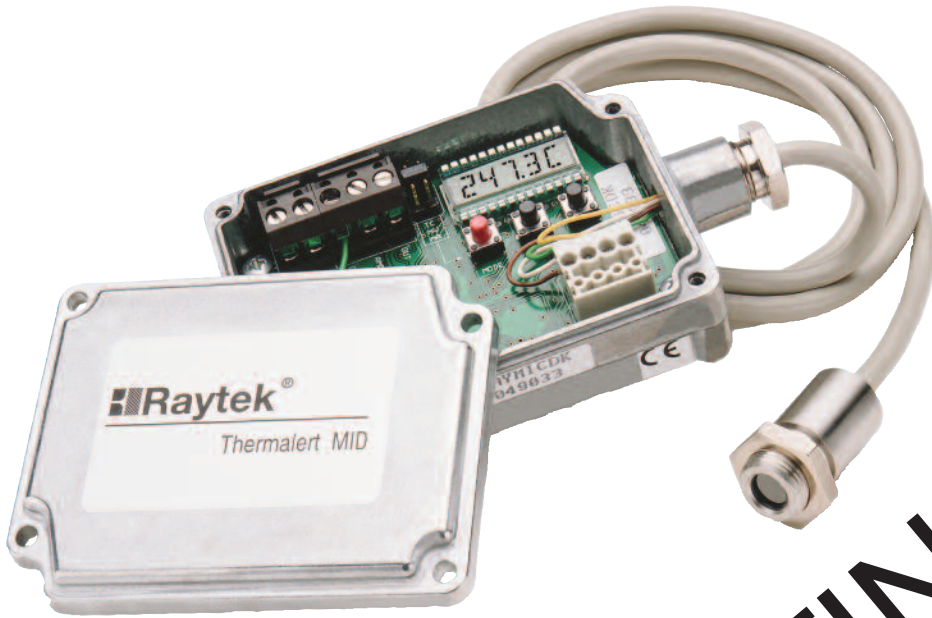
### Ordering Information

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

**Standard lead time is stock to 3 weeks.**



### Non-contact Infrared Temperature Measurement System — NCIT-LC Plus Series



#### 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 typically 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 Sensor

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.

#### 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 ms
- \* Stainless Steel Sensing Head
- \* 10:1 and 22:1 Optics
- \* 0/4 - 20 mA or 5Vdc  
J or K thermocouple outputs
- \* Choice of 3 ft. or 10 ft. cable
- \* Mounting Hardware Included
- \* 12-24VDC Powered

#### Common Industrial Applications

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

#### 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 emissivity adjustment or reflected energy compensation.

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



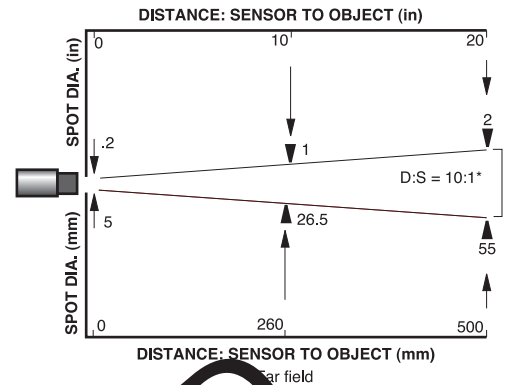
### Non-contact Infrared Temperature Measurement System — NCIT-LC Plus Series

#### Measurement Specifications

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



**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.



#### 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:** 500Ω 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)  
Elect. 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

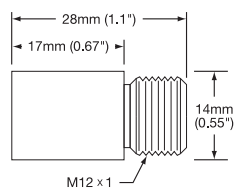
#### Model Numbers

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
<b>with RS485 data interface</b>			
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.

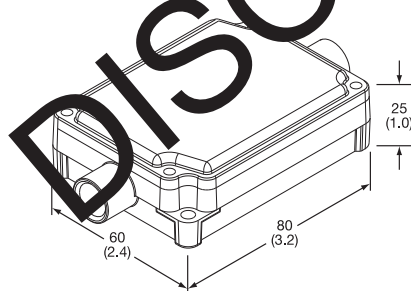
- REN00306** — RS485 2-wire connection kit provides for setup and monitoring via DataTemp® Multi-Drop software and a RS485/RS232 converter provided with 110Vac power supply
- REN00307** — RS232 connection kit provides for setup and monitoring via DataTemp® Multi-Drop software and a 3-wire RS232 connection
- REN00209** — Power supply: 12 Vdc at 200 mA, 120 Vac input

#### Sensor Head



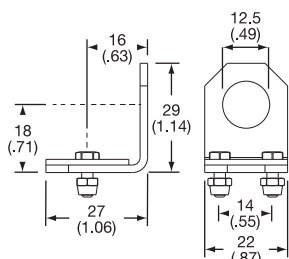
$$\text{Dim.} = \frac{\text{mm}}{(\text{in})}$$

#### Electronics Enclosure

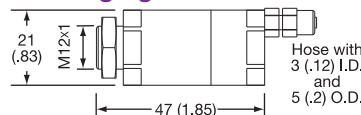


Optional: Electronics enclosure with view port window in cover  
**Part Number: REN00308**

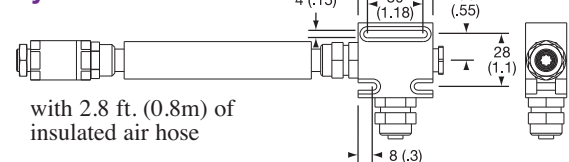
#### Adjustable Mounting Bracket — REN00303



#### Optical Lens Air Purging Jacket — REN00302



#### Air Cooling System — REN00301



#### 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.**



## Non-contact Temperature Measurement

### Non-contact Infrared Temperature Measurement System — NCIT-LC Advanced



#### Design Features

- \* Rugged IP65 rated sensing heads survive ambient temperatures to 248°F (120°C) without cooling
- \* Precision high resolution optics, up to 22:1
- \* Fast response times of < 20 ms
- \* Miniature sensing head fits where other sensors can't
- \* Intuitive user interface with high resolution LCD display
- \* Automatic sensing head detection — plug and play
- \* User configurable analog outputs (0/4-20mA, 0-5/10V, type J, K, R or S t/c)
- \* Isolated solid state alarm relay output
- \* Adjustable Emissivity, Peak Hold, Valley Hold and Averaging functions
- \* Standard USB 2.0 digital interface for remote setup

The NCIT-LC Advanced is a powerful **two-piece** infrared temperature measurement system with miniature sensing head and separate communications electronics. The sensor is small enough to be installed just about anywhere, yet it outperforms much larger systems.

Available in a rugged cast metal electronics enclosure, the **LC-Advanced** offers a host of advanced signal processing features you won't normally find in sensors costing much more.

Designed for an **endless range of applications**, the **LC-Advanced** features a variety of sensing head options. Low temperature sensors with a measurement range of -40°F to 1832°F (-40°C to 1000°C), fast response (<20 mSec) sensors, and 5 μm spectral response sensors, provide an impressive array of solutions for your process needs.

The **rugged stainless steel sensing head** ensures reliable long term performance in the harshest industrial environments. Although the LC-Advanced sensor is small in size, it has all the performance you need with 1% accuracy, and a **choice of high resolution optics up to 22:1**.

Standard features include adjustable Emissivity, Peak Hold, Valley Hold, and Averaging functions. All sensor parameters are easily adjustable on the built-in user interface keypad, or remotely with the Windows® 7 compatible DataTemp software via the **built-in USB interface**.

Advanced features further extend the power of the **LC-Advanced** and include user configurable alarm output, digital "recipe" table inputs that can be easily interfaced to an external control system, an external reset input for signal processing, and external inputs for analog emissivity adjustment or reflected energy compensation.

Optional RS485, Modbus® or Profibus® network interfaces simplify integration with a factory or machine control system.

The **NCIT-LC Advanced** — a new level of innovation and performance in non-contact temperature measurement!

#### Specifications

**Spectral Response:** .....LT (Low Temp.)— 8 to 14 microns  
.....G5 (glass)— 5 microns

**Optical Resolution:** LTS — 2:1, 10:1, 22:1  
LTF — 10:1  
G5 — 22:1

**Temperature Range:**  
LTS (2:1, 10:1) -40° to 1112°F (-40° to 600°C)  
LTF (LTS 22:1) 32° to 1832°F (0° to 1000°C)  
G5S 482° to 3002°F (250° to 1650°C)

**System Accuracy:** ±1% of reading or ±1°C, whichever is greater

**Thermocouple Output Accuracy:** <1°F (0.5°C)  
±1% of reading or ±2.5°C,  
whichever is greater

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

**Temperature Resolution:** LT 0.1°C or 0.2°F

**System Response Time:** LTS 130ms (90%)  
LTF 20ms (90%)  
G5 55ms (90%)

**Emissivity:** 0.100 to 1.100 digitally  
adjustable increments of .001

**Transmission:** 0.1 to 1.000 digitally  
adjustable increments of .001

**Signal Processing:** Peak hold, valley hold, variable averaging  
filter, adjustable up to 998 seconds

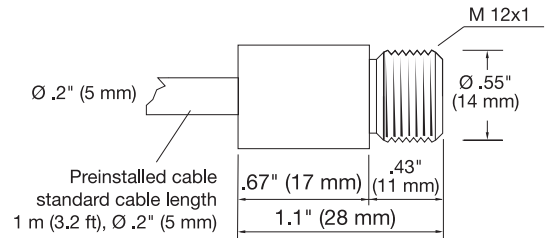




### Non-contact Infrared Temperature Measurement System — NCIT-LC Advanced

#### Sensor Head Specifications

- Environmental Rating:** NEMA 4 (IP65)
- Head Ambient Temperature Range:** 14° to 248°F (-10° to 120°C)  
With air cooling up to 392°F (200°C)
- Cable Length:** 3.3 ft (1m) standard, optional: 9.9 ft (3m), 26 ft (8m), 50 ft. (15m)
- Storage Temperature:** -4° to 185°F (20° to 85°C)
- Relative Humidity:** 10 to 90%, non-condensing
- Construction:** Stainless Steel
- Weight with 1 m cable:** 1.75 oz. (50g)



