



Remote Wireless Monitoring

Halo Wireless Humidity Sensor

General Description

The Halo Wireless Humidity Sensor uses 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 58°F)
 - Non-leaded: Limited to the operational range of the sensors 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 Halo Wireless Humidity Sensor measures relative humidity (RH) and temperature on a user-configurable time interval or Heartbeat. The sensor uses a high-accuracy silicon based digital humidity/temperature element to produce % RH and temperature data. On each heartbeat, the current measurement is sent to the gateway, making the data available in Halo, or another approved data service.

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

Example Applications

- Ambient humidity/temperature monitoring
- Lab monitoring
- Indoor/outdoor environmental monitoring
- Greenhouse and grow house monitoring
- Smart machines and facilities
- HVAC operation & testing
- Data center monitoring
- Additional applications


Features of Halo Sensors

- Wireless range of 2,000+ feet through 18+ walls*
- Frequency-Hopping Spread Spectrum (FHSS)
- Best-in-class interference immunity
- Best-in-class power management for longer battery life**
- Encrypt-RF® Security (Diffie-Hellman Key Exchange + Advanced Encryption Standard (AES)-128 Cipher Block Chaining (CBC) for sensor data messages)
- Sensor logs 2000 to 4000 readings if the gateway connection is lost (non-volatile flash, persists through power cycling):
 - 10-minute Heartbeats = ~ 22 days
 - 2-hour Heartbeats = ~ 266 days
- Automatic over-the-air updates to sensor firmware (future-proof)
- Free Basic Online Wireless Sensor Monitoring and Notification System to configure sensors, view data, and send alerts via SMS text, email, and voice call

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

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

Technical Specification – Halo Wireless Humidity Sensor

Humidity Measurement	Range	0 to 100% RH (non-condensing)
	Accuracy	± 2% RH (0 to 80%), ± 3% RH (80% to 100%)*
	Resolution	0.01 %RH
	Response time- Leded sensor	40 seconds (8-second time constant)**
	Response time- Non-leded sensor	6+ hours (75-minute time constant)**
Temperature Measurement	Range- Leded sensor	-25°C to 70°C (-13°F to 158°F)***
	Range- Non-leded sensor:- Commercial	Limited to operational range of sensor body 10°C to 50°C (50°F to 122°F)
	Enterprise	-18°C to 55°C (0°F to 130°F) using alkaline batteries
	Industrial	-40°C to 70°C (-40°F to 158°F)
	Accuracy	± 0.3°C (0.54°F) Typical*
	Resolution	0.01°C (0.018°F rounded to 0.01 decimal place)
	Response time- Non-leded sensor	100 minutes (20 minute time constant)**
Leded Probe	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
Wireless	Cable length	Standard: 0.9 m (3 ft) Optional: 0.1, 3, 7.5 m (0.33, 10, 25 ft)
	Data Logging	Sensor logs 2000 to 4000 readings if gateway connection is lost (non-volatile flash, persists through power cycling): 10-minute Heartbeats = ~22 days- 2-hour Heartbeats = ~266 days
	Wireless Protocol	Proprietary Frequency-Hopping Spread Spectrum (FHSS)
	Wireless transmission power (EIRP)	50 mW (900MHz), 25 mW (868 MHz), 10 mW (433 MHz)
	Wireless range	2,000+ ft. through 18+ walls with the Halo Gateway
General	Security	Encrypt-RF® (256-bit key exchange and AES-128 CTR)
	Battery Voltage Range	2.0 to 3.8 VDC
	Operating Altitude	-15.2 to 1,982 m (-50 to 6,500 ft) ****
	Storage Altitude	-15.2 to 3,048 m (-50 to 10,000 ft) ****
	Operating humidity	5 to 85% RH (non-condensing)
General	Certifications	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.
		

*Refer to the humidity/temperature graphics below for more detailed information on the sensors accuracy and range.

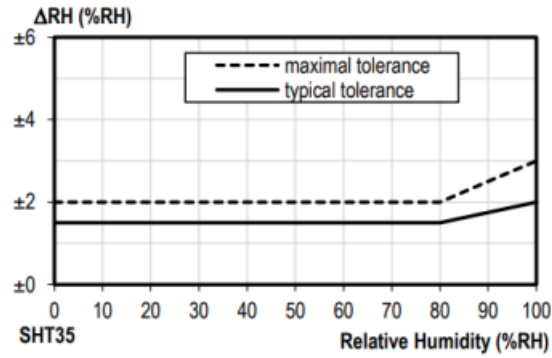
**Response time (?of 99.3%) is significantly affected by air flow and the conditions present in the immediate vicinity of the sensing element.

