uRADMonitor A3
Environmental Monitoring

Temperature, Barometric pressure, Relative Humidity, Volatile organic compounds (VOC), Formaldehyde, Particulate matter PM2.5, Carbon Dioxide and Gamma/x-ray radiation.

Features

- 5 high quality sensors tracking 8 air parameters: Integrated Internet connectivity
- 4 connectivity options including Ethernet, Wifi, GSM and LoraWAN
- Built-in air pump for active flow
- Alarm and notification functions using built-in speaker
- Direct and Cloud data access via API
- Rugged design with aluminum enclosure
- Low power consumption
- Compact size 110x65x25 mm
- Wall mounting support

Applications

- Home monitoring
- Office and production space monitoring
- CBRN Monitoring
- Smart cities
- Internet of things

Description

uRADMonitor A3 is an automated, fixed monitoring station that tracks a total of 8 important air quality parameters. It comes in a rugged aluminum 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.

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

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.

Using the 4 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

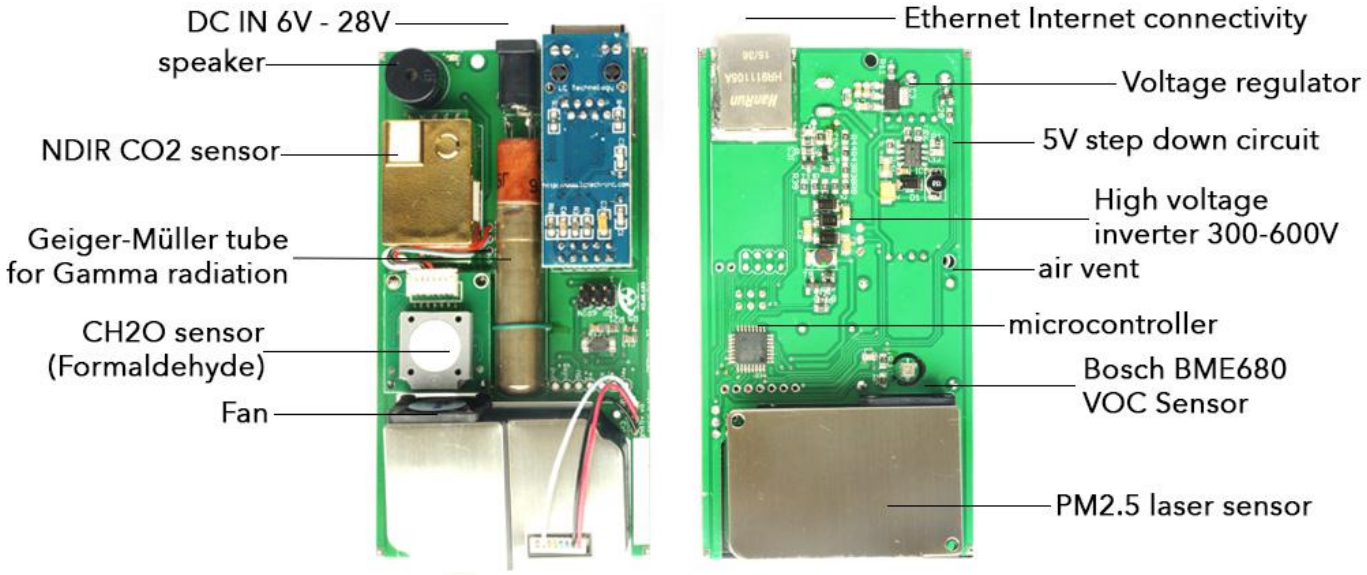
uRADMonitor model A3 uses the BME680 from Bosch to measure air temperature, barometric pressure, humidity and volatile organic compounds, or VOC. A high quality laser scattering sensor is used to detect the Particulate Matter PM2.5 concentration in air. There is an electrochemical formaldehyde sensor, a nondispersive infrared sensor to measure CO2 concentration in air and a SI29BG Geiger Tube to detect gamma and x-ray ionizing radiation. A built in fan assures an active air flow stream across the sensing elements.

Sensor	Parameter	Minimum value	Maximum value	Operating temperature
Bosch BME680	Temperature	-40 °C	+85 °C	-40 °C .. +100 °C
	Pressure	300 hPa	1100 hPa	
	Humidity	0% RH	100% RH	
	VOC	0 mg/m³	100 mg/m³ reducers 10 mg/m³ oxidizers	
Winsen ZH03A	PM2.5	0 µg/m³	1000 µg/m³	-40 °C .. +100 °C
Winsen ZE08	Formaldehyde	0 ppm	5 ppm	0°C .. +100 °C
Winsen MH-Z19B	Carbon Dioxide	400 ppm	5000 ppm	0 °C .. +100 °C
SI29BG	γ,x-rays	0.01µSv/h	9999.99µSv/h	-40 °C .. +100 °C

Specification

Parameter	uRADMonitor A3.LAN	uRADMonitor A3.Wifi	uRADMonitor A3.GSM	uRADMonitor A3.LoraWAN
Internet connection	Ethernet RJ45 10/100/1000 Base-T Networks	Wifi 2.4GHz	Cellular GPRS over GSM GPRS multi-slot class 12 / class 10	LoraWAN compliant with EU, US and the Israeli MoC spec
Standards	IEEE 802.3	IEEE 802.11b/g/n	n/a	IEEE 802.15.4g(FSK/GFSK)
Wireless frequencies	n/a	2400-2483.5MHz	850MHz/900MHz/ 1800MHz/1900MHz	915-917MHz
TX Power	n/a	100mW	250mW	100mW
Modem Chip	Microchip enc28j60	Espressif ESP8266	SIMCom SIM800L	Microchip RN2903
Modem certifications	CE, FCC, ROHS	CE, FCC	CE, GCF, FCC, TA, CTA, CCC, ROHS, REACH, ANATEL, A-TICK	CE, FCC, IC
Antenna connector	n/a	SMA male	SMA female	SMA male
Enclosure Protection	IP30	IP30	IP30	IP30
Supply Voltage	6 - 28V	6 - 28V	6 - 28V	6 - 28V
Dimensions	110x65x25 mm (excl. sup)	110x65x25 mm (excl. sup)	110x65x25 mm (excl. sup)	110x65x25 mm (excl. sup)
Weight	175g	170g	170g	170g
Mounting	mounting support provided	mounting support provided	mounting support provided	mounting support provided

Ethernet, Wifi, GSM and LORAWAN



uRADMonitor A3 Ethernet variant - motherboard front and bottom view

Health impact

Many of the parameters measured by Model A3 can have a negative health impact, ranging from simple allergies to various cancers. Therefore the device gathers valuable data 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]

Ionizing radiation is harmful to living organisms because it can cause damage to cells that can result in multiple disorders, the most common of which is cancer. Ionizing radiation is naturally occurring from cosmic and terrestrial sources, but there are also artificial generators related to nuclear activities or x-ray devices . Worldwide global average dose is 3.01mSv [2]

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 [3]

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 [4]

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 [5]

Warranty

uRADMonitor A3 is covered by a 12 months warranty for any defects in material or workmanship, under normal use.

Resources

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