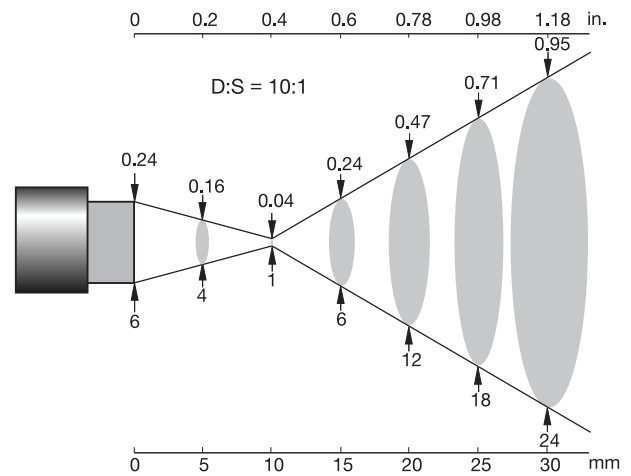
#### Available Sensor Heads

Part Number	Optics	Sensing Temperature Range	Response Time	Maximum Ambient Temperature	Type	Cable Length	Comments
REN30001	2:1	-40° to 1112°F (-40° to 600°C)	130ms	248°F/120°C	LTS	3.3 ft./1m	General Purpose
REN30002	10:1	-40° to 1112°F (-40° to 600°C)	130ms	248°F/120°C	LTS	3.3 ft./1m	General Purpose
REN30003	22:1	32° to 1832°F (0° to 1000°C)	130ms	248°F/120°C	LTS	3.3 ft./1m	General Purpose
REN30004	10:1	32° to 1832°F (0° to 1000°C)	20ms	248°F/120°C	LTF	3.3 ft./1m	Fast Response
REN30005	10:1	482° to 3002°F (250° to 1650°C)	130ms	248°F/120°C	G5	3.3 ft./1m	5μm sensing for glass applications

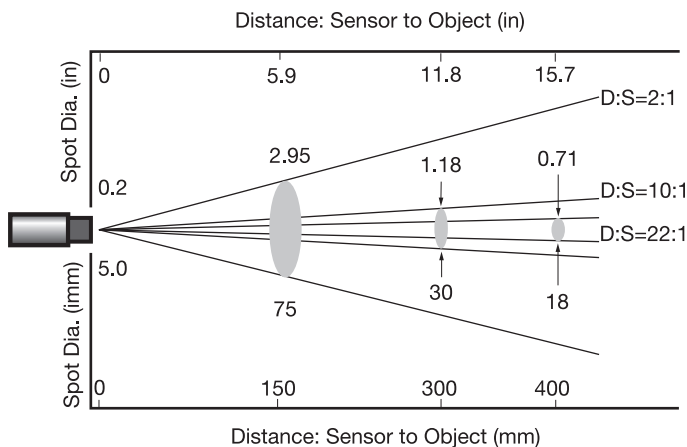
The NCIT-LC Advanced Infrared sensor heads can be supplied with the following optional cable lengths:

- 10 ft. / 3m cable
- 26 ft. / 8m cable
- 49 ft. / 15m cable
- 98 ft. / 30m cable

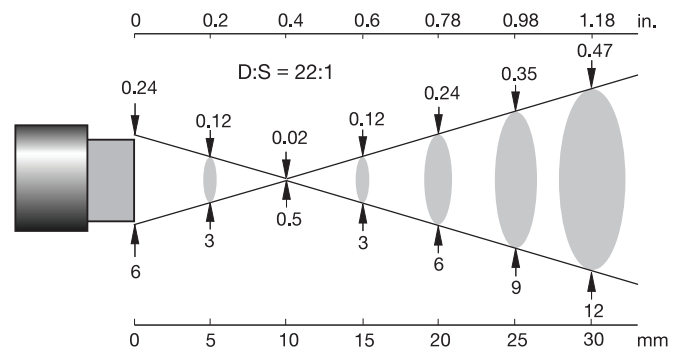
Calibration Certificate with NIST/DKD traceability can be provided. Specify when ordering.



10:1 optics with close focus accessory



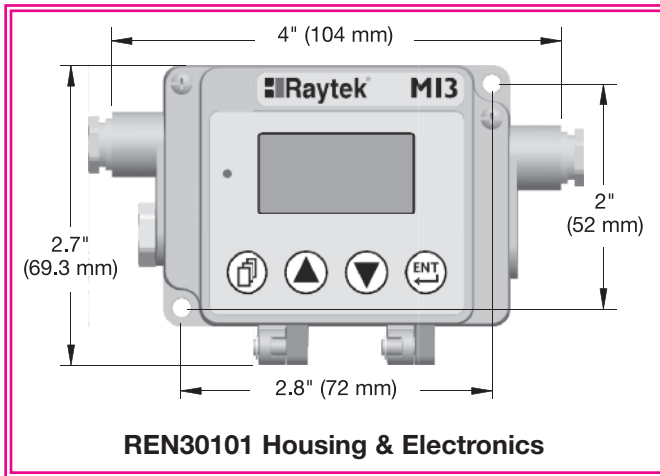
2:1, 10:1 and 22:1 optics



22:1 optics with close focus accessory

**CONTINUED**

### Non-contact Infrared Temperature Measurement System — NCIT-LC Advanced



#### REN30101 NCIT-LC Advanced Electronics and Enclosure Specifications

- Digital Interface:** USB 2.0  
(RS485, Modbus® or Profibus® optional)
- Outputs:** Scalable 4-20mA, 0-20mA,  
0-10V, 0-5V, J, K, R or S thermocouple
- Inputs:** Digital inputs for emissivity control, ambient background temperature compensation, trigger/hold input
- Alarm Relay:** 48 VAC, 300 mA optically isolated solid state relay
- Output Impedance (TC output):** 20 ohms
- Minimum Load Impedance:** (mV output): 10K ohms
- Maximum Loop Impedance:** (mV output): 500 ohms
- Power Draw:** 4W max
- Power Supply:** 8-32VDC
- Housing Construction:** Zinc, die cast
- Environmental Rating:** NEMA 4 (IP65)
- Electronics Housing, Max. Temp.:** 14° to 150°F (-10° to 65°C)
- Storage Temperature:** -4° to 185°F (-20 to 85°C)
- Relative Humidity:** 10 to 95%, non-condensing
- Electronics Weight:** 9.5 oz. (270g)

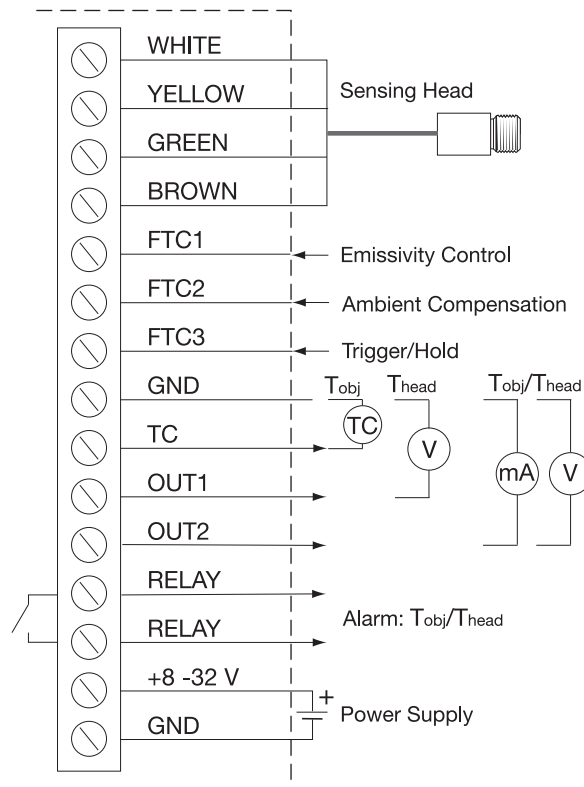
The **REN30101** NCIT-LC Advanced Electronics and Enclosure can also be ordered with the infrared sensor head pre-installed.

Specify which Sensor Head meets your requirements when ordering.

#### Ordering Information

Select the part numbers of the NCIT-LC Advanced Sensor Head, Electronics/Enclosure and Accessories that meet your requirements.

