

MODEL RO-600

Ruthenium Oxidecryogenic Temperature Sensor

INTERCHANGEABILITY: Besides being remarkably repetitive on successive cooldowns, RO-600 series exhibit uniform response within groups. FIGURE 3 shows a typical R vs T curve for Grouping Sensors. Resistance variation at a given temperature is less than 1% for temperatures above 70mK.

SENSITIVITY: FIGURE 4 represents the sensitivity of a typical RO-600. This sensitivity is a smooth and monotonic increase at lower temperatures.

*All data collected and analyzed by G.G. Ihas, L. Frederick, and J.P. McFarland, J. Low Temp. Phy. 113, 963 (1998).

Statistical Temperature Error from 16 SI-RO600 Sensors

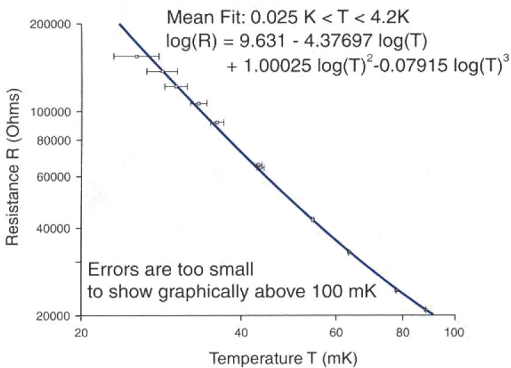


Figure 3*

**Sensitivity of SI RO600 Thermometers
(Log of Negative Sensitivity vs. Log of Temperature)**

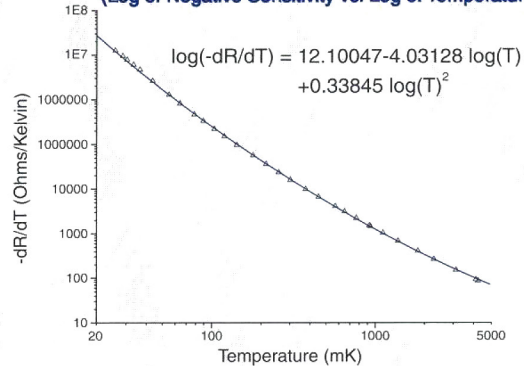
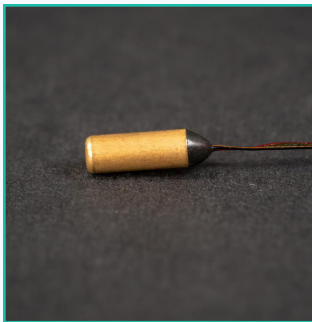


Figure 4*



AVAILABLE MODELS

**Model RO-600
Uncalibrated
Accuracy**
 $\pm 0.01\text{K} @ .050\text{K}$
 $\pm 0.10\text{K} @ 1.50\text{K}$
 $\pm 0.20\text{K} @ 4.20\text{K}$
 $\pm 1.00\text{K} @ 20\text{K}$

**Model RO-600
Group A
Standard Deviation**
 $\pm 0.010\text{K} @ 0.050\text{K}$
 $\pm 0.060\text{K} @ 1.50\text{K}$
 $\pm 0.100\text{K} @ 4.20\text{K}$
 $\pm .600\text{K} @ 20\text{K}$

**Model RO-600
Calibration
Ranges***
 D = 1.50K to 20K
 B1 = 0.30K to 4.2K
 B2 = 0.30K to 20K
 A1 = 0.050K to 20.0K
 A2 = 0.050K to 20.0K
 E = 0.03K to 4.2K
 E2 = 0.025K to 20K
 E3 = 0.020K to 20K

CALIBRATION ACCURACY

$0.050\text{K} \text{ TO } 0.15\text{K} \quad \pm 0.005\text{K}$
 $0.150\text{K} \text{ TO } 1.50\text{K} \quad \pm 0.010\text{K}$
 $1.500\text{K} \text{ TO } 4.20\text{K} \quad \pm 0.025\text{K}$
 $4.200\text{K} \text{ TO } 20.0\text{K} \quad \pm 0.050\text{K}$

* Custom calibrations available, consult factory
 • Data is subject to change as a result of product improvement



SCIENTIFIC INSTRUMENTS

MODEL RO-600

Ruthenium
Oxide cryogenic
Temperature Sensor

The Series RO-600 Ruthenium Oxide Temperature Sensors are thick film resistors which are interchangeable and usable in large magnetic fields with excellent accuracy without special calibrations. These sensors are available as uncalibrated, grouped, or calibrated (Fig.1) units at reasonable cost.

FEATURES

- Excellent Magnetic Field Performance
- Interchangeability
- Repeatability
- Fast Thermal Response
- Rugged
- Temperature Range: .02K to 20K
(Custom ranges available, consult factory)

PHYSICAL SPECIFICATIONS

- Gold plated OFHC copper enclosure, Dia. .093" (2.4mm) x Length .200" (5.1mm)
- Phosphor-bronze lead wire standard, 4-leaded, Polyimide coated, 36 AWG, Custom leads available

ISO9001
CERTIFIED

PERFORMANCE IN MAGNETIC FIELDS: FIGURE 2 shows the remarkable performance of the RO-600 in high magnetic fields. With a temperature error of less than $\pm 1.6\%$, a simple linear formula allows correction of any apparent temperature, measured in a field up to 16 Tesla, to the actual temperature. This result may extend to higher fields, and is useful for a broad temperature range down to 36mK. It is independent of the orientation of the sensor in the magnetic field.

Universal Correction of Temperature Measured in a Magnetic Field

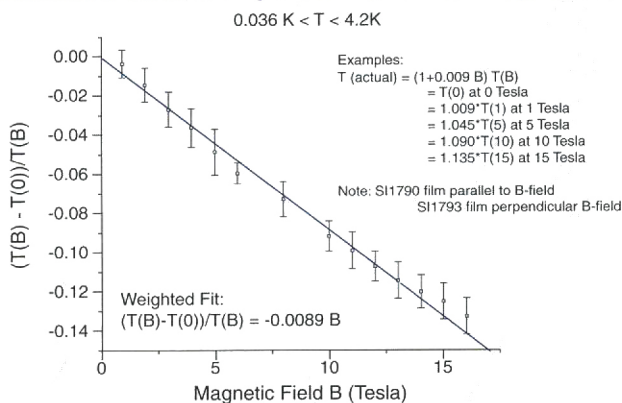


Figure 1*

Statistical Temperature Error from 16 SI-RO600 Sensors

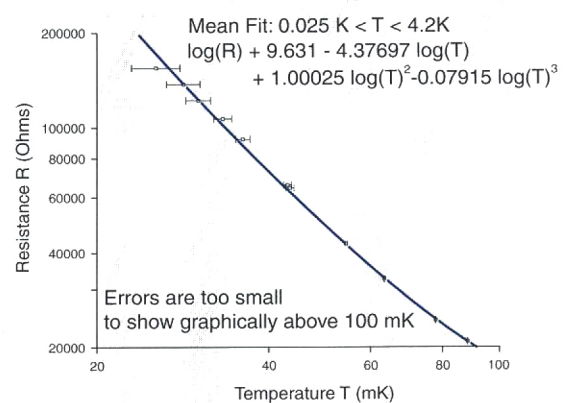


Figure 2*

Since errors in temperature for uncalibrated thermometers, in any magnetic field up to 16 Tesla, accumulate to only a few percent, the RO-600 is exceedingly useful in most low temperature applications, and is versatile enough to use in most low temperature environments.