Air Pro 2 Cellular Manual
SB8202



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Manual User Guide

It is important that any user responsible for the installation, configuration, use and maintenance of the Sensorbee Air Pro 2 Cellular in the civil field has read this manual in advance.

HOW TO USE THIS MANUAL:

1. Before installing and using the product, please read this entire manual and keep it for later reference.

2. Carefully follow the instructions in this manual and always make sure to follow all warnings and instructions marked on the product.

3. If you have any doubts regarding the use of the product after reading this manual, you can contact the Customer Service at support@sensorbee.com.

1. Introduction and Device Overview

1.1 What is the Sensorbee Air Unit

The Sensorbee Air Lite and Air Pro2 devices have been expertly designed to cater to all your outdoor air monitoring needs. With their state-of-the-art technology, these devices are perfect for keeping track of the air quality in your environment. They are ideal for people who are concerned about the impact of air pollution on their health and want to take proactive steps to monitor and improve it. Moreover, these devices are easy to use and come with a range of features that enable you to analyze and interpret the data they collect, giving you a better understanding of air quality in your area.

1.2 The Benefits of Installing the Sensorbee Air

Using our Sensorbee Air Lite and Air Pro2 units as your first-choice air quality monitoring equipment has the following benefits:

- Simple to install, configure, and get running without the need for complex and time-consuming setup processes when utilizing the default settings.
- Flexibility in application based on our Air Pro2 and Air Lite devices, allowing you to install the version that best fits your application.
- Provides accurate, real-time data, improving informed decision-making in demanding environments**.**

2. Safety and Compliance Information

2.1 General Safety Precautions

- Do not expose the device to extreme temperatures (outside the operating range defined in Section 7).
- Do not attempt to open, disassemble, or modify the device; this will void the warranty and may cause damage.
- Use only the power adapter supplied by Sensorbee.
- Ensure the device is mounted securely in accordance with Section 4.

2.2 Regulatory Compliance

The **CE Mark** on the Sensorbee Air Pro 2 Cellular signifies that the product conforms to European health, safety, and environmental protection standards. By affixing the CE Mark, Sensorbee declares that the device meets all mandatory requirements of the relevant European Directives and Regulations. To maintain the integrity of the CE certification and ensure safe operation, users must adhere to the **General Safety Precautions.**

The Sensorbee Air Pro 2 Cellular is a piece of Electrical and Electronic Equipment (EEE) that complies with EU regulations, as indicated by the CE Mark. At the end of its operational life, the device must be disposed of in accordance with the Waste Electrical and Electronic Equipment (WEEE) Directive to ensure proper environmental handling.

3. Package contents

By default, the Sensorbee Air Pro 2 comes with a global operator SIM card, mounted particle sensor but no gas sensors. However, it is possible to customize the Sensorbee Air Pro 2 and install gas sensors before delivery. Please contact a sales representative for more information regarding this.



Figure 1: Visualisation of standard Air Pro 2 with mounting kit.

Item	Quantity
Sensorbee Air Pro 2	1
Mounting Bracket	1
Mounting Stainless Steel Hose Clamps	2
Quick installation guide leaflet	1

4. Installation Guide

4.1 Selection of the mounting site

Selection of the mounting site is crucial: the location must ensure unobstructed air flow for accurate air sampling, be accessible to adequate sunlight if solar power is used, and minimize exposure to localized interference, such as direct heat sources, mechanical ventilation exhaust, or excessive precipitation runoff.

Once the appropriate location is determined, the pole/wall mounting bracket must be secured firmly. Subsequently, the Sensorbee Air Pro 2 unit is attached to the bracket, confirming that the orientation optimizes both air quality measurement and, where applicable, solar panel efficiency.

4.2 Required tools and equipment

To install the Sensorbee Air Pro 2, the following tools are recommended:

- PH2 Phillips head screwdriver
- PH1 Phillips head screwdriver
- T10 torx screwdriver
- Flat headed screwdriver (Gas sensor plugs)
- Cutter for stainless steel hose clamp (for mast installation)
- Screwdriver or 6mm socket wrench (for mast installation).
- Screwdriver and two screws (for wall installation).

