inBiot

Sense your building

MICA

User Manual

V 1.3. (20/06/2022)

1. Product overview

MICA is a smart device that will allow you to monitor the indoor air quality. This device is able to measure up to 8 different parameters: temperature, humidity, carbon dioxide (CO_2), suspended particles (PM10, PM2.5 and PM1.0), formaldehyde and volatile organic compounds (VOCs).

Using WiFi, the device communicates with the My inBiot web platform, where you can check the air quality status, obtain track records and download your information.

Depending on the type of the version chosen, the MICA will be located and installed:

- At the wall.
- On the desk.

Make sure it stays away from windows, vents or direct sunlight.

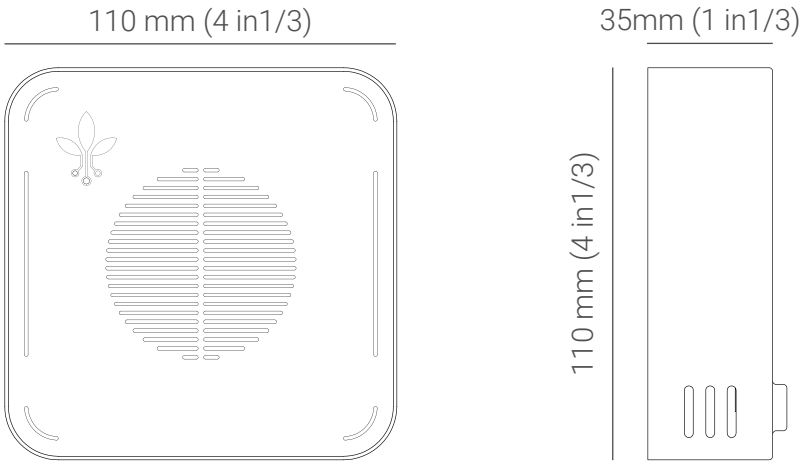
2. Main technical characteristics

Connections

- Wall installation: Fast connector 230VAC 50 Hz.
- Desk installation: Magnetic connector (5V 1A).

Size and Weight

Weight: 337 grams (11.89 oz)



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Connectivity

- IoT “My inBiot” Platform.
- WiFi 802.11 b/g/n/e/i (802.11n @ 2.4 GHz up to 150 Mbit/s).
- Modbus.
- GSM/GPRS (Optional).
- Touchpad.

Sensors

- Temperature.
- Humidity.
- Carbon dioxide (CO_2).
- Suspension particles (PM1.0, PM2.5, PM10).
- Formaldehyde.
- Volatile organic compounds.

Technical specifications

Temperature

Measurement unit: °C (°F)/ Range: 0 - 90°C (32 - 194 °F).

Precision: ±0,5°C (0.89 °F).

Humidity

Measurement unit: %RH / Range: 0 - 100%.

Precision: ±2 %.

Carbon dioxide (CO_2)

Sensor: NDIR.

Measurement unit: ppm / Range: 0 - 5,000 ppm.

Precision: ± (50 + 5%) ppm.

Calibration lifespan: 10 years.

PM1.0/PM2.5/PM10

Sensor: Particle laser.

Measurement unit: µg/m³ / Range: 0 - 1,000 µg/m³.

Precision: < 35 µg/m³: ±5 µg/m³; >35 µg/m³: ±15% of measurement value.

Calibration lifespan: 4 years.

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Formaldehyde

Sensor: Electrochemical.

Measurement unit: µg/m³ / Range: 0 - 6,250 µg/m³.

Precision: <200 µg/m³: ±30 µg/m³; >200 µg/m³: ±20% of measurement value.

Calibration lifespan: 5 years.

Volatile organic compounds

Sensor: MOx.

Measurement unit: ppb / Range: 0 - 60,000 ppb.

Precision: ± 15%.

Calibration lifespan: 10 years.

Indicators

MICA has one indicator:

- **Indoor Air Quality (IAQ):** The air quality is based on the parameters that the device monitors: temperature, humidity, carbon dioxide, suspended particles, formaldehyde and volatile organic compounds. Provides a score on a scale of 0 to 100.

