



**Smartphone Application for
EP5000-XX IAQ probe**

Ver	Date	Change / Update
V1	Initial	Draft
V2	26/03/21	EnOcean Pairing
V3	09/04/21	EnOcean Pairing, input
V4	30/04/21	Minimum ventilation
V5	30/06/21	Ozone and NOx sensors setting added

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1. Presentation

The EP5000-XX probe has an NFC antenna in the front panel and can be configured using a smartphone application. This document presents the main settings.

2. Type of smartphone and settings

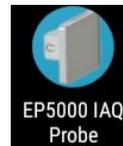
Make sure your Android smartphone has a built-in NFC function.
Enable NFC in the settings section.

3. Download the smartphone application

Go to the Play store  and search for NanoSense. Download the EP5000 application.
Or directly:

<https://play.google.com/store/apps/details?id=com.nanosense.nanosensev2>

The following pictogram will appear on one of your tabs:



4. Reading the configuration

Launch the App first in case you have other apps using NFC.

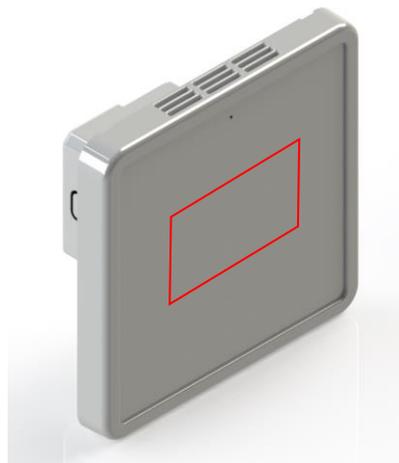
Tap the smartphone on the center of the front panel of the probe (the antenna is located in the center).

Setting by NFC does not require the unit to be powered and can therefore be carried out with the probe in its box. A symbol appears on the box to indicate the location of the antenna.

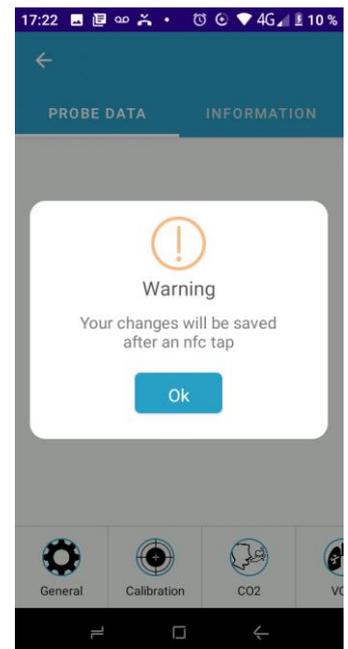
In case of commissioning many probes the same way a copy paste feature can be used (but pairings).

When the probe's NFC antenna responds, you should hear a Beep on the smartphone.

In the process, the application loads the contents of the memory via NFC and at the end opens an alert message indicating that all the parameter modifications will only be applied after a new NFC tap (writing the memory).



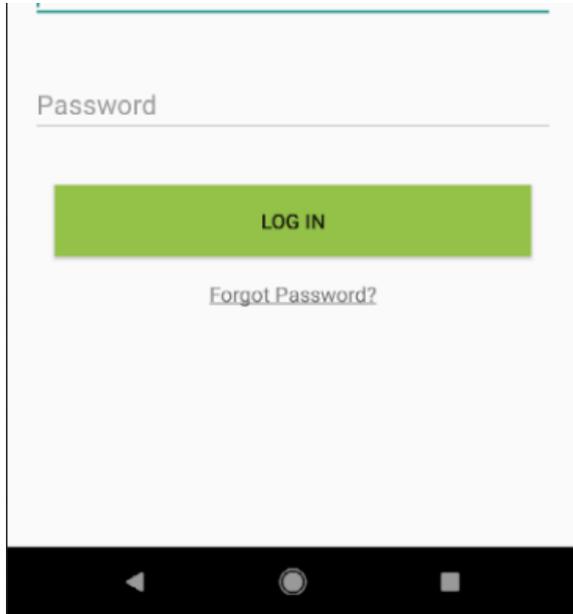
Location of NFC antenna



Memory being read, take the smartphone in hand and make the desired settings.

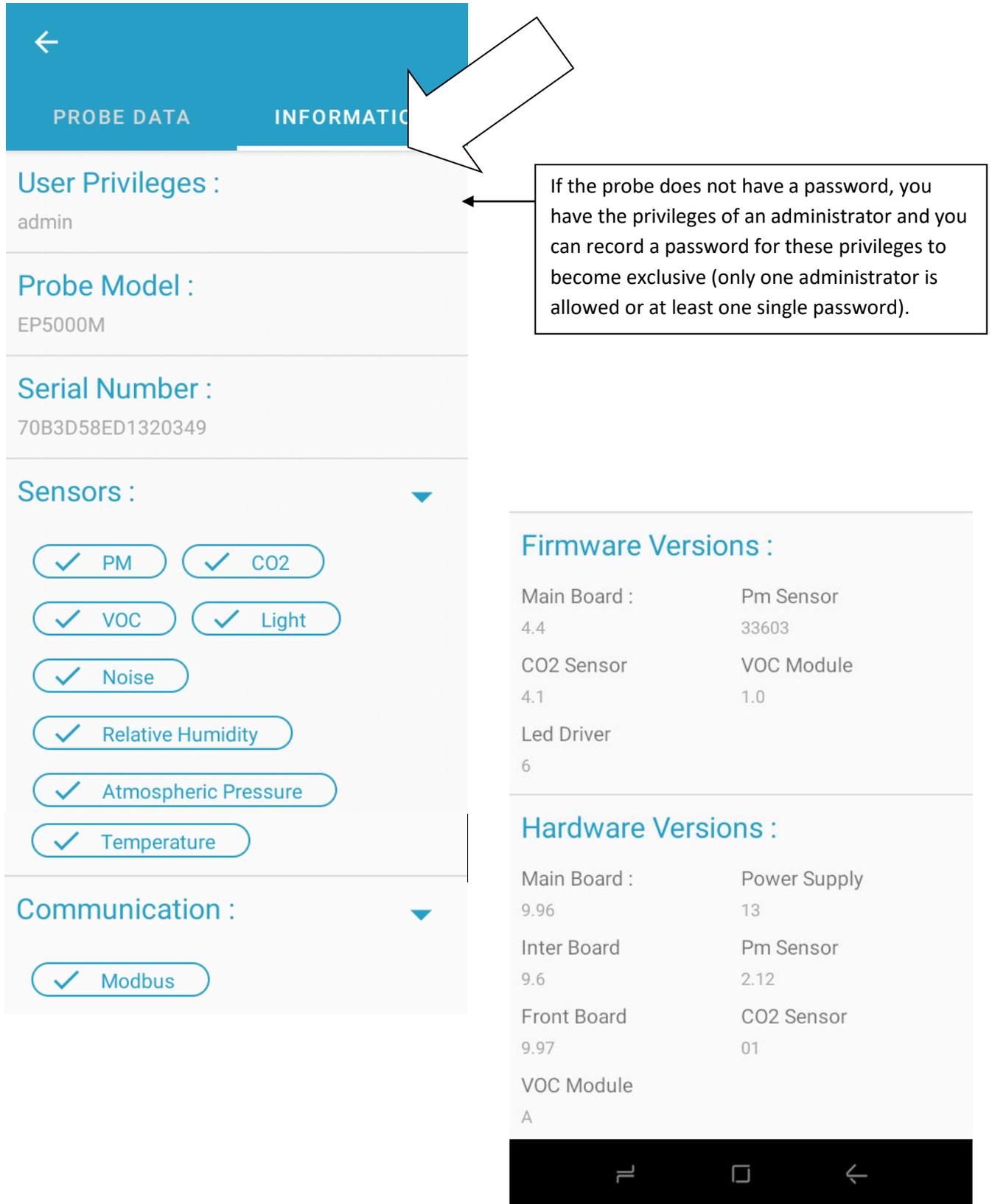
5. Access to data

If the probe has already been programmed and a password entered, the following page appears.
If it does not have a password, see next chapter.



6. Probe Model

By selecting **information**, it is possible to check the probe model, its serial number, its protocol and the sensors on board.



INFORMATION

User Privileges :
admin

Probe Model :
EP5000M

Serial Number :
70B3D58ED1320349

Sensors :

- PM
- CO2
- VOC
- Light
- Noise
- Relative Humidity
- Atmospheric Pressure
- Temperature

Communication :

- Modbus

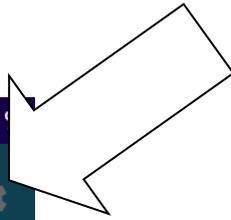
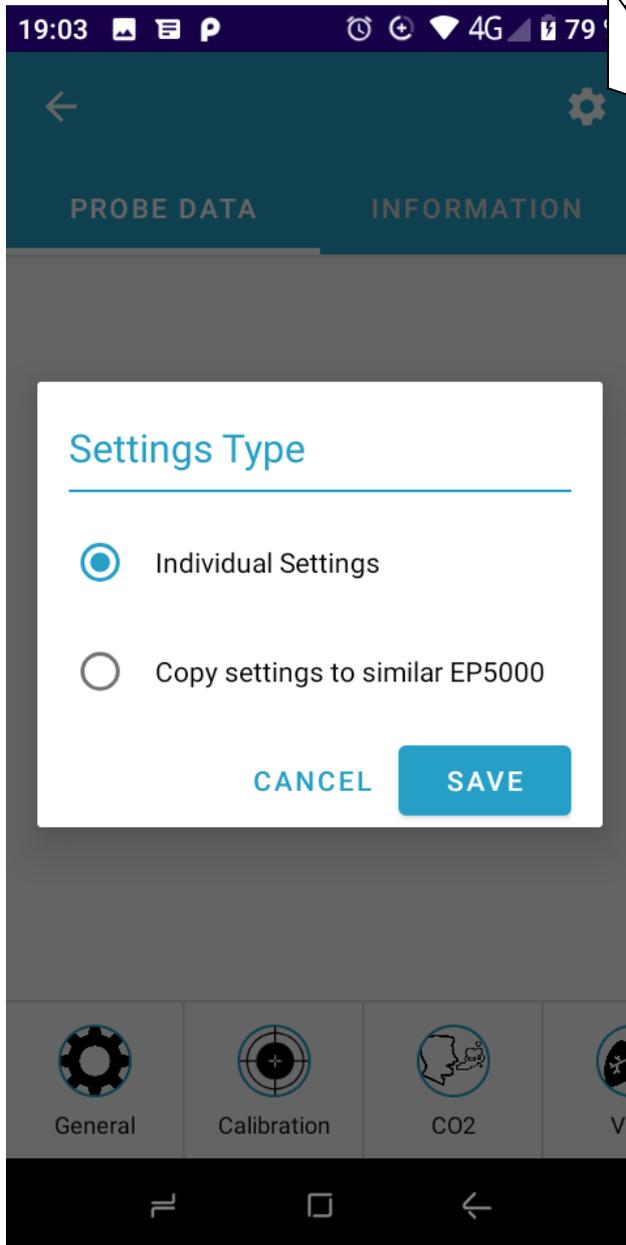
Firmware Versions :

Main Board : 4.4	Pm Sensor 33603
CO2 Sensor 4.1	VOC Module 1.0
Led Driver 6	

Hardware Versions :

Main Board : 9.96	Power Supply 13
Inter Board 9.6	Pm Sensor 2.12
Front Board 9.97	CO2 Sensor 01
VOC Module A	

7. Copy and paste



By default, the application is in individual setting mode.

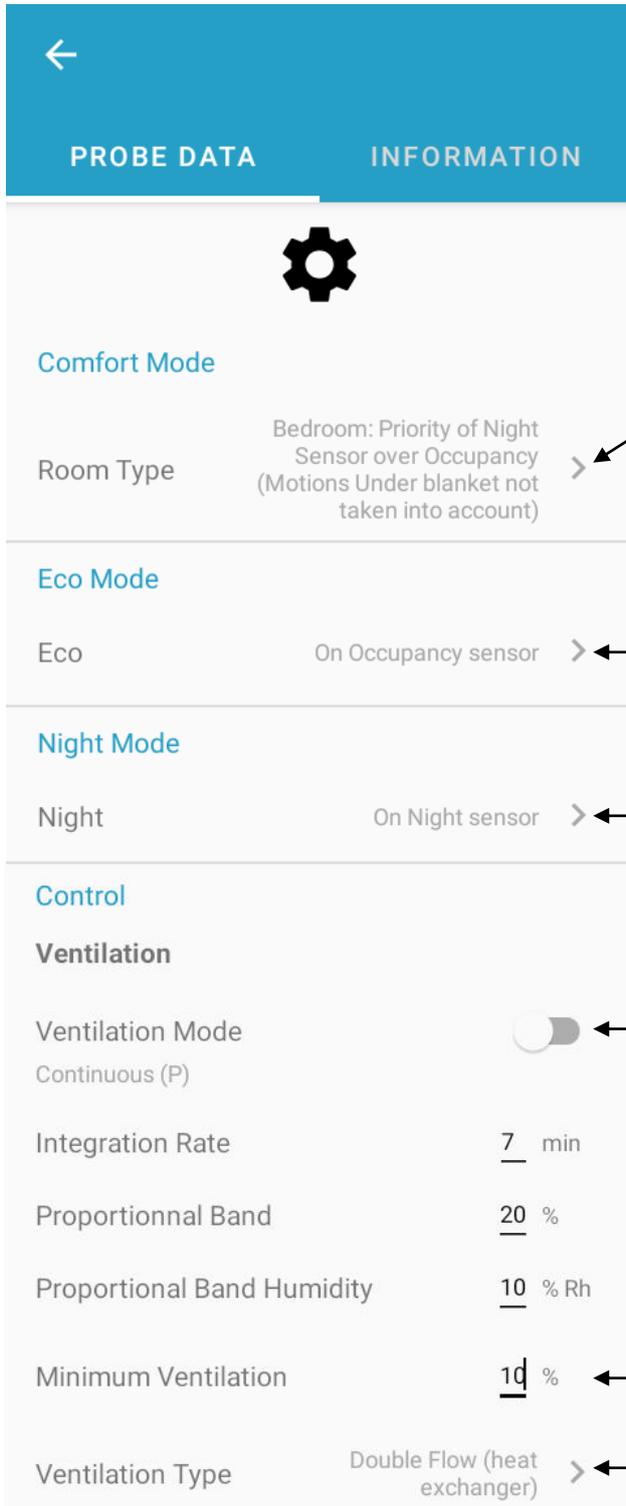
By selecting the configuration pictogram, it is possible to select a copying mode.

This mode is used to copy the current settings to several other probes.

However, this copy does not apply to the pairings. Please note that this copy is only possible for identical models.

The bottom strip can slide from right to left

8. General Setting



←

PROBE DATA INFORMATION

⚙️

Comfort Mode

Room Type Bedroom: Priority of Night Sensor over Occupancy (Motions Under blanket not taken into account) >

Eco Mode

Eco On Occupancy sensor >

Night Mode

Night On Night sensor >

Control

Ventilation

Ventilation Mode Continuous (P)

Integration Rate 7 min

Proportional Band 20 %

Proportional Band Humidity 10 % Rh

Minimum Ventilation 10 %

Ventilation Type Double Flow (heat exchanger) >

Comfort mode is based on occupancy but there is occupancy and occupancy!!

Bedroom: Priority of Night Sensor over Occupancy (Motions Under blanket not taken into account)

Not Specific

CANCEL

CONFIRM

Choose between embedded sensor (occupancy based on CO2) or external sensor (generally PIR) of your ecosystem.

In Eco Mode (unoccupancy) setpoints are set to save energy.

Choose between embedded sensor (Light sensor with settable threshold) or external sensor (Light or clock) of your ecosystem.

In Night Mode setpoints are set to save energy.

Ventilation control can be On Off of Proportional with Proportional Integral control loop depending of your ventilation system.

If set to **PI**, integration rate and proportional band shall be set.

The proportional band for humidity is specific and must be set separately.

Minimum ventilation is recommended for the health of the building.

The type of ventilation is useful in determining the most energy efficient remediation mean to initiate when there are several.

