MAGNASCI

Temperature, Relative Humidity, Nitrogen Dioxide, Formaldehyde, Carbon Monoxide, Ozone, Carbon Dioxide, Particulate Matter PM1, PM2.5, PM10, Volatile Organic Compounds (VOC)

Features

- Multiparameter automated monitor containing 8 high quality digital sensors that track a total of 11 air parameters
- Integrated WIFI Internet Connectivity, no computer needed, works autonomously
- **Outdoor ready with Stevenson Shield for outdoor use, can be installed in sun, rain, snow**
- **Modular design, with separate sensor board, allowing easy maintenance, even in the field**
- Built-in air pump for active flow
- Direct and Cloud data access via API
- Low power consumption
- Can be installed on wall or pole
- Compact size 140x65x42 mm , 200grams

Applications

National:
- CBRN Monitoring

Cities:
- Smart CITY
- IOT / Internet of things

Academic / research:
- Air Quality Monitoring and Studies

Private use:
- Citizen Science
- Home monitoring
- Office and production space monitoring

uRADMonitor® is an EUIPO registered trademark of Magnasci SRL Romania

Description

Communities are increasingly interested in learning more about what pollutants are in the air. Knowing about the air quality in your community can help you decide what actions to take to protect your health. That is where new air sensors come into play. They are low-cost, highly portable, and offer new ways to measure air quality in and around a community.

uRADMonitor® A4 is a fixed, automatic monitoring station that tracks 11 important environmental parameters, mainly various toxic gases that can impact human health. It comes in a rugged ASA/RESIN plastic housing with brackets for easy wall or pole mounting.

Automated monitoring provides more options over using handheld units occasionally. Mapping 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.

The uRADMonitor® network is a global array of interconnected monitoring stations, focused on continuous Environmental Surveillance. Its purpose is to generate fully transparent open data, used to assert the quality of our environment.

The device comes with built in WIFI connectivity and will automatically transmit data as soon as it is powered up and configured. With low power consumption, this device can be deployed for a wide variety of field applications. Its versatility is combined with convenient data access via an API interface to access measurements directly from the uRADMonitor® cloud.

uRADMonitor MODEL A4
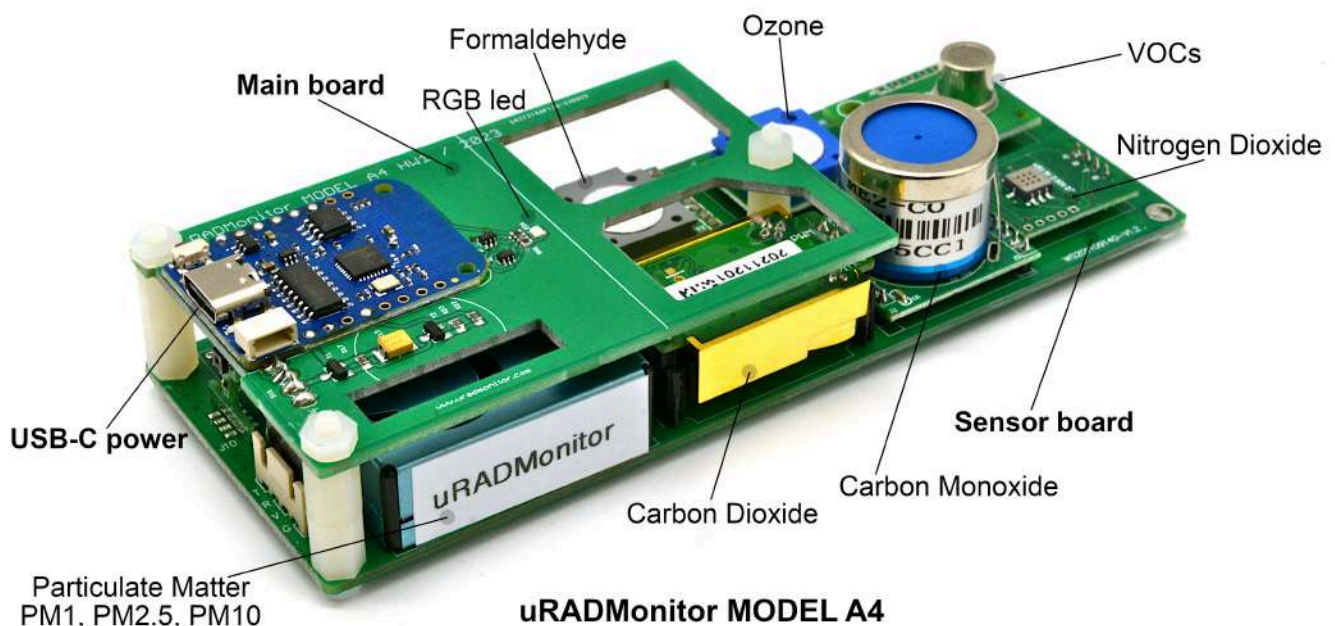
Model A4 implements modular design for cost optimisation

