12

SECTION

INSTRUMENTATION

Melt Pressure Transducers

TEMPCO Cast-In Heat/Cool Bands

Screw

Hopper

Transmission

Gear Box

Motor

Cooling Tubes

Die

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. These are 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

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.

Tempco Tip Material 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.

HASTALLOY® TIP AND DIAPHRAGM

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

HCL	Hydrochloric Acid
HF	Hydrofluoric Acid
HBn	Hydrogen Bromine
HI	Hydrogen Iodine

For example, HCL is present when processing PVC and HF is present when processing Teflon®. If Hastalloy 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

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.

ELECTROLESS NICKEL COATED DIAPHRAGM

The Electroless Nickel diaphragm option gives the transducer an advantage in abusive environments. The Electroless Nickel offers abrasion resistance and corrosion resistance. This is due to a phenomenon called reduce 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" electroless nickel 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" electroless nickel 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 electroless nickel 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 Transducer CONFIGURATIONS
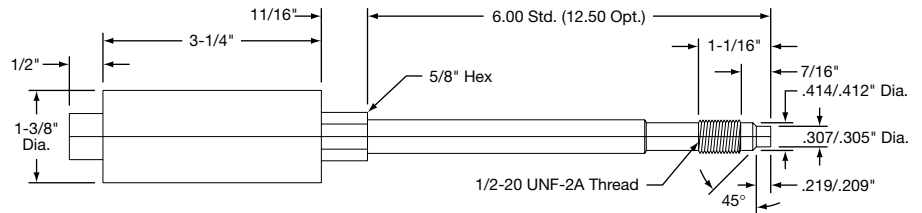
Rigid Stem Transducer

This melt pressure transducer is specifically designed for accuracy, stability, and repeatability. It can have a 1.0% or 0.5% combined error, performance that equals or exceeds any other strain gauge melt pressure transducer on the market today.

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.
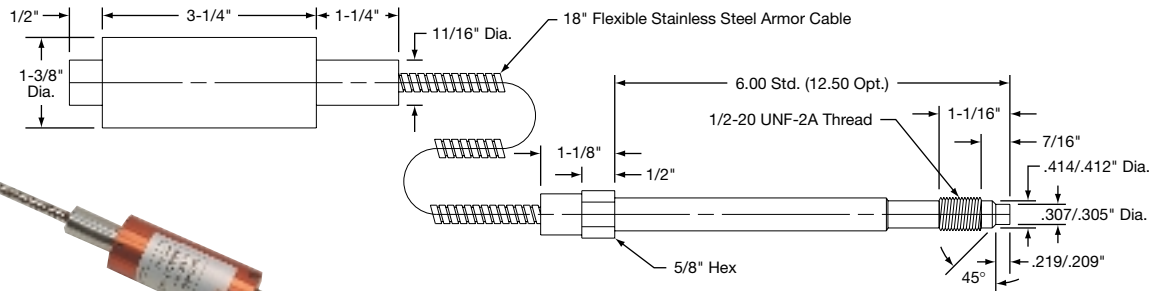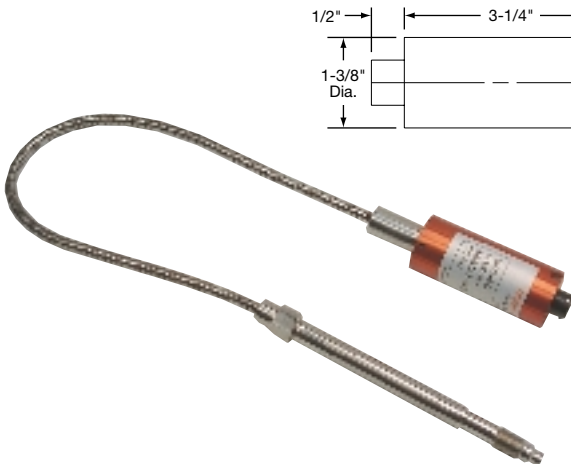
Flexible Armor Tubing Transducer

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.
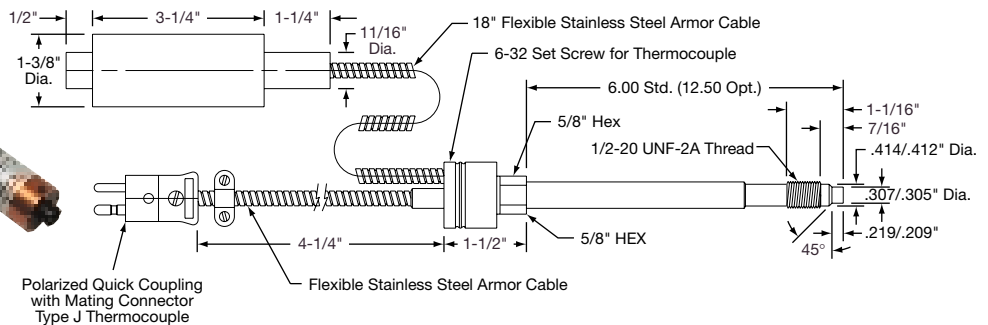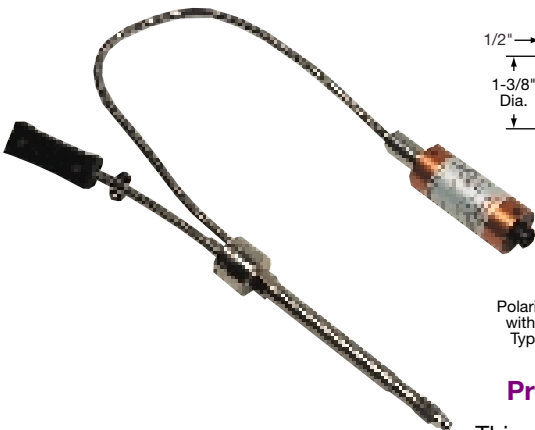
Pressure and Temperature Transducer

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 previous models.*

PROPER CARE for Tempco Melt Pressure Transducers

OVERVIEW

CAUTION The **Melt Pressure Transducer** is a measuring instrument that is subject to damage if mishandled, improperly installed, or dropped.

SENSING DIAPHRAGM

The Tempco fluid transducer is a sealed system. The sensing diaphragm is one of the most important components of the transducer. The diaphragm is a one-piece construction, machined out of 15-5 PH stainless steel and is coated with Armoloy to increase the surface hardness, offering resistance to abrasion. It has a nominal thickness of 0.0045 inches.

If the sensing diaphragm becomes damaged—that is, dented, gouged or deformed in any way, the transducer will no longer provide accurate readings and should be returned for repair/replacement.

TRANSDUCER MOUNT

A bad transducer mount is one of the key causes of damage to the transducer. Extruder barrel wear should be monitored. As the extruder barrel wears, the transducer tip will get closer and closer to the barrel bore until flush with the sidewall. Once the tip is flush, it will then wear at the same rate as the extruder barrel. To alleviate this problem, Tempco recommends that the transducer be recessed 0.015 inches from the barrel bore. A copper shim can be manufactured (to seal on the 45° seating surface) that will act as a spacer backing off the transducer tip from the inside barrel bore.

If the transducer tip protrudes into the extruder barrel, it is subject to unnecessary wear and is vulnerable to damage by a passing screw flite.

Another common transducer mount problem that is a result of barrel wear is rollover. Over time the opening into the barrel is reduced from the recommended dimension of .312"/.314". If a transducer is installed in this under-size hole, the tip becomes crimped or forced into a cone shape, deforming the sensing diaphragm and thus damaging the instrument.

GAUGING THE TRANSDUCER MOUNT

The transducer mount should be gauged prior to the installation of a new transducer or replacement of an existing transducer. The proper method for gauging the transducer mount is to use a gauge plug coated with machinists blue. If the blue is removed in an area, then there is a burr or imperfection in the transducer mount that must be repaired.

MOUNTING THREADS

The transducer mounting threads should be a ½-20UNF-2B and should be cleaned and inspected prior to the installation or reinstallation of a transducer. The use of a high temperature anti-seize compound will help in preventing galling and will allow easy removal of the transducer. Copper graphite anti-seize compounds should be used, such as Never-Seez by Bostik or C5-A by Felpro.

MOUNTING TORQUE

Although the transducer is capable of being installed at a mounting torque of up to 500 inch-pounds without damage or zero shift, an adequate seal is made with 100-200 inch-pounds. Excessive mounting torque will cause seizing and make the transducer difficult to remove.

OPERATING TEMPERATURE

The transducer tip is capable of operating at temperatures up to 750°F (400°C). The transducer electronics are capable of operating at temperatures of up to 170°F (70°C). It is important that the electronic housing not be placed on top of a heater or a heat source.

COLD STARTS

One of the most common causes of diaphragm damage is cold starts. A combined temperature and pressure transducer can be used to insure that the extruder barrel is up to temperature prior to the rotation of the extruder screw.

REMOVAL/REPLACEMENT

The transducer should only be removed or replaced while the machine is at operating temperature and the polymer is liquid. Removal of the transducer from a cold extruder will cause diaphragm damage due to polymer adhesion. A transducer should never be installed into a transducer mount where there is solid polymer. If the diaphragm is forced against a solid, the transducer can easily be overloaded and left with a very high zero offset—too high to be re-zeroed by the zero potentiometer on the instrument.

TIP CLEANING

If the transducer is removed warm, the tip can easily be cleaned with a soft cloth. If there is solid polymer present, a fluidized bed cleaning system can be used. Never use a wire brush, knife, or torch to clean the tip of a transducer.

Given proper care, Tempco transducers will provide years of service.

GENERAL SPECIFICATIONS *for Melt Pressure Transducers*
with 1% or 0.5% Combined Error

Mechanical

Ranges

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

Combined Error/Error Band....... ±1.0% or ±0.5% of full-scale (FS)

Repeatability......................... ±0.1% of FS

Hysteresis........................... 0.1% of FS

Overload Capability................ Up to 20,000 PSIG: 2 × FS
Above 20,000 PSIG: 1.5 × FS

Mounting Torque................... 500 inch-pounds maximum

Diaphragm Material .... 15-5PH stn. stl. (Armoloy plated)

Electrical

Measuring Element................ Strain gauge Wheatstone bridge

Element Resistance .... 350 ohm ±10%

Excitation Voltage .... 6-12 Volt DC (10 V rec.)

Sensitivity .... 3.33 millivolts/volt ±2%

Zero Balance .... ±5.0% full-scale output

Internal Resistance Cali. .... Produces precise electrical signal
 (Factory Adjusted) which is 80% of FS within ±0.25%

Temperature on Strain Gauge Housing

Maximum Temperature .... 160°F or 70°C

Zero Drift............................ 1.0%/100°F or 2.0%/100°C

Sensitivity Drift .... 1.0%/100°F or 2.0%/100°C

Temperature on Diaphragm

Max. Temp. (medium) .... 750°F or 400°C

Zero Shift............................ 25 PSI/100°F or 45 PSI/100°C

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

Design Features

✳ 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 and Readout Instrumentation

                  ✳ 6-Pin or 8-Pin Bendix Connectors Available

                     ✳ CE Approved

How To Order

Melt Pressure Transducers are offered with the options listed in the worksheet below. 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 on page 12-12.

1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐—☐	☐

Style BOX 1

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

Type BOX 2

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

Connector BOX 3

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

Pressure Range (PSI) BOX 4

A = 0-500 (1% CE only)   **F** = 0-5000
B = 0-750 (1% CE only)   **G** = 0-7500
C = 0-1000 (1% CE only)   **H** = 0-10000
D = 0-1500   **J** = 0-15000
E = 0-3000   **K** = 0-20000

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

Stem Length BOX 5

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

Flex Length BOX 6

00 = None (Style A)
18 = 18 Inches* (Styles B & C)

*Other sizes can be made on special request

Diaphragms BOX 7

Standard Diaphragm Construction

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

Optional Materials and Coatings

B = 0.0045" Hastalloy   **E** = 0.006" Inconel & Proprietary Coating
C = 0.008" Electroless Nickel   **F** = 0.0045" Titanium Nitride
D = 0.0045" Electroless Nickel   **G** = 0.008" Titanium Nitride

ADDITIONAL OPTIONS AVAILABLE...

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

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

Plastic Melt Pressure Transmitter: 4-20 mA output, 12-36 Vdc input, available w/or w/o thermocouple. FM approved model is also available, consult Tempco.

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

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

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

Melt Pressure Gauges

With or Without Adjustable Alarm Setting

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.

Three models are available:

◆ A rigid stem unit for standard installations

◆ A 30-inch 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.

◆ The third model provides all the features of the 30" flexible capillary model with the addition of a thermocouple (J-type) output for temperature.

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.

Each of the models is also available with an **optional adjustable alarm**. This adds safety by shutting down the process in the event of a high pressure condition.
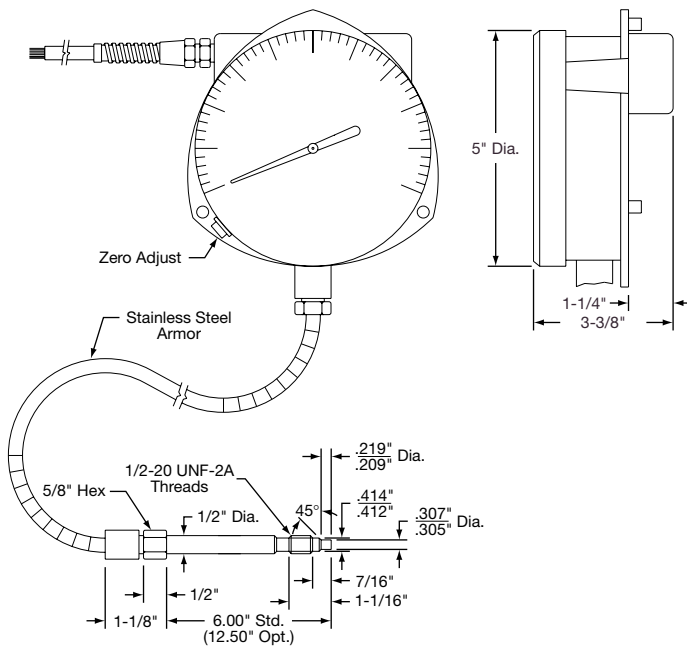
Optional diaphragm materials are available for applications that require extra abrasion and/or corrosion resistance. These options are exactly the same as the diaphragm options for melt pressure transducers.