Double Flow (heat exchanger)
 Single Flow extraction
 Single Flow insufflated (filtered)
 Natural
 None

CANCEL CONFIRM

Recycling

Recycling Mode
 Continuous (P)

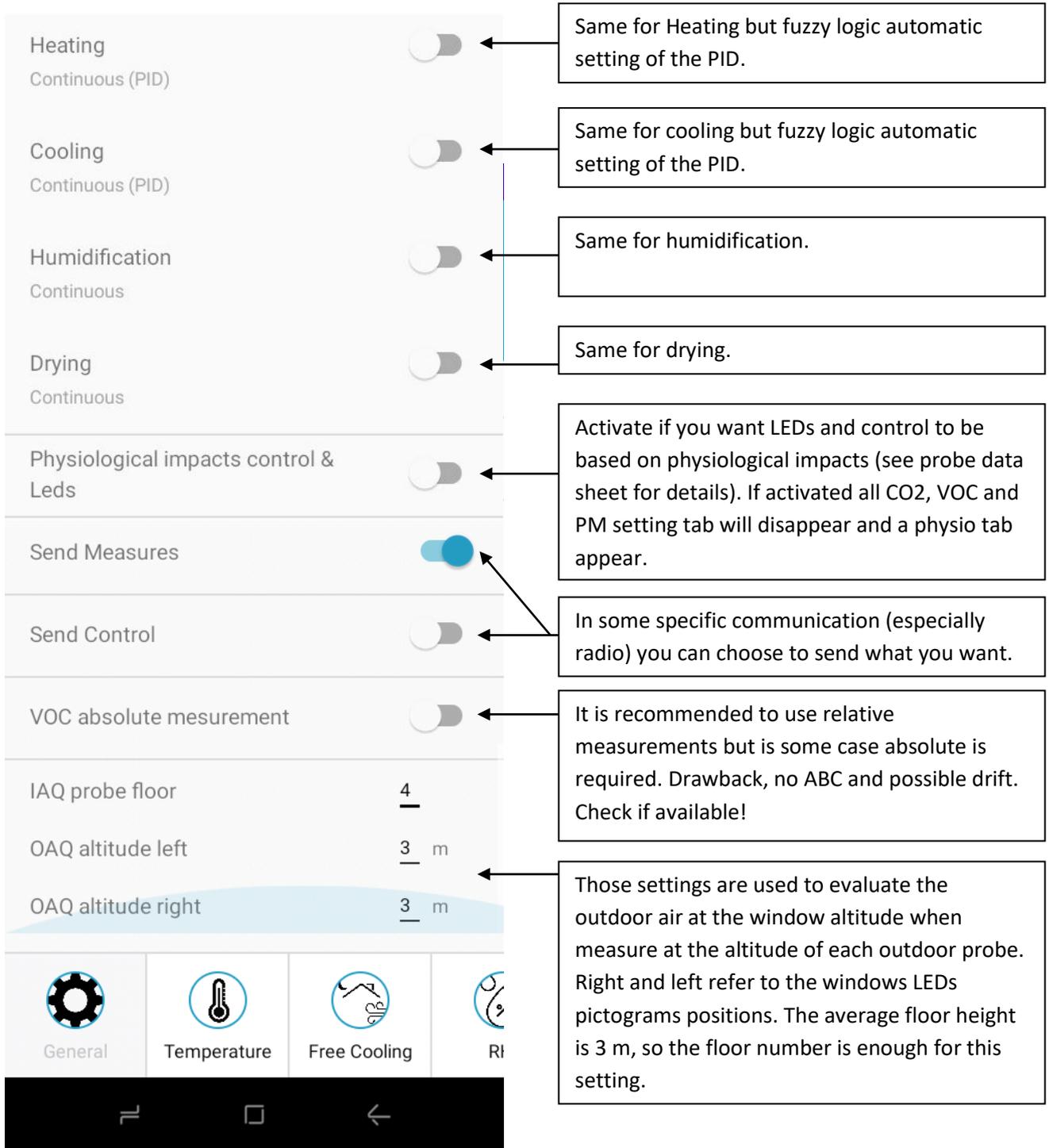
Minimum Recycling %

Recycling Remediation

Stirred CO2 PM Filtered
 VOC Reduced Odors Reduced
 Drying Mode Humidification Mode
 Sterilization

Ditto for recycling if there is any, but the recycling is only Proportional (P).

The remediation effects of recycling serve as initiating criteria versus dilution which is generally more energy intensive.

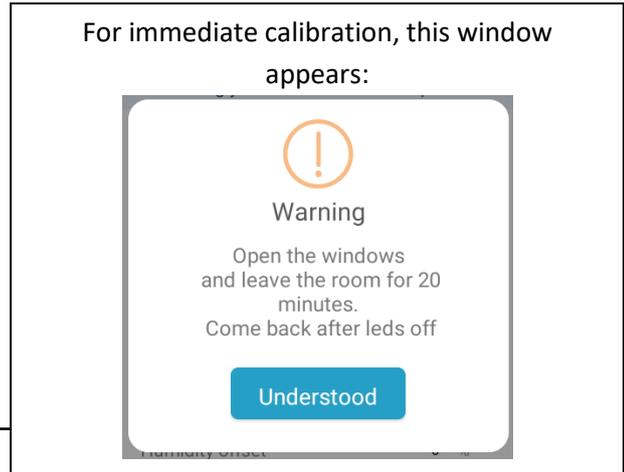
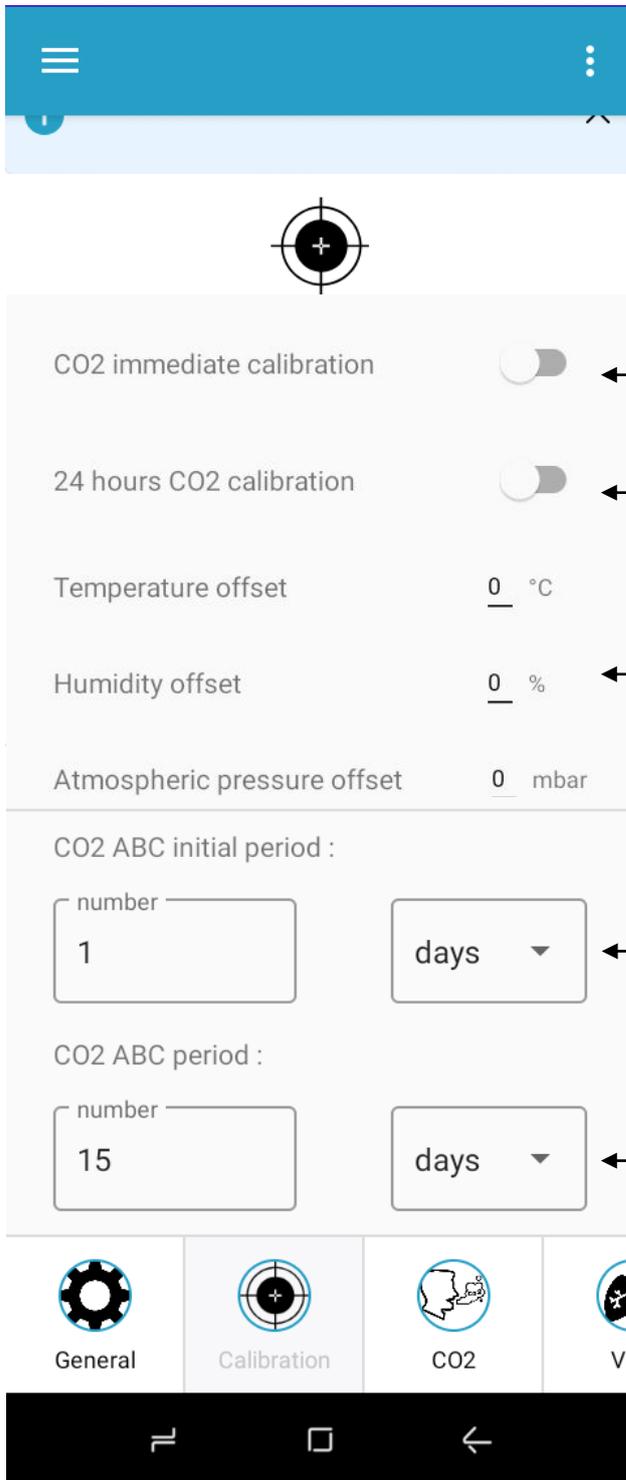


The screenshot shows a mobile application interface for controlling a system. It features a list of settings, each with a toggle switch or a numerical input field. Callout boxes provide detailed explanations for several of these settings.

- Heating** (Continuous (PID)): Toggle switch. Callout: "Same for Heating but fuzzy logic automatic setting of the PID."
- Cooling** (Continuous (PID)): Toggle switch. Callout: "Same for cooling but fuzzy logic automatic setting of the PID."
- Humidification** (Continuous): Toggle switch. Callout: "Same for humidification."
- Drying** (Continuous): Toggle switch. Callout: "Same for drying."
- Physiological impacts control & Leds**: Toggle switch. Callout: "Activate if you want LEDs and control to be based on physiological impacts (see probe data sheet for details). If activated all CO2, VOC and PM setting tab will disappear and a physio tab appear."
- Send Measures**: Toggle switch (checked). Callout: "In some specific communication (especially radio) you can choose to send what you want."
- Send Control**: Toggle switch. Callout: "It is recommended to use relative measurements but is some case absolute is required. Drawback, no ABC and possible drift. Check if available!"
- VOC absolute measurement**: Toggle switch. Callout: "It is recommended to use relative measurements but is some case absolute is required. Drawback, no ABC and possible drift. Check if available!"
- IAQ probe floor**: Input field with value 4.
- OAQ altitude left**: Input field with value 3 m.
- OAQ altitude right**: Input field with value 3 m. Callout: "Those settings are used to evaluate the outdoor air at the window altitude when measure at the altitude of each outdoor probe. Right and left refer to the windows LEDs pictograms positions. The average floor height is 3 m, so the floor number is enough for this setting."

The bottom navigation bar includes icons for General, Temperature, Free Cooling, and RI.

9. Field calibration

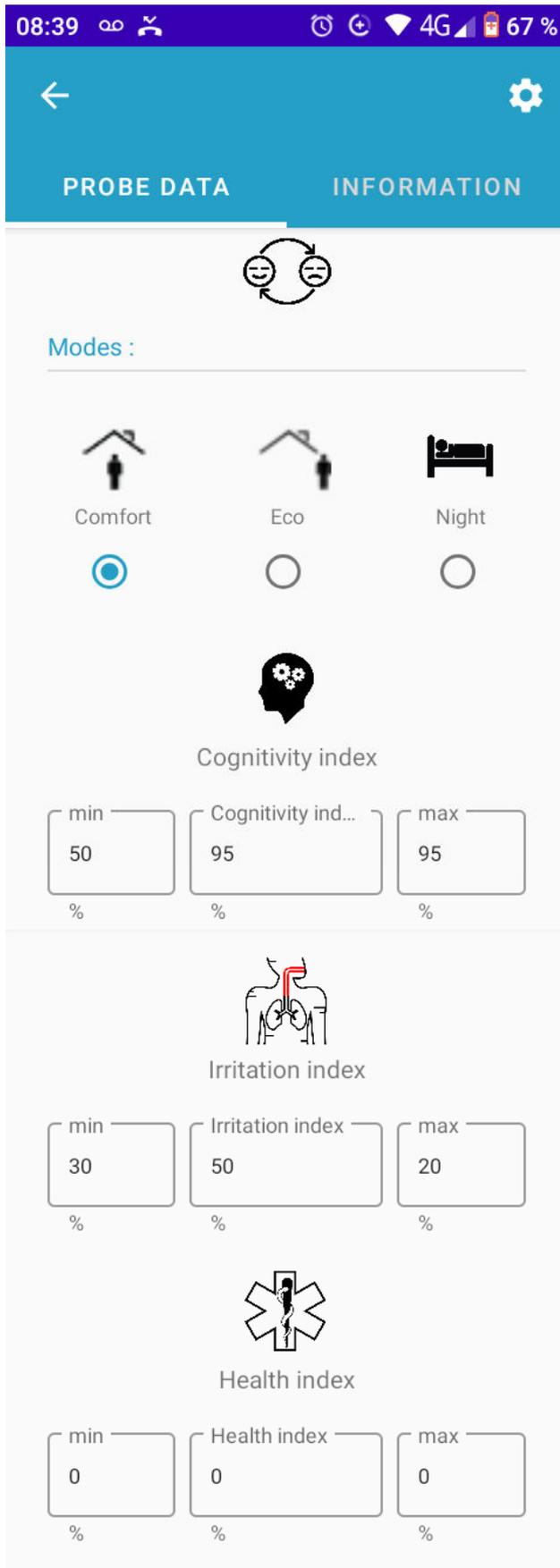


Force ABC for 24 hours, will revert to 15 days automatically. Automatic when first powered on.

Allows adjusting the temperature and humidity measurement. Useful when several sensors are installed in the same room

Allows setting the ABC (Automatic Baseline Calibration) periods of the CO2 sensor. These values are the default ones. It is not recommended to change them. The initial period must be set before the first power-up (more than 24 hours). It is then no longer accessible.

10. Physiological effects setpoints



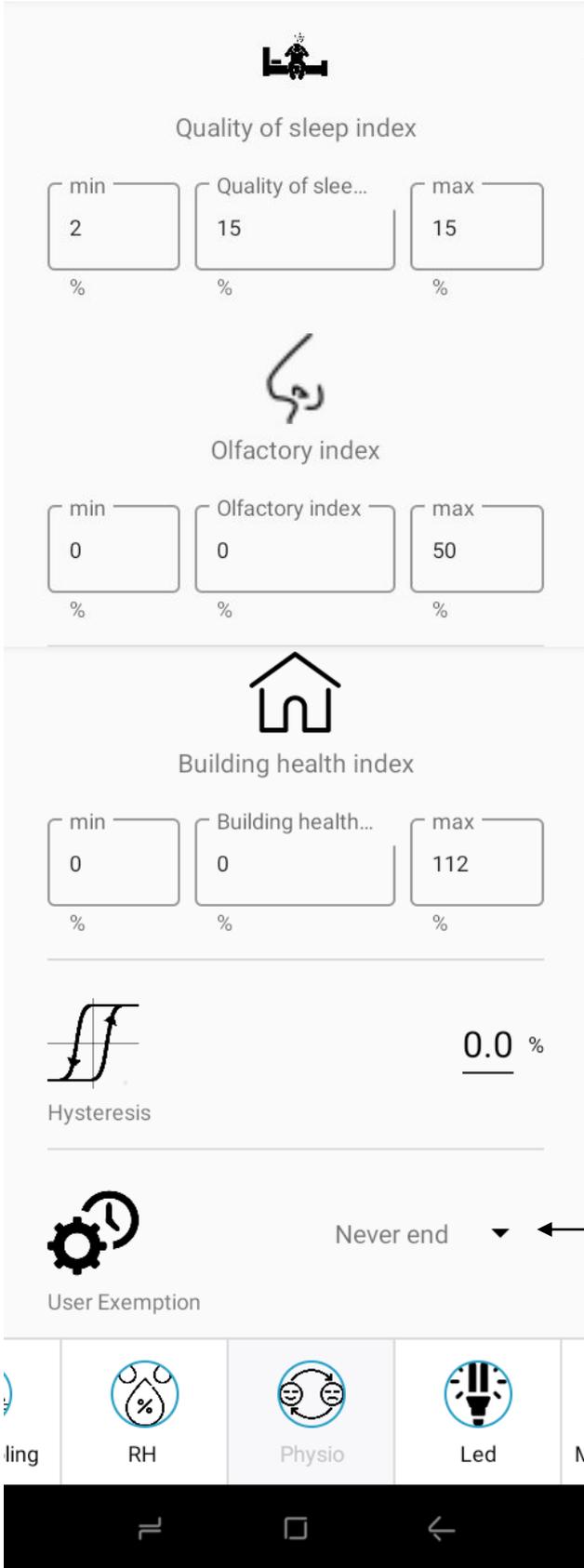
Choose the mode for which you want to apply the setting.

Cognitive functions index. Associated with productivity in the tertiary sector.

Setpoint setting during selected mode The min and max values are the authorized setting limits for users (limited by the administrator).

Respiratory tract irritation risk index.

Health index based on a conservative hypothesis of chronic exposure



The screenshot displays the following sections from top to bottom:

- Quality of sleep index:** Includes an icon of a person sleeping, a title, and three input fields for 'min' (2%), 'Quality of slee...' (15%), and 'max' (15%).
- Olfactory index:** Includes an icon of a nose, a title, and three input fields for 'min' (0%), 'Olfactory index' (0%), and 'max' (50%).
- Building health index:** Includes an icon of a house, a title, and three input fields for 'min' (0%), 'Building health...' (0%), and 'max' (112%).
- Hysteresis:** Shows a graph icon and a value of 0.0 %.
- User Exemption:** Shows a gear and clock icon and a dropdown menu currently set to 'Never end'.

At the bottom, there is a navigation bar with icons for 'ling', 'RH', 'Physio', 'Led', and 'M'. The 'Physio' icon is highlighted.