The air quality monitors like those manufactured by uRADMonitor use advanced electronics and sensors. The latter tend to have a limited life due to the nature of the existing gas technologies but also when getting clogged with contaminants in the air, especially when the pollution levels are high for prolonged periods of time. **uRADMonitor A4** is the first multi parameter air quality monitor to implement a modular design: there is a separate sensor board that can be easily replaced when needed with a new one to restore operation to initial parameters and assure best accuracy.

This replacement can be achieved by non-technical personnel in various conditions including on-site or on-field using basic tools like pliers and screwdrivers only.

Sensors

The **uRADMonitor®** Model A4 is a complex multi-parameter sensor. It uses a MEMs sensor to measure air temperature and humidity. Another MEMs sensor measures Nitrogen Dioxide (NO2). A high quality laser scattering sensor is used to detect the Particulate Matter PM1 / PM2.5 and PM10 mass concentration in air. There are three electrochemical sensors, one for formaldehyde, another one for Ozone and one for Carbon Monoxide. A non-dispersive infrared sensor measures the Carbon Dioxide. A MOX VOC sensor measures the volatile organic compounds. Everything is encapsulated under a high quality Stevenson Shield ready for outdoor use:

SENSOR	PARAMETER	MINIMUM	MAXIMUM	RESOLUTION	ACCURACY
MEMS	Temperature	-20 °C	+65 °C	0.5 °C	± 0.5°C
	Humidity	0% RH	100% RH	1% RH	± 3%
MEMS	Nitrogen Dioxide	0.1 PPM	10 PPM	10 ppb	0.05 PPM
Laser scattering	PM1	0 µg/m³	1000 µg/m³	1 µg/m³	± 15%
	PM2.5	0 µg/m³	1000 µg/m³	1 µg/m³	
	PM10	0 µg/m³	1000 µg/m³	1 µg/m³	
Electrochemical	Formaldehyde	0 ppm	5 ppm	10 ppb	± 5%
Electrochemical	Ozone	0 ppm	10 ppm	10 ppb	± 5%
Electrochemical	Carbon Monoxide	0 ppm	500ppm	100 ppb	± 10%
NDIR	Carbon Dioxide	400 ppm	5000 ppm	1 ppm	± 5%
MOX	VOC Air Quality Score	0	3	-	-

Specification

Internet connection	Wifi 2.4GHz
Standards	IEEE 802.11b/g/n
Wireless frequencies	2400-2483.5MHz
Modem Chip	Espressif ESP8266
Modem certifications	CE, FCC
Protection	IP65 , ready for outdoor use
Dimensions / Weight	140x65x42 mm / 200 grams
Mounting	mounting support provided
Recommended Use Ratings	Temperature: -20°C to +65°C Humidity: 0RH to 95RH
Power supply	Supply Voltage 5V USB-C, 500mA max
Certifications	CE / ROHS 2023

Usage conditions

- **Power supply**

The A4 detectors are powered via a USB-C connector using the supplied cable and a 5V USB Adapter similar to the one you use for your phone.

- **Precautions**

Do not expose the device to a large amount of dust such as in the woodworking centres. Do not expose it to solvents or to a large amount of concentrated vapours of chemicals (acetone, paints, alcohol, butane, propane, etc.), because the internal sensors can wear out or the measurements may become inconclusive. Do not expose the apparatus to mechanical shocks. Mount the unit in a vertical position to ensure its protection to rain or snow.