**Standard lead time is stock to 4 weeks.**



**REN30101 NCIT-LC Advanced Electronics Enclosure Terminal Wiring**

#### Accessories

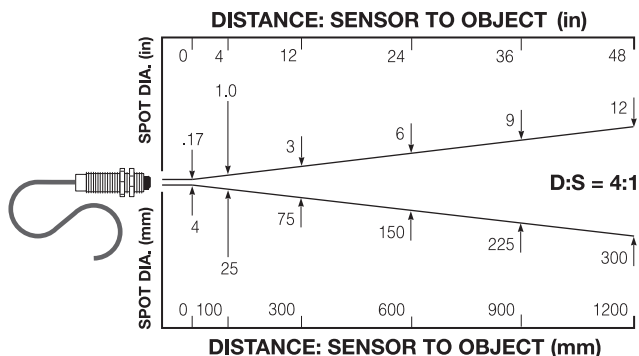
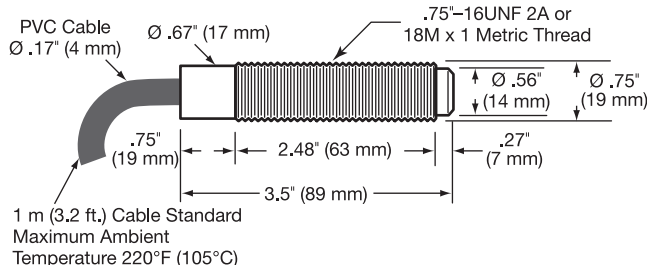
Part Number	Description
<b>REN00309</b>	Close focus lens accessory. 10 mm focus distance.
<b>REN00209</b>	Power supply: 12 Vdc at 200 mA, 120 Vac input
<b>REN00301</b>	Air cooling and purging system with 2.8 ft./8m of hose Maximum ambient temperature: 392°F/200°C
<b>REN00302</b>	Air purge jacket, no cooling
<b>REN00303</b>	Sensing head, adjustable mounting bracket
<b>REN00305</b>	Sensing head, fixed mounting bracket



### Non-contact Infrared Temperature Measurement System — NCIT-LLC Series



The NCIT - LLC model provides the advantages of infrared temperature measurement in a compact, low cost, integrated sensor. Designed for easy integration with a standard 4-wire system, the CI sensor can easily replace traditional contact probes with a type J or K thermocouple output, or with a 0-5 volt dc output if your application is susceptible to noise or requires a longer cable run.



#### Accessories

Part Number	Description
REN25001	Fixed Mounting Bracket
REN25002	Adjustable Mounting Bracket
REN25003	Lens Air Purge Collar
REN25004	Right Angle Mirror

#### Ordering Code:

REN2 -

Basic assembly includes: sensor with 3/4-16 UNF thread, preinstalled 3.3 ft./1 m cable and two mounting nuts.

#### Overall Range BOX 1

- 1 = 32° to 662°F (0° to 350°C)
- 2 = 86° to 932°F (30° to 500°C)

#### Output BOX 2

- J = Type J thermocouple
- K = Type K thermocouple
- V = 10mV/°C

#### Cable Length and Type BOX 3

- A = 3.3 ft./1m cable - 220°F/105°C
- B = 10 ft./3m cable - 220°F/105°C
- C = 50 ft./15m cable - 220°F/105°C

Specify D, E or F if ordering coolable housing

- D = 3.3 ft./1m cable - 500°F/260°C
- E = 10 ft./3m cable - 500°F/260°C
- F = 50 ft./15m cable - 500°F/260°C

#### Ordering Information

Create an ordering code by filling in the boxes per your requirements and a part number will be assigned.

**Standard lead time is stock to 4 weeks.**

#### Options (Select 2) BOX 4 & 5

- C = Coolable housing with air purge
- M = 18M x 1 metric thread instead of 3/4-16 UNF
- N = None

#### Design Features

- \* Type J or K thermocouple, or 0-5 VDC output
- \* Two models cover temperature ranges from 32° to 932°F (0° to 932°C)
- \* NEMA 4 (IP 65) stainless steel housing
- \* 4:1 optics at 90% energy
- \* 350 ms response time to 90% energy
- \* Powered by 12-24 VDC at 20 mA
- \* Accessories for cooling and air purging

#### Measurement Specifications

**Overall Temperature Range: 32° to 662°F (0° to 350°C)**

- Accuracy: 32° - 240°F (0° - 115°C): ±6°F (±3°C)
- 241° - 440°F (116° - 225°C): ±5%
- 441° - 662°F (116° - 225°C): >±5%

**Overall Temperature Range: 86° to 932°F (30° to 500°C)**

- Accuracy: 86° - 211°F (30° - 99°C): ±10°F (±6°C)
- 212° - 932°F (100° - 500°C): ±2% or ±6°F (3°C)

**Spectral Response: 7 to 18 microns**

**Repeatability: 1% of reading or ±2°F (1°C)**

**Temperature Resolution: <1°F (0.5°C)**

**Response Time (95%): 350 ms**

**Emissivity: Fixed at 0.95**

#### Electrical Specifications

**Outputs: Select Type J or K thermocouple or 10 mV / °C**

**Output Impedance: 50 ohms**

**Min. Load Impedance: 50K ohms**

**Power Supply: 12 - 24 Vdc @ 20 mA**

**Standard Cable Length: 3.2 ft. (1 m)**

#### Sensor Specifications

**Environmental Rating: NEMA 4 (IP65)**

**Ambient Temperature Range: 32° to 160°F (0 to 70°C)**

**With air cooling 32° to 200°F (0 to 90°C)**

**With water cooling 32° to 500°F (0 to 260°C)**

**Thread: 3/4-16 UNF, optional 18M x 1**

**Storage Temperature: -22° to 185°F (-30 to 85°C)**

**Relative Humidity: 10 to 90%, non-condensing**

**Weight: 4.5 oz. (130g)**



### Non-contact 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 & Pulp Converting
- ➔ Chemicals
- ➔ Food Processing
- ➔ Pharmaceutical
- ➔ Electronics
- ➔ Construction
- ➔ Industrial Maintenance

#### Non-contact 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, non-contact 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

Non-contact 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.





### Non-contact Infrared Temperature Measurement System — NCIT Plus Series

#### Measurement Specifications

<b>Temperature Range (All Sensor Heads):</b>	0 to 1000°F (-18 to 538°C)
<b>Spectral Response:</b>	Standard & Laser: 8 to 14 μm
<b>Optical Resolution:</b>	Laser: 50:1, close focus 45:1 Standard: 35:1, close focus 30:1
<b>System Accuracy:</b>	±1% or ±2°F (±1°C), whichever is greater
<b>System Repeatability:</b>	±0.5% or ±2°F (±1°C), whichever is greater
<b>Response Time – (95% of final reading):</b>	Standard & Laser: 500 ms
<b>Emissivity:</b>	Digitally adjustable, 0.1 to 1.09 by increments of 0.01 steps
<b>Signal Processing:</b>	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

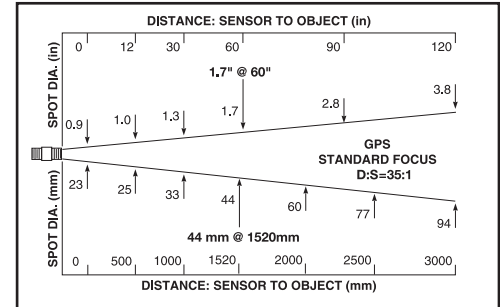
#### Electrical Specifications

<b>Power Supply:</b>	110 /220 VAC, ±20%, 50-60 Hz
<b>Inputs:</b>	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
<b>Outputs-Signal:</b>	4-digit, LED display, °F/°C selectable. User configurable 4-20 mA current or thermocouple output (J, K, E, N, R, S, T)
<b>Alarm Output:</b>	Two adjustable setpoints with deadbands controlling +5 Vdc alarm outputs or optional 3A mechanical relays
<b>DC Supply Output:</b>	24 Vdc / 50 mA excitation voltage for powering external sensors

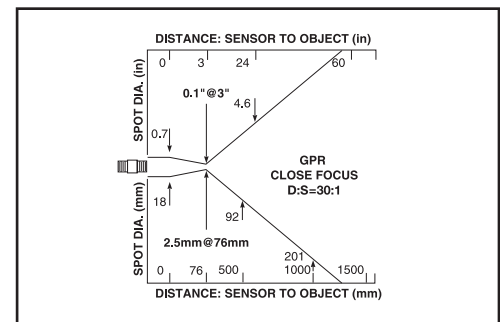
#### Sensor Specifications

<b>Environmental Rating:</b>	Monitor Front Panel: NEMA 12 (IP54) Laser/Standard Head: NEMA 12 (IP65)
<b>Ambient Temperature:</b>	32° to 120°F (0 to 50°C)
<b>Monitor</b>	32° to 150°F (0 to 65°C)
<b>Laser/Standard Head</b>	laser shuts off automatically at 120°F (50°C)
<b>With water cooling</b>	32° to 350°F (0 to 177°C)
<b>With air cooling</b>	32° to 250°F (0 to 120°C)
<b>Relative Humidity:</b>	10 to 95%, non-condensing
<b>Monitor Dimensions:</b>	1/8 DIN, 96 × 48 × 120 mm 1.9" × 3.78" × 4.75"
<b>Cutout Dimensions:</b>	1.75" × 3.63" (92 × 44 mm)
<b>Weight:</b>	Monitor: 320g (0.7 lb.)

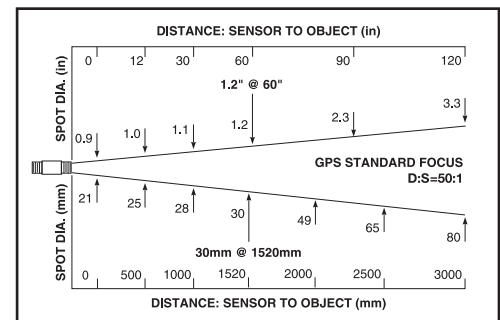
#### Distance to Spot Ratio—Standard



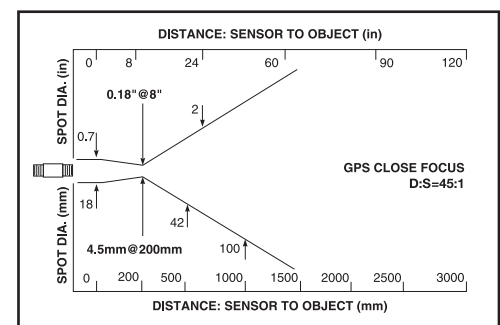
#### Distance to Spot Ratio—Standard Close Focus



#### 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)

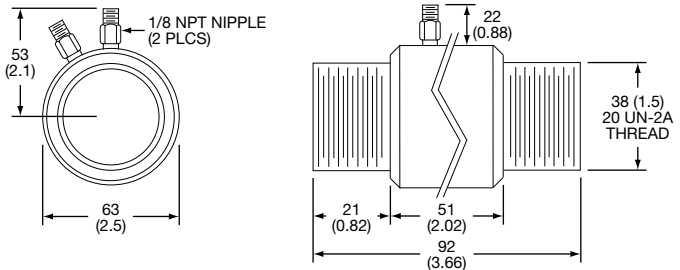
- REN01103** Standard focus infrared sensing head, 50:1 optics
- REN01104** Standard – close focus infrared sensing head,  
45:1 optics
- REN01121** NIST/DKD calibration certificate (also for  
water cooled) **Must be ordered with unit.**

#### 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<sup>2</sup>). 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.



