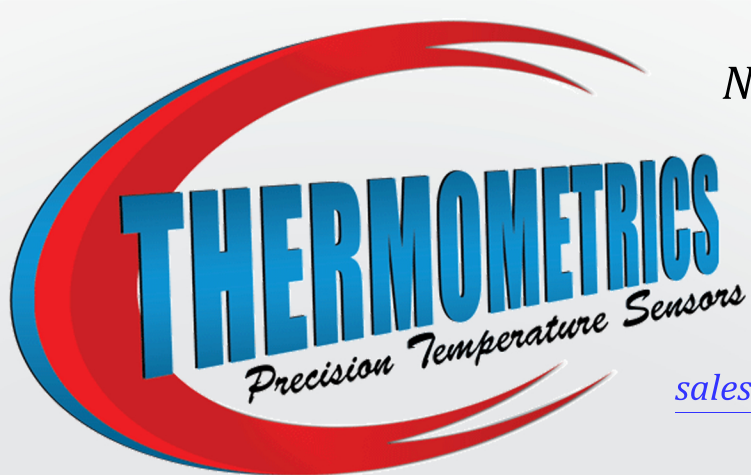
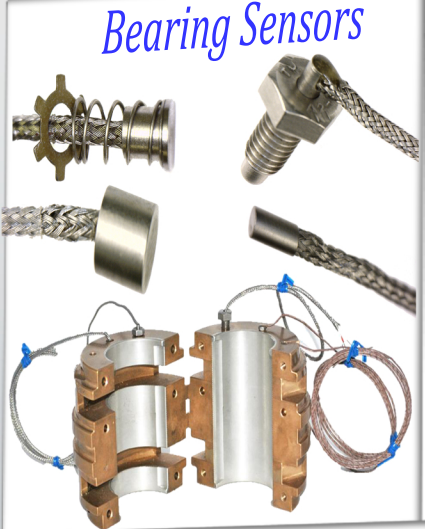
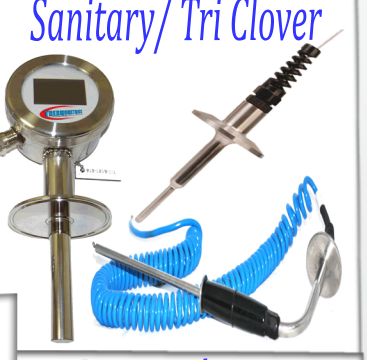


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sales@thermometricscorp.com



"Quality You Can Sense"

www.thermometricscorp.com - www.pharmaceuticalsensors.com - www.bearingsensor.com - www.temperaturedevices.com - www.thermocouplertd.com



Thermometrics Corporation has been a manufacturer of Thermocouples, RTD's and related accessories since 1965. Our company staff includes over 220 years of collective experience and is eager to meet any of our customer's challenges or requests. We are committed to providing outstanding service, competitive pricing and excellent lead times. We are quality audited to ISO-9001-2008 and have an excellent reputation both domestically and globally.

PRODUCTS AND SERVICES AVAILABLE

Thermocouple and RTD Sensors
 Bearing Sensors
 Tube Skin Thermocouples
 Feed Thru's
 Thermocouple Wire & Cable
 RTD Leadwire
 Waterproof Connectors

Replacement Elements
 Thermistor Probes Multipoint Thermocouple
 and RTD Probes
 Bimetal Dial Thermometers
 Precision Wire Wound Resistors
 Thermowells and Protection Tubes
 Custom Mounting Fittings

*Calibration Services Include: Thermocouples, RTDs, Temperature Transmitters, Controllers and Indicators

INDUSTRIES SERVED

Oil, Gas & Petrochemical
 Pharmaceutical
 Paper & Pulp
 Mining
 Utilities
 Marine

Waste Water
 Compost
 Military
 Dairy
 Power Generation
 Refrigeration



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**Transition Assemblies*

**Sanitary Assemblies*

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**Fitting Assemblies*

**Head Assemblies*

Thermocouple Table

RTD Table

Sensor Attributes

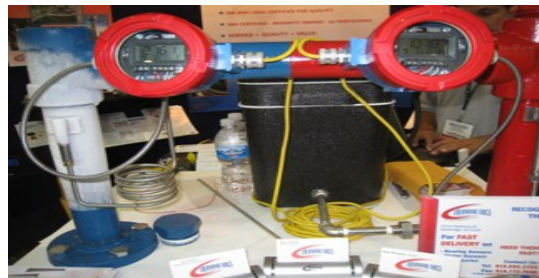
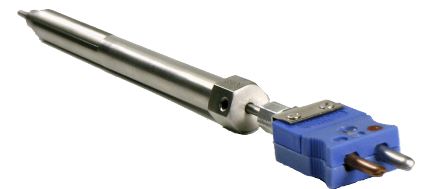
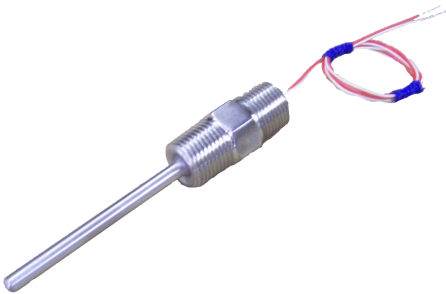
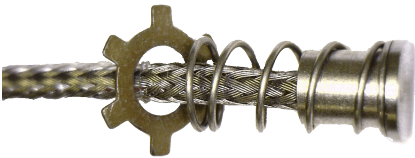
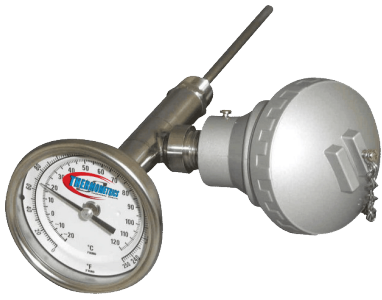
Bearing Sensor TC & RTDs

Thermocouples

RTD's

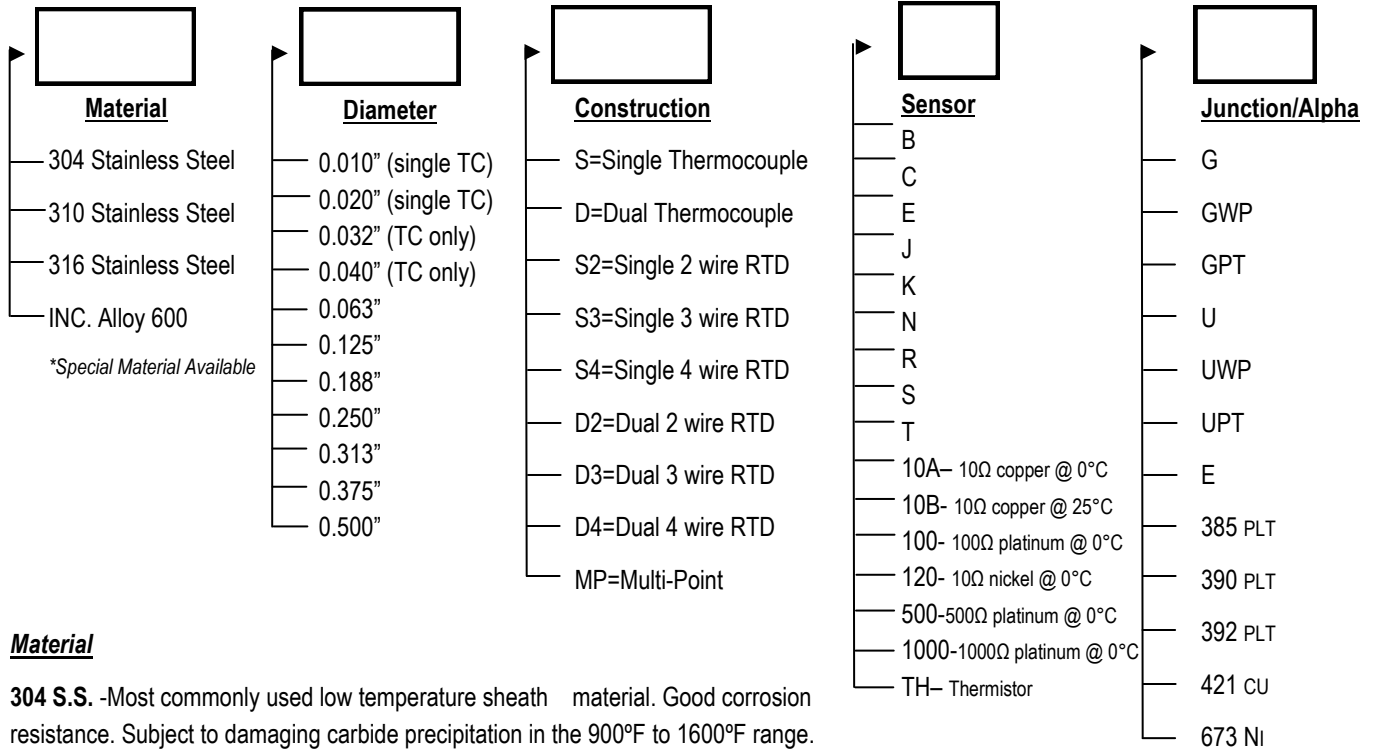
Wireless

Calibration Services





Assemblies offer a wide variety of configurations and termination styles to meet various applications.



Material

304 S.S. -Most commonly used low temperature sheath material. Good corrosion resistance. Subject to damaging carbide precipitation in the 900°F to 1600°F range. Max Temp. 1650°F

310 S.S. Mechanical and corrosion resistance similar to but better than 304 S.S. Very good heat resistance. This alloy contains 25% Cr, 20% Ni. Not as ductile as 304 S.S. Max Temp 2100°F

316 S.S.- Best corrosion resistance of the austenitic stainless steel grades. Good corrosion resistance in Hydrogen Sulfide. Subject to damaging carbide precipitation in the 900°F to 1600°F range. Max Temp. 1650°F

Other Available Materials

- | | |
|----------|-----------------|
| 316L | ALUMINUM |
| 347 | TANTALUM |
| 446 | MONEL 400 |
| INC-625 | MOLYBDENUM |
| COPPER | HASTELLOY B-2 |
| TITANIUM | HASTELLOY C-276 |

Junction

G – Grounded



Grounded Junction– The sheath and conductors are welded together forming a sealed integral junction. Recommended in Liquids, Gas, Moisture, or High Pressure. Response time approaches that of an exposed junction.

U – Ungrounded



Ungrounded Junction– Junction is fully insulated from welded sheath end. Electrically isolates junction from outer sheath. Response time is slightly longer than grounded junction.

E – Exposed



Exposed Junction– Thermocouple conductors are butt welded. Insulation is sealed for moisture protection. This design provides the fastest response time but leaves the junction unprotected from corrosive or mechanical damage.

PT - Pointed Tip

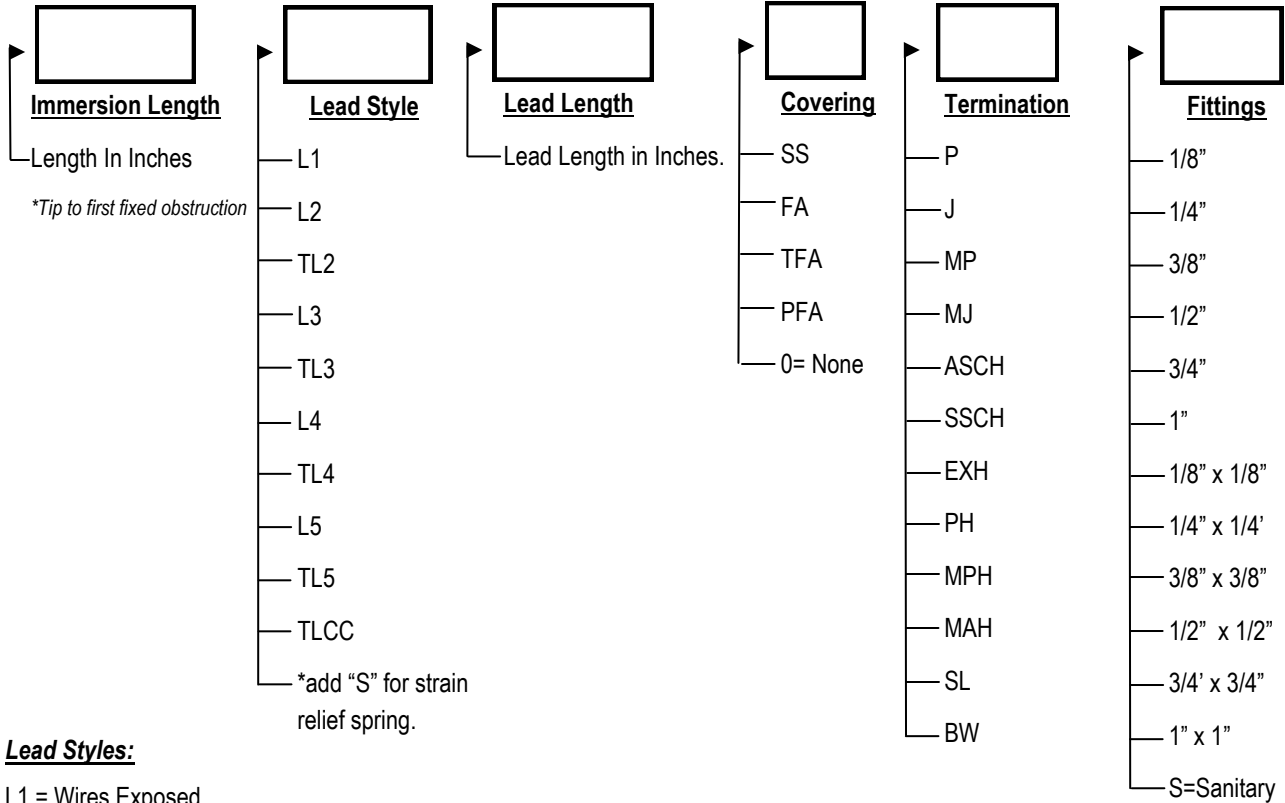
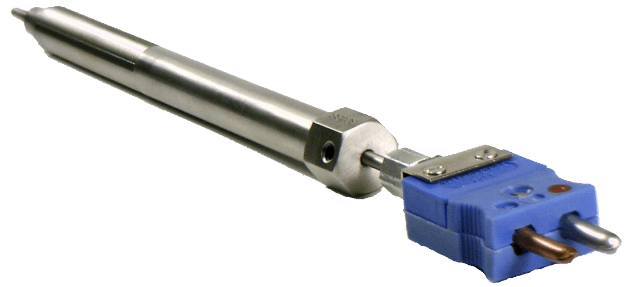
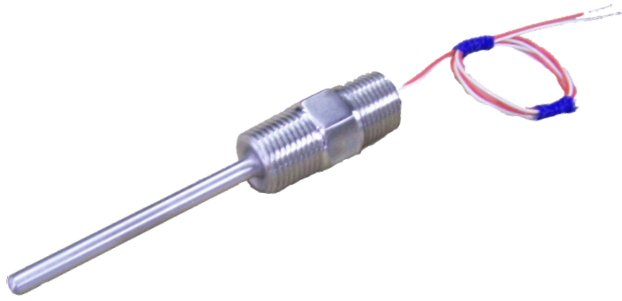


Pointed tip– Is available for piercing probe applications.