100 - 81 IAQ Very good

80 - 61 IAQ Good

60 - 41 IAQ Medium

40 - 21 IAQ Bad

20 - 0 IAQ Very bad

3. Value levels and recommendations

Temperature

According to RITE (Thermal Installations Regulation) comfort levels for temperature should be between 21 and 25 ºC (70 - 77 ºF), being 21 - 23 ºC in winter (70 - 73.4 ºF) and 23 - 25 ºC for summer (73.4 - 77 ºF), although these values could be slightly higher or lower depending on the rest of parameters that determine comfort.

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My inBiot Values:

GREEN: 20 - 23°C (68 - 73.4 ºF)

YELLOW: 24 - 26°C (75.2 - 78.8 ºF)/ 18 - 20°C (64.4 - 68 ºF)

RED: > 26°C or < 18°C

Humidity

The ideal relative humidity for a normal temperature inside an inhabited space is between 45 and 50%, with a range of recommended values between 40 and 60%.

My inBiot Values:

GREEN: 40 - 60 %

YELLOW: 30 - 40% / 60 - 70%

RED: < 30 % or > 70%

Carbon dioxide (CO_2)

In outdoor environments the concentration level of CO_2 is approximately 350 - 400 ppm (parts per million).

The environment is considered “stuffy” at values above 800 - 1,000 ppm.

From 2,000 ppm it is considered very stuffy and symptoms related to headache, tiredness and general apathy occur.

The most serious effects occur from 5,000 ppm, when fading can occur.

My inBiot Values:

GREEN: < 800 ppm

YELLOW: 800 - 1,500 ppm

RED: > 1,500 ppm

Formaldehyde

The limits established in Spain for short-term occupational exposures (VLA-EC) are 0.3 ppm or 370 µg/m³. However, there is no reference value for home interiors.

The SBM2015 Bioconstruction Measurement Technical Standard includes the following indicative values of formaldehyde concentration for indoor air at rest areas:

- Not significant: < 20 µg/m³.
- Slightly significant: 20 - 50 µg/m³.
- Strongly significant: 50 - 100 µg/m³.
- Extremely significant: > 100 µg/m³.

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The ranges of values used in the MICA device as indicators take into consideration the SBM values for rest areas, as well as the values from which allergic and sensitizing reactions may occur:

GREEN: < 70 µg/m³.

YELLOW: 70 - 120 µg/m³.

RED: > 120 µg/m³.

Volatile organic compounds

The AGÖEF (German Association for Ecological Research) has been working since 1993 to develop reference values for chemical compounds, both in air and in dust samples.

The recommended limits are:

- P50 - 50 Percentile. Standard value. Not considered sufficient evidence for urgent action - TVOC < 360 µg/m³.

- P90 - 90 Percentile. Warning value. Emitting source present - TVOC< 1,572 µg/m³.

- Guidance values - Reference value equivalent to values derived from toxicological risk - TVOC = 1,000 µg/m³.

The ranges of values used in the MICA device as indicators are selected considering the values of the German Federal Environmental Agency, from which, and depending on the time of exposure, may lead to allergic and sensitizing reactions, hypersensitivities or diseases of various pathologies.

GREEN: < 220 ppb.

YELLOW: 220 - 660 ppb.

RED: > 660 ppb.

PM2.5/PM10

The current standards of the EPA (Environmental Protection Agency of the United States), recommend maximum values for PM2.5 of 35 µg/m³, although it reduces the total annual values to 12 - 15 µg/m³. The EU establishes maximum limits of 25 µg/m³ also for PM2.5, although with the prospect of increasing the restriction.

The value ranges used in the device are as follows for PM10 and PM2.5.

GREEN: PM2.5 < 15 µg/m³ & PM10 < 50 µg/m³.

YELLOW: 15 µg/m³ < PM2.5 < 35 µg/m³ & 50 µg/m³ < PM10 <150 µg/m³.

RED: PM2.5 > 35 µg/m³ & PM10 > 150 µg/m³.

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4. Installation and set up

To install and set up the device, follow the steps indicated in the following video tutorials.

1. Installing MICA on a wall: **How to install MICA on a wall**

NOTE: Before starting the installation, disconnect the fuses and make sure that the wires are placed in the correct position to avoid a short circuit.

2 .MICA Set up: **MICA Set up**

3. MICA Modbus configuration: **MICA Modbus configuration**

4. Adding a new MICA to My inBiot: **How to add a MICA to My inBiot**

5. Firewall and WiFi security measures: **Firewall and WiFi protocols**

5. Operation

Right after plugging in, the device will enter Access Point mode. A dim blue light will appear, changing to white and after a few seconds finally blinking in a dark blue color. This indicates that is ready to proceed with the WiFi setup configuration following the videos shown on the Tutorials section.

