

Wireless Resistance Sensors

General Description

The Wireless Resistance Sensor reports the resistance across a load. It can be connected to any kind of passive (no voltage) resistance load.

- Measures up to 250 KOhms
- Accurate to $\pm 2\%$ (FS) with user calibration
- Interfaces with any purely resistive and passive load

Principle of Operation

The Wireless Resistance Sensor reads the resistance across any resistive load and reports back the measured resistance. The sensor leads are meant to connect to passive devices only, connecting the sensor leads to any voltage or power source may damage the sensor. It is programmed to sleep for a user-given time interval (heartbeat) and then wake up, convert the analog data, mathematically compute the resistance, and transmit the data to the gateway, where it is then logged into the cloud service. The user can configure defined thresholds and have the system alert on threshold breaches.

Example Interfacing

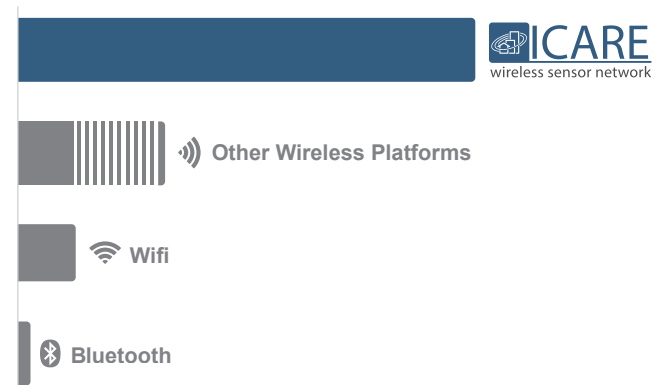
- Resistance Monitoring
- Battery Monitoring
- Transducer Interfacing
- And many more...

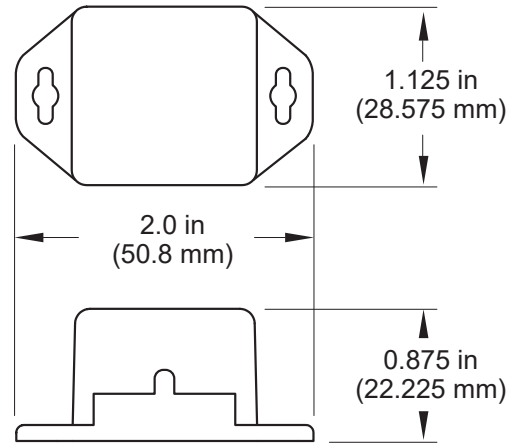
Features of ICARE Sensors

- Wireless range of 1,200+ feet through 12+ walls *
- Frequency-Hopping Spread Spectrum (FHSS)
- Improved interference immunity
- Improved power management for longer battery life ** (12+ years on AA batteries)
- Security (Diffie-Hellman Key Exchange + AES-128 CBC for sensor data messages)
- Onboard data memory stores up to 3200 readings:
 - 10-minute heartbeats = 22 days (of memory)
 - 2-hour heartbeats = 266 days (of memory)
- Over-the-air updates (future proof)
- Online wireless sensor monitoring and notification system to configure sensors, view data and set alerts via SMS text and email



- * Actual range may vary depending on environment.
- ** Battery life is determined by sensor reporting frequency and other variables. Other power options are also available.

Wireless Range Comparison





Commercial Coin Cell Wireless Resistance Sensor | Technical Specifications

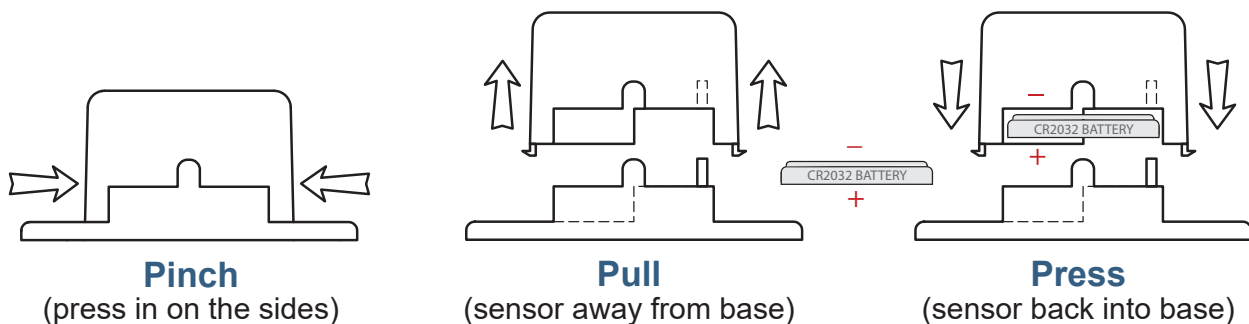
Supply voltage	2.0 - 3.6 VDC *
Current consumption	0.2 μ A (sleep mode), 0.7 μ A (RTC sleep), 570 μ A (MCU idle), 2.5 mA (MCU active), 5.5 mA (radio RX mode), 22.6 mA (radio TX mode)
Operating temperature range (board circuitry and coin cell)	-7°C to +60°C (20°F to +140°F) **
Optimal battery temperature range (coin cell)	+10°C to +50°C (+50°F to +122°F)
Resistive Range (in Ohms)	0 – 250000
Specific Resistive Ranges (in Ohms)	0 – 5600, 5600 – 250000
Resolution (in Ohms)	65535 Unique Values Per Specific Range (16 bit): ~3.4, ~125
Accuracy	+/- 3% FS of Specific Range
User Calibrated Accuracy	+/- 2% FS of Specific Range ***
Lead Wire Length	1 ft. (12 in.)
Integrated memory	Up to 3200 sensor messages
Wireless range	1,200+ ft non-line-of-sight
Security	256-bit key exchange and AES-128 CTR
Weight	0.7 ounces
Certifications	<div style="display: flex; align-items: center; gap: 10px;">   </div> 900 MHz wireless product; FCC ID: ZTL-G2SC1 and IC: 9794A-G2SC1.

