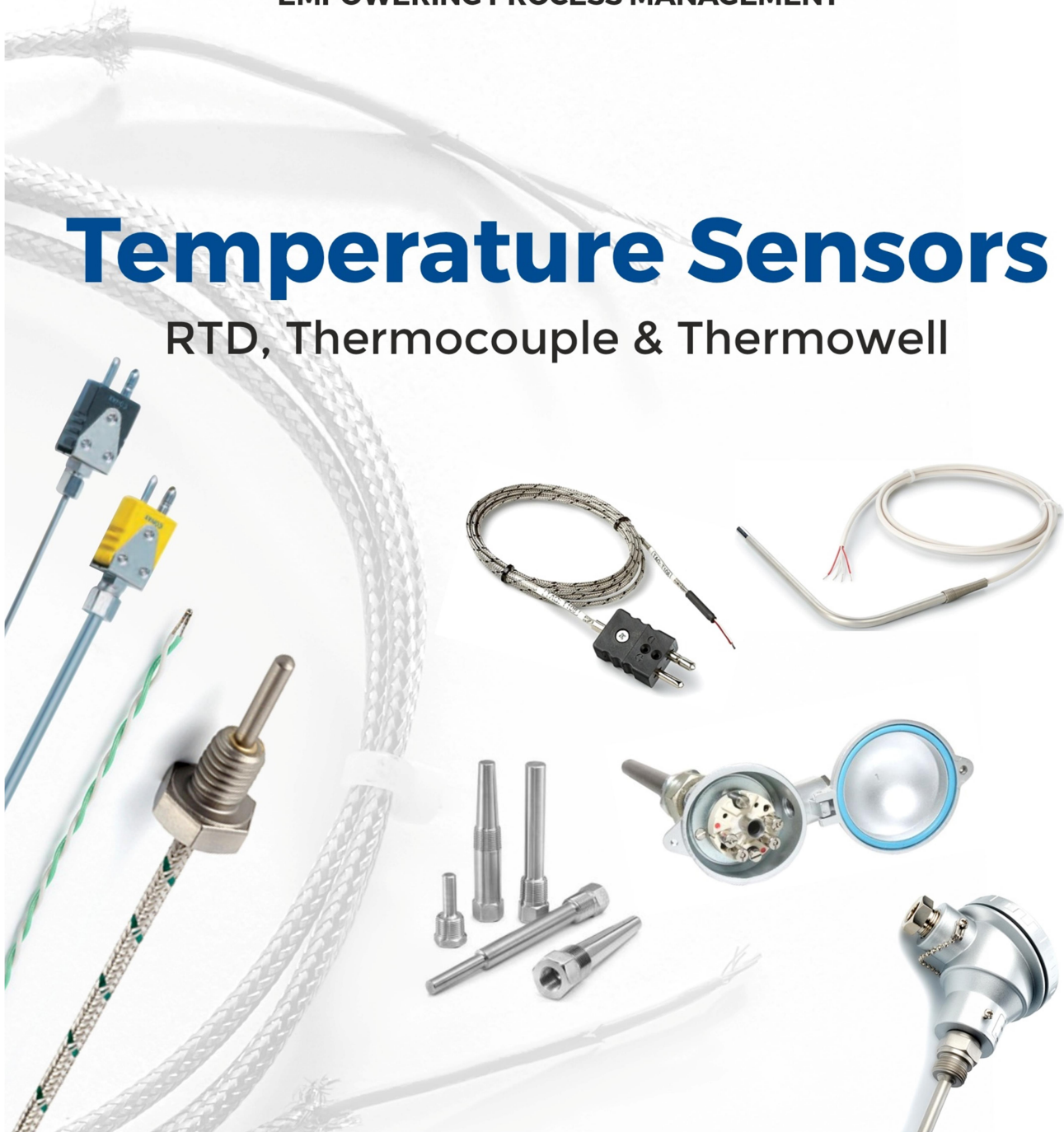




EMPOWERING PROCESS MANAGEMENT

Temperature Sensors

RTD, Thermocouple & Thermowell





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 °C** 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 °C**. It consists of a manufacturing tolerance on the reference point (eg: how close is the resistance to 100 Ω at 0 °C) 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 °C	Resistance Ω (Ohms)	Class A		Class B	
		Ω (Ohms)	°C	Ω (Ohms)	°C
-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 °C, 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 :