There are two possible outcomes after setting up the WiFi:

- **Not connected:** A red light is shown for 10 seconds and then turns off. Repeat the process and make sure the password is correct and there are not any Firewalls or safety protocols blocking the connection.

- **Successfully connected:** A green light is shown for 10 seconds and then turns off. You may proceed to My inBiot and add your new device to your account following the video on the Tuto - rials section.

Once installed, the device will automatically take measurements and upload all the data to the My inBiot web platform, where you can view all the information.

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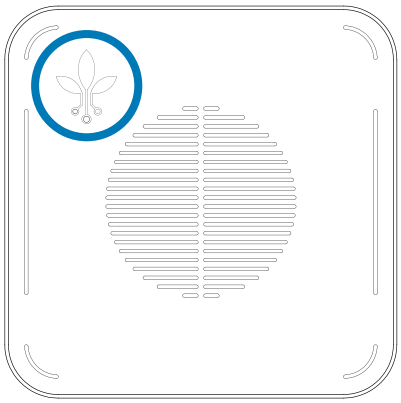
In addition, the equipment has a touch button on the logo on its front face. Depending on the duration of the press, the device will perform two different operations:

- A short press will force a measurement, uploading the different parameters to the web platform. In addition, it shows the CO_2 measurement by means of the LED light for a short time.

- A long press will set the device into Access Point mode. A dim blue light will appear, changing to white and after 3 seconds finally blinking in a dark blue color. This indicates that is ready to proceed with the WiFi setup configuration.



Time intervals

The MICA device will record the measured parameters on the web platform with the selected time interval. The Basic account allows adjustments between 10 and 15 minutes, while the Business account allows adjustments between 1 and 15 minutes.

You may select the uploading time interval from two different places.

- At the initial setup, where you can select the periodicity of uploading data (min).

- At My inBiot, select the desired device and click on the 3 vertical dots at the upper right corner. Select Periodicity of uploading data. A new screen will pop up where you can select the time interval between measurements. You may also apply this change to all the devices in your account selecting the Apply to all MICAs option. Save the changes to confirm your selection.

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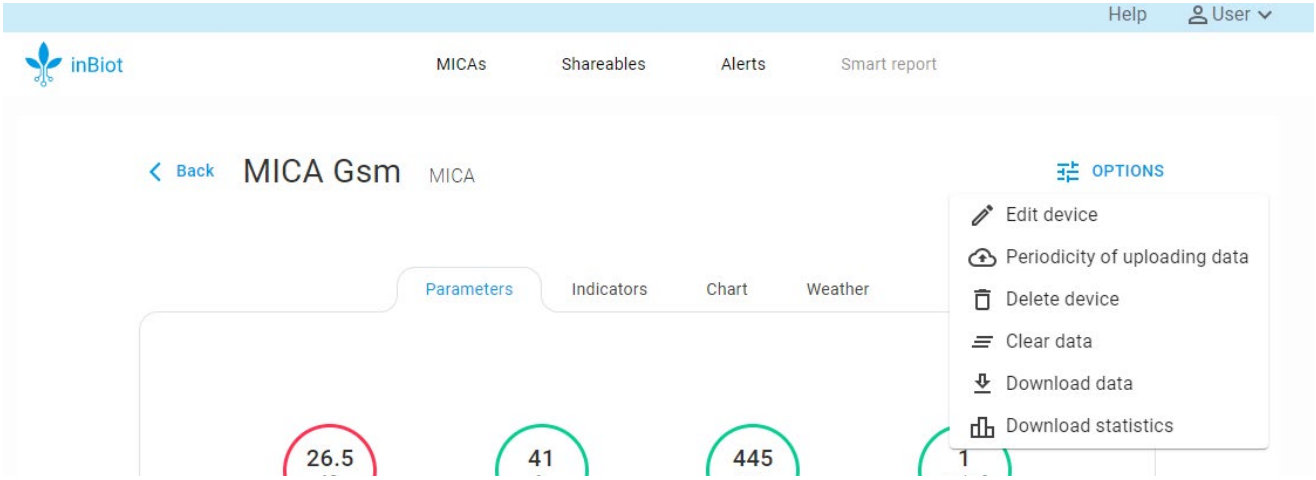

