



INCUE Temperature and Humidity Sensor

General Description

INCUE Wireless Temperature and Humidity Sensors use a high-end, factory-calibrated industrial humidity transducer to accurately measure relative humidity (RH) and temperature. The sensor comes in various leaded and non-leaded options.

Key Features

- ▶ Humidity Measurement Range: 0 to 100%
- ▶ Temperature Measurement Range:
 - ▶ Leaded: -25° C to 70° C (-13° F to 158° F)
 - ▶ Non-leaded: Limited to the operational range of the sensor body (enclosure and battery)
- ▶ Resolution: 0.01 % RH, 0.01° C
Typical Accuracy: ± 2% RH, 0.3° C
- ▶ Configurable thresholds for critical condition monitoring

Principles of Operation

The INCUE Wireless Temperature and Humidity Sensor measures relative humidity (RH) and temperature on a user-configurable time interval or sample. The sensor uses a high-accuracy silicon based digital humidity/temperature element to produce % RH and temperature data. On every sample, the sensor reports the most recent measurement to the gateway, making the data available in the INCUE Platform.

A 7-month ISO-17025 (NIST) calibration certificate is an available option.

Example Applications

- Facility Humidity/Temperature Monitoring
- Infection Control Risk Assessment (ICRA)
- Healthcare Construction & Remediation
- Critical Area Monitoring
- Catheterization Labs
- Endoscopy Unit
- Operating Rooms
- Isolation Rooms
- Sterile Processing Department
- Supply Rooms
- Lab Monitoring
- Other Critical Area Monitoring

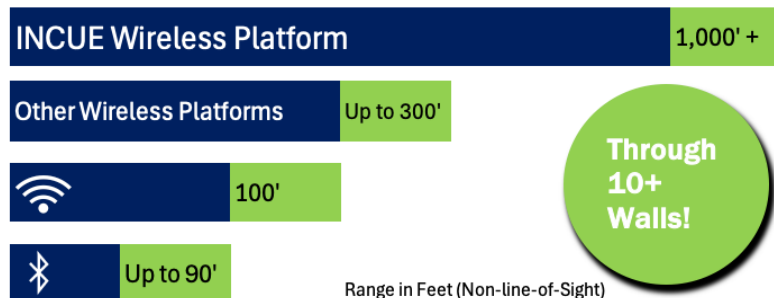
Features of INCUE Sensors

- Wireless range of 1,000+ feet through 10+ walls¹
- Frequency-Hopping Spread Spectrum (FHSS)
- Best-in-class interference immunity
- Best-in-class power management for longer battery life²
- Encrypt-RF® Security (Diffie-Hellman Key Exchange + Advanced Encryption Standard (AES)-128 Cipher Block Chaining (CBC) for sensor data messages)
- Sensor logs 2,000 to 4,000 readings if the gateway connection is lost (non-volatile flash, persists through power cycling):
 - 10-minute samples = ~22 days
 - 2-hour samples = ~266 days
- Automatic over-the-air updates to sensor firmware (future-proof)
- Automatically connects to the INCUE Platform
- INCUE Monitoring and Notification System to configure sensors, view data, and send alerts via app, SMS text, and email.

¹ Actual range may vary depending on the environment and gateway.

² Battery life is determined by the sensor reporting frequency and other variables. Other power options are also available.

INCUE Wireless Range Comparison



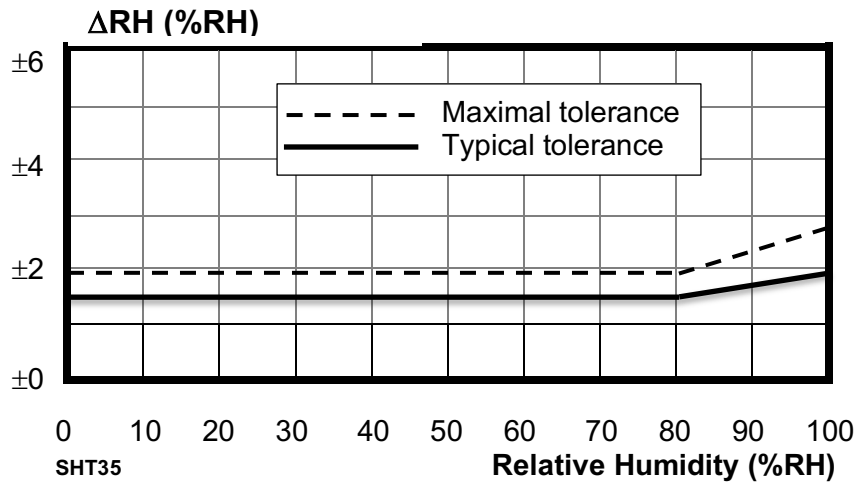
Technical Specification – INCUE Wireless Temperature and Humidity Sensors

