OIZOM
REDEFINING RESOURCES

# Polludrone®

## Ambient Air Quality Monitoring System

Polludrone is a Continuous Ambient Air Quality Monitoring System (CAAQMS). It is capable of monitoring various environmental parameters related to air quality, noise, odour, weather, radiation etc. It measures the particulate matter and gaseous concentrations in the ambient air in real-time. Using external probes, it can also monitor other auxiliary parameters like traffic, disaster etc.
Polludrone is an ideal choice for smart cities as well as urban infrastructure applications like roadside, campus, and airport monitoring. It is easily integrable with a Smart Pole/Intelligent Pole.


## Product Variants

| Variant Name | Application | Parameter |
|---|---|---|
| Polludrone Lite | General Purpose | $PM_{2.5}$, $PM_{10}$, $CO_2$, CO, Noise, Light, UV-Radiation, Temperature, Humidity |
| Polludrone Smart | Extensive | $PM_{2.5}$, $PM_{10}$, $CO_2$, CO, $SO_2$, NO, $NO_2$, $O_3$, Noise, Light, UV-Radiation, Temperature, Humidity |
| Polludrone Pro | Critical | $PM_1$, $PM_{2.5}$, $PM_{10}$, $PM_{100}$ (TSP), $CO_2$, CO, $SO_2$, NO, $NO_2$, $O_3$, $H_2S$, Noise, Light, UV-Radiation, Temperature, Humidity |
| External Modules | Optional | Wind Speed & Direction, Rainfall, Flood (integrable with all the 3 variants) |

### Smart City

Pollution monitoring at strategic locations in a smart-city empowers city authorities to obtain actionable insights for pollution control.

### Road-side & Tunnels

Pollution monitoring at roads and tunnels can help create pollution mitigation action plan to control vehicular emissions.

### Campus Monitoring

Pollution monitoring at key locations on campus allows stakeholders to spread awareness about environmental conditions of the premises.

### Airports

Pollution and noise monitoring at taxiways and terminal surroundings facilitates airport authorities to analyze its impact on travellers and surrounding neighbourhoods

Powered by

e-Breathing™ Technology

## Product Features

**Patented Technology:** Works on innovative e-breathing technology for higher data accuracy

**Weather Resistant:** IP66 Grade (certified) enclosure for endurance against harsh weather conditions

**Solar Powered with Battery Backup:** Compatible to charge internal battery using solar power

**Tamper Proof:** Comes with a security system to avoid tampering / malfunction / sabotage

**Retrofit Design:** Plug and play design for ease of implementation

**Over-The-Air Update:** Automatically upgradeable from a central server without any onsite visit

**Compact:** Light-weight and compact system that can be installed at 12-15 feet (4-5 m) height

**Real-Time Data:** Continuous monitoring and real-time data transfer at configurable intervals

**Ultimate Durability:** Made of high-grade engineering-metal and composite polymers for long life

**Network Agnostic:** Supports a wide range of connectivity options like GSM / GPRS / WiFi / LoRa / NBIoT/ Ethernet / Modbus

**Identity & Configuration:** Each equipment carries its unique identity with geo-tagging through wireless configuration

**On-device Calibration:** On-site device calibration capability using on-device calibration software

## 3 Levels of Calibration

### Factory Calibration

The sensors are bump tested at Oizom factory to check their proper functioning for each parameter.


### Lab Calibration

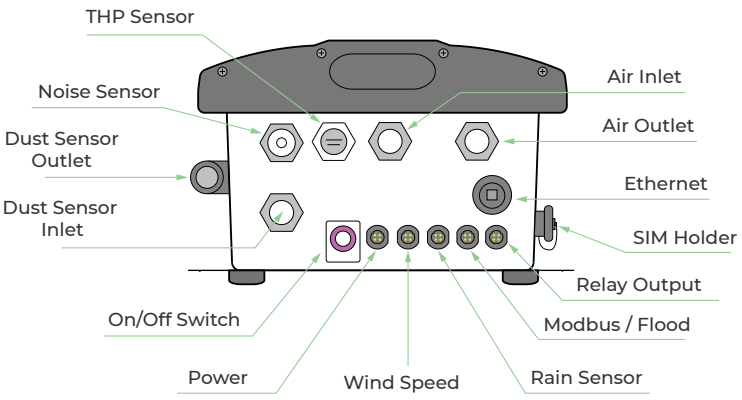
Laboratory calibration is performed for Baseline Correction & Span-Calibration for all the parameters to compensate for cross-sensitivity and ensure higher data accuracy.