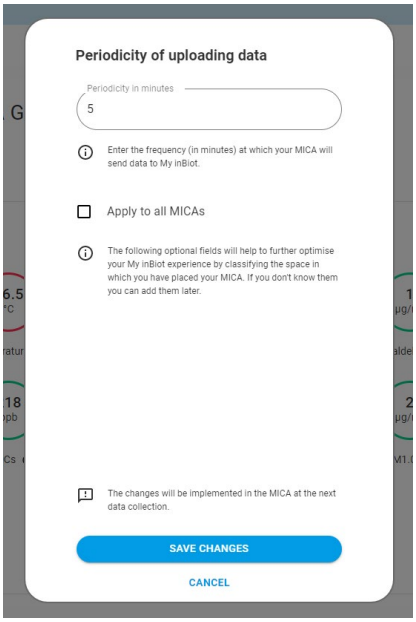

6. Web Platform

Access your account using: https://www.myinbiot.com/login.
The first time you access, you will need to create an account and a valid password.
Within an account, you may have as many devices as you like.

Using My inBiot web platform you may:

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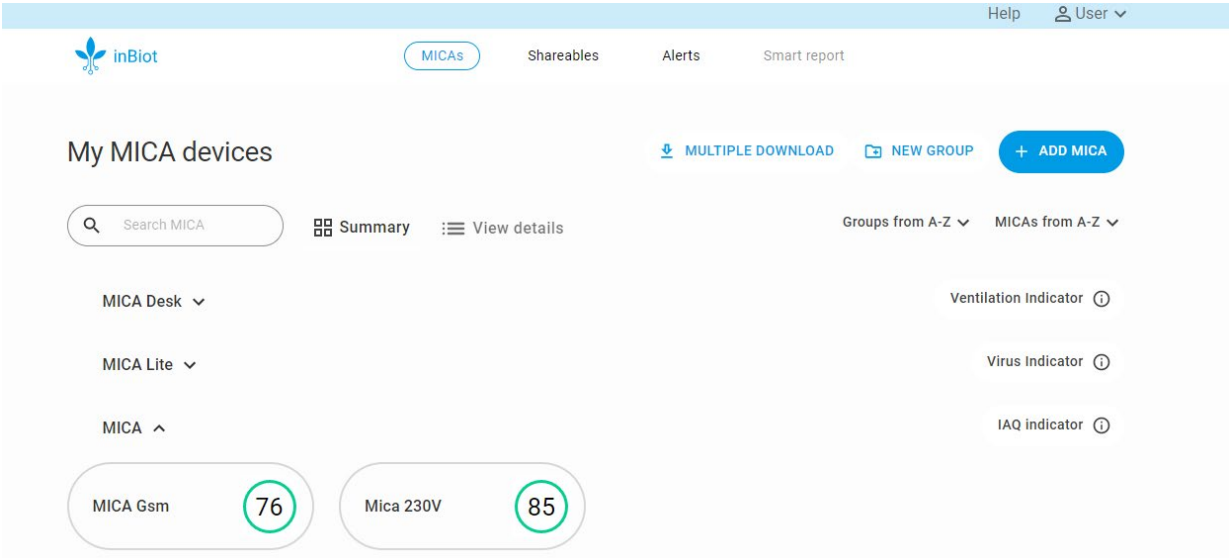
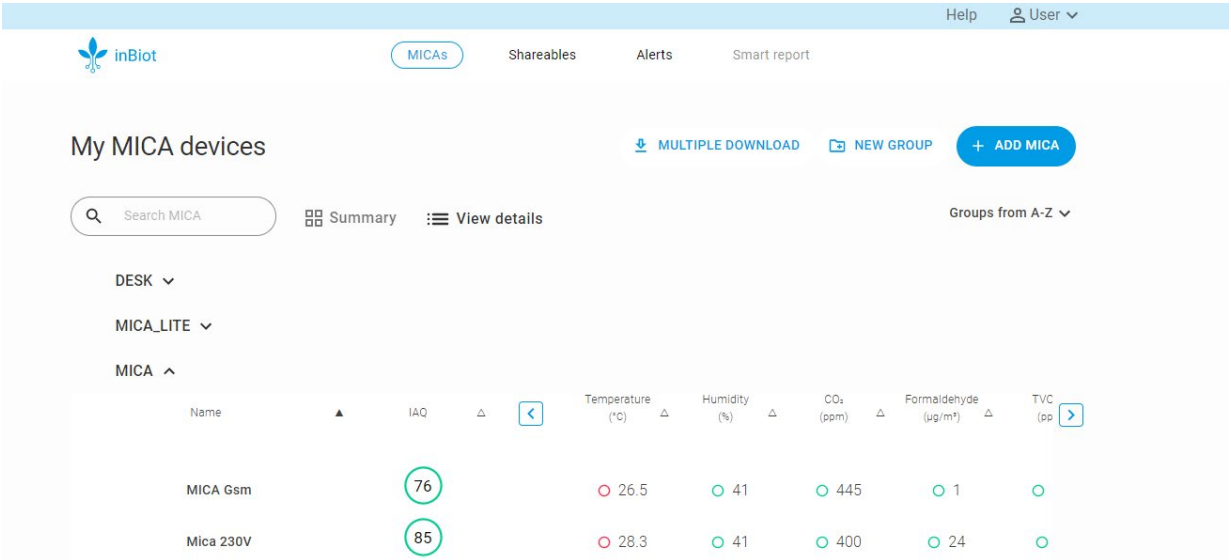
- Check the parameters in real time.
- See the evolution of the parameters over time: hours, days, weeks.
- Consult the information on each parameter about its effects on health, the possible sources of contamination and the recommended ranges.
- Download the data to analyze it in another application.
- Give access to several clients through a shareable link, which you can also use to display the data in full screen for events or offices.

