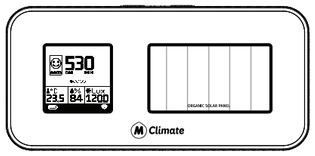

MClimate CO2 Display lite LoRaWAN®

User manual

Scan the QR Code to access MClimate CO2 Display lite LoRaWAN® extended documentation

mclimate.eu/lorawan-resources

Bulgarian
За да разберете как се инсталира MClimate CO2 Display lite LoRaWAN®, сканирайте QR кода или посетете линка до него.

Italian
Per installare MClimate CO2 Display lite LoRaWAN® scannerizzare il codice QR oppure aprire il link al suo lato.

Swedish
För att ta reda på hur du installerar MClimate CO2 Display lite LoRaWAN®, skanna QR-koden eller besök länken bredvid den.

Czech
Chcete-li zjistit, jak nainstalovat MClimate CO2 Display lite LoRaWAN®, prohlédněte si kód QR nebo navštivte odkaz vedle něj.

Polish
Aby dowiedzieć się, jak zainstalować MClimate CO2 Display lite LoRaWAN®, zeskanuj kod QR lub odwiedź link obok niego.

Finnish
Tutustu MClimate CO2 Display lite LoRaWAN®-laitteen asentamiseen, skannaa QR-koodi tai vierailla sen vieressä olevassa linkissä.

German
Um herauszufinden, wie man MClimate CO2 Display lite LoRaWAN® installiert, scannen Sie den QR-Code oder besuchen Sie den Link daneben.

Dutch
Om te weten te komen hoe u MClimate CO2 Display lite LoRaWAN® installeert, scan de QR-code of bezoek de link ernaast.

French
Pour savoir comment installer MClimate CO2 Display lite LoRaWAN®, scannez le code QR ou visitez le lien à côté de celui-ci.

Spanish
Para saber cómo instalar MClimate CO2 Display lite LoRaWAN®, escanee el código QR o visite el enlace al lado.

Need some help?

For more product information and issues related to it, visit:
mclimate.eu/lorawan-resources
or write us to:
lorawan-support@mclimate.eu

00359 800 3 1010
Monday-Friday
09:00 - 18:00

Sofia, Bulgaria
Sofia Tech Park,
labs building, floor 1

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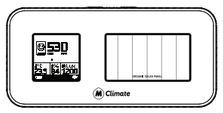
What's inside the box?



MClimate CO2 Display lite LoRaWAN®

Secure bolt

Wall mounting plate with 3M

Technical specifications

Description: MClimate CO2 Display lite LoRaWAN is a stand-alone CO2 sensor powered entirely by solar energy using an organic solar panel. The device features a 1.54" e-ink screen, temperature and humidity sensor, LUX sensor and NDIR CO2 sensor. The user can see the current levels of CO2 as well as historical trend. The data from the CO2 Display Lite can be used in any LoRaWAN compatible system, incl. Building Management Systems to control demand-based ventilation. Sensor information can be exposed as datapoints in Modbus, BACnet and KNX systems through the use of a special gateway.
SKU: MC-LW-LITE-CO2-E-INK-01
Dimensions: 122mm x 58mm x 22mm
Weight: 80gr
Materials: PC/ABS
Frequency range: 863÷870MHz
Power supply: Solar-powered Lithium-ion capacitor (LIC) AND/OR USB-C
Sensors: CO2 (NDIR), Temperature, Humidity, LUX
Working temperature: 0°C to +50°C
Environmental conditions, in which the device is intended to operate:
- Indoor using;
- for altitude up to 2000m;
- for an ambient temperature:0°C to +60°C;
- for maximum relative humidity of 80% for temperature up to 31°C, decreasing linearly to 25% relative humidity at temperature 50°C;
- for environment with a degree of contamination 2 (PD2).