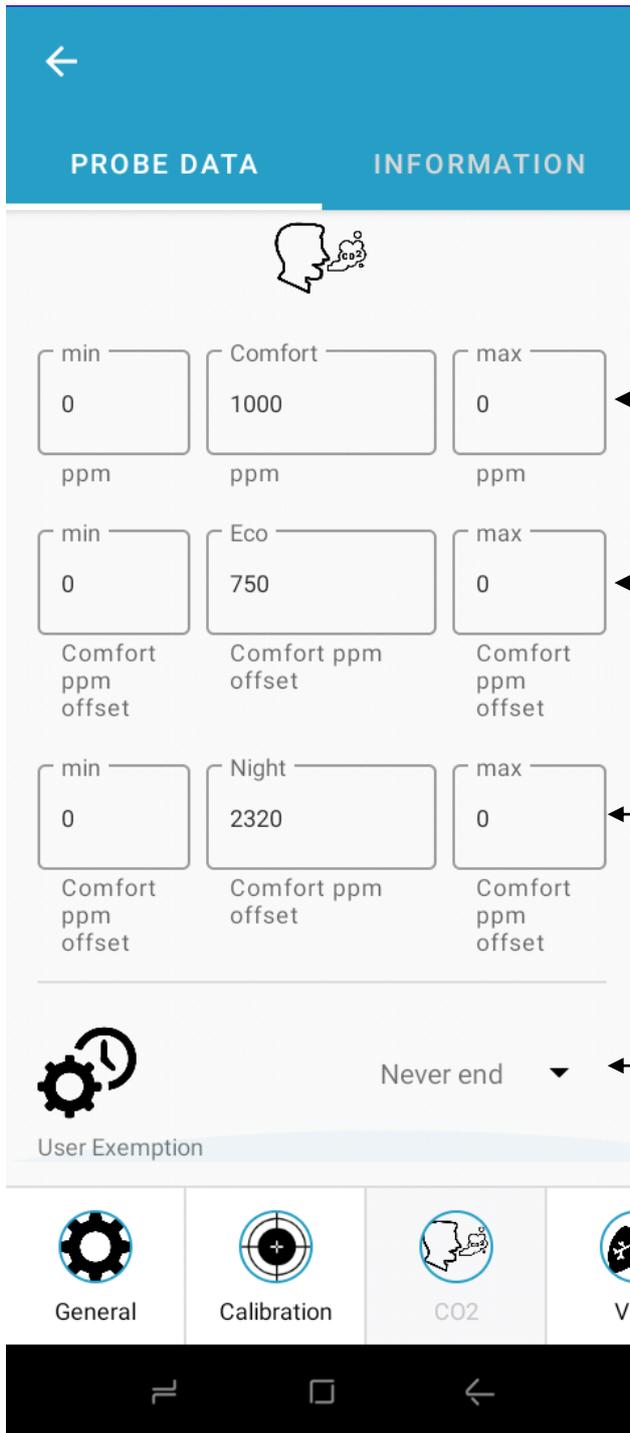
Quality of sleep index.

Olfactory discomfort index.

Health index of the building (risk of condensation, mold, dirt).

The exemptions set above by a user can be limited in time or on an event or be permanent. An event corresponds to a change of mode.

11. CO2 setpoints



Setting of the CO2 setpoint during occupancy periods (**Comfort** mode). The min and max values are the authorized setting limits for users (limited by the administrator).

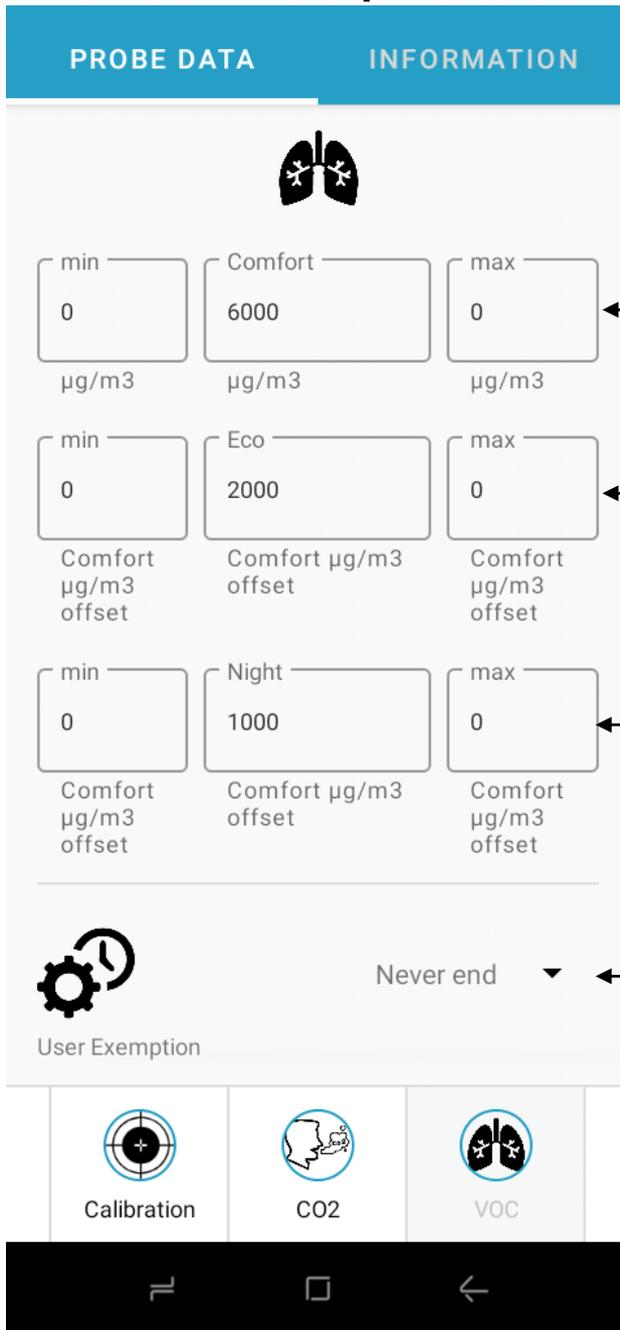
Setting of the CO2 **difference** between **Comfort** mode and **Eco** mode (unoccupied periods). The min and max values are the authorized setting limits for users.

Setting mode of the CO2 **difference** between **Comfort** and **Night** mode. The min and max values are the authorized setting limits for users.

The exemptions set above by a user can be limited in time or on an event or be permanent. An event corresponds to a change of mode.

- Never end
- On event
- 15 minutes
- 30 minutes
- 1 hour
- 2 hours
- 6 hours
- 12 hours
- 24 hours

12. VOC setpoints



Setting of the VOC setpoint during occupancy periods (**Comfort** mode). The min and max values are the authorized setting limits for users (limited by the administrator).

Setting of the VOC **difference** between **Comfort** mode and **Eco** mode (unoccupied periods). The min and max values are the authorized setting limits for users.

Setting mode of VOC **difference** between **Comfort** and **Night** mode. The min and max values are the authorized setting limits for users.

The exemptions set above by a user can be limited in time or on an event or be permanent. An event corresponds to a change of mode.

- Never end
- On event
- 15 minutes
- 30 minutes
- 1 hour
- 2 hours
- 6 hours
- 12 hours
- 24 hours

13. PM 2.5 setpoints

Setting of the PM2.5 setpoint during occupancy periods (**Comfort** mode). The min and max values are the authorized setting limits for users (limited by the administrator).

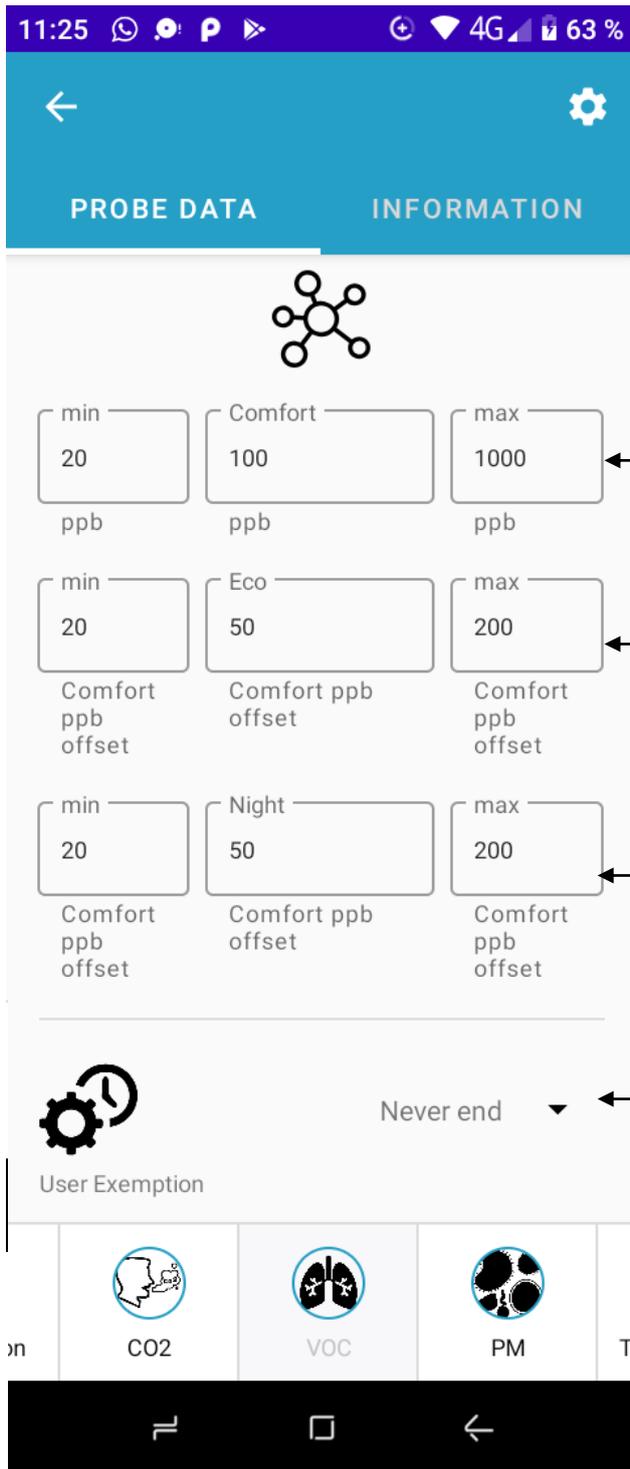
Setting of the PM2.5 **difference** between **Comfort** mode and **Eco** mode (unoccupied periods). The min and max values are the authorized setting limits for users.

Setting mode of PM2.5 **difference** between **Comfort** and **Night** mode. The min and max values are the authorized setting limits for users.

The exemptions set above by a user can be limited in time or on an event or be permanent. An event corresponds to a change of mode.

- Never end
- On event
- 15 minutes
- 30 minutes
- 1 hour
- 2 hours
- 6 hours
- 12 hours
- 24 hours

14. NOx setpoints



Setting of the NOx setpoint during occupancy periods (**Comfort** mode). The min and max values are the authorized setting limits for users (limited by the administrator).

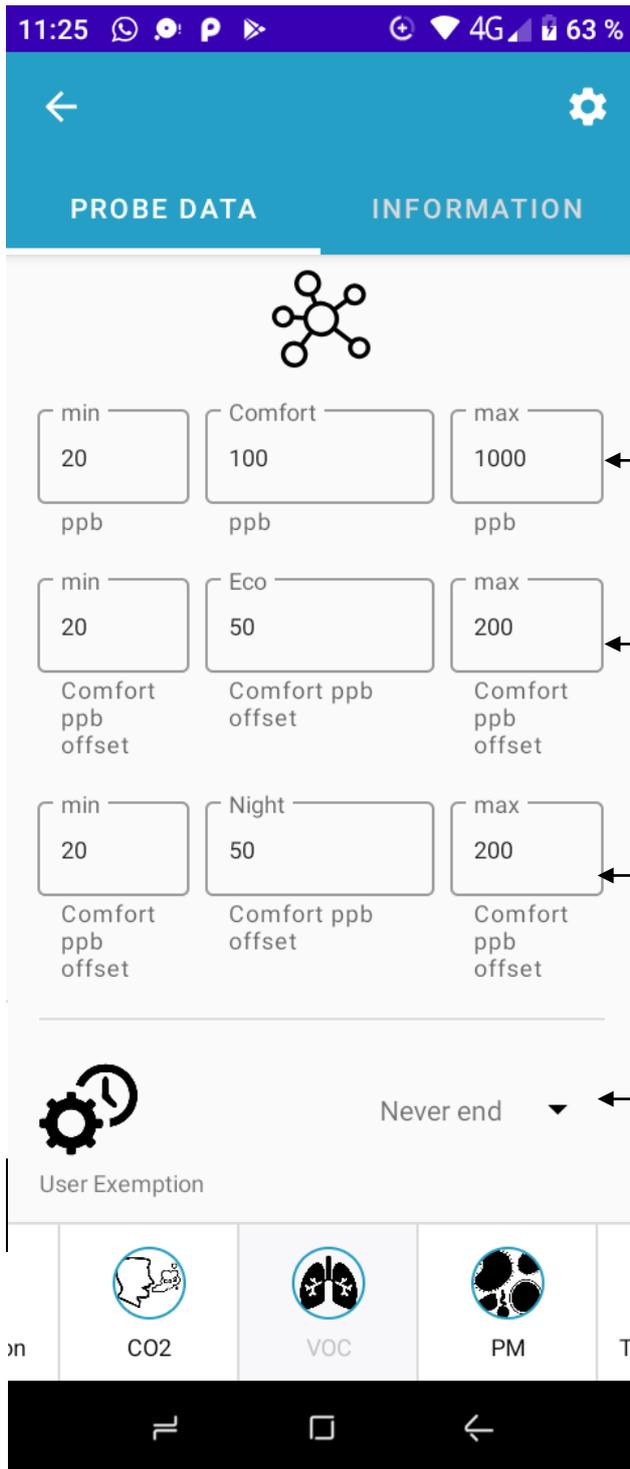
Setting of the NOx **difference** between **Comfort** mode and **Eco** mode (unoccupied periods). The min and max values are the authorized setting limits for users.

Setting mode of NOx **difference** between **Comfort** and **Night** mode. The min and max values are the authorized setting limits for users.

The exemptions set above by a user can be limited in time or on an event or be permanent. An event corresponds to a change of mode.

- Never end
- On event
- 15 minutes
- 30 minutes
- 1 hour
- 2 hours
- 6 hours
- 12 hours
- 24 hours

15. Ozone setpoints



Setting of the Ozone setpoint during occupancy periods (**Comfort** mode). The min and max values are the authorized setting limits for users (limited by the administrator).

Setting of the Ozone **difference** between **Comfort** mode and **Eco** mode (unoccupied periods). The min and max values are the authorized setting limits for users.

Setting mode of Ozone **difference** between **Comfort** and **Night** mode. The min and max values are the authorized setting limits for users.

The exemptions set above by a user can be limited in time or on an event or be permanent. An event corresponds to a change of mode.

