eltec™

EMPOWERING PROCESS MANAGEMENT

Temperature Sensors

RTD, Thermocouple & Thermowell

EMPOWERING PROCESS MANAGEMENT

CONTENTS

ELTEC CABLES & INSTRUMENTS
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EMPOWERING PROCESS MANAGEMENT

RTD (RESISTANCE TEMPERATURE DETECTORS)

RTDs are based on principles that the measuring RTD element produces Ohms (Ω) when heated in proportional to its change in temperature. RTD elements have a predictable and repeatable relationship between temperature and Ohms. Many type of RTD Elements are available such as **PT 100, PT 500, PT 1000**. The most commonly used is **RTD PT 100**.

RTD PT 100 has **100 Ohms (Ω) at 0 ºC** and when heated it produces Ohms in proportion to change in temperature. Resistance Temperature Detectors (RTDs) are used for industrial temperature measurements where high accuracy and long-term stability are required.

TOLERANCE of RTD ELEMENT:

Tolerance of an RTD is a measure of its conformity to the ITS-90 Temperature-Resistance curve, and is normally expressed as an **allowable deviation from the normal resistance at 0 ºC**. It consists of a manufacturing tolerance on the reference point (eg: how close is the resistance to 100 Ω at 0 ºC) and a materials tolerance on the Temperature Coefficient of Resistance (eg: how close does the wire conform to an alpha of 0.00385).

At the reference temperature, only the manufacturing tolerance applies (since this is where the RTD element is "adjusted" to 100 Ω). At other temperatures, the materials tolerance must be added. As the temperature increases or decreases, the tolerance becomes wider. At higher temperatures, the material tolerance has the larger influence.

DIN/IEC 60751 (replaces DIN 43760) defines Class B and Class A tolerances.

Temperature	Resistance	Class A		Class B	
ºC	Ω (Ohms)	Ω (Ohms)	ºC	Ω (Ohms)	ºC
-200	18.52	±0.24	±0.55	±0.56	±1.30
-100	60.26	±0.14	±0.35	±0.32	±0.80
0	100.00	±0.06	±0.15	±0.12	±0.30
100	138.51	±0.13	±0.35	±0.30	±0.80
200	176.86	±0.20	±0.55	±0.48	±1.30
300	212.05	±0.27	±0.75	±0.64	±1.80
400	247.09	±0.33	±0.95	±0.79	±2.30
500	280.98	±0.38	±1.15	±0.93	±2.80
600	313.71	±0.43	±1.35	±1.06	±3.30
650	329.64	±0.46	±1.45	±1.13	±3.60
700	345.28	---	---	±1.17	±3.80
800	375.70	---	---	±1.28	±4.30
850	39048	---	---	±1.34	±4.60

Elements with narrower tolerances are available (eg: 1/3 B, 1/5 B, etc). No standard exists for these fractional tolerance elements; it depends on the manufacturer of the element. For example, a 1/10 B element would normally have a manufacturing tolerance of 0.03 ºC, but the material tolerance would depend on the manufacturer's choice of wire (class B, class A or other).

Accuracy is dependent on the tolerance of the RTD, the measurement temperature, the accuracy of the readout device, the effects of the interconnecting lead wire and the installation.
Platinum elements with other temperature-resistance curves are available (eg: JIS). Copper and Nickel elements are also available as replacements to match existing instrumentation.

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RTD LEAD WIRE CONFIGURATION

Two Wire :

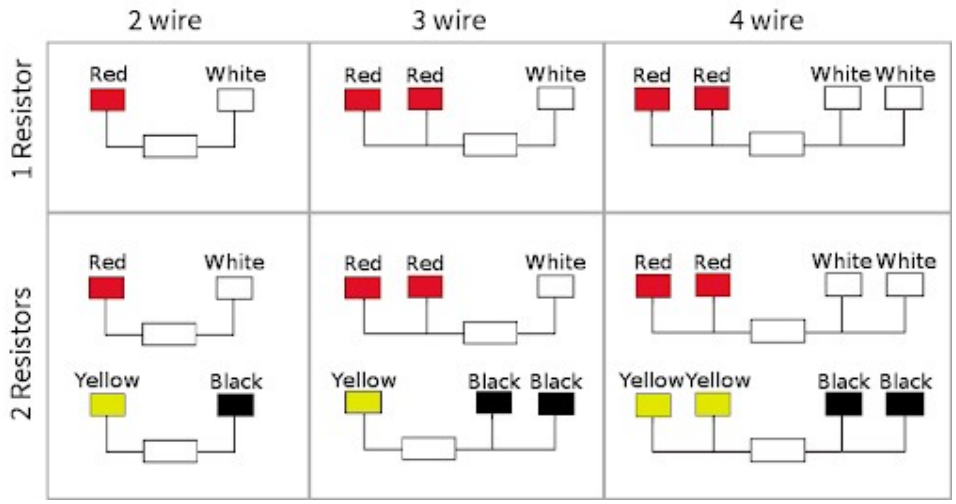
Provides one connection to each end of the element. This construction is suitable where the resistance of the lead wire may be considered as an additive constant in the circuit, and particularly where the changes in lead resistance due to ambient temperature changes may be ignored.

Three Wire :

Provides one connection to one end of the element and two to the other end of the element. Connected to an instrument designed to accept three wire input, sufficient compensation is usually achieved for lead wire resistance and temperature change in leadwire resistance. This is the most commonly used configuration.

Four Wire :

Provides two connections to each end of the element to completely compensate for lead wire resistance and temperature changes in the leadwire. This configuration is used where highly accurate temperature measurement is vital.



