

INSTALLATION GUIDE

mBox Guardian

Indoor monitor

MMG - 173

meersens

www.meersens.com

Kit Content:

- Air quality monitor: CO₂, PM2.5, TVOC, temperature, humidity
- Power cable
- Power adapter
- Manual
- A wall mounting bracket
- 4 fixing screws

Other material needed for the installation:

- On the wall, an electrical outlet with or without a ground connection near where the mBox Guardian will be installed (<1m).

Positioning of the station:

Be sure to position mBox Guardian:

- On one of the walls of the room.
- At a height between 1 and 2 m corresponding as much as possible to the height of the respiratory tract of people occupying the premises (children, adults, seated people mostly ...).
- Out of draughty areas (air intake or exhaust, door, window).
- Away from heat sources (radiator, direct sunlight).
- Away from specific and localized sources of pollution (kitchen, garbage can, changing area, perfume diffuser...)
- More than 1m from the corners of the room.



Product:

Introduction

mBox Guardian MMG-173 is an intelligent air comprehensive index sensor. It can monitor PM2.5 concentration, temperature, humidity, carbon dioxide (CO₂) and TVOC which basically covers various indicators reflecting air quality. Remote data viewing and intelligent management can be performed through Meersens SaaS and app. The product adopts RS-485 (through the international universal ModBus RTU protocol) communication interfaces which is convenient for users to quickly integrate into existing systems. Here is also a Wi-Fi function and help you check its real time data at anytime and anywhere on your cellphone via **Meersens Pro App** after Wi-Fi pairing.



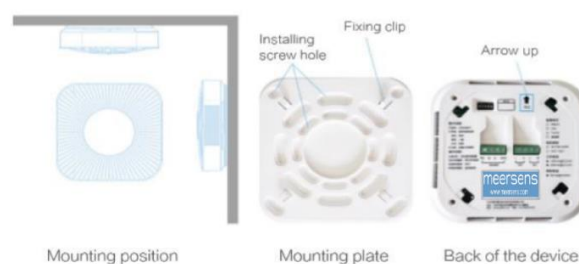
Installation:

Position

mBox Guardian MMG-173 can be installed on the ceiling or wall, can be directly connected to the wall with a 86 × 86 mm base, 220V Alternating Current. If there are no 86 × 86 mm base, can also be used directly with a screw fixed base.

Methods

- Firstly, fix the mounting plate on the wall, the mounting plate is shown in the figure, and the fixing card is outward.
- After the device is connected to the cable, fix it on the mounting plate and turn it clockwise to lock it.