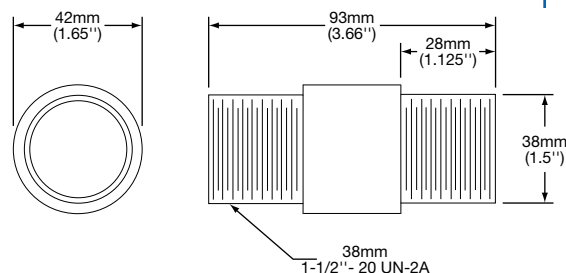
**Note:** The laser-equipped standard sensing head is 125 mm (4.92") long. The laser shuts off automatically at 120°F (50°C).

#### 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.

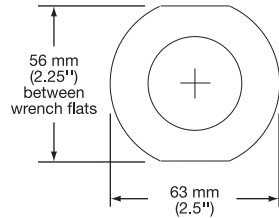




### Infrared Temperature Measurement — NCIT Plus Series Accessories

#### Pipe Adapter:

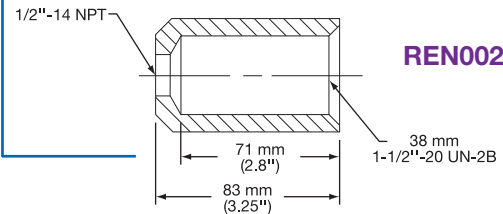
The Pipe Adapter is used to connect the Standard or Laser Head to a 1.5 inch NPT pipe thread.



**REN00206**

#### Conduit Adapter

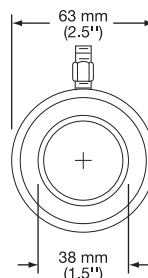
The Pipe Adapter is used to connect the Standard or Laser Head to a 1/2-inch NPT conduit fitting.



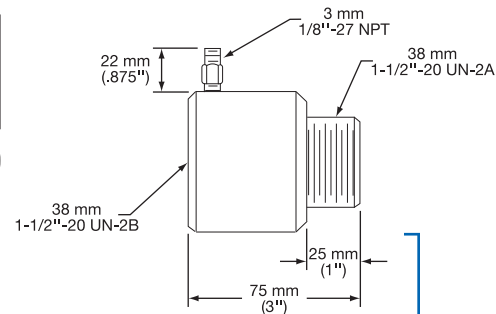
**REN00205**

#### 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 Cables

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

- 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

#### 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 or 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.**



## Temperature Transmitters

### 2-Wire Miniature Universal Temperature/Process Transmitters



ETM1



ETM2



ETM3

**PROGRAMMABLE**  
in the field with your PC and easy to use software.  
Can be ordered pre-programmed from Tempco.

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 with 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.

#### Design Features:

- \* Three levels of accuracy: *ETM1*—±0.15% of span  
*ETM2*—±0.10% of span  
*ETM3*—±0.05% of span
- \* Accepts 11 thermocouple types and 3- or 4-wire RTD sensors
- \* Field programmable with easy to use Windows®-based configuration software and a PC
- \* Sensor break monitoring, programmable for upscale or downscale
- \* Full access to all features while in operation
- \* Temperature linear output
- \* NAMUR-compliant
- \* Configuration, editing & reading without external power
- \* Easy wiring through the large center hole

The **Tempco ETM Series** of 2-wire transmitters are offered in isolated, non-isolated and high precision isolated versions. They are designed to fit in a standard aluminum, iron or plastic industrial connection head, DIN size B or larger.

#### Additional Design Features for the Isolated Versions

- \* 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.



#### Isolation BOX 1

- 1** = Non-Isolated
- 2** = Isolated
- 3** = Isolated, High Precision

#### Input Signal BOX 2

- R** = RTD-Pt100
- S** = RTD-D100
- H** = RTD-Pt100
- T** = Thermocouple
- M** = mV (ETM2 & ETM3 only)
- P** = Potentiometer (ETM2 & ETM3 only)

#### BOX 3

If **thermocouple input**, enter thermocouple **Type Code**: (if not enter **0**)

- J** = J thermocouple
- K** = K thermocouple
- E** = E thermocouple
- B** = B thermocouple
- C** = C thermocouple
- L** = L thermocouple
- N** = N thermocouple
- R** = R thermocouple
- S** = S thermocouple
- T** = T thermocouple
- U** = U thermocouple

#### Minimum Range BOX 4

In degrees (t/c and RTD)  
mV & ohms (isolated only)  
**Backfill unused boxes with 0's**  
Example: 10° = 0010

#### Maximum Range BOX 5

In degrees (t/c and RTD)  
mV & ohms (isolated only)  
**Backfill unused boxes with 0's**  
Example: 950° = 0950

#### Units: BOX 6

- F** = °F
- C** = °C
- M** = mV Ohms (isolated only)
- R** = Ohms (isolated only)





### 2-Wire Miniature Universal Temperature/Process Transmitters

#### ETM Specifications

Parameter	ETM1 Non-Isolation	ETM2 Isolation	ETM3 High Precision Isolation
<b>Typical Accuracy:</b>	±0.15% of span	±0.10% of span	±0.05% of span
<b>Galvanic Isolation:</b>	No	1500 Vac, 1 min.	3750 Vac, 1 min.
<b>Thermocouple Types:</b>	J, K, E, B, C, L, N, R, S, T, U		
<b>RTD Types, 3 &amp; 4 wire:</b>	PT100 IEC $\alpha=0.00385$ , PT1000 IEC $\alpha=0.00385$ and others; Consult Tempco		
<b>Input mV:</b>	N/A	-10 to +500 mV	-10 to +500 mV
<b>Potentiometer / Resistance:</b>	N/A	3/4 wire, 0-2000 $\Omega$	3/4 wire, 0-2000 $\Omega$
<b>Maximum T/C Wire Resistance:</b>	500 $\Omega$	500 $\Omega$	500 $\Omega$
<b>Power Supply:</b>	6.5 to 36 Vdc	6.5 to 36 Vdc	6.5 to 36 Vdc
<b>Output</b>	4 to 20mA, 20-4mA	4 to 20mA, 20-4mA	4 to 20mA, 20-4mA
<b>Linearity Thermocouple:</b>	±0.2%	±0.2%	±0.1%
<b>Linearity RTD:</b>	±0.1%	±0.1%	±0.05%
<b>Sensor Break Monitoring:</b>	Upscale or Downscale, Programmable		
<b>Minimum Span Calibration</b>			
<b>T/C:</b>	2 mV	2 mV	2 mV
<b>RTD:</b>	18°F/10°C	18°F/10°C	18°F/10°C
<b>Potentiometer:</b>	N/A	10 $\Omega$	10 $\Omega$
<b>Temperature Operation &amp; Storage:</b>	-40° to +185°F/-40° to +85°C		
<b>Relative Humidity:</b>	0 to 95%, non-condensing		
<b>Mounting:</b>	DIN B connection head or larger		
<b>Protection: Housing/Terminals:</b>	IP 65/IP 00	IP 50/IP 10	IP 50/IP 10

#### Common Pre-Programmed Miniature Temperature Transmitters

Part Number	Version/ Isolation	Input	Range		Unit
			Zero	Span	
ETM20103	ETM1/no	K tc	0	200	°F
ETM20104	ETM1/no	J tc	0	200	°F
ETM20105	ETM2/yes	RTD	0	200	°F
ETM20106	ETM1/no	K tc	0	500	°F
ETM20107	ETM1/no	J tc	0	500	°F
ETM20108	ETM2/yes	RTD	0	400	°F
ETM20109	ETM1/no	K tc	0	200	°C
ETM20110	ETM1/no	J tc	0	200	°C
ETM20111	ETM1/no	K tc	0	400	°C
ETM20112	ETM1/no	J tc	0	400	°C
ETM30003	ETM3/yes	K tc	0	500	°F
ETM30004	ETM3/yes	J tc	0	500	°F
ETM30005	ETM3/yes	RTD	0	400	°F
ETM30006	ETM3/yes	K tc	0	200	°C
ETM30007	ETM3/yes	J tc	0	200	°C
ETM30008	ETM3/yes	RTD	0	200	°C

#### Ordering Information

Order a common unit by part number from the table or 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.