Humidity Measurement	Range	0 to 100% RH (non-condensing)
	Accuracy	±2% RH (0 to 80%), ±3% RH (80 to 100%) ¹
	Resolution	0.01 %RH
	Response time - Leded sensor	40 seconds (8-second time constant) ²
	Response time - Non-leded sensor	6+ hours (75-minute time constant) ²
Temperature Measurement	Range - Leded sensor	-25° C to 70° C (-13° F to 158° F) ³
	Range - Non-leded sensor: Commercial	Limited to operational range of sensor body 10° c to 50° C (50° F to 122° F)
	Accuracy	±0.3° C (0.54°F) Typical ¹
	Resolution	0.01° C (0.018° F rounded to 0.01 decimal place)
	Response time - Leded sensor	15 seconds (3 second time constant) ²
Leded Probe	Response time - Non-leded sensor	100 minutes (20-minute time constant) ²
	Tip dimensions	11 mm Wide x 4.5 mm Tall (0.44" Wide x 0.16" Tall)
	Tip construction	PCA with high accuracy digital temp/humidity sensing element, soldered interface wires, all wrapped in waterproof heat shrink with small hole for air exchange.
	Wire details	4-conductor, 26 AWG, stranded copper
	Insulation	PVC, 0.010"
	Shield	No
	Jacket	PVC (black)
	Overall Diameter	4.25 ± 0.2 mm (0.17" ± 0.007)
	Ratings / Approvals	UL AWM STYLE 2464, cUL AWM I/II A 80° C 300V FT1 LF
	Temperature Rating	-25° C to 80° C (-13° F to 176° F)
	Voltage Rating	300 V Max
	Dielectric Strength	1500 V RMS
	Cable length	Standard: 0.9 m (3 ft) Optional: 0.1, 3, 7.5 m (0.33, 10, 25 ft)
INCUE Wireless	Data logging	Sensor logs 2,000 to 4,000 readings if gateway connection is lost (non-volatile flash, persists through power cycling): 10-minute samples = ~22 days - 2-hour samples = ~266 days
	Wireless protocol	Frequency-Hopping Spread Spectrum (FHSS)
	Wireless transmission power (EIRP)	50 mW (900MHz), 25 mW (868 MHz), 10 mW (433 MHz)
	Wireless range	1,000+ ft. through 10+ walls with the INCUE Gateway
	Security	Encrypt-RF® (256-bit key exchange and AES-128 CTR)
General	Battery Voltage Range	2.0 to 3.8 VDC
	Operating altitude (non-pressurized environments)	-15.2 to 1,982 m (-50 to 6,500 ft) ⁴
	Storage Altitude (non-pressurized environments)	-15.2 to 3,048 m (-50 to 10,000 ft) ⁴
	Operating Humidity	5 to 85% RH (non-condensing)
	Certification	900 MHz sensors: FCC ID: ZTL-G2SC1 and IC: 9794A-G2SC1 . 868 and 433 MHz sensors tested and comply with: EN 55032: 2015/A11:2020 ; EN 55035:2017/A11:2020 ; ETSI EN 300 220 V3.2.1 (2018-06) ; ETSI EN 301 489-3 V2.2.0. (2021-11) ; and ETSI EN 303 645 . All sensors tested and comply with: EN 61010-1 and EN 60950 and meet RoHS 2015/863 and REACH 224 (June 2022), according to IEC 63000:2016/AMD1:2022 .

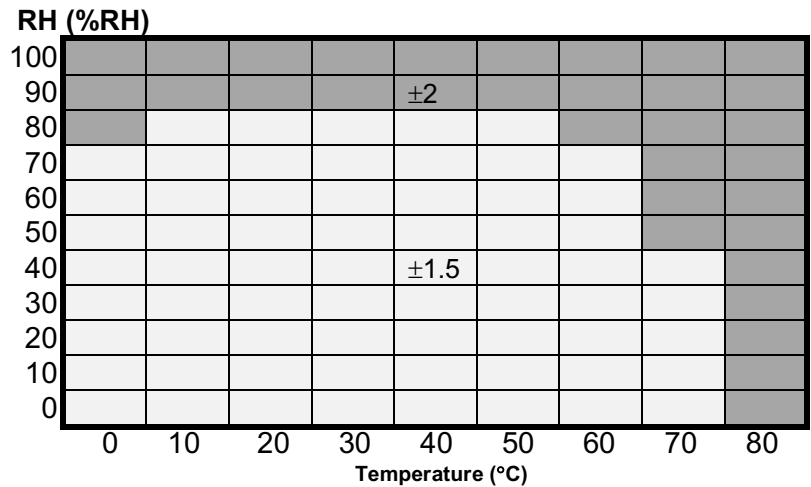


1. Refer to the humidity/temperature graphics below for more detailed information on the sensors accuracy and range.
2. Response time (τ of 99.3%) is significantly affected by air flow and the conditions present in the immediate vicinity of the sensing element.
3. High temperature limited by heat shrink at 70° C. The sensor electronics in the lead are rated to 125° C and will not fail at 70° C but the heat shrink and heat shrink adhesive may become malleable at this temperature compromising the waterproof seal.
4. Operating and storage altitude without DC power supply is -30.48 to 9144 m (-100 to 30,000 ft).