Melt Pressure Gauge without Adjustable Alarm

Design Features

✳ No Power (or Wiring) Required for Non-Alarm Model

✳ No Maintenance

✳ No Grease

✳ Electron Beam Welded

✳ 150% Overload Capability without Damage

✳ Optional Thermocouple Version Available

✳ An Economical Alternative for Many Applications

✳ Greater than 180° Movement for Optimum Readability

✳ PSI, Bar and Kg/cm^2 Ranges Available

✳ Optional Adjustable Alarm with Range from 35 to 90% Full Scale

✳ Stainless Steel Construction

Zero Adjust

Stainless Steel Armor

5/8" Hex

1/2-20 UNF-2A Threads

1/2" Dia.

45°

.219"/.209" Dia.

.414"/.412"

.307"/.305" Dia.

7/16"

1-1/16"

1/2"

1-1/8"

6.00" Std. (12.50" Opt.)

5" Dia.

1-1/4"

3-3/8"

SPECIFICATIONS

Ranges	0-5000 PSIG	0-350 Bar
	0-10,000 PSIG	0-700 Bar
Error	±2.0% of full-scale	
Overload Capability	1.5 times full-scale	
Mounting Torque	500 inch-pounds max	
Diaphragm Material	15-5PH stainless steel (Armoloy plated)	
Max. Case Temperature	185°F (85°C)	
Max. Diaphragm Temp.	750°F (400°C)	
Diaphragm Zero Shift	25 PSI/100°F or 45 PSI/100°C	
Thermocouple Type (If applicable)	J-Type (Iron-Constantan)	

Alarm Specifications (for models with alarms)

Power	115 Vac or 220 Vac (50-60 Hz)
Alarm Reset	Latching—Manual Reset
Adjustable Alarm Scale	35%-90% of Full Scale
Relay Contact	5A @ 115 Vac
	3A @ 220 Vac
	5A @ 30 Vdc

How To Order

Melt Pressure Gauges are offered with the options listed in the worksheet below. 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.

| 1 | 2 | 3 | 4 | 5 | 6 |

Style *BOX 1*

A1 = Rigid Stem, Stem Down
A2 = Rigid Stem, Stem Up
B1 = Flexible Armor Tubing
C1 = Gauge with Type J Thermocouple

Alarm *BOX 2*

1 = No Alarm *(Most Common)*
2 = With Alarm *(except style A2)*

Pressure Range *BOX 3*

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

Stem Length *BOX 4*

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

Flex Length *BOX 5*

00 = None *(Styles A1 & A2)*
30 = 30 Inches* *(Styles B1 & C1)*

*Other sizes can be made on special request

Diaphragms *BOX 6*

Standard Diaphragm Construction

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

Optional Materials and Coatings

B = 0.0045" Hastalloy
C = 0.008" Electroless Nickel
D = 0.0045" Electroless Nickel

E = 0.006" Inconel & Proprietary Coating
F = 0.0045" Titanium Nitride
G = 0.008" Titanium Nitride

Micro-Processor Based Melt Pressure Indicators

- ⅛ DIN
- 2 Alarms with Adjustable Setpoint
- ISO 9002 Certified, CE Approved
- Economically Priced
- Displays Pressure in a 4-Digit LED Display
- Auto Zero, Auto Span, and Auto Calibration

- Touch-Type Keypad
- Built-In Strain Gauge Bridge Excitation
- Filter for Digit Stabilization
- Coded Access for User Lockout

**Model Number: PDA00010**

Series 770 *Melt Pressure Indicator*

- ¼ DIN
- 2 Alarms
- Two Auxiliary Outputs (Field Selectable): 0-10 Volt; 0-20 mA; 4-20 mA
- ISO 9002 Certified
- Auto Zero, Auto Span, Auto Calibration, and Auto Re-zero
- Displays % of Full Scale Upon Demand
- 3 Programming Levels with Coded Access

- Peak Value Memory
- Touch-Type Keypad
- Built-In Strain Gauge Bridge Excitation
- Filter for Digit Stabilization
- RS-232 & RS-485 Communication Available, Consult Factory for More Information

Model Number: PDA00020

Series 880 *Melt Pressure Indicator*
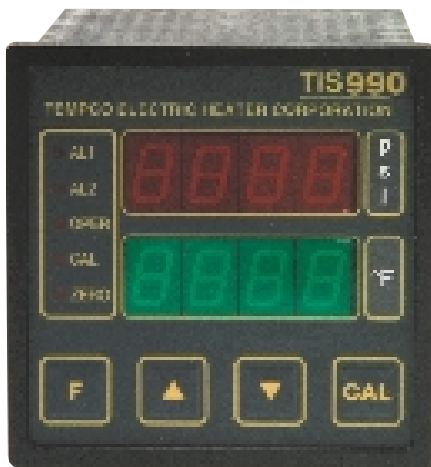
- Displays Pressure & Temperature Simultaneously in Two 4-Digit LED Displays
- ¼ DIN
- C E Approved
- 2 Alarms with Adjustable Setpoint for Temperature or Pressure
- Three Auxiliary Outputs: 0-10 Volt; 0-20 mA; 4-20 mA
- Auto Zero, Auto Span, and Auto Calibration
- Displays % of Full Scale in Illuminated Bargraph
- Coded Access
- Touch-Type Keypad
- Built-In Strain Gauge Bridge Excitation
- Filter for Digit Stabilization

Model Number: PDA00030

Series 990 *Melt Pressure and Temperature Indicator*

Stock List & Technical Information at www.tempco.com

| SPECIFICATIONS			
Part Number:	**770 Series** PDA00010	**880 Series** PDA00020	**990 Series** PDA00030
Electrical			
Power:	120 Vac ±10% or 230 Vac ±10% field selectable (50/60 Hz)	120 Vac ±10% or 230 Vac ±10% customer specified (50/60 Hz) with built-in line filter	120 Vac ±10% or 230 Vac ±10% field selectable (50/60 Hz)
Operating Temp.:	+32°F to +130°F (0° to 55°C)		
Noise Immunity:	VDE 0843 & IEC 801		
Fascia Seal Rating:	IP54 (Splash-proof, dust-proof)		
Termination:	Screw terminals		Removable panel screw terminals
Signal Input			
Type:	350 Ω strain gauge bridge		
Input Sensitivity:	2.0 to 4.5 mV/V	1.0 to 4.5 mV/V	1.5 to 4.0 mV/V
Zero Balance:	±20% of full scale	±30% of full scale	±40% of full scale
Bridge Excitation:	10 Vdc @ 40 mA		10 Vdc (±5.0 Vdc) @ 40 mA
Calibration:	Will accept transducers with internal shunt calibration values from 40%–100% or external calibration resistors		
Housing	$\frac{1}{8}$ DIN (48 × 96 × 160 mm)	$\frac{1}{4}$ DIN (96 × 96 × 160 mm)	
Panel Cutout	1.65 × 3.62 in. (42 × 92 mm)	3.62 × 3.62 in. (92 × 92 mm)	
Display			
Type:	4-digit LED display	5-digit LED display	Two 4-digit LED displays Red: Pressure Green: Temperature
Ranges:	User programmable: –999 to +9999	User programmable to 30,000 units	Pressure: –999 to +9999 Temperature: 32°F to 752°F (0° to 400°C)
Units:	PSI, kg/cm^2, BAR, kPa, Pa, MPa		PSI, kg/cm^2, BAR, °F, °C
Decimal:	Selectable from keyboard		
Set Up Prompts:	Displays program steps and error conditions		
Alarms			
Type:	2 SPDT: In the event of a power failure relays go into alarm condition		
Mode:	Low-High, latch/non-latch: set and reset via front panel keyboard		
Set Point Range:	0-100% full scale A1,& 0-120% full scale A2		
Hysteresis:	1.5% full scale (fixed)		
Contact Rating:	5A @ 115 Vac/230 Vac, 8A @ 30 Vdc		
Indication:	Alarm 1 & 2 LED's illuminate on front panel		
Auxiliary Output			
Voltage Output:	N/A	0-10 Vdc 1000 Watt minimum load	
Current Output:	N/A	4-20 mA 800 Watt maximum load 0-20 mA 800 Watt maximum load	
Linearity:	N/A	Less than 0.5% full scale ±1 digit	

SPECIAL DISCOUNT!

Melt Pressure Sensor Package

A special package has been prepared by Tempco for sale at a special discount price. This melt pressure sensor package contains all the components necessary for monitoring your extruder melt pressures today at one low cost. The package contains:

- One [1] 1% combined error 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.
- One [1] model 770 MELT PRESSURE INDICATOR.
- One [1] 25 foot long TRANSDUCER CABLE assembly for a 6-pin connector.
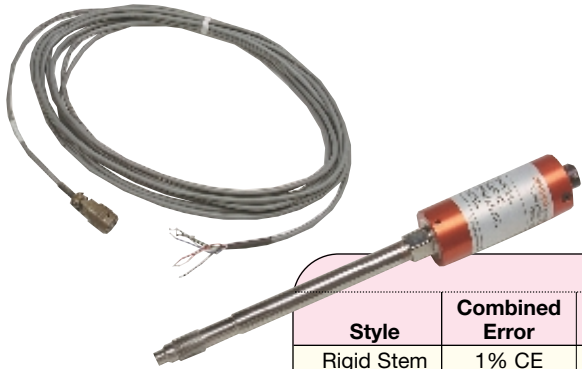
DISCOUNT PACKAGE	
Pressure Range	Part Number
0-500	PDA00101
0-750	PDA00102
0-1000	PDA00103
0-1500	PDA00104
0-3000	PDA00105
0-5000	PDA00106
0-7500	PDA00107
0-10000	PDA00108
0-15000	PDA00109
0-20000	PDA00110

COMMONLY USED MELT PRESSURE TRANSDUCERS

Style	Combined Error	Connector	Pressure Range	Stem Length	Flex Length	Diaphragm	Worksheet Number	Part Number
Rigid Stem	1% CE	6 Pin	0-5000	6"	None	Standard	A1SF100A	PDD00101
Rigid Stem	1% CE	6 Pin	0-7500	6"	None	Standard	A1SG100A	PDD00102
Rigid Stem	1% CE	6 Pin	0-10000	6"	None	Standard	A1SH100A	PDD00103
Rigid Stem	1% CE	6 Pin	0-15000	6"	None	Standard	A1SJ100A	PDD00104
Flex Tube	1% CE	6 Pin	0-5000	6"	18"	Standard	B1SF118A	PDD00105
Flex Tube	1% CE	6 Pin	0-7500	6"	18"	Standard	B1SG118A	PDD00106
Flex Tube	1% CE	6 Pin	0-10000	6"	18"	Standard	B1SH118A	PDD00107
Flex Tube	1% CE	6 Pin	0-15000	6"	18"	Standard	B1SJ118A	PDD00108
with T/C	1% CE	6 Pin	0-5000	6"	18"	Standard	C1SF118A	PDD00109
with T/C	1% CE	6 Pin	0-7500	6"	18"	Standard	C1SG118A	PDD00110
with T/C	1% CE	6 Pin	0-10000	6"	18"	Standard	C1SH118A	PDD00111
with T/C	1% CE	6 Pin	0-15000	6"	18"	Standard	C1SJ118A	PDD00112

ACCESSORIES

Connectors and Cable Assemblies

6-and 8-Pin Transducer Cables

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

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

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

Thermocouple Cables

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

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

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

GENERAL ACCESSORIES	
Description	Part Number
3-Piece Cleaning Tool Kit (½-20 thread)	PDA00251
1-Piece Cleaning Tool (M-18 thread)	PDA00252
Transducer Mount Drill Kit	PDA00253
Transducer Pressure Simulator—6-Pin	PDA00254
Transducer Pressure Simulator—8-Pin	PDA00255
Mounting Bracket	PDA00256

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

THERMOCOUPLE MATING CONNECTORS (hardware only)
Part Number
PDA00214

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

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

Industry CROSS Reference

When using this cross reference please note that a (✱) represents a code for the pressure range; these differ from manufacturer to manufacturer so choose the pressure range that best fits your application needs. Also, though some equipment listed in this cross reference may differ in appearance, the function of the products is equivalent.