#### Un-Programmed Miniature Transmitters

- ETM20001** For Non-Isolated Version
- ETM20002** For Isolated Version
- ETM30002** For High Precision Isolated Version

#### Universal Field Programming Kit

For programming ETM miniature head 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**



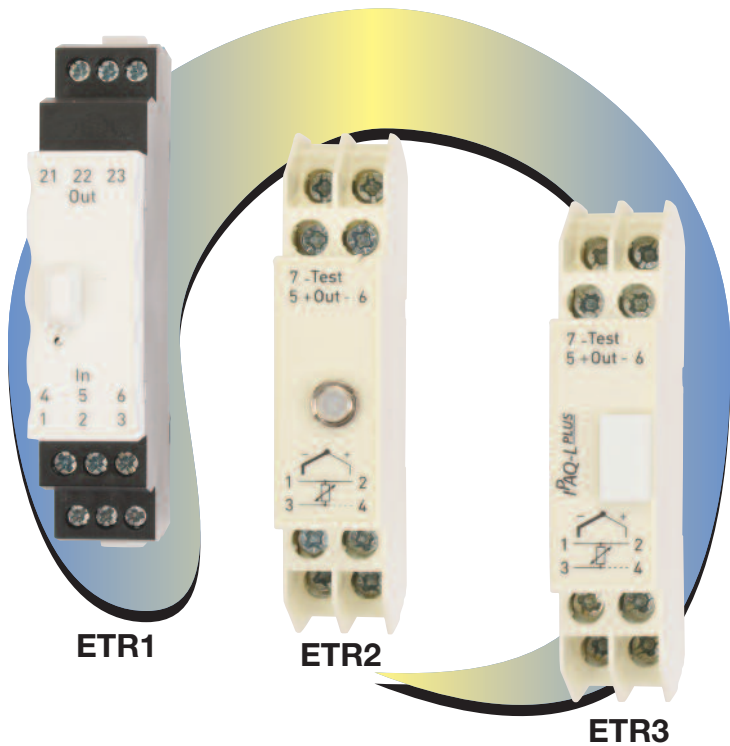
#### Note:

For dimensions and wiring information, see page 12-48.

*All Items Available from Stock*



### 2-Wire Panel Rail Mount Universal Temperature/Process Transmitters



**PROGRAMMABLE**  
in the field with your PC and easy to use software.  
Can be ordered pre-programmed from Tempco.

#### Design Features:

- \* Three levels of accuracy: ETR1— $\pm 0.15\%$  of span  
ETR2— $\pm 0.10\%$  of span  
ETR3— $\pm 0.05\%$  of span
- \* Accepts 11 thermocouple types and 3- or 4-wire RTD sensors
- \* Field programmable with easy to use Windows®-based configuration software and a PC
- \* Sensor break monitoring, programmable for upscale or downscale
- \* Full access to all features while in operation
- \* Temperature linear output
- \* NAMUR-compliant
- \* Configuration, editing & reading without external power
- \* Easy wiring with captive clamp style wire connections

#### Additional Design Features for the Isolated Versions

- \* 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.

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 with 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 ETR Series** of 2-wire transmitters is offered in isolated, non-isolated and high precision isolated versions. They are designed to fit directly on a standard 35 mm DIN rail.

**Ordering Code:** ETR 1 2 3 4 5 6

**Isolation** BOX 1  
**1** = Non-Isolated  
**2** = Isolated  
**3** = Isolated, High Precision

**Input Signal** BOX 2  
**R** = RTD-Pt100  
**S** = RTD-D100  
**H** = RTD-Pt100  
**T** = Thermocouple  
**M** = mV (ETM2 & ETM3 only)  
**P** = Potentiometer (ETR2 & ETR3 only)

BOX 3  
 If **thermocouple input**, enter thermocouple **Type Code**: (if not enter 0)  
**J** = J thermocouple  
**K** = K thermocouple  
**E** = E thermocouple  
**B** = B thermocouple  
**C** = C thermocouple  
**L** = L thermocouple  
**N** = N thermocouple  
**R** = R thermocouple  
**S** = S thermocouple  
**T** = T thermocouple  
**U** = U thermocouple

**Minimum Range** BOX 4  
 In degrees (t/c and RTD)  
 mV & ohms (isolated only)  
**Backfill unused boxes with 0's**  
 Example: 10° = 0010

**Maximum Range** BOX 5  
 In degrees (t/c and RTD)  
 mV & ohms (isolated only)  
**Backfill unused boxes with 0's**  
 Example: 950° = 0950

**Units:** BOX 6  
**F** = °F  
**C** = °C  
**M** = mV Ohms (isolated only)  
**R** = Ohms (isolated only)



### 2-Wire Panel Rail Mount Universal Temperature/Process Transmitters

#### ETR Specifications

Parameter	ETR1 Non-Isolation	ETR2 Isolation	ETR3 High Precision Isolation
Typical Accuracy:	±0.15% of span	±0.10% of span	±0.05% of span
Galvanic Isolation:	No	1500 Vac, 1 min.	3750 Vac, 1 min.
Thermocouple Types:	J, K, E, B, C, L, N, R, S, T, U		
RTD Types, 3 & 4 wire:	PT100 IEC $\alpha=0.00385$ , PT1000 IEC $\alpha=0.00385$ and others; Consult Tempco		
Input mV:	N/A	-10 to +500 mV	-10 to +500 mV
Potentiometer / Resistance:	N/A	3/4 wire, 0-2000 $\Omega$	3/4 wire, 0-2000 $\Omega$
Maximum T/C Wire Resistance:	500 $\Omega$	500 $\Omega$	500 $\Omega$
Power Supply:	8 to 32 Vdc	8 to 30 Vdc	7.5 to 36 Vdc
Output	4 to 20mA, 20-4mA	4 to 20mA, 20-4mA	4 to 20mA, 20-4mA
Linearity Thermocouple:	±0.2%	±0.2%	±0.1%
Linearity RTD:	±0.1%	±0.1%	±0.05%
Sensor Break Monitoring:	Upscale or Downscale, Programmable		
Minimum Span Calibration			
T/C:	2 mV	2 mV	2 mV
RTD:	18°F/10°C	18°F/10°C	18°F/10°C
Potentiometer:	N/A	10 $\Omega$	10 $\Omega$
Temperature Operation & Storage:	-4° to +158°F/-20° to +70°C		
Relative Humidity:	0 to 95%, non-condensing		
Mounting:	DIN, 35 mm (for DIN rail see page 13-95)		
Protection: Housing/Terminals:	IP 20	IP 20	IP 20

#### Common Pre-Programmed Rail Mount Temperature Transmitters

Part Number	Version/ Isolation	Input	Range		Unit
			Zero	Span	
ETR20101	ETR1/no	K tc	0	200	°F
ETR20102	ETR1/no	J tc	0	200	°F
ETR20103	ETR2/yes	RTD	0	200	°F
ETR20104	ETR1/no	K tc	0	500	°F
ETR20105	ETR1/no	J tc	0	500	°F
ETR20106	ETR2/yes	RTD	0	400	°F
ETR20107	ETR1/no	K tc	0	200	°C
ETR20108	ETR1/no	J tc	0	200	°C
ETR20109	ETR1/no	K tc	0	400	°C
ETR20110	ETR1/no	J tc	0	400	°C
ETR30002	ETR3/yes	K tc	0	500	°F
ETR30003	ETR3/yes	J tc	0	500	°F
ETR30004	ETR3/yes	RTD	0	400	°F
ETR30005	ETR3/yes	K tc	0	200	°C
ETR30006	ETR3/yes	J tc	0	200	°C
ETR30007	ETR3/yes	RTD	0	200	°C

#### Un-Programmed Rail Mount Transmitters

<b>ETR20001</b>	For Non-Isolated version
<b>ETR20002</b>	For Isolated version
<b>ETR30001</b>	For Isolated High Precision version

#### Universal Field Programming Kit

For programming 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 12-49.

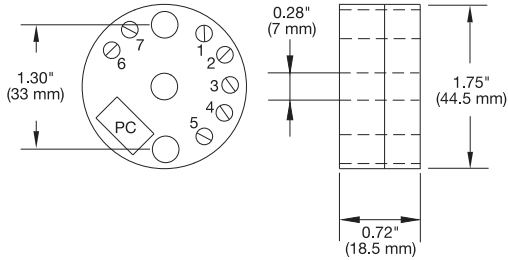
#### Ordering Information

Order a common unit by part number from the table or 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.

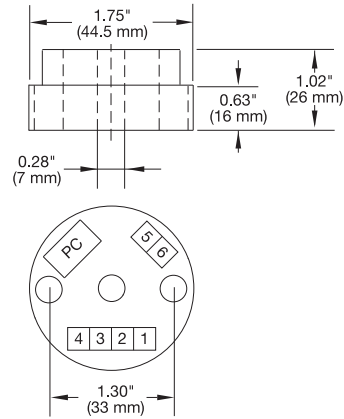
*All Items Available from Stock*

### Wiring Diagrams for 2-Wire Miniature Head Temperature/Process Transmitters

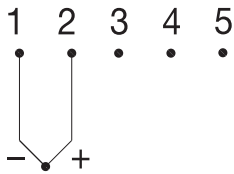
#### ETM1 Non-Isolated



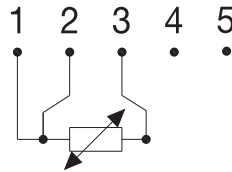
#### ETM2 Isolated and ETM3 Isolated High Precision



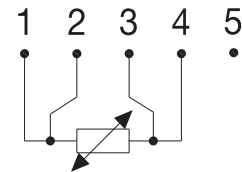
#### Input Connections for ETM1, ETM2 and ETM3



