



EP5000M air quality probe Installation manual

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|-----|------------|----------------------------------|
| V1 | 16/12/2019 | Initial Version |
| V2 | 23/04/2021 | Update |
| V3 | 09/07/2021 | Disassembling the front panel |
| V4 | 10/10/2021 | Add recommendations and warranty |

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1. Security



WARNING

Danger of death, risk of electric shock and fire!

The installation should only be undertaken by a qualified electrician!

To apply for correct bus and power cables and to activate the device, comply with the state of the art and standards.

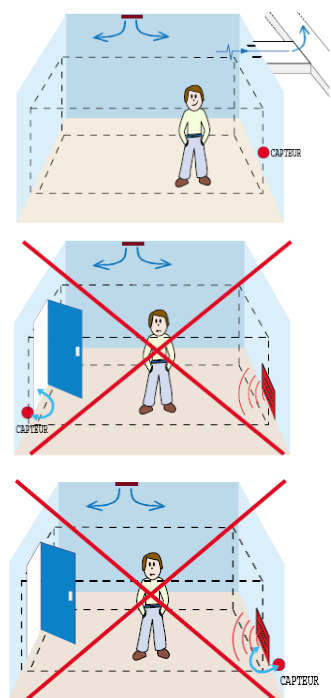
Any intervention or modification to the device will invalidate any warranty claim.

- Do not use this probe in environments with regular exposure to silicon vapors (HMDS) because this gradually alters the sensitivity of the VOC sensor.
- Do not use the sensors for measuring gas content relating to safety!
- Use the probe only with secured low voltages!

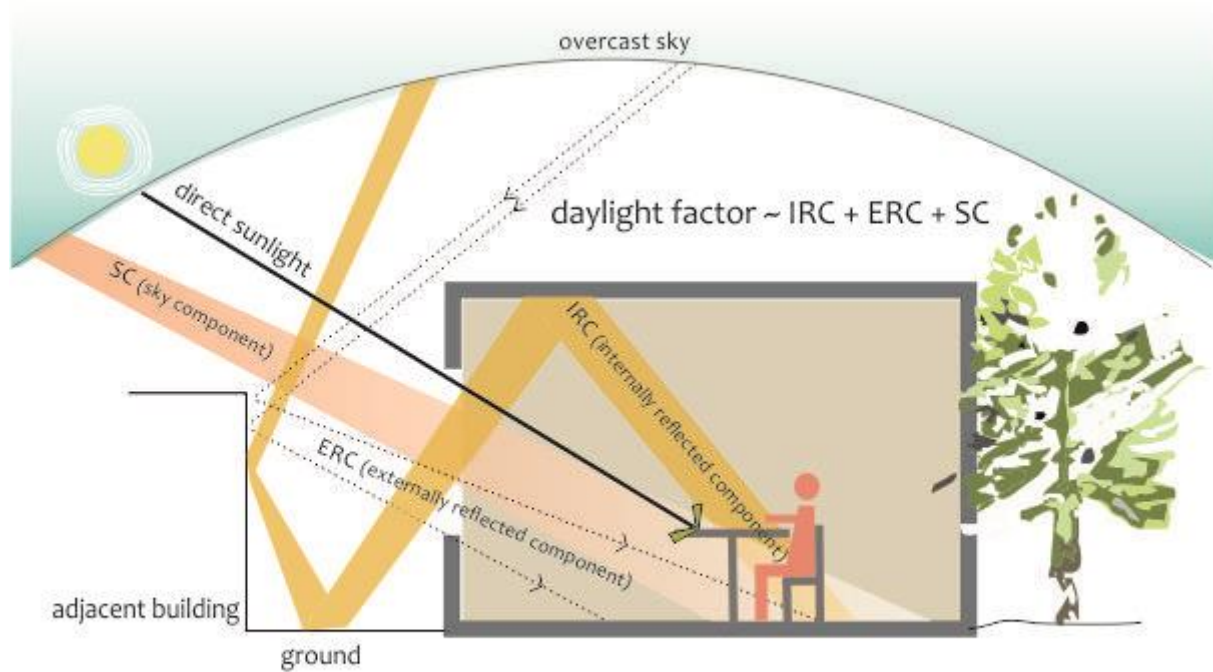
2. Positioning

The position of the probe is crucial vis-à-vis efficiency and energy savings for ventilation, heating and cooling.

