Alledio Indoor

Modbus & BACnet Sensor

Temperature I Humidity I VOC I CO2 I Pressure I Enthalpy I Dew Point I Density of Moist Air I Presence

Document revision	3.1
Document release date	February 2026
Document Number	ALL-MBS-E1-F1
Notes	Data and descriptions in this document are subject to change without notice. Product photos and pictures are for illustrations purposes only and may differ from the real product appearance.

Parameter	Technical data
Housing Material	ABS (flame resistant)
Power Supply	AC: 24 VAC DC: 12-35 V; max expected power: 1,1W
Sensor Measuring Ranges – Output Data	Temperature: -40°C to +125°C Humidity: 0 – 100 % VOC Index points: range 1 – 500 VOC Index points (0-100%). This is based on the measurement range within of 0 – 1000 ppm Ethanol in clean air; specified range: 0,3 – 30 ppm Ethanol in clean air. CO2: 0 – 5000 ppm Pressure: 300 - 1200 hPa (300 mbar – 1200 mbar) Presence: detected / undetected (1/0) from min 1.0m to max 10.5m
Sensor Accuracy:	Temperature: average ±0,5 °C (at 0 – 65°C); available upon request: ±0,2 °C Humidity: ±1,8 % RH (30 – 70%), ±2 % RH (10-30%, 70-90%); available upon request: ±1% RH VOC: < ± 15 VOC Index points (< ± 3%); algorithm stability maintains <5 index point drift/year under continuous operation CO2: ± (50 ppm + 5% of reading) at 400 – 2000 ppm; upon request: ± (30 ppm + 3% of reading) at 400 – 5000 ppm Pressure: relative accuracy: ± 0.06 hPa (or ±0.5 m); absolute accuracy: ± 1 hPa (or ±8 m)
CO2 Auto Calibration	The CO2 sensor is designed to perform automatic self-calibration every 7 days. To ensure optimal calibration and maintain long-term accuracy, the sensor should be exposed to low CO2 levels (ideally around 400-500 ppm which is considered an unoccupied environment), at least once per week.
Communication Protocols	Modbus RS485, BACnet MS/TP, BACnet IP
NFC	Used to pair with Android and iOS smart phones
WiFi	WiFi is activated as an internal hidden network working in the proximity of ~2 meters. Once connected, you can set up Modbus Settings, BACnet Settings and Offset Settings of the Sensors and view the current measured values in real time (automatic reading every 3 seconds). Stay in Wi-Fi range in order to stay connected. WiFi will automatically disconnect after 15 minutes.
Electrical Insulation	Not in standard version; optional upon special request: Isolated RS-485; Up to 1kV (optional); prevents interference transmission, potential differences, and protects against over voltages between devices.
Cable Connections	Solid conductor 0.2 … 0.75 mm^2 / 24 … 18 AWG Fine-stranded conductor 0.2 … 0.75 mm^2 / 24 … 18 AWG Fine-stranded conductor; with insulated ferrule 0.25 … 0.34 mm^2 Fine-stranded conductor; with uninsulated ferrule 0.25 … 0.34 mm^2
Communication Cable	Twisted pair with drain wire and foil wrap or equivalent. Must Be suitable for RS485 Standard.
Ingress Protection	IP30
Ambient condition	From -10 °C to +50 °C, max. 85% rH non-condensing
Product dimensions	87 mm x 87 mm x 19 mm
Product weight	55 g
Package dimensions	115 mm x 115 mm x 42 mm (protective case)

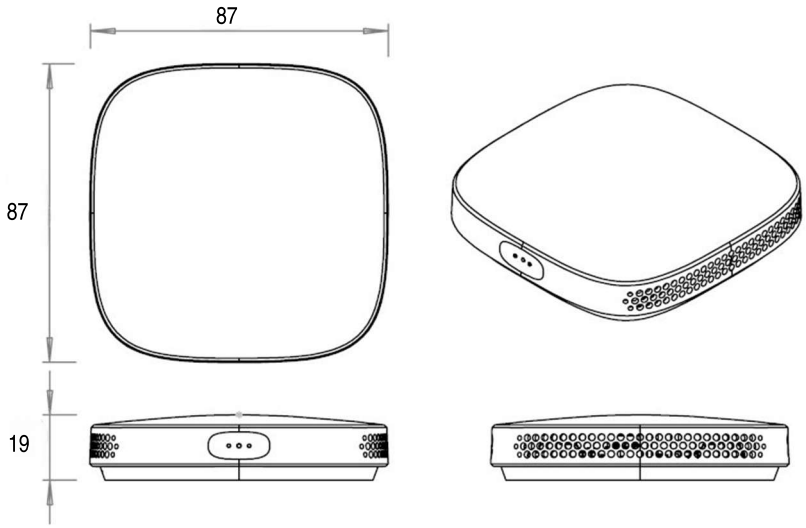
Package weight	90 g (optional bulk packaging – quantity dependent)
Standard	CE
Country of origin	Slovenia, EU
Warranty	1 year

