

Airly Aura is an advanced ambient air quality sensor designed to measure:



particulate matter concentrations
(PM1, PM2.5, PM10)



up to two gas pollutants simultaneously
(possible configurations:
NO2 + O3, NO + NO2 lub CO + SO2)



humidity



temperature



atmospheric pressure

The device uses 2G (GPRS) communication technology for data transmission and enables remote management and configuration. It is equipped with an LED strip that visualizes air quality levels using Air Quality Index colors (default: CAQI).

● Measurement Parameters

Particulate Matter (MCERTS-Certified)

Measurement range	PM1: 0.3–1.0 µm, PM2.5: 1.0–2.5 µm, PM10: 2.5–10.0 µm
Effective measurement range (PM2.5)	0–500 µg/m³
Maximum measurement range (PM2.5)	≤1000 µg/m³
Resolution	1 µg/m³
Accuracy	±10% for 100-500 µg/m³; ±10 µg/m³ for 0-100 µg/m³
Response time	<1s single, <10s cumulative
Operating temperature	-40 to +60 °C
Operating humidity	0-99% RH
Lifetime	>= 3 years
Typical accuracy (R2)	PM1: >0.8; PM2.5: >0.8; PM10: >0.6
Typical Relative Expanded Uncertainty (REU)	PM2.5: < 50% (Class 1 according to CEN Technical Specification (TS 17660-2:2024)) PM10: < 50% (Class 1 according to CEN Technical Specification (TS 17660-2:2024))



Gas Sensors

1. Nitrogen Dioxide (NO₂)

Units	ppb, µg/m ³ (1 ppb = 1.88 µg/m ³ @ 1 atm, 25 °C)
Measurement range	0–5000 ppb
Resolution	1 ppb
Accuracy	±5 ppb
Noise	±15 ppb (±2 stdev)
Response time (t90)	<80 s
Zero drift	±20 ppb/year
Sensitivity drift	±20%/year
Limit of Detection (LoD)	2 ppb
Operating life (50% signal decay)	>24 months
O ₃ filter lifetime	<500 ppm·hrs
Storage	6 months @ 3–20 °C
Lifetime	≥2 years
Typical accuracy (R2)	>0.7
Typical REU	<25% (Class 1, CEN TS 17660-1:2021)

Operating conditions

Temperature	-30 to +40 °C
Relative Humidity	0–99% (recommended 15–85%)
Pressure	800–1100 hPa

2. Nitrogen Oxide (NO)

Units	ppb, µg/m ³ (1 ppb = 1.23 µg/m ³ @ 1 atm, 25 °C)
Measurement range	0–5000 ppb
Resolution	1 ppb
Accuracy	±10 ppb

Noise	±20 ppb (±2 stdev)
Response time (t90)	<25 s
Zero drift	±50 ppb/year
Sensitivity drift	±20%/year
Limit of Detection (LoD)	2 ppb
Operating life (50% signal decay)	>24 months
Storage	6 months @ 3–20 °C
Lifetime	≥2 years
Typical accuracy (R2)	>0.7
Typical REU	<25% (Class 1, CEN TS 17660-1:2021)

Operating conditions

Temperature	-30 to +50 °C
Relative Humidity	0–99% RH (recommended 15–85%)
Pressure	800–1100 hPa

3. Ozone (O₃)

Units	ppb, µg/m ³ (1 ppb = 1.96 µg/m ³ @ 25 °C)
Measurement range	0–5000 ppb
Resolution	1 ppb
Accuracy	±10 ppb
Response time (t90)	<80 s
Zero drift	±20 ppb/year
Sensitivity drift	±20%/year
Limit of Detection (LoD)	3 ppb
Operating life (50% signal decay)	>24 months
Storage	6 months @ 3–20 °C
Lifetime	≥2 years

Typical accuracy (R2)	>0.8
Typical REU	<30% (Class 1, CEN TS 17660-1:2021)

Operating conditions

Temperature	-30 to +40 °C
Relative Humidity	0–99% RH (recommended 15–85%)
Pressure	800–1100 hPa

4. Sulfur Dioxide (SO₂)

Units	ppb, µg/m ³ (1 ppb = 2.62 µg/m ³ @ 1 atm, 25 °C)
Measurement range	0–5000 ppb
Resolution	1 ppb
Accuracy	±10 ppb
Response time (t ₉₀)	<20 s
Zero drift	±20 ppb/year
Sensitivity drift	±15%/year
Limit of Detection (LoD)	5 ppb
Operating life (50% signal decay)	>36 months
Storage	6 months @ 3–20 °C
Lifetime	≥2 years
Typical accuracy (R2)	>0.6
Typical REU	<25% (Class 1, CEN TS 17660-1:2021)

The electrochemical SO₂ sensor is subject to significant cross-sensitivity from other gases (including O₃ and NO₂), for which Airly currently does not offer compensation algorithms. For this reason, the use of this sensor is not recommended in applications that require precise SO₂ measurements at very low concentrations.

