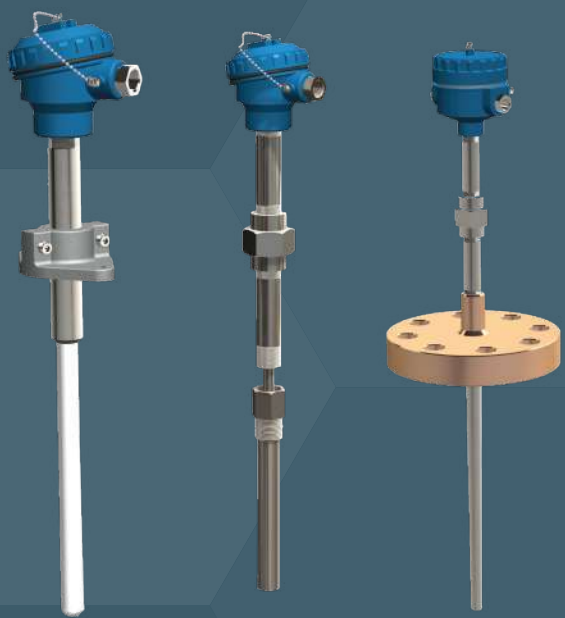




**Tosniwal
Industries Pvt. Ltd.**
Experience • Expertise
MG Tosniwal Group

CELEBRATING
183
years

Thermocouple & Resistance Temperature Detector



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FEATURES

- High integrity construction suited to arduous operating conditions.
- High accuracy and stability maintained throughout operating life.
- Fast response & high insulation resistance.
- Sheath can be bent and retains its form after bending to suit particular installation.
- Excellent shock & vibration resistance.

OVERVIEW

Mineral Insulated Thermocouples & Resistance Temperature Detectors Comprised of a metal sheath in which the thermo-electric elements/ RTD element with conductors are embedded in highly compressed Magnesium Oxide (MgO) insulation, thus providing the elements complete protection against oxidation and corrosion.

Thermocouples are available in type K,I,T,E,R,S,W,W3 and W5, Simplex or duplex, in sheath diameters from 1 mm to 12.7 mm and length from a few cms to 200 meters or more. The hot junction is TIG welded and could be grounded (elements hot junction welded to sheath tip giving faster response) or ungrounded (element insulated from sheath), one of which can be used as per control system requirement.

RTDs are available with platinum elements, $R_0 = 100$ ohms, temp coeff. 0.385 ohm/ °C, simplex or duplex, in sheath diameter from 3 mm to 8mm and in lengths from few cms to several meters as per order.

TOLERANCES ON INITIAL VALUES FOR THERMOCOUPLES

As per DIN IEC 60584 / ANSI MC96.1/ ASTM E230

Element	Type	Temp. Range °C	Standard	Special
			(Whichever is higher)	
Fe/Const.	J	0...760	±2.2°C/ 0.75%	±1.1°C/ 0.4%
NiCr/Ni (Cr/Al)	K	0...1260	±2.2°C/ 0.75%	±1.1°C/ 0.4%
Cu/ Const.	T	0...370	±1.0°C/ 0.75%	±0.5°C/ 0.4%
Cr/ Const.	E	0...870	±1.7°C/ 0.50%	±1.0°C/ 0.4%
Nicrosil/ Nisil	N	0...1260	±2.2°C/ 0.75%	±1.1°C/ 0.4%
Pt10%Rh/Pt	S	0...1600	±1.5°C/ 0.25%	±0.6°C/ 0.1%
Pt13%Rh/Pt	R	0...1600	±1.5°C/ 0.25%	±0.6°C/ 0.1%

TOLERANCE CLASSES FOR RTD

As per DIN IEC 60751

Tolerance Class	Temperature Range	Tolerance Value
AA (1/3 DIN)	0 to +150 °C	(±0.1+0.0017(t))
A	-30 to +300 °C	(±0.15+0.002(t))
B	-50 to +500 °C	(±0.3+0.005(t))
C	-50 to +600 °C	(±0.6+0.01(t))

t = Measured Temperature

ELEMENT DIAMETER / WALL THICKNESS

As per ASTM E585

Number of Thermoelements	2	4	6
Minimum Sheath Thickness	10%	10%	10%
Minimum Thermoelement dia.	15%	12%	9%
Minimum Insulation Thickness	7%	5.5%	4%

Above Percentages are of Nominal outside diameter of MI Cable.