PRODUCT FEATURES

- RTD Elements such as PT 100 / PT 500 / PT 1000.
- Highly accurate & Stable Probes.
- Rugged Construction.
- Wide Temperature Range from -200 °C to 850 °C.
- 2 wire, 3 wire & 4 wire Simplex & Duplex Configuration.
- Probes & Assemblies in various sizes & configuration.
- Various mounting options like Adaptors, Adj. Ferrule fittings, flanged connection, Nipple – Union – Nipple.
- Lead styles include miniature jack, miniature plug, pin leads, standard plugs, stripped lengths, and high and ultra-high temperature plugs.
- Custom Configuration.
- Industrial Safety Enclosure like Die Cast Aluminium Head or SS Head confirming to IP 65, IP 67 & IS Protection.
- Head Mount Transmitter Options.
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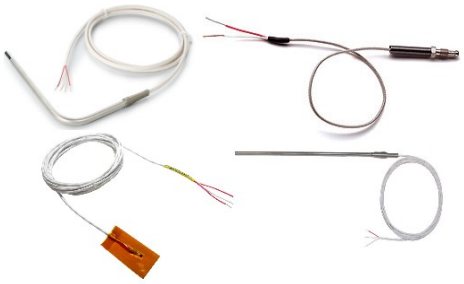
BAYONET & FLEXIBLE RTD CABLE PROBES



Bayonet RTD have a compressible spring and locking cap for quick insertion and detachment. Other probes connections like washer, button, plate, ribbons, ball, nozzles, bolts etc are beings used to manufacture flexible RTD Probes to suit various critical temperature measuring applications.

They are available with no protection tube (insulation only), armour clad flexible tube, or stainless steel over braid. All are light weight for easy connection to an instrument or a distant junction box.

APPLICATIONS	PRODUCT FEATURES
• *Plastic Extrusion Machines, Diversified Plastic & Packing Machinery*	• *Locking cap / spring / screwed bolts / bayonet adaptors for quick & easy attachment & detachment*
• *Automobiles & Engine Testing, Gen set*	• *Fixed & Adjustable lengths*
• *Medical & Scientific Equipments*	• *Wide Industrial applications*
• *Food, Pharma & Beverages*	• *Higher Accuracy & Stability.*
• *Various Industrial Machineries*	• *2 wire, 3 wire, 4 wire configuration*
• *Measuring Bearing Temperature in Motors, Turbines etc.*	• *Customized probes for measuring temperature for critical industrial applications*

PRODUCT TECHNICAL SPECIFICTIONS:	
Element	RTD PT 100 (100 Ohms) at 0 ºC RTD PT 200 (200 Ohms) at 0 ºC RTD PT 500 (500 Ohms) at 0 ºC RTD PT 1000 (1000 Ohms) at 0 ºC
No. of Element	*Simplex / Duplex*
Wire Configuration	*2 wire, 3 wire, 4 wire for SIMPLEX and 4 wire, 6 wire for Duplex*
Sensor Wire Insulation	*Fiber Glass, High Temperature Ceramic Yarn, PTFE, PFA, ETFE, SILICONE RUBBER, KAPTON, PVC etc.*
Sheath OD	*3mm to 8mm*
Sheath Material	*SS Tubes / Brass Tubes*
Mounting	*Bayonet Adaptor or Probe itself becomes suitable to be fixed at temperature measuring position*
Termination / Enclosure	*Seal Pot with flying leads* *Seal Pot with Male Female Connectors* *Flying leads fitted with cable lugs*

RTD Probes can be custom configured depending upon its environmnetal condtions & its probe can be designed as per demanding applications within the above TECHNICAL CONSTRUCTIONAL SPECIFICATIONS.

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INDUSTRIAL RTD PIPE ASSEMBLIES

*Industrial RTD Assemblies are more stable and highly accurate and normally manufactured for temperature range up to **400 °C** and higher on request.*

APPLICATIONS	PRODUCT FEATURES
• *High accuracy sensor for use in Industrial & Laboratory applications*	• *Wider temperature range from -200 C to 450 °C and higher up to 850 °C on request*
• *Food, Pharmaceuticals & Medical Equipments*	• *High Accuracy & Stability*
• *Temperature Measurement in Chemical Reactors & General Industrial applications*	• *Variety of Sheath Material for use in different industrial environmental conditions.*
• *Pulp & Paper Industry*	• *2 wire, 3 wire, 4 wire configuration.*

PRODUCT TECHNICAL SPECIFICTIONS:	
Element	RTD PT 100 (100 Ohms) at 0 °C RTD PT 200 (200 Ohms) at 0 °C RTD PT 500 (500 Ohms) at 0 °C RTD PT 1000 (1000 Ohms) at 0 °C
No. of Element	*Simplex / Duplex*
Wire Configuration	*2 wire, 3 wire, 4 wire*
Accuracy	*Class A / Class B as per DIN 60751*
Sheath OD	*1.5 to 10 mm or even more on request*
Sheath Length	*Rigid up to 1000 mm & up to 20000 mm for MI RTDs*
Sheath Material	*SS 316 or other on request*
Mounting	*Fixed Threaded, Adj. Ferrule fittings, Flanged, Nipple Union Nipple etc.*
Termination	*Flame Proof or Weather Proof Head with Single, Double entry from Cast Aluminium / Cast Iron / SS / Plastic* *Ceramic Terminal Block with Nickel Plated Brass Terminal & Optional spring loaded Terminal* *Ceramic Terminal Block with SS Base Plate* *SS Base Plate with flying leads for Temperature Transmitter*
Enclosure	*Weatherproof & Explosion Proof Head with Double Entry & Single Entry Cable Entry of Alu. Die Cast & Stainless Steel*
Optional Accessories	*Thermo well for external sensor protection, Head mounted transmitter etc. & Extension Wire*

RTD Assemblies can be custom configured & designed depending upon its environmnetal condtions & its demanding applications within the above TECHNICAL CONSTRUCTIONAL SPECIFICATIONS

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RTD PIPE ASSEMBLIES with CONNECTION HEAD ORDERING CODE