WP - Welded Pad



Weld Pad- 300 series stainless steel 1" x 1" x 1/8" is available in grounded (GWP) and ungrounded (UWP) configurations. Weld pad can be parallel, perpendicular or curved per your specification.



Lead Styles:

- L1 = Wires Exposed
- L2 = PVC Insulated Lead Wire. Rated 105°C, Epoxy Potted
- L3 = Teflon Insulated Lead Wire. Rated 204°C, Epoxy Potted
- L4 = Fiberglass Insulated Lead Wire. Rated 204°C, Epoxy Potted
- L5 = Fiberglass Insulated Lead Wire. Rated 510°C, Ceramic Cement

**For transition housing, add "T" to the order code. Ex. "TL2".*

**For spring strain relief spring, ass "S" to the order code. Ex. "TL2S".*

Coverings:

- SS=Stainless Steel Overbraid
- TCTU=Tinned Copper Overbraid
- FA*=Stainless Steel Flex Armor
- TFA*=Teflon Coated Stainless Steel Flex Armor
- PFA*=PVC Coated Stainless Steel Flex Armor
- 0=None

**Add length to armor code.*

Example; "PFA24"

Terminations

- P=Male Plug * (MP = Mini Plug)
- J=Female Jack* (MJ = Mini Jack)
- ASCH=Aluminum Screw Cover Head
- SCH=Stainless Steel Screw Cover Head
- PH=Plastic Screw Cover Head
- MPH=Mini Plastic Screw Cover Head
- MAH=Mini Aluminum Screw Cover Head
- EXH=Explosion Proof Head (USL, CSA)
- HCH=Hinged Cover Head
- HPH=High Profile Hinged Cover Head
- SL=Spade Lugs (# 10 Screw Size)
- BW=Bare Wire

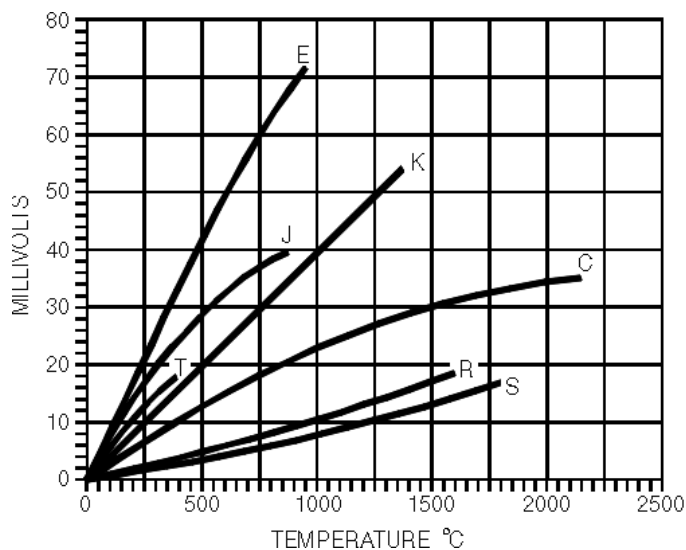
***Thermocouples**- Thermocouples consist of two electrical conductors made of different metals that are joined at one end. Changes in temperature at the measurement junction induce a change in electromotive force (emf) between the other ends. There are two groups, the base metal thermocouples J, K, T, E and N and the precious metal thermocouples R, S, C and B. Each type has a characteristic (emf) vs. temperature curve and application range. The EMF curve is very dependent on the composition of each conductor. Type J and K are the most widely used in industrial applications. Type J (iron vs. copper-nickel (Constantan)) is versatile in that it can be used in both oxidizing and reducing atmospheres up to 1,400°F. Iron rusts at low temperatures where condensation can form. Type K (nickel-chromium (Chromel) vs. nickel aluminum (Alumel)) can be used up to 2,300°F in an oxidizing or inert atmosphere.





Thermocouple Specifications	1
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The primary factor in selecting a thermocouple for a given application is the temperature range it will be exposed to, the graph below offers a quick reference for this purpose. Other important factors to consider are the expected lifespan of the element and the process conditions present during operation. Listed below, in order of increasing maximum temperature limits, are the most commonly used thermocouple calibrations.



ISA Calibration, Element Composition, Recommended Temperature Range, Application Information:

Type T, Copper (+) Constantan (-), -184 to 371°C, Suitable in oxidizing, reducing, or inert atmospheres as well as vacuum. Moisture resistant and very stable. This type is best suited for low temperature service.

Type J, Iron (+) Constantan (-), 0 to 760°C, Suitable for vacuum, reducing, or inert atmospheres, oxidizing atmospheres with reduced life. As Iron oxidizes rapidly above 538°C, use only heavy gauge wire for high temperatures. Avoid exposing bare wires to sulphurous environments.

Type E, Chromel (+) Constantan (-), 0 to 871°C, Recommended for continuous oxidizing or inert atmospheres. Produces the highest EMF (mV) per degree of all common calibrations.

Type K, Chromel (+) Alumel (-), 0 to 1260°C, Recommended for continuous oxidizing or inert atmospheres. Most common for temperatures above 538°C. Not suitable for sulfur environments. Low oxygen levels can produce “green rot”, particularly in the 816 - 1038°C range. Use of purge system, inert seal or Type N is recommended for this condition.

Type N, Nicrosil (+) Nisil (-), 0 to 1260°C, Suitable replacement for Type K where oxidization and “green rot” are a concern.

Type R, Platinum 13% Rhodium (+) Platinum (-), 538 to 1482°C, Recommended for high temperature applications. Must be protected with non-metallic protection tube. Continued high temperature use can lead to mechanical failure. Most common in industrial applications.

Type S, Platinum 10% Rhodium (+) Platinum (-), 538 to 1482°C, Same as Type R with most common applications in laboratories.

Type B, Platinum 30% Rhodium (+) Platinum (-), 871 to 1705°C, Same as R & S with lower EMF but greater resistance to mechanical failure.



Non ANSI Coded Thermocouples:

Type WR, Tungsten (+) Tungsten 26% Rhenium (-), 0 to 2315°C

Type W3, Tungsten 3% Rhenium (+) Tungsten 26% Rhenium (-), 0 to 2315°C

Type W5, Tungsten 5% Rhenium (+) Tungsten 26% Rhenium (-), 0 to 2315°C

Very high temperature applications in inert or vacuum environments. WR is the most brittle at lower temperatures and W5 the least, due to the Rhenium content in the positive leg.

TYPE	MATERIAL	TEMPERATURE RANGE for STANDARD LIMITS of ERROR	STANDARD LIMITS of ERROR	TEMPERATURE RANGE for SPECIAL LIMITS of ERROR	SPECIAL LIMITS of ERROR
T	Copper (+) Blue Constantan (-) Red	(-200 to -67°C) (-67 to 0°C) (0 to 133°C) (133 to 350°C)	± 1.5% (± 1 °C) (± 1 °C) ± 0.75%	(0 to 125°C) (125 to 350°C)	(± 0.5°C) ± 0.4%
J	Iron (+) White Constantan (-) Red	(0 to 293°C) (293 to 760°C)	(± 2.2°C) ± 0.75%	(0 to 275°C) (275 to 760°C)	(± 1.1°C) ± 0.4%
E	Chromel (+) Purple Constantan (-) Red	(-200 to -170°C) (-170 to 0°C) (0 to 340°C) (340 to 900°C)	± 1 % (± 1.7°C) (± 1.7°C) ± 0.5%	(0 to 250°C) (250 to 900°C)	(± 1°C) ± 0.4%
K	Chromel (+) Yellow Alumel (-) Red	(-200 to -110°C) (-110 to 0°C) (0 to 293°C) (293 to 1250°C)	± 2 % (± 2.2°C) (± 2.2°C) ± 0.75%	(0 to 275°C) (275 to 1250°C)	(± 1.1°C) ± 0.4%
N	Nicrosil (+) Orange Nisil (-) Red	(0 to 1260°C)	(± 2.2°C) ± 0.75%	(0 to 1250°C)	_____
R	Platinum 13% Rhodium (+) Black Platinum (-) Red	(0 to 600°C) (600 to 1450°C)	(± 1.5°C) ± 0.25%	(0 to 600°C) (600 to 1450°C)	(± 0.6°C) ± 0.1%
S	Platinum 10% Rhodium (+) Black Platinum (-) Red	(0 to 600°C) (600 to 1450°C)	(± 1.5°C) ± 0.25%	(0 to 600°C) (600 to 1450°C)	(± 0.6°C) ± 0.1%
B	Platinum 30% Rhodium (+) Black Platinum 6% Rhodium (-) Red	(800 to 1700°C)	±0.5%	(800 to 1700°C)	_____
WR	Tungsten (+) Tungsten 26% Rhenium (-)	(0 to 2315°C)	±1%	_____	_____
W3	Tungsten 3% Rhenium (+) Tungsten 26% Rhenium (-)	(0 to 2315°C)	±1%	_____	_____
W5	Tungsten 5% Rhenium (+) Tungsten 26% Rhenium (-)	(0 to 2315°C)	±1%	_____	_____

THERMOCOUPLE SIZE AND RESPONSE TIME (SECONDS)

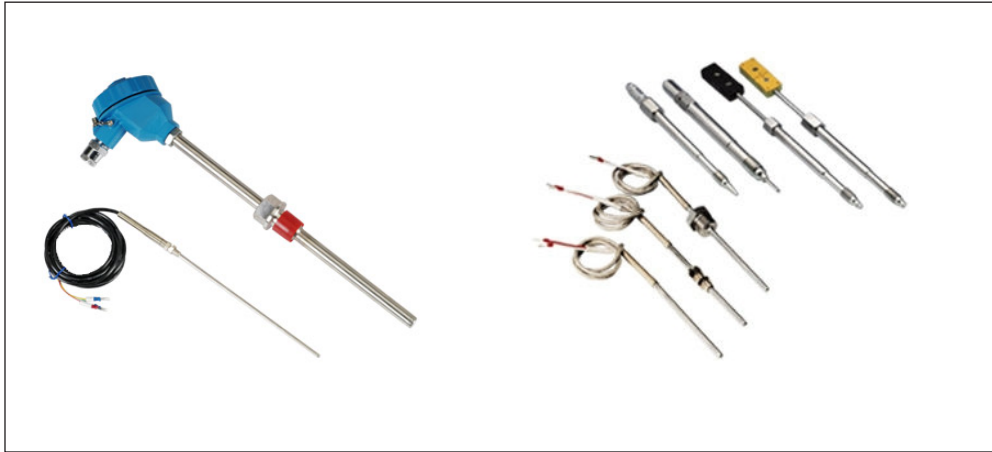
BASED ON TIME TO INDICATE 63.2% OF VALUE FROM ROOM TEMPERATURE TO BOILING WATER

PROBE DIAMETER	CONDUCTOR SIZE NOMINAL (AWG)	RESPONSE TIME OF JUNCTION	
		GROUNDED	UNGROUNDED
.040	33	0.1	0.3
.0625	29	0.2	0.5
.0625 DUAL	31	0.2	0.5
.125	23	0.6	1.5
.125 DUAL	25	0.6	1.5
.187	19	1.1	2.2
.187 DUAL	21	1.1	2.2
.25	17	2.0	4.5
.25 DUAL	19	2.0	4.5
.375	14	2.9	8.2
.375 DUAL	15	3.9	8.2

RECOMMENDED TEMPERATURE LIMITS FOR METAL SHEATH THERMOCOUPLES

	T	J	E	K
1/25"	150°C	480°C	425°C	760°C
1/16"	205°C	540°C	550°C	980°C
1/8"	205°C	540°C	550°C	1000°C
3/16"	371°C	650°C	550°C	1000°C
1/4"	371°C	650°C	593°C	1100°C
3/8"	371°C	650°C	650°C	1200°C

CUSTOM SHEATHED THERMOCOUPLES



CODE	ISA CALIBRATION
T	COPPER - CONSTANTAN
J	IRON - CONSTANTAN
E	CHROMEL - CONSTANTAN
K	CHROMEL - ALUMEL
N	NICROSIL - NISIL
R	PLATINUM 13% RHODIUM - PLATINUM
S	PLATINUM 10% RHODIUM - PLATINUM
B	PLATINUM 30% RHODIUM - PLATINUM 6% RHODIUM

CODE	JUNCTION
G	GROUNDING
DG	DUAL GROUNDING
U	UNGROUNDING
DU	DUAL UNGROUNDING
E	EXPOSED

CODE	PROBE DIAMETER
04	0.040 (1/25 INCH)
16	0.063 (1/16 INCH)
18	0.125 (1/8 INCH)
36	0.188 (3/16 INCH)
14	0.250 (1/4 INCH)
38	0.375 (3/8 INCH)
SP	SPECIAL (SPECIFY)

CODE	SHEATH MATERIAL
304	304 STAINLESS STEEL
316	316 STAINLESS STEEL
310	310 STAINLESS STEEL
600	INCONEL 600
SP	SPECIAL (SPECIFY)


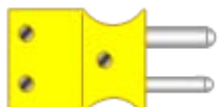
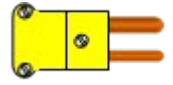
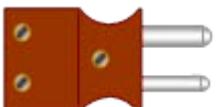
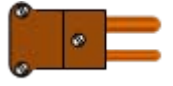

CUSTOM SHEATHED THERMOCOUPLES

CODE	LEAD INSULATION
FB	Fiberglass *482°C (900°F)
SF	Fiberglass with SS Overbraid
AF	Flex Armour Over Fiberglass
PV	Polyvinyl Chloride (PVC) *102°C (215°F)
AP	Flex Armour Over PVC
TE	Teflon *204°C (400°F)
AT	Flex Armour over Teflon
ST	2" Stripped Leads
SP	Special (Specify)
*Maximum Continuous Service Temperature	

CODE	PROCESS FITTING
X	No Fitting Required
**CF	Compression Fitting (SS Ferrule)
**CT	Compression Fitting (Teflon Ferrule)
FX	Fixed HEX Plug
FS	Fixed 1/2 x 1/2 MNPT Bushing
*TX	Spring Loaded Transmitter Bushing 1/2" MNPT
*OS	Adjustable Spring Loaded 1/2 x 1/2 MNPT Bushing with oil seal.
SP	Special (Specify)

**Fitting supplied on probe length specified

CODE	FITTING SIZE
X	No Fitting Required
18	1/8" MNPT
14	1/4" MNPT
38	3/8" MNPT
12	1/2" MNPT
SP	Special (Specify)

CODE	TERMINATION
BE	BARE ENDED LEAD WIRE 
SC	STANDARD MALE CONNECTOR 205°C (400°F) Max Continuous 
MC	MINIATURE MALE CONNECTOR 205°C (400°F) Max Continuous 
HC	HIGH TEMPERATURE MALE CONNECTOR 425°C (800°F) Max Continuous 
HM	HIGH TEMPERATURE MINI MALE CONNECTOR 425°C (800°F) Max Continuous 
SL	SPADE LUGS 
SP	SPECIAL (SPECIFY)

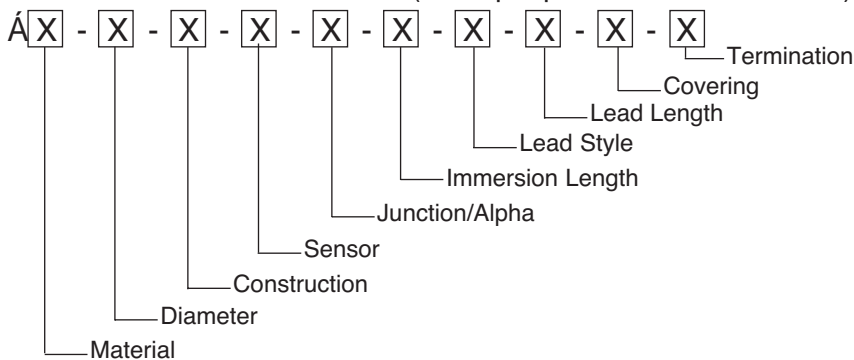
EXAMPLE:

TC4 - K - DU - 38 - 316 - 24 - 62 - AF - SC - FX - 12 - SP
SP = 6" of probe below fitting

- Type K, Dual Ungrounded, 3/8" Diameter, 316 SS Sheath, 24" long with 62" Armoured Fiberglass Leads, c/w Standard Male Connectors and 1/2" MNPT Fixed Bushing.