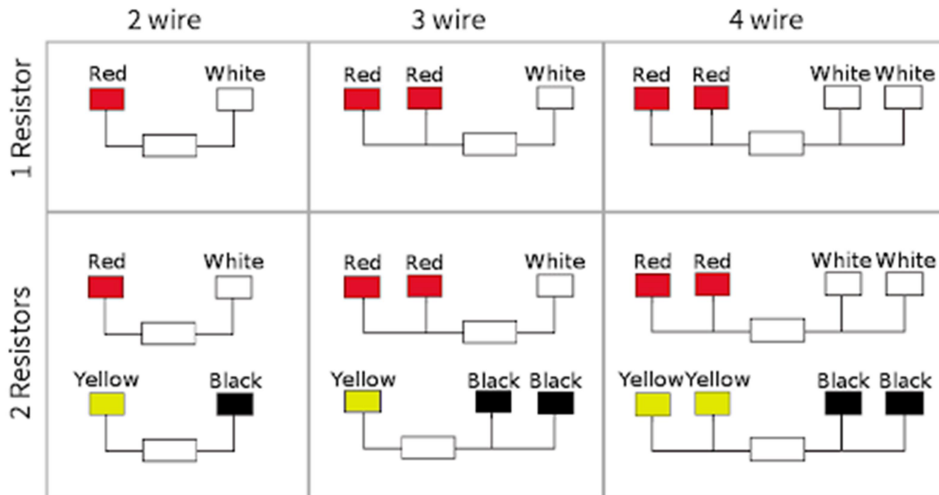
Provides one connection to each end of the element. This construction is suitable where the resistance of the lead wire may be considered as an additive constant in the circuit, and particularly where the changes in lead resistance due to ambient temperature changes may be ignored.

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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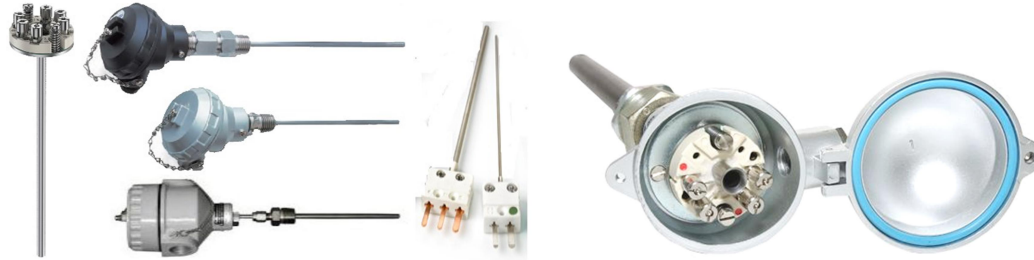
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INDUSTRIAL RTD PIPE ASSEMBLIES



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
<ul style="list-style-type: none"> • High accuracy sensor for use in Industrial & Laboratory applications • Food, Pharmaceuticals & Medical Equipments • Temperature Measurement in Chemical Reactors & General Industrial applications • Pulp & Paper Industry 	<ul style="list-style-type: none"> • Wider temperature range from -200 C to 450 °C and higher up to 850 °C on request • High Accuracy & Stability • Variety of Sheath Material for use in different industrial environmental conditions. • 2 wire, 3 wire, 4 wire configuration.

PRODUCT TECHNICAL SPECIFICATIONS:

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 environmental conditions & 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
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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
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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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