# 1	TS RTD
PT 100	PT 100
PT 500	PT 500
PT 1000	PT 1000
PT XXX	PT XXX – Any other, pl. specify

# 2	ELEMENT (No. of wire & Accuracy)
S2 A / B	*Simplex 2 Wire & Accuracy Class A / Class B*
S3 A / B	*Simplex 3 Wire & Accuracy Class A / Class B*
S4 A / B	*Simplex 4 Wire & Accuracy Class A / Class B*
D2 A / B	*Duplex 2 Wire & Accuracy Class A / Class B*
D3 A / B	*Duplex 3 Wire & Accuracy Class A / Class B*

#3	Type of Insulation
--	*As per manufacturing standards*
MI	*Mineral Insulation*

# 4	Sheath Material
316	*SS 316*
304	*SS 304*
X	*Other than above, please specify*

# 4	Sheath Diameter
4.5	*OD – 4.5 mm*
5	*OD – 5 mm*
6	*OD – 6 mm*
8	*OD – 8mm*
10	*OD – 10 mm*
12	*OD – 12 mm*
X	*Others please specify*

# 5	Sheath Length – Insertion length below Process Connection
X in mm	*55 to 20000 mm, please specify*

# 6	Process Connection
--	*None*
B1	*¼" BSP*
B2	*½" BSP*
N1	*¼" NPT*
N2	*½" NPT*
X	*Flanged or any others, please specify in details*

# 7	Type of Process Connection
F	*Fixed*
A	*Adjustable*
N	*Nipple*
NU	*Nipple Union*

# 8	Enclosure
E1	*Weather Proof Die Cast Alu. Head IP 65 / 67*
E2	*Flame Proof Die Cast Alu. Head*
E3	*Explosion Proof*

# 9	Optional Accessories
---	*None*
Tx	*Head Mount Temperature Transmitter*
XM	*X is wire length in meters*
TW	*Thermo well (Separate details)*

TS RTD	PT 100	S3A	MI	316	6	1000	B1	A	E1	Tx - 3M

TS RTD PT 100 S3A MI 316 6 1000 B1 A E1 T – 3M

RTD PT 100 Simplex 3 Wire Accuracy Class A, Sheath : SS 316, OD: 6mm, Legth: 100 mm, ½ " BSP Adjustable Connection, Weatherproof Enclosure with Head Mount Temperature Transmitter & 3 Meter wire length.

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RTD PLUG & JACK ASSEMBLIES ORDEING CODE

# 1	TS RTD
PT 100	PT 100
PT 500	PT 500
PT 1000	PT 1000
PT XXX	PT XXX – Any other, pl. specify

# 2	ELEMENT (No. of wire & Accuracy)
S2 A / B	*Simplex 2 Wire & Accuracy Class A / Class B*
S3 A / B	*Simplex 3 Wire & Accuracy Class A / Class B*
S4 A / B	*Simplex 4 Wire & Accuracy Class A / Class B*
D2 A / B	*Duplex 2 Wire & Accuracy Class A / Class B*
D3 A / B	*Duplex 3 Wire & Accuracy Class A / Class B*

#3	Type of Insulation
--	*As per manufacturing standards*
MI	*Mineral Insulation*

# 4	Sheath Material
316	*SS 316*
304	*SS 304*
X	*Other than above, please specify*

# 4	Sheath Diameter
4.5	*OD – 4.5 mm*
5	*OD – 5 mm*
6	*OD – 6 mm*
8	*OD – 8mm*
12	*OD – 12 mm*
X	*Others please specify*

# 5	Sheath Length – Insertion length below Process Connection
X in mm	*55 to 20000 mm, please specify*

# 6	Process Connection
--	*None*
B1	*¼" BSP*
B2	*½" BSP*
N1	*¼" NPT*
N2	*½" NPT*
X	*Flanged or any others, please specify in details*

# 7	Type of Process Connection
F	*Fixed*
A	*Adjustable*
N	*Nipple*
NU	*Nipple Union*

# 8	Connector
M	*Male Connector 3 Pin for 3 wire & 2 Pin for 2 wire*
F	*Female Connector 3 Pin for 3 wire & 2 Pin for 2 wire*
MF	*Male – Female Connector 3 Pin for 3 wire & 2 Pin for 2 wire*

# 9	Optional Accessories
---	*None*
XM	*X is wire length in meters*
TW	*Thermo well (Separate details)*

TS RTD	PT 100	S3A	MI	316	6	1000	B1	A	MF	3M

TS RTD PT 100 S3A MI 316 6 1000 B1 A MF – 3M

RTD PT 100 Simplex 3 Wire Accuracy Class A, Sheath : SS 316, OD: 6mm, Legth: 100 mm, ½ " BSP Adjustable Connection, Weatherproof Enclosure with Male Female Connector & 3 Meter wire length

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THERMOCOUPLE

A thermocouple is a temperature sensing element which is based on the principle that when two dissimilar metals are welded to form a junction and when this junction is heated, it produces a low voltage (mV) which is proportional to the temperature. Thermocouples have a predictable and repeatable relationship between temperature and voltage.

The life of a thermocouple is limited mostly by two factors, first the environment in which is exposed to and second is aging. The material characteristics of thermocouple alloys do gets affected by oxidizing, reducing & corrosive atmospheric conditions. The homogeneity also gets affected due to chemical & metallurgical changes which happen due to prolonged exposure to extreme high temperature. This results in change in thermocouple coefficient of thermocouple alloys with time and measured voltage changes accordingly.