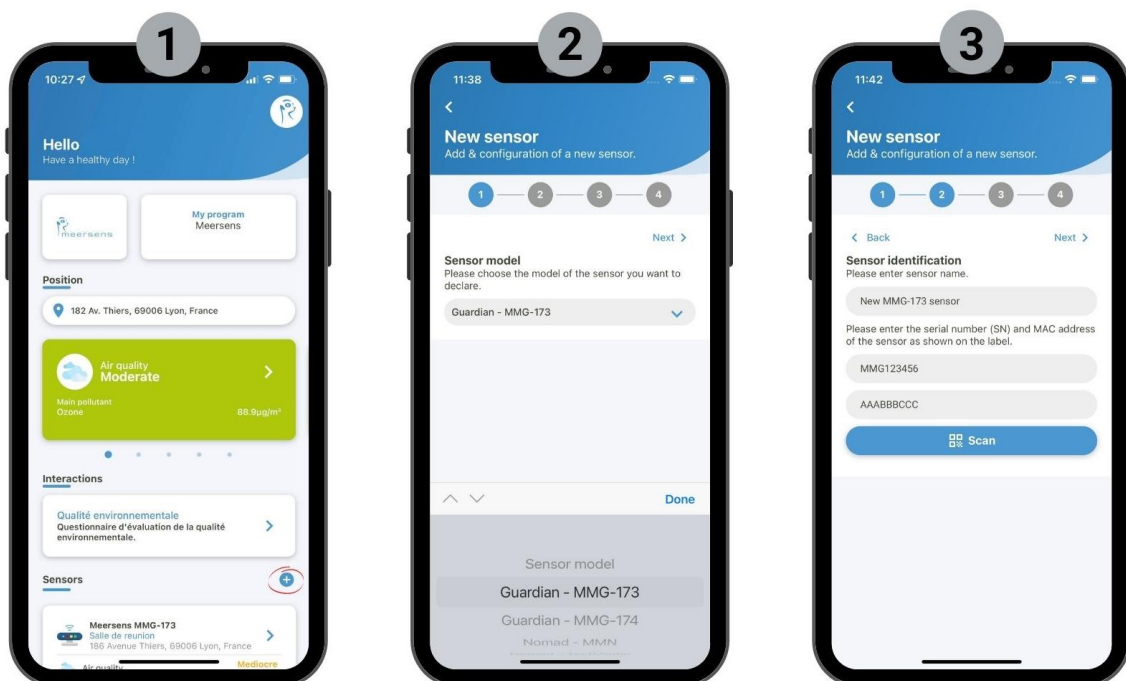


Wi-Fi pairing settings:

After receiving an email with your login information and downloading the Meersens Pro application from the Apple or Android stores, you can begin the pairing process.

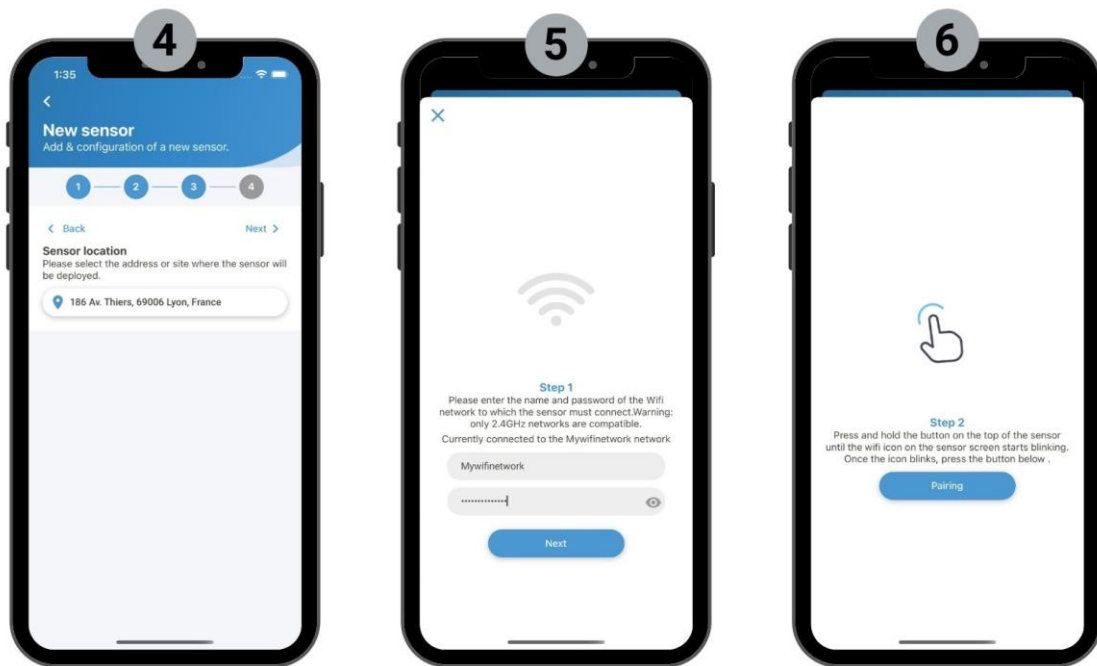
Attention: your network must be a 2.4 GHz Wi-Fi network.* Before starting the pairing process, make sure that your phone is connected to the same network to which you are connecting the sensor to, that your phone and the sensor are both within 5 meters of the WIFI router, and that the device is charged.

* If the name of your Wi-Fi network does not indicate whether it is a 2.4 GHz or 5 GHz network, you will need to change the frequency of your Wi-Fi or consult your network administrator if you are a professional.