4.3 Parts of Air Pro 2 Cellular

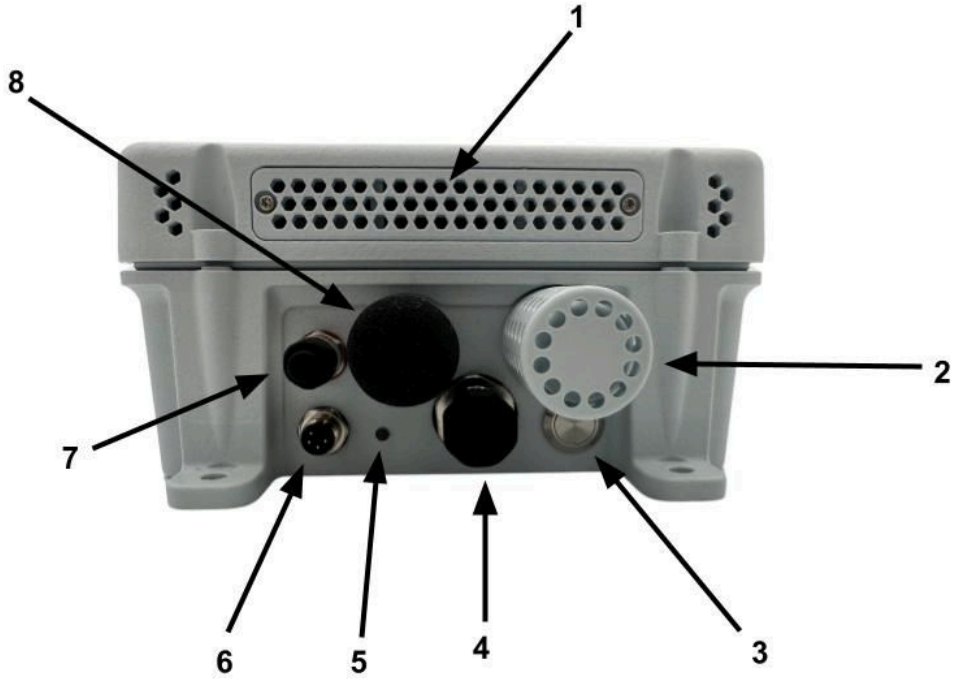

Figure 2: presentation of the connectors of Air Pro 2.

1. Inlet for internal gas sensors and humidity and pressure sensors
2. Temperature sensor
3. Power switch
4. Expansion connector, M12, 8pin, Modbus RTU sensors (5-12V support)
5. Status LED, which indicates the status of the unit.
6. Power connector, M8M-4 (Type A), for input power to the unit (5 - 24 VDC)
7. Expansion connector, M8F-6 (Type A), for Sensorbee external sensors.
8. Expansion sound level sensor, bought separately, otherwise it’s replaced with a plug.

4.4 Startup

To make sure that the unit has power press and hold the power button for 2 seconds as shown in Figure 2. If the unit needs power, connect the power cable from either a solar panel or an external power supply to the power connector of the unit as shown in Figure 2.



Figure 3: LED showcase.

The status LED should now be constantly blue or blinking purple, indicating that the unit is attempting to register to the network or connecting to the bootstrap server. Proceed to the next

chapter to configure cloud services. If the LED doesn't illuminate, there could be two potential reasons. First, the battery might not be connected. Please refer to the battery chapter for instructions on how to establish a connection. Secondly, the battery might be depleted, and the incoming power might not suffice to recharge it. Ensure that the solar panel is exposed to adequate sunlight to facilitate battery charging, note that indoor office lamps are not sufficient.You can check the unit status by looking at the status LED, as shown in Figure 3

Typical status LED sequence during boot:

- Blue light, indicating an attempt to register to the network.
- Blinking purple, indicating an attempt to connect to the bootstrap server.
- Solid purple, indicating that registration to the server is complete.
- Solid green (1sec), indicating that the unit is online and successfully registered to the server.
- off, indicating normal (idle operation).