PROTECTION SHEATH

Sheath Material	Composition (Appx.)	Application Guidelines
Stainless Steel AISI 304	18-20% Cr, 8-11% Ni, ≤2% Mn, balance iron	Upto 900°C in oxidizing conditions. Has good resistance to oxidation and corrosion.
Stainless Steel AISI 316	16-18% Cr, 10-14% Ni, 2-3% Mo, balance iron	For use upto 900°C in oxidizing conditions. Has good resistance to corrosion, mild acid & pitting.
Stainless Steel AISI 446	23-27% Cr, balance iron	Upto 1100°C in oxidizing conditions. Excellent resistance to corrosion in sulphurous atmosphere. Used in salt bath & molten metal.
Stainless Steel AISI 310	24-26% Cr, 19-22% Ni, ≤2% Mn, balance iron	Upto 1100°C High resistance to nitrogenous atmosphere, deficient in oxygen. Suitable for carburizing, annealing, hardening furnaces & cyanide salt bath.
Inconel 600	72% (min) Ni, 14-17% Cr, balance iron	Upto 1150°C under oxidizing conditions, must not be placed in sulphurous atmosphere above 550°C. Suitable for carburizing, annealing & hardening furnace, cyanide salt bath etc.
Molybdenum	Molybdenum	Upto 2200°C, For Inert, Vacuum, Reducing atmosphere, Sensitive to Oxidation, Non bendable, for R/S/W/W3/W5 thermocouples
Tantalum	Tantalum	Upto 2300°C, for use in inert vacuum environment, for R/S/W/W3/W5 thermocouple.

GENERAL SPECIFICATION

Designs	Design no. 1...5 & IT40 Sr.
Head	Provided in design no. 4 & IT40 Sr.
Head Material	Cast Aluminum
Head Type Standard Weatherproof Flameproof	With Threaded cover & cable entry (3/4" ET / 1/2" BSP) Standard with gasket & chain (IP66) CIMFR approved for group I, IIA, IIB & IIC, Weatherproof to IP66
Terminal block (in design no. 3,4 and IT40)	Ceramic with brass terminals & with provision for two mounting screw on 33mm PCD; terminal block is spring loaded in design no 3 & IT40
Sheath	AISI 316/ 304/ 321/ 347/ 310/446/ Inconel 600/ in 1, 1.5, 3, 4.5, 6, 8, 12.7mm dia for thermocouples; AISI 316 in 3, 3.2, 4.8, 6 & 8mm dia for RTDs
Element	Simplex/ Duplex / Triplex; J/K/T/E/N/S/R for thermocouples; Pt100, 2/3 wire for RTD with copper leads (Const./ Ni, Optional)
Insulation resistance	100 M Ohms at 500V DC At elevated temperatures as per IEC 60751
Smallest bending radius	Twice the sheath diameter
Mounting (in design no 4 & IT40 Sr.)	Adjustable compression fitting 1/ 8" BSP (M) upto 6mm OD Sheath other sizes on request in design no 4; flange/ Threaded in IT40 Sr
Extension cable (in design no.2)	Compensating cable with fibre glass/ fibre glass/ SS wire braided insulation for thermocouple; copper cable with teflon/ teflon/ SS wire braided insul. for RTD; other types on request
Connector (in design no.5)	Of glass filled thermoplastic with thermocouple grade contact for thermocouple (Design No 5A); Of MS, circular threaded locking type with copper contacts, 3/6 pin for RTD, (Design No. 5B)
Thermowell (in IT40 Sr.)	Refer drg no TC260(3) for selection of design General construction of sensor in this case will be as per drg. no. TC259 (3) using insert as per design no.3 along with head & extension using nipple/ union.
Accessories	Weld pad, clamps for holding MI Cable



ORDERING DATA

Cat No. T _____ (Without Thermowell)

_____ Length in cm.

_____ Sheath Material

A - AISI 310

B - Inconel 600

C - AISI 316

D - AISI 304

_____ Thermocouple Element

8 - Grounding Junction

9 - Ungrounded Junction

_____ RTD (circuit type)

3 - 3 wire

2 - 2 wire

_____ Sheath Dia mm

Q - 8.0

O - 6.0

E - 4.5 (4.8 for RTD)*

D - 3.0

_____ Elements

P - RTD, Pt100

K - Chromal Aluminum

J - Iron/ Const.

T - Cu/ Const.

E - Chromel/ Const.

R - Pt 13% Rh/ Pt

S - Pt 10% Rh/ Pt

_____ Insulation

R - 97% MgO (Standard)

H - 99.4% MgO (High Purity)

_____ No of elements

1 - Simplex

2 - Duplex

_____ Design

1 - Design No 1

2 - Design No 2

3 - Design No 3

4 - Design No 4

5 - Design No 5

*6 mm dia upto 60mm & balance in 4.8 mm dia



Design 1



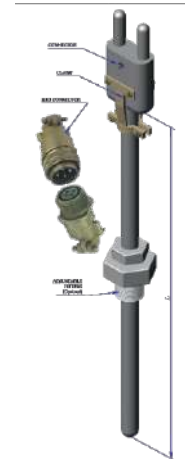
Design 2



Design 3



Design 4



Design 5