- Never end
- On event
- 15 minutes
- 30 minutes
- 1 hour
- 2 hours
- 6 hours
- 12 hours
- 24 hours

16. Temperature settings

PROBE DATA
INFORMATION



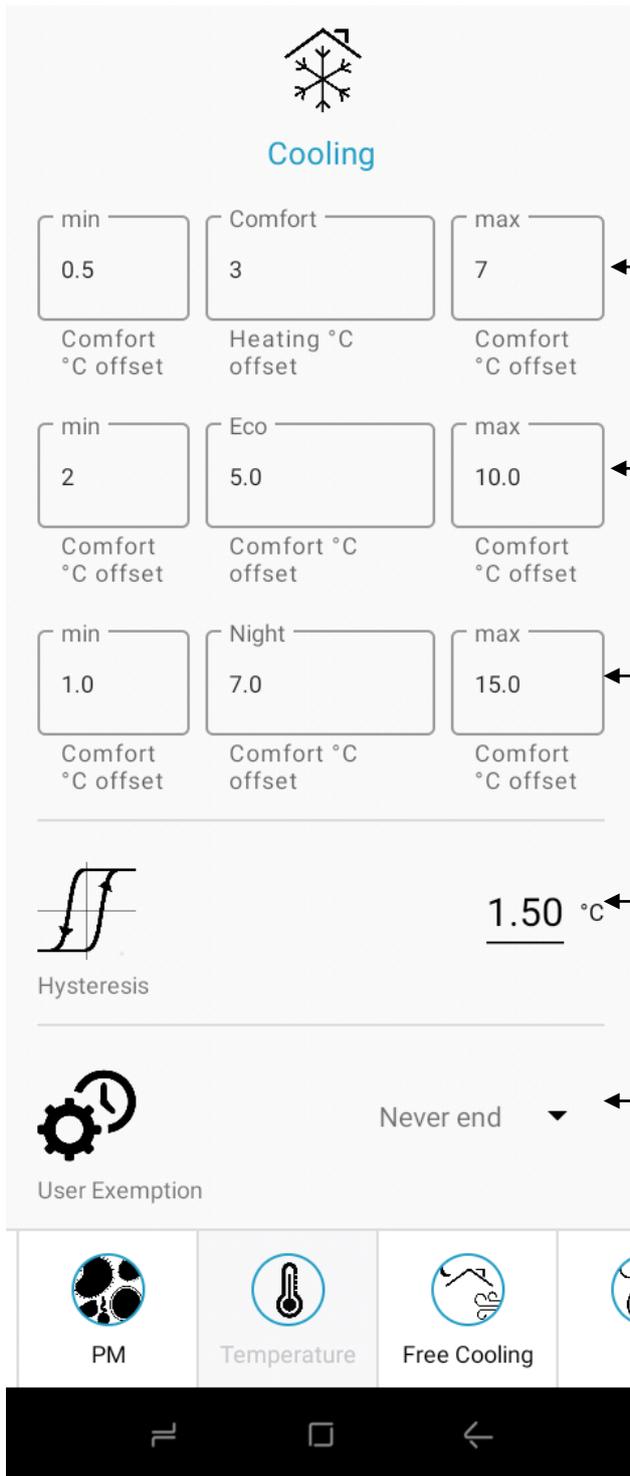
Heating

<div style="text-align: center;">min</div> <div style="text-align: center; border: 1px solid #ccc; padding: 5px; margin: 5px;">17.0</div> <div style="text-align: center;">°C</div>	<div style="text-align: center;">Comfort</div> <div style="text-align: center; border: 1px solid #ccc; padding: 5px; margin: 5px;">18.5</div> <div style="text-align: center;">°C</div>	<div style="text-align: center;">max</div> <div style="text-align: center; border: 1px solid #ccc; padding: 5px; margin: 5px;">25.0</div> <div style="text-align: center;">°C</div>
<div style="text-align: center;">min</div> <div style="text-align: center; border: 1px solid #ccc; padding: 5px; margin: 5px;">-1.0</div> <div style="text-align: center;">Comfort °C offset</div>	<div style="text-align: center;">Eco</div> <div style="text-align: center; border: 1px solid #ccc; padding: 5px; margin: 5px;">-5.0</div> <div style="text-align: center;">Comfort °C offset</div>	<div style="text-align: center;">max</div> <div style="text-align: center; border: 1px solid #ccc; padding: 5px; margin: 5px;">-10.0</div> <div style="text-align: center;">Comfort °C offset</div>
<div style="text-align: center;">min</div> <div style="text-align: center; border: 1px solid #ccc; padding: 5px; margin: 5px;">-1.0</div> <div style="text-align: center;">Comfort</div>	<div style="text-align: center;">Night</div> <div style="text-align: center; border: 1px solid #ccc; padding: 5px; margin: 5px;">-7.0</div> <div style="text-align: center;">Comfort °C</div>	<div style="text-align: center;">max</div> <div style="text-align: center; border: 1px solid #ccc; padding: 5px; margin: 5px;">-15.0</div> <div style="text-align: center;">Comfort</div>

Setting of the heating temperature setpoint during occupancy periods (**Comfort** mode). The min and max values are the authorized setting limits for users (limited by the administrator).

Setting of the **difference** of temperature between **Comfort** mode and **Eco** mode (unoccupied periods). The min and max values are the authorized setting limits for users.

Setting mode of **difference** of temperature between **Comfort** and **Night** mode. The min and max values are the authorized setting limits for users.



The interface is titled "Cooling" and features a house icon with a snowflake. It contains several input fields for temperature offsets and differences:

- Comfort zone:** min (0.5), Comfort (3), max (7). Labels: Comfort °C offset, Heating °C offset, Comfort °C offset.
- Eco mode difference:** min (2), Eco (5.0), max (10.0). Labels: Comfort °C offset, Comfort °C offset, Comfort °C offset.
- Night mode difference:** min (1.0), Night (7.0), max (15.0). Labels: Comfort °C offset, Comfort °C offset, Comfort °C offset.
- Hysteresis:** A graph icon and a value of 1.50 °C.
- User Exemption:** A gear icon and a dropdown menu currently set to "Never end".

At the bottom, there are four mode selection buttons: PM, Temperature, Free Cooling, and another partially visible button.

Comfort zone between heating and air conditioning during occupancy periods (**Comfort mode**). The min and max values are the authorized setting limits for users (limited by the administrator).

Setting of the **difference** of temperature between **Comfort mode** and **Eco mode** (unoccupied periods). The min and max values are the authorized setting limits for users.

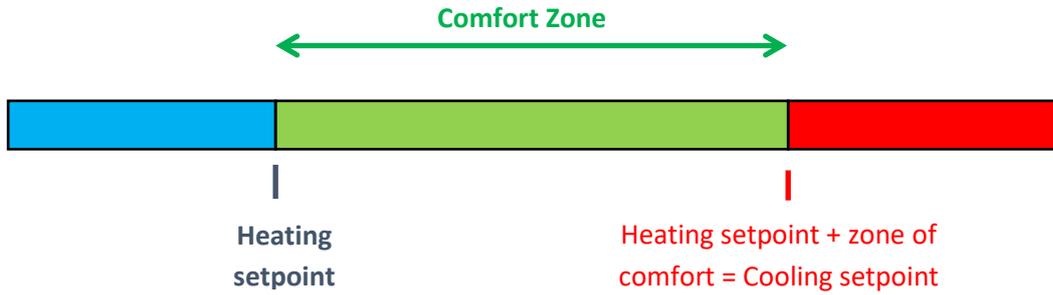
Setting mode of **difference** of temperature between **Comfort** and **Night mode**. The min and max values are the authorized setting limits for users.

Hysteresis setpoint for air conditioning controlled in On/Off (On/Off setting made in "General setting")

The exemptions set above by a user can be limited in time or on an event or be permanent. An event corresponds to a change of mode.

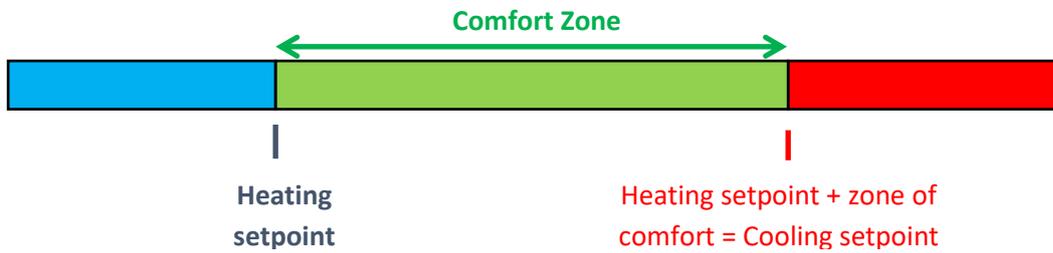
- Never end
- On event
- 15 minutes
- 30 minutes
- 1 hour
- 2 hours
- 6 hours
- 12 hours
- 24 hours

From this setpoint temperatures, the comfort zone between heating and cooling can be determined. The minimum value is 2 °C to avoid any simultaneous triggering related to the thermal inertia.

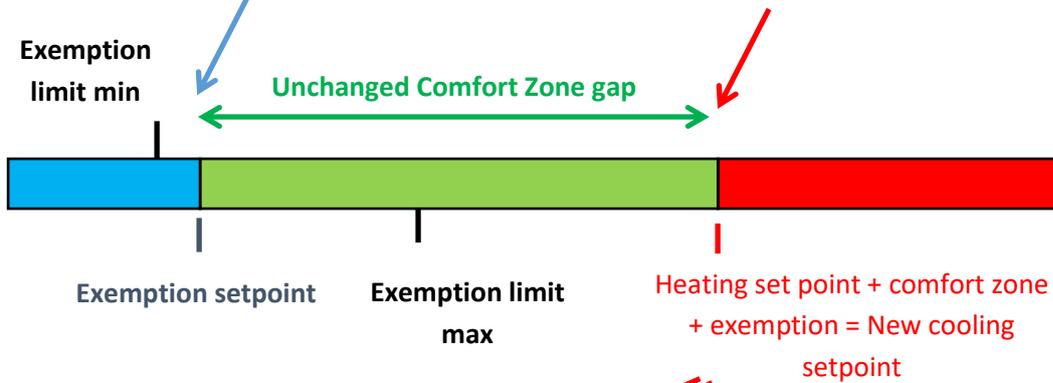


Exemption: It is possible to set a value via NFC to override manually the nominal setpoint. Exceptions are instructions of users in °C to change the low and high values of thermal comfort zone.

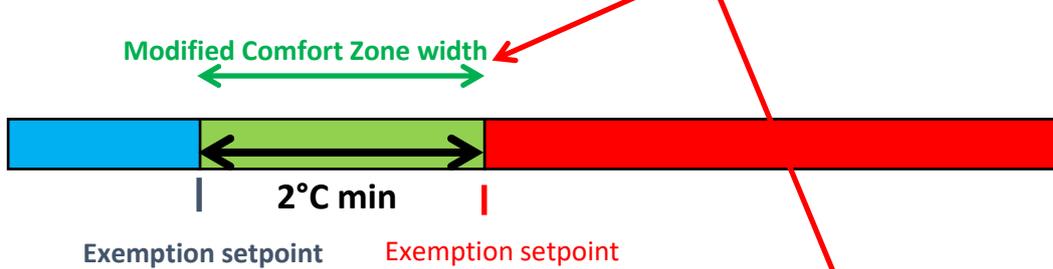
It is possible to limit this exemption by completing the setpoint values limits.



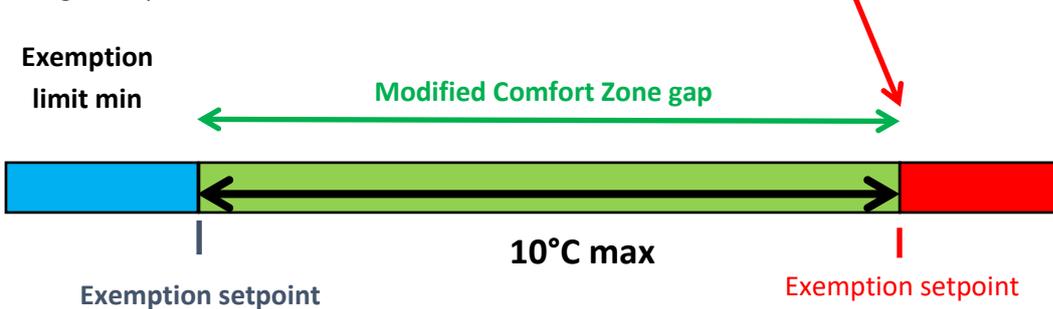
Heating exemption:



Cooling exemption min:

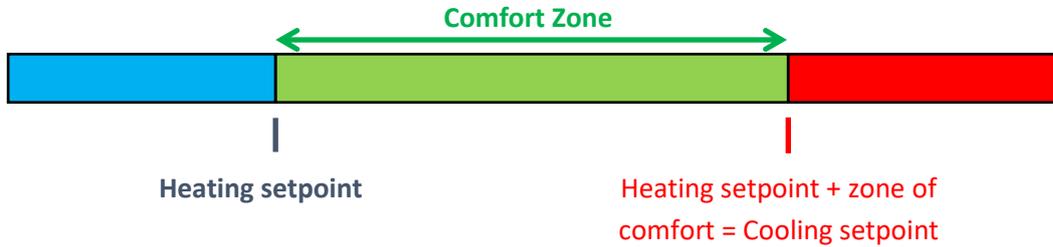


Cooling exemption max:

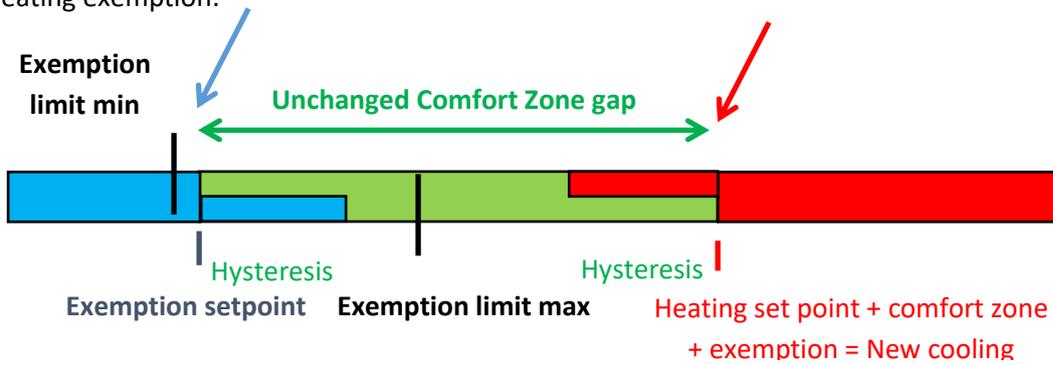


Attention, at least 2°C and at most 10°C must be kept between the exemption limit values. (New comfort zone). **The user will have his exemptions limited automatically.**

In **On Off** mode, hysteresis are limited by exemptions as follow:

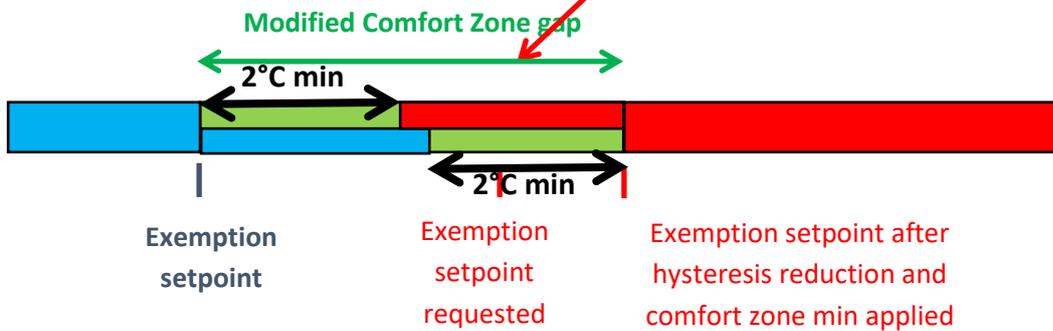


Heating exemption:

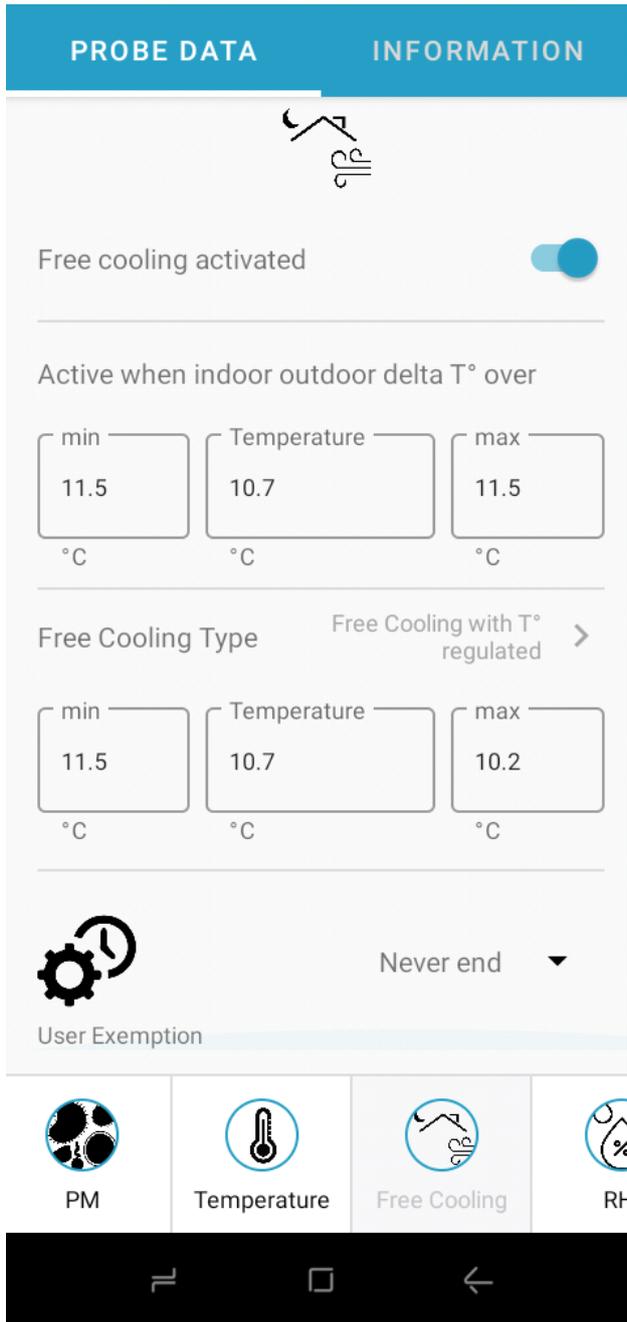


Cooling exemption min:

The exemption reduces the hysteresis up to 0.5°C min symmetrically and, if it is insufficient, the comfort zone up to 2°C min between hysteresis limits and setpoints.



