

Temperature, Relative Humidity, Barometric Pressure, Volatile organic compounds (VOC), Particulate matter PM1, PM2.5, PM10, Ozone O<sub>3</sub>, Carbon Monoxide CO, Nitrogen Dioxide NO<sub>2</sub>, Sulphur Dioxide SO<sub>2</sub>, Noise level



### Hardware Version

HW 8th

### Features

- 9 high quality digital sensors tracking 12 air parameters
- Four slots for electrochemical sensors, allowing custom gas detection, 26 gases supported
- Multiple connectivity options including GSM, WiFi, LoRaWAN, NB-IOT
- USB port for power, data access, debug and configuration
- Relay Output pin to control one external relay
- Built-in air pump for active flow
- Alarms and notifications using built-in speaker
- Direct and Cloud data access via API
- Rugged design with aluminum enclosure
- Low power consumption
- Designed to support solar panels operation
- Compact size 150x60x30 mm
- Wall mounting support

### Applications

- INDUSTRIAL monitoring
- Production space monitoring
- CBRN Monitoring

### Description

uRADMonitor INDUSTRIAL is an automated, fixed monitoring station that tracks a total of 12 important air quality parameters. It is intended for the industrial sector, to monitor industrial emissions of moderate and high concentration. It comes in a rugged aluminium enclosure with wall mounting support. The data is exported to the uRADMonitor network and can be accessed in real time using the cloud API interface or directly via the local network.

With automated monitoring, data trends becomes possible thanks to continuous surveillance and a permanent data flux. We have a higher detection capability for small variations and can trigger automated alarms if predefined thresholds are reached, improving reaction time while lowering costs.

# uRADMonitor INDUSTRIAL

## Environmental Monitoring

Using the available connectivity options and the low power consumption this device can be deployed for a large variety of field applications. Its versatility is combined with a convenient cloud based data access with an API interface to access the measurements directly from the uRADMonitor cloud.

### Sensors

The device uses a high quality laser scattering sensor to measure the Particulate Matter PM1.0, PM2.5 and PM10 concentration in air. Four additional electrochemical sensors measure Carbon Monoxide, Sulphur Dioxide, Nitrogen Dioxide and Ozone by default, interchangeable to support additional gases. A MOX VOC sensor measures volatile organic compounds. A built in fan assures an active air flow stream across the sensing elements. Two MEMS sensors read ambient temperature (with redundancy), pressure and humidity, and a noise sensor measures the noise level.

SENSOR	PARAMETER	MINIMUM	MAXIMUM	RESOLUTION	ACCURACY	INTERVAL <sup>(1)</sup>	LIFESPAN <sup>(2)</sup>
MEMS	Temperature	-40 °C	+125 °C	0.5 °C	± 0.3°C	-40..+125°C	5 years
	Humidity	0% RH	100% RH	1% RH	± 2%	-40..+125°C	
MEMS	Pressure	950 hPa	1050hPa	1Pa	0.12hPa	-40..+100°C	5 years
Laser scattering	PM1	0 µg/m³	1000 µg/m³	1 µg/m³	R=0.99 <sup>(3)</sup>	-40..+100°C	5 years
	PM2.5	0 µg/m³	1000 µg/m³	1 µg/m³		-40..+100°C	
	PM10	0 µg/m³	1000 µg/m³	1 µg/m³		-40..+100°C	
Mox sensor	VOCs	10 ppm <sup>(4)</sup>	1000 ppm <sup>3</sup>	-	± 5%	-40..+100°C	2 years
Analog noise sensor	Noise level	30 dB	130 dB	1 dB	± 10%	-40..+100°C	2 years
Electrochemical O <sub>3</sub>	Ozone	0 ppm	10 ppm	0.001 ppm	± 10 %	-20..+50°C	2 years <sup>(5)</sup>
Electrochemical CO	Carbon Monoxide	0 ppm	10 ppm	0.001 ppm	± 10 %	-20..+50°C	2 years <sup>(5)</sup>
Electrochemical SO <sub>2</sub>	Sulphur Dioxide	0 ppm	10 ppm	0.001 ppm	± 10 %	-20..+50°C	2 years <sup>(5)</sup>
Electrochemical NO <sub>2</sub>	Nitrogen Dioxide	0 ppm	10 ppm	0.001 ppm	± 10 %	-20..+50°C	2 years <sup>(5)</sup>

<sup>1</sup> Using the sensor outside the recommended temperature interval can shorten its lifespan

<sup>2</sup> Estimated for normal usage conditions. Device maintenance is recommended after the shortest sensor lifespan interval (2 years).