Sensor Variations for ANM-[...] with Modbus & ANB-[...] with Modbus & BACnet

ANM-[...]	Temperature	Humidity	Pressure	VOC	CO2	Presence	Dew Point	Enthalpy	Density of Moist Air	Modbus	BACnet
TH	×	×								×	
THPV	×	×	×	×			×	×	×	×	
THPC	×	×	×		×		×	×	×	×	
THPVC	×	×	×	×	×		×	×	×	×	
THPVCP	×	×	×	×	×	×	×	×	×	×	
ANB-[...]											
TH	×	×								×	×
THPV	×	×	×	×			×	×	×	×	×
THPC	×	×	×		×		×	×	×	×	×
THPVC	×	×	×	×	×		×	×	×	×	×
THPVCP	×	×	×	×	×	×	×	×	×	×	×

Case - Dimensions

L × W × H	87 mm × 87 mm × 19 mm

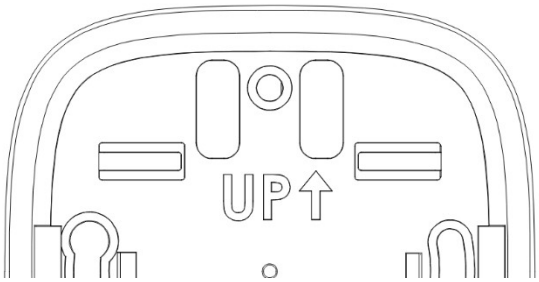


Mounting

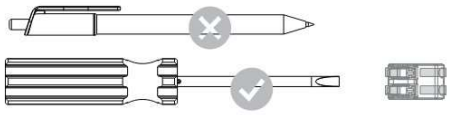
Mounting Location	Wall-mounted, approx. 1.5m from floor level; avoid direct blow or other intense airflow
EU	flush mounted with standard EU box (Ø=60 mm), 3.5mm countersunk screw (wood screw)

Mounting Instructions

- Mount the sensor in a location that is free from direct airflow, such as air blown by fan coil units, split system units, localized heating or cooling devices, or central ventilation system intake grilles, to ensure accurate and reliable measurements.
- Mount the sensor at a height of **1.5 meters** from the floor to ensure optimal performance and accurate readings.
- Mount the sensor to the wall. On the **back plate** of the sensor there is an **"UP ↑"** marking in order to attach the back plate in the correct direction for best measurement performance;
- Connect the sensor firstly with **RS485 communication** cables: Pin 1,2,3. Connect the sensor secondly with **Power Supply** cables: Pin 4,5.
- Once sensor is mounted and connected you can close the sensor with the front plate;

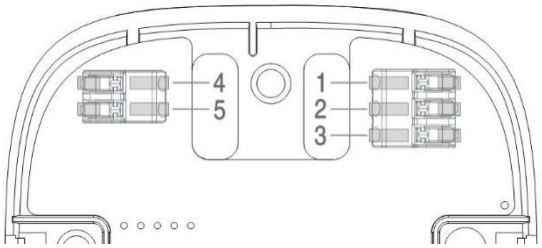


IMPORTANT! Do not press connectors with a pen or pointed object. Use a flat-head screwdriver to avoid damaging the connectors.



Electrical Connection

Pin 1	RS485 A
Pin 2	RS485 B
Pin 3	GND / GNDiso (only version with isolation)***
Pin 4	Vin / ~ Vin
Pin 5	GND / ~ Vin



*** For long runs, or where devices are on different electrical circuits/power supplies, it's recommended to use a third wire for GND.

