

Technote #16

IRt/c repeatability and long-term accuracy

The ability of a measuring device to maintain its calibration under service conditions and over a long period of time, is of fundamental interest in temperature control. The IRt/c is rated at less than 0.1°C (0.2°F) repeatability and has no measurable long-term calibration change. This makes it well suited to reliable temperature control. These attributes are inherent in the basic design and construction of every IRt/c. Repeatability is defined as the ability of a measuring device to reproduce its calibration under identical conditions. The IRt/c is a solid, hermetically sealed, fully potted system that does not change mechanically or metallurgically during service. There are no active electronic components and no power source to produce the signal, only the thermoelectric effects that produce a thermocouple signal. Long-term accuracy is influenced by the same things that influence repeatability: mechanical and metallurgical changes, which are known to change the calibration of thermocouples over time. Mechanical changes occur because conventional thermocouples are

generally constructed to be as small and light as possible to enhance response time. This makes them vulnerable to deformations that can change the thermoelectric properties. More importantly, the conventional thermocouple must operate at elevated temperature, since it merely measures its own temperature. The metallurgical changes which affect thermoelectric properties are a strong function of temperature. They are negligible at room temperature, but are of serious concern at high temperature, and the IRt/c solves both problems by its design and basic operation. It has a solid fully potted construction in a mechanically rigid stainless-steel housing, and operates at near room temperature conditions. This essentially eliminates the classical drift problems of conventional thermocouples. Every IRt/c is double annealed at temperatures above 100°C (212°F) to ensure long term stability, then tested five times prior to packaging. Barring a small percentage of failure, the IRt/c has potentially unlimited long-term calibration accuracy.