During the first boot, the unit may take extra time to register the SIM card with the operator. Furthermore, each time the unit is moved between different networks or countries, there may be a longer boot-up period, especially if the SIM card is replaced.

5. Setting up cloud service

Sensorbee Air Pro 2 Cellular comes prepared with a client account unless requested otherwise by a client.

5.1 Pairing unit with cloud service

To ensure the optimal performance of Sensorbee Air products, they must be bootstrapped with an LWM2M server.On the backside of the unit, you'll find a sticker displaying the necessary configuration information. This sticker features a QR code that can be scanned with a smartphone or any device able to read QR codes. This QR code directs you to the pairing webpage. If scanning the QR code isn't an option, use the eight-digit code shown in Figure 4 as the pairing ID. If, for some reason, the sticker on the outside of the unit is flawed, you can find the pairing ID on the sticker inside the unit.



Figure 4. Label used for pairing the unit with cloud services.

Once the pairing process is complete, the unit will connect to the server. This is indicated by the status LED turning solid purple, then solid green for 1 second, before turning off. The unit is now online and ready to be used. The unit is now ready for final checks and deployment preparations. Please proceed to the next chapter.Sensorbee Air Pro 2 can support a self-hosted LwM2M server upon request.

6. Deployment

6.1 Check before deployment

Before installing the unit in its final location, it is recommended to test its function. This can easily be done through Sensorbee's cloud services or your own server. The standard sensor value update interval on Sensorbee Air products is set to 5 minutes from the factory. This is how often the unit reads its internal and external sensors and sends the data to the server.

If all sensors are reporting and the functions seem to be operating properly, it is time to power down the unit and install it in its final location. To turn off the unit, press and hold the power button for 5 seconds. When the unit is being powered off, the Status LED will turn solid red for 10 seconds and then turn off, indicating that the unit is now in power-down mode. If an error occurs during power-off, the LED will blink red six times before the unit reboots. The unit will turn on if the power cable is connected to the power connector and the incoming power is at an adequate level. This means that if the unit is connected to a solar panel, the solar panel needs enough sunlight to start the unit. If an external power supply is used, then this is not an issue. It is recommended to use a power supply as the power source when testing indoors. The unit is now ready for deployment.

6.2 Choosing location of deployment

Location selection depends on the application, such as urban background monitoring, traffic monitoring, etc. The user should consider the following when selecting the final location:

- Install the unit far away from pollution sources that are very close and have insufficient air flow (such as chimneys, air conditioners, etc.) that may disrupt your readings.
- Install the unit between 3 and 4 meters high.
- If the unit is installed with a solar panel, place the unit at a safe distance from buildings, trees, and other obstructions to ensure that the solar panel receives maximum solar radiation. This will guarantee a proper battery recharge and prevent Sensorbee Air from running out of battery.
- If a unit is installed in a location that might not receive enough sunlight for extended periods, such as in northern countries, an external power source is recommended instead of a solar panel.
- For optimal sensor performance, it is recommended to mount the unit in a location that is not directly exposed to sunlight or receives as little sunlight as possible.

To ensure proper operation and due to design, Sensorbee Air products must be installed with the air inlet of the sensors facing downward. Different types of installations are possible, such as vertical masts, walls. Connecting the external cables to the unit before clicking it onto the bracket may be easier. When the external power cable is connected to the unit , the status LED should light up as described in earlier chapters. This indicates that the unit has started up correctly and is connected to the server.

6.3 Installation to Mast

As figure 5 shows, the mounting bracket is attached to the mast using a stainless steel hose clamp. Once this is done, the unit can be attached onto the bracket and the external cables can be connected to it.



Figure 5. Mounting of Air Pro 2 Cellular on a mast.

6.4 Installation on wall

Attach the mounting bracket to the wall using four screws. Then, mount the unit onto the bracket and connect the external cables to it. Either use the solar panel or the wall adapter to power the unit. The unit has been deployed and is sending sensor data to the server.

7. Accessories of Air Pro 2 Cellular

Air Pro 2 Cellular comes with multiple possible add-on and accessories, they range from additional wall mounted sensors to power cables.