1. Move the sensor closer to your Wi-Fi router. Then, in the *Meersens Pro* app on your phone, go to the home page and scroll down to the “Sensors” section. Add a sensor by clicking on the “+” icon on the right.
2. Select the model “**MMG-173**” in the dropdown list.
3. Choose the name of the sensor to identify it more easily later (*example: meeting room*). To enter the serial number and MAC address of your sensor, scan the QR code on the right side of the product using the Meersens Pro App. If you are unable to scan, please manually enter the serial number and MAC address according to the product label





4. Select the sensor current location
5. Enter WIFI network credentials (name and password) at the Peering step. **Warning:** do not click on the “pairing” button until you have completed step 6.
6. Long press the white circular button in the middle of the device for more than 3 seconds. Press the “Pairing” button (on the app) once the light button starts blinking fast (on the sensor). Wait for the peering procedure to complete successfully. Your device is now paired. Click on “Declare new sensor” button to finish the procedure. The first data will appear within 10 minutes.

Once paired, the sensor can be safely positioned more than 5 meters from the WIFI router.

(Please note that you might have to try again the Peering step another time in case the first time fails).



Light Display:

Identification of the light display:

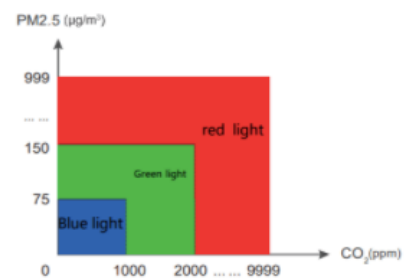
Configuration state:

- Blue light flashing 1 seconds interval

Light working state:

- Rotating : it is detecting
- Breathing : it is sleep mode
- During sleep mode, short press the button to start detection, press again to turn off the display light

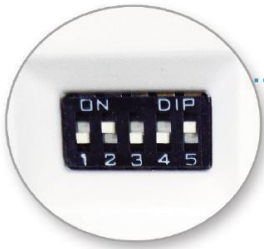
Light color :



Settings for Modbus RTU communication:

Device address setting:

- if there is only one MMG-173, there's no need to set up.
- otherwise, if there is many MMG-173 devices that want to access to the RS-485 bus, please set up the device address by adjusting the address dial switch
- it can be set by a low 5 bit address code switch presented as below, high 3 through RS-485 bus extension. The most significant bit corresponds to the leftmost switch (identified by the number 1), and the least significant bit corresponds to the rightmost switch (identified by the number 5)
- Example : the address of the is:



Address Dial Switch : $2^4 \times 0 + 2^3 \times 1 + 2^2 \times 0 + 2^1 \times 0 + 2^0 \times 1 = 9$

Bus protocol:

Modbus Fieldbus physical interface: RS-485

Baud rate: 9600bps

Byte format: 1 start bit, 8 data bits, 1 stop bit

Register description:

Register Address	Word Length	Meaning	Unit	Read/Write	Remark
0x0000	1 word	PM _{2.5}	µg/m ³	R	0 to 999 µg/m ³
0x0001	1 word	Temperature	0.1°C	R	- 40 to 125°C (negative is complement)
0x0002	1 word	Humidity	0.1%RH	R	0 to 100% RH
0x0003	1 word	CO ₂	ppm	R	0 to 9999 ppm
0x0004	1 word	TVOC	0.01mg/m ³	R	0.22 to 9.99 mg/m ³
0x0005	1 word	On-Off state		R	Off = 0x4F On = 0x40
0x000A	1 word	Light On-Off control		RW	Off = 0x4F On = 0x40
0x000B	1 word	Modbus add extension code		RW	0 to 7 0 by default
0x000C	1 word	Detecting interval	minute	RW	1 to 240min 10 by default
0x000D	1 word	Program version		R	Major version: highest byte Minor version: lowest byte

Read function code is 0x03 and Write function code is 0x06.