Sensor Calibration and Commissioning Process

To ensure optimal performance and accuracy, proper calibration of the sensor during commissioning is essential. Begin by connecting the Modbus / BACnet cables to sensor. Then connect it to a stable power supply. Connect to the sensor with your Smart Phone and configure the Settings.

Setting manual Offsets

Once powered, allow the sensor to initialize and auto-calibrate itself. This process typically requires a waiting period of **45 to 60 minutes** during which the sensor will **automatically calibrate itself** before it begins providing accurate readings. Avoid interacting with or making adjustments to the sensor during this critical auto-calibration phase.

A calibration countdown timer appears in the WebApp Status bar (See: Page 11). The timer starts running automatically as soon as the sensor is powered on.

After the auto-calibration period has passed, connect to the sensor using an NFC enabled smartphone. Utilize the provided application to establish a connection, enabling you to configure the sensor offset settings. At this stage, you can proceed to set up Modbus / BACnet Communication and make any necessary adjustments to the sensor offsets to match your application's requirements.

Calibration Recommendations:

- Calibrate the temperature, humidity, and pressure readings using a reliable calibration device to ensure accurate values.
- Keep the weekly CO2 sensor auto-calibration enabled.
- For the presence detector, run room auto-calibration and follow the wizard on the WebApp, then adjust sensitivity and detection range (distance) as needed. You must leave the room during presence calibration.

Important Consideration for Power Interruptions: If the power supply to the sensor is interrupted during the commissioning process, it is vital to ensure the sensor has **cooled down to room temperature before reconnecting it** to the power source. This precaution helps maintain the integrity of the sensor's calibration process and prevents potential errors in operation. Following this guideline will contribute to achieving reliable and consistent performance from the sensor.

Connecting to the Sensor with a Smart Phone (iOS or Android)

Android devices

Tap Sensor (1st time)	**Tap the sensor** with your smart phone on the bottom right part of the case for the first time. If your phone doesn't detect the NFC right away, try moving around a bit. The sensor will push a **notification to connect** to the sensors internal Wi-Fi network. **Accept** the connection. Wait for 2-3 seconds for the sensor to **connect** with your smart phone. **Note**: If you touch the sensor before it manages to connect with your smart phone it will re-read the NFC tag as empty. In this case, wait an additional 1-2 seconds, before tapping for the second time. The sensors Wi-Fi network is a private hidden network. You won't be able to see it in your smart phones Wi-Fi networks list
Tap Sensor (2nd time)	**Tap the sensor** with your smart phone on the bottom right part of the case for the second time. If your phone doesn't detect the NFC right away, try moving around a bit. The sensor will push a **notification to open** your web browser on your smart phone. **Tap** the notification. Your browser will open up with the Andivi Sensor Web App, where you can configure the sensor.

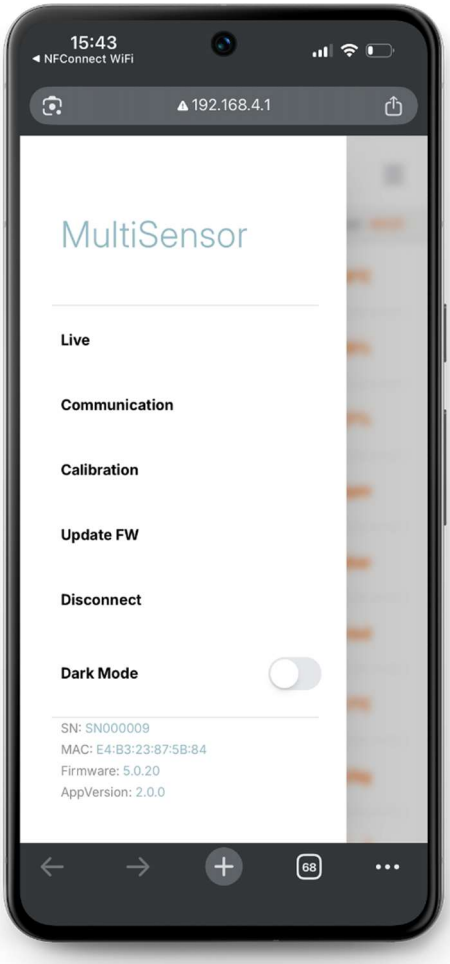
Important: First-Time WiFi Connection Android: On Android devices, a pop-up will appear asking if you want to stay connected to the network. If you select "Stay Connected" or leave the pop-up open, the connection will be maintained without issues. However, if you close the pop-up or select "Do Not Stay Connected," the device will switch to another available network.