Thermocouple

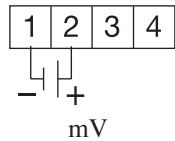


RTD- PT100, PT1000  
3-wire

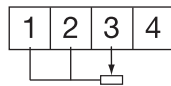


RTD- PT100, PT1000  
4-wire

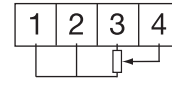
#### Additional Input Connections for Isolated ETM2 and ETM3



mV

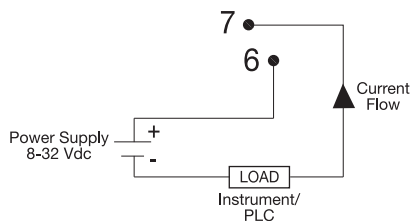


Potentiometer 3-wire

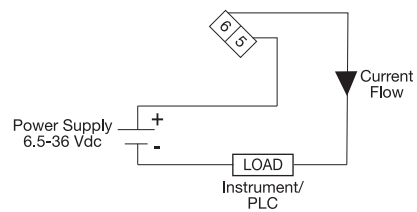


Potentiometer 4-wire

#### Output Connections for ETM1, ETM2 and ETM3



ETM1



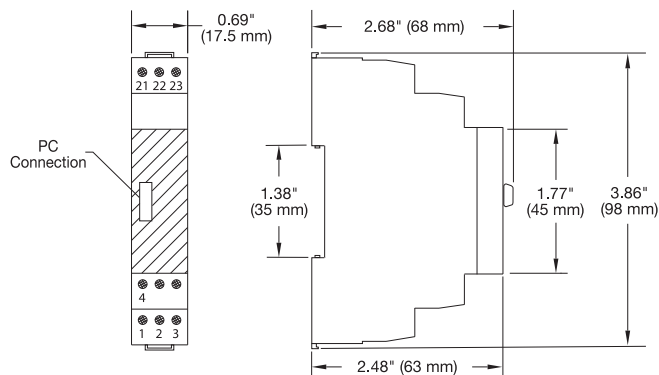
ETM2 & ETM3



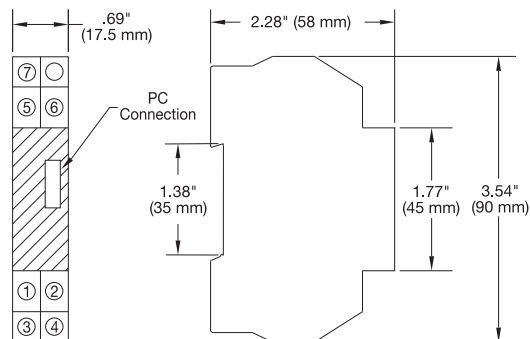


### Wiring Diagrams for 2-Wire DIN Rail Mount Temperature/Process Transmitters

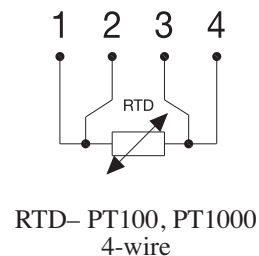
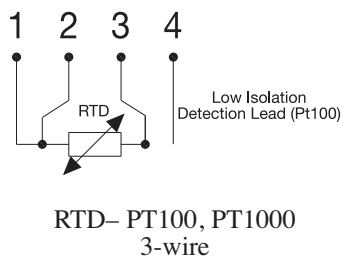
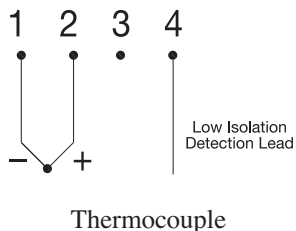
#### ETR1 Non-Isolated



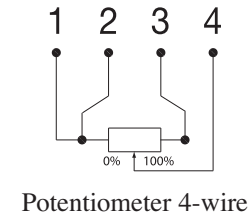
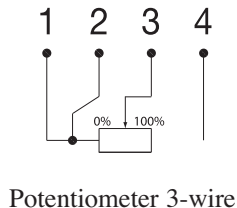
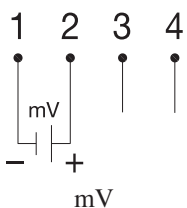
#### ETR2 Isolated and ETR3 Isolated High Precision



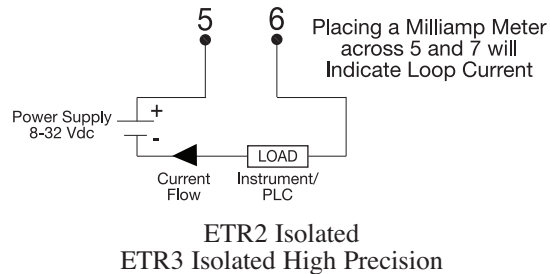
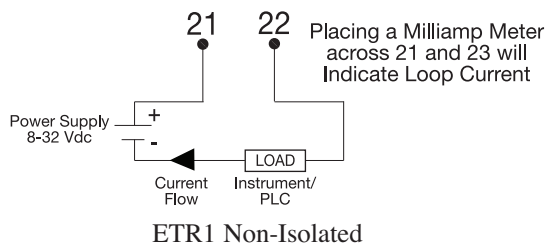
#### Input Connections for ETR1, ETR2 and ETR3



#### Additional Input Connections for Isolated ETR2 and ETR3



#### Output Connections for ETR1, ETR2 and ETR3





## Temperature Displays

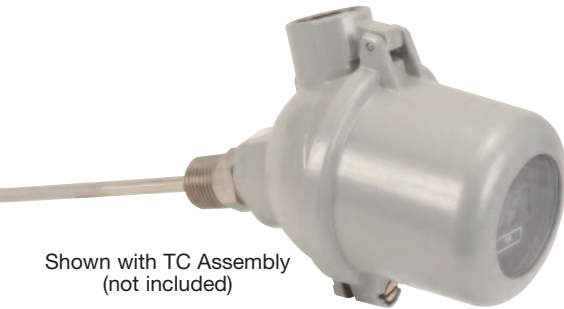
### Loop Powered (4-20mA) LCD Temperature/Process Indicator in Standard and Heavy Duty Connection Heads

The EMT1 & EMT2 are digital indicators for installation directly in a 4-20mA signal loop without the requirement of external power.

It is provided in a sensor connection head, ready for attachment to a thermowell or industrial sensor assembly.

The indicator is equipped with high contrast easy-to-read LCD digits.

Scaling the display is easily accomplished, without a reference signal, by three push buttons for any values between -1999 and 9999.



Shown with TC Assembly (not included)

EMT10001



EMT20001

#### Design Features:

- \* Installation directly in a 4-20mA signal loop without the need for an external power supply.
- \* Works in conjunction with an ETM In-Head transmitter, sold separately
- \* Minimal voltage drop
- \* High contrast, 4-digit LCD display
- \* Simple push-button scaling without a reference signal
- \* Any range between -1999 and 9999 for the 4-20mA input
- \* Labels for different engineering units are included
- \* Typical accuracy of  $\pm 0.1\%$  allows for high precision readouts.
- \* HART transparent
- \* NEMA 4X / IP65 / IP66 protection for display housings

#### Specifications

	ETM1	ETM2
<b>Input current</b>	4 - 20 mA	
Operating range	3.8 - 22 mA	3.5 - 30 mA
<b>Voltage drop</b>	2.5 Vdc	1.5 Vdc
<b>Indication</b>	Black LCD with 4 digits include minus sign	
Display	Black LCD with 4 digits include minus sign	
Digit height	12 mm	12.7 mm
Decimals	Selectable, 0 to 3	
Engineering units	Set of labels included	
<b>Response time</b>	Approx. 0.5 sec.	0.25 to 2 sec.
<b>Scale setting</b>	3 push buttons	
<b>Operating Temperature</b>	ETM1: -4 to +158°F / -20 to +70°C ETM2: -13 to +158°F / -25 to +70°C	
<b>Typical Accuracy</b>	$\pm 0.1\%$	0.05%
<b>Protection</b>	NEMA 4X / IP 65	NEMA 4X / IP 66 FM/CSA Class 1, Div 1 & 2
<b>Wire Connection</b>	16 ga. or smaller	
<b>Mounting</b>	Process: 1/2"-14 NPT Conduit: 3/4"-14 NPT	3/4"-14 NPT x 3

#### Ordering Information

Order by the Part Number EMT10001 or EMT20001.

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

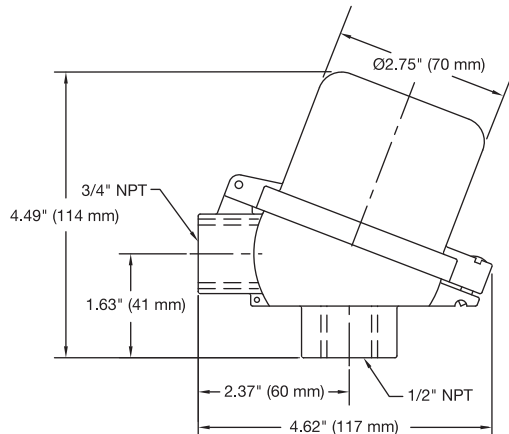


#### Note:

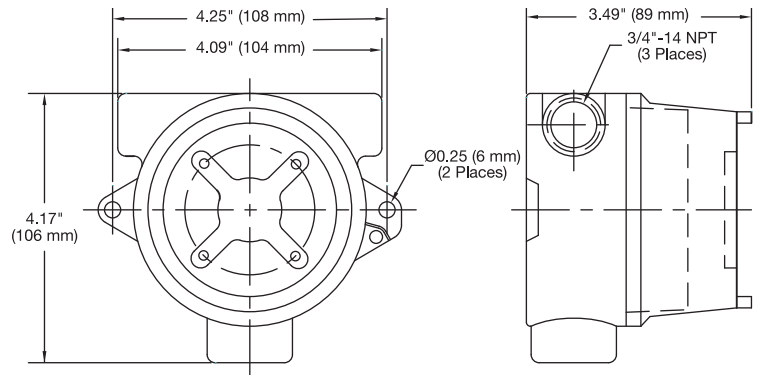
The in-head temperature transmitters are sold separately; see page 12-44.