Operating conditions

Temperature	-30 to +50 °C
Relative Humidity	0–99% RH (recommended 15–85%)
Pressure	800–1100 hPa

4. Carbon Monoxide (CO)

Units	ppb, $\mu\text{g}/\text{m}^3$ (1 ppb = $1.15 \mu\text{g}/\text{m}^3$ @ 1 atm, 25 °C)
Measurement range	0–5000 ppb
Resolution	1 ppb
Accuracy	± 10 ppb
Response time (t90)	<30 s
Zero drift	± 100 ppb/year
Sensitivity drift	$\pm 10\%$ /year
Limit of Detection (LoD)	4 ppb
Operating life (50% signal decay)	>36 months
Storage	6 months @ 3–20 °C
Lifetime	≥ 2 years
Typical accuracy (R2)	>0.8
Typical REU	<25% (Class 1, CEN TS 17660-1:2021)

Operating conditions

Temperature	-30 to +50 °C
Relative Humidity	0–99% RH (recommended 15–85%)
Pressure	800–1100 hPa

Meteorological Measurements

Humidity	
Range	0-100%RH
Accuracy	$\pm 2\%$ RH
Resolution	0.1%RH
Drift	$\pm 0.25\%$ RH/year
Lifetime	≥ 2 years

Temperature	
Range	-40 to +80 °C
Accuracy	$< \pm 0.2$ °C
Resolution	0.1°C
Lifetime	≥ 4 years

Pressure Sensor

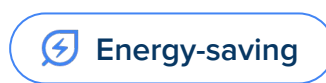
Range	300-1100 hPa
Resolution	0.1 hPa
Accuracy	+/- 0.12 hPa
Lifetime	≥4 years

• Data Acquisition and Transmission Mechanism

The device can operate in two modes:



samples are collected every 1–2 seconds.



measurements are performed at defined intervals, with duty cycle between 10% and 50%.

Collected data is averaged over **5–20 minutes** (depending on configuration). After each cycle, results are automatically transmitted to the server.

To optimize energy use and reduce electromagnetic interference from the GSM module, data may be buffered and uploaded in batches.

The device communicates with the Airly endpoint using GPRS (2G) over a TCP/IP connection.

In case of network failure or congestion, the device can buffer data for up to 1 hour. Additional samples overwrite the oldest buffered records.

• Wireless Communication

Data transmission via 2G (GPRS) mobile network. Device must be within operator coverage; minimum signal strength: -90 dBm. Equipped with an integrated omnidirectional antenna with 2.15 dB gain. Equipped with a SIM card ensuring connectivity across countries supporting 2G.

• Power Supply and Energy Consumption

Supply voltage	5 V via included 110/230 V adapter
Minimum current capacity	2.1 A
Average consumption	1.2 W
Maximum consumption	2 W
Power cable	2.9 m, extendable with 24 AWG USB extension (max. 1.8 m)
Power consumption	0.5–1.5 W (depending on mode)

Low Power Mode	
LED brightness	0-50%
Duty cycle	10–50% (6–30 seconds per minute)
Averaging interval	5 minutes
Transmission interval	15 minutes – 1 hour

• LED Status and Diagnostics

Startup sequence

- 
- White: attempting server connection (up to 60 seconds)
- Status indications:
 - No connection attempt → Flashing red
 - Connecting → Flashing yellow
 - Connection established → Flashing blue
- After successful connection, the sensor begins normal operation. Air quality indicator color appears after the first data transmission.

OFFLINE MODE

- If disconnected for >30 minutes, LEDs display PM2.5 levels per CAQI thresholds.
- Once reconnected, LED indicators return to normal CAQI-based air quality display <https://airly.org/map/en/>.

Diagnostics and Error Handling

The device includes an advanced exception logging system to monitor and store error information. This system includes:

Error Types

The device distinguishes between different types of errors:

-  **GSM communication error** – network connectivity issues.
-  **Sensor error** – sensor malfunction or abnormal readings.
-  **Memory error** – device memory problems.

Reset Counter

The device records reset causes, enabling precise diagnostics. Possible causes:

-  **No response from server** – no communication with the server.
-  **Memory error** – reset caused by memory issues.
-  **Server-initiated reset** – reset initiated by an external server.