Description	Dynisco	ISI	Gentran	Tempco
Melt Pressure Transducer with 1% Combined Error and 6-Pin Connector				
6" Rigid Stem Armoloy Coated Tip	PT460E-✱-6	ISI 0100-✱T-6	GT-76/6D6✱	A1S✱100A
6" Stem with 18" Flexible Tubing, Armoloy Coated Tip	PT462E-✱-6	ISI 0101-✱T-6	GT-76/6D6Z1✱	B1S✱118A
Above Transducer with Thermocouple	TPT463E-✱-6	ISI 0102-✱T-6	GT-76/6JD6Z1✱	C1S✱118A
Melt Pressure Transducer with 1% Combined Error and 8-Pin Connector				
6" Rigid Stem Armoloy Coated Tip	N/A	ISI 0160-✱T-6	GT-76/6D8✱	A1E✱100A
6" Stem with 18" Flexible Tubing, Armoloy Coated Tip	N/A	ISI 0161-✱T-6	GT-76/6D8Z1✱	B1E✱118A
Above Transducer with Thermocouple	N/A	ISI 0162-✱T-6	GT-76/6JD8Z1✱	C1E✱118A
Melt Pressure Transducer with 0.5% Combined Error and 6-Pin Connector				
6" Rigid Stem Armoloy Coated Tip	PT420A-C16-✱-6	ISI 0110-✱T-6	GT-72/6D6✱	A2S✱100A
6" Stem with 18" Flexible Tubing, Armoloy Coated Tip	PT422A-C16-✱-6	ISI 0111-✱T-6	GT-76/6D6Z1✱	B2S✱118A
Above Transducer with Thermocouple	TPT432A-C16-✱-6	ISI 0112-✱T-6	GT-76/6JD6Z1✱	C2S✱118A
Melt Pressure Transducer with 0.5% Combined Error and 8-Pin Connector				
6" Rigid Stem Armoloy Coated Tip	PT420A-✱-6	ISI 0120-✱T-6	GT-72/6D8✱	A2E✱100A
6" Stem with 18" Flexible Tubing, Armoloy Coated Tip	PT422A-✱-6	ISI 0121-✱T-6	GT-76/6D8Z1✱	B2E✱118A
Above Transducer with Thermocouple	TPT432A-✱-6	ISI 0122-✱T-6	GT-76/6JD8Z1✱	C2E✱118A
Melt Pressure Gauge				
6" Rigid Stem, Stem Down, Armoloy Coated Tip	PG541-✱-6	ISI 0150-✱T-6-SD	GT-90/6D✱ GT-95/6D✱	A21✱100A
6" Stem with 30" Flexible Tubing, Armoloy Coated Tip	PG442-✱-6 PG542-✱-6	ISI 0151-✱T-6	GT-95/6Z3✱	B11✱130A
Above Gauge with Thermocouple	TPG443-✱-6 PG543-✱-6	ISI 0152-✱T-6	GT-95/6JZ3✱	C11✱130A
Stem Up, Stem Down, Stem Left versions are available. Consult Tempco				
Melt Pressure Gauge with Adjustable Alarm				
6" Rigid Stem, Stem Down, Armoloy Coated Tip	PG551-✱-6	ISI 0150A-✱T-6-SD	GT-90B/6D✱	A22✱100A
6" Stem with 30" Flexible Tubing, Armoloy Coated Tip	PG552-✱-6	ISI 0151A-✱T-6	N/A	B12✱130A
Above Gauge with Thermocouple	TPG553-✱-6	ISI 0152A-✱T-6	N/A	C12✱130A

Design Features

✴ Rugged, Portable, Easy To Use
✴ Measure Temperature without Contact
✴ –50° to 1600°F
✴ 50:1 Optical Resolution
✴ Dual Digital Temperature Display
✴ ±1% Accuracy
✴ High/Low Audible Alarms
✴ Analog and RS232 Outputs
✴ 9 Volt Battery Operation
✴ Handy Belt-Pouch and Operator's Manual

Common Industrial Applications

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

Now With LASER Sighting on All Models

Most Tools Fix Problems, the BAT Plus Helps Prevent Them

Temperature change often means trouble. With a **BAT Plus** you can spot problems early and avoid costly downtime or processing problems that lead to rejected product.

Functional Electronics Designed for Accuracy and Convenience

Sophisticated microprocessors insure accuracy and repeatability. For added accuracy most models allow you to adjust for emissivity differences.

Actual and Maximum temperatures are always displayed. Fahrenheit or Celsius units are switch-selectable in all models.

For added convenience, certain models provide Max., Min., Differential, and Average values as well as audible Hi/Lo alarms.

The overall temperature range of the **BAT** series is 50 to 1600 degrees Fahrenheit. Response time is 350 mSec, far superior to any conventional contact method.

Data outputs on the **BAT 3+, 4+, and 5+** models provide a direct interface to chart recorders or printers. Customized temperature graphs and tables can be created and displayed with DataTemp™ software and PC compatible computers.

The **BAT 5+** has a built-in data logger. It can store up to 64 readings and transfer them to a Lotus 1-2-3 spreadsheet. A printer option is also available.

Rugged, Simple, and Easy to Use

The **BAT Plus** optics and electronics are built to deliver, even in the harshest conditions.

It is a rugged, everyday tool that can be used by anyone. You simply aim, pull the trigger and read the temperature. There is no need to focus and no need to calibrate.

With *LASER sighting* you can pinpoint small targets at a distance, even in dark environments.

The **BAT Plus** is ideal for checking temperatures of electrical components, automotive diagnostics, bearings, insulation, steam traps, roofing materials, concrete, pumps, and compressors. Or use it to monitor process or product temperatures.

The Best Feature is the Price

No other handheld thermometer delivers this much for the money. When you consider the thousands of dollars you could save in repairs, rejected product, and downtime, a **BAT Plus** could pay for itself the first time you use it.

Standard Features

Model:	BAT 2+	BAT 3+	BAT 4+	BAT 5+
Part number:	REB00020	REB00030	REB00040	REB00050
Temperature range:	0° to 1000°F (-18° to 540°C)	0° to 1600°F (-18° to 870°C)		
Emissivity:	Fixed @ 0.95	0.10-1.0 digitally adjustable		
Laser sighting: *(Meets FDA Class IIIa req.)*	✳	✳	✳	✳
Temperature measurement: Real time, MAX	✳	✳	✳	✳
MIN, DIF, AVG			✳	✳
Recall of last reading		✳	✳	✳
Stores 64 pts. in memory				✳
Hi/Lo audible and visual alarm:			✳	✳
Reflected energy compensation (Tamb):			✳	✳
Locking trigger:		✳	✳	✳
DC power input:		✳	✳	✳
Data output: RS232C or 1 mV per °C or °F:		✳	✳	✳

Options *(Must be ordered with instrument)*

	AVAILABILITY				
Model:	BAT 2+	BAT 3+	BAT 4+	BAT 5+	Part Number
Tenth Degree Display Resolution:	✳	✳	✳	✳	REB00201
Close Focus: *3.1 mm (0.12 in) spot size @ cone tip, maximum cone tip temp. is 180°F (82°C)*	✳	✳	✳	✳	REB00202
Sub Zero: *-46 to 400°C (-50 to 750°F)*	✳	✳	✳	✳	REB00203
N.I.S.T. calibration certification	✳	✳	✳	✳	REB00204
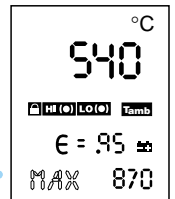
Liquid Crystal Display for BAT 5+

Accessories *(BAT 3+, 4+, 5+ only):*

	Description	Part Number
AC Adapter:	9 Vdc Output at 100 mAmp, tip positive, 110 Vac	REB00205
Output Cable:	60" (1.5 m) Analog	REB00206
Printer:	Thermal-type with internal battery or AC adapter 9.5 × 6.4 × 2.3 in., (241 × 163 × 58 mm) 2.2 lbs., 1.0 kg	REB00207
Software Programs: *(Computer cable included)*		
DataTemp™ 1	5¼" or 3½" disk data transfer to Lotus 1-2-3 or ASCII	REB00208
DataTemp™ 2	Logs up to 5,000 points and makes graphs or tables	REB00209

Specifications

Accuracy:	Greater of ±1% of reading or ±1.0°C (1.5°F), @ 23±5°C (73±9°F) ambient operating temperature
Repeatability:	Greater of ±0.5% of reading or ±0.5°C (±1°F)
Spectral Response:	8 to 14 microns, thermopile detector
Response Time:	350 mSec
Temperature Display:	°F or °C selectable, 4 digit backlit LCD
Display resolution:	1°C or °F std. (0.1°C or °F in AVG mode or all modes with option)
Ambient operating range:	32° to 120°F (0° to 50°C)
Relative humidity:	10-95% RH noncondensing @ up to 30°C (86°F)
Storage Temperature:	-20 to 50°C (-4 to 120°F) w/o battery
Power:	9 VDC Alkaline or battery
Dimensions (L x W x H):	5.5 × 1.75 × 7 in. (140 × 44 × 178 mm)
Weight:	1 lb., 4 oz. (0.6 kg)
Tripod Mount:	¼—20 UNC

Spotsize

DISTANCE: SENSOR TO OBJECT (FT)

SPOT DIA.* (IN)

1	2	3	4	5	6	7	8	9	10
0.85	0.85	0.9	1.0	1.2	1.5	1.7	2.0	2.3	2.7

Nominal D:S = 50:1

SPOT DIA.* (mm)

21	21	22	24	30	42	52	68
100	250	500	1000	1500	2000	2500	3000

DISTANCE: SENSOR TO OBJECT (mm)
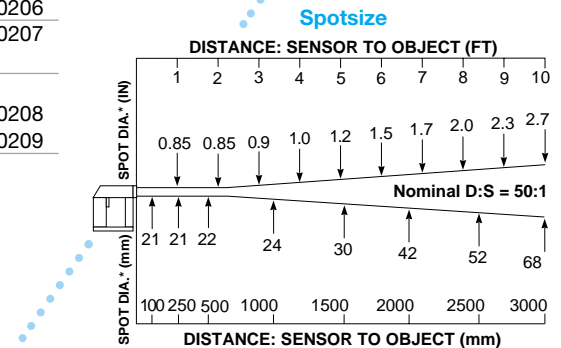
▲ *How To Order*

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

Beam-A-Temp™ LC — Low Cost Noncontact Thermometer

Design Features

✷ Rugged, Portable, Easy-To-Use
✷ Measure Temperature without Contact
✷ 0° to 750°F
✷ 8:1 Optical Resolution
✷ Digital Temperature Display
✷ ±2% Accuracy
✷ High/Low Audible Alarms
✷ 9 Volt Battery Operation
✷ Handy Belt-Pouch

Common Industrial Applications

• Plastics
• Paper and Pulp Converting
• Chemicals
• Food Processing
• Pharmaceutical
• Electronics
• Construction
• Industrial Maintenance
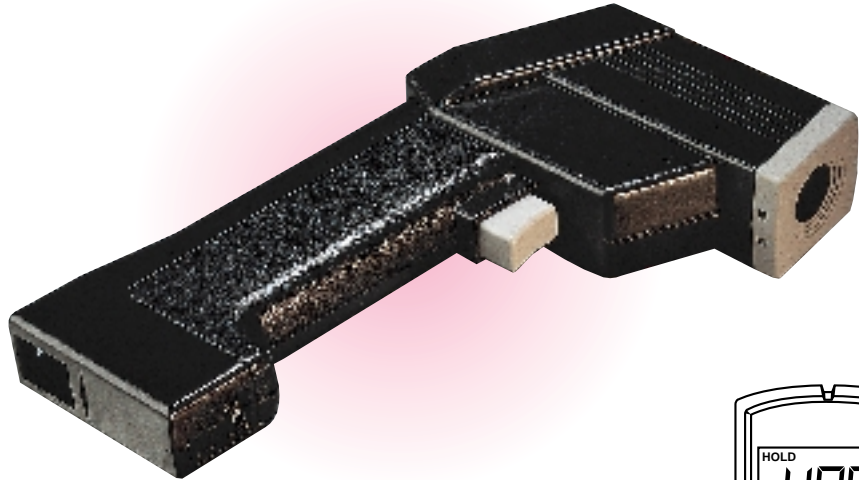
BAT LC2 Readout

Temperature Change Often Means Trouble

A **Beam-A-Temp™ LC** *(BAT LC)* can spot heat problems early in your electrical and mechanical systems, machinery and equipment— and help you avoid costly repairs, downtime, and ruined product.

Rugged, Simple, and Safe to Use

An everyday maintenance tool, the **LC** can be used by anyone. There's no need to focus or calibrate-and no need for special training. You simply aim, pull the trigger, and read the temperature.

Since there is no need to touch what you are measuring, temperatures of hazardous, hard-to-reach, or moving materials can be taken without getting burned or shocked—and without contamination.

The **BAT LC** is also designed to be held away from the eye. So your vision is not blocked in dangerous environments.

Accurate and Reliable

Proven circuitry assures accuracy and repeatability, even for targets as small as 2 cm (0.8 in.) in diameter. The rugged optics are environmentally sealed, so you get measurements you can count on, day after day, even in the harshest conditions.

Available with *LASER sighting* so you can pinpoint small targets at a distance— even in the dark!

Special Features

Powered by a single 9V battery, **BAT LC** models measure temperatures from -4 to 932°F (-20 to 500°C). The **LC4** also has an adjustable high alarm, temperature recall, adjustable emissivity, and MaxScan, a handy feature that tracks the highest temperature measured.

The Best Feature is the Price

No other portable noncontact thermometer delivers this much for the money. As for a return on investment, a **BAT LC** could easily pay for itself the first time you use it by spotting a minor problem before it turns into a major one.
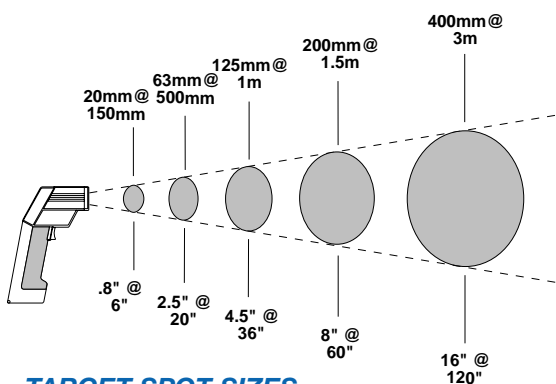
Noncontact Thermometer

Specifications

Model:	LC2	LC3	LC6
Part Number:	REB00120	REB00130	REB00160
MAX, MIN, ∆T		MAX only	✳
AVG temperatures:			✳
Recall last reading:			✳
HI or LO audible/visual alarm:			✳
LCD backlight:	✳		✳
Laser Sight (Class II):		✳	✳
Temperature range:	-18 to 400°C (0 to 750°F)	-20 to 500°C (-4 to 932°F)	
Accuracy:	Greater of ±2% of reading or ±2°C (±3°F), @ 23±5°C (73±9°F) ambient operating temperature		
Repeatability:	Greater of ±1% of reading or ±1°C (±2°F)		
Response time (95% response):	500 ms		
Spectral response:	7-18 microns nominal, thermopile detector		
Emissivity:	preset 0.95	0.3 to 1.0 digitally adjustable	
Temperature display:	°C or °F (selectable), 3 digit LCD		
Display resolution:	1°C or °F in all modes		
Ambient operating range:	0 to 50°C (32 to 120°F)		
Relative humidity:	10-95% RH noncondensing, @ up to 30°C (86°F)		
Storage temperature:	-25 to 70°C (-13 to 158°F) without battery		
Power:	9V alkaline or nicad battery		
Battery life (alkaline):	50 hrs. (no backlight), 20 hrs. (backlight used 50%)		
Dimensions:	137 × 41 × 196 mm (5.4 × 1.6 × 7.7 in.)		
Weight:	270 gm (9.5 oz.)		