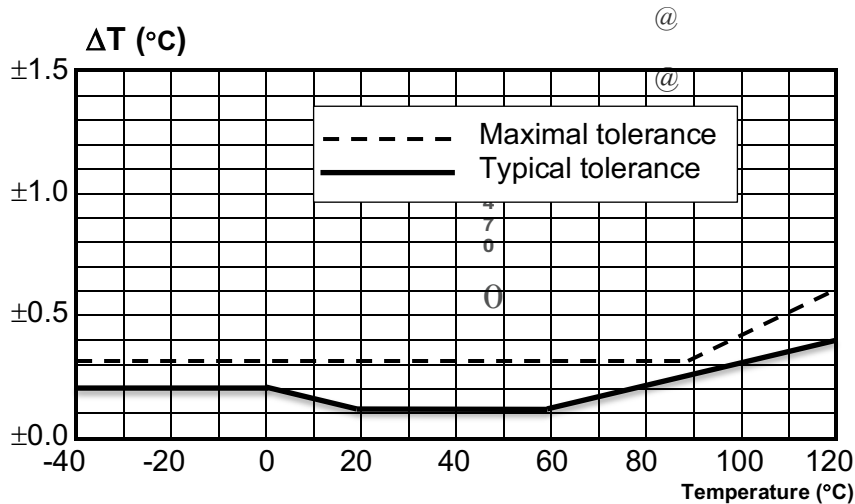
Accuracy: Relative Humidity Measured (%) vs Relative Humidity Actual (%)

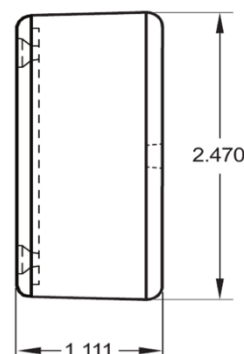
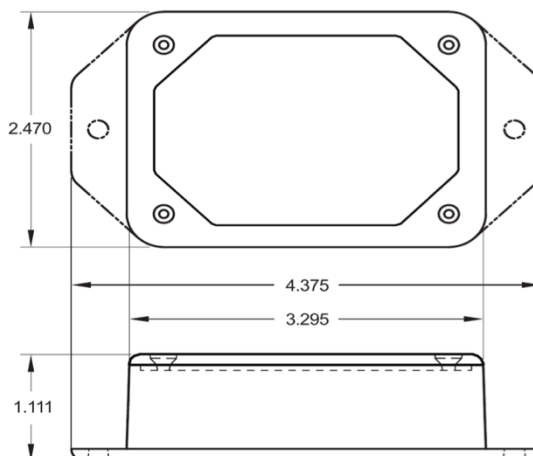


Accuracy: Relative Humidity Measured (%) vs Temperature Actual (°C)



Accuracy: Temperature Measured (°C) vs Temperature Actual (°C)





Technical Specifications INCUE Temperature and Humidity Sensor

Battery ¹	2x 1.5V M Alkaline, 1500 mAh, (standard) 2x 1.5V M Lithium, 3000 mAh, (optional)
Battery Life	1+ years expected
External line-power option ²	Input voltage: 5.0-12.0 V Power jack: 2.1 x 5.5 mm barrel, center positive
Operating temperature range (non-leaded measurement range) ³	-18° C to 55° C (0° F to 130° F) - AA Alkaline Batteries -25° C to 60° C (-13° F to 140° F) - AA Lithium L91 Batteries 0° C to 40° C (32° F to 104° F) - US 5V Power Supply 10° c to 40° C (50° F to 104° F) - International 5V Power Supply
Wireless antenna type	1/4-wave, 20-gauge wire whip, 3.5" (900/868MHz), 7" (433MHz)
Weight	3 oz. (85.05 g) with no lead

1. Hardware cannot withstand negative voltage. Please take care when inserting and removing batteries.
2. Batteries will provide backup power in the case the external power is removed.
3. Operating below 0° C (-32° F) degrees will reduce battery life.

Commercial-Grade Sensors

INCUE 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 oxide 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 temperatures may cause deterioration of the characteristics or the material quality.