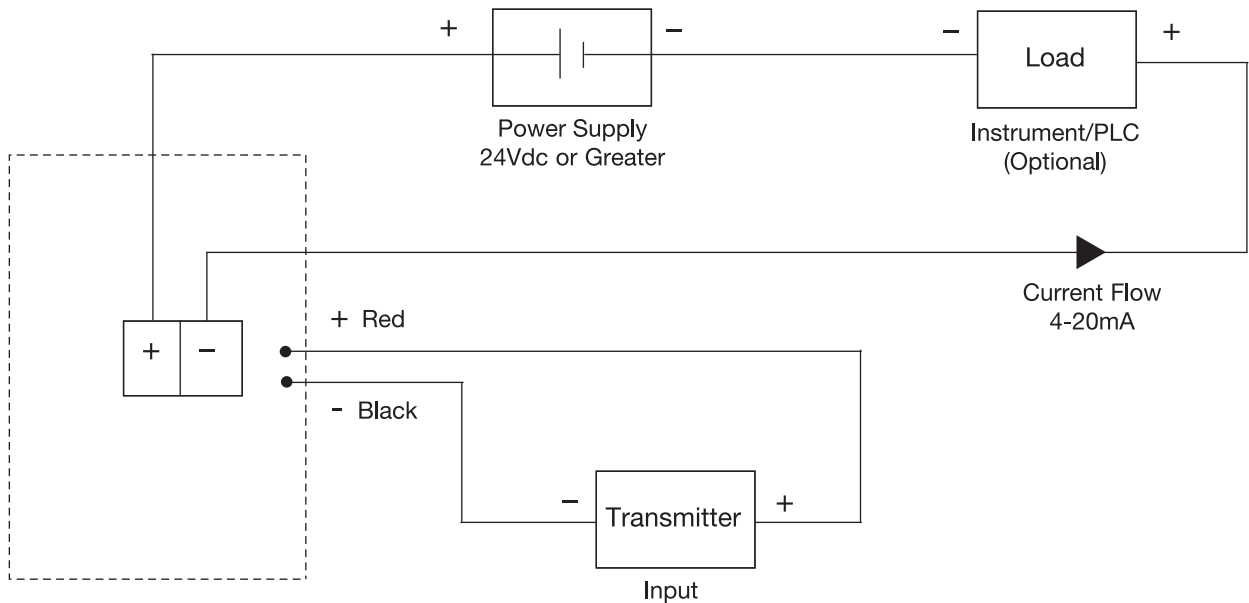
### EMT10001



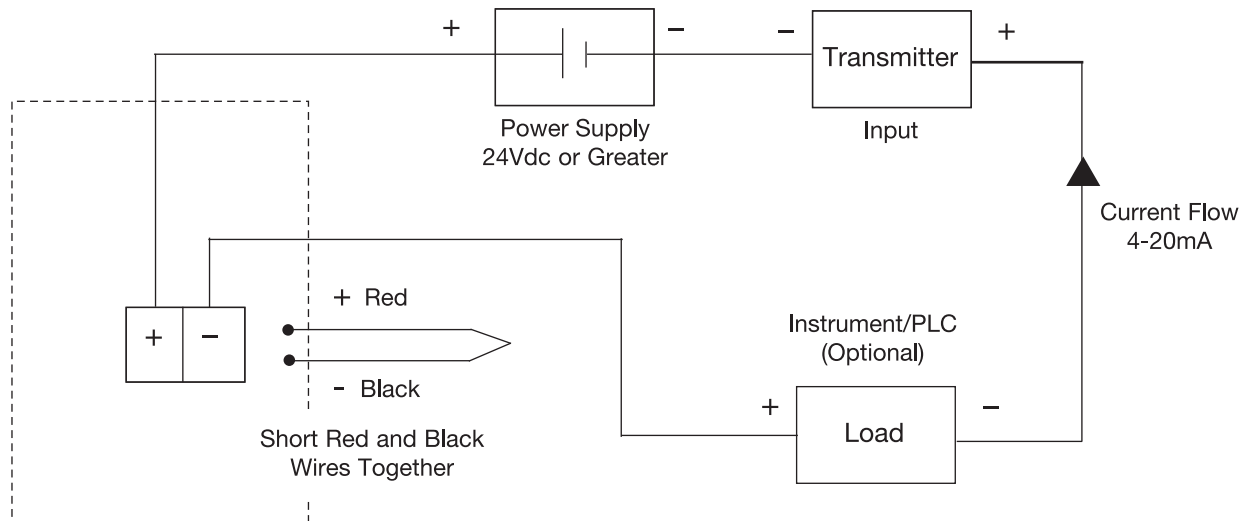
### EMT20001



### EMT10001 & EMT20001 Wiring with Internal Transmitter



### EMT10001 & EMT20001 Wiring with External Transmitter





### 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 Monitor

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	K
6	°F	DTM30010	DTM30015
6	°C	DTM30020	DTM30025

#### 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.**

#### Specifications

<b>Display Range:</b>	-199 to 1999 °F or °C
<b>Measuring Accuracy:</b>	±1/2% of reading ±1°
<b>Ambient Oper. Temp.:</b>	-5° to 140°F (-21° to 60°C)
<b>Relative Humidity:</b>	90% max., non-condensing
<b>Cold Junction Offset:</b>	1° max. for 32° to 110°F (0° to 43°C)
<b>Display Updates:</b>	3 times per second
<b>LCD Height:</b>	0.5" (12.7 mm) high
<b>Construction:</b>	High-density polyethylene case, aluminum panel with meter and miniature thermocouple jacks
<b>Dimensions:</b>	12" x 8" x 3"
<b>Power Requirement:</b>	9 Vdc (9V "transistor" alkaline battery)
<b>Weight:</b>	2.0 lb. (0.9 kg.)

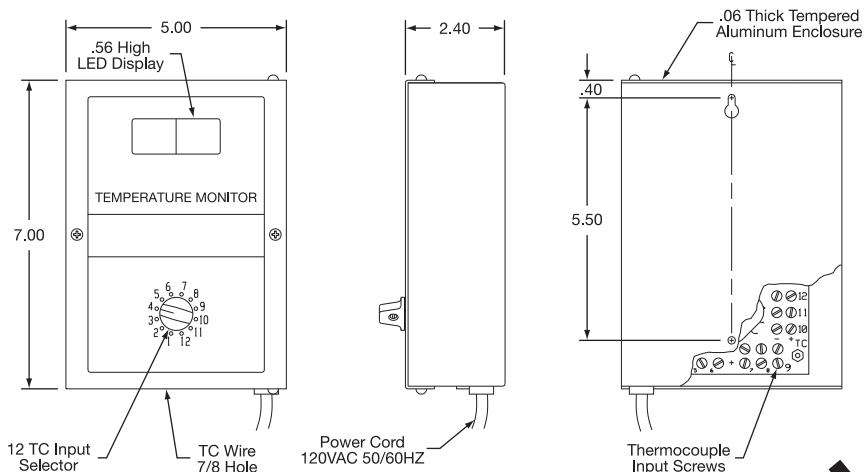
#### DISPLAY RANGE

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





### 12-Station Temperature Monitor



#### Design Features

- \* Thermocouple calibrations available are T, K, J, or E linearized in two 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	Min. °F	Max. °F	Min. °C	Max. °C
J-Fe/Constantan	-60	1400	-50	750
K-Chromel™/Alumel™	-50	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., non-condensing
- 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.)

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.

#### Typical Applications

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

#### 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

### Bimetal Dial Thermometers for Industrial Applications

#### Typical Applications

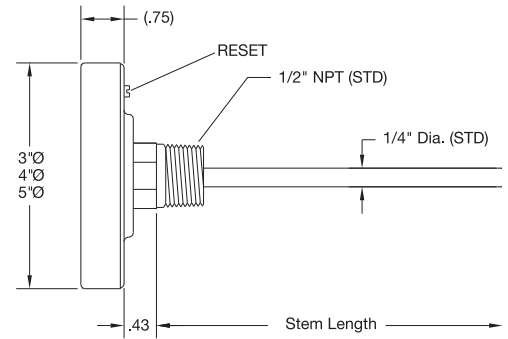
- ➔ Oil, Gas & Petrochemical
- ➔ Food & Beverage
- ➔ Power Generation
- ➔ Waste Water
- ➔ Military
- ➔ Utilities
- ➔ Pharmaceutical
- ➔ Paper and Pulp
- ➔ Refrigeration
- ➔ Compost
- ➔ Dairy
- ➔ Marine
- and Many More !!!
- ➔ Mining

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



### Backmounted Bimetal Dial Thermometers Standard Sizes and Ranges 1/2" NPT Connection Standard

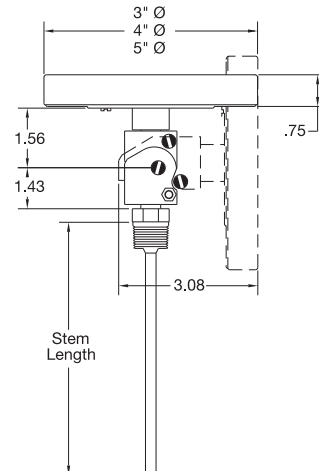
Dial Dia. (in)	Stem Length (in)	Part Number by Temperature Range					
		-40 to 160°F	0 to 100°F	0 to 200°F	0 to 250°F	50 to 300°F	50 to 550°F
3	2.5	BMT10001	BMT10004	BMT10007	BMT10010	BMT10013	BMT10016
	4	BMT10002	BMT10005	BMT10008	BMT10011	BMT10014	BMT10017
	6	BMT10003	BMT10006	<b>BMT10009</b>	BMT10012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

Stock Items Are Shown In RED

### 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



**CONTINUED**



### Bimetal Dial Thermometers for Industrial Applications

Continued from previous page...