• Embedded Software

The sensor is delivered with dedicated firmware enabling:



Remote management (reset, memory bank switching, APN configuration, LED control).



OTAU firmware upgrades with dual-bank technology.



Automatic air pollution and meteorological data acquisition.



Remote diagnostics and error logging.

Supported protocol functions:

Measurement transmission

Static sensor information upload

Device status reports

Remote reset

Firmware download

Configuration update

LED color change

• MCERTS Certification



The Airly Aura sensor is MCERTS-certified. MCERTS certification is available at the [CSA Group website](https://www.csa-group.com/en/mcerts).

The user should verify with the manufacturer that the monitoring system is suitable for the intended application.

The device may operate under the certificate in one of the two following ways:

Qualitative measurement

Provides indicative data for pollution trend analysis and source identification.

Such an application may rely on factory calibration only.

Quantitative measurement

Providing measurement data with an Relative Extended Uncertainty (REU) specified for indicative instruments (<+/- 50%).

Requires local co-location calibration against a reference method for two weeks, with slope and offset applied.

Calibration must be repeated at least annually or after relocation.

• Safety Information



CE Declaration of Conformity: The device meets all requirements set out in European Union directives, which means it is safe to use in EU countries. It bears the required CE marking, confirming that the device has been designed and manufactured in accordance with standards related to health, safety, and environmental protection.



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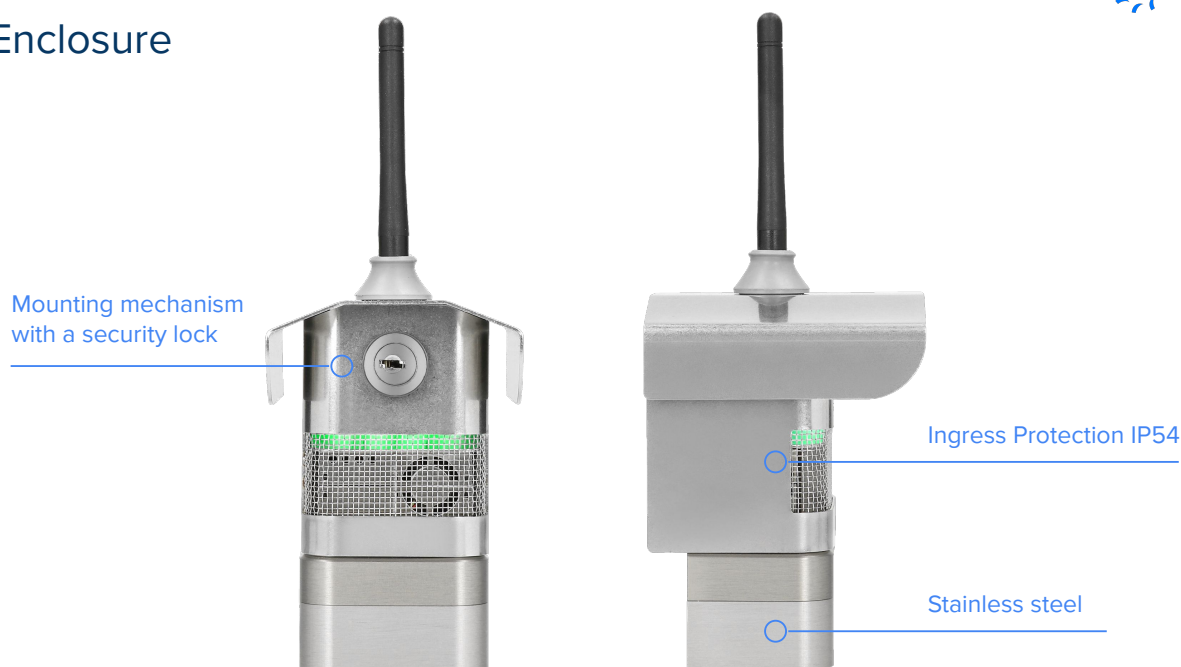
RoHS Compliance: The device complies with the RoHS directive (Restriction of Hazardous Substances), which restricts the use of hazardous substances in electronic and electrical equipment.



DIN EN 60825-1 Class 1: The device complies with safety standards related to optical radiation emissions (e.g., lasers). Class 1 means that the device is safe for the eyes during normal use and does not pose a health risk to the user.

Airly Aura is designed to withstand dust and water ingress, ensuring durability in harsh outdoor conditions.