List of Internal add-on Sensors

Product code	Name
SB4212	Carbon Dioxide Sensor
SB4262	Carbon Monoxide Sensor
SB4282	Hydrogen Sulfide Sensor
SB4242	Nitric Oxide Sensor
SB4202	Nitrogen Dioxide Sensor
SB4272	Ozone Sensor
SB4252	Sulphur Dioxide Sensor
SB4292	Volatile Organic Compounds Sensor

List of external add-on Sensors

Product code	Name
SB3104	Precision Temp & Humidity Sensor with Solar Shield
SB3103	Precision Temp & Humidity Sensor
SB3662	Pyranometer
SB3632	Rain Sensor
SB3641	Vibration Sensor
SB3612	Wind Speed and Direction Sensor
SB3602	Wind and Rain Sensor
SB4652	Sound Level Sensor Class 2

List of Connectors

Product code	Name
SB9112	1M Sensor Cable Extender
SB9114	2M Sensor Cable Extender
SB9116	5M Sensor Cable Extender
SB9131	Sensor Cable Splitter Y-Type 2 to 1

List of Power related accessories

Product code	Name
SB9031	USB Power Adapter 5V1A
SB6103	Solar Panel 14W integrated mounting
SB9011	2M Power Cable M8 to USB-A
SB9013	5M Power Cable M8 to USB-A
SB9014	10M Power Cable M8 to USB-A
SB9022	2M Power Cable Extender M8 to M8

8. Internal Hardware Modification

Generally any additional internal sensors come mounted in the unit directly at the factory, however customers can specify to send them separately or they can be bought as an add-on later on.

8.1 Installation of Gas Sensors

If the gas sensors were installed before delivery or no gas sensors are to be installed, skip these steps.To remove the unit, first disconnect any connected cables, and then unscrew the 4 screws that hold the unit to the mounting bracket.