- **Outdoor use and exposure to elements**

The devices can be used outdoors. uRADMonitor A4 comes with a Stevenson type resin housing that allows outdoor use. For mounting, use the holes in the back of the housing. Ensure that you properly connect the power cord and network cable and secure against vibration where necessary.

Data access

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

- **Local access**

The uRADMonitor unit serves an internal webpage accessible via port 80. To access the content open the unit's IP in a browser , in your LAN network on a computer or a phone.

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. More on this topic here: https://www.uradmonitor.com/direct-data-access/

The internal webpage served is as follows:

```
uRADMonitor MODEL A4 218A98BA - HW:6 SW:30 [MAP]

        MULTIPARAMETER SENSOR ARRAY - running


                    CO2:1376ppm        CH2O:206ppb      PM1.0:12ug/m^3
Temperature:21.30C  O3:48ppb           CO:0.5ppm        PM2.5:16ug/m^3
Humidity:47.00RH    NO2:10ppb          VOC:0            PM10:17ug/m^3


Time:1970s          WIFI:connected
Interval:60s        IP:192.168.88.106
Stats:31/31 200     DNS:192.168.88.1

        Warmup: 0s | valid | JSON | CONFIG

        uRADMonitor, a Magnasci SRL 2015-2023 project

                    1264
```

Internal webpage exposing raw data and debug parameters. The JSON link offers formatted data output while CONFIG is for Wifi setup

- **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.

More on this is available in the API manual at: https://www.uradmonitor.com/api

You can also learn more on how to use the API programatically, by following the code samples in your dashboard at https://www.uradmonitor.com/dashboard/

The API is the main interface to the uRADMonitor data.

Server Dashboard-04 visualisation tool for detailed view and history data, link https://www.uradmonitor.com/tools/dashboard-04/?open=21XXXXXX

Warranty

uRADMonitor® Model A4 is covered by a 12 months warranty for any defects in material or workmanship, under normal use.
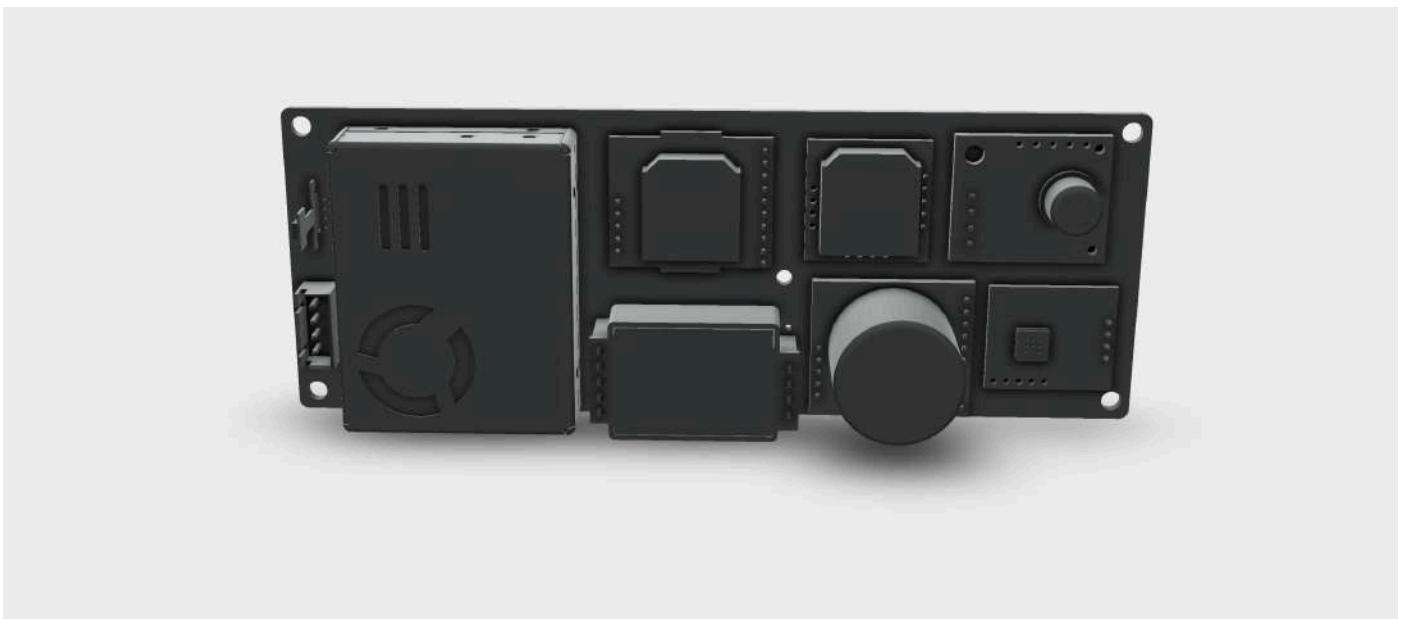
uRADMonitor A4 sensor board 3D model. We recommend replacing the sensor board every 2 years

