

# THERMOCOUPLE

THE ULTIMATE SOLUTION FOR TEMPERATURE SENSING

THERMECH



# THERMOCOUPLE

The principle on which the modern thermocouple operates is derived from Seebeck's discovery that if a circuit is formed using two dissimilar metal Conductors with one junction at a higher temperature than other, then a current will flow in the circuit. The resultant emf. is proportional to the temperature difference between the junctions .

For many industries heating processes particularly those carried out at high temperature a Thermocouple is the most accurate convenient and simple method for temperature measurement.

## THERMOCOUPLE TYPE & TEMPERATURE RANGE

TC Type	Name of Materials	Application Range
B	Platinum 30% Rhodium (+) Platinum 6% Rhodium (-)	1200-1800°C
C	W5Re Tungsten 5% Rhenium (+) W26 Re Tungsten 26% Rhenium (-)	1650 – 2315°C
E	Chromel (+) Constantan (-)	0-900°C
J	Iron (+) Constantan (-)	0-760°C
K	Chromel (+) Alumel (-)	0-1200 °C
N	Nicrosil (+) Nisil (-)	650-1260°C
R	Platinum 13% Rhodium (+) Platinum (-)	870-1650°C
S	Platinum 10% Rhodium (+) Platinum (-)	980-1650°C
T	Copper (+) Constantan (-)	-200 - 350°C

## PROTECTION SHEATHS

### Seamless tube and drilled bar stock

Type	Recommended Max. Temp	Remarks
SS304	870°C	Most widely used low temperature sheath material. Extensively used in food, beverage, chemical and other industries where corrosion resistance is required.
SS316	870°C	Best corrosion resistance of the austenitic stainless steel grades. Widely used in the food and chemical industry
SS310	1150°C	Mechanical and corrosion resistance, similar to but better than 304 SS. Very good heatresistance
446 SS	1150°C	Ferritic stainless steel which has good resistance to sulfurous atmospheres at high temperatures. corrosion resistance to nitric acid, sulfuric acid and most alkalis.
INCONEL 600/601	1175°C	Good high temperature strength, corrosion resistance, resistance to chloride-ion stress corrosion cracking and oxidation resistance to high temperatures.
Metal Ceramic	1370°C	Used in Copper, Brass and Steel Industry
Silicon Carbide	1650°C	Used in Aluminium Industry
Syalon®	1150°C	Used in aluminium Industry
Ceramic 610	1600°C	Excellent thermal mechanical and corrosion resistance.
Ceramic 710	1800°C	Excellent thermal mechanical and corrosion resistance.

standard thermocouple protection tube should be preheated to about 480°C before immersion in molten metal at 1100°C or higher

General Hand Held Purpose Thermocouple Sensor



Fast Response Hand Held Air/Gas Thermocouple Sensor



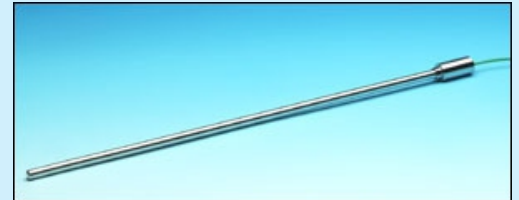
Hand Held Needle Penetration Thermocouple Sensor



Moving Surface Roller Thermocouple Sensor



Mineral Insulated Thermocouple with Pot Seal - 4.5mm and 6.0mm diameters



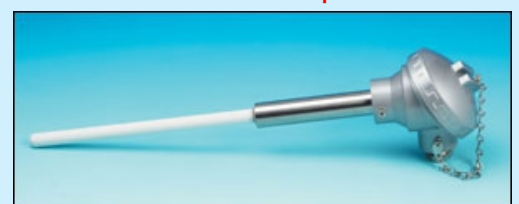
Mineral Insulated Thermocouple with Miniature Flat Pin Plug