- Enclosure



Case material

The device's enclosure is made of acid-resistant stainless steel, ensuring high resistance to corrosion, moisture, chemicals, and high temperatures. Acid-resistant stainless steel and aluminum provide durability and an aesthetic appearance, even in harsh industrial or environmental conditions.

Dimensions

The device measures 112 mm* x 74 mm x 83 mm, making its design compact and convenient. Its size allows for easy installation and enables mounting in various locations, saving space while maintaining full functionality.

*without antenna; antenna 170–200 mm

Mounting mechanism with a security lock

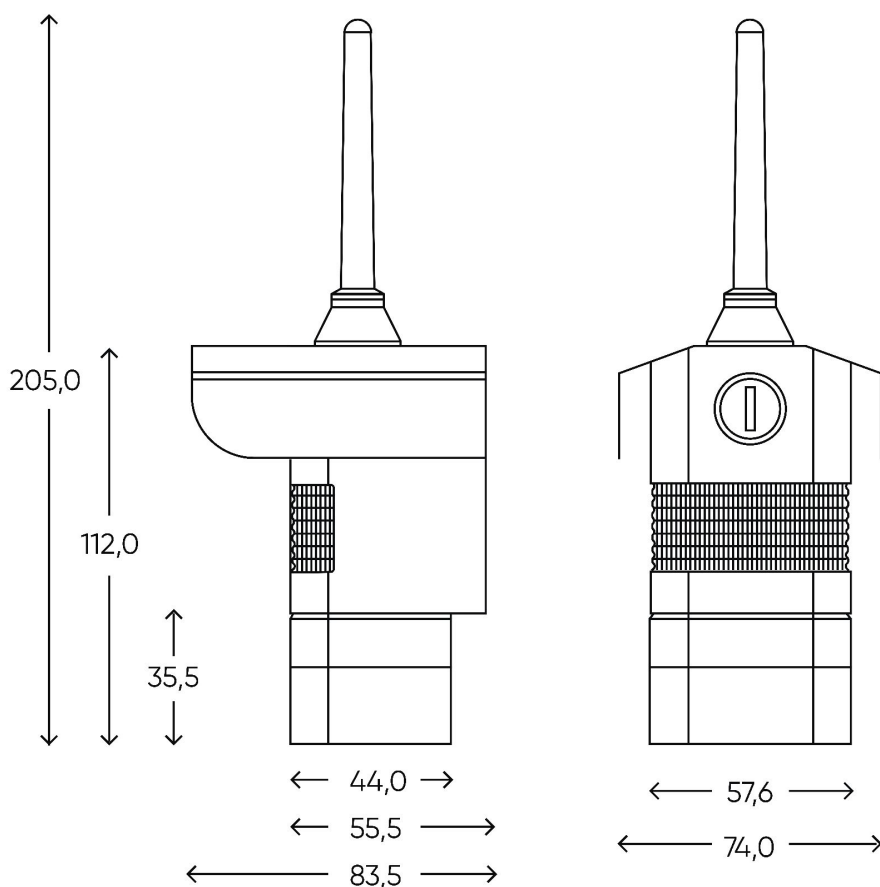
The device is equipped with a key-lock mounting system, providing additional protection against unauthorized access. This type of solution is especially useful in applications requiring protection against theft or accidental disassembly. It ensures that the device remains securely in place and operates as intended.

Weather resistance

The enclosure has been designed for operation in various weather conditions, meaning the device is fully adapted for outdoor use. The use of appropriate materials and construction allows the device to function reliably in different climates and weather scenarios, from rain to intense sunlight.

Ingress Protection IP54

The device's enclosure provides an IP54 protection rating, meaning it is resistant to dust ingress in quantities that do not interfere with its operation and to water splashes from any direction. This rating ensures the device can be used in challenging conditions, such as in the presence of dust, rain, or other adverse weather factors, while maintaining reliability and operational safety.



• Data Access

Measurement data is available via:



Airly Map



API



Mobile Apps



Airly Data Platform

Data is stored in secure cloud infrastructure with retention mechanisms ensuring:

- Long-term durability,
- Storage security.

• Storage Conditions

Before installation and during storage, the device should be kept under appropriate conditions to maintain the performance and accuracy of its sensors.

Storage temperature	10°C to +40°C
Relative humidity	15–85% RH (non-condensing)

Keep in original packaging, in a dry, ventilated area free from direct sunlight and chemical vapors.

Avoid proximity to heat sources, electromagnetic fields, and vibration.