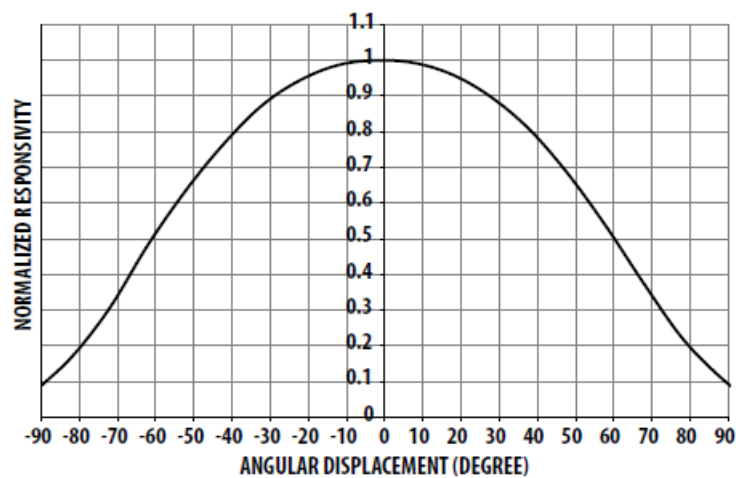
- The probe is designed to ensure air quality; it must be placed in the area of occupancy of the premise served by outlet vents, on a wall at eyes level (breathing human level, between 1.5 and 1.8m).
- Avoid drafts (near openings, blowing air, doors, outlet vents) and dead zones (niche, shelves and curtains).
- Avoid orthogonal walls (corners of room in particular)
- Avoid heat sources and the proximity of occupants (radius of 1 m from workstation).
- Position the probe vertically on a wall or partition.
This device is not intended for installation in duct or ceilings.
- Avoid direct exposure to sunlight. Consider all seasons sun positions
- The measurement of luminous intensity is mainly intended for the measurement of scattered light. This is what corresponds to the perception of our eyes. The positioning of the probe must take into account the quality of the desired measurement.



The following graph shows how the different contributions of natural light combine without even taking into account the generally zenithal artificial lighting:



Consideration should also be given to the receptivity of the light sensor which is mounted vertically similar to our eyes:



Any work not in accordance with this documentation or changes to the device will invalidate all warranty claims.

3. Disassembling the front panel

The front panel is clipped on the apparatus.

Put the probe on a table, the front glass facing the table (connector up)

With your fingernails or your finger move away one clip of the front panel peripheral from the apparatus and pull the apparatus up.

Do not spread the outline too far and do not exert pressure on the glass with your hand or other means as this may disassemble the front panel.



4. Flush mounting

Use the multi material backbox provided or an airtight insulated backbox with a waterproofing membrane through which the sheath passes. If the backbox passes through the sealing plane, seal between the backbox and the partition with a specific VOC free and silicone free sealant. If ordering the backbox separately:

- Make sure that the backbox doesn't contain Silicone.
- The internal depth of the case must be at least 50mm.
- The internal diameter (about 64mm) shall have a 40x40mm space free up to the bottom)
- The space between screws shall be 60mm
- The height of the screws heads shall be 2mm max)



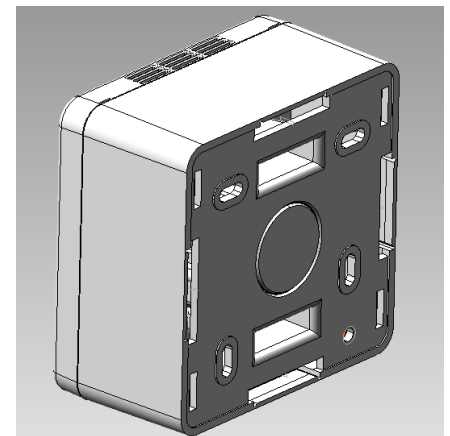
5. Surface box mounting (renovation)

Use the specific wall surface box (To be ordered separately).

This box has 4 pre-cut cable passages (one on each side) for wiring under trunking.

In case of a recessed cable, the bottom of the box has a pre-cut central pad.

Fix the box to the wall with four screws, checking the direction (arrow inside the box indicating the "UP" side)



Fix the probe into the box

6. Wiring

Be careful, wiring must be sealed. Incoming air, even slight, would seriously jam the temperature, humidity and air quality measures.

