hand held probe/sensor selection guide

thermocouples or platinum resistance or thermistor

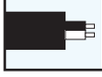
thermocouple probes

A thermocouple probe consists of two dissimilar metals or metal alloys that are welded together to form a 'hot junction' measuring sensor. The other end of the thermocouple probe is connected to the measuring instrument, normally via a miniature connector. Within the instrument a second junction is formed electronically, this is normally referred to as the 'cold junction'. When a temperature difference exists between the two ends (Seebeck effect), a voltage is generated which is proportional to the temperature difference. Cold junction compensation techniques are used to correct for instrument variations in ambient temperatures to give meaningful and accurate measurements. Thermocouples of a given type generally produce repeatable results and are therefore interchangeable.

type K thermocouples are robust and durable and recognised as the most frequently used thermocouple type. Type K thermocouples are ideal for general purpose applications when monitoring over a wide temperature range.

type T thermocouples are ideal for applications which require a higher accuracy but are only suitable to measure over a limited temperature range.

thermocouple accuracies/tolerances table

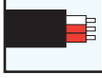
type	description/conductors	temperature range	BS EN 60584-2:1993 class 1 tolerances	ETI thermocouple probe tolerances
K 	Nickel Chromium/Nickel Aluminium (Ni-Cr/Ni-Al)	-210°C to +1372°C	±1.5°C -40 to +333°C ±0.4% +333 to +1000°C	±1.5°C -40 to 0°C ±0.5°C 0 to +100°C ±1.5°C +100 to +333°C ±0.4% +333 to +1000°C
T 	Copper/Constantan (Cu/Con)	-210°C to +400°C	±0.5°C -40 to +125°C ±0.4% +125 to +350°C	±0.5°C -40 to -20°C ±0.2°C -20 to +70°C ±0.5°C +70 to +125°C ±0.4% +125 to +350°C
J 	Iron/Constantan (Fe/Con)	-180°C to +1200°C	±1.5°C -40 to +375°C ±0.4% +375 to +750°C	±1.5°C -40 to 0°C ±1.0°C 0 to +100°C ±1.5°C +100 to +375°C ±0.4% +375 to +750°C

All ETI hand held thermocouple probes are manufactured to the above ETI accuracies/tolerances that are more stringent than BS EN60584-2:1993

platinum resistance probes

Platinum resistance probes (PT100) are high accuracy probes which exhibit a change in resistance with a change of temperature. High purity platinum wire is used to produce the resistance thermometer detectors (RTD). Platinum resistance probes cover a wide temperature range but generally, the response times are slower than thermocouples. PT100 probes tend to be larger and are not particularly suitable for the measurement of surface temperatures. ETI's standard PT100 platinum probes use a three wire configuration to eliminate the effects of cable resistance variations.

PT100 accuracies/tolerances table

type	description/conductors	temperature range	BS EN 60751:1996 class A tolerances	BS EN 60751:1996 class B tolerances
PT100 	Platinum Resistance 3-wire Copper/Copper/Copper (Cu/Cu/Cu)	-200°C to +600°C	±0.15°C ±0.2% -200 to +600°C	±0.3°C ±0.5% -200 to +600°C

All ETI hand held 3-wire PT100 probes are manufactured to the above accuracies/tolerances

NTC thermistor probes

Thermistor probes are accurate probes which exhibit a change in resistance with a change of temperature. Thermistor probes have a negative temperature coefficient (NTC), the resistance decreases with the increase in temperature. Thermistor probes cover a limited temperature range and are generally slower to respond to changes in temperature than thermocouples but quicker than PT100 probes. Thermistor probes tend to be smaller than PT100 probes but larger than thermocouple probes. Thermistor probes are not recommended for the measurement of surface temperatures.

thermistor accuracies/tolerances table

type	description/conductors	temperature range	ETI NTC thermistor probe tolerances
NTC 	Thermistor 10k nominal resistance at +25°C Copper/Copper (Cu/Cu)	-20°C to +110°C	±0.4°C -20 to -10°C ±0.3°C -10 to 0°C ±0.2°C 0 to +70°C ±0.4°C +70 to +100°C

All ETI hand held NTC thermistor probes are manufactured to the above accuracies/tolerances

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