Mineral Insulated Thermocouple with Standard Round Pin Plug



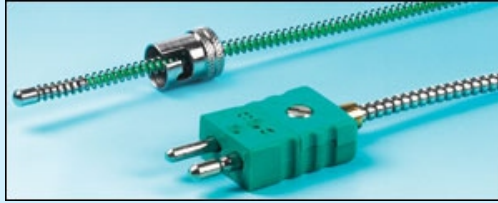
Industrial Ceramic Thermocouples



**Thermocouple with Standard Head and 4-20mA Transmitter**



**Heavy Duty Bayonet Thermocouple**



**Nozzle Thermocouple**



**Mineral Insulated Thermocouple with Standard Head & Process Connection**



**Plastic Melt Thermocouple**



**Spring Bearing Thermocouple 'Top Hat Style'**



**Mineral Insulated Thermocouple with a Size 1 Lemo Connector**



**Standard Bearing Thermocouple**



**Adjustable Ring Thermocouple**



**Mineral Insulated Thermocouple with Pot Seal**



**Washer Thermocouple**



**Autoclave Drain Thermocouple**



**Mineral Insulated Thermocouple with IP67 Miniature Weatherproof Head**



**Autoclave Load Thermocouple**



**Heavy Duty Industrial Thermocouple**



**Budget Bayonet Thermocouples**



**Welded Tip Teflon Thermocouple**



**NIPPLE-UNION-NIPPLE (N-U-N) & FLANGED THERMOWELL**



**Mineral Insulated Thermocouple with IP67 Miniature Weatherproof Head**



**Bayonet Thermocouple with an Adjustable Cap Fitting**



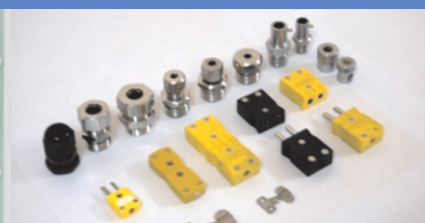
**BEADED ELEMENTS, with METAL SHEATH & FLANGE or THREADED MOUNTING**







**FOUNDRY PYROMETER**



**ADJUSTABLE FITTING & CONNECTOR**



**FOUNDRY TIP**

**Resistance Temperature Detector**

When accuracy over a wide temperature range is a crucial factor in the industry, Platinum Resistance Temperature Detectors (RTD's) are unequal in performance. A Resistance Temperature Detectors operates on the principle of the change in electrical resistance in wire as a function of temperature. An RTD probe or assembly is composed of element, a sheath, a lead wire and a termination or a connection. These probe may be terminated in connector head, quick disconnect, a terminal block or extension wire.

**Compensating Cable**

When connecting thermocouple to instruments, it is essential that is used which has the same emf output as the thermocouple, otherwise superiors emf is generated at these junctions. The best solution is to use the same material as the thermocouple (extension cable) A cheaper alternative is to use compensating cables, the alloys of which are different from those of the thermocouple but have the same output over a limited temperature range.

Compensating cable for thermocouple J, K, T, E, N, R, S, and B Types. Wire Gauge: 14 to 36 (AWG / SWG) Insulation: Fiber Glass, Teflon, Asbestos, Silicon, PVC, SS Braided etc. Protection: Armored / Unarmored

**Thermocouple and Extension Wire Color Codes**

Overall/Positive (+)/Negative (-)

T/C Type	ANSI MC96.1 T/C	ANSI MC96.1 Extension	UK BS 1843	Germany DIN 43714	Japan JIS C1610-1981	France NF C42-323
B(overall)	---	Grey	---	Grey	Grey	---
BP	---	+Grey	---	+Red	+Red	---
BN	---	-Red	---	-Grey	-White	---
E(overall)	Brown	Purple-Red	Brown	Black	Purple	---
EP	+Purple	+Purple	+Brown	+Red	+Red	+Yellow
EN	-Red	-Red	-Blue	-Black	-White	-Black
J(overall)	Brown	Black	Black	Blue	Yellow	Black
JP	+White	+White	+Yellow	+Red	+Red	+Yellow
JN	-Red	-Red	-Blue	-Blue	-White	-Black
K(overall)	Brown	Yellow	Red	Green	Blue	Yellow
KP	+Yellow	+Yellow	+Brown	+Red	+Red	+Yellow
KN	-Red	-Red	-Blue	-Green	-White	-Purple
N(overall)	Brown	Orange	---	---	---	---
NP	+Orange	+Orange	---	---	---	---
NN	-Red	-Red	---	---	---	---
R(overall)	---	Green	Green	---	Black	---
RP	---	+Black	+White	---	+Red	---
RN	---	-Red	-Blue	---	-White	---
S(overall)	---	Green	Green	White	Black	Green
SP	---	+Black	+White	+Red	+Red	+Yellow
SN	---	-Red	-Blue	-White	-White	-Green
T(overall)	Brown	Blue	Blue	Brown	Brown	Blue
TP	+Blue	+Blue	+White	+Red	+Red	+Yellow
TN	-Red	-Red	-Blue	-Brown	-White	-Blue

**THERMECH INDUSTRIES**

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**ISO 9001:2015**