TO ORDER: SELECT APPROPRIATE CODE FROM PRECEDING TABLES.

(Example provided for Reference)



COMPLETE AS APPLICABLE:

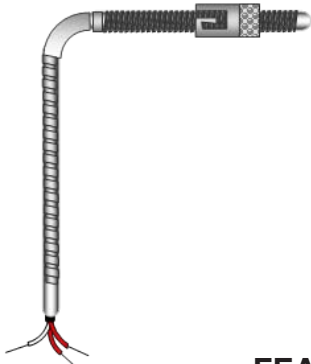
SP = _____

BAYONET STYLE THERMOCOUPLES

MODEL PT



MODEL PT90



MODEL PT45



MODEL PTSA (Locking nut travels on coiled spring)



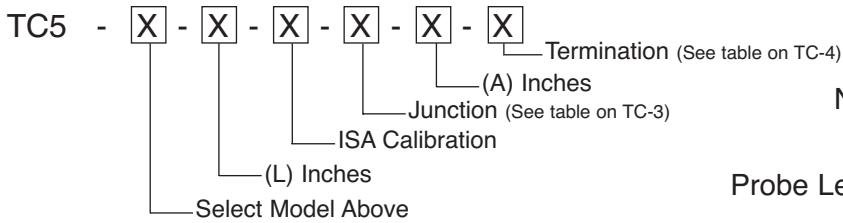
MODEL PTAF (Locking nut travels on flex armour)



FEATURES

PROBE: 3/16" O.D., 316SS Sheath.

LEADS: 20 AWG Fiberglass with SS Armour.

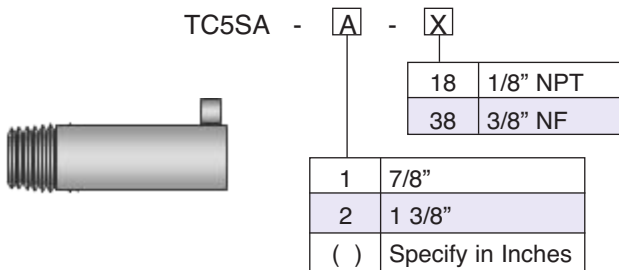


ORDERING

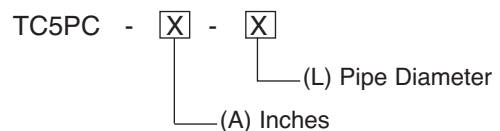
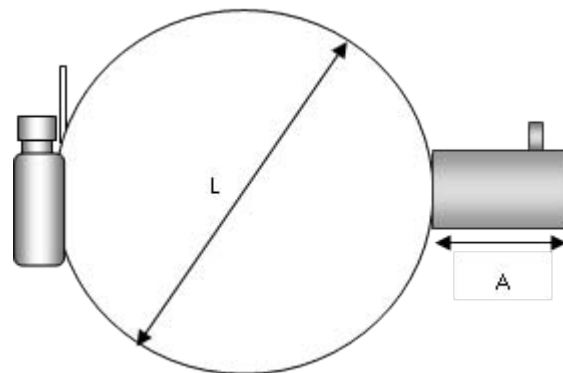
NOTE: When ordering probes for known hole depths;

Probe Length = Hole Depth + Adapter Length + 1/2"

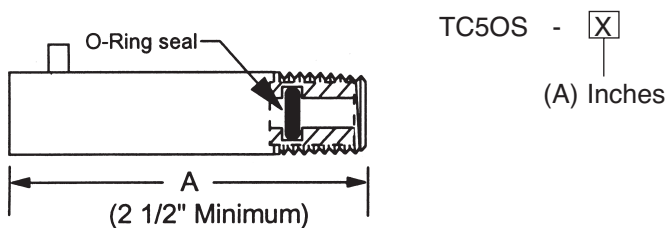
STANDARD ADAPTER



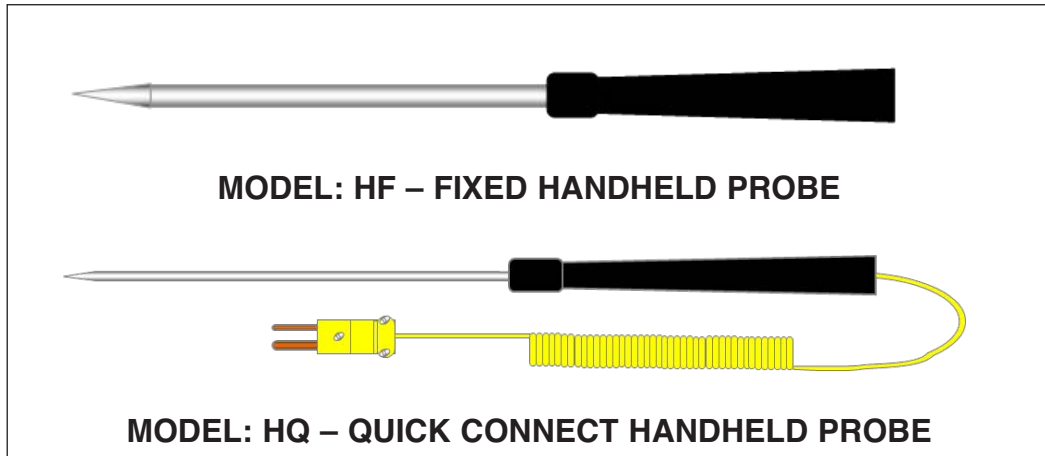
PIPE CLAMP ADAPTER



OIL SEAL ADAPTER

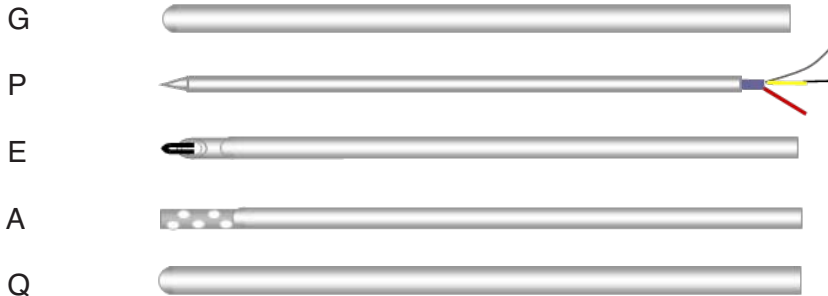


HANDHELD PROBES



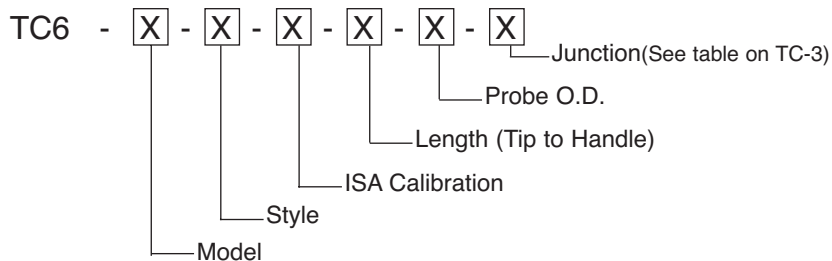
AVAILABLE TIP STYLES:

CODE:



STYLE

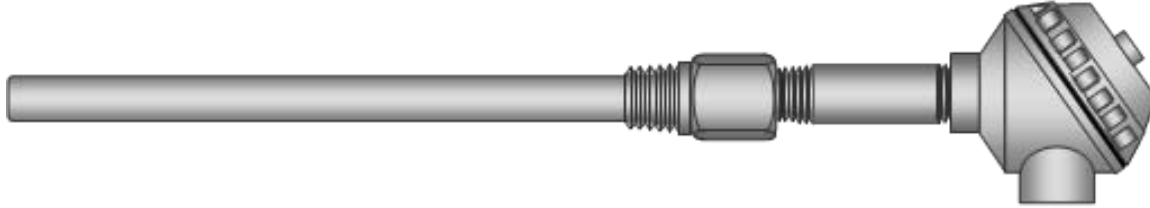
- GENERAL PURPOSE
- PENETRATION
- EXPOSED
- AIR
- QUICK RESPONSE 1/16" O.D.



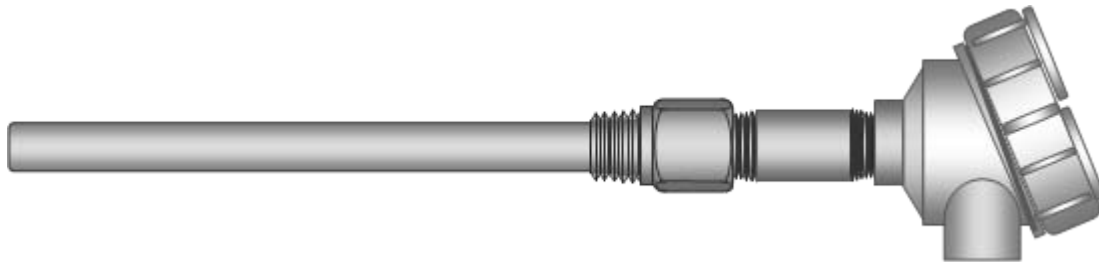
CODE	PROBE O.D.
16	1/16"
18	1/8"
36	3/16"
14	1/4"

COMPLETE ASSEMBLIES

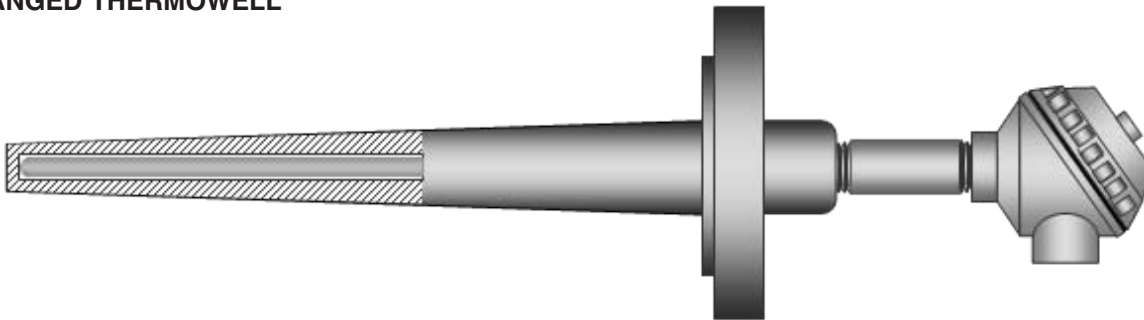
**GENERAL PURPOSE WITH
THREADED THERMOWELL**



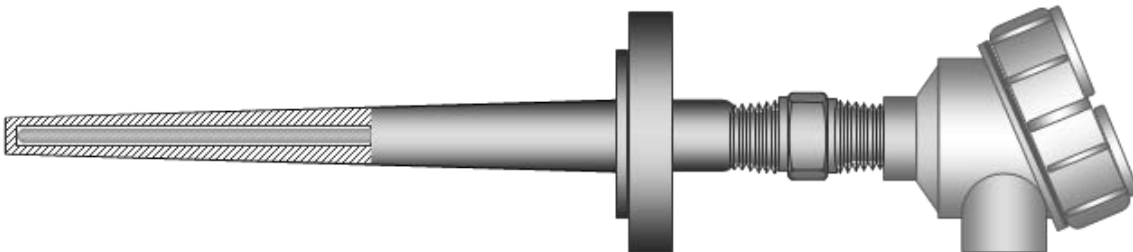
**EXPLOSION PROOF WITH
THREADED THERMOWELL**



**GENERAL PURPOSE WITH
FLANGED THERMOWELL**



**EXPLOSION PROOF WITH
FLANGED THERMOWELL**





COMPLETE ASSEMBLIES

CONNECTION HEAD

GENERAL PURPOSE: For non-hazardous locations.

Material: Cast Aluminum supplied as standard, optional cast iron available.

Conduit Connection: 3/4" NPT standard, optional 1/2" NPT available.

Process Connection: 1/2" NPT.

Termination: Ceramic composition with solid brass screw blocks. For single or dual element.

Extension: 1/2" NPT galvanized carbon steel nipples and union.

EXPLOSION PROOF: Class 1, Groups B, C & D. Class II, Groups E, F & G.

Choose from: Aluminum, Cast Iron, Stainless Steel, or Epoxy Coated Aluminum.

Conduit Connection: 3/4" NPT standard, optional 1/2" NPT available.

Process Connection: 1/2" NPT.

Termination: Bakelite terminal block is standard or ceramic for high temperature applications.

Extension: 1/2" NPT galvanized carbon steel nipples with plated steel explosion proof union.

ELEMENT

All ANSI coded calibrations with spring loaded 1/4" O.D. 316 SS sheath. Single or dual element available.

Junction: Grounded and ungrounded available.

Replacement Element: Probe length = A + T + U with 6" Leads.