Magnasci SRL Romania, For more information www.uradmonitor.com

Health Impact

Many of the parameters measured by Model A4 can have a negative health impact, ranging from simple allergies to various cancers. Therefore the data gathered by this device is valuable for our understanding on the quality of our environment.

VOC or volatile organic compounds are a class of substances that evaporate at room temperature. Being different substances may be responsible for a broad category of disorders, including respiratory problems, allergic or weakening immunity in children. Some VOC 's are responsible for the formation of smog, irritation of eyes, nose and throat, headaches and concentration problems. In extreme circumstances, more severe complications can occur, such as damage to liver, kidney and central nervous system or cancer [1]

Particulate matter PM2.5 refers to small particles with a diameter of up to 2.5 microns. These particles can penetrate deep into the lungs , causing allergies, respiratory and cardiovascular diseases [2]

Formaldehyde is a toxic colorless gas with a pungent smell, that results from the burning of carbon based materials. It can be found in forest fires, in automobile exhaust and cigarette smoke. It is an allergenic and a known carcinogenic compound that can cause serious health effects, depending on concentration and exposure. Even in tiny quantities just above 0.1ppm it can irritate the eyes and nose, and can worsen asthma symptoms [3]

Carbon dioxide is a gas heavier than air. In small quantities of up to 5000ppm (0.5%) can cause headaches, lethargy, slowing of intellectual ability, irritability, sleep disturbance. In larger quantities can cause dizziness, loss of sight, hearing or knowledge. The fresh air contains between 360ppm and 410 ppm of CO2 [4]

Ozone can cause the muscles in the airways to constrict, trapping air in the alveoli. This leads to wheezing and shortness of breath. Long-term exposure to ozone is linked to aggravation of asthma, and is likely to be one of many causes of asthma development. Long-term exposures to higher concentrations of ozone may also be linked to permanent lung damage, such as abnormal lung development in children. [5]

[1] Volatile Organic Compounds' Impact on Indoor Air Quality, US Environmental Protection Agency
[2] Health and Environmental Effects of Particulate Matter (PM), US Environmental Protection Agency
[3] ToxFAQs™ for Formaldehyde, Agency for Toxic Substances and Disease Registry
[4] Health Risk Evaluation for Carbon Dioxide, US Bureau of land management
[5] Health Effects of Ozone Pollution, US Environmental Protection Agency

Magnasci SRL

The company Magnasci was founded in 2015 in Timișoara and managed to gain international recognition with **uRADMonitor**®, a complex product that quickly became the first global environmental monitoring network, present in many countries. All key development steps were implemented locally, from electronics design, prototyping, hardware software development, server software, security, large database architecture, server backend and user interface.

| SAN FRANCISCO Finalist Hackaday Prize **2015** | First prize ARAD Innovation Fair - **2015** | Bucharest Innovation Labs **WINNER 2016** | **2017** CROWDFUNDING 2 campaigns IndieGogo totalling close to 100,000 $ | Global presence, over 3000 uRADMonitor sensors deployed worldwide **2020** | AIRLAB **2021** France uRADMonitor receives two awards | "Excellence in Innovation Award" **2022** from Orange |

In the more than 8 years of its existence, the company has developed several types of sensors that are now present in more than 60 countries, being used by universities, research institutes and municipalities.

Thank you for trusting us and using uRADMonitor® systems, technology #madeinro .