Accessories

Description	Part Number
Belt Pouch Carrying Kit (with wrist strap)	REB00301
Waterproof Toolbox	REB00302
N.I.S.T. calibration certification	REB00303

TARGET SPOT SIZES

20mm@ 150mm — .8" @ 6"
63mm@ 500mm — 2.5" @ 20"
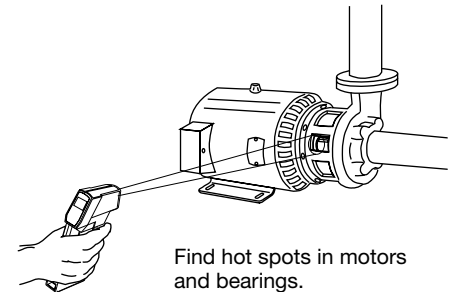125mm@ 1m — 4.5" @ 36"
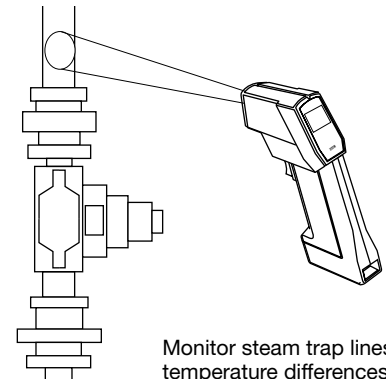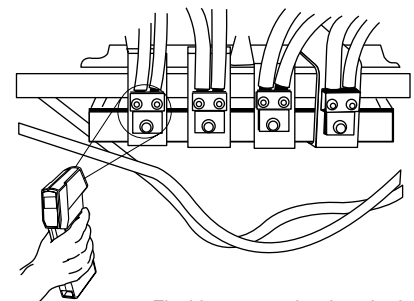200mm@ 1.5m — 8" @ 60"
400mm@ 3m — 16" @ 120"
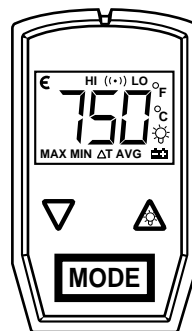
BAT LC4 Readout

TYPICAL USES

Find hot spots in motors and bearings.

Monitor steam trap lines for temperature differences.
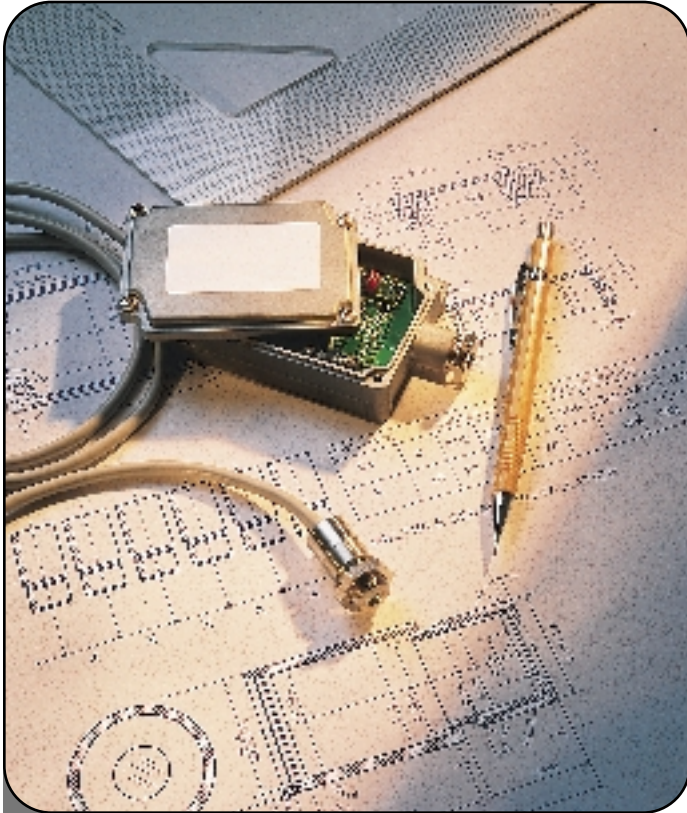
Find hot spots in electrical connections

How To Order

Choose the BAT LC unit and/or accessories desired, order by the associated Part Number.

Noncontact Infrared Thermocouple NCIT-LC Series

Design Features

✳ 0° to 500°C (32°F to 932°F)
✳ Compact and Rugged
✳ Designed for On-Line Monitoring and Control
✳ Ultra Fast Response Time
✳ Stainless Steel Sensing Head
✳ High Ambient Temperature Rating
✳ 3-Foot Cable
✳ Four Different Analog Outputs Offered
✳ Mounting Hardware Included
✳ 12-24 VDC Powered

Common Industrial Applications

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

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. The NCIT-LC is designed for applications in the 0°C to 500°C (32°F to 932°F) temperature range.

World's Smallest IR Sensors

The NCIT-LC is a 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's response time is as fast or faster than many high-end systems.

Rugged, Reliable, Practical Features

The NCIT-LC's electronics include: Emissivity and selectable Peak Hold, Valley Hold, and Averaging—features you won't normally find in systems in this price range. Output format is field selectable.

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

Affordable IR

The NCIT-LC's miniature size and low cost make it ideal for installation at multiple points along your process. Accurate. Easy to install. Practical. With the NCIT-LC, precision infrared temperature measurement is now an economic alternative.

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

Infrared Thermocouple

General Specifications

Repeatability:...................±1% of reading, ±1°C (2°F)

Temperature Resolution:..±0.1°C (±0.2°F)

Response Time:
    Resolution 2:1 ....150 mSec (95% response)
    Resolution 4:1 ....120 mSec (95% response)

Spectral Response: ....7.6 18 μm

Emissivity:........................0.20 to 1.00 adjustable

Signal Processing:...........Peak/Valley Hold, Averaging

Power:..............................12-24 VDC, ±10%

Output: ....Field selectable by model

Output Impedance (TC):..50 ohms

Minimum
Load Impedance (mV):.....100K ohms

Maximum Loop Impedance
(mA outputs): ....500 ohms @ 24 VDC power supply

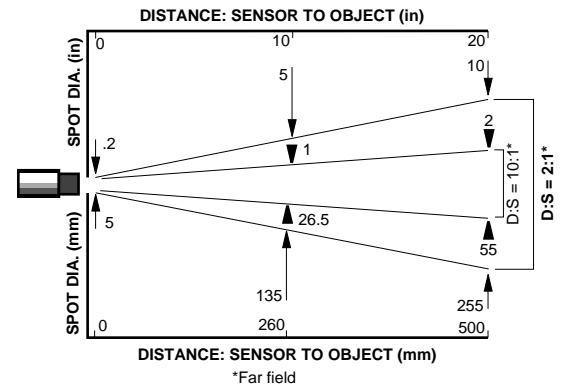**Current Draw:** ....< 40 mA

Mechanical

Sensing Head
    Construction: ....Stainless Steel
    Dimensions: ....14 mm dia. x 28 mm L (0.55" dia. x 1.1"L)

Electronics Housing w/Electronics Card
    Construction: ....Zinc, die-cast
    Dimensions: ....80 x 60 x 25 mm (3.2" x 2.4" x 1.0")
    Weight: ....270 g (9.5 oz)

Environmental

Rating:..............................IP 65, NEMA 4

Ambient Temperature Range
    Sensor: ....0 to 85°C (32 to 185°F)
    Housing: ....0 to 50°C (32 to 122°F)
    w/air cooling: ....–18 to 200° (0 to 392°F)

Relative humidity: ....10 to 95%

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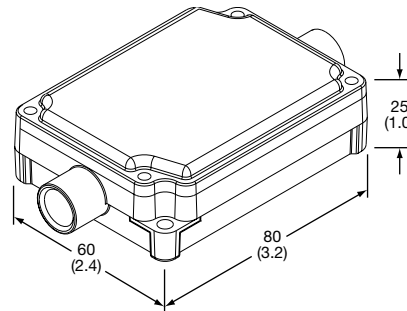

DISTANCE: SENSOR TO OBJECT (in)
SPOT DIA. (in)
SPOT DIA. (mm)
DISTANCE: SENSOR TO OBJECT (mm)
*Far field
D:S = 10:1*
D:S = 2:1*

Models and Temperature Ranges

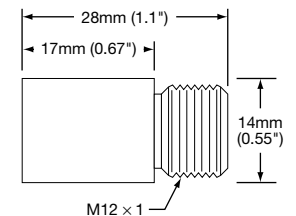| Part Number	Output Range	Temperature	Accuracy *(whichever is greater)*
REN00120	Type J Tc	0-180°C (32-356°F)	±3% or ±3°C
or	Type K Tc	0-500°C (32-932°F)	±3% or ±3°C
REN00100	0-5 Volt	0-500°C (32-932°F)	±2% or ±2°C
REN00125	0-20 mA	0-500°C (32-932°F)	±2% or ±2°C
or			
REN00105	4-20 mA	0-500°C (32-932°F)	±2% or ±2°C

Note: **1.** REN00120 and REN00125 have optical resolutions of 2:1.

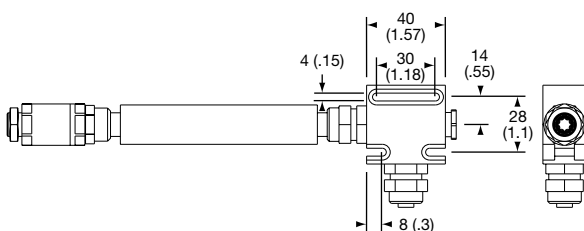**2.** REN00100 and REN00105 have optical resolutions of 10:1.

NEMA-4 Enclosure

25 (1.0)
60 (2.4)
80 (3.2)

Sensor head

28mm (1.1")
17mm (0.67")
14mm (0.55")
M12 × 1

Air Cooling System – REN00301

40 (1.57)
4 (.15)
30 (1.18)
14 (.55)
28 (1.1)
8 (.3)

Air Purging Jacket – REN00302

21mm (.83")
M12×1
47mm (1.85")
Hose with 3mm (.12") I.D. and 5mm (.2") O.D.
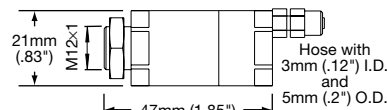
Mounting Bracket – REN00303

12.5 (.49)
16 (.63)
18 (.71)
29 (1.14)
27 (1.06)
14 (.55)
22 (.87)
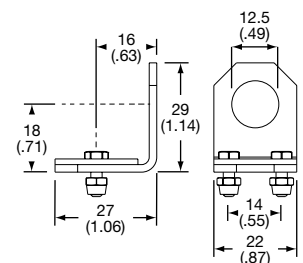
Design Features

✴ 0° to 1000°F
✴ Compact and Rugged
✴ Designed for On-Line Monitoring and Control
✴ Fast Response Time
✴ NEMA-4 Sensing Head
✴ High Ambient Temperature Rating
✴ Detachable 15-Foot Cable
✴ Four Different Analog Outputs Offered
✴ Mounting Hardware Included
✴ DC or AC Powered

Common Industrial Applications

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

Small, Rugged and Versatile

Most of the electronics are contained in the remote circuit-board—not the sensing head, so it's small enough to fit in tight places. If it's necessary to get in close, the NEMA-4 sensing head can withstand ambient temperatures to 185°F (85°C) without a special cooling jacket. The optional cooling jacket takes the rated ambient up to 350°F (177°C).

Excellent optical resolution is offered for the price. With standard and close-focus models, you can mount the unit further away or up close, and still focus on small target areas. Microprocessor technology makes it possible to offer a wide temperature range and four outputs: Type J, Type K, 1 mV/degree, and contact closure.

Adjustable Setpoint Model

The model NCIT-4 offers the additional capability of on/off control, alarm annunciation, or other automatic action by giving you a remotely adjustable setpoint. When the setpoint temperature is exceeded, a contact closure is actuated. The setpoint is operable throughout the 0 to 1000 degree range.

Each NCIT includes sensing head with quick-release cable (15 feet), electronics board, mounting nut, fixed bracket and if required, a rugged NEMA-4 electronics enclosure.

Proven Technology

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

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

Noncontact Thermocouple for Special Temperature Measurement

The **NCIT** line brings the benefits of non-contact temperature measurement to an increasing number of applications in which cost is a major concern.