Web platform

You will find a clear explanation of the possibilities of our software in the following link My inBiot web platform.

START





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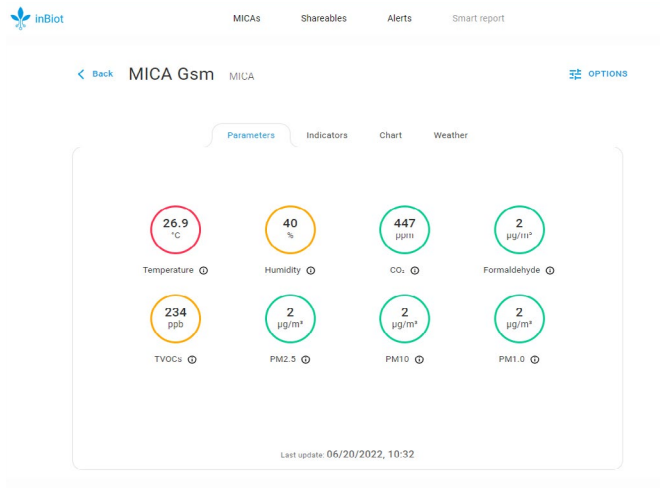
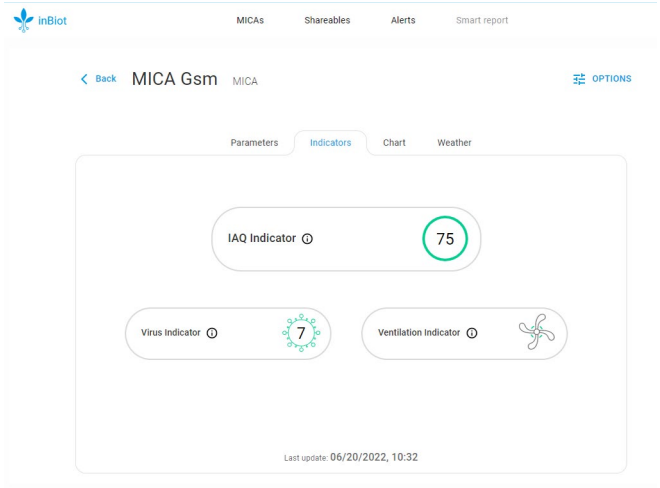
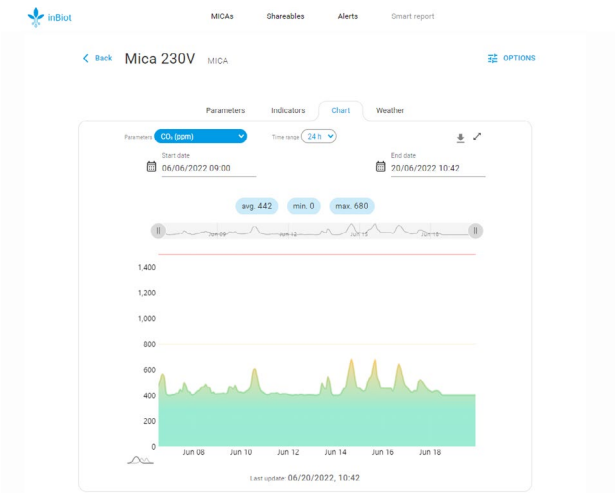
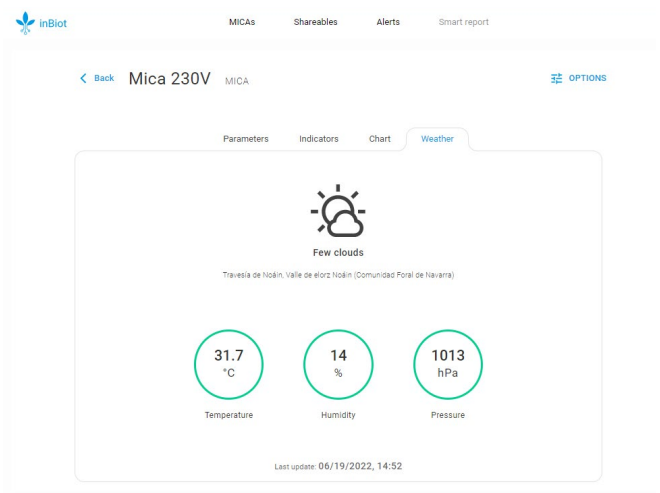
DEVICE