iOS devices

Download from App Store	For iOS we recommend downloading the *NFConnect WiFi* app: https://apps.apple.com/us/app/nfconnect-wifi/id6504420354 Scan QR code to download it with your smart phone.
Tap Sensor (1st time)	**Tap the sensor** with your smart phone on the bottom right part of the case for the first time. If your phone doesn't detect the NFC right away, try moving around a bit. The sensor will push a **notification to open the app & connect** to the sensors internal WiFi network. **Accept** the connection. **Wait for 3-5 seconds** for the sensor to **connect** with your smart phone. Once connected ...
Tap Sensor (2nd time)	**Tap the sensor** with your smart phone on the bottom right part of the case for the second time. If your phone doesn't detect the NFC right away, try moving around a bit. The sensor will push **another notification to open** your web browser on your smart phone. **Tap** the notification. Your browser will open up with the Multi-Sensor Web App, where you can configure the sensor.

Important: Auto Turn-Off: Once paired with the Web App, the sensor stays connected to Wi-Fi for 15 minutes, then automatically powers off.

Configuring the Sensor with the Web App



Main Menu

Live: see live readings from the sensor; refreshed every 3 seconds.

Communication Settings:

- Modbus RS485 Settings set Address, Baudrate, Parity, Mode, Stop Bits and Termination.
- BACnet MSTP Settings: set Device ID, MAC ID, Max Master, Baudrate
- BACnet IP Settings: set Device ID, SSID, Password, Port

Calibration: calibrate the sensor and set offsets for every value.

Update FW: firmware update wizard

Disconnect: disconnect sensor from Web App

Dark mode: switch between light and dark mode of the WebApp

Device info:

SN: serial number of the device

MAC: MAC Address of the device.

Firmware: Firmware version of the device.

App Version: Web App version of the device.

Modbus Settings

Modbus Settings	Options	Default Settings
Baud rate	4800, 9600, 19200, 38400, 57600, 76800, 115200	9600
Termination	None, 120 Ω	None
Parity	Even, Odd, None	None

Modus	RTU, ASCII	RTU
Stop Bits	1, 2	1
Address	From 1 to 247 Important: The addresses of the Modbus communication registers can be shifted by 1 depending on the controller used to receive the data.	1

Modbus Input Registers (for reading measured values)

Value	Unit	Register	Gain
Temperature	°C	10	10
Humidity	% r H	15	10
VOC	%	20	/
VOC Index	VOC Points	21	/
CO2	ppm	25	/
Pressure	mbar	30	10
Presence	[detection Y/N]	50	0 = presence not detected; 1 = presence detected
Dew Point	°C	35	10
Enthalpy	kJ/kg	40	10
Density of Moist Air	kg/m^3	45	100
CO2: Manual Calibration State		26	0 = Idle; 1 = Recalibration in progress; 2 = Success (latched ~1 minute, then returns to 0); 3 = Failed (latched ~1 minute, then returns to 0).
CO2: Weekly Calibration	[active/inactive]	27	0 = off, 1 = on
Presence: Calibration Status	[calibrated Y/N]	51	0 = the presence sensor is not calibrated and requires calibration; 1 = the sensor has been successfully calibrated.
Presence: Calibration Progress	%	52	Current Calibration progress from 0% to 100%
Presence: Sensitivity	[stages]	53	1 - Very Low, 2 - Low, 3 - Medium, 4 - High, 5 - Very High

Modbus Holding Registers (for setting values via Modbus communication)

Value	Unit	Register	Gain
Temperature	°C	10	10
Humidity	% r H	15	10
VOC	Cannot be readjusted manually because it automatically readjusts based on last 24h with a new average baseline 50% (=100 VOC Points)		