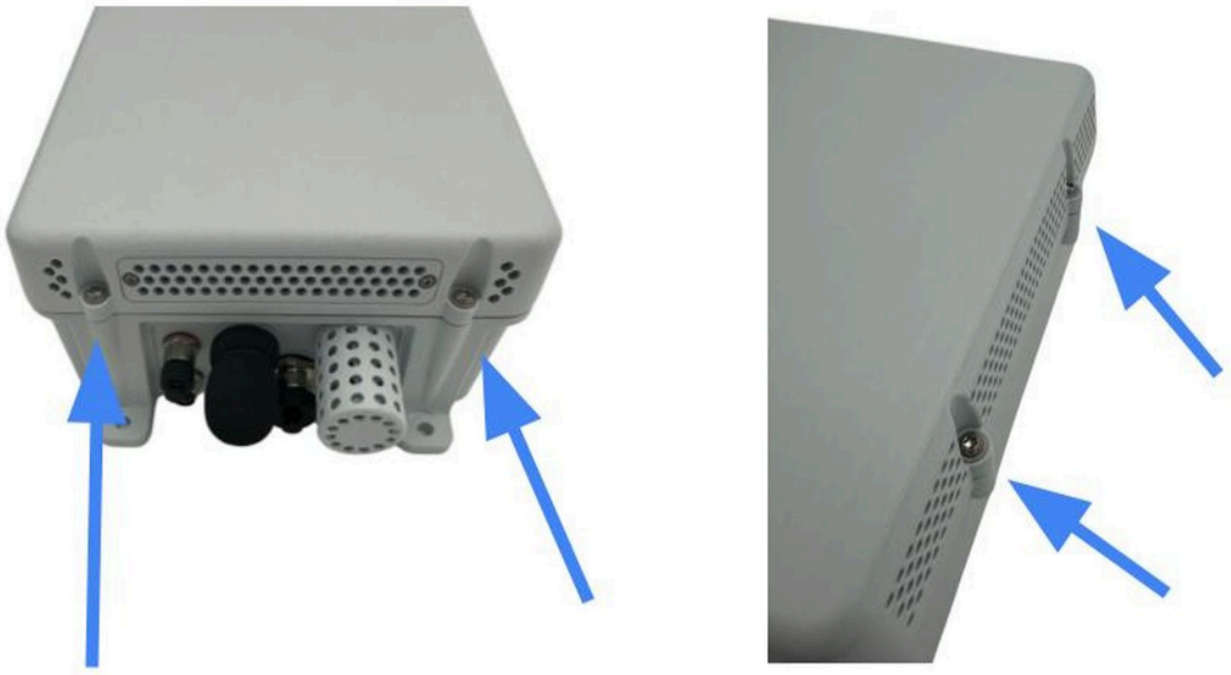

Figure 6. Use a T10 torx screwdriver to unscrew the sensor-house from the base.

Place the sensor-house upside down next to the base, without disconnecting the cable between them as shown in figure 7. Up to six gas sensors, one particulate sensor and one Envirosense can be installed in the sensor-house. The Particulate Sensor and Envirosense is already installed from the factory.

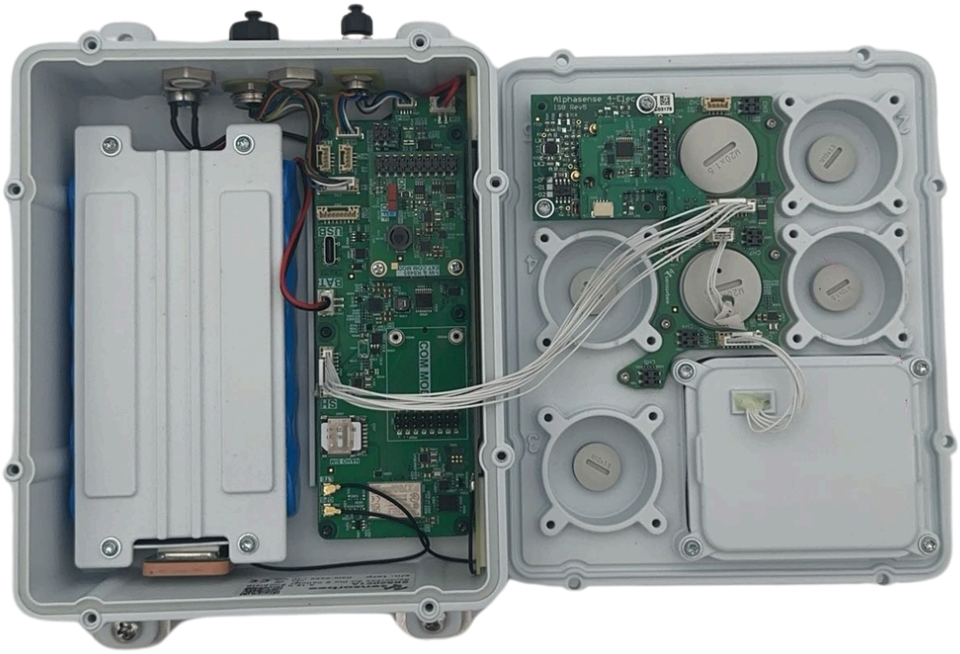

Figure 7. The bottom part of Air Pro 2 Cellular and Sensorhouse are still connected to each other.

To remove the plugs, use a flat headed screwdriver. Make sure the gas sensor is aligned with the mounting holes along with the four pin connector and pressed down before fastening the screws as shown in Figure 8.

