

## Ultra-low temperature Rox™

### RX-102B-RS features

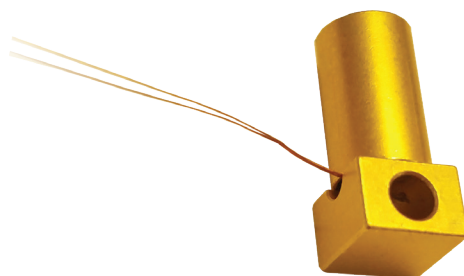
- Calibrated down to 5 mK
- Optical shielding reduces unwanted sensor heating

### Temperature measurement for the world's greatest dilution refrigerators

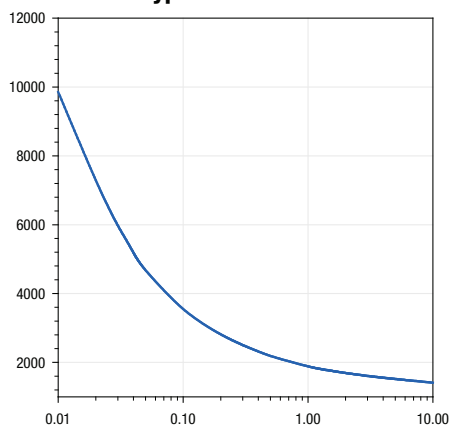
ULT Rox™ sensors are designed to achieve ultra-low temperatures down to 5 mK. These sensors are calibrated down to 5 mK and up to 40 K with guaranteed calibration accuracies. The package is optimized for thermalization and minimizes optical radiation absorption, thereby reducing heat load and temperature rise from line-of-sight radiation emitted by higher-temperature objects such as a cold plate or surrounding shields. The package is also designed to minimize environmental noise, which is critical for 5 mK measurements. This sensor pairs with the 372 temperature controller to monitor and control temperature below 50 mK.

### Packaging options

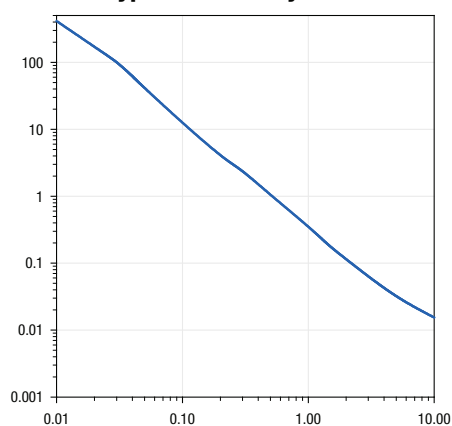
RS



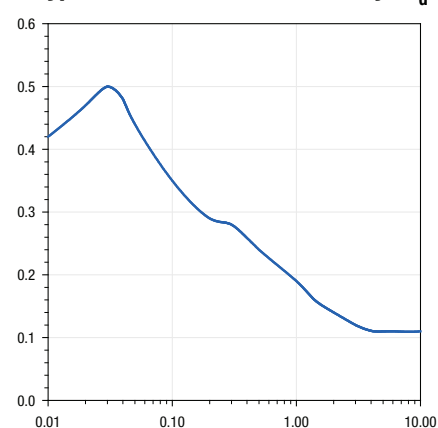
Typical resistance  $\Omega$



Typical sensitivity  $|\Omega/\text{mK}|$



Typical dimensionless sensitivity  $|S_d|$



## Specifications

**Recommended excitation**<sup>1</sup> 20  $\mu$ V (0.05 K to 0.1 K); 63  $\mu$ V (0.1 K to 1.2 K); 10 mV or less for  $T > 1$  K

**Dissipation at recommended excitation**  $7.5 \times 10^{-8}$  W at 4.2 K

**Thermal response time** 0.5 s at 4.2 K, 2.5 s at 77 K

**Radiation effects** Recommended—see Appendix B

**Magnetic field** Not recommended

**Reproducibility**<sup>2</sup>  $\pm 15$  mK at 4.2 K

**Soldering standard** J-STD-001 Class 2

<sup>1</sup> Recommended excitation for  $T < 1$  K based on Lake Shore calibration procedures using an AC resistance bridge—for more information refer to Appendix D and Appendix E

<sup>2</sup> Short-term reproducibility data is obtained by subjecting sensor to repeated thermal shocks from 305 K to 4.2 K

## Range of use

	Minimum limit	Maximum limit
RX-102B-RS calibrated	0.005 K	40 K

## Calibrated accuracy<sup>3</sup>

	RX-102B-RS	RX-102B-CB (discontinued)
5 mK	$\pm 1.2$ mK <sup>4</sup>	—
7 mK	$\pm 0.8$ mK <sup>4</sup>	—
10 mK	$\pm 1$ mK	$\pm 1$ mK <sup>4</sup>
20 mK	$\pm 2$ mK	$\pm 2$ mK
50 mK	$\pm 4$ mK	$\pm 4$ mK
1.4 K	$\pm 16$ mK	$\pm 16$ mK
4.2 K	$\pm 16$ mK	$\pm 16$ mK
10 K	$\pm 30$ mK	$\pm 30$ mK