THERMOCOUPLE CALIBRATION SELECTION GUIDE *(Table 01)*

Type of TC	THERMOCOUPLE GRADE		Temperature Range °C (°F)	Applications
	Metal Alloy + ve Leg	Metal Alloy - ve Leg		
J	Iron , Fe	Copper Nickel, Cu Ni	0 to 750 (32 to 1382)	Suitable for vacuum, reducing or inert atmospheres, oxidizing atmospheres with reduced life. Iron oxidizes rapidly about 540°C (1000°F) so only heavy gauge wire is recommended for high temperature
K	Nickel Chromium, Ni Cr	Nickel Aluminum, Ni Al	-200 to 1250 (-328 to 2282)	Recommended for continuous oxidizing or neutral atmospheres. Should not be used in reducing atmospheres or vacuum. Mostly used above 540°C (1000°F). Must be protected from marginally oxidizing atmospheres.
T	Copper , Cu	Copper Nickel, Cu Ni	-200 to 350 (-328 to 662)	Usable in oxidizing, reducing or inert atmospheres as well as vacuum. Not subject to corrosion in moist atmospheres. Traditionally used for low temperature applications. Copper oxidizes about 370°C (700°F).
E	Nickel Chromium, Ni Cr	Copper Nickel, Cu Ni	-200 to 900 (-328 to 1652)	Recommended for continuously oxidizing or inert atmospheres. Can be used for short time in vacuum. Must be protected from sulphurous or marginally oxidizing atmospheres. Extended usage at high temperature causes chromium to vaporize altering calibration.
N	Nickel Chromium, Silicone, Ni Cr Si	Nickel Silicone, Ni Si	-270 to 1300 (-454 to 2372)	Suitable for use in oxidizing, inert or dry reducing atmospheres. Can be used in applications where type K elements have shorter life and stability problems due to oxidation. Must be protected from sulphurous atmospheres. Provides higher stability than K about 1000°C (1800°F).
R	Platinum Rhodium, Pt Rh 13%	Platinum, Pt	0 to 1600 (0 to 2912)	Recommended for continuous usage at extremely high temperature. Typically used in Industries.
S	Platinum Rhodium, Pt Rh 1%	Platinum, Pt	0 to 1600 (0 to 2912)	Recommended for continuous usage at extremely high temperature. Typically used in Laboratories
B	Platinum Rhodium, Pt Rh 6%	Platinum Rhodium, Pt Rh 30%	0 to 1700 (0 to 3092)	Recommended for continuous usage at extremely high temperature.

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We at **ELTEC** manufacture THERMOCOUPLE that can be exposed to stringent environmental conditions & for extremely high temperature applications.

Base Metal Sheathed Thermocouple

The thermocouple junction is protected with Stainless Steel or mixed alloys depending upon the environmental conditions. They are designed for higher temperature. Mounting with Nipple Union Nipple Junction, Fixed Fittings or Flanged Connection.

Mineral Insulated Thermocouple

Stainless Steel sheathing coupled with tightly compact magnesia (MgO), ensures relatively longer life by protecting thermocouple from oxidizing, reducing & corrosive atmosphere. The tightly compacted powder contained within the tough metal sheath locks the wires rigidly in position, permitting the cable to be bent, flattened, or twisted.

Noble Metal Thermocouple

We also use Noble Metal & Base Metal like Platinum & Rhodium to manufacture thermocouple junction, for high temperature applications. High Temperature Ceramic Protection tubes are used to enclosed thermocouple junction.

Bayonet & Flexible Cable Thermocouples

Various Bayonet fixtures & other probes connections like washer, button, plate, ribbons, ball, nozzles, bolts etc are beings used to manufacture thermocouple to suit various critical temperature measuring applications. These thermocouples are fabricated from flexible wires manufactured from thermocouple alloys and Insulated with **FIBER GLASS YARN, PTFE, FEP, PFA, SILICONE RUBBER, KAPTON** etc. to meet various industrial applications.

PRODUCT FEATURES

- Various Thermocouple Calibration such as **J, K, T, E, N, R, S, T**
- Exposed, Grounded & Ungrounded Thermocouple junctions
- Rugged Construction
- Wide Temperature Range from **-200 °C to 1800 °C**
- Probes & Assemblies in various sizes & configuration
- Various mounting options like Adaptors, Adj. Ferrule fittings, flanged connection, Nipple – Union – Nipple
- Lead styles include miniature jack, miniature plug, pin leads, standard plugs, stripped lengths, and high and ultra-high temperature plugs.
- Custom Configuration
- Industrial Safety Enclosure like Die Cast Aluminium Head or SS Head confirming to IP 65, IP 67 & IS Protection.
- Head Mount Transmitter Options

SHEATH MATERIAL APPLICATION GUIDE (*Table 02*)

Code	Sheath Material	Melting Temp. °C (°F)	Continuous Max. Temp. °C (°F)	Applications
304	304 L	1400 (2550)	**900 (1650)**	Good resistance to corrosion and oxidation. Lowest cost sheath.
310	310 S	1400 (2550)	**1150 (2100)**	High temperature strength and scale resistance. Good resistance to carburizing and reducing environments. Withstands sulphurous gas at elevated temperatures.
316	316 L	1370 (2550)	**925 (1700)**	Good corrosion resistance and creep strength at elevated temperatures. Resists tendency to pit in phosphoric and acetic acids. Withstands sulphuric acid compounds.
321	321	1400 (2550)	**870 (1700)**	Excellent scale and corrosion resistance at high temperature. Suitable for oxidizing, sulphurous and reducing atmospheres.
446	446	1480 (2550)	**1100 (1700)**	Good high temperature oxidation resistance. Resists attack by sulphur gas. Good in oxidizing and reducing atmospheres.
600	INCONEL 600	1400 (2550)	**1150 (1700)**	High corrosion resistance at elevated temperatures. High hot strength. Used in sulphur-free environments. Resists oxidizing and reducing atmospheres.
825	825	1370 (2550)	**1000 (1700)**	Excellent resistance to a wide variety of corrosives. Resists pitting and inter granular corrosion
PYD	PYROSIL D	1380 (2550)	**1250 (1700)**	Superior oxidation resistance and high temperature strength. Used in sulphur free environments.