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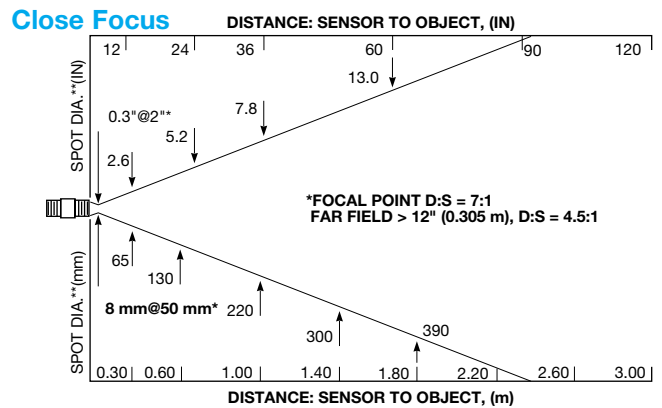
The **NCIT** models can't scratch, tear, smear, or contaminate because they don't make contact with your product. They are easier and safer to install and maintain because they can be positioned away from hot and hazardous processes and moving products.

They remain accurate over a longer 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 thermocouples can help you improve quality, speed production, and save money.

Infrared Thermocouple

Standard Focus
DISTANCE: SENSOR TO OBJECT, (IN)

| 12 | 24 | 36 | 60 | 90 | 120 |

SPOT DIA.**(IN)

| 1.3 | 2.0 | 2.9 | 4.5 | 7.0 | 9.2 |

FOCAL POINT D:S = 13:1
FAR FIELD > 90" (2.28 m), D:S = 13:1

SPOT DIA.**(mm)

| 30 | 51 | 77 | 104 | 137 | 170 | 205 | 230 |

| 0.30 | 0.60 | 1.00 | 1.40 | 1.80 | 2.20 | 2.60 | 3.00 |

DISTANCE: SENSOR TO OBJECT, (m)

Close Focus
DISTANCE: SENSOR TO OBJECT, (IN)

| 12 | 24 | 36 | 60 | 90 | 120 |

SPOT DIA.**(IN)

0.3"@2"*

| 2.6 | 5.2 | 7.8 | 13.0 |

*FOCAL POINT D:S = 7:1
FAR FIELD > 12" (0.305 m), D:S = 4.5:1

SPOT DIA.**(mm)

| 65 | 130 | 220 | 300 | 390 |

8 mm@50 mm*

| 0.30 | 0.60 | 1.00 | 1.40 | 1.80 | 2.20 | 2.60 | 3.00 |

DISTANCE: SENSOR TO OBJECT, (m)

Standard Specifications

Model:	NCIT-1	NCIT-2	NCIT-3	NCIT-4
Part Number:	REN00010*	REN00020*	REN00030*	REN00040*
Data Output:	Type J Thermocouple 50 Ω Impedance	Type K Thermocouple 50 Ω Impedance	1 mV/ °F or °C	100 mA NO/NC switch Contact closure
Temperature Range:	0° to 1000°F (–18°-538°C)		0° to 1000°F (–18°-538°C)	
Emissivity:	Emissivity 0.1 to 1.0 digitally adjustable			Adjustable setpoint 0°-999°F (–18°-538°C)
Spectral Response:	8 to 14 microns			
Detecting Element:	Thermopile			
Accuracy:	Greater of ±1% of reading or ±2.5°F (1.4°C), @ 73°F±9° (23°C ±5°C) ambient operating temp.			
Repeatability:	±0.5% of reading, ±1°F or °C			
Response Time:	800 ms (95% response)			
Fail-Safe Operation:	Under-ranging (low scale); over-ranging (full scale); cable break (full scale)			
Power:	9-24 VDC or nominal 12 VAC, 50 to 60 Hz., 25 mA			
Environmental Rating:	Sensing head: NEMA-4			
Vibration:	MIL-STD-810D (IEC 68-2-6): 3G's on any axis, 11 to 200 Hz			
Shock:	MIL-STD-810D (IEC 68-2-27): 50G's on any axis, 11 ms			
Ambient Operating Range:	Sensing head: 32° to 185°F (0° to 85°C) Box: 32° to 120°F (0° to 50°C)			
Storage Temperature:	–22 to 150°F (–30 to 65°C)			
Relative Humidity:	Sensing head: 10-95% non-condensing @ 72 to 100°F (22 to 43°C)			
Connection:	Detachable 15 ft. (4.5 m) cable included			
Dimensions:	Sensing head: 3.66" (93 mm) L × 1.65" (42 mm) dia. Electronic card: 3.94" (100 mm) L × 6.3" (160 mm) dia.			

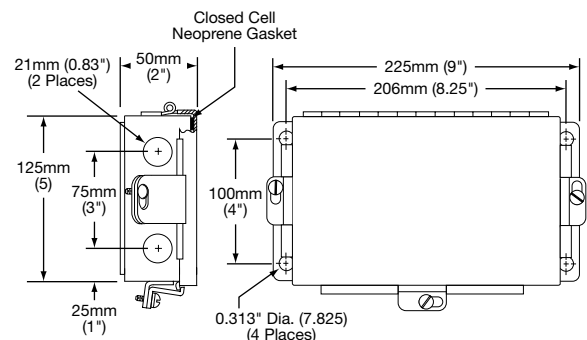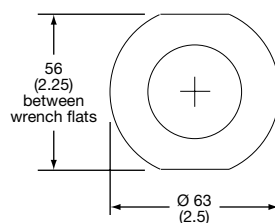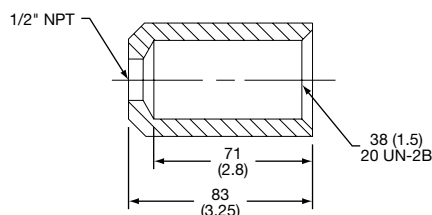***Last digit of Part Number becomes a 1 for a Close Focus Lens**

Note: The basic system includes the Sensing head, Electronic board, mounting bracket and 15 ft. cable.

Dimensional Specifications

NEMA-4 Enclosure – REN00210

Conduit Adapter (Acc.) – REN00205

1/2" NPT

71 (2.8)

83 (3.25)

38 (1.5) 20 UN-2B

Pipe Adapter (Acc.) – REN00206

56 (2.25) between wrench flats

Ø 63 (2.5)

Closed Cell Neoprene Gasket

21mm (0.83") (2 Places)

50mm (2")

225mm (9")

206mm (8.25")

125mm (5)

75mm (3")

100mm (4")

25mm (1")

0.313" Dia. (7.825) (4 Places)

Infrared Thermocouple

Standard Sensing Head

All 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. The sensor cable may be shortened, but not lengthened. Avoid installing the sensor cable in noisy electrical environments such as around electrical motors, switch gear, or induction heaters. In these environments, it is recommended to install the cable in conduit. A conduit adapter accessory is available for this purpose.

42 (1.65)

93 (3.66)

28 (1.125)

38 (1.5)

38 (1.5) 20 UN-2A
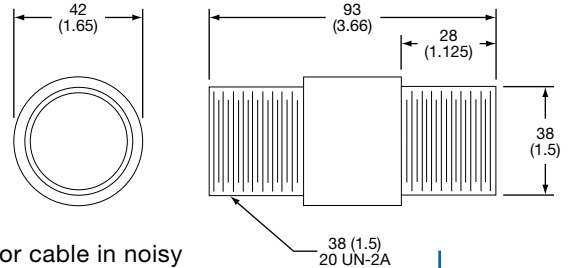
Air/Water Cooled Sensing Head

The Air/Water-Cooled Housing option allows the 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 ⅛" 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/cm²). 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

Chilled water below 50°F (10°C) is not recommended. To avoid condensation and lens damage, Tempco suggests using the Air Purge Collar with the Air/Water-Cooled Housing. All units ordered with the Air/Water-Cooled Housing include the Air Purge Collar.

53 (2.1)

1/8 NPT NIPPLE (2 PLCS)

63 (2.5)

22 (0.88)

38 (1.5) 20 UN-2A THREAD

21 (0.82)

51 (2.02)

92 (3.66)
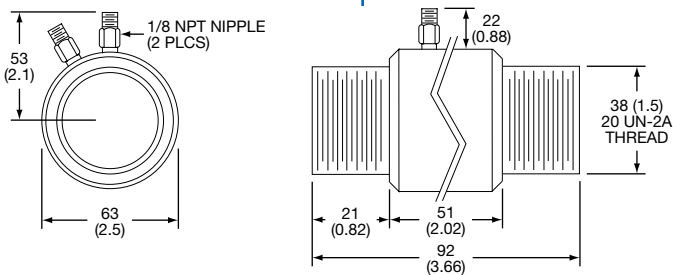
Air Purge Collar

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 flows into the ⅛" NPT brass fitting and out the front aperture. 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.

Ø 63 (2.5)

Ø 38 (1.5)

3 (1/8) 27 NPT

38 (1.5) 20 UN-2A

22 (.875)

38 (1.5) 20 UN-2B

25 (1)

75 (3)
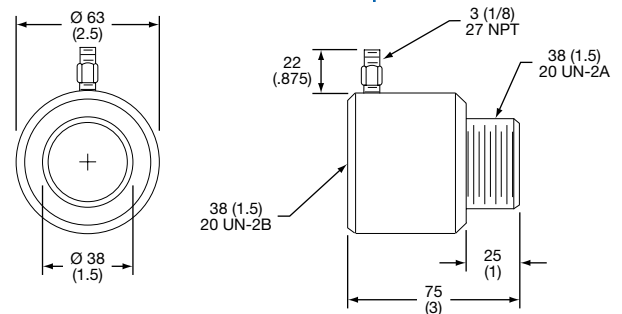
OPTIONS	
Description	Part Number
Close Focus	
Water/Air-Cooled Housing (includes air purge collar)	REN00202
N.I.S.T. Certification	REN00203

ACCESSORIES	
Description	Part Number
Air Purge Collar	REN00204
Conduit Adapter	REN00205
Pipe Adapter	REN00206
Mounting Nut (Spare)	REN00207
Fixed Bracket (Spare)	REN00208
110/220 Vac to 12 Vac transformer	REN00209
NEMA-4 Enclosure	REN00210

Digital Handheld Thermocouple Thermometer

Instrument Specifications

Accuracy: ±1% of reading ±1 digit with instrument itself at room temperature (20° to 30°C). For colder or warmer ambient temperature to 0°C and 50°C, add (0.03% of reading ±0.1°C)/°C. Can be recalibrated in the field with instructions provided.

Thermocouple: Type J, Iron-Constantan; –112°F to 1382°F, switchable to –80°C to 750°C

Resolution: All temperatures less than 200° (F or C) are shown in 0.1° resolution. Temperatures above 200° are shown in 1° resolution.

Battery Life: 500 hours per battery; capacity up to 3 (9V) "transistor radio" batteries. LO BATT signal gives 10 hours warning.

Display: Black-on-silver LCD digits ½" tall.

Housing: Rugged ABS Housing 3" x 5" x 1¾". Weight 12 oz. with battery and typical probe.

Part Number: DTM10000

Complete Thermometer Unit and Right-Angle Probe

Tempco's DTM10000 digital thermometer features a rugged housing with a clip for hooking onto a belt or tool pouch and black-on-silver ½" tall LCD digits for easy reading. Easily cleaned membrane switch is resistant to accumulation of dirt or grease. The instrument is switchable from °F to °C and has proven itself to be invaluable in applications where several methods of temperature measurement are necessary.

Temperature sensing kits are available at a *10% discount*. These include: a meter, a probe (of the appropriate type), and a vinyl case.

Right-Angle Ceramic Tip Surface Probe

Max. temp. for sensor: 1200°F for type J, response time: 4 sec.

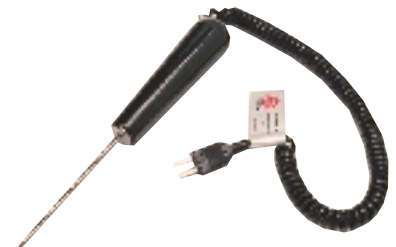Part Number
Probe   DTA00020
Kit   DTM10020

High Temperature Reduced Tip Needle Probe

4" stem, max. temp. for sensor: 930°F for type J, response time: 2 sec.

Part Number:
Probe   DTA00030
Kit   DTM10030

Straight Shaft Ceramic Tip Surface Probe

Max. temp. for sensor: 1200°F for type J, response time: 4 sec.

Part Number:
Probe   DTA00010
Kit   DTM10010

Vinyl Carrying Case

Belt-mounting vinyl case to carry thermocouple thermometer and probe.

Part Number:
Case   DTA00050

⅛" Diameter Needle Probe

4" probe length, max. temp. for sensor: 500°F for type J, response time: 3 sec.

Part Number:
Probe   DTA00040

How To Order

Select the digital thermometer and/or accessories from this page and order by the item(s) Part Number.

Note: NIST traceability certificate can be supplied. Consult Tempco for more information.