***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.

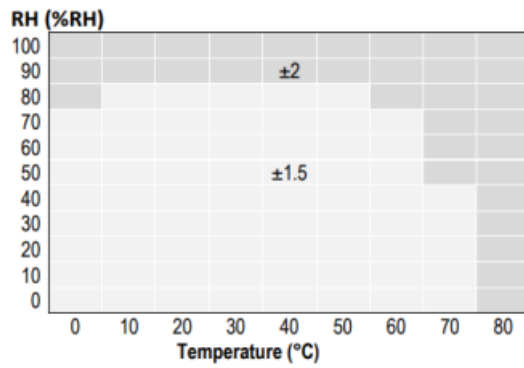
****Operating and storage altitude without DC power supply is -30.48 to 9144 m (-100 to 30,000 ft).

This sensor reports the relative humidity in % and temperature in °C or °F.

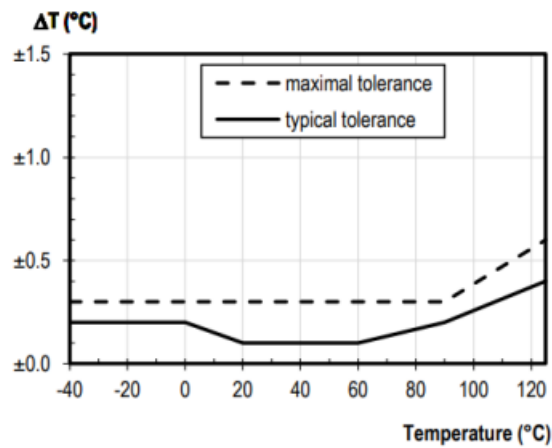
Accuracy: Relative Humidity Measured (%) vs Relative Humidity Actual (%)

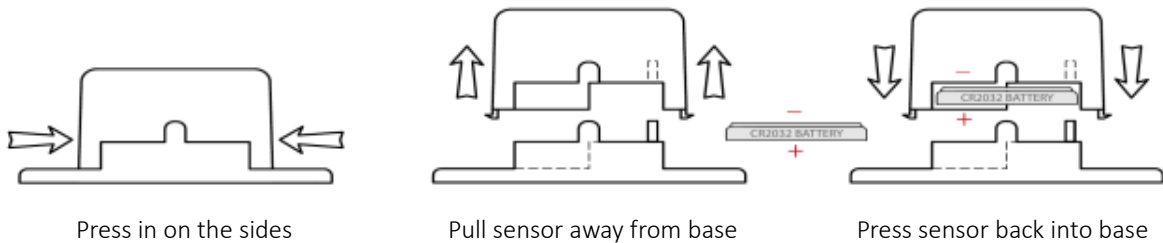
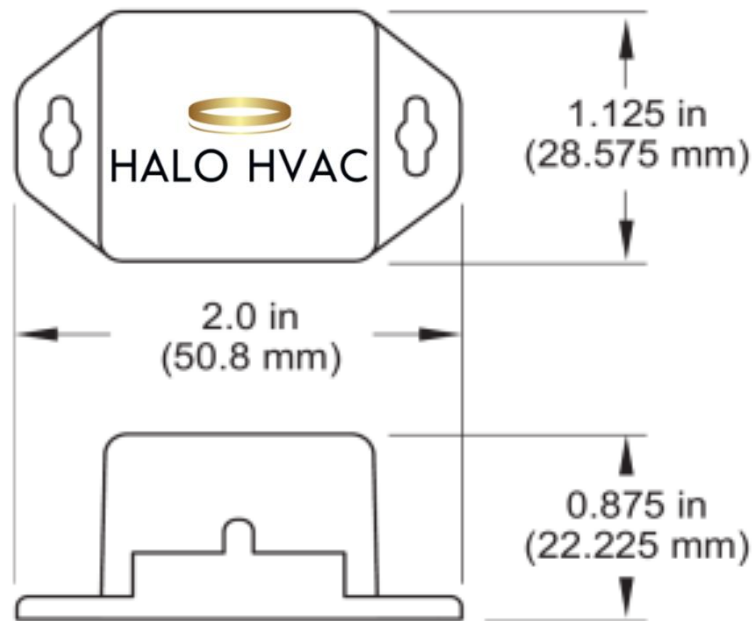