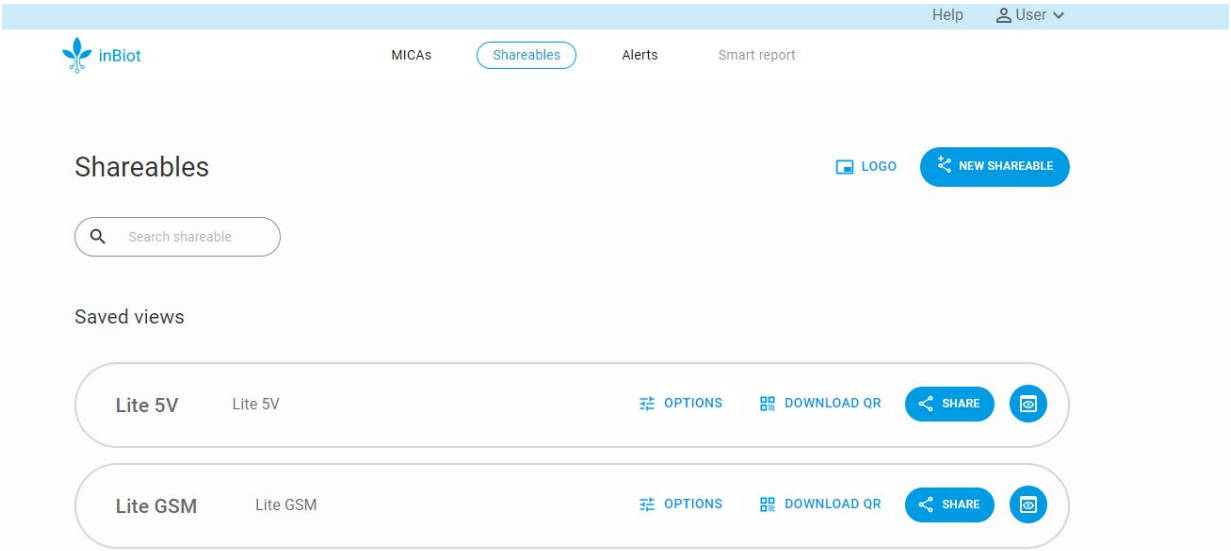








SHAREABLES



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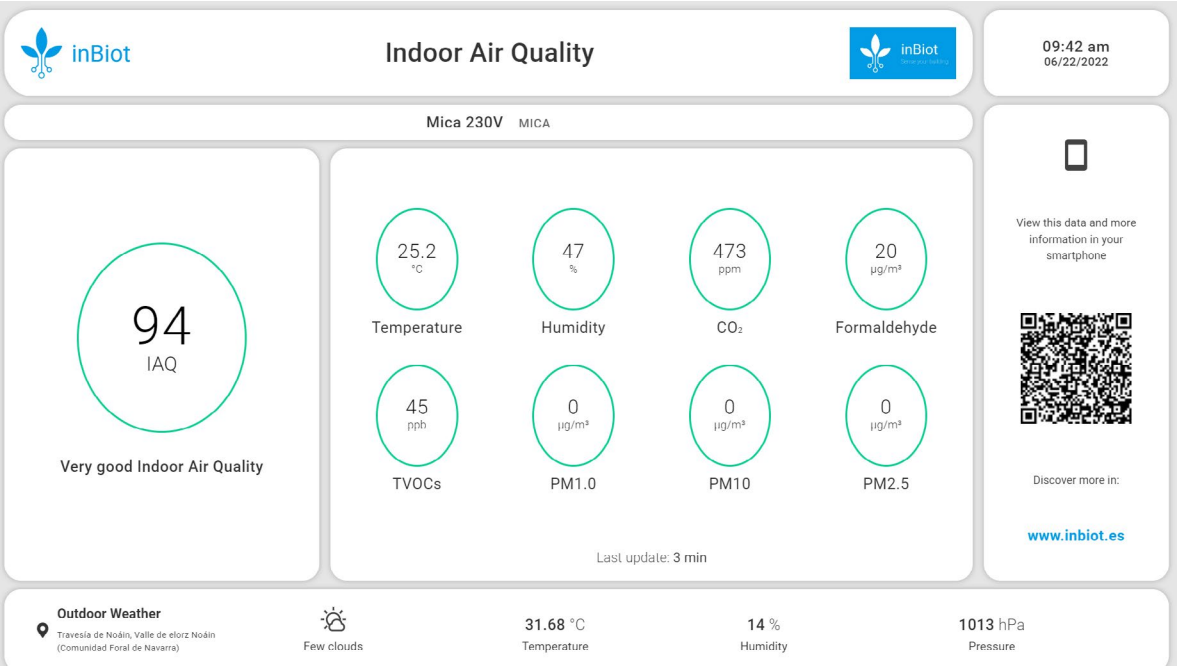
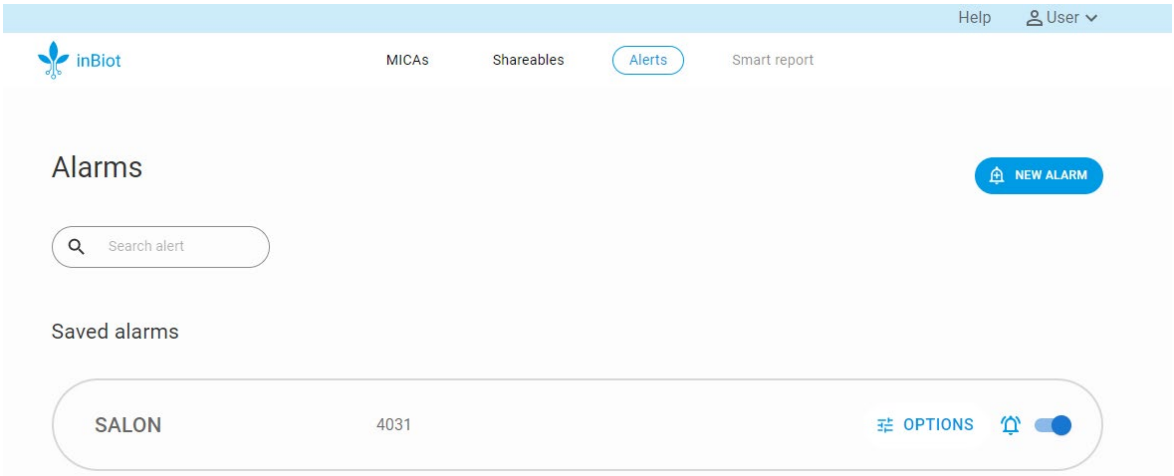


ALERTS



Additionally, the My inBiot Business account gives access to several more features. This modality has an annual fee and will give you access to:

- Select up to 1 minute of periodicity of uploading data.
- Download historical data without any time limitation.
- Download multiple devices in one file up to one week.
- Organize your devices in Groups for an easier management.
- Set personalized alerts when a parameter reaches a certain level.
- Download statistics.