*See Page
TC-4 of
Catalogue*

THERMOWELL

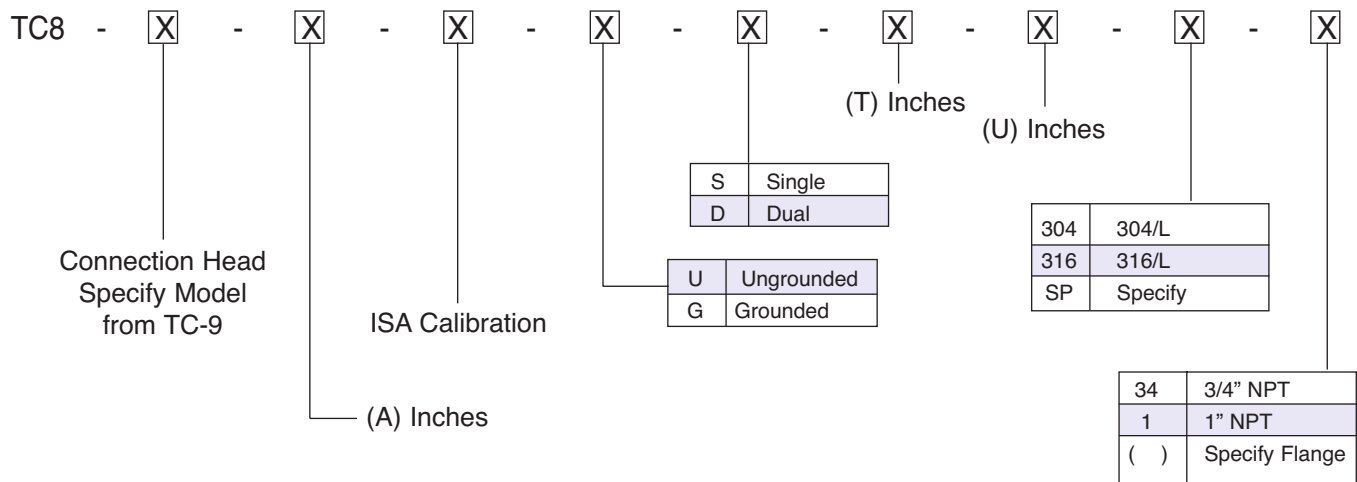
Threaded: 3/4" NPT or 1" NPT, hex bar stock drilled 0.260" bore, tapered to 3/4" diameter.

Material: 304/L or 316/L SS supplied as standard, other grades available on request.

Flanged: 1 1/8" round bar stock, standard, optional 1 1/4" or 1 3/8", drilled 0.260" bore and tapered to 3/4" diameter.

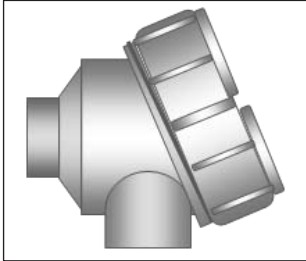
Material: 304/L or 316/L SS supplied as standard, other grades available on request.

TO ORDER:



CONNECTION HEADS

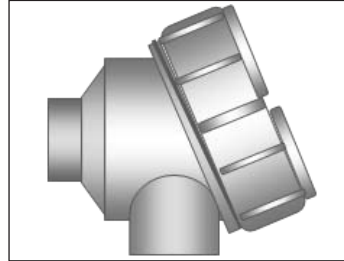
EXPLOSION PROOF



Class I, Div. I, Gr. B, C, D
Class II, Div. I, Gr. E, F, G
Class III

MODEL	MATERIAL
2AL	Cast Aluminum
2SS	316 Stainless Steel
2ALT	Cast Aluminum Teflon Coated

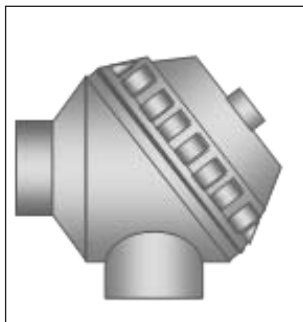
EXPLOSION PROOF



Class I, Div. I, Gr. A, B, C, D
Class II, Div. I, Gr. E, F, G
Class III

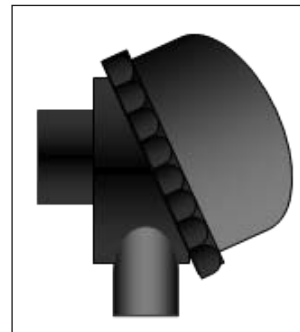
MODEL	MATERIAL
1AL	Cast Aluminum
1CI	Cast Iron
1ALT	Cast Aluminum Teflon Coated
1CIT	Cast Iron Teflon Coated

GENERAL PURPOSE



MODEL	MATERIAL
3AL	Cast Aluminum
3CI	Cast Iron
3ALE	Cast Aluminum Epoxy Coated
3CIE	Cast Iron Epoxy Coated

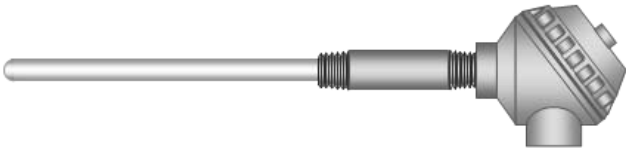
NON HAZARDOUS INDOOR/OUTDOOR/SANITARY



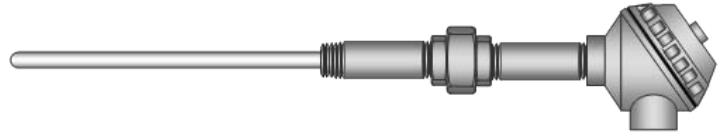
MODEL	MATERIAL
4P	White Polypropylene (92°C Max.)
4D	Grey Delrin (135°C Max.)

REPLACEMENT ASSEMBLIES

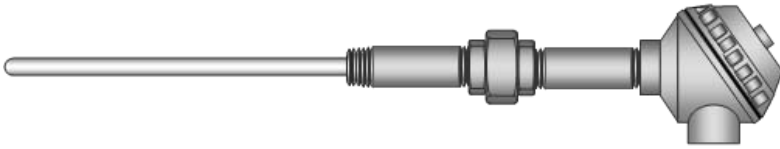
Insulator Thermocouple with Nipple



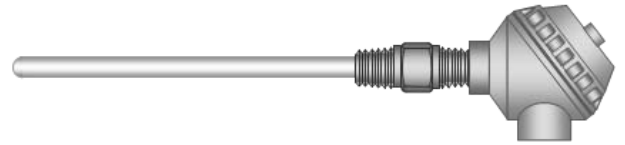
Insulator Thermocouple with Nipple/Union/Nipple



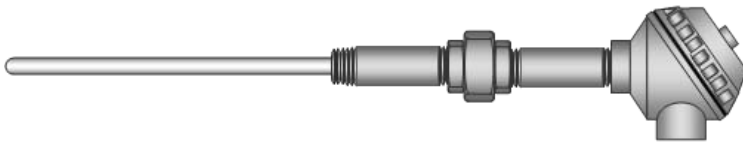
Sheathed Thermocouple with Fixed Bushing



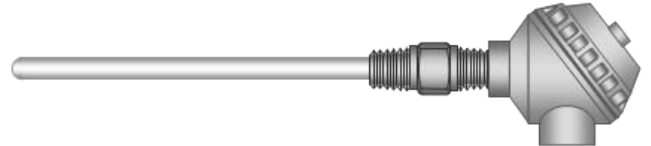
Sheathed Thermocouple with Nipple Plain or Spring Loaded



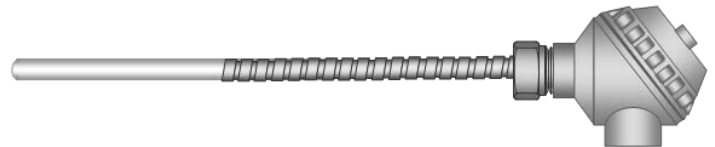
Sheathed Thermocouple with Nipple/Union/Nipple. Plain or Spring Loaded



Sheathed Thermocouple with Spring Loaded or Oil Seal Bushing



Sheathed Thermocouple with Flex Armoured Leads



FOR REPLACEMENT PROBES ONLY :

Ceramic Insulated: See Page TC-12
Metal Sheathed: See Page TC-4

TC10 - - - - - - - - - - - - - (L) Inches

(A) Inches
(X) Not Applicable

ISA Calibration

Code	Process Fitting
N	Nipple
NUN	Nipple, Union, Nipple
FX	Fixed
OS	Spring Loaded with Oil Seal
AF	Flex Armour over Fiberglass
TX	Spring Loaded Bushing

Code	Probe Diameter
18	1/8" O.D.
36	3/16" O.D.
14	1/4" O.D.
38	3/8" O.D.

Code	Sheath Material
CI	Ceramic Insulated
304	304 SS
316	316 SS
SP	Special Specify

S	Single Element
D	Dual Element

U	Ungrounded
G	Grounded
EX	Exposed

Connection Head
Specify Model
From Opposite Page

CERAMIC INSULATORS

TWO HOLE OVAL



WIRE GAUGE	O.D.	HOLE SIZE	LENGTH	PART NUMBER
8	0.500" x 0.250"	0.190"	1"	INS1
8	0.562" x 0.312"	0.190"	3"	INS2
14	0.375" x 0.219"	0.094"	1" to 48"	INS3*
20	0.187" x 0.125"	0.062"	4" to 48"	INS4*
24	0.120" x 0.090"	0.042"	1" to 48"	INS5*

TWO HOLE ROUND



8	0.468"	0.156"	1"	INS6
8	0.500"	0.187"	3"	INS7
14	0.250"	0.094"	1" to 60"	INS8*
14	0.312"	0.094"	1" to 60"	INS9*
20	0.187"	0.062"	1" to 48"	INS10*
20	0.250"	0.062"	4" to 60"	INS11*
24	0.187"	0.040"	4" to 48"	INS12*
24	0.250"	0.040"	4" to 60"	INS13*

FOUR HOLE ROUND



14	0.312"	0.091"	1" to 48"	INS14*
20	0.250"	0.062"	4" to 48"	INS15*
20	0.187"	0.047"	1" to 48"	INS16*
24	0.187"	0.031"	4" to 48"	INS17

ONE HOLE ROUND



8	0.250"	0.156"	1"	INS18
8	0.250"	0.156"	3"	INS19
14	0.187"	0.093"	1"	INS20
14	0.187"	0.094"	4" to 60"	INS21*

BALL AND SOCKET (FISH SPINE)

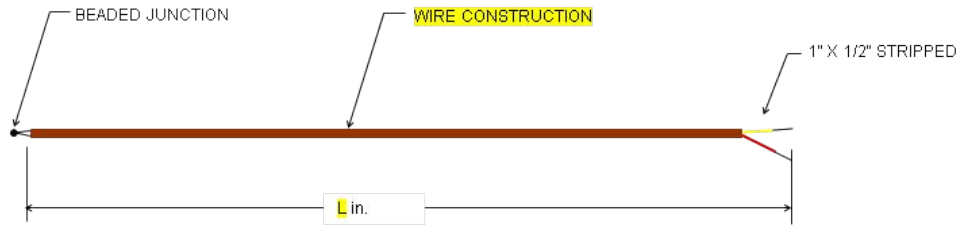


† 8	0.260"	0.156"	0.260"	INS22
†14	0.200"	0.092"	0.200"	INS23
†20	0.170"	0.068"	0.170"	INS24
†24	0.110"	0.056"	0.110"	INS25

† Sold in 12" Sleeves

* Specify Length Required
When Ordering

PLATINUM AND HIGH TEMPERATURE THERMOCOUPLES



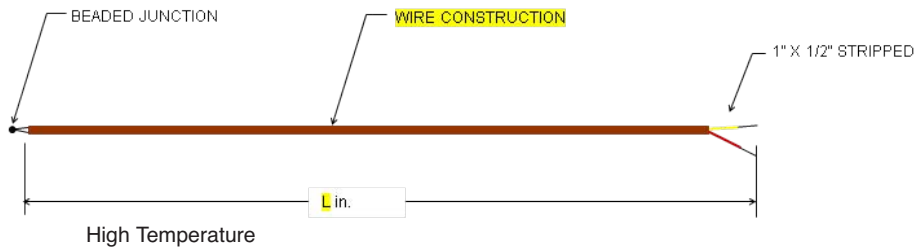
TO ORDER:

TC12PT - - - - (L) Inches

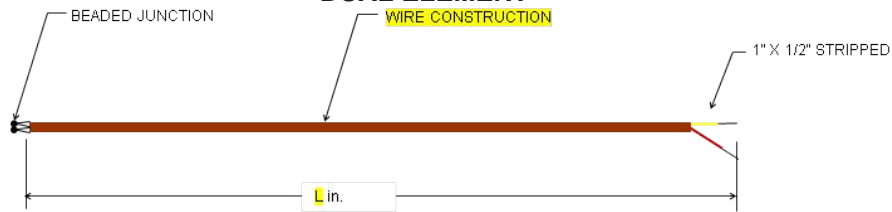
Code	ISA Calibration
R	Type R 1482°C Max.
S	Type S 1482°C Max.
B	Type B 1705°C Max.
SP	Special (Specify)

Code	Diameter
12	0.125"
18	0.187" O.D.

ANSI CODED INSULATOR THERMOCOUPLE



DUAL ELEMENT



TO ORDER:

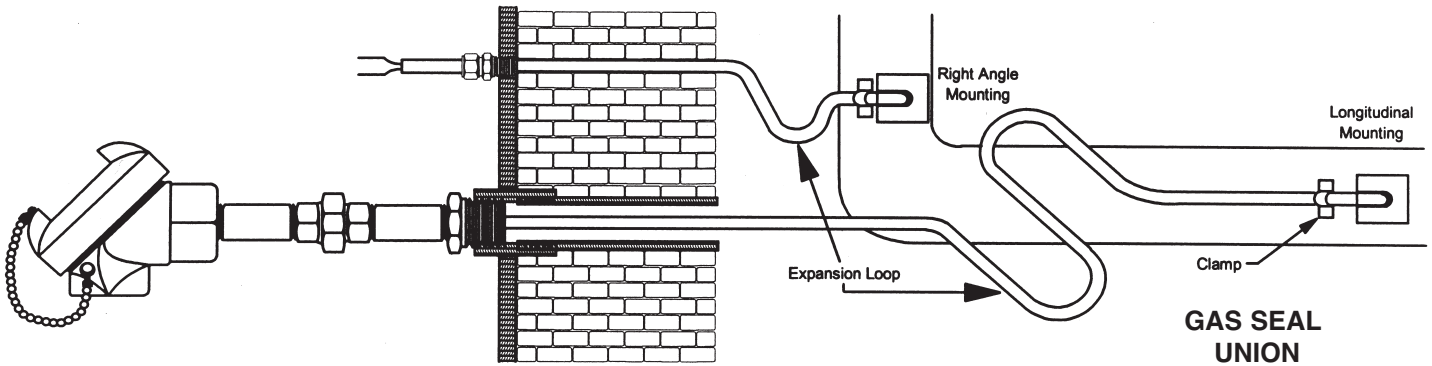
TC12BT - - - - - (L) Inches

Insulator	
O	Oval
R	Round

ISA Calibration	
S	Single
D	Dual

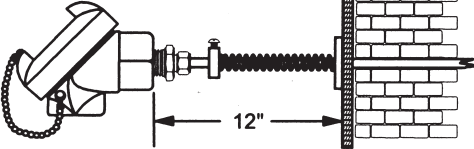
Code	Wire Gauge
8	8 AWG
14	14 AWG
20	20 AWG

WELD PAD THERMOCOUPLES

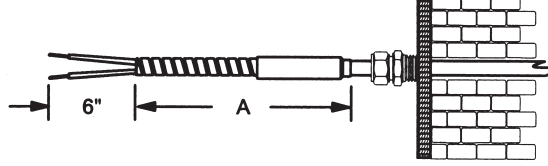


OTHER TERMINATIONS AVAILABLE:

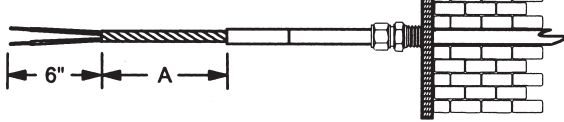
Spring Loaded Process Cover



Flex Armour Leads



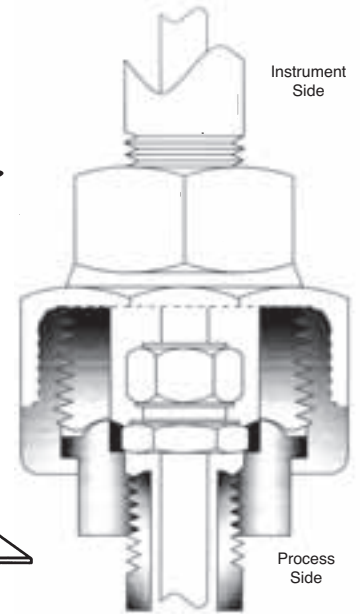
Inline Transition



WELD PAD CLAMP



GAS SEAL UNION



FEATURES:

WELD PAD: 1" x 1" x 1/8" of same material as sheath.