<sup>3</sup> [(Calibration uncertainty)<sup>2</sup> + (reproducibility)<sup>2</sup>]<sup>0.5</sup> for more information see Appendices B, D, and E

<sup>4</sup> Extrapolated accuracy values are anticipated

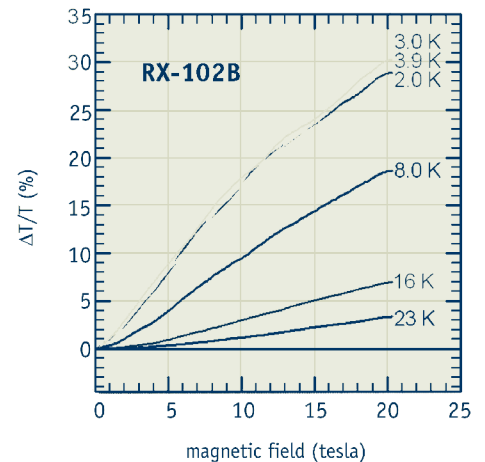
## Long-term stability

	RX-102B-RS	RX-102B-CB (discontinued)
4.2 K	$\pm 30$ mK	$\pm 30$ mK

## Typical magnetic field-dependent temperature errors $\Delta T/T$ (%) at B (magnetic induction)

	Rox™ 102B			
	2.5 T	8 T	14 T	19 T
2 K	3.29	13.82	22.53	27.95
3 K	3.96	14.68	23.12	29.12
4 K	3.53	13.92	22.57	28.20
8 K	1.53	7.53	13.50	17.86
16 K	0.27	2.14	4.66	6.58
23 K	0.06	0.79	2.01	3.11

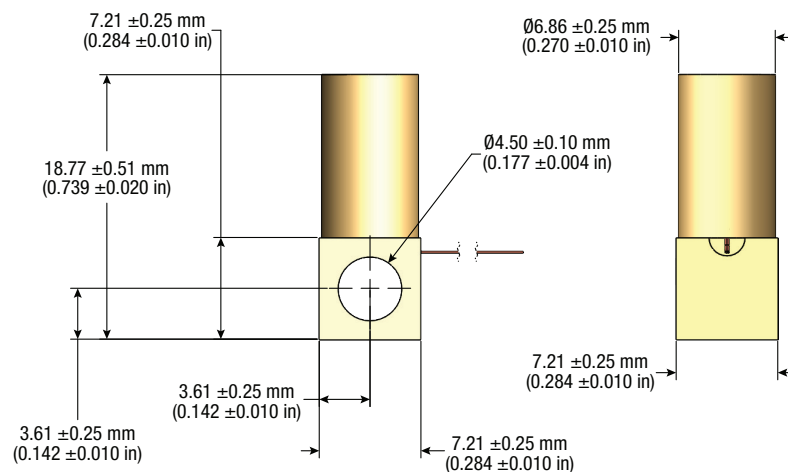
## Magnetic field dependence data for sample Rox™ RTDs



## Physical specifications

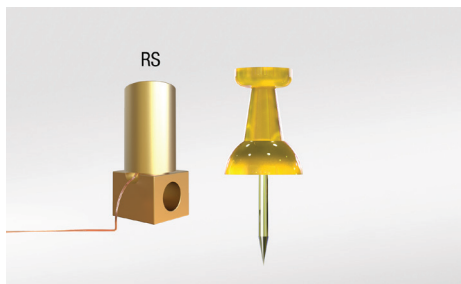
	Mass	Lead type	Mounting hole diameter
RX-102B-RS	5.36 g	Two 36 AWG copper leads with heavy build polyimide insulation, 15 cm length, lead ends tinned with 63/37 SnPb solder	Accommodates a #6-32 or M3 screw

## RX-102B-RS



### Packaging options

For more information on sensor packages and mounting adapters, see page 20.



See the appendices for a detailed description of:

- Installation
- Uncalibrated sensors
- SoftCal™
- Calibrated sensors
- CalCurve™
- Sensor packages

To add length to sensor leads see page 25.

### Ordering information

ULT Rox™ RTD	Calibration range suffix codes Numeric figure is the low end of the calibration Letters represent the high end: C=1 K, B=40 K			
Part number	0.01B	0.01C	0.02B	0.02C
RX-102B-RS	■	■	■	■

*Note: the RX-102B-RS is not interchangeable to a standard curve and is not available as matched. Other packaging available through special order—consult Lake Shore*

#### Accessories available for sensors

8000-CD Calibration report on CD-ROM  
8000-USB Calibration report on USB  
COC-SEN Certificate of conformance



#### Accessories suggested for installation—

see **Accessories** section for full descriptions

Stycast® epoxy  
Apiezon® grease  
90% Pb, 10% Sn solder  
Indium solder  
VGE-7031 varnish  
Phosphor bronze wire  
Manganin wire