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

✳ ½" High LCD Display is Sunlight Readable

✳ Powered by 9V Alkaline "Transistor" Battery

✳ Durable Rotary Selector for Displaying 12 Thermocouple Inputs

✳ Large Pointer Selector Knob Clearly Indicates the Monitored Location

✳ Polymer Coated Circuit Will Perform Indefinitely Even in High Humidity Environments

✳ Made in the United States and Warranted Against Material or Workmanship Defects for 1 Year

Multi-Station Portable Thermocouple Monitors

These thermocouple monitors were designed to assist field technicians with testing or calibrating HVAC/refrigeration systems, baking/curing ovens, motors, engines, and much more. Instant response circuits allow a technician to compare up to 12 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
12	°F	DTM30030	DTM30035
12	°C	DTM30040	DTM30045

How To Order

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.
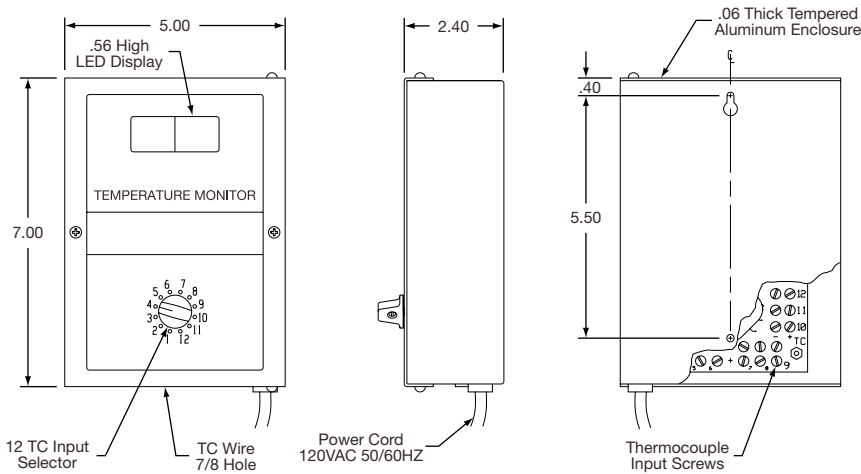
Specifications

Display Range:	–199 to 1999 °F or °C
Measuring Accuracy:	±½% of reading ±1°
Ambient Oper. Temp.:	–5° to 140°F (–21° to 60°C)
Relative Humidity:	90% max. no condensation
Cold Junction Offset:	1° max. for 32° to 110°F (0° to 43°C)
Display Updates:	3 times per second
LCD Height:	0.5" (12.7 mm) high
Construction:	High-density polyethylene case, aluminum panel with meter and miniature thermocouple jacks
Dimensions:	12" × 8" × 3"
Power Requirement:	9 Vdc (9V "transistor" alkaline battery)
Weight:	2.0 lb. (0.9 kg.)

DISPLAY RANGE

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

.06 Thick Tempered Aluminum Enclosure

5.00 — .56 High LED Display — TEMPERATURE MONITOR — 7.00 — 12 TC Input Selector — TC Wire 7/8 Hole — 2.40 — Power Cord 120VAC 50/60HZ — .40 — 5.50 — Thermocouple Input Screws

Design Features

✱ Thermocouple Calibrations Available are T, K, J, or E Linearized in Four Sections for Good Accuracy

✱ RTD Cold Junction Compensates Accurately for Ambient Temperature Changes as Fast as 2°/Min.

✱ ½" 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 Location Temperature Monitor

These thermocouple monitors were designed for industrial or commercial applications that require monitoring of 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.

DISPLAY RANGE

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

Specifications

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

Typical Applications

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

TEMPERATURE MONITORS			
Volts AC	Scale	Thermocouple	
		J	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.

How To Order

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.

Digital Multimeter — For Volts, Ohms, & Amps

Features:

* Heavy Duty design with large 0.95" easy to read 3½ digit display
* Full Overload Protection and Indication
* AC/DC Current measurements to 20A
* Low battery and polarity indication

* Transistor test, Diode Check and audible continuity <30 ohms.
* Wide frequency range-Autoranging 2kHz-20MHz
* Complete with heavy duty rubber protective holster with stand, strap, test leads and 9V battery.

Specifications	Range	Basic Accuracy
DC Voltage:	200mV, 2V, 20V, 200V, 1000V	200mV: 0.25% ±2d; others 0.6% ±4d
AC Voltage:	200mV, 2V, 20V, 200V, 750V	±1.2% ±3d
DC Current:	200µA, 2mA, 20mA, 200mA, 20A	±0.8% ±4d; 20A: 1.5% ±5d
AC Current:	2mA, 20mA 200mA, 20A	±1.5% ±5d; 20A: 2.0% ±5d
Resistance:	200, 2K, 20K, 200K, 2M, 20MΩ	±0.8% ±4d; 20M: 3% ±10d
Capacitance:	2nF, 20nF, 200nF, 2µF, 20µF	±3.0% ±3d
Frequency:	2KHz, 20KHz, 200KHz, 2MHz, 20MHz	±1.0% ±5d
Dimensions:	3.5" × 7.5" × 1.4" (88 × 191 × 36mm)	
Weight:	11 oz (312g)	

Part Number: EMV00010

1000A AC/DC Clamp Digital Multimeter

Capture current surges with Peak Hold plus measure temperature

Features:

* Wide range to 1000 Amps
* 100mA resolution
* Jaws open to 1.3"
* New hand guard design complies with IEC-1010-1 for operator safety
* Peak Hold and Data Hold
* Accepts any type K thermocouple for temperature measurements

Measure AC or DC current during motor or heater startup and recall highest point of surge using Peak Hold function. Dual Hall effect sensors provide DCA accuracy to 2% of full scale.

Full function Digital Multimeter also measures voltage, resistance, plus diode check. Large 3½ digit LCD display indicates Overload and Low Battery.

Complete with carrying case and test leads and standard type K bead wire thermocouple with the temperature option.

Specifications	Ranges	Resolution	Accuracy
AC/DC Current:	200A	0.1A	2% of full scale
AC Frequency 40-400Hz	1000A	1A	
Overload Protection:	1000A (within 1 minute)		
AC Voltage:	200V	0.1V	1% rdg+2 digits
	600V	1V	
DC Voltage:	200mV	0.1mV	0.8% rdg+1 digit
	200V	0.1V	
	600V	1V	
Overload Protection:	AC/DC 600V		
Resistance:	2000Ω	1Ω	1% rdg+2 digits
Temperature: °F	–40-1400°F	1°	1.2%FS+2°F
°C	–40-750°C	1°	
Peak Hold (accuracy):	Yes (3%)		
Peak Hold Decay Rate:	Less than 1 digit/sec		
Operating Temperature:	32-122°F (0-50°C)		
Dimensions:	9.1 × 2.8 × 1.4" (230 × 70 × 36 mm)		

Part Numbers: EMV00020 with °F temperature
EMV00030 with °C temperature
EMV00040 with NO temperature

Megohmmeter/Insulation Tester

1mA test current ensures 1000V/500V/250V rated

Features:

* *Three test ranges*
  200MΩ/1000VDC
  200MΩ/500VDC
  200MΩ/250VDC
* Power lock for 3-minute test
* Auto power off and Data Hold
* No voltage drop at low resistance

* Full function indication and Overload Protection
* Measures resistance to 200Ω and Volts to 750VAC
* *Complete* with 6 AA batteries, test leads and case with neck strap

Specifications

	Range
Insulation Voltage:	250/500/1000
Insulation resistance (accuracy):	200/2000MΩ (3% + 5 digits)
Output short circuit current:	≤ 2.5mA
Resistance (accuracy):	200Ω (1% rdg)
Overload Protection:	2200 V (<1 min)
Dimensions:	3.8" × 6.3" × 2.3" (97 × 160 × 58mm)

Part Number: EMM00010

⅛th DIN Digital Temperature Panel Displays

Features:

* Models for Type J, K, or T thermocouples and Pt 100Ω RTD
* 1999 count 0.56" LED display
* Switchable between °F or °C calibration
* ⅛ DIN case (cutout 1.77 × 3.66"; 45 × 92 mm), with screw terminals
* Analog Recorder output of 1mV per degree
* Bezel dimensions: 3.78 × 1.89 × 4.57" deep (96 × 48 × 116mm deep)
* Powered by 110/220VAC

Part Numbers:		
	EMT00010	Type J thermocouple input
	EMT00020	Type K thermocouple input
	EMT00030	Type T thermocouple input
	EMT00040	RTD (Pt 100Ω) input
	EMT00200	NEMA-4 Bezel Cover

Digital Multimeter Temperature Adapter

Plugs into any multimeter for direct temperature readings.

Type K adapter is *°F or °C switchable* with 1mV per 1° output. Use 200mV range of multimeter to obtain readings from –50 to 199.9°F or °C. Using multimeter's 2V scale will enable measurements to 1400°F/750°C. *Complete* with fast response bead wire probe.

Dimensions: 3 × 2 × 1" (76 × 51 × 25mm)

Part Number: EMT00050

2-Wire Miniature Universal Temperature/Process Transmitters

1.30" (33mm)

.300" (7.6mm)
.165" (4.2mm)

1 2 3 4 5 6

1.73" (44mm)

1.10" (28mm)

.71" (18mm)

User selectable for all thermocouple types, mV and Pt-100 RTD
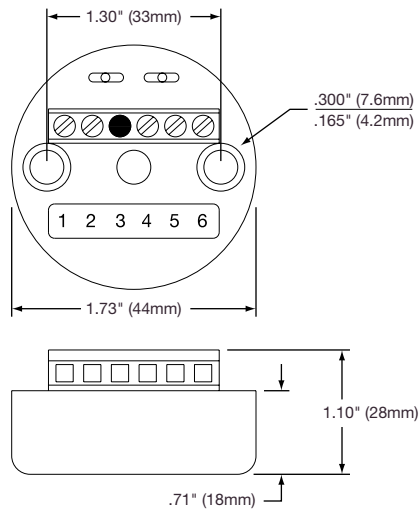
The **Tempco ETM Series** of 2-wire transmitters offers both isolated and non-isolated versions. They are designed to fit in a standard industrial thermal head.
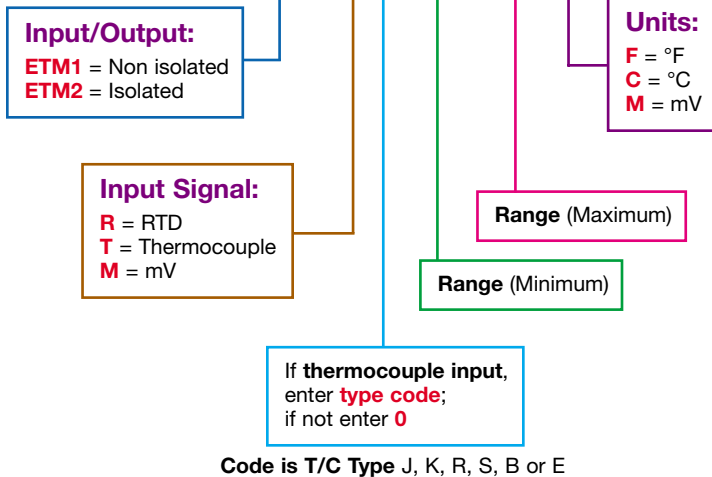
Features:

✳ Better measurement stability through improved circuitry and enhanced RFI-EMI rejection.

✳ Ease of maintenance through product standardization

✳ Field rangable

✳ Isolated version eliminates ground loop errors

✳ Universal input capabilities reduce the required inventory levels needed.

The **ETM Transmitter** is constructed of an upper and lower section. The lower section contains the isolation and output circuitry, while the upper half contains the "personality" components that define the input sensor type and the measure range. The two halves snap into each other for a perfect fit, yet enable disassembly for the purpose of input and range changes.

Specifications	model ETM100___ non-isolated	model ETM200___ isolated
Isolation:	N/A	500 Vdc or peak AC
Output Span:	4-20 mA, limiting at <28mA	
Input-RTD:	Pt-100, 2- or 3-wire	
-TC:	all known types	
Input Span-RTD:	20°C min. 500°C max.	
-TC:	10mV min.	5mV min.
Burnout Protection:	Upscale standard	
Adjustability:	±25% for both zero and span	
Supply Voltage:	8-38 Vdc	10-40 Vdc
	Polarity Protected	
Maximum Load = :	(Vsupply-8V)÷20mA	(Vsupply-10V)÷20mA
Ambient Temp:	−20°C to +70°C	
Humidity:	0-95% RH, Non condensing	
Linearity-RTD:	±0.05% of span	±0.1% of span
-TC/mV:	±0.03% of span	±0.1% of span
Stability-RTD:	0.03% of span/°C	0.02% of span/°C
-TC/mV:	0.04% of span/°C	0.02% of span/°C
Tc CJ Compensation:	0.05°C/°C of ambient temperature	

E T M

Input/Output:
ETM1 = Non isolated
ETM2 = Isolated

Input Signal:
R = RTD
T = Thermocouple
M = mV

If **thermocouple input**, enter **type code**; if not enter **0**

Code is T/C Type J, K, R, S, B or E

Range (Minimum)

Range (Maximum)

Units:
F = °F
C = °C
M = mV

How To Order

Transmitters 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.

2-Wire Rail Mount Universal Temperature/Process Transmitters

General Specifications

Output:	4-20 mA limiting at <28mA
I/O Isolation:	If specified: 1000VDC or peak AC min.
Power Supply:	12-50 VDC reverse polarity protected
Linearity:	±0.05% of span (for linear input)
Calibration:	±0.1% of span or better (for linear input)
Output ripple (to 1kHz):	<0.02% of span
C.M.R.R.:	>120db DC to 60Hz
Zero Span Adjustability:	±20% of span minimum
Operating Temperature:	−10°C to 70°C
Humidity:	0 to 95% RH, non-condensing
Mounting:	DIN rail 35mm or panel
Dimensions:	22.5mm (W) × 79mm (H) × 83mm (D)

Component Specifications

RTD Transmitter

Range: Δ Max. 800°C; Δ Min. 10°C
Sensor Excitation: 1 mA constant current
Linearity: Better than ±0.05% of span
Input Span: Minimum,10°C; Maximum, 800°C

Thermocouple Transmitter

Types: E, J, K, R, S, T, B, N, W3, W5
Input Span: Minimum: 5 mV
Input Impedance: 10 Megohms
Linearity: Better than ±0.05% of span

DC/Volt Transmitter

Range: Min. 2 mV, Max. 300V
Protection: 20X rated input, 300VDC max
Input Span: Min.-2mV; Max.-300 V
Linearity: > ±0.05% for linear input

DC/mA Transmitter

Range: Min. 10 μA; Max. 100 mA
Protection: 20X rated input, 250 mA max
Input Span: Min. 10 μA; Max. 100 mA
Linearity: > ±0.05% for linear input

Potentiometer Transmitter

Range: Min. 100Ω; Max. 20 KΩ
Sensor Excitation: 50mV constant voltage (nominal)
Input Span: 10% of potentiometer, minimum
Linearity: > ±0.05% for linear input

How To Order

Transmitters 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.