WELD PAD CLAMP: One supplied of same material as sheath.

TO ORDER:

WPT - X - X - X - X - X - X - X - X - X - X - X
 BTB

(A) Inches
(X) Not Applicable

ISA Calibration

(L) Inches

Pipe Diameter (Inches)

Code	Connection Head
	Specify from Page TC-9
(X)	Not Required

Code	Process Fitting
38	3/8" NPT
12	1/2" NPT
34	3/4" NPT
10	1" NPT
14	1 1/4" NPT
21	1 1/2" NPT

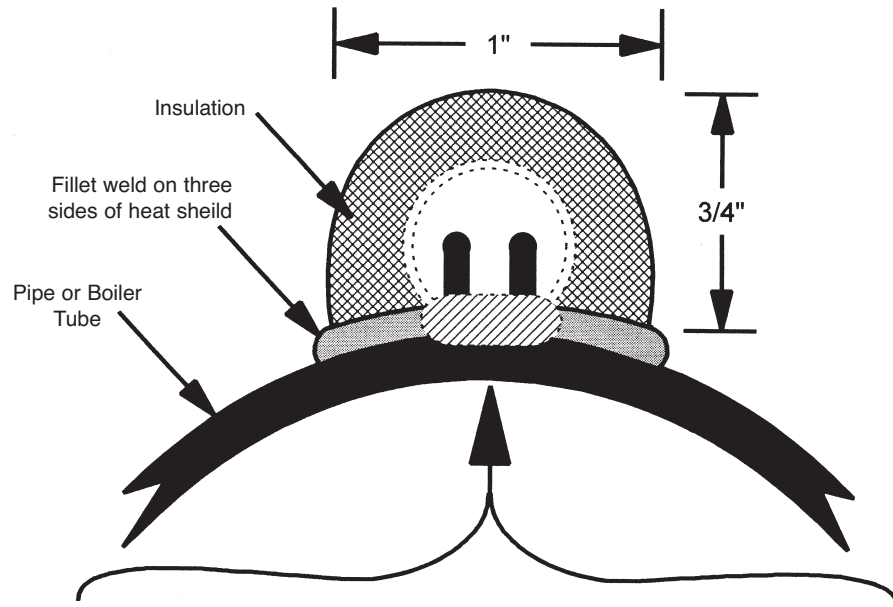
Code	Sheath Material
304	304 SS
310	310 SS
316	316 SS
600	Inconel 600
()	Specify

R	Right Angle
L	Longitudinal
X	BTB (Not Applicable)

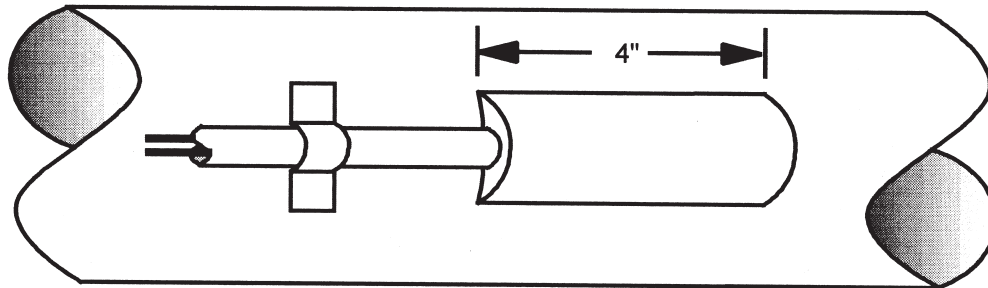
Code	Sensor Style
CF	Compression Fitting
GS	Gas Seal Union
FX	Flex Armour over Fiberglass
TX	Flex Armour over Teflon
FL	Fiberglass Lead Wire
TL	Teflon Lead Wire

Code	Probe Diameter
36	3/16"
14	1/4"
38	3/8"

BOILER TUBE BLOCK



This is where the **Boiler-Tube-Block** sets itself apart from all others. A simple 1/8" fillet weld puts the junction right in the wall. The insulated heat shield over the **BTB** ensures no adverse affects from external temperature sources.



HOW TO ORDER:

See page TC-13 for BTB

STANDARD FEATURES :

The Boiler Tube Block (BTB) is pre-shaped to fit onto the pipe diameter specified.

Installation instructions are supplied with each set of thermocouples.

Each BTB is supplied with a weld clamp for extra support.

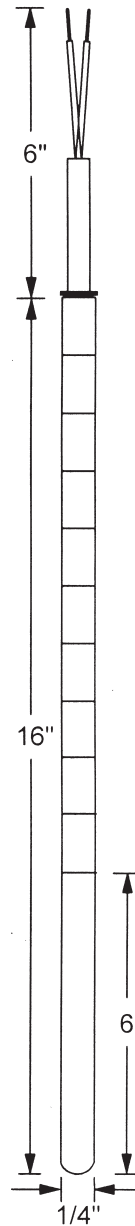
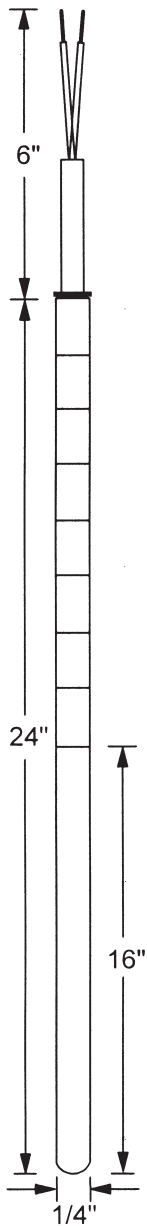
Unless otherwise specified, the **BTB**, **Heat Shield** and **Clamp** are the same alloy as the sheath.

A heat shield is supplied to insulate the sensor from adverse effects of external temperatures.

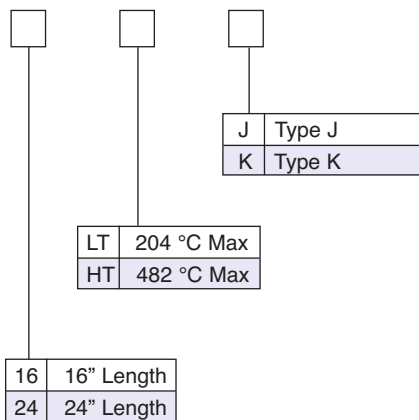
All instrument terminations available on the Weld Pad are also available on the BTB.

THERMOCOUPLE

Reduce inventory levels and costs by
consolidating sensor requirements.



TO ORDER:



**NOTE: ALSO AVAILABLE IN RTD
SEE PAGE RT-9**

STANDARD FEATURES :

- Type J or K element, +/- 0.75% Typ
- 316/L Stainless Steel Sheath
- Teflon or Fibreglass Insulated and Jacketed Leads

The Break - To - Length sensor is designed as a quick replacement element for existing thermowell assemblies. Pre-scored at 1" increments, the sensor can be "broken" to fit most applications. A pair of pliers and a screw driver are the only tools required for the job. This unique design has no burrs or sharp edges. For added protection the sensors come with a grommet that slips over the leads and fits into the tubing.

Shown here are our most common sensors available from stock. Please contact us to discuss options required to suit your specific needs.

***Resistive Temperature Device (RTD)-** Are temperature sensors that contain a sensing element whose resistance changes with temperature. These sensors are often placed so they can be in a position in the process where it can reach the same temperature. Platinum wire or films RTDs are the most common type in use today. Platinum RTDs are used to measure temperatures from -400 °F to 1550 °F. Due to higher accuracy and repeatability RTDs are slowly replacing the use of thermocouples in many industrial applications below 1200°F.





RTD Specifications	1
Resistance Temperature Detector (RTD) Probes.....	3
Complete RTD Assemblies.....	5
Replacement RTD Assemblies.....	7
Connection Heads.....	8
Break - To - Length RTD	9



RTD SPECIFICATIONS

STANDARD RTD ELEMENT SPECIFICATIONS

ELEMENT MATERIAL*	RESISTANCE @ 0°C	TEMPERATURE COEFFICIENT	OPERATING RANGE†	AVAILABLE ACCURACIES @ 0°C
Platinum	100 Ohm	.00385	-200 to 850°C	± .5% ± .1% ± .06% ± .01%
Platinum	100 Ohm	.00391	-200 to 600°C	± .1% ± .06%
Copper	10 Ohm	.00427	-200 to 204°C	± .2% ± .5%
Nickel	120 Ohm	.00672	-200 to 204°C	± .3% ± .5%

* Sensing elements of other materials and temperature coefficients are available upon request.

† Stated operating ranges are typical values and are dependant upon the sensing element and the construction style of the sensor assembly. Assemblies to exceed the stated limits may be available upon request.

RTD Elements

supply elements of several different materials, base resistances, temperature coefficients, accuracies and configurations for installation into RTD assemblies that meet customer supplied requirements. The most common element we use is Platinum with a base resistance of 100 ohms @ 0°C, accuracy of ± 0.5% and temperature coefficient of 0.00385 ohms/ohm/°C. The second most common element is a 392 curve (0.00392 ohms/ohm/°C) element found in most Japanese and a few American made assemblies. Our most common construction of these elements is a Platinum wound element enclosed in a ceramic housing. Process conditions may dictate use of other types of element construction such as Thin-Film, Glass Bulb, or Kapton insulated. The following standards dictate the specifications to which our elements are manufactured to:

For 0.00385 ohms/ohm/°C elements

- International Electromechanical Commission Standard IEC 751, 1995
- British Standards Institution BS 1904, 1984
- Deutsches Institut für Normung (Germany) DIN 43760, 1987

For 0.00392 ohms/ohm/°C elements

- Scientific Apparatus Manufacturers Association SAMA RC21-4-196
- Japanese Standards Association JIS C 1604-1989

RESISTANCE/TEMPERATURE		
	Copper	Nickel
Base resistance:	10 Ω at 25°C	120 Ω at 0°C
TCR (Ω/Ω°C)	.00427	.00672
Sensitivity (Average Ω/°C)	0.039	0.806
Temperature (°C)	Resistance (ohms)	
-100	5.128	120.00
-80	5.923	66.60
-60	6.712	79.62
-40	7.490	92.76
-20	8.263	106.15
0	9.035	120.00
20	9.807	134.52
40	10.580	149.79
60	11.352	165.90
80	12.124	182.84
100	12.897	200.64
120	13.669	219.29
140	14.442	238.85
160	15.217	259.30
180	15.996	280.77
200	16.776	303.46
220	17.555	327.53
240	18.335	353.14
260	19.116	380.31

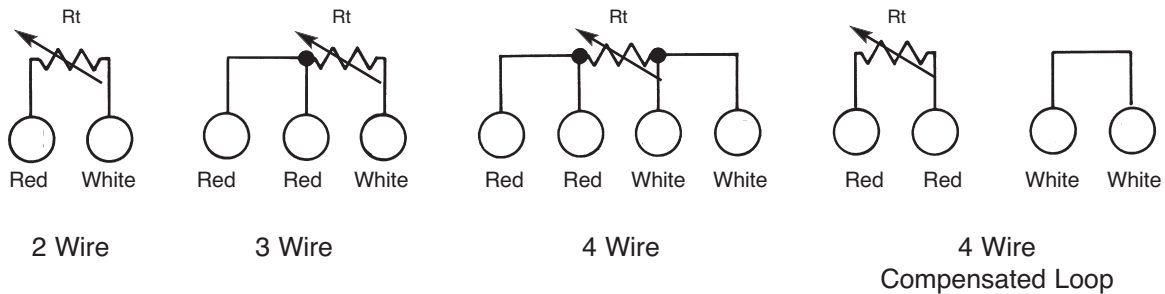
RESISTANCE/TEMPERATURE			
Platinum Elements			
Resistance at 0°C: TCR (Ω/Ω°C)	100 Ω .00392	100 Ω .00391	100 Ω .00385
Sensitivity (Average Ω/°C)	0.392	0.391	0.385
Temperature (°C)	Resistance (Ohms)		
-200	17.00	17.26	18.52
-180	25.72	25.97	27.10
-160	34.31	34.54	35.54
-140	42.80	43.01	43.88
-120	51.19	51.37	52.11
-100	59.49	59.64	60.25
-80	67.71	67.83	68.32
-60	75.87	75.96	76.33
-40	83.96	84.03	84.27
-20	92.01	92.04	92.16
0	100.00	100.00	100.00
20	107.95	107.92	107.79
40	115.85	115.78	115.54
60	123.70	123.60	123.24
80	131.50	131.38	130.90
100	139.26	139.11	138.51
120	146.97	146.79	146.07
140	154.64	154.42	153.58
160	162.25	162.01	161.05
180	169.82	169.55	168.48
200	177.35	177.04	175.86
220	184.82	184.49	183.19
240	192.25	191.89	190.47
260	199.64	199.24	197.71
280	206.97	206.55	204.90
300	214.26	213.81	212.05
320	221.50	221.02	219.15
340	228.70	228.19	226.21
360	235.85	235.31	233.21
380	242.95	242.38	240.18
400	250.00	249.41	247.09
420	257.01	256.39	253.96
440	263.97	263.32	260.78
460	270.88	270.21	267.56
480	277.75	277.04	274.29
500	284.57	283.84	280.98
520	291.34	290.58	287.62
540	298.06	297.28	294.21
560	304.74	303.93	300.75
580	311.37	310.54	307.25
600	317.96	317.09	313.71
620	324.49	323.60	320.12
640	330.98	330.07	326.48
660	337.43	336.49	332.79
680	343.82	342.86	339.06
700	350.17	349.18	345.28
720			351.46
740			357.59
760			363.67
780			369.71
800			375.70
820			381.65
840			387.54
850			390.48