17. Free cooling setting



The screenshot displays the 'INFORMATION' tab of the NanoSense app. At the top, there are two tabs: 'PROBE DATA' and 'INFORMATION'. Below the tabs, there is a toggle switch for 'Free cooling activated' which is currently turned on. Underneath, there are two sections for temperature settings. The first section, 'Active when indoor outdoor delta T° over', has three input fields: 'min' (11.5 °C), 'Temperature' (10.7 °C), and 'max' (11.5 °C). The second section, 'Free Cooling Type', also has three input fields: 'min' (11.5 °C), 'Temperature' (10.7 °C), and 'max' (10.2 °C). Below these is a 'User Exemption' dropdown menu set to 'Never end'. At the bottom, there is a navigation bar with four icons: PM, Temperature, Free Cooling (which is highlighted), and RH.

Activating free cooling will disengage the heat exchanger of the double flow ventilation during summer nights when the outdoor air is colder than the indoor air.

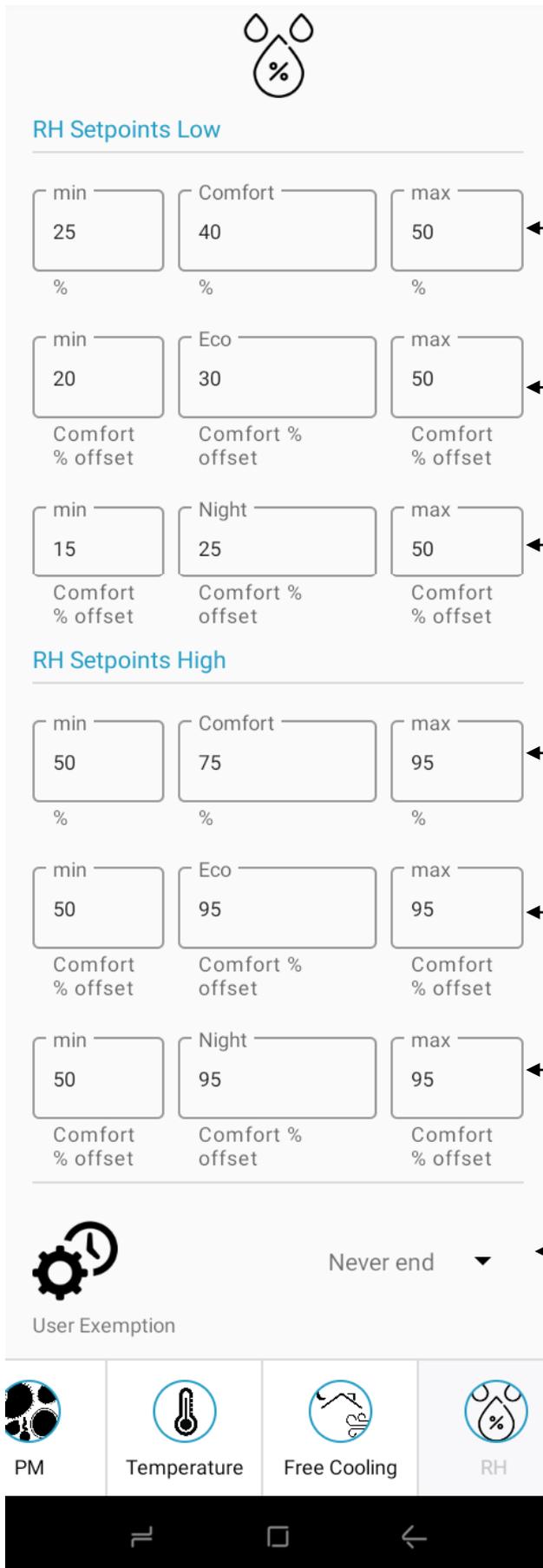
Adjustment of the delta temperature. The min and max values are the authorized setting limits for users (limited by the administrator). The inertia of the building retained this freshness for part of the next day.

As long as the temperature difference set previously exists, the ventilation is either at fixed speed (adjustable in% of the nominal) or variable to reach a set temperature. The min and max values are the authorized setting limits for users (limited by the administrator).

The exemptions set above by a user can be limited in time or on an event or be permanent. An event corresponds to a change of mode.

- Never end
- On event
- 15 minutes
- 30 minutes
- 1 hour
- 2 hours
- 6 hours
- 12 hours
- 24 hours

18. Humidity setpoints



The interface is titled "RH Setpoints Low" and "RH Setpoints High". It features a grid of input fields for setting humidity levels. Each row represents a different mode or condition, with columns for minimum, target, and maximum values, and a "Comfort % offset" field. At the bottom, there is a "User Exemption" section with a "Never end" dropdown menu. A navigation bar at the very bottom shows icons for PM, Temperature, Free Cooling, and RH.

Mode	min (%)	Target (%)	max (%)	Comfort % offset
Low - Comfort	25	40	50	
Low - Eco	20	30	50	
Low - Night	15	25	50	
High - Comfort	50	75	95	
High - Eco	50	95	95	
High - Night	50	95	95	

Setting of the high level humidity setpoint during occupancy periods (**Comfort** mode). The min and max values are the authorized setting limits for users (limited by the administrator).

Setting of the **difference** of humidity between **Comfort** mode and **Eco** mode (unoccupied periods). The min and max values are the authorized setting limits for users.

Setting mode of **difference** of humidity between **Comfort** and **Night** mode. The min and max values are the authorized setting limits for users.

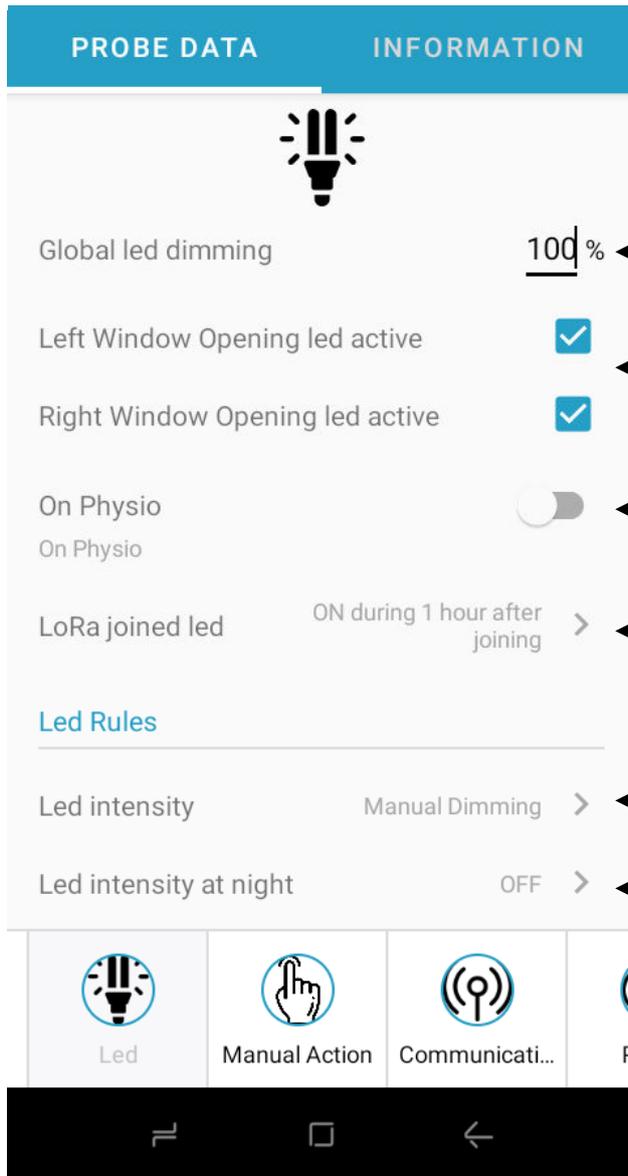
Setting of the low level humidity setpoint during occupancy periods (**Comfort** mode). The min and max values are the authorized setting limits for users (limited by the administrator).

Setting of the **difference** of humidity between **Comfort** mode and **Eco** mode (unoccupied periods). The min and max values are the authorized setting limits for users.

Setting mode of **difference** of humidity between **Comfort** and **Night** mode. The min and max values are the authorized setting limits for users.

The exemptions set above by a user can be limited in time or on an event or be permanent. An event corresponds to a change of mode.

LEDs settings



General dimming setting of the front panel LEDs.

Setting the activation of the right or left LEDs indicating the opportunity to open the windows on the street and on the back yard.

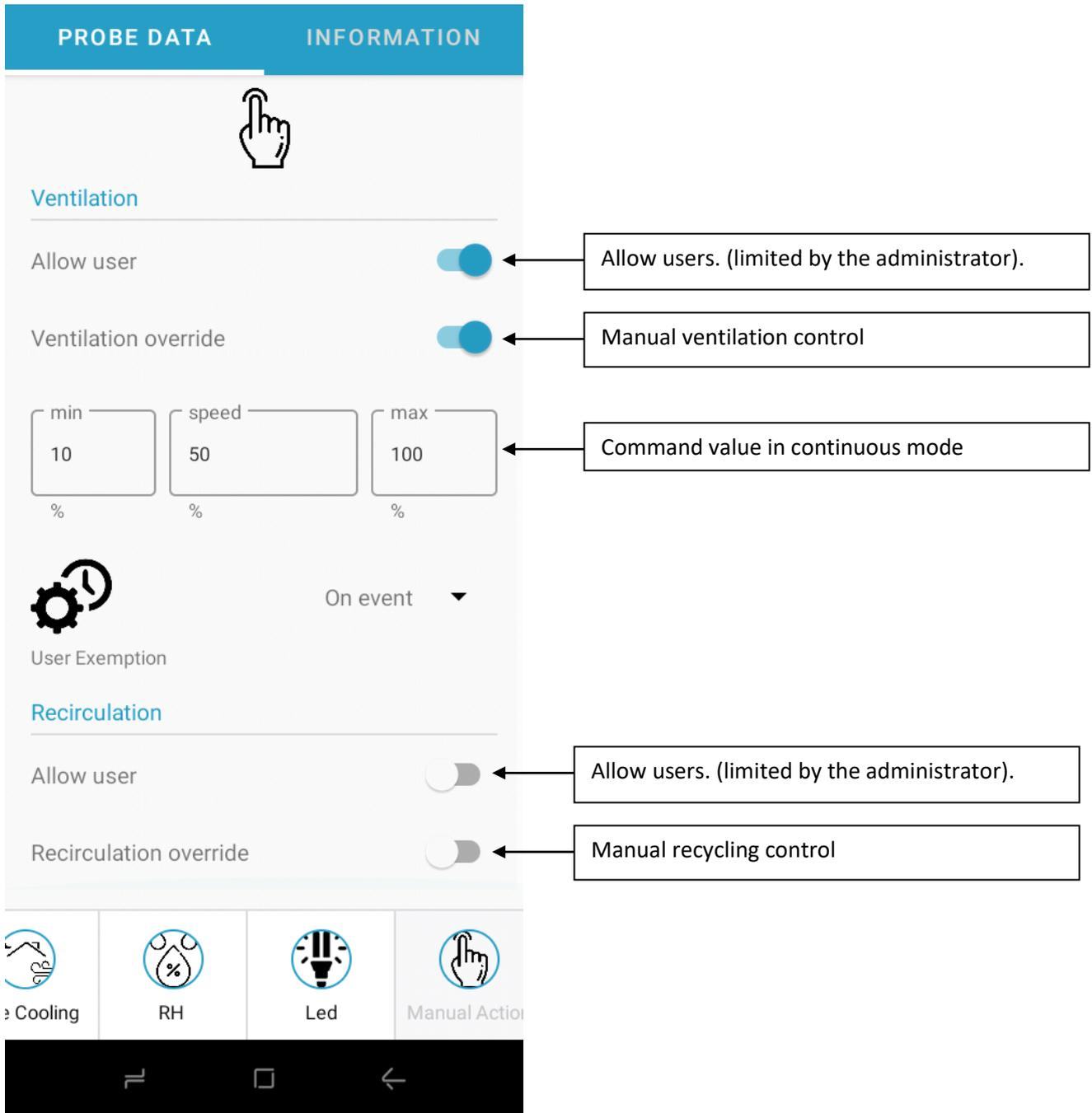
LED window management according to WELL V2 or IAQ / OAQ comparison via physiological effects.

For LoRaWAN versions only.

Activation of LEDs during the night (On or Off).

If activated at night, intensity level.

20. Manual overrides



The screenshot shows the 'INFORMATION' tab of the NanoSense interface. A hand icon points to the 'INFORMATION' tab. The interface is divided into two main sections: 'Ventilation' and 'Recirculation'.

Ventilation Section:

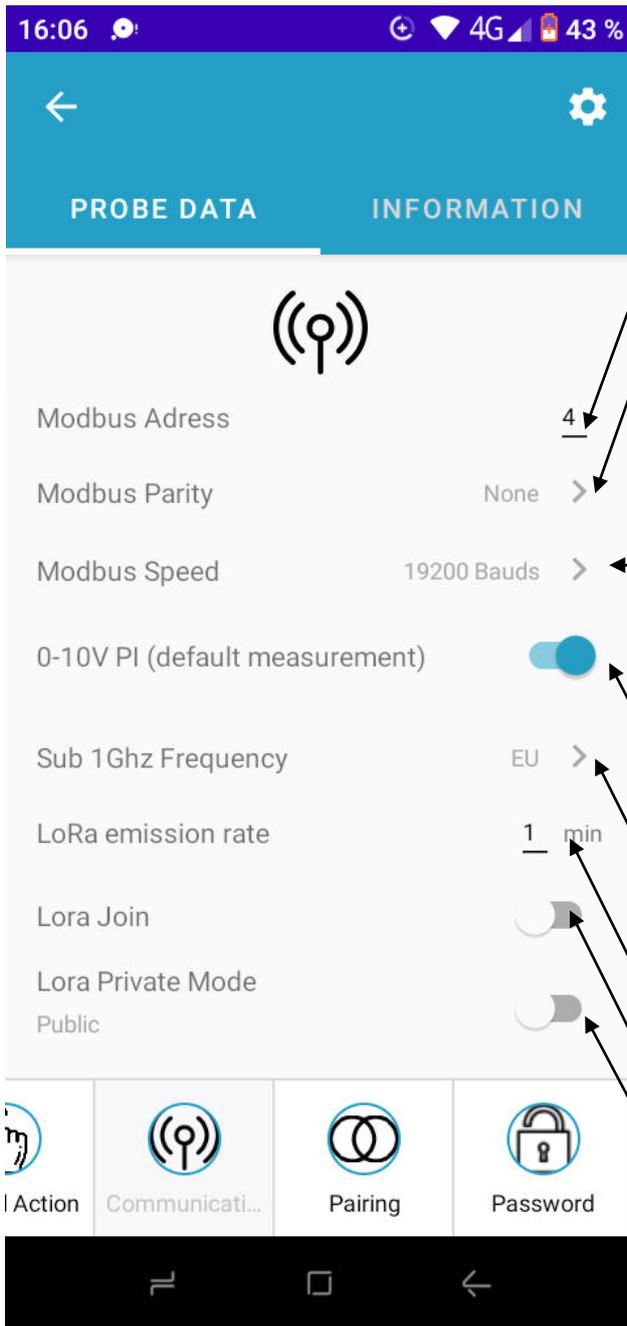
- 'Allow user' is a toggle switch that is turned on. Callout: "Allow users. (limited by the administrator)."
- 'Ventilation override' is a toggle switch that is turned on. Callout: "Manual ventilation control"
- Below these are three input fields: 'min' (10%), 'speed' (50%), and 'max' (100%). Callout: "Command value in continuous mode"
- 'User Exemption' is a gear icon with a clock, and 'On event' is a dropdown menu.

Recirculation Section:

- 'Allow user' is a toggle switch that is turned off. Callout: "Allow users. (limited by the administrator)."
- 'Recirculation override' is a toggle switch that is turned off. Callout: "Manual recycling control"

At the bottom, there is a navigation bar with four icons: Cooling, RH, Led, and Manual Action (highlighted). Below the navigation bar is an Android-style navigation bar with back, home, and recent apps buttons.

21. Communication settings



Setting the bus address (Modbus probe version).

Parity setting.

Bus speed setting.