Features:

✳ Universal Inputs
✳ High Accuracy
✳ High Density design
✳ Reduced Inventory
✳ Low Cost

The **ETR Series** is the world's first 4-20 mA analog transmitter to offer a combination of selectable input and multiranging capabilities in a single DIN rail mounted instrumentation package.
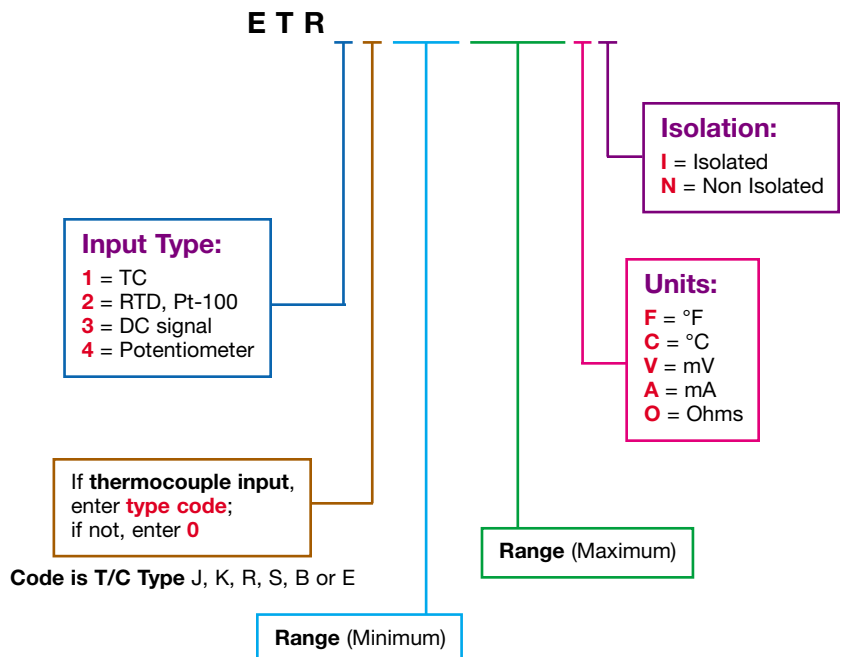
Input sensor type is selectable via DIP switch configuration and offers the choice of most common sensors used in the industrial environment. Ranging is equally easy and can be done in a matter of minutes.

Only one instrument is used for all types and ranges of thermocouples, RTD's, Potentiometric and DC inputs.

The **ETR Series** is housed in a slim line High Density package for a minimum of panel space and highest cost efficiency.

E T R

Input Type:
1 = TC
2 = RTD, Pt-100
3 = DC signal
4 = Potentiometer

If **thermocouple input**, enter **type code**; if not, enter **0**
Code is T/C Type J, K, R, S, B or E

Isolation:
I = Isolated
N = Non Isolated

Units:
F = °F
C = °C
V = mV
A = mA
O = Ohms

Range (Maximum)

Range (Minimum)

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 red LED will illuminate to indicate the presence of current.
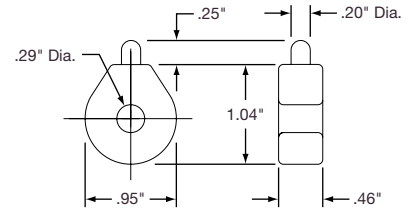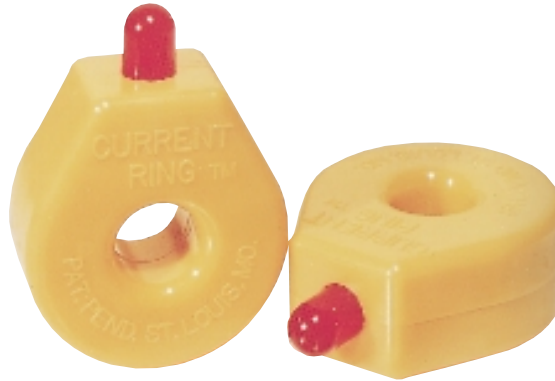
Red LED Indicator

Part Number: CTT00001

A green LED model is available; consult Tempco for ordering information.

Mounting Bracket for Current Ring

Part Number: CTT00003

Wire Passes	Turn-On Point (Amps)	Max. Wire Dia. (in.)
1	2	.29
2	1	.14
3	.667	.13
N	2 ÷ N	

Features

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

Applications

• Monitor Heater Element Status
• Observe Remote Loads

.25"   .20" Dia.
.29" Dia.
1.04"
.95"   .46"

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.
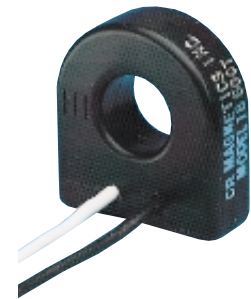
Applications

• Indicate Open Heater Elements
• Observe Remote Loads
• Indicate Phase Loss
• Monitor Motor Operation
• Requires LED Panel Indicator

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

Part Number: CTT00004

Max. Wire Dia.: .55 inches
Indicating Range: 2.5 to 100 A
Max. Transient Current: 150 A for 5 sec.
Working Class: 600 Volts, 50-60 Hz
Lead Wire Length: 24"
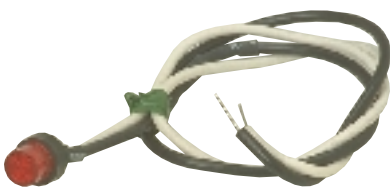
Part Number: CTT00005

Surface Mounting Bracket
For use on model CTT00005 only
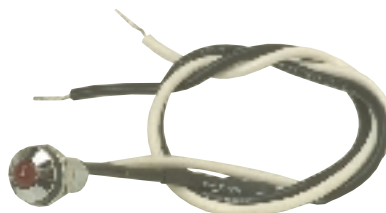Dimensions: $1\frac{3}{8}$" × $1\frac{1}{4}$"
Mounting Dims.: (2) #6 screws $\frac{7}{8}$" apart

Part Number: CTT00006

Panel Indicators for Remote Current Transformers

Press-In Panel LED Indicator

Splash-Proof Panel LED Indicator

Panel LED Indicators

Press-In LED Panel Indicator
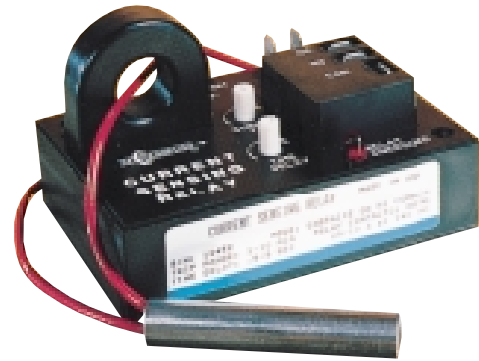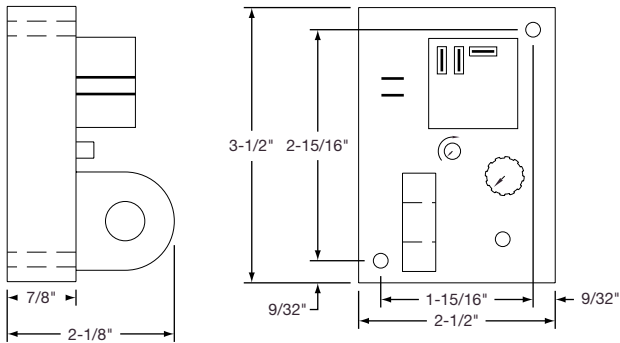
LED Type: T-1-$\frac{3}{4}$, Red Bi-Polar
Part Number: CTL00001

Splash-Proof LED Indicator

Supplied with rubber sealing washer
LED Type: T-1 $\frac{3}{4}$, Red Bi-Polar
Part Number: CTL00002

Current Sensing Relay

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.

Specifications

Mounting: 2—$\frac{3}{16}$" dia. clearance holes on 1$\frac{15}{16}$" by 2$\frac{15}{16}$" 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 VAC
Input Terminals: 2—$\frac{1}{4}$" 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—$\frac{1}{4}$" Male Quick Connect

RELAY CONTACT RATINGS

Voltage	Load Type	N.O. Contact	N.C. Contact
240 VAC	Resistive	20 A	10 A
240 VAC	Motor	2 HP	½ HP
125 VAC	Motor	1 HP	¼ HP
28 VDC	Resistive	20 A	10 A

Features

✳ Variable Trip Point and Time Delay
✳ Monitors Currents from 10 mA to 60 AC Amps
✳ Output Relay Rated Up to 20 Amps
✳ LED Relay Status Indicator
✳ Dead Band Prevents Relay Chatter
✳ Calibrated Dial

Applications

• Monitor Electrical Heater Elements
• Sense Motor Over/Under Loads
• Detect Lamp Burn-Out
• Indicate Phase Loss

Relay Trip Status

1 = Relay Energized on High Current (above trip point)
2 = Relay Energized on Low Current (below trip point)

C T R

Options

L = Latching
E = Extended Freq. Range
N = None

Trip Ranges

1 = 1.0 to 10 AC Amps
2 = 3.0 to 30 AC Amps
3 = 6.0 to 60 AC Amps
4 = .01 to 0.1 AC Amps
5 = 0.1 to 1.0 AC Amps

Trip Point Dial

CD = Calibrated Dial
= Fixed Setpoint (specify required value)

Time-On Delay

A = .5 to 6 Sec.
B = 2 to 25 Sec.

How To Order

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.

Compact Flatbed Temperature Chart Recorder

Tempco's **SE** recorder saves space without giving up functionality by providing a full range of inputs in a small "footprint". It operates on line voltage, external 12 Vdc, as well as standard and rechargeable internal "C" size batteries. When used with rechargeable batteries, it automatically documents the recorder settings directly on the chart, insuring data is always accurately interpreted.

An integrated 3½ digit LCD displays the sensed temperature in real time. Standard features include immediate electronic over-range protection to protect the servo system in over-range situations. The servo system is also enclosed to prevent dust and debris from impairing operation. Superimposed event marking, electric pen lift, as well as a detachable dust cover are also standard.

Unique input terminals provide both wire clamp and banana jack connections, allowing all types of leads to be accommodated. The completely remote-controllable, quartz-clocked chart drive system allows users to control chart run/stop, forward/reverse, and speed as well as the electric pen lift remotely via external switch closures or TTL level signals. The **SE** is delivered complete with a roll of standard chart paper and one disposable recording pen.

Specifications

Recording Width: 100 mm

Min/Max Display Ranges:
   Type J: -100.0 to +1100°C
   Type K: -100.0 to +1200°C
   Type T: -100.0 to +400°C
   Pt 100 Rtd: -100.0 to +850°C

Accuracy: 1.5% FS or 1.5°C (T/C Input)
                      1% FS or 1°C (RTD Input)

Response Time: 1.5 seconds

Zero Suppression: -100, 0, 100, 200, 300, 400, 500°C

Measuring Ranges (Span): 50, 100, 200, 500, 1000°C

Operating Ambient Temp.: 0 to 50°C

Power Supply: 120 Vac (through external transformer), 50/60 Hz; 12 Vdc; Internal C-size (9 each) Ni/Cad Batteries

Dimensions: 3"H × 12"W × 9.1"D (76 × 305 × 231 mm)

Weight: 4.9 lbs. (2.22 kg)

How To Order
Choose the Part Number of the unit and/or accessories that best fit your application needs.

Features

✳ Accepts Types J, K, and T Thermocouples; and RTDs (Pt 100)
✳ 50, 100, 200, 500, 1000°C Measuring Ranges
✳ Built-In 3½" Digital LCD Display
✳ Internal Cold Junction Temperature Switchable On/Off
✳ Variety of Power Sources Available: Internal Standard or Ni/Cad Batteries, Battery Backed-Up Line Supply, External 12 Vdc, Line Voltage
✳ Measuring Parameters Plotting
✳ Transparent, Hinged, Detachable Dust-Cover
✳ Simple Frontloading System

CHART RECORDER	
Description	**Part Number**
Flatbed Temperature Recorder	RCR30010

ACCESSORIES	
Description	**Part Number**
Carrying Case	RCA30001
Roll Paper 100 mm × 16 m	
0 to 100 Scale…	RCA30002
0 to 30 Scale…	RCA30003
(3) Disposable Felt-Tip Pens	RCA30004
(9) C-cell Ni/Cad Batteries	RCA30005

Chart Recorder

K-Thermocouple Remote Sensing Temperature Recorder

The **KTx Series** was developed to provide the ultimate in versatility and accuracy. All **KTx** Series models accept any type K thermocouple probe with a miniconnector plug, so it serves as many recorders in one. If your workplace requires that you document temperatures for a variety of precision applications, **KTx** Series is the one remote recorder that will do all the jobs.

Remote sensing is ideal for extreme environments like freezers, kilns, ovens, and chambers. Super accurate with 4 Fahrenheit, 3 Celsius ranges and 3 recording time options.

You set all the recording parameters, using keypad and dip switches, so you can change parameters easily for use in multiple applications.