Communication examples:

PM2.5 request:

Byte number	0	1	2	3	4	5	6	7
Instruction	Device Address	Function Code	Address Register MSB	Address Register LSB	Number of Data MSB	Number of Data LSB	CRC LSB	CRC MSB
Data	0x01	0x03	0x00	0x00	0x00	0x01	0x84	0x0A

PM2.5 reading returned from slave is 125ug/m³:

Byte number	0	1	2	3	4	5	6
Instruction	Device Address	Function Code	Number of bytes	PM2.5 MSB	PM2.5 LSB	CRC LSB	CRC MSB
Data	0x01	0x03	0x02	0x00	0x7D	0x78	0x65

Temperature and humidity request:

Byte number	0	1	2	3	4	5	6	7
Instruction	Device Address	Function Code	Address Register MSB	Address Register LSB	Number of Data MSB	Number of Data LSB	CRC LSB	CRC MSB
Data	0x01	0x03	0x00	0x01	0x00	0x02	0x95	0xCB



Temperature and humidity returned from slave is -10.5°C and 23.6% RH:

Byte number	0	1	2	3	4	5	6	7	8
Instruction	Device Address	Function Code	Number of bytes	Temperature MSB	Temperature LSB	Humidity MSB	Humidity LSB	CRC LSB	CRC MSB
Data	0x01	0x03	0x04	0xFF	0x97	0x00	0xEC	0x7A	0x46

Host controls slave, start detection:

Byte number	0	1	2	3	4	5	6	7
Instruction	Device Address	Function Code	Address Register MSB	Address Register LSB	Number of Data MSB	Number of Data LSB	CRC LSB	CRC MSB
Data	0x01	0x06	0x00	0x0A	0x00	0x40	0xA8	0x38

Slave returned value:

Byte number	0	1	2	3	4	5	6	7
Instruction	Device Address	Function Code	Address Register MSB	Address Register LSB	Number of Data MSB	Number of Data LSB	CRC LSB	CRC MSB
Data	0x01	0x06	0x00	0x0A	0x00	0x40	0xA8	0x38

Host controls slave, detection interval = 30 minutes :

Byte number	0	1	2	3	4	5	6	7
Instruction	Device Address	Function Code	Address Register MSB	Address Register LSB	Number of Data MSB	Number of Data LSB	CRC LSB	CRC MSB
Data	0x01	0x06	0x00	0x0C	0x00	0x1E	0xC9	0xC1

Slave returned value:

Byte number	0	1	2	3	4	5	6	7
Instruction	Device Address	Function Code	Address Register MSB	Address Register LSB	Number of Data MSB	Number of Data LSB	CRC LSB	CRC MSB
Data	0x01	0x06	0x00	0x0C	0x00	0x1E	0xC9	0xC1

Host request reading program version number:

Byte number	0	1	2	3	4	5	6	7
Instruction	Device Address	Function Code	Address Register MSB	Address Register LSB	Number of Data MSB	Number of Data LSB	CRC LSB	CRC MSB
Data	0x01	0x03	0x00	0x0D	0x00	0x01	0x15	0xC9

Version number returned value is V2.6:

Byte number	0	1	2	3	4	5	6
Instruction	Device Address	Function Code	Number of bytes	Major Version	Minor Version	CRC LSB	CRC MSB
Data	0x01	0x03	0x02	0x02	0x06	0x39	0x26

Illegal data returned:

Byte number	0	1	2	3	4	
Instruction	Device Address	Function Code	Error code		CRC LSB	CRC MSB
Data	0x01	0x83	0x01		0x80	0xF0



Precautions:

- Wall-mounted, pay attention to the installation direction, and the arrow points upward. The default data detection interval of the device is 10 minutes. If the air in the environment changes suddenly, the device may not respond immediately.
- The terminal is connected to 180 ~ 240V_{AC}. Exceeding the specified range or incorrect connection will permanently damage the equipment.
- During the PM2.5 detection process, there will be a slight motor sound. This sound is normal and will not produce noise interference.

Use environment:

- This product is suitable for indoor use.
- Do not use this product in an environment with extreme temperature and humidity.
- Do not use this product for a long time in a severe dust pollution environment to avoid errors in the monitoring results.
- Do not subject the product to strong shocks and vibrations (such as dropping it from a high place).



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#HealthGuardian

Meersens is a DeepTech artificial intelligence company specialized in the aggregation and processing of exposome data in order to help and support communities, companies involved in CSR issues and health professionals in taking into account the impact of the environment on the medical condition of individuals. Through its solution, Meersens acts for Public Health and is part of a virtuous process for the implementation of advice, prevention actions and decision support in close collaboration with specialists in the fields concerned.

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