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

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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: 15-35 V; configuration 24V – 45mA (1,08W); normal operation 24V – 34mA (0,82W)
Sensor Measuring Ranges	Temperature: -40°C to +125°C Humidity: 0 – 100 % VOC: 0 – 1000 ppm Ethanol in clean air; specified range: 0,3 – 30 ppm Ethanol in clean air. Entire range 1 – 500 VOC Index points (0-100%) CO2: 0 – 5000 ppm Pressure: 300 - 1200 hPa (300 mbar – 1200 mbar) Presence: from min 0.0m to max 8.4m (adjustable with a 0.7m step)
Sensor Accuracy:	Temperature: average ±0,2 °C (at 0 – 65°C); Humidity: ±1,8 % (30 – 70%), ±2 % (10-30%, 70-90%) VOC: < ± 15 VOC Index points (< ± 3%) CO2: ± (50 ppm + 5% of reading) at 400 – 2000 ppm Pressure: relative accuracy: ± 0.06 hPa (or ±0.5 m); absolute accuracy: ± 1 hPa (or ±8 m) Presence: ± 0.35m
Temperature Sensor	PT1000
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	BACnet MSTP, BACnet IP, Modbus RS485
NFC	Used to connect with Android and iOS smart phones
WiFi	WiFi is activated as an internal hidden netwok 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 5 seconds). Stay in Wi-Fi range in order to stay connected.
Electrical Insulation	Isolated RS-485; Up to 1kV (optional); prevents interference transmission, potential differences, and protects against over voltages between devices.
Connections	Pluggable screw terminals for 0.3 to 1.5mm cable
Power Supply Cable	Screened, twin twisted pair 0.75mm to 1mm. Screen earthed at controller end only.
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)

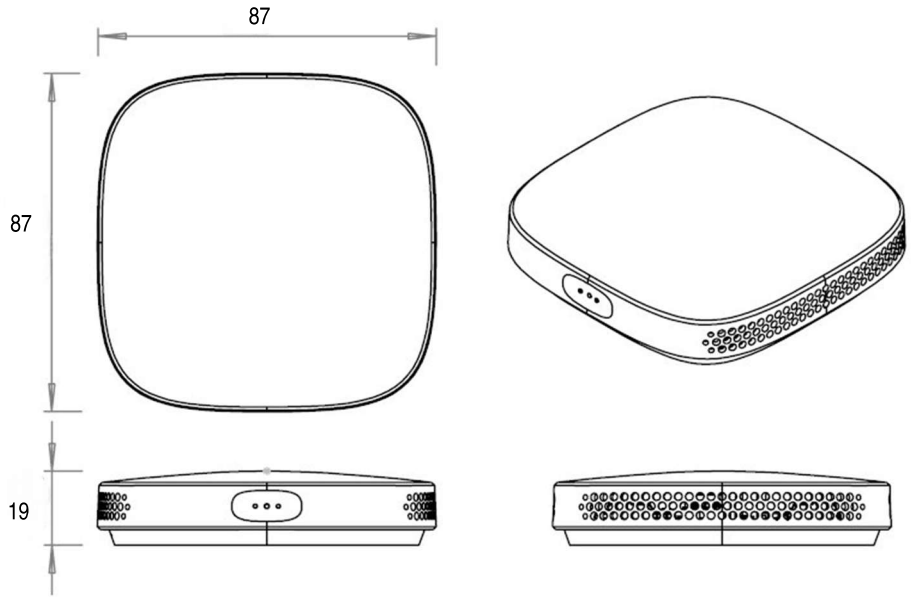
Package weight	90 g (optional bulk packaging – quantity dependent)
Standard	CE
Country of origin	Slovenia, EU
Warranty	1 year

Sensor Variations for ANDBAC-[...]