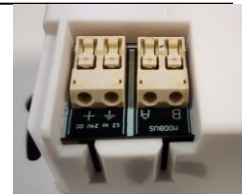
When the switchboard is located in the heated volume: caulk arrivals between cables and ducts at the switchboard level.

When the switchboard is out of the heated volume, caulk between cables and ducts before entering the heated volume. A sealing plug must also be placed between duct and cable reaching the EP5000 probe to prevent air entry.

When the sealing of the duct is not possible, use a specific sealant without silicone and VOC.

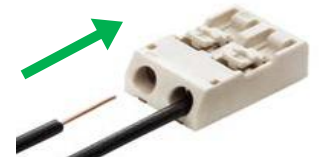


In case of use of electrical backbox, select an airtight case with sealing membrane from which the duct passes through. If the case crosses through the sealing plane (plasterboard), seal between the casing and panel with a special sealant without silicone and VOC.



Connectors are specified for rigid cable 18 to 24 AWG (1 to 0.5mm dia.) or twisted 20 to 22 AWG (0.8 to 0.65mm dia.)

The connectors accept two 0.8mm cables on the same terminal in order to chain several sensors. Beware of line losses, a 0.8mm cable has a resistance of 21Ω per Km.



7. Installation

It is recommended to install the probe at the end of the work (after painting and using silicone-based products).

Connect the ModBus and the 24V DC Power Supply pair cables on the terminal block on the back of the product. Pay attention to marking: Modbus A & B and power supply polarity.

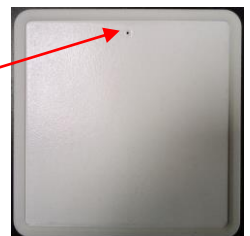
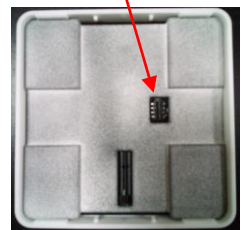
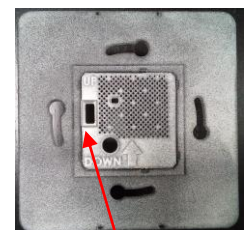
Just push the stripped ends (flexible or rigid) into the connector. In case of a multi-strand cable, make sure to well twist them before inserting them. In case of difficulty, push the release tab. Respect the polarity (non-destructive).

Make sure to respect the Up marking otherwise the temperature and humidity measurement will be jammed.

Screw the plate on the backbox.

Plug the front panel onto the plate. Pay attention to the position of the connector in the back of the front plate.

If well mounted, the transparent window of the light sensor shall be on top middle.



8. Connections

8.1.1. Power supply

The power supply must be continuous (DC) and between 12 and 32V (24V nominal).



8.1.2. ModBus

RS485 Modbus connection is not optically isolated. Therefore, you must pay special attention during the installation procedures that they do not cause communication failures or does not damage the RS485 coupler. Follow the points in the table below to ensure proper operation of your communication.

- 1 Use a shielded bus cable and connect one end of the shield to ground. Make sure, wherever possible, that there is no break in the cables. If this is not possible, you must have shield continuity consistent with the EMC at the connection points.
- 2 Keep RS485 cables away from other cables like power cables for example.

- 3 Connect the shielding to one end grounded to ensure equipotentiality of the shield.
No other grounding is required.
The "Shield" terminal of the power supply terminal block is isolated and is intended to facilitate the continuity of shielding.

THE SHIELD BUS MUST NOT BE CONNECTED TO THE “-“ OF THE BUS.

Warning: If you do not comply with above, the interface may be destroyed.

- 4 Make sure electrical signals are correct for the bus cable. This sets the resting level of the signal between two posts and is important for identifying the beginning of a message. The EP0000 probe produces a 5V electrical signal. The voltage between the data lines + (B) and - (A) should be between 0.5 and 1V.
- 5 For bus cable lengths over 100m, make sure to activate a bus termination at both ends with a 120Ω resistor (provided on demand with initial delivery)
- 6 The polarization of the bus is also highly recommended using the two other jumpers. RS485 standard requires a differential level of 200 mV for the signal detection. If the RS485 is not polarized, this level will not be reached at rest (without communication on the line) and then the operation will not be guaranteed. For this, a bias is applied to only one point of the bus. It is preferably applied to the master side.

