



SENSEWELL
INSTRUMENTS PVT. LTD.

TEMPERATURE SENSOR



THERMOCOUPLE

TYPE : J, K, N, R, S, T, B

High Accurate Thermocouple For Variety Of Application.....
Pharmaceuticals, Petrochemicals, Chemicals, Power Plant (Gas Turbine),
Nuclear, Glass Industries, Plastic & Packaging, Cement Plant, Furnace / Oven

Types of Thermocouples

G Multi point Thermocouple G Skin Thermocouple G Thermocouple with head G High temp. t/c with Male/Female connectors G High temp. t/c with alumina sheath G Washer type/bolt type t/c G Thermocouple with seal pot G Baynot Type thermocouple G Thermocouple for Portable indicator G Thermocouple for Gas/Steam turbine.

Base Metal Thermocouple



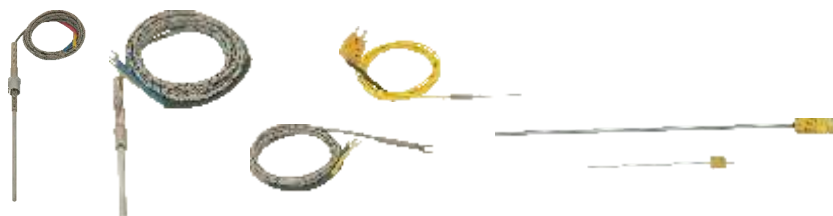
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|-------------------|--|
| Types | : J, K, N |
| Element size (MI) | : 1, 1.5, 3, 4.5, 6, 8 MM |
| Non (MI) | : upto 22 MM |
| Protection Sheath | : SS 316L, SS 310, HRS 446, Inconel, Nickel, Monel, Hastalloy Titanium, Ceramic |
| Configuration | : Simple, Duplex, Multipoints |
| Termination | : 1. Head-W/P or FLP
2. Seal pot with flying Leads
3. Seal pot with male female connector
4. Ceramic terminal block with SS plate |

Stem Type T/C

Mineral Insulated T/C



Flexible T/C



Noble Metal Thermocouples

- | | |
|-------------------|--|
| Types | : R, S, B |
| Element size | : 0.30, 0.35, 0.4, 0.45, 0.5 mm |
| Protection Sheath | : Ceramic (Ker 710), 610, Inconel |
| Configuration | : Simplex, Duplex, Tri-level with Platinum Thimble |



Hand Held T/C



- * Leaf type probe
- * Bow type probe
- * Roller type probe
- * Air Temp. type probe

Types of RTD'S

G Multi point RTD'S G Skin RTD'S G Vibration proof RTD'S for DG sets G RTD'S with head G RTD'S with Male / Female connectors G Bearing & winding temp. RTD'S G RTD'S with seal pot G RTD'S for portable indicator G RTD'S for Gas / Steam turbine G TRI clover - RTD'S G Baynot type RTD'S

Head Mounted RTD



Flexible RTD



Mineral Insulated RTD



-: Specification :-

Element	: Wire wound ceramic encapsulated Wire wound glass encapsulated Thin film ceramic encapsulated	Protection Sheath:	Seamless SS 304, SS 316 L
Connection	: Adjustable Size : 1/8", 1/4", 1/2", 3/4", 1" - BSP / NPT Flange Size : 1", 1.5", 2", ANSI Class 150, 300 Union / Nipple / Union Triclover / Sanetory connection	Configuration	: Simple, Duplex
Types	: 2, 3, 4 Wire	Termination	: 1. Head - W/P or FLP 2. Seal pot with Flying Leads 3. Seal pot with male female connector 4. Ceramic terminal block with SS plate
Accuracy	: CLASS A, 1/2, 1/3, 1/5 DIN class - B	Length	: 25 mm to 5000 mm
		Dia	: 1.5, 2.0, 3.0,12 mm

Thermo couple Head

Connection heads

Material : Die cast Aluminum, Stainless Steel, Plastic
 Type : Single, Double entry, Miniature
 Cable Entry : 3/4" ET, 1/2" NPT / BSP
 Protection Class : IP 67, Ex-Proof II A & II B, II C



Ceramic Disc & Insulators

Material : Statite Ceramic
 Type : 2 / 4 Hole
 Terminal : Simplex / Duplex

Connectors

Plug & Jack compensated connectors for thermocouples
 J-Black, K-Yellow, R-Green, S-Green, B-Green, T-Blue types,
 Standards, Miniature, Panel Mounted,
 Material : Special PVC & Ceramic



Thermocouple Connector



Adjustable Connector

Material : SS 304, SS 316 L
 Size : 1/8", 1/4", 1/2", 3/4", 1" - BSP / NPT

Compensating Cables



Compensating cables for the
 Thermocouples J, K, T, E, N, R, S, B Types
 Wire Gauge : 14 to 36 gauge (AWG / SWG)
 Conductor : Solid / Multistrand
 Insulation : Fibre glass, teflon, ceramic fibre, silica fibre,
 SS braided, PVC etc.
 Protection : Armored / Unarmored / Screen

THERMOWELLS

Thermowells and Protection Tubes

A wide choice of refractory and stainless steel protective sheathing is available to suit various application

Metal

Material : SS 304, SS 316, SS 310, SS 321
 HRS 446, Inconel 600 / 800
 Hastalloy, Monel, Alloy 20 Titanium etc.