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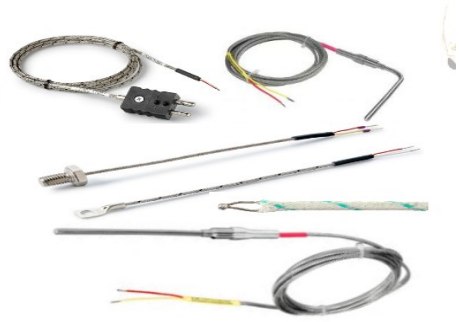
BAYONET & FLEXIBLE THERMOCOUPLE CABLE PROBES



Bayonet thermocouples have a compressible spring and locking cap for quick insertion and detachment. Other probes connections like washer, button, plate, ribbons, ball, nozzles, bolts etc are beings used to manufacture flexible thermocouple to suit various critical temperature measuring applications.

They are available with no protection tube (insulation only), armour clad flexible tube, or stainless steel over braid. All are light weight for easy connection to an instrument or a distant junction box. Closed end tubes are welded for Type K. Bayonet thermocouples are generally rated for service to 480 °C (900 °F) under dry conditions; temperature rating does not apply to cold end terminations.

APPLICATIONS	PRODUCT FEATURES
• *Plastic Extrusion Machines, Diversified Plastic & Packing Machinery*	• *Locking cap / spring / screwed bolts for quick & easy attachment & detachment*
• *Automobiles & Engine Testing, Gen set*	• *Adjustable Lengths & Fixed Lengths*
• *Medical & Scientific Equipments*	• *Wide Industrial applications*
• *Pharma, Food & Beverages*	• *Easy to use in hanging applications.*
• *Various Industrial Machineries*	• *Thermal Accuracy as per ANSI MC 96.1 & ASTM E230*
• *Measuring Bearing Temperature in Motors, Turbines etc.*	• *Customized probes for measuring temperature for critical industrial applications*

PRODUCT TECHNICAL SPECIFICTIONS	
Element	J (Fe / Const) 0 °C – 760 °C K (Chromel / Alumel) -200 °C – 1260 °C T (Copper / Const) -250 °C – 350 °C E (Chromel / Const) -200 °C – 900 °C N (Nicrosil / Nisil) -270 °C – 1300 °C
No. of Element	*Normally Simplex*
Junction	*Grounded / Ungrounded / Exposed*
Sensor Wire Insulation	*Fiber Glass, High Temperature Ceramic Yarn, PTFE, PFA, ETFE, SILICONE RUBBER, KAPTON, PVC etc.*
Sheath OD	*3mm to 8mm*
Sheath Material	*SS Tubes / Brass Tubes*
Mounting	*Bayonet Adaptor or Probe design itself becomes suitable to be fixed at temperature measuring position*
Termination / Enclosure	*Seal Pot with flying leads* *Seal Pot with Male Female Connectors* *Flying leads fitted with cable lugs*

Thermocoupole can be custom configured depending upon its environmnetal condtions & its probe can be designed as per demanding applications within the above TECHNICAL CONSTRUCTIONAL SPECIFICATIONS.

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EMPOWERING PROCESS MANAGEMENT

SHEATHED BASE METAL THERMOCOUPLE with CONNECTION HEAD

Industrial thermocouple assemblies are designed to be used in the most severe and demanding environments. The choice of a specific style is to a large degree determined by the temperature working range, ambient atmospheric or media conditions, as well as the size and shape required for the application. Control requirements such as accuracy and speed of response may also be taken into considerations.

APPLICATIONS	PRODUCT FEATURES
• *General Purpose but especially appropriate for severing & demanding conditions*	• *Wider Temperature Range up to 1100 ºC*
• *Salt Baths, Heat Treating and Molten Metal Applications*	• *Heavy Wall to provide long life of thermocouple in harsh conditions*
• *Temperature Measuring Instrument for Boilers & Other Temperature & Pressure Vessels*	• *Variety of Pipe Material for use in different atmospheres*
• *Temperature Measurement in various type of furnaces*	• *Easy to use in hanging applications.*
• *Temperature Measurement in Chemical Reactors*	• *Thermal Accuracy as per ANSI MC 96.1 & ASTM E230*
• *General Industrial Applications*	• *Faster Response*

PRODUCT TECHNICAL SPECIFICTIONS	
Element	J (Fe / Const) 0 °C – 760 °C K (Chromel / Alumel) -200 °C – 1260 °C T (Copper / Const) -250 °C – 350 °C E (Chromel / Const) -200 °C – 900 °C N (Nicrosil / Nisil) -270 °C – 1300 °C
No. of Element	*Simplex / Duplex*
Junction	*Grounded / Ungrounded*
Insulation	*Ceramic*
Sheath OD	*6 mm to 25 mm or higher on request*
Sheath Length	*1000 mm or more on request*
Sheath Material	*SS 304 / 316 / 310 / 446 / INCONEL 600 / Hast Alloy / High Alumina oxide (Ceramic Tubes)*
Mounting	*Fixed Threaded, Adj. Ferrule fittings, Flanged, Nipple Union Nipple etc.*
Termination	*Flame Proof or Weather Proof Head with Single, Double entry from Cast Aluminium / Cast Iron / SS / Plastic* *Ceramic Terminal Block with Nickel Plated Brass Terminal & Optional spring loaded Terminal* *Ceramic Terminal Block with SS Base Plate* *SS Base Plate with flying leads for Temperature Transmitter*
Enclosure	*Weatherproof & Explosion Proof Head with Double Entry & Single Entry Cable Entry of Alu. Die Cast, Optional Stainless Steel*
Optional Accessories	*Thermo well for external sensor protection, Head mounted transmitter etc. & Extension Wire*

Thermocoupole can be custom configured & designed depending upon its environmnetal condtions & its demanding applications within the above TECHNICAL CONSTURCTIONAL SPECIFICATIONS.

EMPOWERING PROCESS MANAGEMENT

MINERAL INSULATED THERMOCOUPLE

Thermocouples with magnesium oxide insulation are recommended where the thermocouple is immersed in liquids, high moisture, corrosive gases, or high pressure. The thermocouple can be formed to reach otherwise inaccessible areas. The magnesium oxide has a high dielectric strength, responds quickly to temperature changes, and is very durable.