#### 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	<b>BMT20010</b>	BMT20013	BMT20016
	4	BMT20002	BMT20005	BMT20008	BMT20011	BMT20014	<b>BMT20017</b>
	6	BMT20003	BMT20006	BMT20009	BMT20012	BMT20015	BMT20018
5	2.5	BMT20019	BMT20022	BMT20025	BMT20028	BMT20031	BMT20034
	4	BMT20020	BMT20023	BMT20026	BMT20029	BMT20032	BMT20035
	6	<b>*BMT20021</b>	BMT20024	BMT20027	BMT20030	BMT20033	<b>BMT20036</b>

Stock Items Are Shown In **RED**

### Ordering Code



#### Dial Diameter BOX 1

**Standard:** **3** = 3"  
**5** = 5"  
**Special:** **4** = 4"  
**9** = Other (Specify)

#### Temperature Scale BOX 5

**Standard:** **F** = Fahrenheit  
**Special:** **C** = Celsius  
**D** = Dual

#### 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 TEMPSCO with your requirements.*

#### Temperature Ranges BOX 6

Code	Fahrenheit	Celsius	Dual (°F & °C)
<b>Standard:</b>			
<b>23</b>	-40/160°F		
<b>35</b>	0/100°F		
<b>43</b>	0/200°F		
<b>47</b>	0/250°F		
<b>63</b>	50/300°F		
<b>67</b>	50/500°F		
<b>Special:</b>			
<b>23</b>		-40/70°C	-40/160°F & -40/70°C
<b>55</b>	25/125°F	0/50°C	25/125°F & -5/50°C
<b>43</b>		0/100°C	0/200°F & -10/90°C
<b>47</b>		-20/120°C	0/250°F & -20/120°C
<b>63</b>		10/150°C	50/300°F & 10/150°C
<b>67</b>		10/250°C	50/500°F & 10/250°C
<b>69</b>	50/550°F	10/300°C	50/550°F & 10/300°C
<b>81</b>	150/750°F	50/400°C	150/750°F & 70/400°C
<b>85</b>	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      **PC** = Acrylic Window  
**SF** = Silicone Fill      **PY** = Polycarbonate Window  
**SS** = 316 SS Stem      **TG** = Tempered Glass Window  
**F3** = 3/8" Stem Diameter      **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

### 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

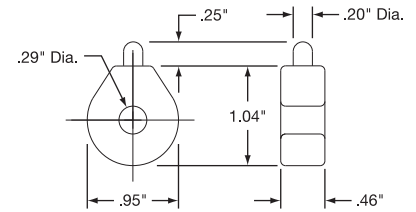
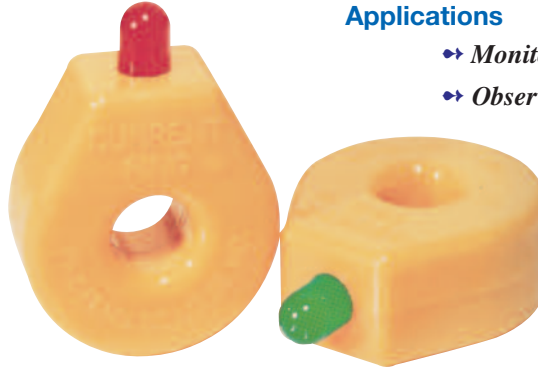
#### Green LED Indicator

Part Number: CTT00002

#### Panel Mounting Bracket

Part Number: CTT00003

Wire Passes	Turn-On Point (Amps AC)		Max. Wire Dia. (in.)
	Red LED	Green LED	
1	2	2.5	.29
2	1	1.25	.14
3	.66	.83	.13
N	$2 \div N$	$2.5 \div 2$	-



#### Design Features

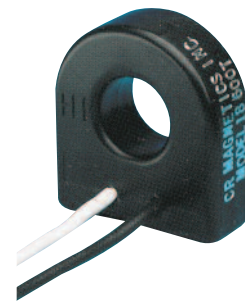
- \* Self Powered
- \* Easy to Install
- \* Supplied with Plastic Tie
- \* Indicates Current from 2 to 100 Amps AC (1 Wire Pass)

#### 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

#### Specifications

Max. Wire Dia.: .29 inches  
 Indicating Range: 2 to 100 Amps AC  
 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 100 Amps AC  
 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

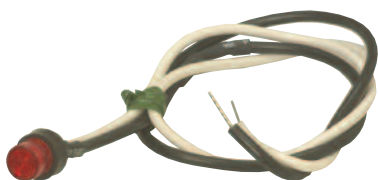
#### Surface Mounting Bracket

For use on model CTT00005 only

Dimensions: 1.37" x 1.25"  
 Mounting Dims.: (2) #6 screws .87" apart  
 Part Number: CTT00006

All Items Available from Stock

#### 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

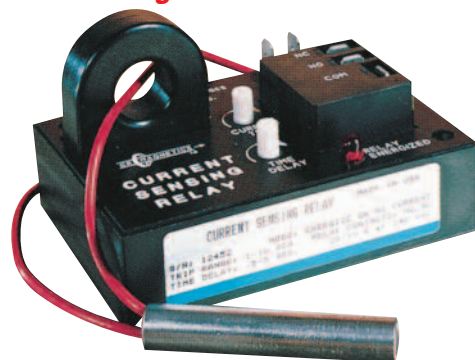
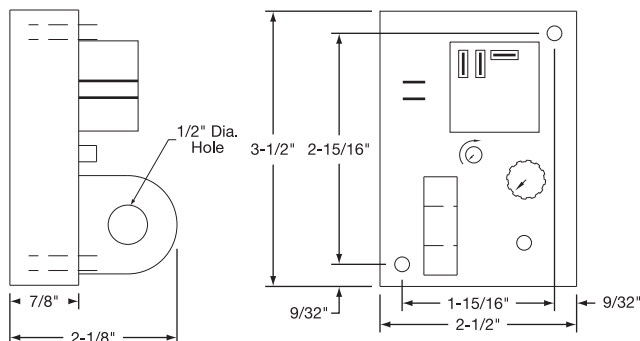
#### Splash-Proof LED Indicator

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





### Current Sensing Relay for Heater Monitoring



#### 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:** **CTR** - 1 2 3 4 5 6

**Relay Trip Status** BOX 1

**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** BOX 2

**1** = 120 Vac

**2** = 240 Vac

**3** = 24 Vdc

**Trip Ranges** BOX 3

**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** BOX 4

**A** = .5 to 6 Sec.

**B** = 2 to 25 Sec.

**C** = .1 to 1 Sec.

**X** = None

**Trip Point Dial** BOX 5

**CD** = Calibrated Dial

**FP** = Fixed Setpoint (specify required value)

**Output Options** BOX 6

**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
- \* Data Hold for AC/DC voltage and current
- \* Relative function for establishing a baseline 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

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



#### Design Features

- \* Built-in Non-Contact Voltage Detector with LED alert
- \* 4000 count, backlit LCD display
- \* 1.2" jaw size for conductors up to 350MCM
- \* Relative Mode for Capacitance Zero and Offset Adjustment
- \* Data Hold
- \* Auto Power Off
- \* Complete with test leads, general purpose Type K bead wire temperature probe, two AAA batteries, and carrying case

Specifications	Range	Maximum Resolution	Basic Accuracy
<b>Display Counts:</b>	4000		
<b>AC Current:</b>	40.00A, 400.0A	0.01A	±(2.5%+8d)
<b>AC Voltage:</b>	4.00V, 40.00V, 400.0V, 600V, 400.0mV, 4.000V, 40.00V, 400.0V	0.001V	±(1.8%+8d)
<b>DC Voltage:</b>	600V	0.1mV	±(0.8% +2d)
<b>Resistance:</b>	400.0Ω, 4.000kΩ, 40.00kΩ, 400.0kΩ, 4.000MΩ, 40.00MΩ	0.1Ω	±(0.8% +2d)
<b>Frequency:</b>	10Hz to 10kHz	0.01Hz	±(1.5%+2d)
<b>Capacitance:</b>	40.00nF, 400.0nF, 40.00uF, 100.0uF	0.01nF	±(3.0%+5d)
<b>Temperature:</b>	Type K tc, -4° to 1400°F (-20° to 760°C)	0.1°	±(3.0%+9°F or 5°C)
<b>Duty Cycle:</b>	0.5 to 99.0%	0.1%	±(1.2%+2d)
<b>Diode Test:</b>	Yes		
<b>Continuity Test:</b>	Yes		
<b>Dimensions:</b>	7.9" × 2.6" × 1.5" (200 × 66 × 37 mm)		
<b>Weight:</b>	7.2oz. (205g)		

**Part Number: EMV00060**

The EMV00060 is the perfect meter for plant maintenance or HVAC repair. Besides the standard voltage current and resistance, the additional functions of temperature, capacitance, frequency and duty cycle make this the perfect all-in-one service tool.



### Megohmmeter/ Insulation Tester

#### Design Features:

- \* Three test ranges:  
200M /1000VDC  
200M /500VDC  
200M /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 200 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% reading)
Overload Protection:	2200 V (<1 min)
Dimensions:	3.8" × 6.3" × 2.3" (97 × 160 × 58mm)



All Items Available from Stock



### 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: ×1 for direct readings  
×10 for actual reading multiplied by 10
- \* Dimensions: 5.25" × 2" × 1" (133 × 51 × 25mm)

Part Number: EMV00065



## Digital Thermometers

### 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.



DTM11010



DTM11020



DTM11030

All Items Available from Stock

#### Specifications

	DTM11010	DTM11020	DTM11030
<b>Thermocouple:</b>	Single Type K	Dual Type K	Dual Type J or K
<b>Temperature Range:</b>	-58° to 2000°F (-50° to 1300°C)		<b>J</b> -328° to 1922°F (-200° to 1050°C) <b>K</b> -328° to 2498°F (-200° to 1370°C)
<b>Basic Accuracy:</b>	± 0.3% of reading		± 0.05% of reading
<b>Display Counts:</b>	2000		20,000
<b>Resolution:</b>	0.1° / 1°		0.2°F / 0.1°C
<b>Dimensions:</b>	6.5" × 3" × 1.7" (165 × 76 × 43mm)		7.6" × 3.6" × 2.1" (192 × 91 × 53mm)
<b>Weight:</b>	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: 932°F / 500°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: 1472°F / 800°C