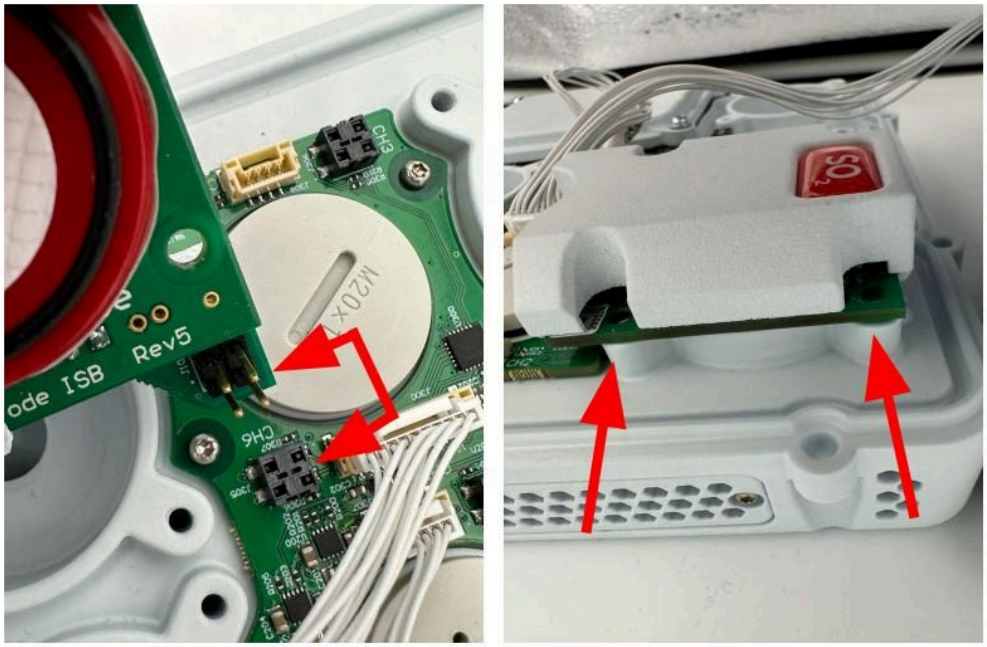

Figure 8. Mounting of Gas Sensor in the Sensorhouse

The gas sensors need to stabilize when the device is powered on. This may take several hours.Use a T10 torx screwdriver and screw the sensor-house back to the base as shown. Double check that the cable between the sensor-house and base does not get squeezed in the seal between them.

8.2 Removing of Battery

If the battery is defective a spare part can be bought and the battery can be replaced.

To remove the unit, first disconnect any connected cables, then unscrew the four screws on each corner of the bracket. Next, lift the unit off the mounting bracket. Unscrew the 8 screws as shown in Figure 6. After doing so, use a T10 torx screwdriver to unscrew the 4 screws holding the battery clamp to the unit as shown in Figure 9.



Figure 9. 4 Screws fastening the battery clamp.

Locate the connector input labeled “BAT” and unplug the red and black cable by gently pulling it out. Only the lighter white plastic should come out.

