

What is Temperature Coefficient of Resistance (TCR)?

Temperature coefficient differentiates between resistance/temperature curves of RTD's. It is also called ALPHA and may be specified in various ways by different manufacturers. Here TCR is the RTD's resistance change from 0 to 100°C, divided by the resistance at 0°C, divided by 100°C:

$$\text{TCR } (\Omega/\Omega/^\circ\text{C}) = \frac{R_{100^\circ\text{C}} - R_{0^\circ\text{C}}}{R_{0^\circ\text{C}} \times 100^\circ\text{C}}$$

Example: A platinum RTD measuring 100 Ω 's at 0°C and 138.5 Ω 's at 100°C has TCR 0.00385 $\Omega/\Omega/^\circ\text{C}$

$$\text{TCR} = \frac{138.5\Omega - 100\Omega}{100\Omega \times 100^\circ\text{C}} = 0.00385 \Omega/\Omega/^\circ\text{C}$$

Stated another way, TCR is the average resistance increase per degree of a hypothetical RTD measuring 1 ohm at 0°C.

The most common use of TCR is to distinguish between curves for platinum, which is available with TCR's ranging from 0.00375 to 0.003927. The highest TCR indicates the highest purity platinum, and is mandated by ITS-90 for standard platinum thermometers.

There are no technical advantages of one TCR versus another in practical industrial applications. 0.00385 platinum is the most popular worldwide standard and is available in both wire-wound and thin-film elements.

In most cases, all you need to know about TCR is that it must be properly matched when replacing RTD's or connecting them to instruments.