### Collocation Calibration

The sensors are calibrated against a reference station before installation and their performance is tested in the ambient condition before final deployment.

## General Specifications

| | |
|---|---|
| Size | 360mm (H) x 328mm (W) x 200mm (D) |
| Weight | 7.2 Kg (instrument weight) |
| Material | Aluminum Magnesium Alloy, Mild-steel (With Powder Coating), FRP |
| Certifications | CE & FCC Certified, PTCRB Certified Communication Module |



## Communication

| | |
|---|---|
| Data Interval | 2-30 minutes (configurable) |
| Data-push Protocol | HTTP post request to host-server |
| Data-pull | HTTP request on device IP |
| Firmware Updates | Over-The-Air Firmware Update |
| Standby Connectivity | GSM (2G/3G/4G) for remote diagnosis, FOTA updates, and cloud calibration |

## Power

| | |
|---|---|
| Avg. Power Consumption | 5 Watt (Actual consumption depends upon the number of parameters) |
| Power Input Options | External 110-230V AC 50-60Hz, 40Watt Monocrystal Solar Panel |
| SMPS Specs | 24V, 2Amps output UL-62368 & CAN/CSA C22.2 Certified |
| Battery Backup Time | 12 Hours |
| Battery Specs | Lithium iron phosphate (LiFePO4) battery cell with rated voltage 12.8V Capacity 6Ah |

## Technical Specification

| | |
|---|---|
| Processor | Quad Core ARM Cortex |
| Memory | 2GB RAM / 8GB eMMC ROM |
| Device Interface | On-device Software / API |
| Operating Temperature | -20 °C to 60 °C |
| Operating Humidity | 0-95% RH |

| | Connectivity Options | Specification |
|---|---|---|
| Wireless | GSM | Global 2G / 3G / 4G |
| | LORA | 868 MHz / 915 MHz |
| | LTE | CAT-M1 |
| | NB-Iot | CAT-NB1 |
| | Sigfox | 868 to 869 MHz, 902 to 928 MHz |
| | Wifi | AP Mode and Station Mode |
| Wired | Ethernet | Static / DHCP Configuration |
| | Modbus | RS485 RTU / TCP |
| | Relay Output | 2 Channel |

## Parameters

| ID | Parameter | Range | Resolution | Min. Detection | Error / Drift | Working Principle | Measurement Principle | Sample Rate | Expected Sensor Life |
|---|---|---|---|---|---|---|---|---|---|
| OZPM_1 | Suspended Particulate Matters with size less than 2.5µ ($PM_{2.5}$) | Upto 5000 µg/m³ | 0.1 µg/m³ | 1 µg/m³ | Upto ±10 % | Optical Particle Counter | Active Sampling | 1 L /min | 12 months |
| OZPM_2 | Suspended Particulate Matters with size less than 10µ ($PM_{10}$) | | | | | | | | |
| OZPM_3 | Ultra Fine Particulate Matters with size less than 1µ ($PM_1$) | | | | | | | | |
| OZPM_4 | Total Suspended Particulates (TSP) | Upto 30000 µg/m³ | | | | | | | |
| OZCO2_1 | Carbon Dioxide ($CO_2$) | Up to 5000 ppm | 1 ppm | 20 ppm | < ±5 ppm / Year | NDIR | | 325 mL per sample | 3 years |
| OZCO_3 | Carbon Monoxide (CO) | 0-1000 ppm | 10 ppb | 100 ppb | < ±100 ppb / Year | Electrochemical | | | 2 years |
| OZSO2_1 | Sulfur Dioxide ($SO_2$) | 0-20 ppm | 1 ppb | 10 ppb | < ±20 ppb / Year | | | | |
| OZNO_1 | Nitric Oxide (NO) | 0-20 ppm | 1 ppb | 10 ppb | < ±50 ppb / Year | | | | |
| OZNO2_1 | Nitrogen Dioxide ($NO_2$) | 0-20 ppm | 1 ppb | 10 ppb | < ±20 ppb / Year | | | | |
| OZO3_1 | Ozone ($O_3$) | 0-20 ppm | 0.001 ppm | 10 ppb | < ±20 ppb / Year | | | | |
| OZH2S_1 | Hydrogen Sulfide ($H_2S$) | 0-100 ppm | 1 ppb | 0.01 ppm | < ±100 ppb / Year | | | | |
| OZN_1 | Ambient Noise | Upto 140 dB | 1 dB | 30 dB | 2% / Year | Capacitive | Passive Monitoring | N.A. | 3 years |
| OZLI_1 | Light Intensity | Up to 1,00,000 Lux | 1 Lux | 1 Lux | N.A. | Photo-conductivity | | | |
| OZUV_1 | UV Radiation (0-12 UVI) | 0.1-100,000 uW/cm² | 0.1 uW/cm² | 0.1 uW/cm² | N.A. | | | | |
| OZVLI_1 | Visible Light Intensity | Up to 5000 Lux | 0.1 Lux | 0.1 Lux | N.A. | | | | |
| OZTEMP_1 | Temperature | -40 to 125 °C | 0.01°C | -40 °C | N.A. | Solid state semi conductor sensing | | | |
| OZHUM_1 | Humidity | Up to 100% Rh | 0.1% | 0.1% | N.A. | | | | |
| OZPRES_1 | Barometric Pressure | 300-1100 hPa | 0.18 Pa | 300 hPa | ±1.0 hPa / Year | | | | |