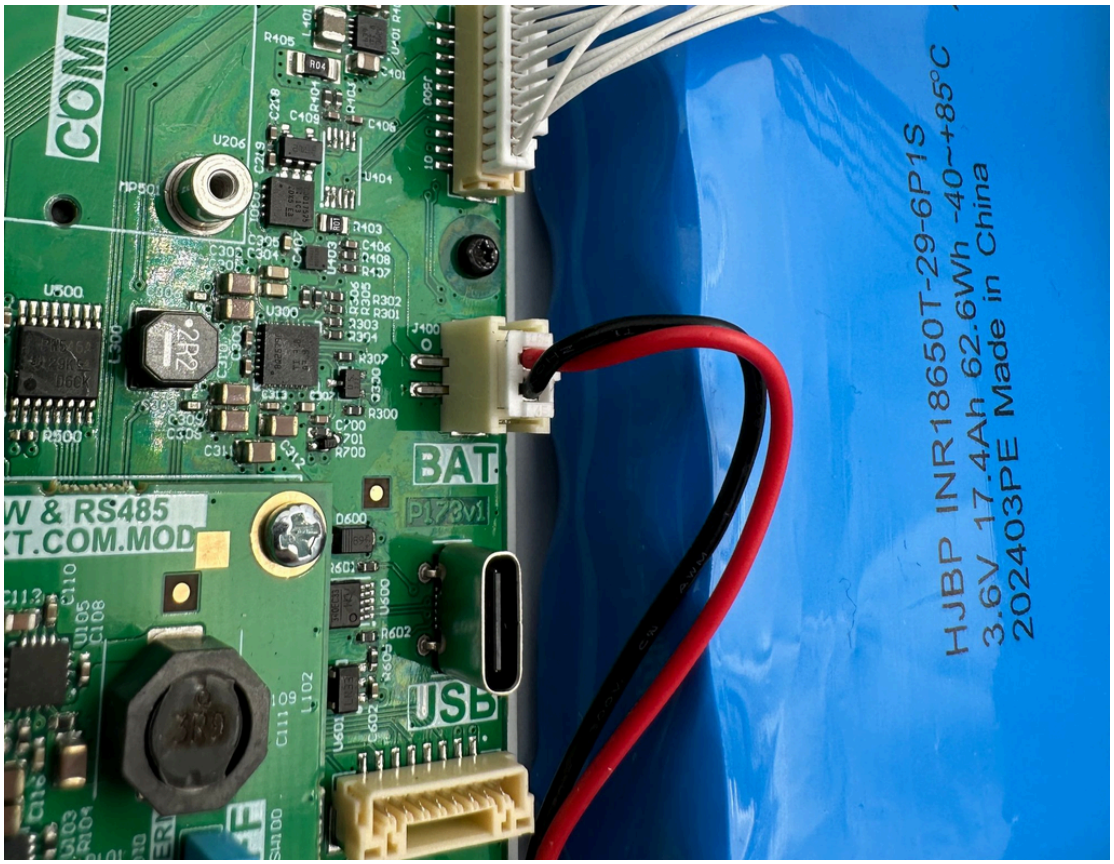

Figure 10. BAT socket for battery connector.

Remove the battery and place the new one, only batteries provided by Sensorbee should be used. To plug in the battery, start by placing the battery in between the cover holes as shown in figure 6. The side with a red and black cable should be closest to the front where all the inputs are located. Make sure no cables are lodged under the battery after placing it. Once the battery is placed, plug in the red and white cable into the connector labeled “BAT” on the circuit board. The black (negative) cable should be on the left side, closest to the USB-C connector. Do not connect the cables in any other direction, as this will cause permanent damage to the unit. After connecting the cable, place the cover on top of the battery with the padded side down by sliding it under the white cables that run across the battery. Then align the screw holes on the cover with the holes in the base of the sensor and screw it in place using a T10 torx screwdriver. The unit will now operate on its internal battery. The status LED indicates booting and network status.If the status LED is not lit or blinking, even for a short time, please double-check the battery connection to the main board. Alternatively, try using an external power supply.Use a T10 torx screwdriver to screw the sensor-house back on top of the base. Double check that the cable between the sensor-house and base does not get squeezed in the seal between them.

9. Data sheet

9.1 General Data Sheet

Component	Value
Power Input	5 to 24 VDC
Internal Battery	20 Ah
Communication & Remote Management	LTE-M or NB-IoT (Nano SIM) Sensorbee Cloud (LwM2M ≥1.1)
Dimensions	145x 200x 85 mm
Weight	1.9 kg
Enclosure Material	Polyamide
Operating Temperature	-20 to 60 °C
Operating Humidity	0 to 99 %RH
Operating Pressure	300 to 1250 hPa

9.2 Technical Data Sheets

Field Performance (Relative to Reference):

Measured Component	Certification Range	Performance Criterion	Notes
PM2.5	0 - 1000 µg/m³	Expanded uncertainty (W_{CM}) ≤ 50%	Relative to a Palas® Fidas® 200 reference instrument.
PM10	0 - 1000 µg/m³	Expanded uncertainty (W_{CM}) ≤ 50%	Relative to a Palas® Fidas® 200 reference instrument.

Core Sensor Component Specifications (NextPM Adjusted):

Parameter	Value / Range	Units	Notes
Particle Size Detection Range	0.3 - 10	µm	Concentration Detection Range
Detection Range	0 - 1,000	µg/m³	For PM1, PM2.5, PM10

Site Conditions Affecting Performance

Condition	Operating Range	Units	Notes
Ambient Temperature	-20 to +70	°C	
Relative Humidity	0 - 95	%	Non-condensing
Atmospheric Pressure	500 to 1500	hPa	