8.1.3. Programming the physical address

The bus address of the probe can be configured using the smartphone application and the NFC link (up to address 255). The default address is between 1 and 33.

8.1.4. Other Modbus settings

Thanks to the smartphone application, it is possible to select the speed of the bus and parity.

8.1.5. Choosing Cable Bus

The RS422 standard recommends 24AWG (0.23mm²) twisted pair cable with a capacity of 16 pF shunt per foot and 100 Ohms characteristic impedance. Although the standard does not specify anything for RS485 wiring, this cable can perfectly be used for RS485.

Another possibility is to choose a cable commonly used in Ethernet cabling.

This cable is commonly referred to as Category 5 cable, it is widely available and very inexpensive, often less than half the price of 24AWG.

This cable has a maximum capacitance of 17 pF per foot (14.5 pF typical) and a characteristic impedance of 100 Ohms.

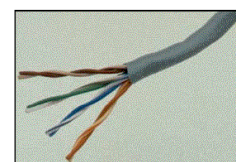
Category 5 Ethernet cable is available as shielded or unshielded twisted pair and generally exceeds recommendations for RS422 making it an excellent choice for RS485 systems.

8.1.6. Shielding

It is difficult to say whether shielding is needed in a particular system or not, until issues arise. We recommend that you use shielded cable for added safety. In addition, the shielded cable is not much more expensive than the unshielded one.

Name:

Unshielded Twisted Pair: **UTP** (Unshielded Twisted Pair)





Shielded Twisted Pair: **STP** (Shielded Twisted Pair)

The lines are disturbed by electric and magnetic fields, all the more so if the ventilation motors are controlled by variable speed drives.

To limit disturbances, you must:

- Separate the power lines from the bus cables by metal screens, and pass through separate sheaths (more than 30 mm from the power cables) or with other low current cables,
- Arrange very cleanly and align the cables in solid metal paths,
- Attach the bus cables to press them against the metal supports, without deforming them,
- Regularly (every 5 m) connect the cable trays to the earth with a large section wire,
- Use the appropriate cable,
- Respect the radii of curvature and the mechanical constraints provided.

To benefit from the shielding, it is essential to ensure continuity from one box to another.

The shielding consists of either a foil screen with screen wire, or a braid. Continuity is ensured by connecting either screen wires or braids. Note that the EP5000 probe's does not have a terminal block dedicated to the shielding.

It is recommended to earth the shielding of the building. Ungrounded shielding is more catastrophic than no shielding at all.

8.1.7. Wiring precautions

Be careful when stripping not to injure the copper core. A wire damaged when stripping is a weakened wire, it is a risk of breakage.

8.1.8. Maximum distance

The maximum distance between the PLC and the last device connected to the bus is 1200 meters.

8.1.9. Number of devices

The maximum number of peripherals connected to the bus depends on the coupler between the PLC and the bus:

For a 1/2 impedance coupler: 63 subscribers

For a 1/4 impedance coupler: 127 subscribers

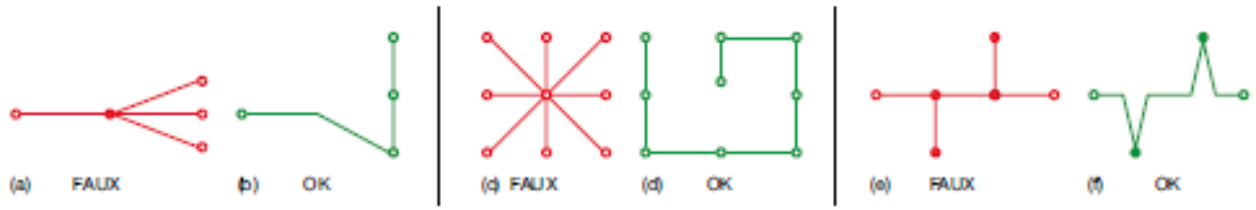
For a 1/8 impedance coupler: 255 subscribers

All EP5000 probes are compatible with a coupler up to 1/8 impedance.

8.1.10. Topology

The topology of RS485 cabling must be observed. The cable must go to the first bus coupler device, leave the first device to the second, etc. .. until the last device.

The topologies in tree, branch or star are not allowed.