- 1200 Bauds
- 2400 Bauds
- 4800 Bauds
- 9600 Bauds
- 19200 Bauds
- 38400 Bauds
- 56700 Bauds

CANCEL CONFIRM

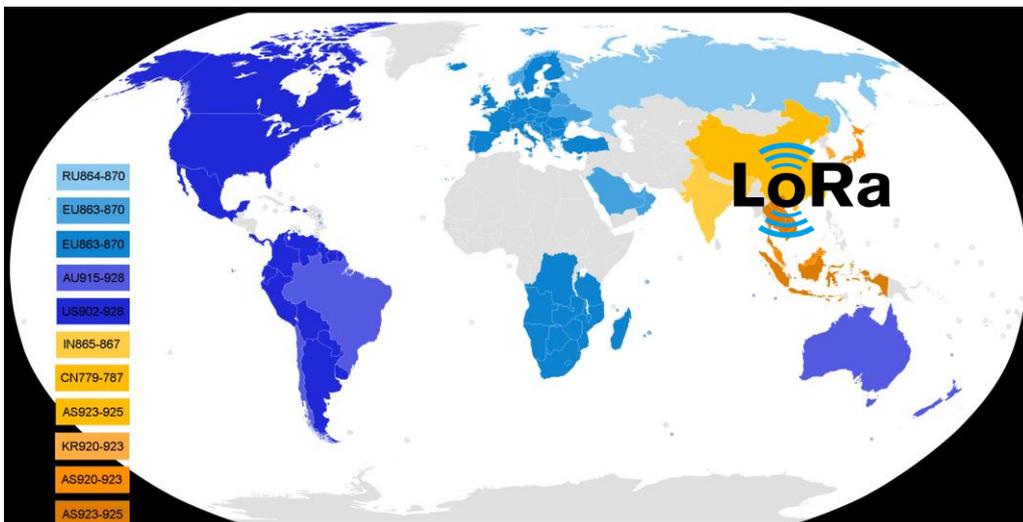
Selection 0-10V output on measurements or PI.

Choose the region because the modulation, power and frequency bands are specific to local regulations. Applies to LoRa as well as EnOcean.

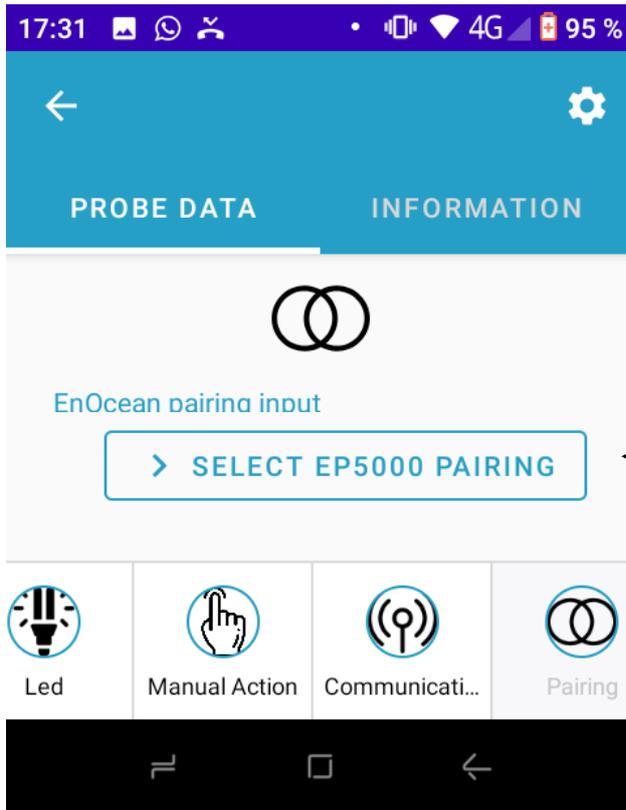
LoRa emission rate.

Manual launch of a LoRa join.

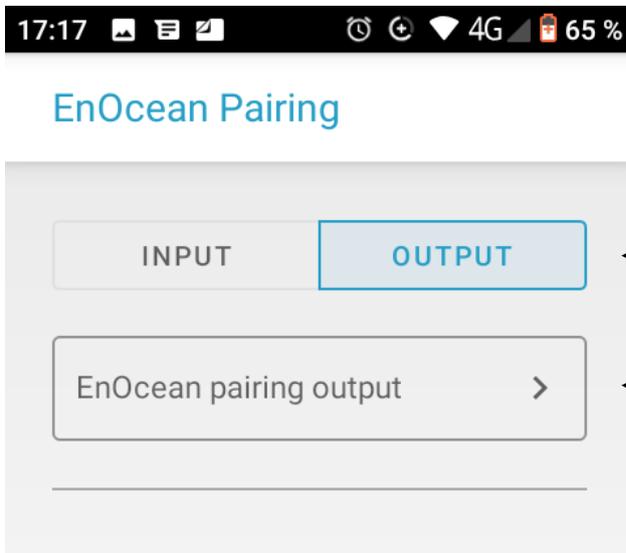
Private or public LoRa mode.



22. EnOcean Pairing



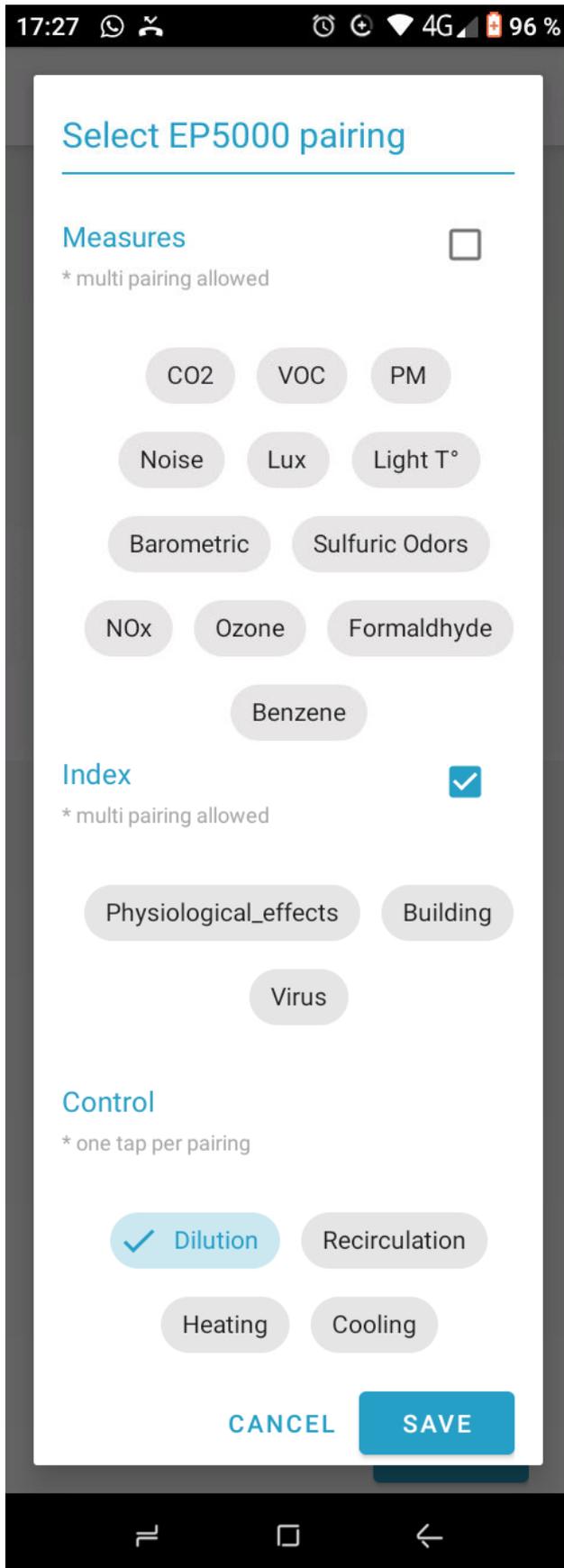
Paired telegrams list empty.
Select the EnOcean pairings.



Choose between incoming and outgoing pairing.

Pressing this key takes you to the following window.

22.1. Emitted EnOcean telegrams

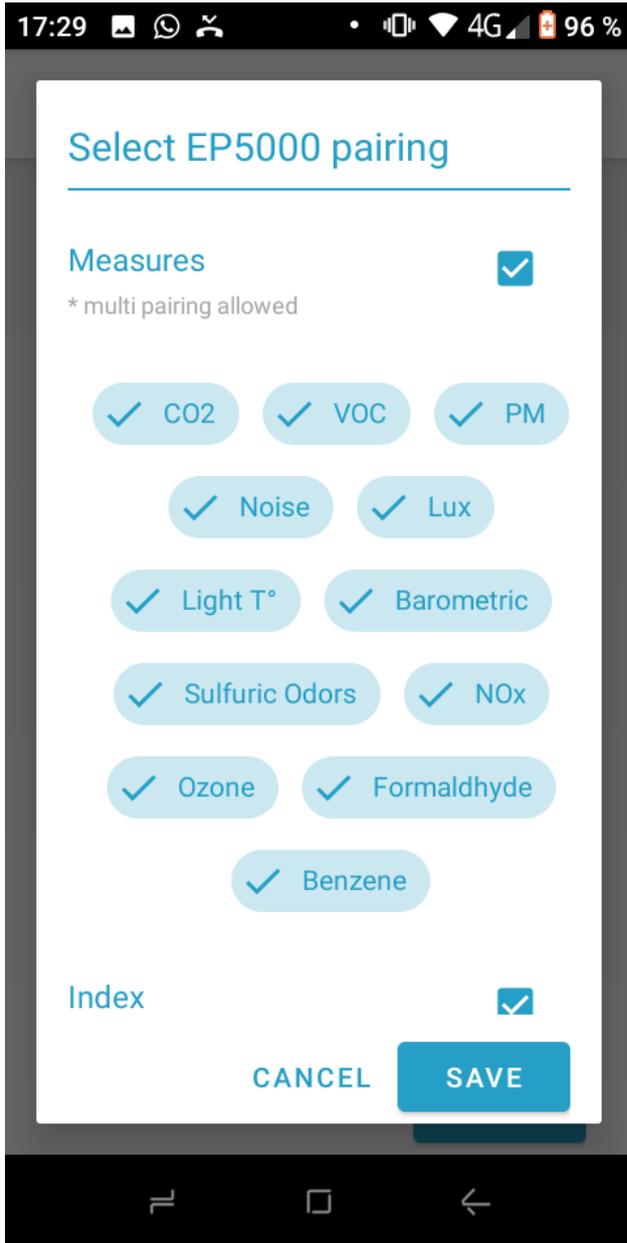


This window offers all the EnOcean (EEP) profiles that can be paired.

The measurements, for example, can all be selected together for multiple pairing. In this case the probe will send each telegram a few seconds apart indicating the RORG (the identification of the EEP).

Ditto for indexes (physiological effects, etc.) which can benefit from a multi-pairing.

For control commands, they must be paired one by one.



Example of multiple pairing selection.

Pressing SAVE goes to the next page.

EnOcean Pairing

INPUT
OUTPUT

EnOcean pairing output

CO2; VOC; PM; Noise; Lux;
Light T°; Barometric; Sulfuric
Odors; NOx; Ozone;
Formaldehyde; Benzene; >

✕

CO2

D2-04-08 | CO2
(5000ppm) + T° + RH
+ day/night +
autonomy

✕

VOC

A5-09-05 | VOC

✕

PM

A5-09-07 | PM1,
PM2.5, PM10

✕

Noise

A5-13-11 | Noise

✕

Lux

A5-07-03 | Lux

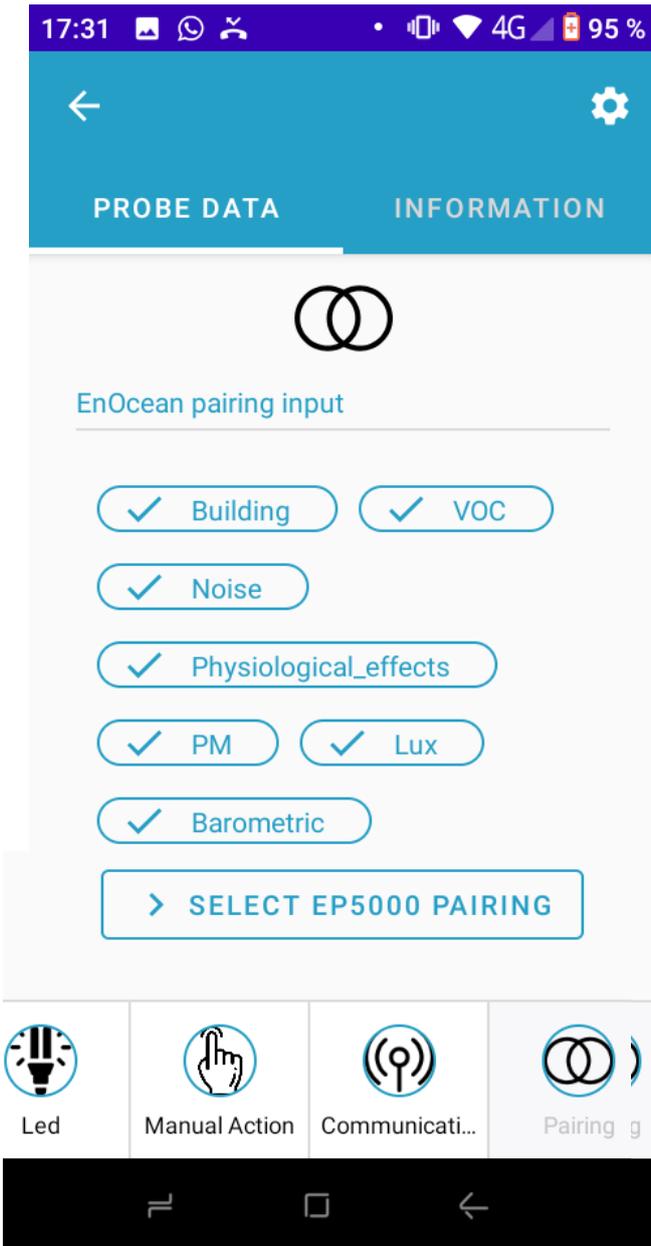
DISMISS
SAVE

List of the choice of elements that will be paired. A click allows you to change this choice and return to the previous page.

In EnOcean there are several profiles from which to choose depending on the ecosystem. Most measurements have only one possible EEP with the exception of CO2, but each EEP is listed for clarity.

The red cross is used to deselect an EEP from the list.

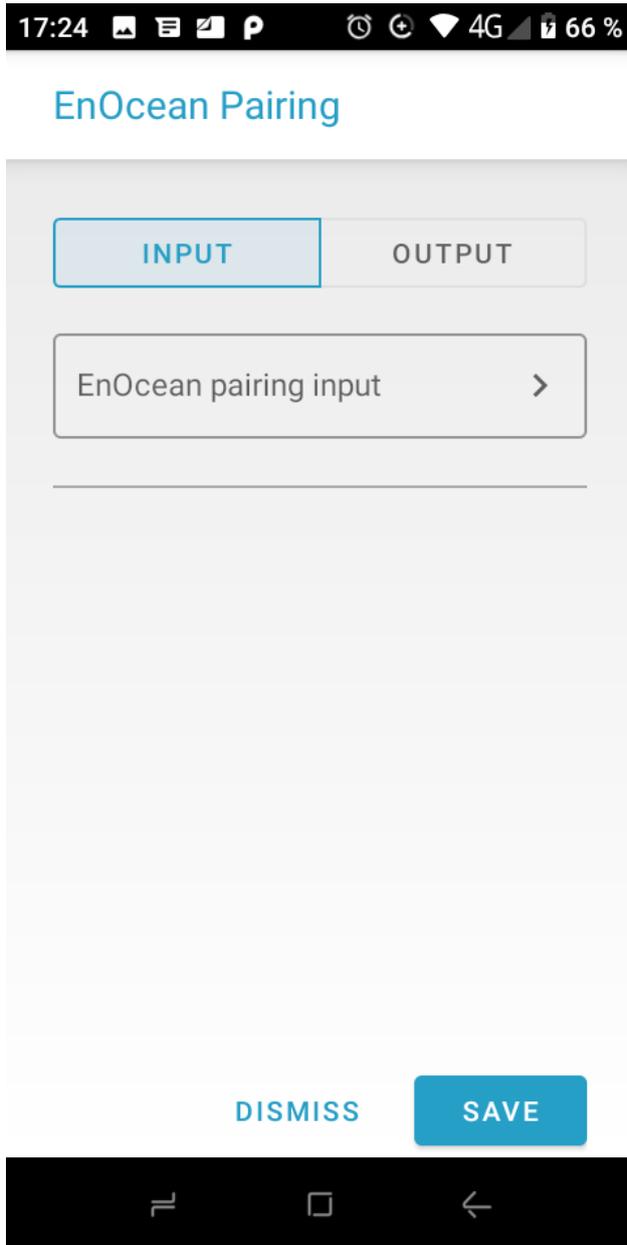
Pressing SAVE starts the pairings and the window returns to the beginning of the pairing process with the list of paired telegrams.