● Operating Conditions

The Airly Aura sensor has been designed to operate in demanding outdoor conditions. To ensure proper and long-term sensor performance, the following recommendations should be followed:

Ambient temperature	-40 to +60 °C (recommended -30 to +50°C)
Humidity	0–100% RH (recommended 15–85%)
Pressure	700 hPa to 1100 hPa

Avoid exposure to excessive dust. Continuous operation of the device in high-dust conditions (concentration above 1000 µg/m³ for 24 hours) may shorten the effective lifespan of the measurement components.

Exposure to weather conditions: The enclosure protects the device from rain, dust, and UV radiation. However, direct contact with pressurized water (e.g., pressure washers) should be avoided. Compressed air must not be used to clean the dust sensor, as high pressure may damage internal measurement components.

● Installation

To ensure proper operation and high measurement accuracy, the following installation guidelines should be followed, in accordance with Directive 2008/50/EC and the PAS 4023:2023 Code of Practice [\(link\)](#)

Height

- The recommended installation height for the device is **1.5 to 4 meters above ground level**, in accordance with European Parliament Directive 2008/50/EC.
- In justified cases (e.g., intentional measurement of exposure at higher altitudes or lack of possibility to install at a lower height), installation **up to a height of 8 meters is permitted**.

Location



Free airflow – The device should be installed in a location free from obstacles that could interfere with the airflow around it.



Avoid electromagnetic interference – Do not install the device closer than 3 meters from transformer stations, high-voltage electrical boxes, or other sources of variable electromagnetic fields.



Avoid the influence of local sources of heat or humidity – Such as air conditioners, heaters, or humidifiers. Minimum recommended distance: 5-10 meters.



Protection from pollution sources – The device should be placed at least 15 meters away from chimneys, exhaust outlets, and other sources of particulate matter. Detailed installation guide. It is also recommended to avoid installing the device near dust-emitting plants, which may contribute to elevated levels of measured particulate pollution.

Mounting and power supply

- The device should be mounted in a vertical position to ensure:
 - unobstructed airflow through the sensors
 - minimized impact of air turbulence and mechanical contaminants.
- The device should be mounted on a stable surface, resistant to vibrations and impacts.
- Power supply: **110/230V AC, 50/60Hz** (using the factory-supplied power adapter: 5V, min. 2.1A). The power adapter must be protected from rain, water, and dust – it is not intended for outdoor use without proper protection.

Non-compliance may cause

- Reduced measurement accuracy
- Shortened sensor lifetime
- Device damage.

 **Detailed installation guide**

• Warranty and Service

Warranty conditions:

- The warranty covers repair or replacement of the device in case of material or manufacturing defects.
- Warranty and post-warranty service is provided through authorized Airly service centers.
- The warranty does not cover mechanical damage resulting from improper use, installation not in accordance with the user manual, or interference with the device's software.
- To request service, please contact the support team at: support@airly.org

Detailed warranty conditions are available in the **General Warranty Terms (GWT)**, accessible at www.airly.org/warranty-terms.

The GWT may vary depending on the region, type of customer, or the terms of the agreement concluded within a specific project.

• Calibration Validity / Recalibration Procedure

Airly Pure devices are factory-calibrated and ready for use immediately after installation.

For applications requiring high measurement precision (e.g., research projects, validation against reference methods), **local calibration against a reference station is recommended**:

- every **12 months**
- or after each **change of device location**.

The local calibration process includes:

- **a two-week of colocation measurements** with a reference station
- adjustment of calibration parameters such as **slope and offset**.

Airly offers support for local calibration upon customer request.

Additional information and calibration tools are available on demand, please contact: support@airly.org.

- Maintenance

At least **once every 6 months**, it is recommended to check the condition of the device and its power supply to ensure there are no mechanical damages that could affect its functionality. It is also important to verify that the device has not been exposed to excessive moisture or extreme weather conditions, which may lead to damage.

- Disposal

The device must not be disposed of with household waste. In accordance with the WEEE Directive (2012/19/EU) on waste electrical and electronic equipment, the device should be taken to a designated collection point responsible for the reception and processing of such equipment. These collection points are commonly found in electronics stores, service centers, and specialized recycling facilities.

Steel enclosure: The device's steel enclosure can be recycled as scrap metal, allowing for the recovery of materials that can be reused in the production of new products.

Electronic components: All electronic parts, batteries, and accumulators contained in the device require specialized processing to recover valuable raw materials and eliminate hazardous chemical substances.

Recommendations: Users are required to comply with local regulations regarding the disposal of electrical and electronic equipment and to use collection points equipped for the safe handling of such waste.

The device may also be sent to Airly's headquarters for disposal.