

RUTHENIUM OXIDE CRYOGENIC TEMPERATURE SENSOR

PRODUCT DESCRIPTION:

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 calibration. 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: .05K 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

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

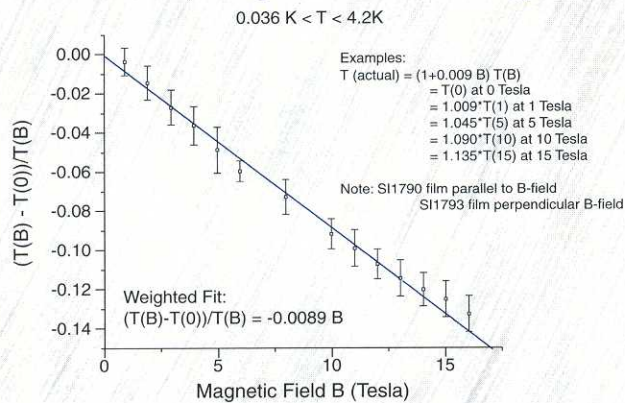


Figure 1*

Statistical Temperature Error from 16 SI-RO600 Sensors

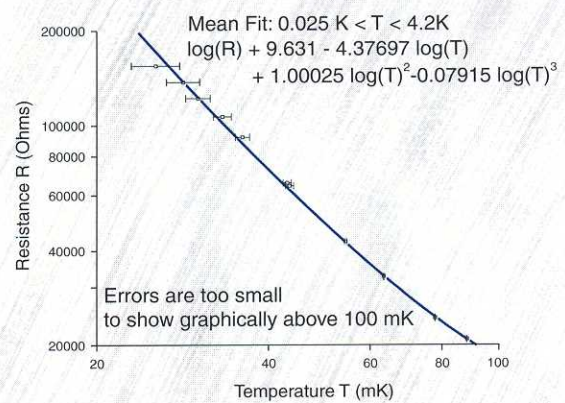


Figure 2*

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.

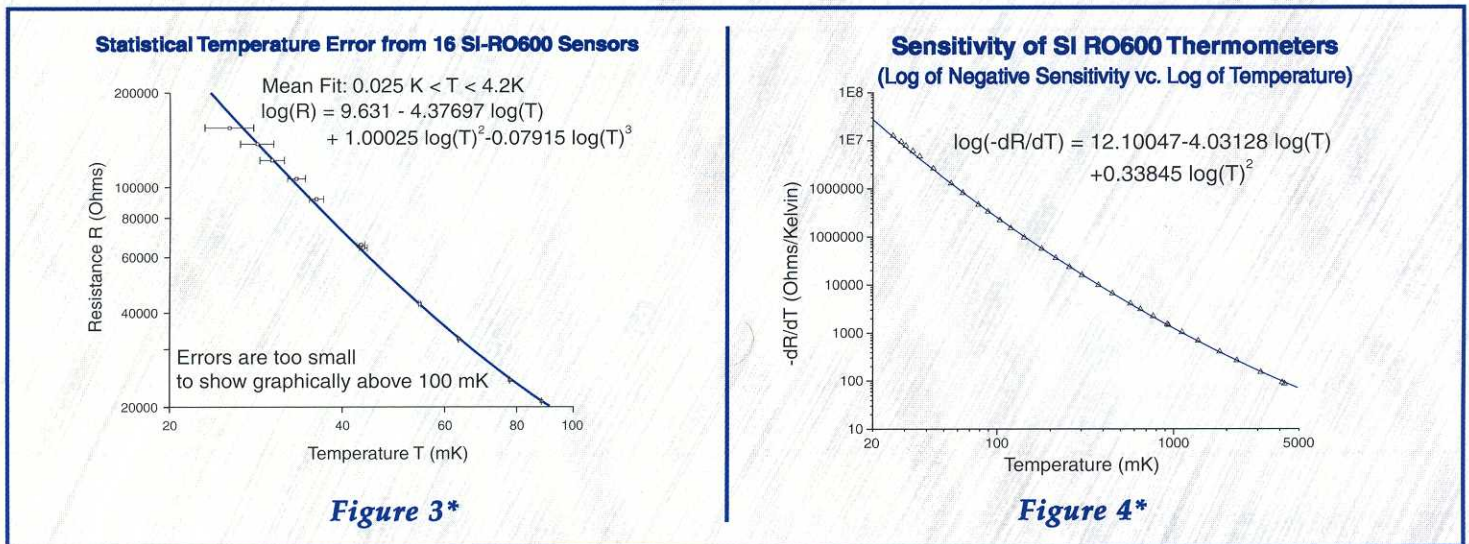
MODEL RO-600

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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).



AVAILABLE MODELS:

**Model RO-600
Uncalibrated
Accuracy**

± 0.01K @ .050K
 ± 0.10K @ 1.50K
 ± 0.20K @ 4.20K
 ± 1.00K @ 20 K

**Model RO-600
Group A
Standard Deviation**

± 0.010K @ 0.050K
 ± 0.060K @ 1.50K
 ± 0.100K @ 4.20K
 ± 0.600K @ 20 K

**Model RO-600
Calibration
Ranges***

A = 0.050K to 3.20K B1 = 0.30K to 4.2K
 A1 = 0.050K to 4.20K B2 = 0.30K to 20K
 A2 = 0.050K to 20.0K D = 1.50K to 20K
 B = 0.30K to 3.2K H = 4.20K to 20K

CALIBRATION ACCURACY:

0.050K to 0.15K ± 0.005K
 0.150K to 1.50K ± 0.010K
 1.500K to 4.20K ± 0.025K
 4.200K to 20.0K ± 0.050K

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



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