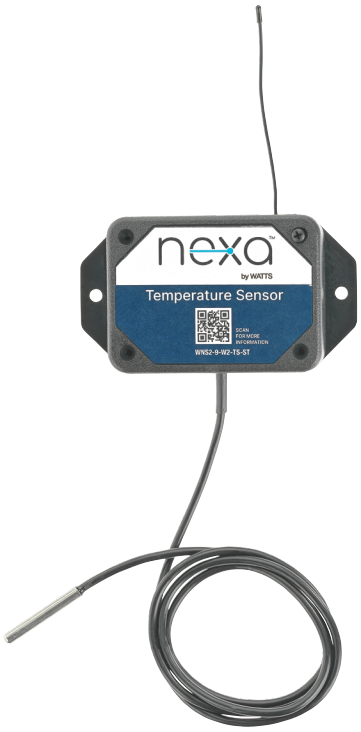
Product Specification

Temperature Sensor

WNS2-9-W2-TS-ST

Nexa™ Temperature Sensor is a wireless, battery-powered device that uses a thermistor encapsulated in a waterproof probe to take accurate measurements.

- Measurement Range: -40°F to 257°F (-40°C to 125°C)
- Resolution: 0.18°F (0.1°C)
- Accuracy: ±1.8°F (±1°C)
- Calibrated Accuracy: ±0.45°F (±0.25°C)
- Configurable thresholds for critical condition monitoring



Battery-powered, wireless temperature sensor

Principle of Operation

The sensor measures the ambient or surface temperature based on a user-configurable time interval or heartbeat. When performing a measurement, the sensor momentarily energizes a thermistor in series with a precision resistor. This produces a voltage directly proportional to the temperature of the thermistor. The sensor converts the analog voltage signal to a digital value and computes the measurement. The temperature of the thermistor (in degrees Fahrenheit or Celsius) is then sent to the gateway, making the data available in Nexa.

The sensor can be user-calibrated for improved accuracy. Additionally, an industry-leading 25-month ISO 17025 (NIST) certification is also available.

Primary Applications

- Domestic hot water pipes, risers, and branches
- Cold water lines
- Boiler and chiller supply and return
- Ambient temperature

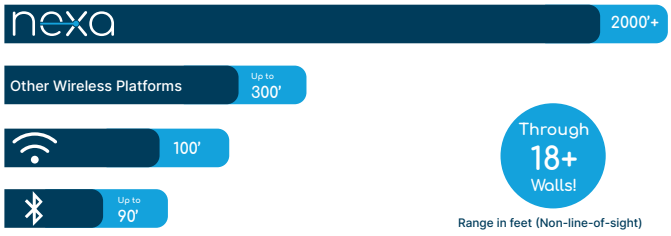
Features

- Wireless range of 2,000+ feet through 18+ walls[1]
- Frequency-hopping Spread Spectrum (FHSS)
- Best-in-class interference immunity
- Best-in-class power management for longer battery life[2]
- Encrypt-RF® Security (Diffie-Hellman Key Exchange + Advanced Encryption Standard (AES)-128 Cipher Block Chaining (CBC) for sensor data messages)
- Sensor logging of 2,000 to 4,000 readings if the gateway connection is lost (nonvolatile flash, persists through power cycling):
  - 10-minute heartbeats = ~22 days
  - 2-hour heartbeats = ~266 days
- Over-the-air (OTA) firmware updates (future proof)

[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.

Wireless Range Comparison



NOTICE

Watts is not responsible for the failure of alerts due to connectivity issues, expired batteries, or improper installation.

NOTICE

The information contained herein is not intended to replace the full product installation and safety information available or the experience of a trained product installer. You are required to thoroughly read all installation instructions and product safety information before beginning the installation of this product.

Inquire with governing authorities for local installation requirements.

Technical Specification

Call customer service if you need assistance with technical details.

Temperature Measurement	Range	-40°F to 257°F (-40°C to 125°C)
	Accuracy @ 77°F (25°C)	±1.8°F (±1°C)
	Calibrated accuracy	±0.45°F (±0.25°C)
	Resolution	0.18°F (0.1°C)
	Response time[1]	50 s (10 s time constant)
Probe	Transducer type	10 Ω NTC Thermistor (β = 3455 K)
	Tip dimension	0.157 in. (4 mm) diameter by 1.18 in. (30 mm)
	Tip material	Type 304 stainless steel
	Cable material	Waterproof high-temperature ABS with EMF shielding
	Cable diameter	0.14 in. (3.56 mm)
	Cable length	Standard: 3 ft (0.9 m)
Wireless Sensor	Data logging	Sensor logs 2,000 to 4,000 readings if gateway connection is lost (nonvolatile flash, persists through power cycling): 10-minute heartbeats = ~22 days 2-hour heartbeats = ~266 days
	Wireless protocol	Nexa Proprietary Frequency-hopping Spread Spectrum (FHSS)
	Wireless transmission power (EIRP)	50 mW (900 MHz), 25 mW (868 MHz), 10 mW (433 MHz)
	Wireless range	2,000+ ft through 18+ walls with Nexa 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)[2]	-50 ft to 6,500 ft (-15.2 m to 1,982 m)
	Storage altitude (non-pressurized environments)[2]	-50 ft to 10,000 ft (-15.2 m to 3,048 m)
	Operating humidity	5% to 85% RH (non-condensing)
	Certifications FC Industry Canada CE UK CA	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 24 (June 2022), according to IEC 63000:2016/AMD1:2022

[1] Response time defined as five time constants for 99.3% of actual temperature.

[2] Operating and storage altitude without DC power supply is -100 ft to 30,000 ft (-30.48 m to 9,144 m).

Technical Specification, cont.

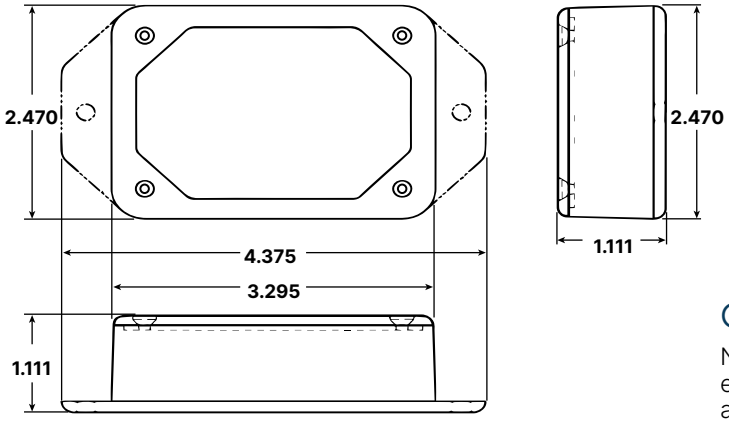
Battery[1]	2× 1.5V AA alkaline, 1500 mAh
Battery life	10+ years expected
Operating temperature range (non-leaded measurement range)[2]	0°F to 130°F (-18°C to 55°C)
Wireless antenna type	1/4-wave, 20 gauge wire whip, 3.5 in. (900/868 MHz)
Weight	3.7 oz (105 g) - with 3.0 ft (0.9 m) lead

[1] Hardware cannot withstand negative voltage. Take care when inserting and removing batteries.

[2] Operating below 32°F (0°C) reduces battery life.

Dimensions

Measurements expressed in inches.



Operating Conditions

Nexa 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 such as chlorine gas, hydrogen sulfide gas, ammonia gas, sulfuric acid gas, nitric oxide gas
- 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 Nexa specified temperature range. Higher temperatures may cause deterioration of the characteristics or the material quality.