Pressure	mbar	30	10
CO2: Manual Calibration Setpoint*	ppm	26	/ Write the desired manually entered calibrated CO2 value; the written value remains for ~1 minute, then returns to 0 (idle).
CO2: Weekly Calibration	[active/inactive]	27	0 = off, 1 = on
Presence: Calibration Status	[calibrated Y/N]	51	0 = the presence sensor calibration is not currently in progress; 1 = calibration in progress; if you write 1, you activate/start the calibration.
Presence: Sensitivity	[stages]	53	1 - Very Low, 2 - Low, 3 - Medium, 4 - High, 5 - Very High

*The purpose of the **manual calibration setpoint feature for the CO2 sensor** is to allow an installer to manually calibrate the sensor by entering the current CO2 level in the room, provided they know its exact value. If the sensor automatically self-calibrates once a week under normal conditions, this option is available for situations where immediate calibration is required, such as for testing purposes, without the need to wait for the automatic calibration process.

BACnet MS/TP Settings

Device ID	The Device ID, also known as the Device Object Identifier or Device Instance, is a unique identifier for each BACnet device across the entire BACnet internetwork. It is used for device discovery, communication, and referencing devices in the control system network and can typically range from 0 to 4,194,303 (22-bit value). The Device ID is typically field-configurable to ensure uniqueness in each installation.
MAC Address	The MAC ID (Media Access Control address) uniquely identifies devices within a specific network segment and facilitates direct communication within that segment. The MAC ID, must be unique within the specific network segment or MS/TP trunk. BACnet MS/TP: 0-127 for master devices.
Max Master	The Max Master setting indicates the highest Media Access Control (MAC) address assigned to any master device on the MS/TP network. It is used to limit the range of addresses that a device will poll when searching for other master devices on the network.* The default Max Master value is typically 127.Valid values range from 1 to 127, corresponding to the possible master device addresses in MS/TP networks. For optimal configuration set Max Master equal to the highest MAC address actually in use on the network. Use consecutive MAC addresses for devices when possible. Setting Max Master significantly higher than the highest numbered device will result in increased network traffic and slower response times. Setting Max Master lower than the highest MAC address on the network will result in some controllers being unavailable for network traffic
Baud rate	Select baud rate 9600, 19200, 38400, 57600, 76800, 115200
Termination	Select termination None, 120 Ω
Objects	See BACnet Objects: Analog Input, Analog Value, Binary Input

BACnet IP Settings

Device ID	The Device ID, also known as the Device Object Identifier or Device Instance, is a unique identifier for each BACnet device across the entire BACnet internetwork. It is used for device discovery, communication, and referencing devices in the control system network and can typically range from 0 to 4,194,303 (22-bit value). The Device ID is typically field-configurable to ensure uniqueness in each installation.
SSID	The SSID (Service Set Identifier) is the name of a WiFi network that you want to connect your BACnet sensor with.
Password	Type in the password of the selected WiFi network to securely access to the BACnet sensor.
Port	Set the UDP port used for BACnet communication. It specifies which application reads the BACnet messages when a computer receives an Ethernet message Default value 47808.
Objects	See BACnet Objects: Analog Input, Analog Value, Binary Input

BACnet Property List

Object Name	Temperature / Humidity / Pressure / CO2 / VOC / VOC Index / Presence / Enthalpy / Dew Point / Density of Moist Air
Present value	Displayed value of selected variable (e.g. 23.5°C for temperature)
Out of service	If a particular hardware component (e.g. CO2 sensing element) is not present on this sensor version then “Out of Service = True”.
Units	°C for temperature, % for humidity, % for VOC, Points for VOC Index, ppm (particles per million) for CO2, mbar for pressure.
Resolution	Temperature: 0,1 °C, Humidity: 0,1%, VOC: 1%, VOC Index : 1, CO2: 1 ppm, Pressure: 0,01 mbar, Dew Point: 0,1°C, Enthalpy: 0,1 kJ, Density of Moist Air: 0,01 kg/m3

BACnet Object Table

Analog Input	Value	Unit	Resolution	Default COV Increment
AI: 0	Temperature	°C	0.1 °C	0.5 °C
AI: 1	Humidity	r H	0.1 % r H	5 % r H
AI: 2	VOC	%	1 %	5 %