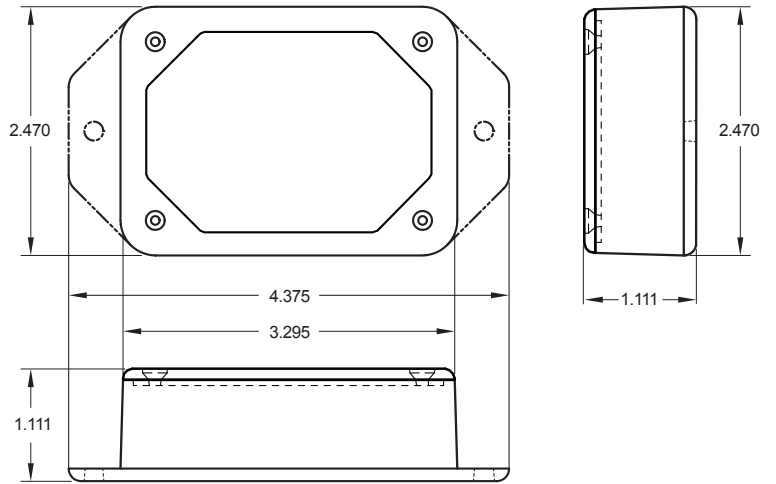
* Hardware cannot withstand negative voltage. Please take care when connecting a power device.

** At temperatures above 100°C, it is possible for the board circuitry to lose programmed memory.




*** For a valid calibration, the resistance under measurement must be maintained in circuit for 1 data transmission before calibration and 1 data transmission after calibration. Calibration is only applied to the specific resistive range, for best results calibrate at a resistance between 10% and 90% of the specific range. In general, calibrating between the 50% and 90% points of the specific range will yield better calibration results for the entire range.

Pinch For Battery Access





Commercial AA Wireless Resistance Sensor | Technical Specifications

Supply voltage	2.0–3.6 VDC (3.0–3.6 VDC using power supply) *
Current consumption	0.2 μ A (sleep mode), 0.7 μ A (RTC sleep), 570 μ A (MCU idle), 2.5 mA (MCU active), 5.5 mA (radio RX mode), 22.6 mA (radio TX mode)
Operating temperature range (board circuitry and batteries)	-18°C to 55°C (0°F to 130°F) using alkaline -40°C to 85°C (-40°F to 185°F) using lithium **
Optimal battery temperature range (AA)	+10°C to +50°C (+50°F to +122°F)
Resistive Range (in Ohms)	0 – 250000
Specific Resistive Ranges (in Ohms)	0 – 5600, 5600 – 250000
Resolution (in Ohms)	65535 Unique Values Per Specific Range (16 bit): ~3.4, ~125
Accuracy	+/- 3% FS of Specific Range
User Calibrated Accuracy	+/- 2% FS of Specific Range ***
Lead Wire Length	1 ft. (12 in.)
Integrated memory	Up to 3200 sensor messages
Wireless range	1,200+ ft non-line-of-sight
Security	256-bit key exchange and AES-128 CTR
Weight	3.7 ounces
Certifications	<div style="display: flex; align-items: center; gap: 10px;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div> 900 MHz wireless product; FCC ID: ZTL-G2SC1 and IC: 9794A-G2SC1.

* Hardware cannot withstand negative voltage. Please take care when connecting a power device.

** At temperatures above 100°C, it is possible for the board circuitry to lose programmed memory.

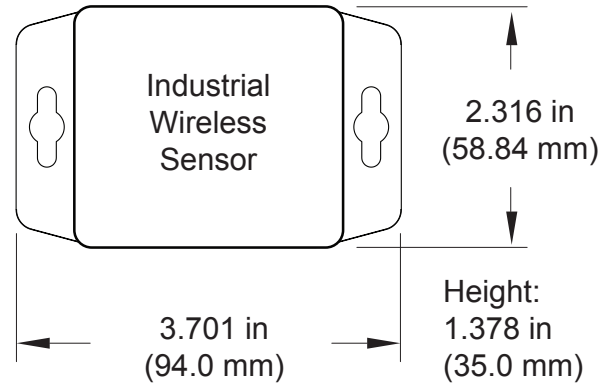
*** For a valid calibration, the resistance under measurement must be maintained in circuit for 1 data transmission before calibration and 1 data transmission after calibration. Calibration is only applied to the specific resistive range, for best results calibrate at a resistance between 10% and 90% of the specific range. In general, calibrating between the 50% and 90% points of the specific range will yield better calibration results for the entire range.