RTD SPECIFICATIONS

RTD INTERCHANGEABILITY			
Temperature °C	Platinum RTD		
	±0.06% at 0°C	±0.1% at 0°C	±0.5% at 0°C
-200	±0.55°C	±1.3°C	±2.1°C
-100	±0.35°C	±0.8°C	±1.7°C
0	±0.15°C	±0.3°C	±1.3°C
20	±0.19°C	±0.4°C	±1.6°C
100	±0.35°C	±0.8°C	±2.9°C
200	±0.55°C	±1.3°C	±4.4°C
260	±0.67°C	±1.6°C	±5.5°C
300	±0.75°C	±1.8°C	
400	±0.95°C	±2.3°C	
500	±1.15°C	±2.8°C	
600	±1.35°C	±3.3°C	
700		±3.8°C	
800		±4.3°C	
850		±4.6°C	

Temperature °C	Copper RTD		Nickel RTD	
	±0.02% at 25°C	±0.5% at 25°C	±0.3% at 0°C	±0.5% at 0°C
-100	±1.5°C	±2.2°C		
0	±0.7°C	±1.5°C	±0.5°C	±0.8°C
20	±0.5°C	±1.3°C	±0.8°C	±1.2°C
100	±1.5°C	±2.5°C	±1.8°C	±2.2°C
150	±2.2°C	±3.3°C	±2.5°C	±3.0°C
200	±2.8°C	±4.1°C	±3.1°C	±3.7°C
260	±3.6°C	±5.1°C	±3.4°C	±4.0°C

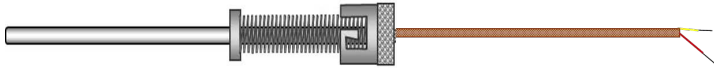
WIRING CONFIGURATIONS:



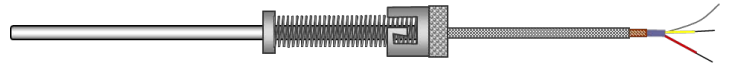
ELEMENT DIMENSIONS:

Dimensions in inches	R (0°C)	Temperature Range	Leads	63% response time Sec. in water, 0.4 m/s
550°C wire-wound elements				
0.060 ϕ 	100 Ω	-100 to 550°C	0.010" (0.25 mm) ϕ Platinum alloy	0.14
0.080 ϕ 	100 Ω	-100 to 550°C	0.010" (0.25 mm) ϕ Platinum alloy	0.18
0.100 ϕ 	100 Ω	-100 to 550°C	0.014" (0.35 mm) ϕ Platinum alloy	0.22
400°C and 600°C thin-film elements				
0.055 THICK Lead Length: 0.4	100 Ω	-70 to 400°C	0.010" ϕ Ag 0.004 Ω /mm/lead	0.2
	100 Ω	-70 to 600°C	0.008" (0.20 mm) ϕ Pd 0.036 Ω /mm/lead	0.2

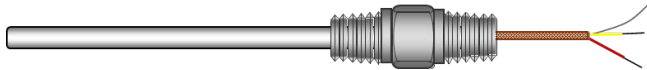
CUSTOM SHEATHED RTD'S



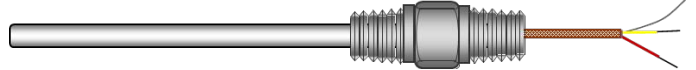
Bayonet Probe with Teflon Leads



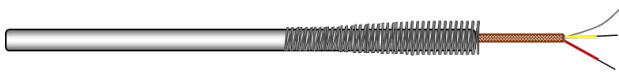
Bayonet Probe with Armoured Leads



Spring Loaded or Fixed Bushing



Spring Loaded Oil Seal



Adjustable Spring



Teflon Jacketed Leads



Tip Sensitive



Flex Armoured Leads



Electrically Isolated



General Purpose

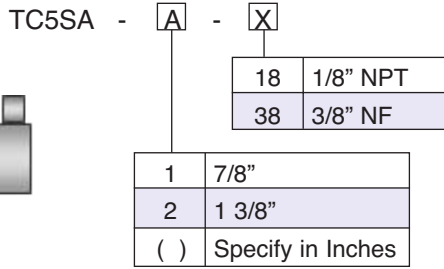
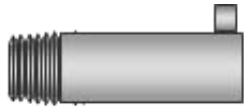


Teflon Leads with Standard Connector

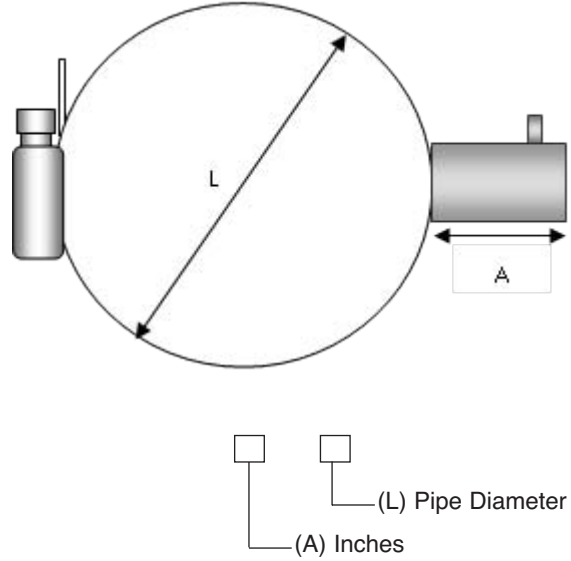


Miniature Connection Head

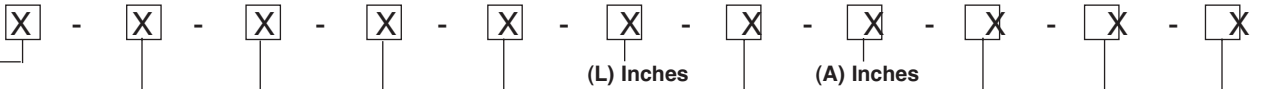
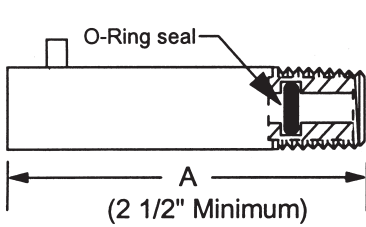
STANDARD ADAPTER



PIPE CLAMP ADAPTER



OIL SEAL ADAPTER



Code	Element
A	100Ω Platinum 385 ± 0.1%
B	100Ω Platinum 385 ± 0.01%
C	100Ω Platinum 392 ± 0.1%
D	120Ω Nickel 627 0.806 Ω/°C
E	10Ω Copper 427 0.039 Ω/°C
()	Other Specify

Code	Probe Diameter
18	1/8" O.D.
14	1/4" O.D.
21	0.215" O.D.
36	3/16" O.D.

Code	Termination
BE	Bare Ended Leads
SC	Standard Connector
MC	Mini Connector
MH	Mini Head

Code	# of Leadwires
2	2 Wire
3	3 Wire
4	4 Wire
4C	4 Wire Compensated Loop

Code	Process Fitting
CF()	Compression Fitting (Specify Process NPT)
SG	Adjustable Spring
FS()	Fixed Hex Bushing (Specify Process NPT)
TX()	Spring Loaded Transmitter Bushing (Specify Process NPT)
OX()	Oil Seal Hex Bushing (Specify Process NPT)
X	Not Required

S	Single Element
D	Dual Element

Code	Probe Style
GP	General Purpose
EI	Electrically Isolated
TS	Tip Sensitive
BP	Bayonet Style
TE	Tip Sensitive/Electrically Isolated
BT	Bayonet/Tip Sensitive

Code	Lead Options
T	Teflon Leadwire
F	Fiberglass Leadwire
AT	Armoured Teflon
AF	Armoured Fiberglass
ST	Standard 6" TFE Leads

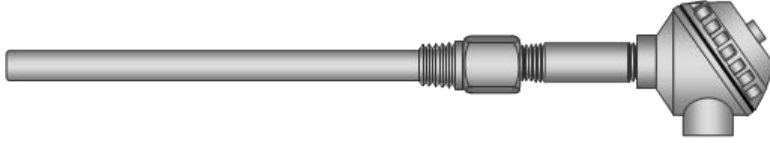
Code	Temp. Rating
LT	Low Temp. (204°C Max.)
HT	High Temp. (482°C Max.)
VT	High Temp. High Vibration (850°C)

* Available in most probe styles. Minimum lengths apply. Consult factory.

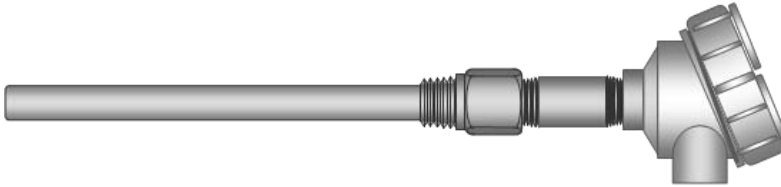
NOTE: 316SS Sheath supplied as standard. If other required, specify at time of order.

RTD ASSEMBLIES

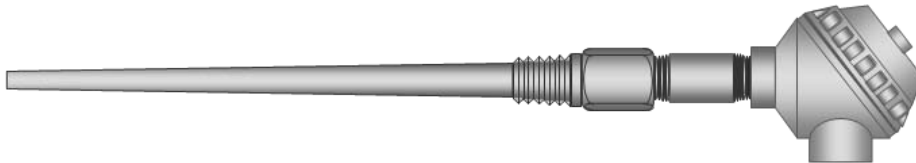
**GENERAL PURPOSE WITH
THREADED THERMOWELL**



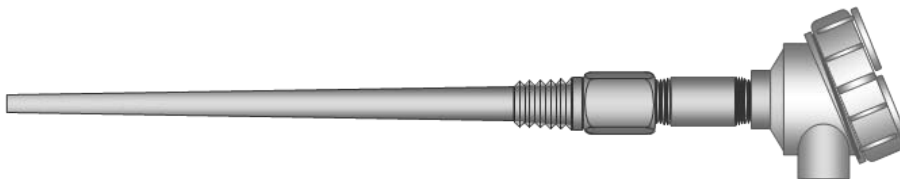
**EXPLOSION PROOF WITH
THREADED THERMOWELL**



**GENERAL PURPOSE WITH
FLANGED THERMOWELL**



**EXPLOSION PROOF WITH
FLANGED THERMOWELL**





RTD ASSEMBLIES

CONNECTION HEAD

GENERAL PURPOSE: For non-hazardous locations.

Material: Cast Aluminum supplied as standard, optional cast iron available.

Conduit Connection: 3/4" NPT standard, optional 1/2" NPT available.

Process Connection: 1/2" NPT.

Termination: Ceramic composition with solid brass screw blocks. For single or dual element.

Extension: 1/2" NPT galvanized carbon steel nipples and union.

EXPLOSION PROOF: Class 1, Groups B, C & D. Class II, Groups E, F & G.

Choose from: Aluminum, Cast Iron, Stainless Steel, or Epoxy Coated Aluminum.

Conduit Connection: 3/4" NPT standard, optional 1/2" NPT available.

Process Connection: 1/2" NPT.

Termination: Bakelite terminal block is standard or ceramic for high temperature applications.

Extension: 1/2" NPT galvanized carbon steel nipples with plated steel explosion proof union.

ELEMENT

- 100Ω Platinum 385 0.1% @ 0°C standard (other tolerances and accuracies on request) with spring loaded 1/4" O.D. 316 SS sheath and single or dual element.

- Replacement Element Length: U + T + A with 6" leads (see page RT-4 to order).

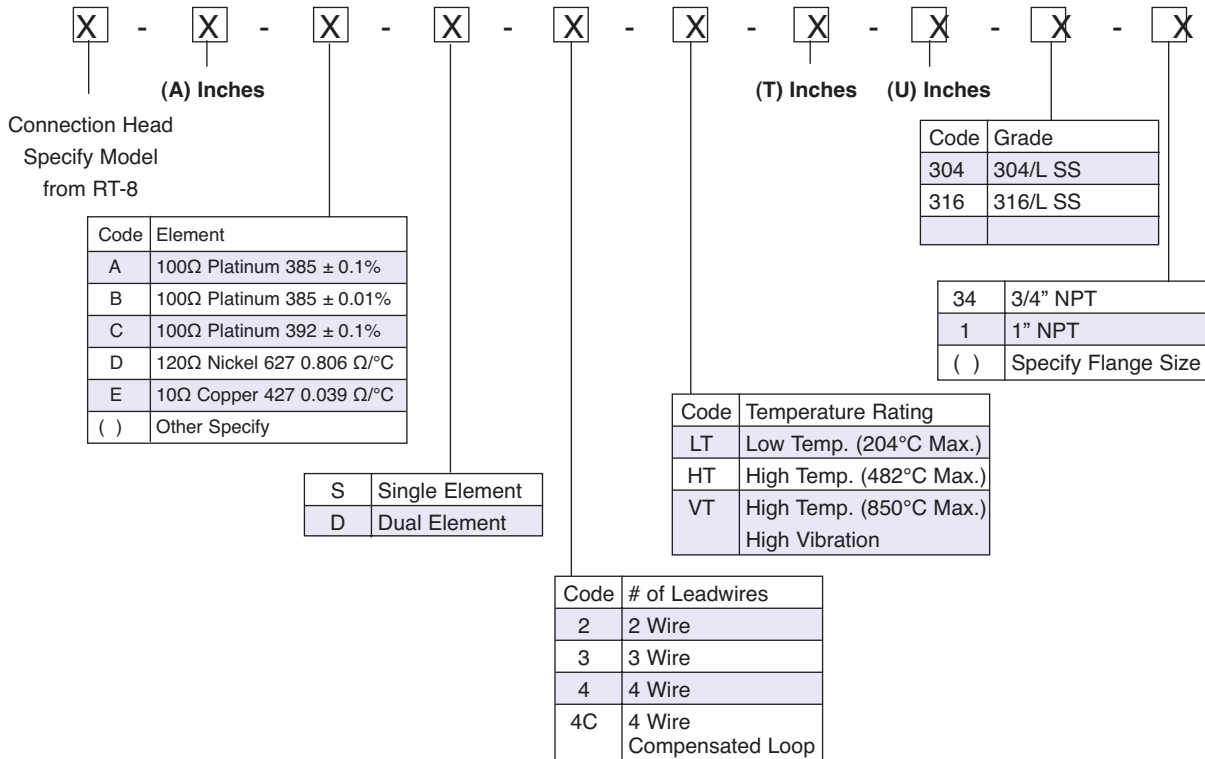
THERMOWELL

Threaded: 3/4" NPT or 1" NPT, hex bar stock drilled 0.260" bore tapered to 3/4" diameter.