AI: 3	VOC Index	Index point	1	25
AI: 4	CO2	ppm	1 ppm	50 ppm
AI: 5	Pressure	mbar	0.01 mbar	10 mbar
Analog Value				
AV: 0	Dewpoint	°C	0.1 °C	1 °C
AV: 1	Enthalpy	kJ/kg	0.1 kJ/kg	0.5 kJ/kg
AV: 2	Density of Moist Air	kg/m3	0.01 kg/m3	0.05 kg/m3
Binary Input				
BI: 0	Presence	[Y/N]	[Y/N]	[Y/N]

Understanding VOC Index

The VOC Index provides a standardized 0–500 scale for assessing indoor air quality by measuring volatile organic compounds (VOCs) – gases emitted from sources like cleaning products, paints, furniture and building materials. Unlike raw ppm measurements, this index normalizes readings across different VOC types and environmental conditions using a proprietary algorithm, while compensating for humidity variations.

The VOC Index sensor works much like a highly sensitive electronic nose. Here's how you can think about it:

When you walk into a room, your nose instantly compares the air's smell to what you've been breathing recently. If you just came from outside and enter a kitchen where someone is cooking, your nose quickly notices the change and tells you, "This air smells different!" The VOC sensor does something very similar:

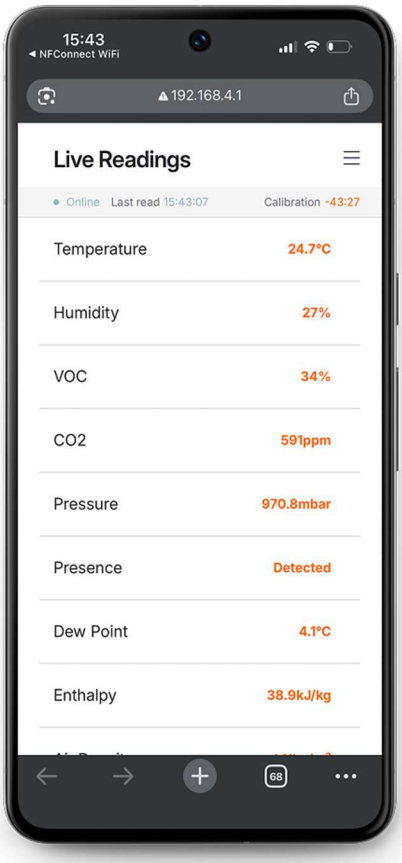
- It constantly "sniffs" the air and remembers what the air has been like over the past 24 hours (its "memory" or baseline).
- When the air changes—maybe someone starts cleaning, cooking, or opens a window—the sensor detects this difference and updates the VOC Index accordingly.
- A value of 100 on the VOC Index means the air quality is about the same as what the sensor has learned is "normal" for that room. If the index goes above 100, it means there are more VOCs (volatile organic compounds) than usual—just like your nose noticing a stronger smell. If it drops below 100, the air is fresher than usual, similar to when you notice a fresh breeze after opening a window.

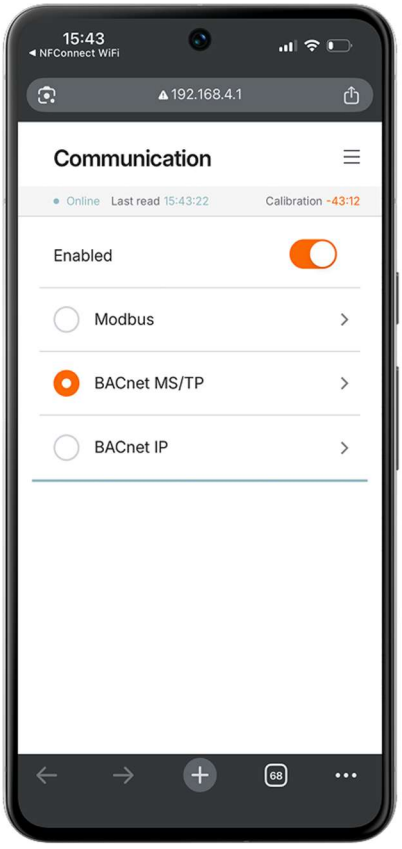
Just as your nose can't always tell you exactly what chemicals are present, but can sense if the air feels stuffy or fresh, the VOC Index gives a simple number that reflects the overall air quality trend compared to recent history.