9. Power on

Few seconds after power-up, all LEDs will be activated individually for a visual test. At the end of the cycle, failure message made of blink between orange and red LED may appear during few seconds, the time to interrogate all sensors then, the blue LED shall "breathe" if the air quality is good enough. The start-up cycle includes built in tests and visual checks of LEDs
The cycle lasts about **one minute** in total.

LEDs indicate faults as follows:

| LED code on the front panel | Identification # | Defective FRU |
|------------------------------|------------------|--|
| No LED active | NA | Power supply failure suspected or probe power supply board |
| Red LED on for 5 seconds | | |
| Followed by a yellow flash | 1 | Front panel board. |
| Followed by 2 yellow flashes | 2 | Single band CO2 sensor module. |
| Followed by 3 yellow flashes | 3 | Dual band CO2 sensor module |
| Followed by 4 yellow flashes | 4 | VOC sensor module |
| Followed by 5 yellow flashes | 5 | Motherboard |
| Followed by 6 yellow flashes | 6 | Interconnection board |
| Followed by 7 yellow flashes | 7 | Particle sensor board |
| Followed by 8 yellow flashes | 8 | Power supply board |
| Red LED blinking | 9 | Multiple failures |
| Alternation Red Blue | 10 | Perishable sensor reaching the end of life. |
| All LEDs blinking | 11 | No communication between front panel and probe. (after 30 seconds) |

10. NFC

Used for commissioning (See commissioning and App manuals)

11. Removing the front panel of an installed probe

There are 4 side recess.

Insert a small screwdriver head horizontally by 1mm into one recess avoiding to damage the wall.

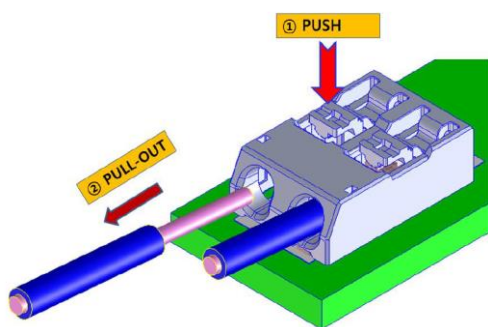
Pull the front panel 2mm from the wall and push the screw driver deeper. (between 2 plastic parts)

Move the screwdriver towards the middle of the side until the front panel unclips from the device.

Be careful not to fall the panel down as the tempered glass may break apart.



12. Disconnection



13. Recommendations

The EP50000 probe guarantees you precise measurements for years to come, provided you give it some attention ...

- Do not install your probe near sources of alcohol, gasoline, fuel oil, lubricants, paint or chemicals. The VOC sensor would be contaminated.
- Do not spill aerosol products such as deodorants, perfumes, paints, lubricants, etc. near the probe.
- Avoid contact or proximity with silicone-based materials.
- Do not use detergent or solvent to clean the probe, chemicals can cause sensor failure by contaminating or damaging it temporarily or permanently.
- Do not immerse or spray any liquid in the openings, this could permanently damage the probe.
- Do not attempt to expect an accurate VOC measurement immediately after exposure to high concentration, the sensor requires time to recover and perform to its full potential.

14. Warranty

This probe was manufactured to high quality standards. However, it can happen that it presents a defect or a failure despite the numerous tests to which it has been subjected. This device is guaranteed against any manufacturing or material defect within the limits of the following provisions:

- The warranty is strictly limited to the exchange or repair in the factory of parts recognized as defective, after examination and control, to the exclusion of any other compensation.

- The warranty period, offered by the manufacturer, is one year and begins to run from the date of purchase.
- It is only effective if the device has been used in accordance with the installation instructions, recommendations and good practice.
- Are excluded from the guarantee:
 - Damage resulting from abnormal conditions of use.
 - Damage caused by shocks or excessive mechanical forces,
 - Damage or accidents resulting from negligence or resulting from a transformation or - transformation attempted of the device.
 - Damage due to disassembly and improper reassembly of the probe.
- The warranty is only valid for devices that are returned to the manufacturer's address.
- Interventions under the guarantee cannot have the effect of extending the duration of the guarantee.
- The provisions of this guarantee are not exclusive of the benefit, for the benefit of the purchaser, of the legal guarantee for defects and latent defects which applies in any event.