Accuracy: Relative Humidity Measured (%) vs Temperature Actual (°C)



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



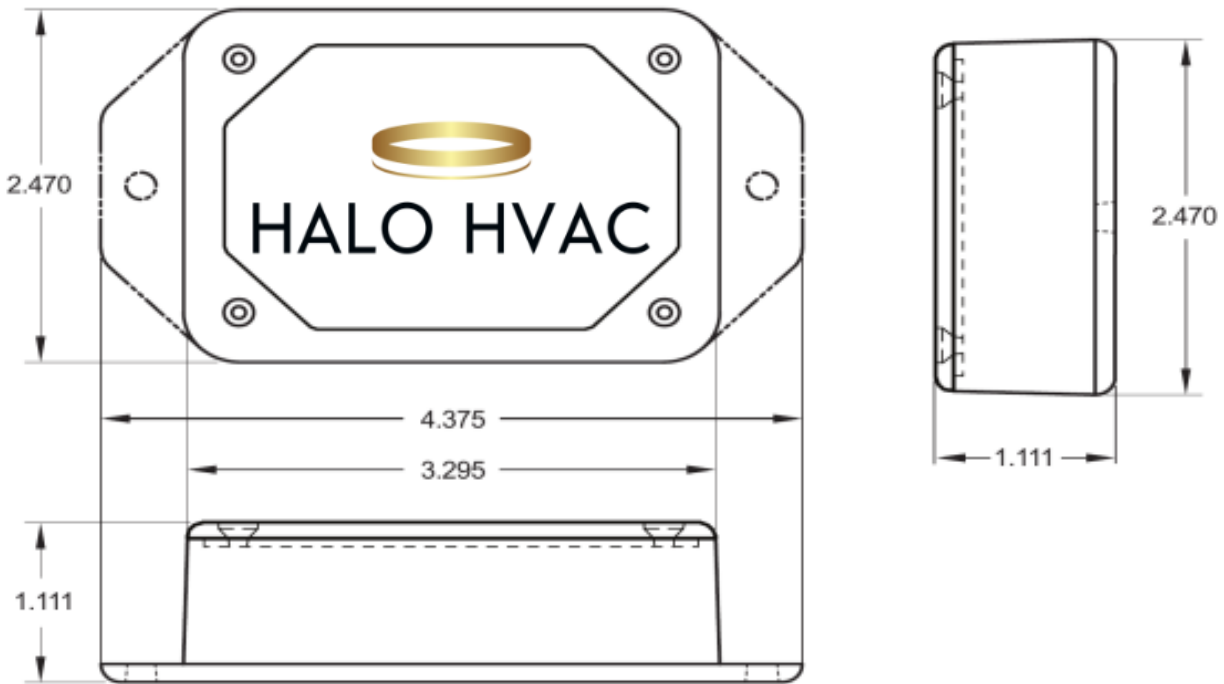


Technical Specification – Halo Commercial Wireless Humidity Sensor

Battery*	1x 3.0V CR2032 Button Cell, 100 mAh
Battery Life	2+ years expected
Operating temperature range (non-leaded measurement range)	10°C to 50°C (50°F to 122°F)
Wireless antenna type	1/4-wave, 20-gauge wire whip, 3.5" (900/868MHz), 7" (433MHz)
Weight	0.7 oz

*Hardware cannot withstand negative voltage. Please take care when inserting and removing batteries.

This sensor reports the relative humidity in % and temperature in °C or °F.