Higher values indicate poorer air quality, with actionable thresholds typically set at:

VOC Index Points	VOC %	Air Quality
1–99	1% – 49%	Less intense than average – in the last 24h
100	50%	Average - in the last 24h
101–500	51% – 100%	More intense than average – in the last 24h

Web App Screenshots





Live Readings

see live readings from the sensor; refreshed every 5 seconds.

[Status Bar]

Connection: ● = online | ● = sensor is disconnected

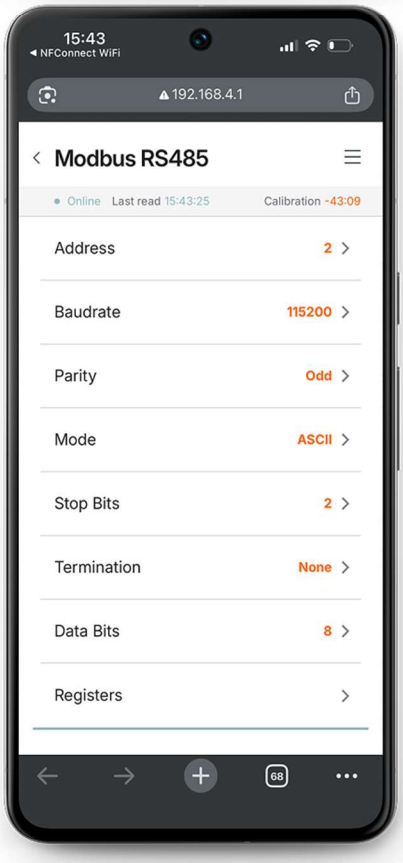
Last read: hh/mm/ss - Last time the sensor retrieved data.

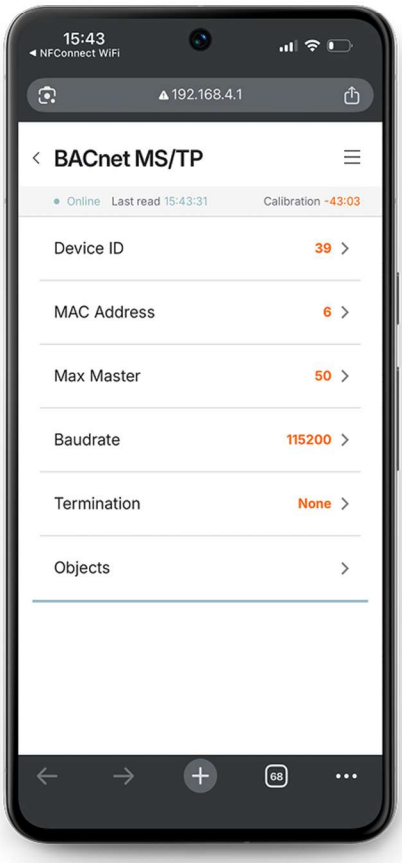
Calibration: mm/ss – countdown timer till auto-calibration has been completed

Communication Settings

Enable / Disable Communication

Set type of Communication (Modbus, BACnet)





Modbus RS485 Settings

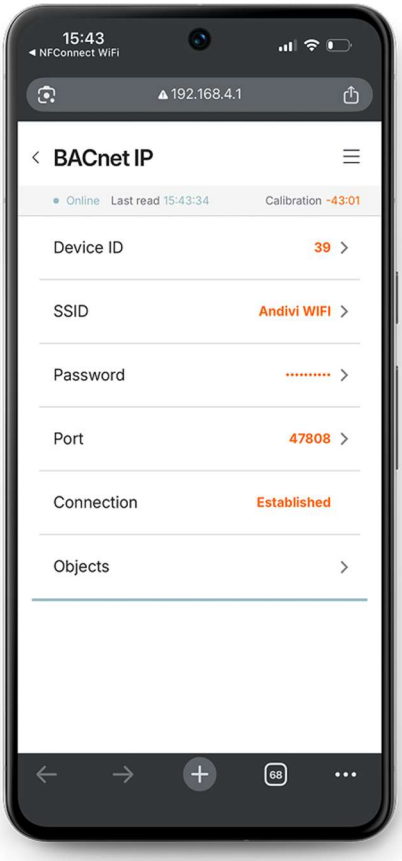
Set Modbus Address, Baudrate, Parity, Mode, Stop Bits and Termination.