EnOcean pairing menu with the list of already paired telegrams.

Select EnOcean pairing to continue pairing.

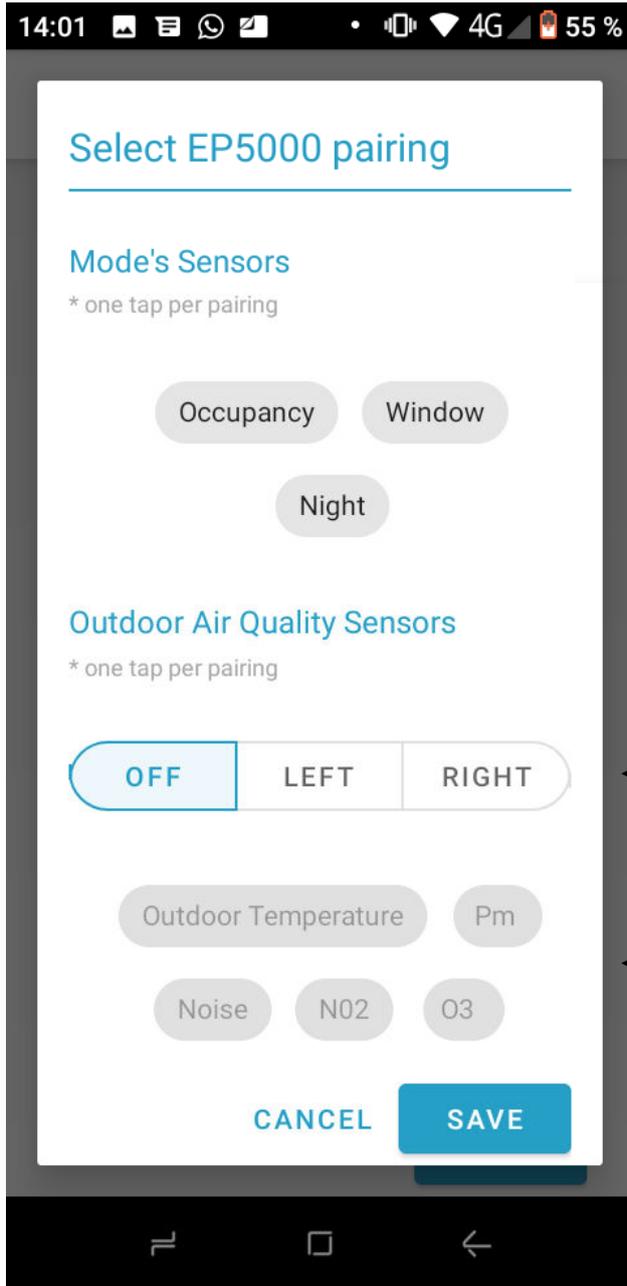
22.2. Received EnOcean telegrams



Choosing inbound pairing allows you to pair the occupancy and window sensors to determine an operating mode for the control functions.

Pressing this key takes you to the following window.

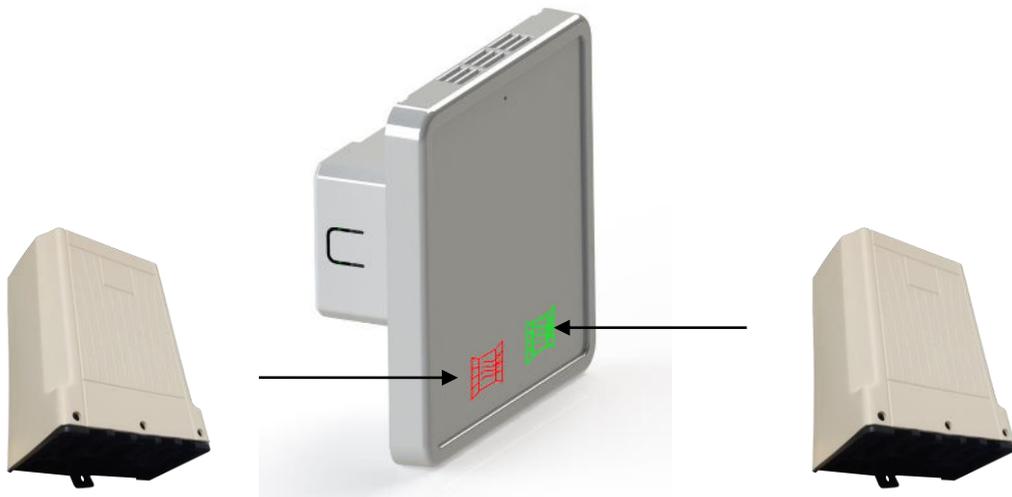
**TAP THE
NFC FOR
EACH
PAIRING**



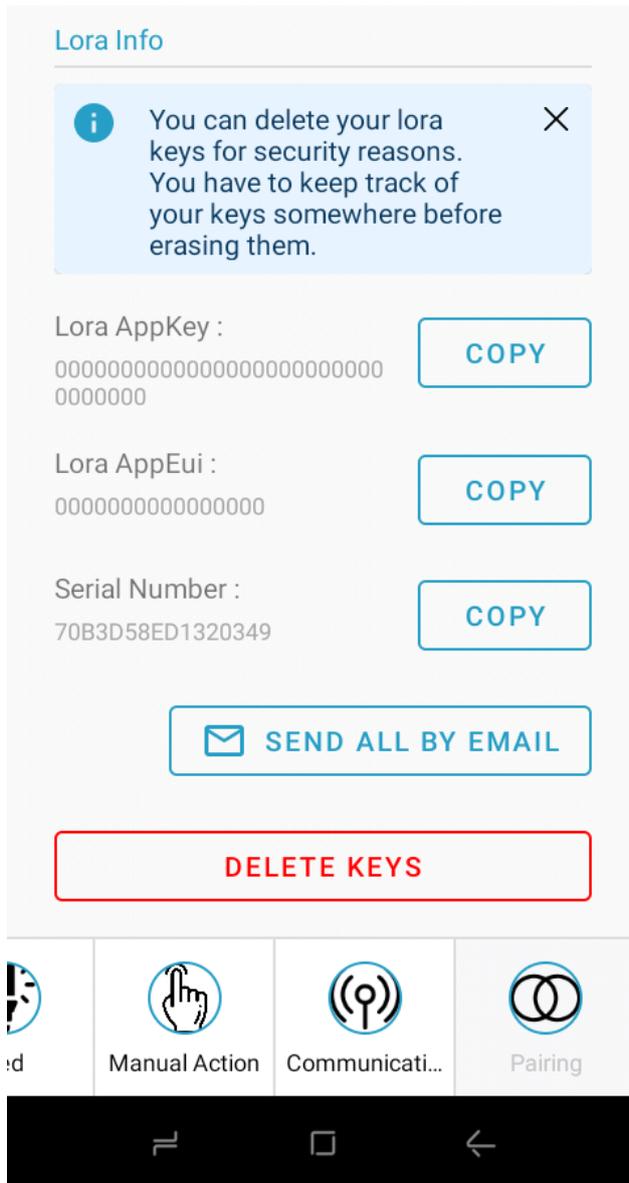
Choose one of the types of sensor associated with the modes:
 Occupancy for Eco mode
 Night sensor for Night mode
 Windows to cut off ventilation and heating or cooling when opened.

Choose the outdoor air quality sensor corresponding to the display on the front panel.
 If looking at the EP5000 probe, the street is on the right, select right for the OAQ probe on the street side.

The right or left choice will select all the boxes because the pairing of a OAQ probe is done by a single press on the outside probe side.



23. LoRa Pairing

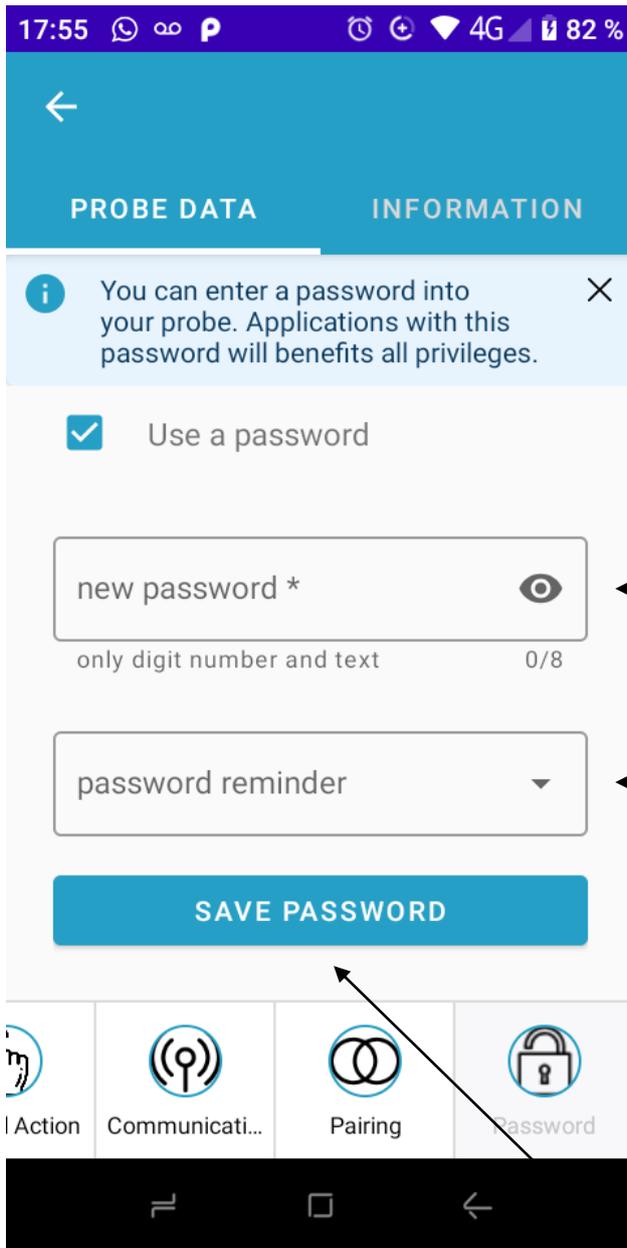


← Secret LoRaWAN keys. The copy makes it possible to save them on a platform or a gateway via the smartphone.

← It is best to keep track of keys by sending them by Email, provided the smartphone has the corresponding software.

← Once the recording is complete and tested, it is possible to erase the keys from the memory accessible by NFC. However, they are only accessible to the administrator, so deletion is not essential. In this case, it is imperative to use a password which will be recorded in the probe.

24. Password



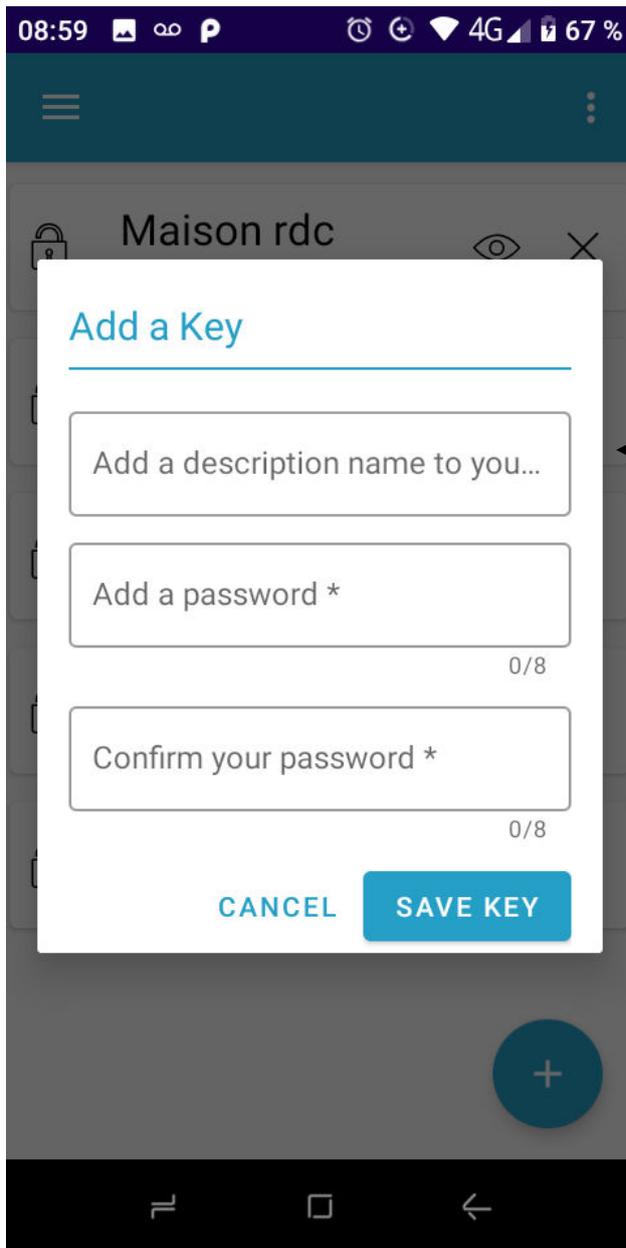
Enter a password here (8 characters max). Once a password is entered, users without a password are considered regular users without privilege and will be limited to the allowed settings.

Select one of the following hint to remember the password:

- Mon's birthday
- Dad's birthday
- Favorite cake
- Favorite city
- City of birth
- Mon Birthday
- Grand pa First name
- Grand Ma first name
- Favorite book
- Favorite actress
- Favorite actor
- First car
- First dog's name
- Favorite country
- Favorite place
- Favorite cereal brand

Save Password
Once saved, the following page opens to record the alias of the probe in the password memento.

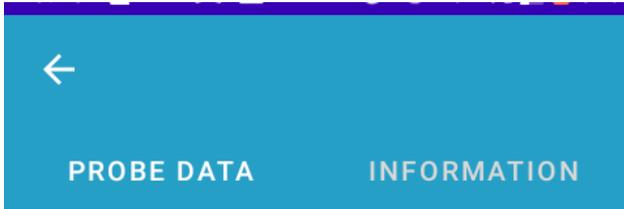
25. Alias



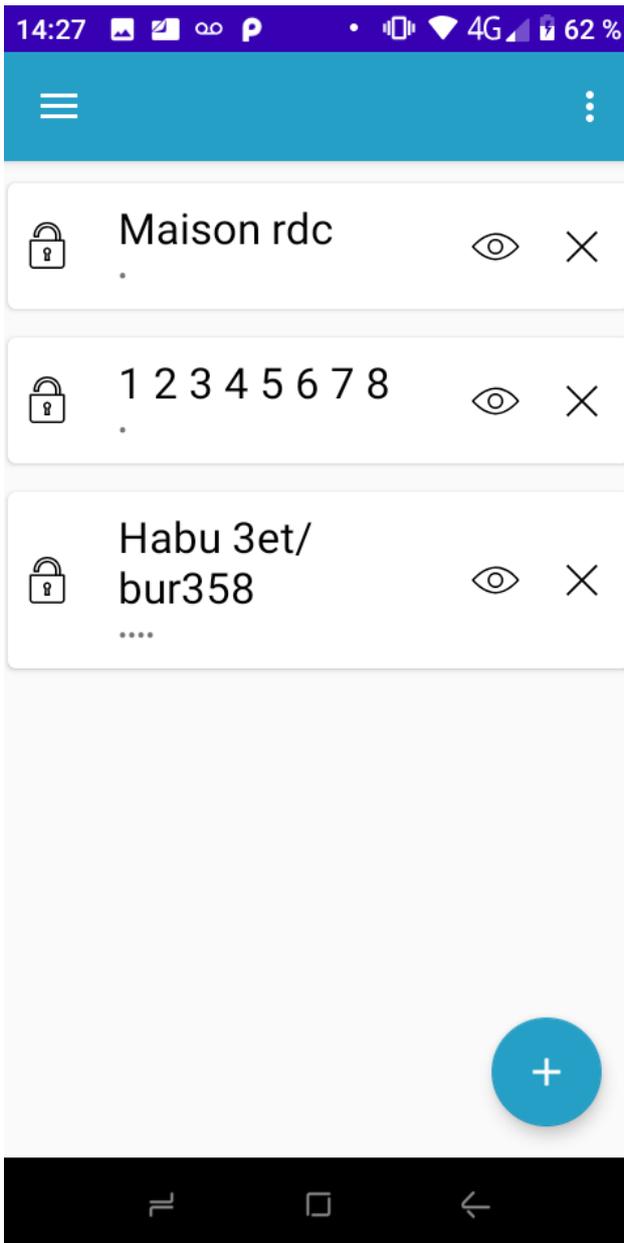
Enter the name (alias) of the probe whose password you want to save in your smartphone. For a building, it is preferable to identify a sensor by address, # of floor, and # of office or apartment. Please note that the length of this field is limited to 16 characters.