## External Modules (optional)

1 

**Rain Sensor**
- Tipping Bucket
- In mm / inch

2 

**Wind Sensor**
- Ultrasonic sensor
- 360°, 0-40 m/s

3 

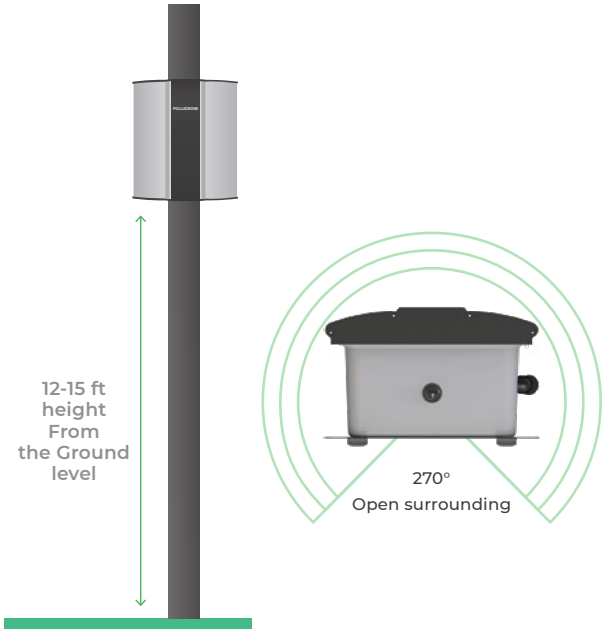
**Flood Sensor**
- Ultrasonic sensor
- Upto 765 cm

# Functional Specification

### Strategic Location Selection

Proper location selection is critical for optimized data collection. It varies as per the purpose of the project. According to USEPA QA handbook (Vol II, Section 6.0 Rev.1), the selection of locations should be based on monitoring purposes such as:

- Real-time air quality public reporting
- Research monitoring
- Trends monitoring
- Compliance monitoring
- Emergency episode monitoring




### Installation

| | |
|---|---|
| Preferred Mounting | Pole / Wall (preferably 270° open surrounding) |
| Installation Height | 12-15 feet (4-5 meters) |
| Direction | As per maximum direct sunlight exposure (if ambient-light monitoring is a preference) |
| Power Availability | Constant AC supply within a 2-meter range from the unit or solar panel |
| Network Availability | Uninterrupted network connection |

### Operation

When the device is powered on, the device intakes air samples at a predefined frequency through the air sampling system. Once the air sample is stabilized, the sensory system takes multiple readings during the sampling time and performs relevant data-processing. During this cycle time, the device flushes out old air sample and pulls in a fresh one. After each sampling, the data processing system sends the processed data to the central server using a built-in communication module

### Maintenance

**Cleaning:** Periodic cleaning is important to ensure optimum device performance. Monthly or quarterly regular maintenance activity has to be carried out depending upon the surrounding. The activity includes cleaning the dome for the light sensor, air inlet, and outlet mesh & general cleaning of the exterior.

**Sensor Replacement:** Every sensor has a limited life span. The sensor life depends on the average pollutant concentration in the area. The sensors need to be replaced once their performance starts to deteriorate and the system starts giving unstable data.

**Spot-Calibration:** The frequency of calibration is decided based on atmospheric conditions and individual sensor drift to ensure data accuracy. Spot calibration can be performed using reference equipment which can also be a recently calibrated Oizom device.

**Diagnosis/Debugging:** Power and network availability are the prime check in case of equipment failure. If the issue is still unresolved after remote diagnosis, on-site troubleshooting can be planned by an engineer.

**Accurate Air Quality Monitoring And Advanced Data Analytics**

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