APPLICATIONS	PRODUCT FEATURES
• *Immersion in liquids*	• *Wider Temperature Range up to 1100 ºC*
• *High Moistures Applications*	• *Can be easily bent, flattened or twisted*
• *Corrosive Gases, Oils & Petrochemical Industries*	• *SS Sheathing coupled with tightened magnesia ensure longer life*
• *Power, Steel & Sponge Iron*	• *High Die Electric Strength*
• *Temperature Measurement in Chemical Reactors*	• *Thermal Accuracy as per ANSI MC 96.1 & ASTM E230*
• *General Industrial Applications*	• *Faster Response*

PRODUCT TECHNICAL SPECIFICTIONS	
Element	J (Fe / Const) 0 °C – 760 °C K (Chromel / Alumel) -200 °C – 1260 °C T (Copper / Const) -250 °C – 350 °C E (Chromel / Const) -200 °C – 900 °C N (Nicrosil / Nisil) -270 °C – 1300 °C
No. of Element	*Simplex / Duplex*
Junction	*Grounded / Ungrounded*
Insulation	*Tightly Packed Magnesia (MgO) powder in Metal Tubes*
Sheath OD	*1.5 / 3 / 4.5 / 6 / 8 mm or other on request*
Sheath Length	*Up to 20000 mm*
Sheath Material	*SS 316 / 310 / INCONEL 600 and some other on specific request*
Mounting	*Fixed Threaded, Adj. Ferrule fittings, Flanged, Nipple Union Nipple etc.*
Termination	*Seal Pot with flying leads* *Seal Pot with Male Female Connectors* *Ceramic Terminal Block with SS Base Plate* *Ceramic Terminal Block with Nickel Plated Brass Terminal & Optional spring loaded Terminal* *SS Base Plate with flying leads for Temperature Transmitter*
Enclosure	*Weatherproof & Explosion Proof Head with Double Entry & Single Entry Cable Entry of Alu. Die Cast & Stainless Steel*
Optional Accessories	*Thermo well for external sensor protection, Head mounted transmitter etc. & Extension Wire*

Thermocoupole can be custom configured & designed depending upon its environmnetal condtions & its demanding applications within the above TECHNICAL CONSTURCTIONAL SPECIFICATIONS

ELTEC CABLES & INSTRUMENTS
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EMPOWERING PROCESS MANAGEMENT

NOBLE METAL THERMOCOUPLE

Noble Metal Thermocouple usually designed for extremely high temperature applications mostly above 1000 ºC and hence uses High Alumina Content Ceramic tubes as outer protection for thermocouple junction. They have good resistance to thermal shock but poor resistance to mechanical shock; they should be mounted vertically.

APPLICATIONS	PRODUCT FEATURES
• *Heat Treatment, Forging and Annealing*	• *Higher Temperature Range up to 1700 ºC and even more*
• *Ceramics and Glass Industry*	• *High Resistance to Thermal Shock*
• *Cements, Metals & Steel Plants*	• *Aluminium Oxide Tubes Impervious to Gases up to 1760 ºC (3200 ºF)*
• *Temp. Measurement for Molten Metals*	• *Easy to use in hanging applications.*
• *High Temperature Furnaces & Kilns*	• *Thermal Accuracy as per ANSI MC 96.1 & ASTM E230*
• *Research Laboratories*	• *Expensive as junction is made from highly expensive noble metals like platinum, rhodium etc.*

PRODUCT TECHNICAL SPECIFICTIONS	
Element	R (Pt / Pt-Rh 13%) 0 °C – 1600 °C S (Pt / Pt-Rh 10%) 0 °C – 1600 °C B (Pt / Pt-Rh 13%) 500 °C – 1700 °C
No. of Element	*Simplex / Duplex*
Junction	*Grounded / Ungrounded*
Insulation	*Ceramic*
Sheath OD	*6 mm to 25 mm*
Sheath Material	*High Alumina Content Ceramic Tubes (Alumina Oxide Tubes)*
Mounting	*Fixed Threaded or Flanged Connection*
Termination	*Ceramic Terminal Block with SS Base Plate* *SS Base Plate with flying leads for Temperature Transmitter* *Ceramic Terminal Block with Nickel Plated Brass Terminal & Optional spring loaded Terminal*
Enclosure	*Weatherproof & Explosion Proof Head with Double Entry & Single Entry Cable Entry of Alu. Die Cast & Stainless Steel*
Optional Accessories	*Thermo well for external sensor protection, Head mounted transmitter etc. & Extension Wire*

- *Optional Dual Ceramic Tubes*
- *Dual Ceramic Tubes in Inconel for higher mechanical protection*
- ***Thermocoupole can be custom configured & designed depending upon its environmnetal condtions & its demanding applications within the above TECHNICAL CONSTRUCTIONAL SPECIFICATIONS***

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EMPOWERING PROCESS MANAGEMENT

THERMOCOUPLE with CONNECTION HEAD ORDERING CODE

# 1	TC		
J	Iron - Constantan	0 °C –	760 °C
K	Chromel - Alumel	-200 °C –	1260 °C
T	Copper – Constantan	-200 °C –	350 °C
E	Nicrosil - Nisil	-200 °C –	1300 °C
N	Chromel - Constantan	-200 °C –	900 °C

# 2	ELEMENT (No. of wire)
Si	*Simplex*
Du	*Duplex*

#3	Type of Insulation
--	*As per manufacturing standards, High Temperature Ceramic Insulation above 8 mm*
MI	*Mineral Insulation available up to 8mm*

# 4	Sheath Material
304	*SS 304 Up to 900 ºC, Good resistance to corrosion & oxidation*
310	*SS 310 Up to 1100 ºC, Good scaling resistance & use in reducing atmosphere*
316	*SS 316 Up to 925 ºC, Superior corrosion resistance & withstands acidic compounds*
446	*HRS 446 Up to 1100 ºC, Good High Temp. Oxidation resistance*
IN 600	*INCONEL 600 Up to 1150 ºC, High corrosion resistance at elevated temp.*
X	*Others pl. specify, Refer Table on Page 1*