Enter the password in case of manual probe addition. Password is automatically transferred if the password and its hint were entered in the previous page. Limited to 8 characters.

26. Memento access



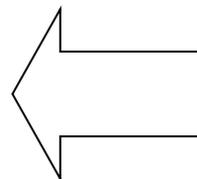
Click on the back arrow to directly access the memento.



Each memo can be deleted using the cross.

It is possible to change the alias of the probe by clicking on it. Since the password is stored in a probe, it is not possible to change it here. You have to go back to the password tab. If you enter the same alias when saving, the previous one will be overwritten in the smartphone memory.

Please note, if you delete a probe and later wish to access it, the password must be entered to have administrator privileges. The reminder stored in the probe may help you. If you cannot find the password, please send a request to the manufacturer.



Manually adding a probe

Be careful, if you change your smartphone, remember to export the reminder to the new smartphone.

27. ANNEX

27.1. VAV

VAV registers (Variable Air Volume)

A VAV is to air flow what a thermostatic valve is to water flow.

A VAV controls the flow rate thanks to a local regulation loop: the regulator compares the measured flow rate with the setpoint flow rate (0-100%), in the event of a deviation it controls the motor which modifies the position of the damper so that the actual flow rate corresponds to the target flow. Thus the air flow is continuously regulated according to the setpoint. Each VAV is set for a maximum flow and the command corresponds to a percentage of that maximum flow. If, for example, a VAV is set to 500m³ / h maximum, a command of 50% will correspond to a flow rate of 250m³ / h.



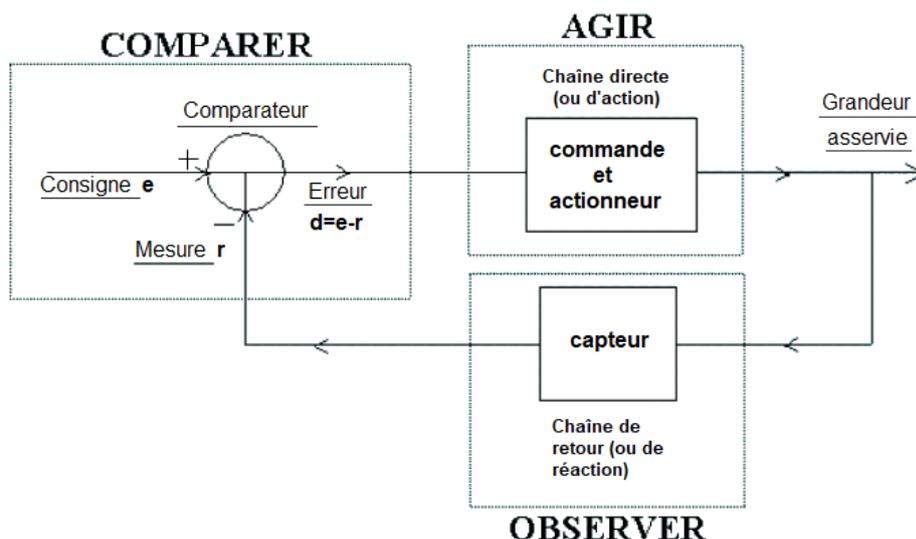
Thus, not only will the air flow correspond to the command but, in addition, in the event of closure, the flow rate of the registers of neighboring rooms, if they are VAV type, will remain constant. We therefore have a real flow control according to an air flow measurement. It is much more stable and precise than a simple damper driven at an opening angle. This solution is not recommended with a control by the 0-10V signal based on measurements but quite appropriate with a PI control signal (see next chapter).

27.2. PI command

27.2.1. Ventilation control command

Ideally, ventilation motors or VAVs should be controlled by a real control loop.

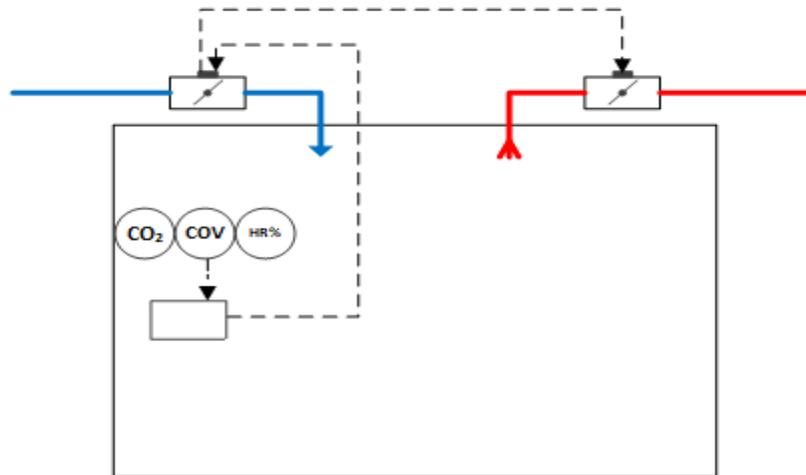
A control loop requires a setpoint and a regular comparison between the setpoint and the value reached using a sensor. The greater the difference between the setpoint and the dead end, the greater the control will be (so-called Proportional control). The control loop also includes an integration component (PI) for better accuracy.



The IAQ EP5000 probe is able to control VAVs with a PI control loop.

The IAQ instructions are adjustable using the smartphone application but can also go through the communication system.

If the setpoint is exceeded, the control signal will cause the ventilation to keep the value below the setpoint. The control signal here will act directly on the air flow if it controls a flow-controlled ventilation motor or VAVs.



27.2.2. Proportional regulation

Imagine a ventilation system with a VAV type damper that modulates the flow rate so that the room receives the volume of just needed air, such that the fresh air just compensates for the CO₂ generated by the breathing of the occupants of the room. In this case, the ambient CO₂ level would be stable.

Supposing a set point set at 1000ppm. Assuming an initial CO₂ rate higher than the setpoint, it is therefore necessary to ventilate.

Supposing the VAV is at 100% of the maximum flow for 1200ppm (200ppm above from the setpoint). Fresh air arrives, the CO₂ level drops and reaches 1100ppm. The deviation is then 100ppm and the VAV is only at 50% of the max flow.

Unfortunately, when it reaches 1100ppm, nothing changes: the CO₂ level in the room is stabilized and the VAV opening too: it remains open at 50% of the maximum flow.

Why ?

With a flow rate of 50%, it supplies a quantity of fresh air as it exactly compensates the CO₂ generated by the occupants of the room. The CO₂ remains at 1100ppm, the deviation remains 100ppm above the setpoint, and this deviation results in 50% of the max flow! Everything is stable and will remain so.

It is therefore impossible to achieve the desired 1000ppm! If this were the case, the gap would be zero, the VAV would be closed, the CO₂ rate would rise as the occupants continue to breathe, so the gap would not remain zero!

This is the problem of Proportional only regulation: since fresh air is needed, the VAV must be half-open, so a gap must remain. The CO₂ rate will stabilize at 1100ppm, instead of the requested 1000ppm.

New idea: could we not reduce the range of CO₂ that generates the opening of the register? Returning to the previous situation, if the damper was at 100% of the maximum flow rate above 1100ppm, it would stabilize at 50% of its value for an ambient CO₂ level of 1050ppm. This is indeed a possibility: we say that we reduce the proportional band from 200 to 100ppm.

But this solution has its limits: with a too narrow proportional band, the system will start to oscillate, going from too open to too closed, sometimes without being able to stabilize. We say that the system "pumps", unable to stabilize.

27.2.3. Proportional - Integral (PI) regulation

By acting with a force proportional to the difference between the ambient CO₂ level and the setpoint, a difference remains permanently. It is therefore decided that the intervention force will have two components. The first is Proportional force, as above. But a second force completes it: a force linked to the integration of the deviation over time, that is to say a function of the sum of all the deviations continuously measured.

If the CO₂ stabilizes at 1100, due to the proportional component, a difference of 100ppm remains. Every "time step", the regulator will measure this difference and add it to the value of a "memory" box. The opening of the register will be given by the sum of the 2 components P and I. As long as the setpoint is not reached, the Integral component will increase, the VAV will open a little more, this time until the setpoint is reached.

Once this is reached, the deviation becomes zero and the integration component is no longer modified (since it adds a value "0"). If the setpoint is exceeded, the deviation will be negative and the integration component will decrease.

But couldn't this integral component work alone? No, it is too slow to react effectively to changes in CO₂. It would be necessary to decrease its time step (decrease the "integration time") but then the system becomes unstable. It is indeed the combination of the 2 actions (P and I) that is the most adequate to meet the demand: the **P** component does most of the work, then the **I** component refines over time to converge towards the set value.

28. Indication of LEDs in normal operation

The LEDs show the overall synthesis of IAQ (thresholds or physiological impacts on health, cognition, respiratory tract irritation and quality of sleep which depend on the combined effects (cocktail effect) of CO₂, VOCs, particles, noise and light)

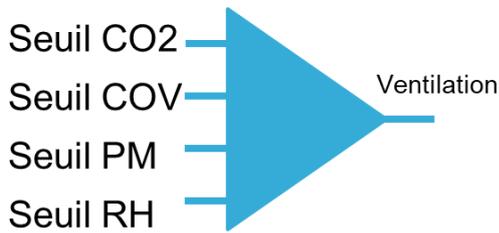
The building health is also synthesized and takes into account: risk of condensation, deposit of particles on cold parts.

This synthesis is materialized by a continuous gradual rising and then descending gradation of the breathing type.

The thresholds are adjustable via an NFC smartphone and the Android app.



28.1. In measurement thresholds mode



Fonction **OU**

Ne tient pas compte de la combinaison des effets

The control of the LEDs is based on the difference between the setpoint (threshold) and the measurement as well as the proportional band.

The proportional band is 10% of readings and 10% RH by default. The proportional band corresponds to a ventilation control of 100%. If for example the CO₂ threshold is set at 1000ppm, the ventilation control will be 100% above 1100mm (threshold + 10%).

LED modes.

Percent of proportional band		
 5s	0%	25%
 2s	25%	50%
 5s	50%	75%
 2s	75%	100%

This results in the following thresholds with the proportional band by default:

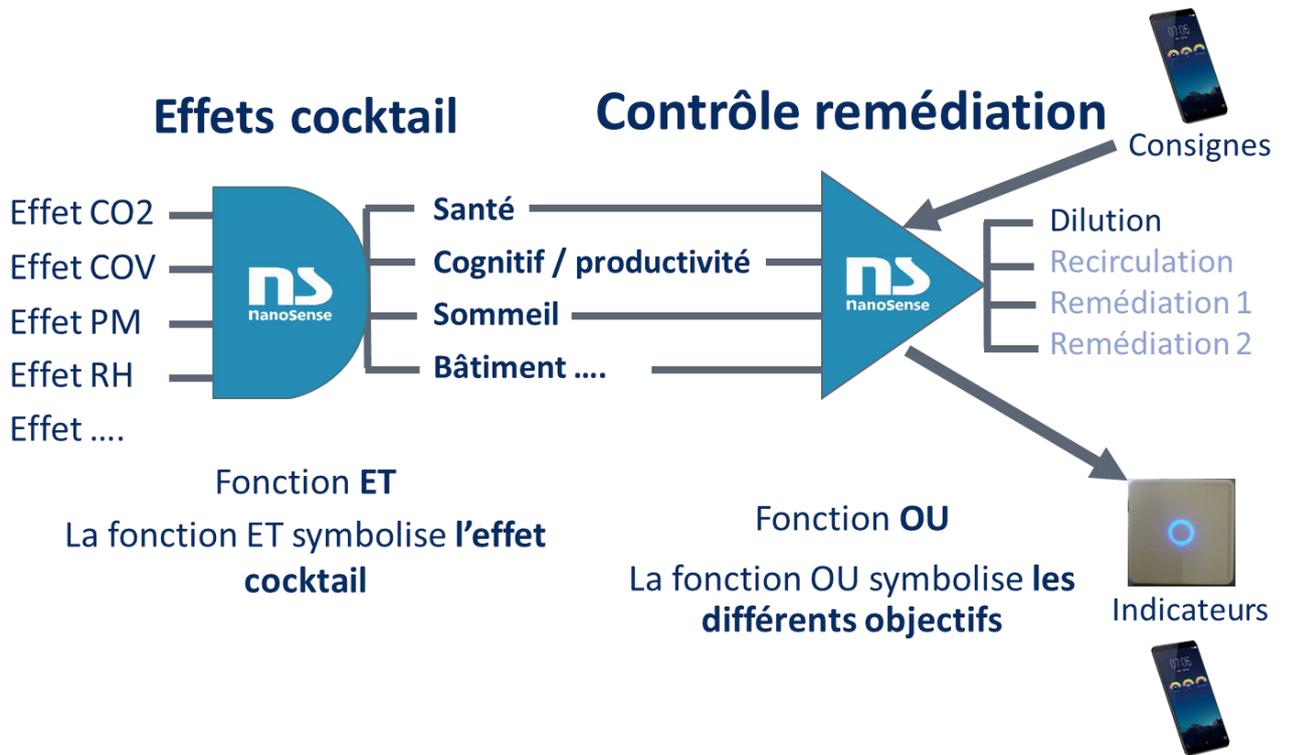
Sensors LED Status	Description
 5s	The air quality is ideal. The probe is working perfectly. $CO_2 < \text{setpoint} + 2.5\% \text{ of setpoint}$ Or $VOC < \text{setpoint} + 2.5\% \text{ of setpoint}$ Or $PM_{2.5} < \text{setpoint} + 2.5\% \text{ of setpoint}$ Or $RH < \text{setpoint} + 2.5\% RH$
 2s	The air quality is acceptable. The probe is working perfectly. $CO_2 > \text{setpoint} + 2.5\% \text{ of setpoint}$ Or $VOC > \text{setpoint} + 2.5\% \text{ of setpoint}$ Or $PM_{2.5} > \text{setpoint} + 2.5\% \text{ of setpoint}$ Or $RH > \text{setpoint} + 2.5\% RH$
 5s	The air quality is poor. The probe is working perfectly. $CO_2 > \text{setpoint} + 5\% \text{ of setpoint}$ Or $VOC > \text{setpoint} + 5\% \text{ of setpoint}$ Or $PM_{2.5} > \text{setpoint} + 5\% \text{ of setpoint}$ Or $RH > \text{setpoint} + 5\% RH$
 2s	The air quality is bad. The probe is working perfectly. $CO_2 > \text{setpoint} + 7.5\% \text{ of setpoint}$ Or $VOC > \text{setpoint} + 7.5\% \text{ of setpoint}$ Or $PM_{2.5} > \text{setpoint} + 7.5\% \text{ of setpoint}$ Or $RH > \text{setpoint} + 7.5\% RH$

Examples:

	Setpoint	Measures	LED
CO2	1000ppm	1020ppm	 5s
COV	500µg/m3	300µg/m3	
PM	25µg/m3	26µg/m3	
HR	80%	75%	

	Setpoint	Measures	LED
CO2	1000ppm	1070ppm	 5s
COV	500µg/m3	300µg/m3	
PM	25µg/m3	26µg/m3	
HR	80%	75%	

28.2. In Physiological Effects Mode



Sensors LED Status	Description
 5s	The air quality is ideal. The probe is working perfectly. Health Index > Setpoint - 5% Or Cognitivity Index > Setpoint - 10% Or Sleep quality index > Setpoint - 10% Or Respiratory tract irritation > Setpoint - 10% Or Building health index > Setpoint - 10%
 2s	The air quality is ideal. The probe is working perfectly. Health Index < Setpoint - 6% Or Cognitivity Index < Setpoint - 12% Or Sleep quality index < Setpoint - 12% Or Respiratory tract irritation < Setpoint - 12% Or Building health index < Setpoint - 12%
 5s	The air quality is ideal. The probe is working perfectly. Health Index < Setpoint - 7.5% Or Cognitivity Index < Setpoint - 15% Or Sleep quality index < Setpoint - 15% Or Respiratory tract irritation < Setpoint - 15% Or Building health index < Setpoint - 15%
 2s	The air quality is ideal. The probe is working perfectly. Health Index < Setpoint - 10% Or Cognitivity Index < Setpoint - 20% Or Sleep quality index < Setpoint - 20% Or Respiratory tract irritation < Setpoint - 20% Or Building health index < Setpoint - 20%

Examples:

	Setpoint	Index	LED
Cognitivity	82%	80%	 5s
Health	90%	81%	
Respiratory tract irritation	80%	71%	
Sleep quality Building	0%	80%	
Building health	70%	65%	

	Setpoint	Index	LED
Cognitivity	82%	66%	 5s
Health	90%	81%	
Respiratory tract irritation	80%	71%	
Sleep quality Building	0%	80%	
Building health	70%	65%	