[...]	Temperature	Humidity	Pressure	VOC	CO2	Presence	Dew Point	Enthalpy	Density of Moist Air
T	×								
TH	×	×							
THP	×	×	×				×	×	×
THPV	×	×	×	×			×	×	×
THPC	×	×	×		×		×	×	×
THPVC	×	×	×	×	×		×	×	×
THPVCP	×	×	×	×	×	×	×	×	×

Dimensions

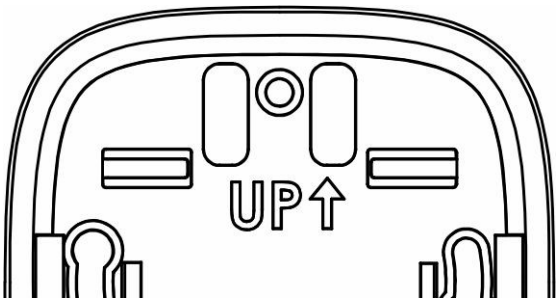
L × W × H	87 mm × 87 mm × 19 mm



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), M3.5 countersunk screw

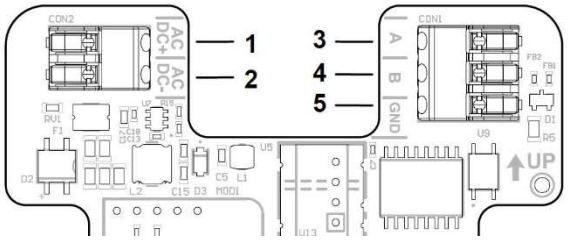
Mounting Instructions



- 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 **Modbus / BACnet MS/TP communication** cables: Pin 3,4,5.
- Connect the sensor secondly with **Power Supply** cables: Pin 1,2.
- Once sensor is mounted and connected you can close the sensor with the front plate;
- You are ready for configuration with a smart phone.

Electrical Connection

Pin 1	+ Vin / ~ Vin
Pin 2	- Vin / ~ Vin
Pin 3	Modbus A / BACnet A
Pin 4	Modbus B / BACnet B
Pin 5	GNDiso



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 Modbus Settings (Adress, Baudrate, Party ...) or BACnet Settings (Device ID, MAC ID, Baudrate ...).

Setting manual Offsets

Once powered, allow the sensor to initialize and auto-calibrate itself. This process typically requires a waiting period of **30 to 45 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.

After the auto-calibration period has passed, you can connect to the sensor using a NFC enabled smartphone. Utilize the provided application to establish a connection, enabling you to configure the sensor 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.

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 lower right part of the case for the first time. The sensor will push a **notification to connect** to the sensors internal WiFi 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 lower right part of the case for the second time. 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.

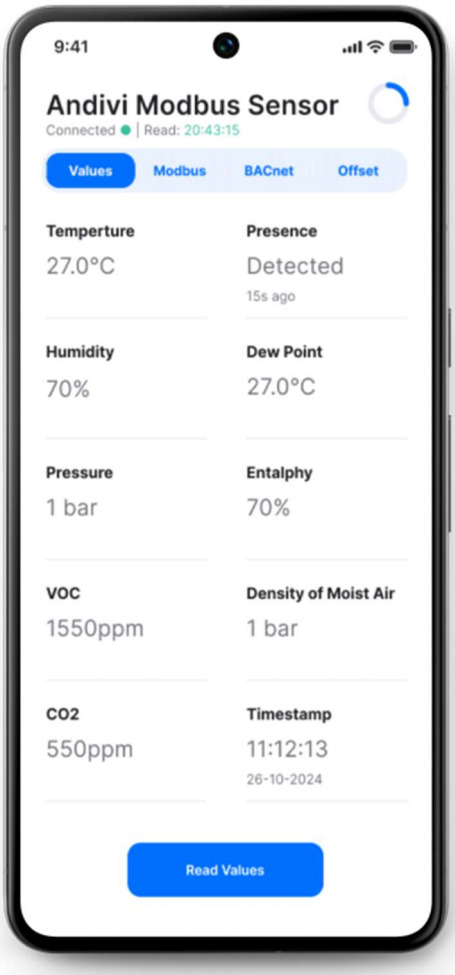
Important: First-Time WiFi Connection Android: On Android devices, a pop-up will appear asking if you want to stay connected to the network. If you select "Stay Connected" or leave the pop-up open, the connection will be maintained without issues. However, if you close the pop-up or select "Do Not Stay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

