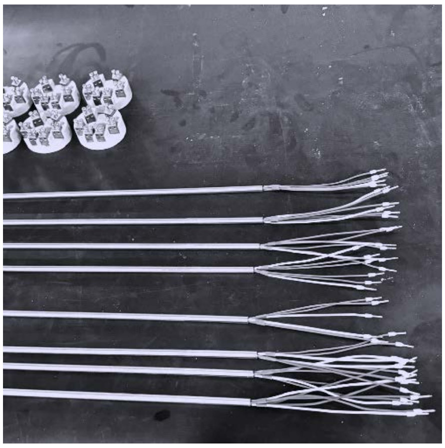
MEASUREMENT SOLUTIONS
SINCE 1962

RESISTANCE TEMPERATURE DETECTORS

Resistance Thermometers, also known as Resistance Temperature Detectors (RTDs), are highly sensitive temperature sensors used across a wide range of industries.

TECHNICAL SPECIFICATIONS

APPLICATIONS	Oil & Gas / Petrochemical Industries / Power Stations
TYPE AND CONSTRUCTION	RTD are carefully selected to meet the basic resistance values and accuracies specified from IEC 60751 Nominal resistance value is 100ohm at 0° C. Standard bulbs have platinum or Nickel wound resistance elements, with hard glass or ceramic base. One, two or three windings are available on the same bulb. Resistance thermometer bulbs always take up the mean value of the temperature operating over the full winding length, therefore it is important that the full length of the element is exposed to the medium whose temperature is to be measured. Trouble free working of resistance thermometer bulbs is dependent on proper care being taken in their own installation and the selection of associated components used for this purpose.
MATERIAL	At the heart of an RTD is a fine wire - typically made from pure platinum, nickel, or copper - wound around a ceramic or glass core. The resistance of these metals changes in a predictable way as the temperature shifts, allowing for accurate readings.



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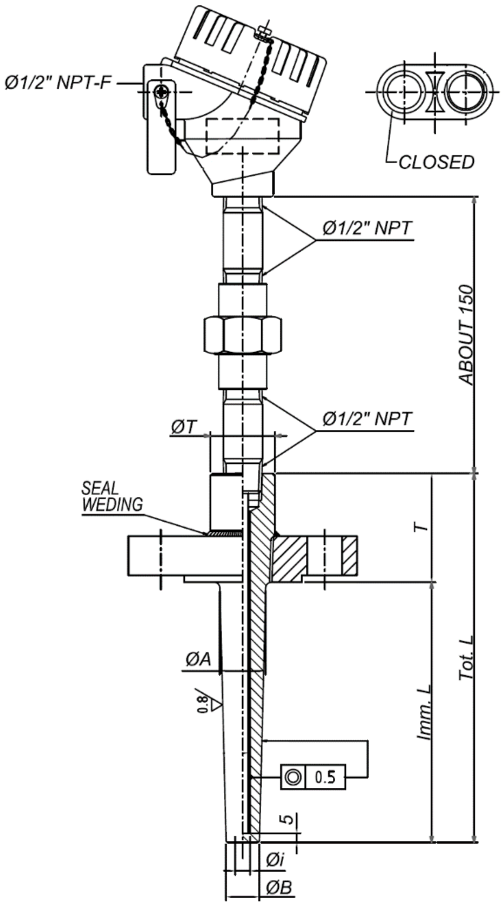
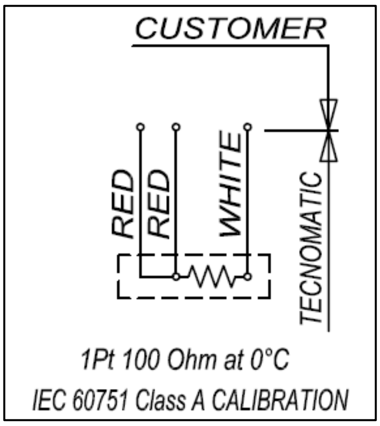
Mod DS-RTD ED08-25

STANDARD LIMITS & APPLICATION FIELDS	
UNMATCHED ACCURACY	RTDs (Resistance Temperature Detectors) made from platinum (Pt), nickel (Ni), or copper (Cu) are ideal for all type of industrial applications. These materials provide a consistent and repeatable resistance-to-temperature relationship (R vs T) that is crucial for accurate temperature measurements.
HOW IT WORKS	The resistance of the sensor changes predictably with temperature. This change, known as the **temperature coefficient of resistance**, remains relatively stable throughout the sensor's operating temperature range, ensuring precise readings even in dynamic environments.
KEY ADVANTAGES	- Stable R vs T Relationship: Ensures accurate temperature monitoring - Minimal Variations: The temperature coefficient of resistance stays nearly constant - Wide Operating Range: Effective across a range of biomedical applications

