

INCUE Air Quality Sensor

General Description

The INCUE Wireless - Air Quality Sensor measures particulate matter (PM) concentrations in the air.

Key Features

- ▶ Measurement Sensitivity:
 - ▶ PM1: 0.3 to 1.0 μm
 - ▶ PM2.5: 1.0 to 2.5 μm
 - ▶ PM10: 2.5 to 10 μm
- ▶ Effective Range: 0 to 500 $\mu\text{g}/\text{m}^3$
- ▶ Maximum Range: 0 to 500 $\mu\text{g}/\text{m}^3$
- ▶ Counting Efficiency: 50% @ 0.3 μm , 98% @ $\geq 0.5 \mu\text{m}$

Principles of Operation

The INCUE Wireless Air Quality Sensor measures the particulate matter (PM) based on a user-configurable time interval or sample. The sensor works by turning on a small fan at the beginning of a measurement cycle to bring in a volume of ambient air and measures the PM content of that sample. The sensor measures PM content using a laser that scatters based on the number and size of particles suspended in the air. This measurement is then sent to the gateway, making the data available in the INCUE Platform.

It is important to keep the air ports of the sensor clear to ensure proper readings. Remember to:

- ▶ Install the meter with the air ports pointing down to prevent accumulation of dust and moisture.
- ▶ Ensure that the air ports are open to the ambient air without any obstructions within 25 mm (1 inch).

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

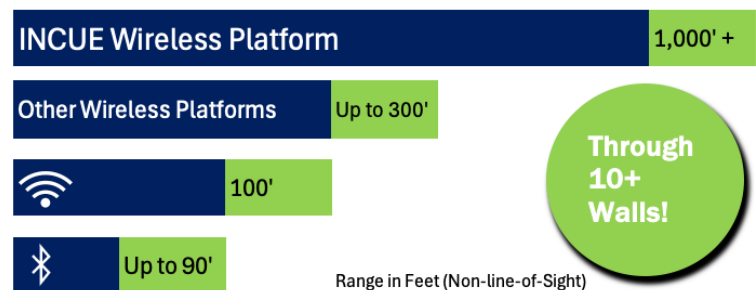
Features of INCUE Sensors

- 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)
- 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 Air Quality Sensor

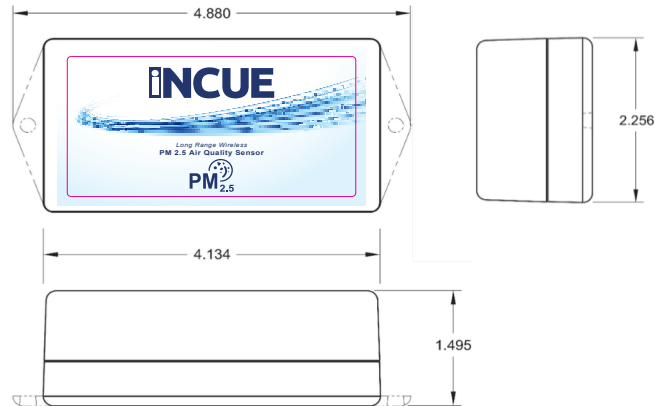
PM Meter	Measurement sensitivity	PM1: 0.3 to 1.0 μm PM2.5: 1.0 to 2.5 μm PM10: 2.5 to 10 μm
	Counting efficiency	50% @ 0.3 μm , 98% @ $\geq 0.5 \mu\text{m}$
	Effective range	0 to 500 $\mu\text{g}/\text{m}^3$
	Maximum range	0 to 1000 $\mu\text{g}/\text{m}^3$
	Maximum consistency error	+/- 10% 100 to 500 $\mu\text{g}/\text{m}^3$ +/- 10 $\mu\text{g}/\text{m}^3$ @ 0 to 100 $\mu\text{g}/\text{m}^3$
	Response time	~10 Seconds ¹
	Supply voltage	2.0-3.8 VDC (5.0-12 VDC using power supply) ²
	Active current	~180 mA @ 3.3 battery voltage, ~0.6 W overall
	Operating humidity	0 to 99%
	Storage temperature	-40° C to 80° C
	Mean time to failure	≥ 3 Years
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
General	Security	Encrypt-RF® (256-bit key exchange and AES-128 CTR)
	Battery voltage range	2.0 to 3.8 VDC
	Operation altitude (non-pressurized environments)	-15.2 to 3,048 m (-50 to 10,000 ft) ³
	Storage altitude (non-pressurized environments)	-15.2 to 1,982 m (-50 to 6,500 ft) ³
	Operation humidity	5 to 85% RH (non-condensing)
	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.



1. Response time may vary with stability threshold setting and PM concentration. Increasing the stability threshold will improve response time but reduce stability and accuracy of readings. With higher PM concentrations the sensor will acquire stable readings more quickly.
2. Hardware cannot withstand negative voltage. Please take care when connecting a power device.
3. Operating and storage altitude without DC power supply is -30.48 to 9144 m (-100 to 30000 ft).

This sensor reports the following three values:

- PM1 measurement on sample
- PM2.5 measurement on sample
- PM10 measurement on sample



Technical Specifications | INCUE

Battery ¹	2x 1.5V AA Alkaline, 1500 mAh, (standard) 2x 1.5V AA Lithium, 3000 mAh, (optional)
Battery Life	<1 years expected
External line-power option ²	Input voltage: 5.0-12.0 V Micro USB 2.0 B type
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	3.7 oz. (105 g)

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.