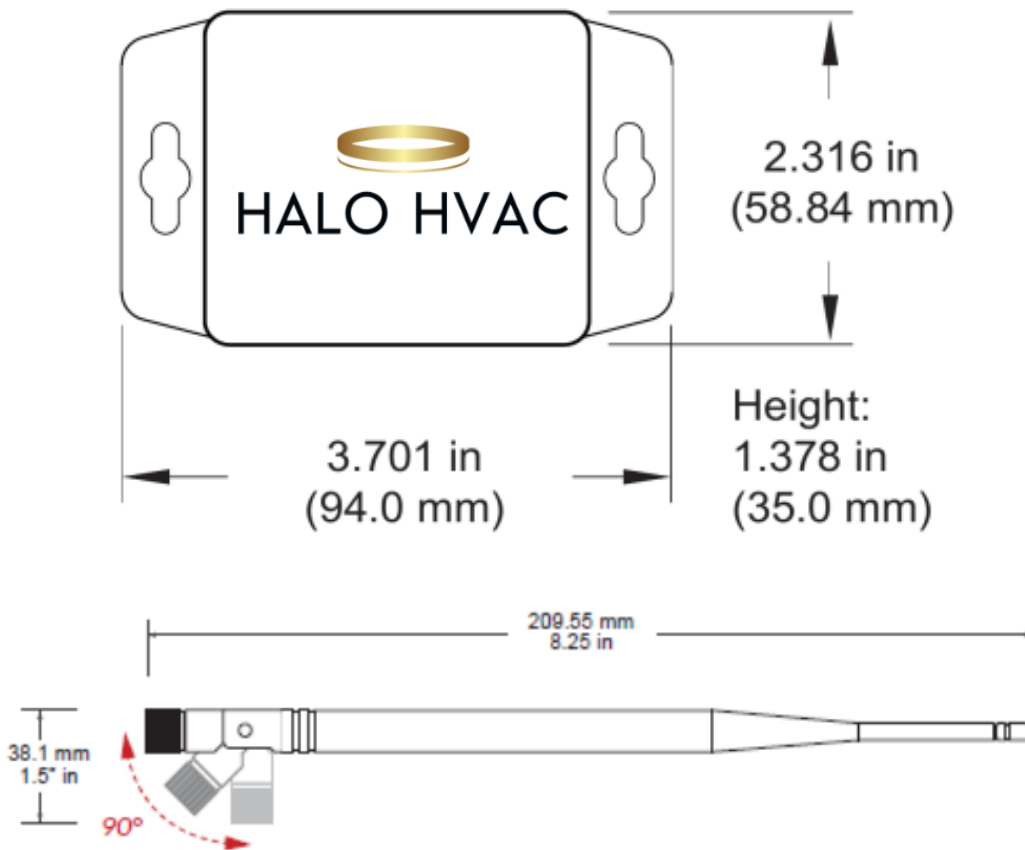
Technical Specification – Halo Enterprise Wireless Humidity Sensor	
Battery*	2x 1.5V AA Alkaline, 1500 mAh, (standard) 2x 1.5V AA Lithium, 3000 mAh, (optional)
Battery Life	10+ years expected
External line-power option**	Input voltage: 5.0-12.0 V Power jack: 2.1 x 5.5 mm barrel, center positive
Operating temperature range (non-leaded measurement range)***	-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 3.7 oz. (105 g) with 0.9 m (3.0') lead

*Hardware cannot withstand negative voltage. Please take care when inserting and removing batteries.

**Batteries will provide backup power in the case the external power is removed.

***Operating below 0°C (-32°F) degrees will reduce battery life.

This sensor reports the relative humidity in % and temperature in °C or °F.



Technical Specification – Halo Industrial Wireless Humidity Sensor	
Battery	1x 3.6V AA Lithium Thionyl Chloride, 1500mAh, pre-installed
Battery Life	10+ years expected
Operating temperature range (non-leaded measurement range)*	-40°C to 85°C (-40°F to 185°F)
Wireless antenna type	1/2-wave waterproof dipole with RP-SMA connector and swivel neck; dBi of 3.0 (900/868MHz) or 2.5 (433 MHz); length of 8.27" (210mm) (900/868MHz) or 7.68" (195mm) (433 MHz); diameter at thickest point of 0.55" (14mm)
Weight	4.7 oz. (133 g) with 0.15 m (6.0") lead 5.2 oz. (147 g) with 0.9 m (3.0') lead
Enclosure rating	IP-65 (dust-proof and waterproof but not submersible) NEMA 1, 2, 4, 4x, 12, and 13 rated, sealed, and weatherproof UL Listed to UL508-4x specifications (File E194432)

*Operating below 0°C (-32°F) degrees will reduce battery life.

Commercial-Grade Sensors

Halo 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.

Industrial-Grade Sensors

Halo 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 and the damaging effects of 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



HALO HVAC