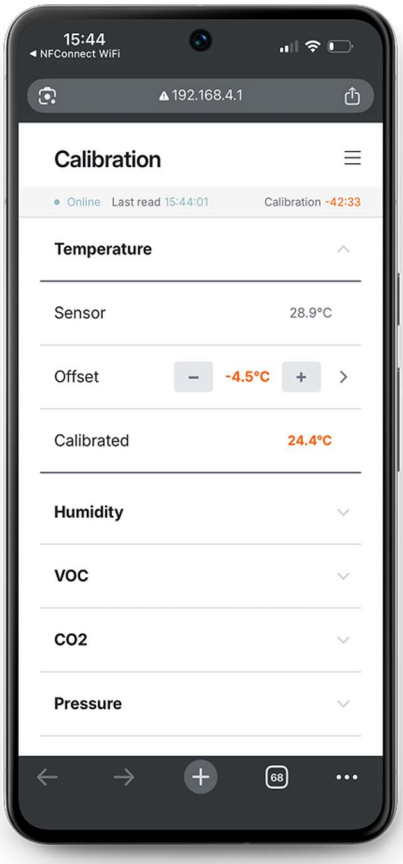
See Registers list.

BACnet MS/TP Settings

Set Device ID, MAC Address, Max Master, Baudrate, Termination

See Objects list.





BACnet IP Settings

Set Device ID, SSID, Password, Port, Connection,

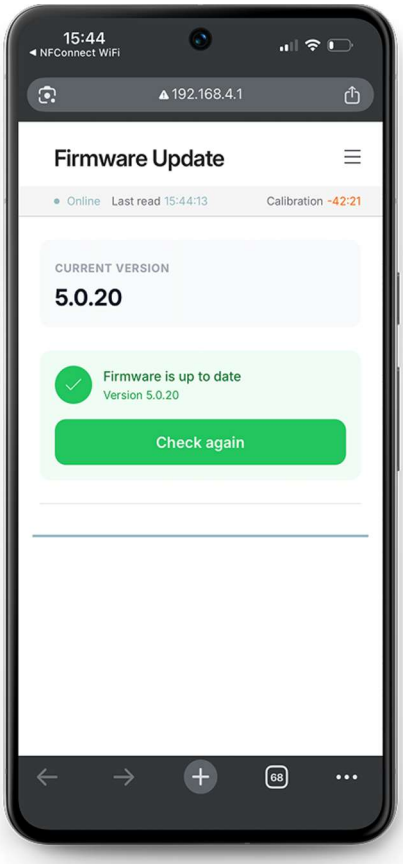
See Objects list.

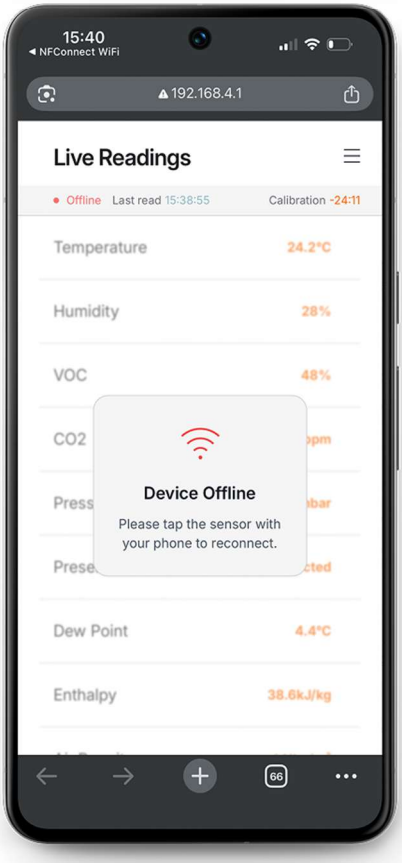
Calibration

Set offsets for temperature, humidity, pressure.

For CO2 sensor set Weekly Auto-Calibration or set Manual Calibration.

For Presence sensor run Auto-Calibration for the current room, set Sensitivity and Range.





Update Firmware

Check for firmware updates and follow the update wizard in order to update the firmware settings of the sensor.

Device offline

Sensor Auto Disconnects after 15 minutes. Tap the sensor with your phone to reconnect again.