# 4	Sheath Diameter
X	*OD – 1.5 mm to 25 (in mm), other pl. specify*

# 5	Sheath Length – Insertion length below Process Connection
Y	*55 to 20000 mm, please specify*

# 6	Process Connection
--	*None*
B1	*¼" BSP*
B2	*½" BSP*
N1	*¼" NPT*
N2	*½" NPT*
Z	*Flanged or any others, please specify in details*

# 7	Type of Process Connection
F	*Fixed*
A	*Adjustable*
N	*Nipple*
NU	*Nipple Union*

# 8	Enclosure
E1	*Weather Proof Die Cast Alu. Head IP 65 / 67*
E2	*Flame Proof Die Cast Alu. Head*
E3	*Explosion Proof*

# 9	Optional Accessories
---	*None*
Tx	*Head Mount Temperature Transmitter*
XM	*X is wire length in meters*
TW	*Thermo well (Separate details)*

TC	K	Si	--	310	25	600	B1	A	E1	Tx - 3M

TC K Si 310 25 x 600 B1 A E1 T – 3M

Thermocouple K Type Duplex, Sheath : SS 310, OD: 8 mm, Legth: 2000 mm, ½ " BSP Adjustable Connection, Weatherproof Enclosure with Head Mount Temperature Transmitter & 3 Meter wire length

- ***For Simplex Thermocouple, standard enclosure offered is single cable entry Alu. Die Cast Head***
- ***For Duplex Thermocouple, standard enclosure offered is double cable entry Alu. Die Cast Head***
- ***Other enclosure with different colors, size & types are available on request***

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EMPOWERING PROCESS MANAGEMENT

THERMOCOUPLE with MALE FEMALE CONNECTOR ORDERING CODE

# 1	TC		
J	Iron - Constantan	0 °C –	760 °C
K	Chromel - Alumel	-200 °C –	1260 °C
T	Copper – Constantan	-200 °C –	350 °C
E	Nicrosil - Nisil	-200 °C –	1300 °C
N	Chromel - Constantan	-200 °C –	900 °C

# 2	ELEMENT (No. of wire)
Si	*Simplex*
Du	*Duplex*

#3	Type of Insulation
--	*As per manufacturing standards, Ceramic above 8 mm*
MI	*Mineral Insulation available up to 8mm*

# 4	Sheath Material
310	*SS 310 Up to 1100 ºC, Good scaling resistance & use in reducing atmosphere*
316	*SS 316 Up to 925 ºC, Superior corrosion resistance & withstands acidic compounds*
IN 600	*INCONEL 600 Up to 1150 ºC, High corrosion resistance at elevated temp.*
X	*Others pl. specify, Refer Table on Page 1*

# 4	Sheath Diameter (in. mm)
X	*OD – 1.5 mm to 8 , other pl. specify*

# 5	Sheath Length – Insertion length below Process Connection
IL	*55 to 20000 mm, please specify*

# 6	Process Connection
--	*None*
B1	*¼" BSP*
B2	*½" BSP*
N1	*¼" NPT*
N2	*½" NPT*
Y	*Flanged or any others, please specify in details*

# 7	Type of Process Connection
F	*Fixed*
A	*Adjustable*
N	*Nipple*
NU	*Nipple Union*

# 8	Connector
M	*Male Connector miniature up to 4.5 OD & standard size above it*
F	*Female Connector miniature up to 4.5 OD & standard size above it*
MF	*Male – Female Connector miniature up to 4.5 OD & standard size above it*

# 9	Optional Accessories
---	*None*
XM	*X is wire length in meters*
TW	*Thermo well (Separate details)*

TC	K	Du	MI	310	8	2000	B1	A	M	3M

TC K Du MI 310 8 x 1000 B1 A M T – 3M

Thermocouple K Type Duplex, Sheath : SS 310, OD: 8 mm, Legth: 2000 mm, ½ " BSP Adjustable Connection, with Male Connector with 3 meter wire

- ***Upto 4.5 mm OD sensor, connecotor offered is miniature size i.e. jack & plug with flat pin, temp. Up to 180 ºC***
- ***Above 4.5mm OD sensor, connector offered is standard size i.e. jack & plug with round pin temp. Up to 180 ºC***
- ***Connector offered as per ANSI MC 96.1 color code unless and other wise specified for any other standards***
- ***High Temperature Ceramic Connector up to 650 ºC are available on request.***
- ***Any speical type connector like flanged, round etc. are also avaialbe on request***

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EMPOWERING PROCESS MANAGEMENT

THERMOWELL

Thermo wells are cylindrical fittings used to protect temperature sensors installed in industrial processes. A thermo well consists of a tube closed at one end and mounted in the process stream. A temperature sensor such as a **THERMOCOUPLE, RTD** or **Bimetal Thermometer** is inserted in the open end of the tube, which is usually in the open air outside the process piping or vessel and any thermal insulation.

The main advantage of the thermo well is that if the sensor fails, **it can be easily replaced without draining the vessel or shutting down the process**. The main drawback of a thermo well is reduced the responsiveness & accuracy of the measuring sensor.