Material: 304/L or 316/L SS supplied as standard, other grades available on request.

Flanged: 1 1/8" round bar stock, standard, optional 1 1/4" or 1 3/8", drilled 0.260" bore and tapered to 3/4" diameter.

Material: 304/L or 316/L SS supplied as standard, other grades available on request.



REPLACEMENT ASSEMBLIES

Spring Loaded, Sheathed RTD with Nipple



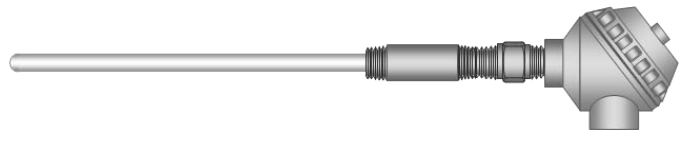
Sheathed RTD with Flex Armoured Leads



Fixed Hex, Spring Loaded Oil Seal, or Transmitter Bushing Sheathed RTD



Spring Loaded, Sheathed RTD with Nipple/Union/Nipple



For replacement sensors, see page RT-4.

- - - - - - - - -

Connection Head
Specify Model
from RT-8.
(X) Not Required

(A) Inches
(X) Not Applicable

(L) Inches

Code	Element
A	100Ω Platinum 385 ± 0.1%
B	100Ω Platinum 385 ± 0.01%
C	100Ω Platinum 392 ± 0.1%
D	120Ω Nickel 627 0.806 Ω/°C
E	10Ω Copper 427 0.039 Ω/°C
()	Other Specify

Code	Temperature Rating
LT	Low Temp. (204°C Max.)
HT	High Temp. (482°C Max.)
VT	High Temp. (850°C Max.) High Vibration

Code	# of Leadwires
2	2 Wire
3	3 Wire
4	4 Wire
4C	4 Wire Compensated Loop

Code	Probe Diameter
18	1/8"
36	3/16"
21	.215"
14	1/4"

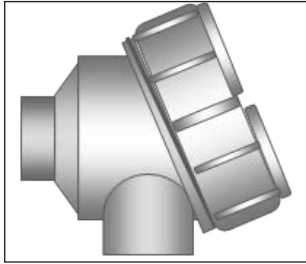
Code	Process Fitting
N	Nipple
NU	Nipple/Union/Nipple
FX	Fixed (1/2" NPT Process)
OS	Oil Seal (1/2" NPT Process)
TX	Transmitter (1/2" NPT Process)
FA	Flex Armour

S	Single Element
D	Dual Element

NOTE: 316SS Sheath supplied as standard. If other required, specify at time of order.

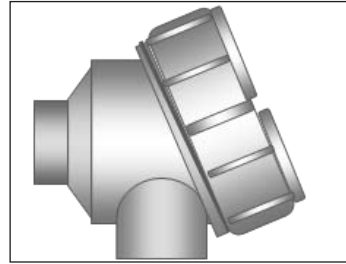
CONNECTION HEADS

EXPLOSION PROOF



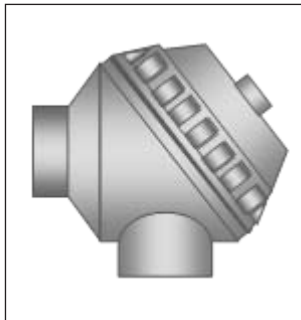
MODEL	MATERIAL
2AL	Cast Aluminum
2SS	316 Stainless Steel
2ALT	Cast Aluminum Teflon Coated

EXPLOSION PROOF



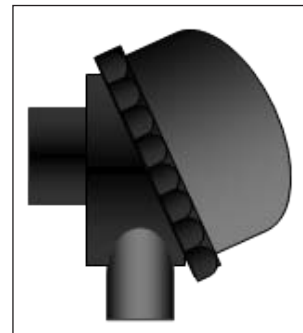
MODEL	MATERIAL
1AL	Cast Aluminum
1CI	Cast Iron
1ALT	Cast Aluminum Teflon Coated
1CIT	Cast Iron Teflon Coated

GENERAL PURPOSE



MODEL	MATERIAL
3AL	Cast Aluminum
3CI	Cast Iron
3ALE	Cast Aluminum Epoxy Coated
3CIE	Cast Iron Epoxy Coated

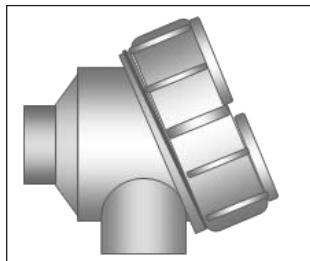
NON HAZARDOUS INDOOR/OUTDOOR/SANITARY



MODEL	MATERIAL
4P	White Polypropylene (92°C Max.)
4D	Grey Delrin (135°C Max.)

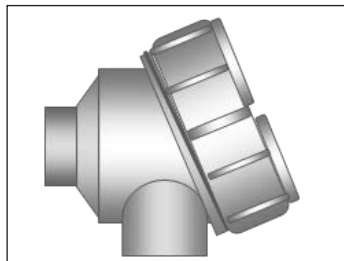
CONNECTION HEADS

EXPLOSION PROOF



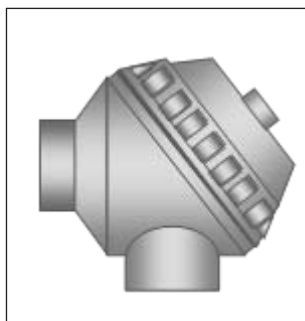
MODEL	MATERIAL
2AL	Cast Aluminum
2SS	316 Stainless Steel
2ALT	Cast Aluminum Teflon Coated

EXPLOSION PROOF



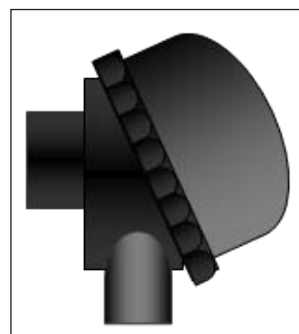
MODEL	MATERIAL
1AL	Cast Aluminum
1CI	Cast Iron
1ALT	Cast Aluminum Teflon Coated
1CIT	Cast Iron Teflon Coated

GENERAL PURPOSE



MODEL	MATERIAL
3AL	Cast Aluminum
3CI	Cast Iron
3ALE	Cast Aluminum Epoxy Coated
3CIE	Cast Iron Epoxy Coated

NON HAZARDOUS INDOOR/OUTDOOR/SANITARY



MODEL	MATERIAL
4P	White Polypropylene (92°C Max.)
4D	Grey Delrin (135°C Max.)

Sensor Attributes

Criteria	Thermocouple	RTD
Range Measurement	-454°F to 4208°F -270°C to 2320°C	-400°F to 1472°F -240°C to 800°C
Accuracy	Medium	High
Response	Medium-High	High
Sensitivity (output)	Low	High
Repeatability	Poor-Fair	Excellent
Linearity	Fair	Good
Self Heating	No	Low
Tip (end) Sensitivity	Excellent	Fair
Lead Effect	High	Medium
Size/Packaging	Small-Large	Small-Medium


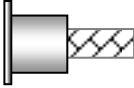



*Grounded vs. Ungrounded- A grounded junction places the junction in contact with the immediate case metal. In turn this allows for quicker response time. On the other hand, a tip that is grounded leaves it vulnerable to electromotive forces (EMF) in the environment, which potentially cause errors in the readings. An ungrounded junction is best suited when isolating the sensor is done and when response time is not a high priority.

*Performance- Ensuring exceptional performance of the sensor requires it to be in good thermal contact with the process at hand. When using both a sensor and thermowell together, a suitable heat transfer compound is needed to fill the gap between the sensor and bore of the thermowell. This in turn will improve the transfer of heat between the process and the sensor.

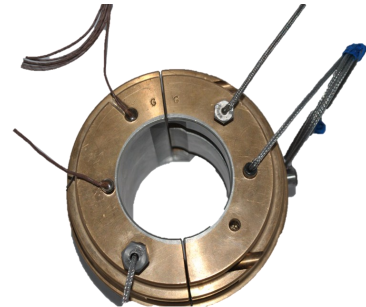
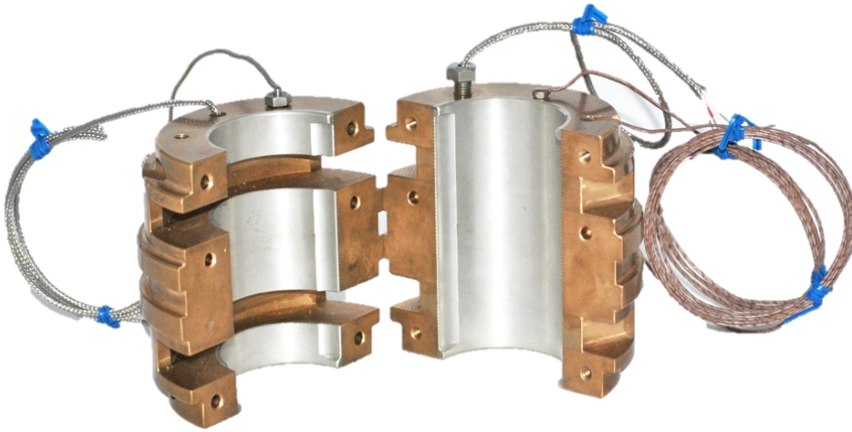
Bearing RTD's & Thermocouples

Applications: Bearings, Babbitt Bearings, Shafts, Motor Windings, and Thrust Plates

Thermometrics miniature temperature sensors used in rotating machinery are designed to measure the critical temperature of the bearing shoes operating in turbines, generators and other rotating equipment. Monitoring the bearing temperature of rotating equipment is very critical and can provide an early warning of the lubricating oil breaking down when it becomes too hot, allowing machine shutdown and necessary maintenance to take place.

Sensor Type	Case Style A		Case Style B		Case Style C		Case Style D		Case Style E	
										
	.275" OD x .250"L		.188"OD x .250" L		.125" OD x 0.300"L		.080" OD x 0.300"L		.275" OD x .250"L	
Platinum 100Ω ± .12% @ 0°	SINGLE	DUAL	SINGLE	DUAL	SINGLE	DUAL	SINGLE	DUAL	SINGLE	DUAL
	3 wire 22 awg	6 wire 22 awg	3 wire 22 awg	6 wire 26 awg	3 wire 26 awg	6 wire 30 awg	3 wire 30 awg	N/A	3 wire 22 awg	6 wire 30 awg
Thermocouple (J,K,T,E)	2 wire 22 awg	4 wire 24 awg	2 wire 24 awg	4 wire 24 awg	2 wire 24 awg	4 wire 24 awg	2 wire 30 awg	N/A	2 wire 20 awg	4 wire 24 awg

Visit www.bearingsensor.com for all your bearing sensor needs.



Temperature Range: -50° to 260°C (-58° to 500°F)

Lead Wires: Stranded silver-plated copper conductors with PTFE insulation and optional stainless steel overbraid.

Insulation Resistance: 10 Megaohms Min. at 100 VDC, leads to case (RTD)

10 Megaohms Min. at 100 VDC, Ungrounded only (T/C)

*Other wire gauges available upon request.

*Fluid resistant wire available.

*Custom configurations available.

ACCESSORIES AVAILABLE



Bearing Sensor RTD's & Thermocouples



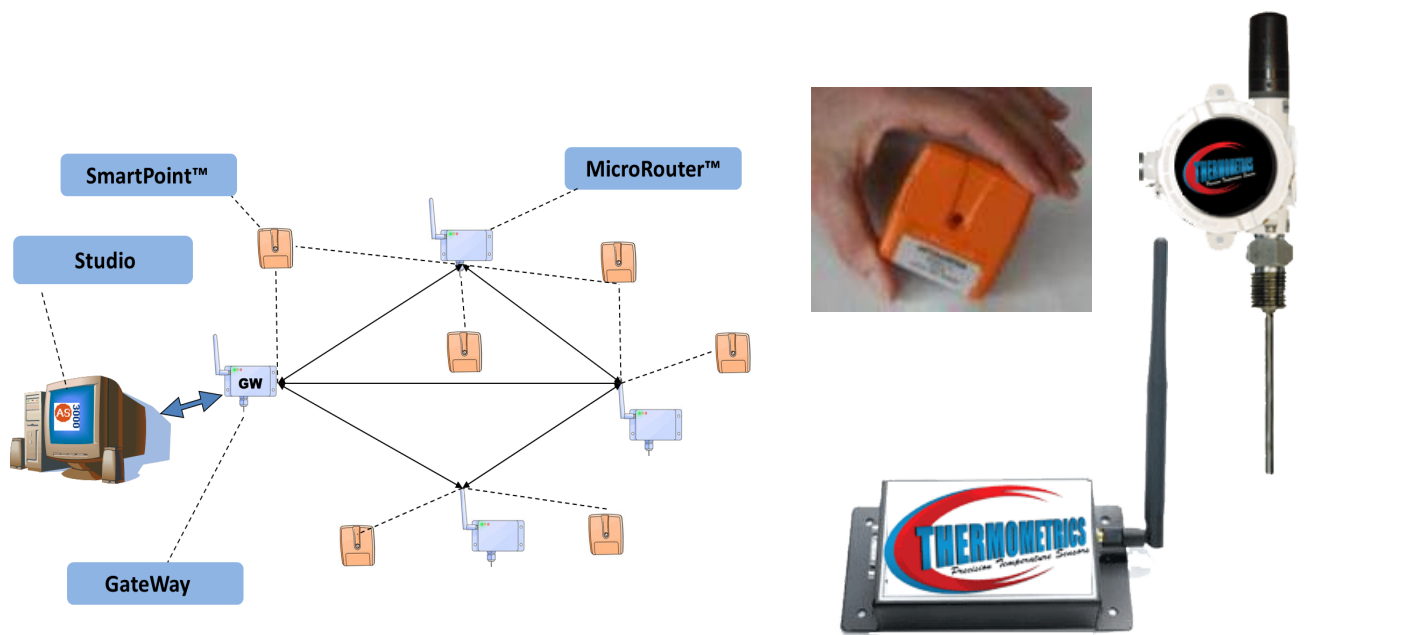
Wireless Temperature Sensing

WIRELESS TEMPERATURE SENSOR NETWORK

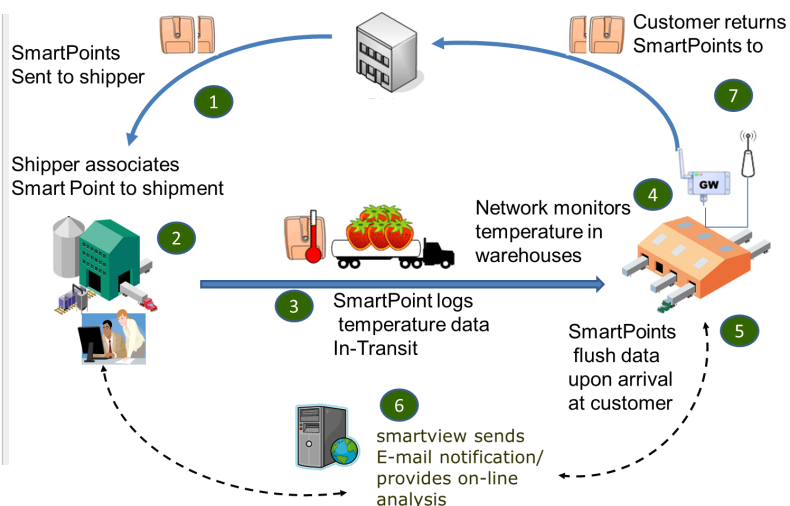
Thermometrics now has the ability to offer customers wireless temperature monitoring and data logging systems.