Power Options



The standard version of this sensor is powered by two replaceable 1.5 V AA sized batteries (included with purchase).

This sensor is also available with a line power option. The line powered version of this sensor has a barrel power connector allowing it to be powered by a standard 3.0–3.6 V power supply. The line powered version also uses two standard 1.5 V AA batteries as backup for uninterrupted operation in the event of line power outage.

Power options must be selected at time of purchase, as the internal hardware of the sensor must be changed to support the selected power requirements.



Industrial Wireless Resistance Sensor | Technical Specifications

Supply voltage	2.0–3.6 VDC (3.0–3.6 VDC using power supply) *	
Current consumption	0.2 μ A (sleep mode), 0.7 μ A (RTC sleep), 570 μ A (MCU idle), 2.5 mA (MCU active), 5.5 mA (radio RX mode), 22.6 mA (radio TX mode)	
Operating temperature range (board circuitry and battery)	-40°C to +85°C (-40°F to +185°F) **	
Included battery	Max temperature range	-40° to +85°C (-40° to +185°F)
	Capacity	1500 mAh
Optional solar feature	Solar panel	5VDC/30mA (53mm x 30mm)
	Charging temperature range	0° to 45°C (32° to 113°F)
	Max temperature range	-20° to 60°C (-4° to 140°F)
	Included rechargeable battery	600 mAh/>2000 charge cycles (80% of initial capacity)
	Solar efficiency	Optimized for high and low-light operation ***
	Charging efficiency	40% ***
	Luminous sustainability	Minimum of 250 LUX ***
Resistive Range (in Ohms)	0 – 250000	
Specific Resistive Ranges (in Ohms)	0 – 5600, 5600 – 250000	
Resolution (in Ohms)	65535 Unique Values Per Specific Range (16 bit): ~3.4, ~125	
Accuracy	+/- 3% FS of Specific Range	
User Calibrated Accuracy	+/- 2% FS of Specific Range ****	
Lead Wire Length	1 ft. (12 in.)	
Integrated memory	Up to 3200 sensor messages	
Wireless range	1,200+ ft non-line-of-sight	
Security	256-bit key exchange and AES-128 CTR	
Weight	4.7 ounces	
Enclosure rating	NEMA 1, 2, 4, 4x, 12 and 13 rated, sealed and weather proof	
UL rating	UL Listed to UL508-4x specifications (File E194432)	
Certifications	  Industry Canada	900 MHz wireless product; FCC ID: ZTL-G2SC1 and IC: 9794A-G2SC1.

* Hardware cannot withstand negative voltage. Please take care when connecting a power device.

** At temperatures above 100°C, it is possible for the board circuitry to lose programmed memory.

*** Solar feature's energy harvesting circuitry works indoors with low light. Light present 25% of day yields 125% of operating power to support 10-minute heartbeats.

**** For a valid calibration, the resistance under measurement must be maintained in circuit for 1 data transmission before calibration and 1 data transmission after calibration. Calibration is only applied to the specific resistive range, for best results calibrate at a resistance between 10% and 90% of the specific range. In general, calibrating between the 50% and 90% points of the specific range will yield better calibration results for the entire range.

Commercial Grade Sensors

ICARE commercial grade sensors are designed for applications in ordinary environments (normal room temperature, humidity and atmospheric pressure). Do not use these sensors under the following conditions as these factors can deteriorate the product characteristics and cause failures and burnout.

- Corrosive gas or deoxidizing gas—chlorine gas, hydrogen sulfide gas, ammonia gas, sulfuric acid gas, nitric oxides gas, etc.
- Volatile or flammable gas
- Dusty conditions
- Low-pressure or high-pressure environments
- Wet or excessively humid locations
- Places with salt water, oils chemical liquids or organic solvents
- Where there are excessively strong vibrations
- Other places where similar hazardous conditions exist

Use these products within the specified temperature range. Higher temperature may cause deterioration of the characteristics or the material quality.

Industrial Grade Sensors | Type 1, 2, 4, 4X, 12 and 13 NEMA Rated Enclosure

ICARE's Industrial sensors are enclosed in reliable, weatherproof NEMA-rated enclosures. Our NEMA-rated enclosures are constructed for both indoor or outdoor use and protect the sensor circuitry against the ingress of solid foreign objects like dust as well as the damaging effects of water (rain, sleet, snow, splashing water, and hose-directed water).

- Safe from falling dirt
- Protects against wind-blown dust
- Protects against rain, sleet, snow, splashing water, and hose-directed water
- Increased level of corrosion resistance
- Will remain undamaged by ice formation on the enclosure



For more information about our products or to place an order, please contact our sales department at 586-899-1150.

Visit us on the web at www.icaremonitoring.com.

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