iOS devices

Download from App Store	For iOS we recommend downloading the *NFC21 Reader* App to your smart phone: https://apps.apple.com/us/app/nfc21-reader/id1293225257 or any other NFC app.
Launch App	Once downloaded, open the app on your smart phone.
Tap Sensor (1st time)	**Tap the sensor** with your smart phone on the lower right part of the case for the first time. The sensor will push a **notification to connect** to the sensors internal WiFi 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 lower right part of the case for the second time. 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 iOS: If another known WiFi network is nearby and you are connecting to the sensor for the first time, the iPhone will automatically switch to the other known network after a few seconds. On the second connection attempt, the iPhone will remain connected to the sensor for approximately 20 minutes before disconnecting from the WiFi network again.

Configuring the Sensor with the Web App



Status:
Connected status:
- = sensor is connected
- = sensor is disconnected

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

Menu:

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

Modbus RS485 Settings
set Modbus 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

Registers
see the registers table and the gains.

Offset
see the offsets for every value.

Modbus Settings	
Baudrate	9600, 19200, 38400, 57600
Termination	None, 120 Ω
Parity	Even, Odd, No Parity
Modus	RTU, ASCII
Stop Bits	1, 2
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.

Modbus Input Registers (for reading measured values)

Value	Unit	Register	Gain
Temperature	°C	10	10
Humidity	% r H	15	10
VOC	%	20	/
CO2	ppm	25	/
Pressure	mbar	30,31*	100
Dew Point	°C	35	10
Enthalpy	kJ/kg	40	10
Density of Moist Air	kg/m^3	45	10
Presence	[detection Y/N]	50	0 = presence not detected; [else] presence detected

* Value for pressure is gained by combining combine two 16-bit registers (30 and 31) into one 32-bit register. We use that following this formula: *[value of register 30] x 65536 + [value of register 31]*. The combined value is then divided by 100 since gain is 100.
For example: If the value of *register 30* is 1 and the value of *register 31* is 34464, then we combine it using the [1] x 65536 + [34464] = 100.000; this number is then divided by 100 since gain is 100. Meaning 100.000 / 100 = 1000mbar.

Modbus Holding Registers (for setting offset via Modbus communication)

Value	Unit	Register	Gain
Temperature	°C	10	10
Humidity	% r H	15	10
VOC	%	20	/
CO2	ppm	25	/
Force Calibrate CO2*	ppm	26	/
Pressure	mbar	30	100

*The purpose of the **force calibration feature for the CO2 sensor** is to allow an installer to manually calibrate the sensor by entering the current CO2 level in the space, provided they know its exact value. While 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.

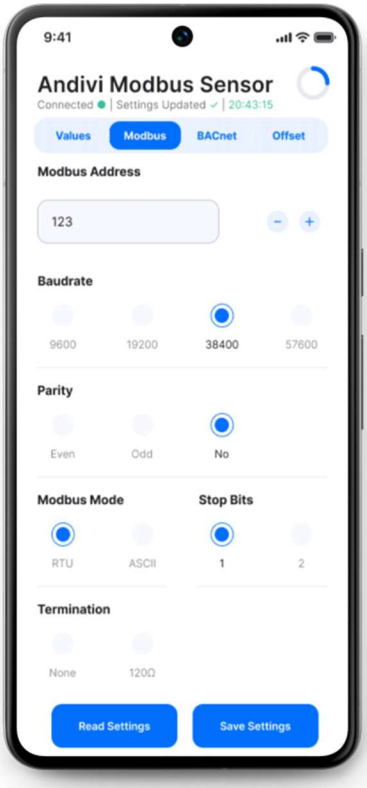
BACnet MS/TP Settings

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 ID	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
Baudrate	Select baudrate 9600, 19200, 38400, 57600, 76800, 115200

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.

Web App Screenshot: Configuring the Modbus RS485 Settings



Web App Screenshot: Configuring the BACnet MS/TP Settings & BACnet IP Settings