Customers now have the ability to view temperature readouts on any windows mobile or xp wifi device and receive alerts when temperatures move beyond their constraints. This gives you the ability to monitor your temperature sensors from anywhere in world that you have internet.

Monitoring temperature is crucial in trying to avoid costly repairs. Having the ability to monitor temperature from your cellphone or any computer in your network is just another step in making sure you machines are running right.



smartview



Sanitary Assemblies

3-A sanitary system accepted practices pertain to the sanitation aspects of equipment used to produce frozen desserts, egg, milk, cottage cheese, and similar food and dairy products. Included are Culinary Steam, Boiler Feed Water, Heat Exchangers, Transfer Station, Silo Tank, Atmospheric Pasteurizers, Pipeline Milking Systems and Feed Production.

Why is 3A Sanitary Temperature Measurement Important?

The following sanitary systems are dependent upon accurate temperature measurement;

Pasteurization Systems include high temperature short time (HTST) at 105 degree's Celsius and higher heat shorter time (HHST) at 149 degree's Celsius. requirements.

Boiler Feed Water Systems include temperature measurement to reduce water hardness and to prevent corrosion and scale in boilers and or to facilitate sludge removal for proper boiler care and operation.

Sanitization Systems include temperature, time and the concentration of specific detergent solutions and bactericides. Cleaning and sanitizing procedures routinely include requirements at 121 degree's Celsius.

Such factors as flavor control, homogenization, clarification, and separation of the product are



Petro-Chemical Sensors



Thermometrics Corporation manufactures temperature sensors, radiant tubeskin thermocouples, petrochemical sensors and gasifier thermocouples for refining facilities around the world. Tube skin refinery thermocouples manufactured with superior metallurgy are used to measure the temperature of process such as Coker, Purge Gas Recovery, Primary Reformer, and Synthesis Converter systems. The size of the sensors are designed for each particular application by an engineer during construction or retrofit of a factory or process. The type of thermocouple sensor used is generally a Type K due to its optimum temperature range and cost factors. Tube skin thermocouples unique design with expansion loops allows the thermocouple temperature sensor tip to move as the process vessel expands and contracts.



ANSI CALIBRATION

Type J Type J is composed of positive leg, which is iron and a negative leg, which is approximately 45% nickel-55% copper. When protected by compacted mineral insulation and appropriate outer sheath, Type J is useable from 32° to 1400°F. It is not susceptible to aging in the 700-1000°F temperature range, (+2°F to +4°F drift) which occurs with ANSI Type E and K. This low cost, stable calibration is primarily used with 96% pure MgO insulation and a stainless steel sheath.

Type K Type K is composed of a positive leg, which is approximately 90% nickel, 10% chromium and a negative leg, which is approximately 95% nickel, 2% aluminum, 2% manganese and 1% silicon. When protected by compacted mineral insulation and appropriate outer sheath, type K is useable from (-32° to 2300°F). If temperature range falls between (600° to 1100°F), we recommend using type J or N because of aging which can cause a drift rate of, (2° to 4° F) in a few hours time. For applications below (32°F), special selection of alloys are usually required.

Type N Type N is composed of a positive leg which is approximately 14% chromium, 1.4% Silicon and 84.6% Nickel, a negative leg which is approximately 4.4% Silicon, 95.6% Nickel. When protected by compacted mineral insulation and appropriate outer sheath, Type N is useable from (32° to 2300°F). Type N was developed to overcome several problems inherent in Type K thermocouples. Aging in the (600° to 1100°F) temperatures is considerably less. Type N has also been found to be more stable than Type K in nuclear environments.

Type T Type T is composed of a positive leg which is pure copper and a negative leg which is approximately 45 % nickel, 55 % copper. When protected by compacted mineral insulation and appropriate outer sheath, Type T is useable from (32° to 662°F). Type T is very stable and is used in a wide variety of cryogenic and low temperature applications. For applications below (32°F) special selection of alloys are usually required.

Type E Type E is composed of a positive leg which is approximately 90% Nickel, 10% Chromium and a negative leg which is approximately 45% Nickel, 55% copper. When protected by compacted mineral insulation and appropriate outer sheath, Type E is useable from (32° to 1652°F). This Thermocouple has the highest EMF output per degree of all recognized thermocouples. If the temperature is between (600° to 1100°F), we recommend using type J or N because of aging which can cause drift of (2° to 4°F) in a few hours time. For applications below (32°F), special selection of alloys are usually required.

ANSI CALIBRATION

- Type S** Type S is composed of a positive leg, which is 90% platinum 10% Rhodium and a negative leg which is 100% Platinum. When protected by compacted mineral insulation and appropriate outer sheath, Type S is usable from (32° to 2700°F). Reducing atmospheres are particularly damaging and easily contaminated. Type S should be protected with gas tight ceramic tubes, a secondary tube of porcelain and silicon carbide or metal outer tubes as conditions require.
- Type R** Type R is composed of a positive leg, which is 87% Platinum 13% Rhodium and a negative leg which is 100% Platinum. When protected by compacted mineral insulation and appropriate outer sheath, Type R is usable from (32° to 2700°F). Type R has a higher EMF output than type S. Also easily contaminated, and damaged by reducing atmospheres. Type R should be protected in a similar fashion as Type S.
- Type B** Type B is composed of a positive leg which is approximately 70% Platinum, 30% Rhodium and a negative leg which is approximately 94% Platinum, 6% Rhodium. When protected by compacted mineral insulation and appropriate outer sheath, Type B is usable from, (1600° to 3100°F). Also easily contaminated, and damaged by reducing atmospheres. The same protective measures as shown above apply to type B Thermocouples.
- Type C** Tungsten-5 % Rhodium/Tungsten-26 % Rhodium is generally referred to as type C. When protected by compacted mineral insulation and appropriate outer sheath, it is usable from, (32° to 4200°F). Used most often with Beryllium oxide insulation and either molybdenum or tantalum sheath. These combinations can only be used in an inert or vacuum environment.

MINERAL INSULATIONS

HIGH PURITY
MAGNESIUM OXIDE
(MGO) 99.4%
MINIMUM PURITY

Low impurity levels make this insulation very useful for all thermocouples calibrations up to 2500°F Hygroscopic , compacts well.

STANDARD PURITY
MAGNESIUM OXIDE
(MgO) 96%
MINIMUM PURITY

This lower cost insulation is similar to high purity MgO except should not be used in applications above 2000°F because of the impurity levels. Should not be used with platinum or in nuclear applications.

ALUMINA OXIDE
(AL₂O₃) 99.6%
MINIMUM PURITY

Comparable to MgO in electrical properties but does not compact well. Commonly used as one piece insulator for noble metal calibrations. Maximum temperature recommended: 2400°F

ORDER CODE	SHEATH MATERIAL	MAXIMUM TEMPERATURE (CONTINUOUS SERVICE AIR)	NOTES
304	304 Stainless Steel	1650°F	Most commonly used low temperature sheath material. Good corrosion resistance. Subject to damaging carbide precipitation in 900° to 1600°F range.
304L	304 Low Carbon Stainless Steel	1650°F	Low carbon version of 304ss Low carbon content allows this material to be welded and heated in the 900° to 1600°F range without damage to corrosion resistance.
*310	310 Stainless Steel	2100°F	Mechanical and corrosion resistance similar to but better than 304ss. Very good heat resistance. This alloy contains 25% Cr, 20% Ni. Not as ductile as 304ss
*316	316 Stainless Steel	1650°F	Best corrosion resistance of the austenitic stainless steel grades. Good corrosion resistance in Hydrogen Sulfide. Subject to damaging carbide precipitation in the 900° to 1600°F range.
316L	316 Low Carbon Stainless Steel	1650°F	Same as 316ss, except low carbon version which allows for better welding and fabrication.
347	347 Stainless Steel	1600°F	Similar to 304 except nickel columbium stabilized. Designed to overcome susceptibility to carbide precipitation in the 900° to 1600°F range.
446	446 Stainless Steel	2100°F	Ferritic stainless steel which has good resistance to sulfurous atmospheres at high temperature. Good corrosion resistance to nitric acid, sulfuric acid and most alkalis. 27% chromium content gives this alloy this highest heat resistance of any ferritic stainless steel.
INC	Inconel 600	2150°F	Most widely used thermocouple sheath material. Good high temperature strength, corrosion resistance, resistance to chloride-ion stress corrosion cracking and oxidation resistance to high temperature. Do not use in sulfur bearing environments. Good in nitriding environments
INC625	Inconel 625	1800°F	Excellent high temperature strength. Excellent resistance to pitting and crevice corrosion. Unaffected by radiation embrittlement.
MOL	Molybdenum	750°F (in Air)	Refractory metal. Brittle, cannot be bent. Use only in inert, vacuum or reducing atmospheres. Most commonly used with BeO insulation and Tungsten Rhenium conductors. Non-compacted assemblies only.
TI	Titanium	800°F	Lightweight, excellent strength in the 300° to 800°F temperature range. Excellent resistance to oxidizing acids such as nitric or chromic. Resistant to inorganic chloride solutions, chlorinated organic compounds and moist chlorine gas. Resistant to salt water spray and sea water.
MO	Monel 400	1000°F	1000°F Maximum in oxidizing conditions. Nickel-copper alloy with good corrosion resistance. Excellent resistance to sea water, hydrochloric acid and most alkalis.
HAB	Hastelloy B-2	1000°F (oxidizing) 1500°F (Reducing or Vacuum)	Excellent resistance to hydrochloric acid at all concentrations and temperature. Also resistant to hydrogen chloride, sulfuric, acetic, and phosphoric acid.
HAC	Hastelloy C-276	2000°F	Excellent corrosion resistance, especially in chlorinated environments. Resistant to ferric and cupric chlorides, solvents, chlorine, formic acids, acetic acids, brine, wet chlorine gas and hypochlorite.
CU	Copper OFHC	400°F	Excellent thermal conductivity. Used in special applications for research and low temperature applications.
TA	Tantalum	900°F (in air)	Refractory metal. Very ductile. Use only in inert or very good vacuums. Most commonly used with BeO and Tungsten Rhenium conductors. Do not use in environments containing nitrogen above 700°F
AL	Aluminum (1100)	600°F	Commercially pure aluminum. Used in special applications requiring good thermal conductivity.
AL20	Alloy 20	1800°F	Generic version of Carpenter 20CB-3 developed specifically for resistance to sulfuric acid.

TRANSMITTERS

Temperature transmitters make it possible to send a scaleable (4 to 20) mA signal from a temperature sensor to a control device without investing in long, expensive runs of thermocouple or RTD wire.

Thermometrics carries programmable temperature transmitters that can be mounted in the temperature sensor assembly connection head, or surface mounted using a DIN rail mounting clip. They are PC programmable and convert various signals into a scaleable (4 to 20) mA analog output signal. We also carry transmitters programmable with Hart® protocol for various signal inputs.



CONNECTION HEADS

Connection heads provide a protected, clean area for mounting a terminal block or transmitter as part of the transition from temperature sensor assembly to lead wire.

As a full-line manufacturer, Thermometrics produces its own connection heads for its temperature sensor assemblies and other applications. Our product line includes aluminum, plastic, stainless steel and cast iron connection heads. Thermometrics specially-designed explosion proof stainless steel, aluminum or cast iron/aluminum connection heads are approved as part of temperature sensing assemblies used in hazardous locations within the U.S. and Canada. Most of the line consists of screw-cover connection heads; however, we also carry a flip-top aluminum head for easy-access. Our connection heads are designed to accommodate most transmitters and wire connections.

Customers interested in private brand labeling of our connection heads can contact their sales representative for more information. Connection heads are available as separate components or as



FLANGES & WELLS

Thermowells and Flanged Thermowells are available for immediate installation. These designs are acceptable for most common industries and promote a long service life and accurate measurement of your process.



ACCESSORIES

Thermometrics offers the support products needed to install and maintain your temperature sensor assemblies. From jacks, terminals and plugs to pipe nipples, clamps, bushings and other fittings, we always have inventory available for shipment. Connection heads and transmitters are two of the larger accessories we carry in stock, but we also keep a variety of coiled cords, grips and flexible armor on hand.



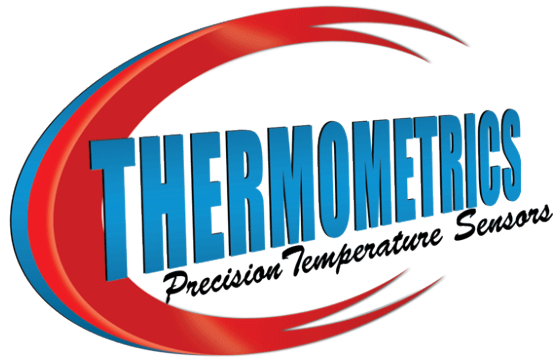
Calibration Services

Thermometrics laboratory has an operating range of -100°C to $+1200^{\circ}\text{C}$ and is designed to support our research and production operations. Calibrations are performed in accordance with ANSI Z540 and MIL-STD 45662 and are traceable to N.I.S.T. Industrial specification such as AMS, ASTM, DIN, IEC, and JIS are common knowledge among our staff.

Temperature calibration is the laboratories business and our focus is to perform calibrations exactly the way our customer requires. We take the extra step and design documentation specifically for your requirements to enable you to maintain your calibration system, the way you want.

- *Precision RTD Calibration with ITS-90, IPTS-68, Calendar Van Dusan or Polynomial Chart.
- *Industrial RTD calibration with Data and Deviation from IEC-751.
- *Meters, Transmitters & Switches.
- *Thermistor & Bi-Metallic Calibration





Application Assistance

Our sales engineers and cross trained and able to attend to all of our customer's special needs and requirements. By doing so, this means you'll speak with the same Sales Engineer every time and consequently, you can depend on getting sales assistance based on your needs. Our sales team, all with hands-on, in-house production experience and field application knowledge, can provide you with information about our products and their process applications, as well as help you select a standard or special product to solve your specific problem. They are your partners and your first link to the successful application and use of our products.

General Questions- sales@thermometricscorp.com

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