Dust Monitoring Sensor

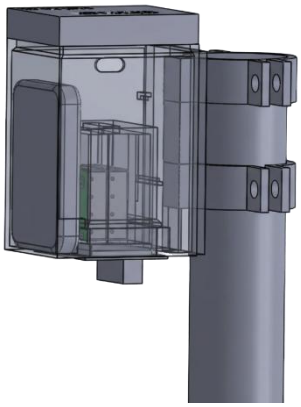
Industrial Quality Monitoring

3D-ENSURE
Tailored Sensors, Endless Possibilities

Description

The 3D-ENSURE Dust Monitoring Sensor provides accurate, real-time monitoring of particulate matter across multiple size ranges (PM1.0, PM2.5, PM4, PM10). Engineered for industrial applications, it integrates temperature and humidity sensing to contextualize dust dynamics. Its modular, 3D additive-manufacturing design ensures reliability, easy maintenance, and scalability for large-scale deployment.

Dust Sensor with Wireless Data Collection – V0.3



Key Features

- ✓ Multi-parameter monitoring (PM1.0, PM2.5, PM4, PM10, Temp, Humidity).
- ✓ High reliability with SPS30 contamination-resistant design.
- ✓ IP65 ruggedized housing with airflow-optimized filter.
- ✓ LoRaWAN wireless communication, scalable networks.
- ✓ Low power operation (9–24 VDC, >6-day autonomy).
- ✓ Tool-free screwless housing for fast maintenance.
- ✓ Suitable for factories, mining, construction, and urban monitoring.

Technical Specifications

SPECIFICATION	VALUE	UNIT	NOTES
SYSTEM LIFETIME	>6	Years	Depending on environment
MAINTENANCE	Annual	-	Replace sensing unit
PARTICULATE MATTER	PM1.0, PM2.5, PM4, PM10	-	Mass & number concentration
TEMPERATURE	-20 to 50 (operating) -40 to 80 (extended)	°C	Ambient range
HUMIDITY	0–95	% RH	Non-condensing
SUPPLY VOLTAGE	9–24	VDC	Nominal 12 V
BATTERY AUTONOMY	>6	Days	Backup operation
DIMENSIONS	98 × 72 × 154	mm	Housing
WEIGHT	1.5	kg	Total unit
ENCLOSURE	IP65	-	Dust/water resistant
COMMUNICATION	LoRaWAN	-	15s transmission, 2s sampling

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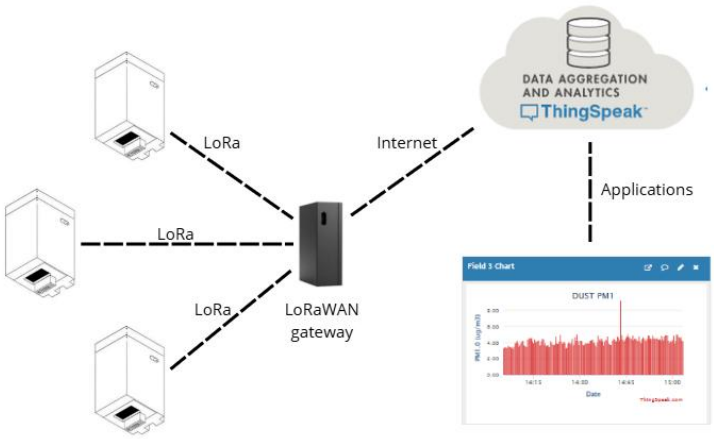
Communication Protocol

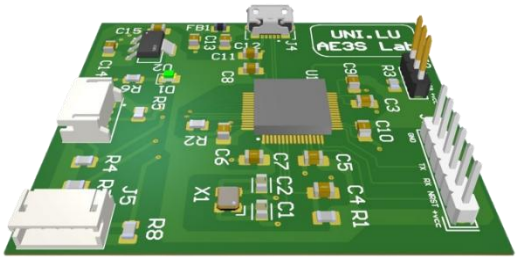
Sensor data is transmitted via LoRa to a LoRaWAN gateway, which forwards it over the Internet to the ThingSpeak™ cloud platform (or a custom server). The platform enables real-time visualization, analytics, and secure storage of environmental data. Through a web interface, users can access live dashboards, track trends, and monitor charts. Additional features include custom alerts, automated reporting for regulatory compliance, and data export. With updates every 15 seconds, the system ensures timely, accurate insights, empowering users to make informed and proactive environmental management decisions.



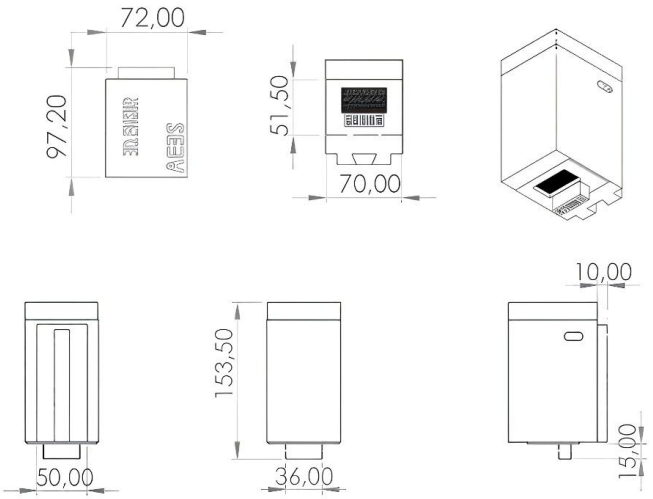
Web interface

Electronics & PCB

The embedded STM32 microcontroller manages data acquisition, filtering, and communication. The PCB is optimized for low-power consumption, ensuring uninterrupted operation in remote deployments. Integrated safeguards protect against voltage peaks, reverse polarity, and harsh environmental factors.



Technical Drawing



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