ELTEC manufactures & offer THERMOWELL

PRODUCT TECHNICAL SPECIFICTIONS:	
Type	**Threaded Thermo well** **Flanged Thermo well** **Socket Weld Thermo well** ***Built Up Design (Fabricated from Pipe)***
Shank Design	***Straight / Tapered / Stepped***
Sheath ID	***5 to 10 mm or other as per requirements***
Sheath OD	***12 mm to 35 mm or even more on request***
Sheath Length	***As per client' s requirement***
Sheath Material	***Brass / Carbon Steel / SS 304 / SS 316 / SS 310 / HRS 446 / INCONEL 600 / INCONEL 601 / Monel / Hast Alloy B / Hast Alloy C***
Process Connection	***Threaded / Flanged / Welded***

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Type of Thermo Well

	Type of Thermo well	Replacement	Typical Process
	Threaded Thermo wells	Infrequent	Smaller Pipes or Vessels, Non-corrosive Media
	Flanged Thermo wells	Frequent	Large Pipes, High Pressure, High Corrosion
	Weld-In Thermo wells	Rarely	Non-corrosive, High Temperature or High Pressure

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CERTIFICATIONS:

RICL
Royal Impact Certification Ltd
Facilitating Businesses for Enhanced Efficiency

Certificate of Registration

This is to certify that

Eltec Cables & Instruments

16, Bhaktinagar Station Plot, Rajkot - 360002 (Gujarat), India.

has been assessed by RICL and found to comply with the requirements of

ISO 9001 : 2015
Quality Management System

For the following activities:

Manufacturer and Exporter of Thermocouple Wires & Cables, RTD Cables, Instrumentation Cables, High Temperature PTFE, Fiber Glass Wires & Cables, Temperature Sensors such as Thermocouple, RTD PT 100 & Thermowell.

This Certificate is Valid from 13/01/2020 Until 12/01/2021

Date of Initial Certification: 13/01/2020
Ist Surveillance on or before: 12/12/2020
IInd Surveillance on or before: 12/12/2021
Certification Valid Until: 12/01/2023

Certificate No.:
20RQ01AH

Director
Royal Impact Certification Ltd.
Certificate details entered into JAS-ANZ register on 13/01/2020

623, Tower-B, iThum, Plot No. A - 40, Sector - 62, Noida 201301, India.
www.isointernational.org, info@isointernational.org
Phone : +91 120 4113893
This Certificate can be verified at: www.isointernational.org and www.jas-anz.org

MEMBER OF MULTILATERAL RECOGNITION ARRANGEMENT IAF
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www.jas-anz.org/register

This Certificate remains the property of Royal Impact Certification Limited. Must be returned on request or if certificate is withdrawn. Validity of this certificate is subject to successful surveillance audits. RICL is accredited by JAS-ANZ. URL of Joint Accreditation System of Australia & New Zealand- www.jas-anz.org/register

CERTIFICATIONS:

PROGRESSIVE

PRODUCT CERTIFICATE
EC Attestation of Conformity

ELTEC CABLES & INSTRUMENTS

Address : 16, BHAKTINAGAR STATION PLOT, RAJKOT - 360002, GUJARAT - INDIA.

Is in compliance with Directive
LVD/HVD - 2004/108/EC, 94/9/EC, 2006/95/EC, 2006/42/EC

For The following product

THERMOCOUPLE WIRES,
RTD CABLES,
INSTRUMENTATION CABLES,
HIGH TEMPERATURE PTFE,
FIBER GLASS WIRES & CABLES,
TEMPERATURE SENSORS THERMOCOUPLE,
RTD PT 100.

In accordance with
TCF No. CE/01

The present certificate exclusively refers to the product above identified, in accordance to TCF submitted in PICL. Any Changes or modification implemented on the mentioned Product will not be covered by this certificate.

Registration No.:PICL/CE/1016/8896
Certificate Issue Date: 22.10.2016
1st Surveillance: 10.2017
2nd Surveillance: 10.2018

Certificate Expire Date: 21.10.2021
4th Surveillance: 10.2020
3rd Surveillance: 10.2019

Head of Certificate

This Certificate of Registration is granted subject to the Regulations approved by the Board.
PROGRESSIVE INTERNATIONAL CERTIFICATIONS LTD.
Office 4, 219, Kensington High Street, Kensington, London, W8 6BD, England.
E-mail.: info@picluk.com, Website: www.picluk.com
For current validity of this certificate. Please visit our website

Certificate of Registration

PROGRESSIVE

The Governing Board of
Progressive International Certifications Limited
hereby grant to:

ELTEC CABLES & INSTRUMENTS

Address to which this Certificate refers:

16, BHAKTINAGAR STATION PLOT, RAJKOT - 360002, GUJARAT - INDIA.

RoHS

(Directive - 2011/65/EU)

The certificate of compliance is based on a test procedure or an evaluation of the above-mentioned product.This is to certify that the above-mentioned product is in compliance with the RoHS Directive (2011/65/EU) of the European parliament and commission Decision on the Restriction of the certain Hazardous Substances [Lead (pb); Mercury (Hg); cadmium (cd); Hexavalent chromium (cr); polybrominated biphenyls (pBBs) and polybrominated diphenyl ethers (PBDEs)] in Electrical and Electronic equipment

Approved Scope to which this Certificate refers

THERMOCOUPLE WIRES & CABLES, RTD CABLES, INSTRUMENTATION CABLES, HIGH TEMPERATURE PTFE, FIBER GLASS WIRES & CABLES, TEMPERATURE SENSORS THERMOCOUPLE, RTD PT 100.

Certificate No.: PICL/ROHS/0317/8354
Certificate Issue Date: 02.03.2017
1st Surveillance: 03.2018

Certificate Expire Date: 01.03.2020
2nd Surveillance: 03.2019

Head of Certificate

QM 005

This Certificate of Registration is granted subject to the Regulations approved by the Board.
PROGRESSIVE INTERNATIONAL CERTIFICATIONS LTD.
Prakruti, Plot No. 03, Sector 21 Kharghar, Navi Mumbai - 410210, India.
Ph. +91 8080091139, E-mail.: info@progressiveltd.com, Website: www.progressiveltd.com
For current validity of this certificate. Please visit our website

USE OF ACCREDITATION MARK INDICATES ACCREDITATION IN RESPECT OF THE ACTIVITIES COVERED BY ACCREDITATION INSTITUTE ASSESMENT BODY (EUROPE) CERTIFICATION NUMBER 005

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