Features

✶ Keyhole Slots for Wall Mounting
✶ Large Digital Display
✶ Locking Keypad: On/Off, Alarm Set, Min/Max
✶ Batteries for Back-Up Power
✶ Snap-On Feet for Added Stability
✶ K-Thermocouple Bead Wire Probe Included
✶ Locking Door

Common Applications

Manufacturing: Food Processing, Oven & Chamber temperature monitoring, process control

Quality Control: Laboratories, Test Conditions monitoring, Verify adherence to standards and regulations

Storage: Critical storage, Food storage, Refrigerator/Freezer monitoring and maintenance

Specifications

Ranges:
High Range Recorder: 0 to +250°F/°C, 0 to +500°F/°C, 0 to +1000°F/°C, 0 to +2000°F

Med. Range Recorder: 0 to +100°F/°C, -50 to +50°F/°C, 0 to +250°F/°C, 0 to +500°F

Low Range Recorder: 0 to -100°F/°C, 0 to -150°F/°C, +20 to -120°F/°C, +150 to -250°F

Temperature Accuracy: ±0.3% of reading ±1.0°C (±1.8°F)

Average Response Time: 10 seconds for 60% step change; depending on sensor thermocouple

Alarms: Audio/Visual high and low alarms

Recording Times: 24-hour, 7-day, and 31-day

Power: 120V AC adapter with 4 "D" batteries for power back-up

Dimensions: 10.5" × 13.2" × 2.8" thick

Chart Size: 8" diameter

RECORDERS — *3 Models to Choose From*	
Description	**Part Number**
KTx High Range 0 to 2000°F with 6" Stainless Steel Probe (2100°F Max)	RCR20010
KTx Medium Range –50 to 500°F with Bead Wire Probe (500°F Max)	RCR20020
KTx Low Range -250 to 150°F with Bead Wire Probe (500°F Max)	RCR20030

Included with every recorder are the following: probe, batteries, AC adapter, one red pen, 1-point NIST traceable calibration, and one box of charts: High Range (0 to +1000°F/°C 7-day), Medium Range (0 to +100°F/°C 7-day), and Low Range (0 to –100°F/°C 7-day).

CHARTS (60 per box)				
		Part Number		
	Temp. Range	**24-Hr**	**7-Day**	**31-Day**
High Range	0 to +250°F/°C	RCA20001	RCA20002	RCA20003
	0 to +500°F	RCA20004	RCA20005	RCA20006
	0 to +1000°F/°C	RCA20007	RCA20008	n/a
	0 to +2000°F/°C	RCA20009	RCA20010	n/a
Medium Range	-50 to +50°F/°C	RCA20011	RCA20012	RCA20013
	0 to +100°F/°C	RCA20014	RCA20015	RCA20016
	0 to +250°F/°C	RCA20001	RCA20002	RCA20003
	0 to +500°F	RCA20004	RCA20005	RCA20006
Low Range	0 to -100°F/°C	RCA20014	RCA20015	RCA20016
	0 to -150°F/°C	RCA20017	RCA20018	n/a
	+20 to -120°F/°C	RCA20019	RCA20020	RCA20021
	+150 to -250°F	RCA20022	RCA20023	n/a

ACCESSORIES	
Description	**Part Number**
(6) Red Replacement Pens	RCA20101
Stainless Steel Basic Probe (316SS)	RCA20102
Replacement Type "K" Bead Probe	RCA20103
NIST Traceable Calibration 3-Pt.	RCA20104

Features

✶ 100 mm Strip Chart
✶ One, Two, or Three Pen Continuous Trace
✶ 40 Character Vacuum Fluorescent Display
✶ Thermocouple, RTD, mV, and V Input
✶ Digital Accuracy 0.1% of Span
✶ EEPROM Memory Ensures Total Security
✶ Chart Annotation Option for Logging, Scaling and Text Printing

Powerful Yet Simple Interface

Application specific programming can be done via the integral keyboard. Menu driven selections provide prompts instructing the user on the alpha-numeric display with six front panel keys to completely configure the recorder. The alpha-numeric display is a 40-character vacuum fluorescent display that displays real time information or programming menus.

Channel information can be displayed two ways: Individually, with value, channel number, units, tag name, and alarm information; or three channels displayed simultaneously with value and units. Long life, plug-in ink markers, three available print modes, and a selection of chart sizes and speeds allow a great selection in the variety of output available to be charted.

Never Lose Important Information Again

Information is backed up by EEPROM and RAM microchips with battery back-up. Thus a power failure does not require a total reprogram of the recorder.

The **Tempco 345** chart recorder also has fully isolated universal input channels capable of accepting RTDs, TCs, current, dc volts, and millivolt sources.

Adaptable to Whatever Needs You Have

Universal inputs make data sampling simple. Data can be measured using thermocouples, RTDs, or a simple millivolt or volt signal can be used. The operating voltage of the unit is factory preset to 115 volts; however, the unit is internally switch selectable for 230 volts. Chart speed is also flexible, capable of ranging from 1 mm every hour to 1 cm every second. This is programmed via the integral keyboard and thus is easily changed from application to application.

There are also many customizing options available. The annotating option mentioned above allows the recording of data directly on the chart while it is graphing. An event input option is offered that allows an external event to activate a function of the recorder. There is also a relay output, option which is activated by an internal trigger or an external event input. Even a locking glass door is offered as an option.

Chart Recording Made Easy

Tempco's **Series 345** 100 mm chart recorder is a rugged unit designed to perform in most difficult industrial environments. A durable metal chassis construction insures trouble-free reliability and quality construction.

Designed for ease of use, the **Series 345** chart recorder comes with front mounted operator controls. These controls allow access to many of the operations that these recorders can do—from setting alarms to chart speed selection to printing mode.

With the annotation option, readings are easily and clearly marked for easy analysis later. This option records the date, the time, the minimum and maximum measured values, and chart speed—just to name a few.
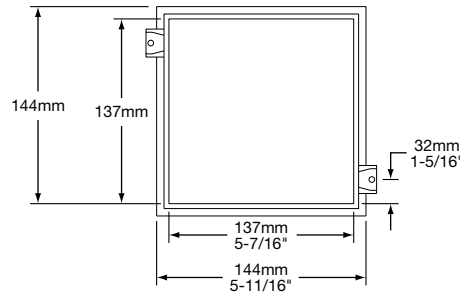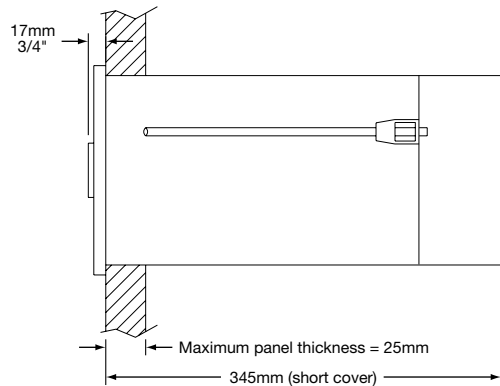
Chart Recorder

Standard Features for 345 Models

✳ 115 Volt ac (Internally switchable to 230 V)

✳ Universal Programmable Inputs (TC, RTD, mV, and V)

✳ Glass Door

✳ 16 Meter Z-Fold Paper Chart and Appropriate Pens

17mm 3/4"

Maximum panel thickness = 25mm

345mm (short cover)

144mm · 137mm

32mm 1-5/16"

137mm 5-7/16"

144mm 5-11/16"

Specifications

Number of Inputs: 1, 2, or 3

Input Type: Universal (TC, RTD, mV, V)

Operating Voltage: 115 Vac (switch selectable for 230V)

Chart Size: 100 mm

Chart Length: 16 meter Z-fold

Environmental: 0-50°C (32-122°F); 0-90% RH

Case Panel Space: 144 × 144 mm

Cutout: 138 × 138 mm

Depth: 345 mm

Weight: 7 Kg (15.4 lb)

Accuracy: 0.1% of span ±5 µV

Scan Speed: 250 ms

Full scale response: <0.5 sec.

Noise Rejection:
   Common Mode: 120 dB
   Normal Mode: 60 dB NMR

Input Impedance: >20 MΩ

Channel Isolation: 500V

Writing System: Blue, red, and green disposable pen (1 Mile of line each pen)

Chart Speeds: 1 mm/Hr up to 36,000 mm/hr

Configuration Method: Integral keyboard

Options

EVENT INPUTS

This allows an external event to have boolean (on or off) control over the activation of certain features on the chart recorder. Which feature(s), and how it is triggered is all programmable via the integral keyboard.

RELAY OUTPUT

These relays operate in response to any internal trigger or external event input, (2) Single Pole, Double Throw relays on a circuit board.

ANNOTATION OPTION (Clock and Pen)

This option supplies an additional pen and a clock to record vital information on the chart while it is being recorded. Examples of the information recorded by the annotation option are the date, time, minimum value, maximum value, and chart speed, etc.

LOCKING GLASS DOOR

How To Order

Series 345 Chart Recorders are offered with the options listed in the worksheet below. 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.

	1	2	3	4	5
R C R 1	☐	☐	☐	☐	☐

Number of Pens *BOX 1*
1 = 1 Pen
2 = 2 Pens
3 = 3 Pens

Relay Output *BOX 2*
N = No
Y = Yes

Event Input *BOX 3*
N = No
Y = Yes

Annotation Option *BOX 4*
N = No
Y = Yes

Glass Door with Lock *BOX 5*
N = No
Y = Yes

ACCESSORIES	
Description	**Part Number**
16 m Z-fold Paper	RCA10101
Replacement Pens	
Blue	RCA10102
Red	RCA10103
Green	RCA10104
Annotation	RCA10105

Linear Temperature Device

Temperature Probes for PLCs and Process Controls

Tempco's **Linear Temperature Device** combines the functions of temperature sensing, signal conditioning, transmission, and linearization in a single rugged package.

Inside the 316 stainless steel probe are highly miniaturized electronics and a proprietary laser trimmed silicon temperature sensor.

The output signal is permanently calibrated to produce 10mV per degree. Therefore, a temperature of 225°F produces a direct reading signal of 2.25 VDC.

CHARACTERISTICS

Isolation
• Minimizes ground loop problems

Voltage Protection
• Excitation reversal protection
• Over voltage protection

Bibolar Operation
• Automatically switches polarity from + to - when below 0°F or C

Sensor
• Solid state technology
• Individually laser trimmed for accuracy

Probe
• High heat transfer
• Various configurations

Linearization
• 10mV/Degree

Construction
• NEMA 6P sealed crimp
• Instrument grade 316 stainless steel

Signal Conditioning
• Cold end compensated, no external requirements
• Signal trimmed 0.00VDC for 0°F or C

Noise Filter
• Wide excitation voltage

Long Distance
• Over $\frac{1}{2}$ mile transmission
• Differential line, so line loss is eliminated
• Shielded multi-conductor cable

WIRING CONNECTIONS

The **Tempco LTD Series** temperature sensor is a 4-wire plus shield type device. The excitation voltage is 5-30 VDC. This range accommodates the common voltages found in most process control systems.
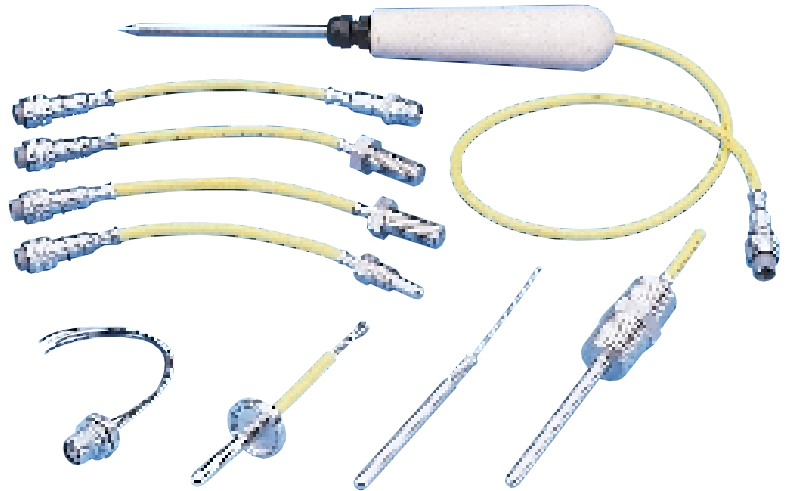
Black Wire: + pos. signal

Brown wire: + pos. power input

White Wire: – neg. signal

Blue wire: – neg. power input

Or use the micro connector. It is a push connector with locking ring for reliable connections. It offers convenience for maintenance, a NEMA 6P seal, and passes the shield through the connector.

Specifications

Minimum Probe Size: $\frac{1}{4}$" dia. x $1\frac{5}{8}$" length
Operating Range: -60°F to +300°F (-51°C to +150°C)
Storage Temperature: -76°F to +356°F (-60°C to +180°C)
Isolation: 600 VDC (VAC RMS)
Supply Voltage: 5 to 30 VDC Unregulated
Output Signal: -0.60 to +3.00 VDC (10mV/Degree)
Max. Output Current: 10mA
Max. Cable Length: Over $\frac{1}{2}$ mile
Ratings: NEMA 6P (submersible in water)
Accuracy: Typical ±0.2°F, Max. ±0.5°F at 77°F
Non-linearity: Min. ±0.0°F, Typ. ±0.3°F, Max. ±0.6°F
Sheath: 316 SS

How To Order

The LTD Temperature Sensor can be manufactured in a wide variety of configurations. **Please Specify** your requirements and a part number will be assigned when the order is placed.

Style
Straight Wand
$\frac{1}{8}$" through $\frac{1}{2}$" NPT Fitting Probe
$\frac{1}{8}$" through $\frac{1}{2}$" NPT High Pressure Probe
$\frac{1}{8}$" through $\frac{1}{2}$" NPT Hex Nipple Probe
$\frac{1}{8}$" through $\frac{1}{2}$" NPT Hex Nipple High Pressure Probe
$\frac{5}{16}$" through $\frac{1}{2}$" SAE Bolt Probe
1" through 4" Sanitary Flange Probe

Termination Stripped and tinned conductors or micro connector with mating connector

Probe Length $\frac{1}{4}$" nib, $\frac{5}{8}$", 1", $1\frac{5}{8}$", 2", 3", 6", 9", 12", 48"

Tip Style No Tip, Round, Flat, Point, Lug

Range 230°F, 110°C, 300°F, 150°C