<sup>3</sup> Correlation coefficient to reference gravimetric sampler Sven Leckel LVS3 (SR EN 12341: 2014), determined by ISO17025 certified laboratory INCD-ECOIND Bucharest, per contract 14237 / 24.08.2018.

<sup>4</sup> Estimated for alcohol.

<sup>5</sup> Operating life time until 50% original signal degradation (24 months).

## Specifications

Parameter	GSM <sup>(1)</sup>	WIFI	LORAWAN	NBIOT <sup>(1)</sup>
Wireless bands / frequencies	850MHz/900MHz/ 1800MHz/1900MHz GPRS multi-slot class 10/12	Wifi 2.4GHz	IN865, EU868, US915, AU915, IL915, KR920, AS923	1920-1980MHz (LTE B1), 1710-1785MHz (LTE B3), 880-915MHz (LTE B8) 832-862MHz (LTE B20), 704.5-731.5MHz (LTE B28)
Modem Chip	SIMCom SIM800L	Espressif ESP8266	Microchip RN2483 / RN2903, RAK 811	SIMCom SIM7020
Modem certifications	CE, GCF, FCC, TA, CTA, CCC, ROHS, REACH, ANATEL, A-TICK	CE, FCC	CE, FCC, IC	CCC / TA / CTA / CE / GCF / RoHS / REACH
Antenna connector	SMA female	built in antenna	SMA female	SMA female
Enclosure Protection	IP30			
Supply Voltage	6 - 28V / Solar			
Dimensions	110x65x25 mm (excl. sup)			
Weight	210g			
Mounting	mounting support provided			
Recommended Use	Temperature: -20°C to +65°C		Humidity: 0RH to 95RH	
Certifications	CE/ROHS 2018			

<sup>1</sup> The uRADMonitor INDUSTRIAL with GSM / NB-IOT doesn't offer USB Data connection. The USB Port can still be used to power the unit.

## Usage conditions

- **Power supply:** Be careful not to exceed 28V as it will damage the unit. A 9V adapter is provided with the unit.
- **Outdoor use and exposure to elements:** Do not expose the device to direct sunlight, rain or snow. The aluminum case is not sealed, and water getting inside will damage the appliance. Do not cover the air circulation holes.
- **Precautions:** Do not expose the device to a large amount of dust such as in the woodworking centers. Do not expose the appliance to solvents or to a large amount of concentrated vapors of chemicals (acetone, paints, alcohol, butane, propane, etc.), because the sensors can wear out, or the measurements may become inconclusive. Do not expose the apparatus to mechanical shocks. Wherever possible, mount the appliance in a vertical position to extend the life of the built-in fan mechanisms.
- **Installing the unit**  
For mounting, use the holes in the housing. Ensure that you properly connect the power cord and network cable and secure against vibration where necessary. Make sure the antenna is installed before powering the unit.

## Additional gases supported

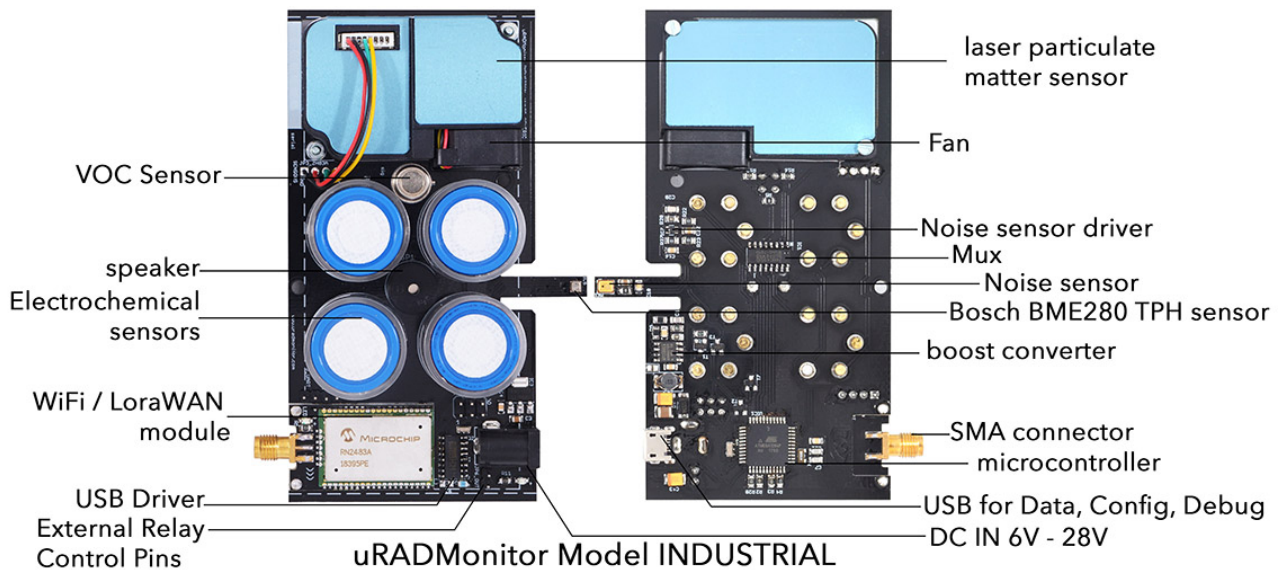
The 4 electrochemical sensors can be replaced with any combination of sensors for the following gases and ranges:

Symbol	Gas	Detection interval	Resolution
CO	Carbon monoxide	0 - 10ppm	0.001ppm
O2	Oxygen	0 - 25%VOL	1% VOL
NH3	Ammonia gas	0 - 10ppm	0.001ppm
H2S	Hydrogen sulfide	0 - 10ppm	0.001ppm
NO2	Nitrogen dioxide	0 - 10ppm	0.001ppm
HF	Hydrogen fluoride	0 - 10ppm	0.001ppm
SO2	Sulfur dioxide	0 - 10ppm	0.001ppm
Cl2	Chlorine gas	0 - 20ppm	0.001ppm
O3	Ozone	0 - 10ppm	0.001ppm
H2	Hydrogen gas	0 - 10ppm	0.001ppm
HCl	Hydrogen chloride	0 - 10ppm	0.001ppm
HCN	Hydrogen cyanide	0 - 10ppm	0.001ppm

## Gases to be supported in the future:

C2H4	Ethylene	0 - 100ppm	0.1ppm
CH2O	Formaldehyde	0 - 10ppm	0.1ppm
ETO	Ethylene oxide	0 - 20ppm	0.1ppm
C6H6	Benzene	0 - 100ppm	0.1ppm
C7H8	Toluene	0 - 500ppm	1ppm
C2H3Cl	Vinyl chloride	0 - 20ppm	0.1ppm
C2H6S	Methyl Sulfide	0 - 100ppm	0.1ppm
C2H6S2	Dimethyl Disulfide	0 - 100ppm	0.1ppm
AsH3	Arsine	0 - 3ppm	0.1ppm
C3H9N	Trimethylamine	0 - 100ppm	1ppm
C8H8	Styrene	0 - 100ppm	0.1ppm
CH4S	Methanethiol	0 - 100ppm	0.1ppm
CS2	Carbon Disulfide	0 - 100ppm	0.1ppm
PH3	Phosphine	0 - 10ppm	0.1ppm

# uRADMonitor INDUSTRIAL Environmental Monitoring



## Data access

uRADMonitor is designed for easy and open data access. The data can be accessed in two ways:

- **Local access**

Applies where the uRADMonitor unit is part of a LAN network (the Wifi variants). The uRADMonitor unit serves an internal webpage accessible via port 80. To access the content open the unit's IP in your LAN network on a computer or a phone.

There are two links at the bottom of the page.

The JSON link points to a JSON formatted data source, that can be polled periodically to access the uRADMonitor unit readings. As this is done directly by connecting to the uRADMonitor unit, the server compensation layer is not used, so you would receive the raw readings. This is not the preferred way, and additional compensation must be implemented (eg. Temperature offset to compensate for internal heating, other corrections, etc). This functionality is offered rather for debugging and decentralised operation in critical situations such as server failure or malfunction.

The other link named Config (or Wifi) is used to configure the Wifi settings so the uRADMonitor unit will be able to connect to your Internet router.

- **Data access via the Server RESTful API**

This is the preferred data access method. REST API does not require the client to know anything about the structure of the API. Rather, the server needs to provide whatever information the client needs to interact with the service. An HTML form is an example of this: The server specifies the location of the resource, and the required fields. The browser doesn't know in advance where to submit the information, and it doesn't know in advance what information to submit. Both forms of information are entirely supplied by the server. Lookups should use GET requests. PUT, POST, and DELETE requests should be used for creation, mutation, and deletion.

The API is called for both directions of data transfer (upload and download). The uRADMonitor devices use the API to upload their measurements to the server, for further processing and storage in the database. The API is then used to access data by the frontend, the mobile app or third party systems that need the uRADMonitor data.