Type : Drilled, Bar Stock, Fabricated

Connection : Flange Connection - 1", 1 1/2", 2" ANSI
 Class 150, 300, 600
 Thread Connection - 1/2" (F) x 1/2" (M)
 1/2" (F) x 3/4" (M)

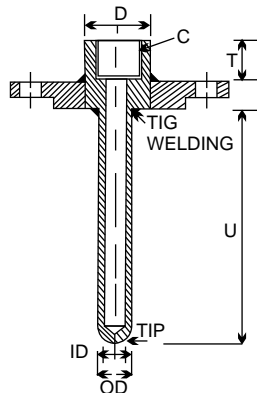


G Metal Thermowells with Ceramic /
 PTFE / PVDF / PFA coatings

G Platinum Thimble

G Tantalum, Titanium, Nickel Cladding

G Graphite Thermowells



C = Instrument Connection
 U = Immersion Length
 T = Extension Length
 OD = Outer Dia.
 ID = Inner Dia.

Ceramic



Material : Recrystallised Alumina 99.7%

Type : KER 710 (C-799)

Length : 350, 530, 600, 650, 740, 900, 1030, 1200, 1430

OD X ID : 6x4, 8x5, 10x6, 12x8, 15x10, 20x15, 24x18 MM

Insulating tubes : 2 / 4 / 6 holes

OD : 2.8, 3.5, 5.5, 8.5

Temperature Bath Dry Block

Temperature Range : Ambient TO 600° C

Resolution : 0.1° C.

Stability : ± 1° C.

Uniformity : ± 0.1° C.

Heating time : 30 min. to reach max. temp.

Cooling time : One hour to reach ambient temp.

Method of control : Digital self tuned PID controller

Supply : 230 V AC.

Setting : By front feather touch key

Power : Approx. 600W ,230 V AC

Calibration volume : Dia 50 mm x 150 mm

Insert Dimension : dia. 6, 8, 10, 13 mm

Size : 400 mm (H) x 200 mm (D) x 225mm (W)

Approx. Wt. : 5 kgs.

Sensor : RTD / Thermocouple



THERMOCOUPLES REFERENCE DATA (ITS 90) mV v/s TEMPERATURE

TYPE	'T' Cu-CuNi	'J' Fe-CuNi	'K' NiCr-NiAl	'N' NiCrSi-NiSi	'S' PtRh10%-Pt	'R' PtRh13%-Pt	'B' PtRh30%-PtRh6%	'E' NiCr-CuNi
Calibration	IS 2056/ASTME 230	IS 2057/ASTME 230	IS 2054/ASTME 230	ASTME 230	IS 2055/A STME 230	IS 2055	IS 6720	ASTME 230
Tolerances	Standard	$\pm 1^{\circ}\text{C}$ or $\pm 0.75\%$	$\pm 2.2^{\circ}\text{C}$ or $\pm 0.75\%$	$\pm 2.2^{\circ}\text{C}$ or $\pm 0.75\%$	$\pm 1.5^{\circ}\text{C}$ or $\pm 0.25\%$	$\pm 1.5^{\circ}\text{C}$ or $\pm 0.25\%$	$\pm 0.5\%$	$\pm 1.7^{\circ}\text{C}$ or $\pm 0.5\%$
	Special	$\pm 0.5^{\circ}\text{C}$ or $\pm 0.4\%$	$\pm 1.1^{\circ}\text{C}$ or $\pm 0.4\%$	$\pm 1.1^{\circ}\text{C}$ or $\pm 0.4\%$	$\pm 1.1^{\circ}\text{C}$ or $\pm 0.4\%$	$\pm 0.6^{\circ}\text{C}$ or $\pm 0.1\%$	$\pm 0.6^{\circ}\text{C}$ or $\pm 0.1\%$	over 800°C
TEMPERATURE $^{\circ}\text{C}$	-100	-3.379	-4.633	-3.554	-2.407		-	-5.237
	0	0	0	0	0	0	0	0
	100	4.279	5.269	4.096	2.774	0.646	0.647	0.033
	200	9.288	10.799	8.138	5.913	1.441	1.469	0.178
	300	14.862	16.327	12.209	9.341	2.323	2.401	0.431
	400	20.872	21.848	16.397	12.974	3.259	3.408	0.787
	500		27.393	20.644	16.748	4.233	4.471	1.242
	600		33.102	24.905	20.613	5.239	5.583	1.792
	700		39.132	29.129	24.527	6.275	6.743	2.431
	800		45.494	33.275	28.455	7.345	7.950	3.154
	900			37.326	32.371	8.449	9.205	3.957
	1000			41.276	36.256	9.587	10.506	4.834
	1100			45.119	40.087	10.757	11.850	5.780
	1200			48.838	43.846	11.951	13.228	6.786
	1250			50.644	45.694	12.554	13.926	7.311
	1300			52.410	47.513	13.159	14.629	7.848
	1400					14.373	16.040	8.956
1500					15.582	17.451	10.099	
1600							11.263	
1700							12.433	