SAMPLE OF SIMPLE RTD WITH FLANGED THERMOWELL





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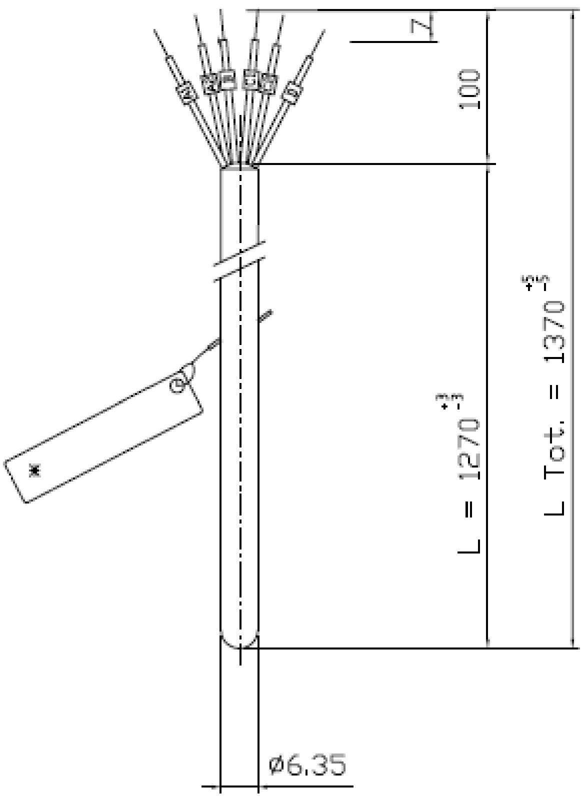
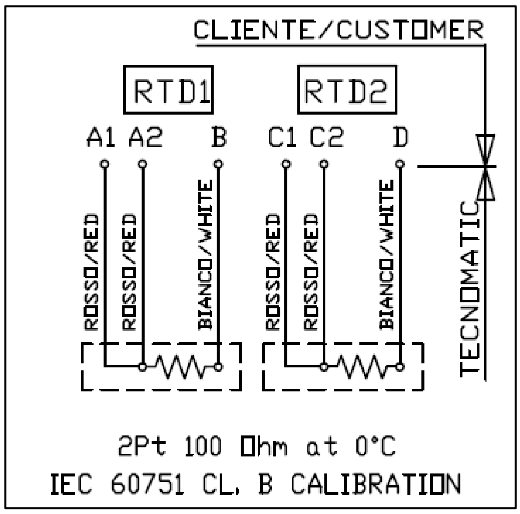
ACCURACY AND REPEATABILITY	Resistance thermometers (RTDs) are designed to provide greater stability, accuracy, and repeatability compared to traditional thermocouples. Unlike thermocouples, which use the **Seebeck effect** to generate voltage, RTDs measure temperature by detecting changes in electrical resistance, requiring a power source for operation. This resistance change follows a nearly linear relationship with temperature, based on the **Callendar–Van Dusen equation.**
PLATINUM EXCELLENCE	The heart of most RTDs is platinum - a material chosen for its high stability and precision. To ensure consistent performance, platinum wires are carefully supported to minimize strain and differential expansion, making them resistant to vibrations.
COEFFICIENT	Commercial platinum RTDs exhibit a temperature coefficient of resistance of 0.00385/°C (0.385%/°C), in line with the **European Fundamental Interval** (BS EN 60751:1996). The sensor is commonly designed to have a resistance of 100 Ω at 0°C.
LEAD-WIRE RESISTANCE EFFECTS	To achieve accurate measurements, lead-wire resistance must be considered. The use of three- or four-wire connections can effectively eliminate errors caused by connection lead resistance. In industrial settings, a three-wire connection is typically sufficient and is widely adopted.

SAMPLE OF DOUBLE RTD WITH FLYING WIRES





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RTDs VS THERMOCOUPLES – THE SELECTION CRITERIA	
TEMPERATURE RANGE	- **RTDs**: Ideal for temperatures between −200 to 500 °C. For processes within this range, RTDs offer high accuracy and stability. - **THERMOCOUPLES**: Have a much wider range, from −180 to 2320 °C. For temperatures above 500 °C, thermocouples are typically preferred.
RESPONSE TIME	- **RTDs**: Have a slower response time due to their construction, typically measuring changes over seconds. - **THERMOCOUPLES**: Offer faster response times, making them the best choice for processes that require temperature readings within fractions of a second.
SIZE	- **RTDs**: The standard sheath diameter ranges from 3.175 to 6.35 mm (0.1250 to 0.2500 in), making them larger than thermocouples. - **THERMOCOUPLES**: Known for their compact size, with sheath diameters often smaller than 1.6 mm (0.063 in), making them ideal for tight or limited spaces.
ACCURACY & STABILITY	- **RTDs**: Offer higher accuracy and long-term stability. They maintain precise readings over years of use, with minimal drift. - **THERMOCOUPLES**: Can provide reasonable accuracy, but with a tolerance of ±2 °C. They can experience drifting within the first few hours of use, which limits their LTS.

EXAMPLE OF CODIFICATION

THERMORESISTANCE → RTD | D | 02 | 03 | 01 | 03 | 001 ← ID NUMBER

TYPE OF RTD:
S – SIMPLE
D – DOUBLE

STEM DIAMETER:
01 – 4,77 mm
02 – 6 mm
03 – 6,4 mm
04 – 8 mm
05 – 10 mm
06 – 12 mm

OUTPUT:
01 – FREE WIRES
02 – TERMINALS
03 – HOUSING Exd
04 – TRANSMITTER

MATERIAL:
01 – SS 316
02 – SS 446
03 – INCONEL 600
04 – ALLOY 800

STEM LENGTH:
01 – UP TO 300mm
02 – UP TO 600mm
03 – UP TO 900mm
04 – UP TO 1200mm
05 – UP TO 1500mm
06 – UP TO 1800mm
07 – UP TO 2100mm
..... – UP TO ...

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