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7. Calibration

The calibration process of the MICA devices has several phases, from the manufacturer's guarantee of the sensors, the remote correction of some sensors and the modular design for the replacement of sensors according to the life span of each specific sensor. This process allows:

- Regular maintenance according to the specific requirements of each user.
- The reduction of the variations of measurements between different devices, both in the short and long term.
- The long-term stability of the measurements.

Manufacturer's warranty

The design of the MICA devices includes the detailed selection of specific sensors. All sensors are calibrated by the sensor manufacturer itself, with its corresponding warranty.

Sensor self-calibration

Additionally, some sensors such as CO_2 or VOCs have an automatic self-calibration process by software.

Carbon Dioxide (CO_2)

The MICA carbon dioxide sensor is an NDIR sensor (non-dispersive infrared sensor), which uses gas spectrometry to measure CO_2 concentrations. NDIR sensors are not susceptible to physical sensor degradation, as they do not produce chemical reac - tions on their surface.

Like any sensor, NDIR sensors will start to drift over time. However, it is possible to use the outdoor air reference of 400 ppm for self-calibration or remote correction. Depending on the type of ventilation selected in the configuration of the MICA device, an automatic self-calibration period will be established between 24 and 48 hours, correcting the lowest average value during this period in relation to the external reference.

The CO_2 sensor also requires at least one full cycle of 24 - 48 hours of continuous use to trigger this automatic self-calibration. Once the initial calibration has been succesfully completed, the values are stored in the device and thus there is no need for a new calibra tion after a disconection

During the initial calibration period, the readings will fluctuate and once completed, the data measured by MICA will be automatically adjusted.

Volatile organic compounds

The VOC sensor also requires an initial calibration of 12 hours and has an automatic bi-weekly calibration with exposure to fresh air for 30 minutes.

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Contrary to the CO2 sensor, calibration values are not stored and a new complete calibra tion process of 12 hours will be needed after a disconection.

8. Safety instructions

Cleaning and storage

- Use a damp cloth and mild detergent for cleaning purposes. Do not use solvents or abrasives.
- MICA is designed exclusively for indoor use only and is not suitable for outdoor use.
- Store the equipment in an area with moderate temperature and humidity: -5°C to 50°C (23°F to 122°F) and less than 90% relative humidity.
- Do not submerge the device in water.

Important safety notes

- MICA has been developed solely for general purpose air quality monitoring and thus has not been certified for use in accordance with state or local carbon monoxide monitoring or alarm requirements.
- MICA has not been tested by an independent laboratory to comply with UL 2034 or IAS 6-96. CO15-en-ES_v1.0 7/17 3.
- It is the customer's responsibility to obtain and apply applicable local, state, and national regulations regarding CO alarms, monitoring, and testing.

Notes – Warranty

The device includes a 3-year warranty for products sold in Spain, 2 years for products sold within the EU/UK and 1 year for those sold in the US/CAN and other countries.

Should you find any defect that is the responsibility of inBiot and not due to misuse of the device, please contact our Customer Service team through support@inbiot.es and communicate the ID of the equipment, proof of purchase, date of purchase and a detailed fault description. We will contact you as soon as possible to proceed with its repair or replacement.

For devices that have expired their warranty already, we will be happy to repair or replace them according to inBiot's repair prices. Contact our Customer Service team for more information.

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In case of damage caused by non-compliance with this manual, the right to guarantee will be extinguished provided that:

- Has been modified by any other but inBiot.
- Has suffered an accident or misuse.
- Has been damaged during the installation of the product.
- Has been damaged by the system with which the product is used.
- Has liquid damage.
- Has been damaged during transport to or from our facilities.
- Has damage to the interface or charging connections.
- Has been falsified. The guarantee will only apply to products with the inBiot brand, serial num - ber and logo that identifies it as such. inBiot will not apply the warranty on any product that was not manufactured by or with the permission of inBiot.

End of life cycle

In the European Union, electronic equipment cannot end up as household waste: it must be disposed of properly in accordance with Directive 2002/96/EC OF THE EUROPEAN PARLIAMENT AND THE COUNCIL of January 27, 2003 on waste electrical and electronic equipment. At the end of its useful life, please dispose this device in accordance with current legal regulations.

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