SHEATH MATERIALS

SHEATH	MELTING POINT $^{\circ}\text{C}$	USABLE TEMP. $^{\circ}\text{C}$	CHARACTERISTICS
SS - 304	1430	800	High resistance to heat and corrosion
SS - 316	1430	900	Excellent resistance to heat, Acids & Alkalies
SS - 321	1400	900	Excellent resistance to corrosion
SS - 310	1410	1100	Good oxidation resistance at low temp. & sulphur atmosphere
HRS - 446	1400	1150	Excellent oxidation resistance at elevated temp. and sulphur atmosphere
Inconel 600/800	1400	1100	Excellent oxidation resistance (do not use in sulphur atmospheres)
High Alumina 610		1500	General Purpose
Sintered Alumina 710/C-799	1800	1500	Excellent thermal, mechanical, electrical and corrosion resistant.
Recrystallised Silicon Carbide	1850	1500	Outstanding resistance to thermal shock, good mechanical strength

Other sheath materials hot Titanium, Molybdenum, Graphite, Aluminum etc. are available against specific requirements

TOLERANCE VALUES OF RTD PT-100(IEC 751)

TEMP($^{\circ}\text{C}$)	BASIC VALUES	TOLERANCE			
		CLASS A		CLASS B	
		($\pm\text{C}$)	($\pm\text{W}$)	($\pm\text{C}$)	($\pm\text{W}$)
-200	38.52	0.55	0.24	1.3	0.56
-100	60.26	0.35	0.34	0.8	0.32
0	100	0.15	0.06	0.3	0.12
100	138.51	0.35	0.13	0.8	0.30
200	175.86	0.55	0.20	1.3	0.48
300	212.05	0.75	0.27	1.8	0.64
400	247.09	0.95	0.33	2.3	0.79
500	280.98	1.15	0.38	2.8	0.93
600	313.71	1.35	0.43	3.3	1.06
700	345.28			3.8	1.17
800	375.70			4.3	1.28
850	390.45			4.6	1.34

COLOUR CODE OF COMPENSATING CABLES & THERMOCOUPLES

TYPE	BRITISH to BS1843	AMERICAN to ANSI/MC96.1	GERMAN to DIN 13714	INDIAN to IS 8784	JAPANESE to JIS C 1610-1981
K					
T					
J					
E					
R					
S					
B					
N					

LIMIT OF ERROR THERMOCOUPLES-REF. JUNCTION $^{\circ}\text{C}$

Thermocouple Type	Temperature Range $^{\circ}\text{C}$	Temperature Range $^{\circ}\text{F}$	Limits of Error ²	
			Standard (Whichever is greater)	Special (Whichever is greater)
T	0 to 350	32 to 662	$\pm 1.0^{\circ}\text{C}$ or $\pm 0.75\%$	$\pm 0.5^{\circ}\text{C}$ or $\pm 0.4\%$
J	0 to 750	32 to 1382	$\pm 2.2^{\circ}\text{C}$ or $\pm 0.75\%$	$\pm 1.1^{\circ}\text{C}$ or $\pm 0.4\%$
E	0 to 900	32 to 1652	$\pm 1.7^{\circ}\text{C}$ or $\pm 0.5\%$	$\pm 1.0^{\circ}\text{C}$ or $\pm 0.4\%$
K	0 to 1250	32 to 2282	$\pm 2.2^{\circ}\text{C}$ or $\pm 0.75\%$	$\pm 1.1^{\circ}\text{C}$ or $\pm 0.4\%$
R or S	0 to 1450	32 to 2642	$\pm 1.5^{\circ}\text{C}$ or $\pm 0.25\%$	$\pm 0.6^{\circ}\text{C}$ or $\pm 0.1\%$
B	800 to 1700	1472 to 3092	$\pm 0.5\%$	Not Estab.
C*, G*, D*	0 to 425	32 to 797	$\pm 4.5^{\circ}\text{C}$	Not Estab.
	425 to 2320	797 to 4208	$\pm 1.0\%$	Not Estab.
	Sub-Zero Range ³			
T	-200 to 0	-328 to 32	$\pm 1.0^{\circ}\text{C}$ or $\pm 1.5\%$	Not Estab.
E	-200 to 0	-328 to 32	$\pm 1.7^{\circ}\text{C}$ or $\pm 1.0\%$	Not Estab.
K	-200 to 0	-328 to 32	$\pm 2.2^{\circ}\text{C}$ or $\pm 2.0\%$	Not Estab.

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