Storage and transportation conditions:
- for an ambient temperature :-40°C to +85°C;
- for relative humidity 5% to 90% without condensation

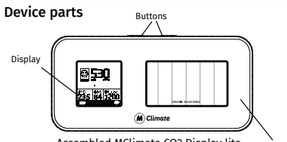
Manufacturer: MClimate Jsc, 1784 Sofia, Sofia Tech Park, Labs Building, 111j Tsarigradsko Shose
Compliance with the WEEE Directive
The appliance marked with this symbol should not be disposed of with other household waste.
It must be handed over to the relevant collection point for the recycling of electrical and electronic equipment.

⚠ Safety Instructions

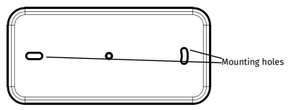
Please read the safety instructions before installing the device! Failure to follow the recommended instructions in this manual may be dangerous or in violation of the law. The manufacturer MClimate Jsc., is not responsible for any loss or damage caused by failure to follow the instructions in the operating manual.

Legal Notices
All information, including but not limited to, features, functionality, and / or other product specifications are subject to change without notice. MClimate retains all rights to review or update its products, software or documentation without being required to notify any natural or legal person.
The MClimate and MClimate logo are trademarks of MClimate Jsc. All other brands and product names mentioned herein are trademarks of their respective owners.
EU Declaration of Conformity
This device complies with the essential requirements and other applicable provisions of the following EU directives:
2014/53/EC, EN 50491-3:2009
EEU 300 220-1 V3.1.1:2017
EN 60950-1:2006+A11:2009
+A1:2010+A12:2011+ A2:2013 + AC:2015
EEU 300 220-2 V3.1.1:2017, EN 301 489-1 V2.1.1:2017
Compatibility
In order to operate MClimate CO2 Display lite LoRaWAN®, you will need:
LoRaWAN® network

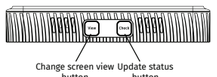
Device parts



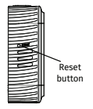
Assembled MClimate CO2 Display lite LoRaWAN®, front view



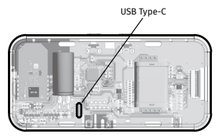
Assembled MClimate CO2 Display lite LoRaWAN®, back view



Assembled MClimate CO2 Display lite LoRaWAN®, top view



Assembled MClimate CO2 Display lite LoRaWAN®, side view

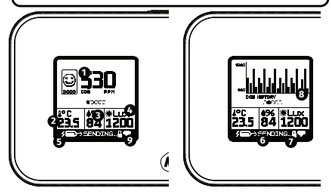


Disassembled MClimate CO2 Display lite LoRaWAN®, side view

Display's content

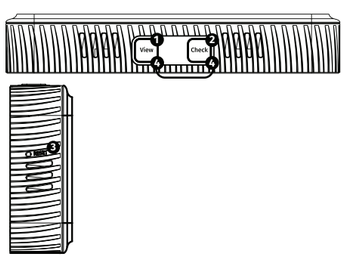
The image below has all visible elements of the display activated.

⚠ The 1.54" e-ink display supports fast partial refresh. Full refresh is performed every 12 hours (period can be adjusted via a downlink) to avoid the e-ink phenomena "image sticking" and steer clear of permanent damage to the display.



#	Description
1	Current CO2 reading
2	Sensor temperature
3	Humidity reading
4	Lux reading
5	Power source indicator - solar/USB
6	Shows when the sensor is transmitting an uplink
7	Child lock icon - indicates that the device is locked
8	History of CO2, temperature, humidity and lux readings
9	Spreading factor indicator SF7 & SF8 | SF10, SF11, SF12 SF9

Buttons



#	Button	Function
1	View	Switch between different data views on the display.
2	Check	Check current readings, refreshing the screen with the new values. After you check, depending on the configuration, you have to wait certain time until next check.
3	Reset	When pressed for 10s the device resets, triggering another Join Request on SF9. Performs full refresh of the screen. Performing a Reset IS NOT equal to factory reset. All configured parameters are preserved.
4	Check (10s press)	When the check button is pressed for 10s continuously, child lock is enabled. To disable child lock, hold the Check button again for 10s. When in Child lock, the Check button is disabled and the user cannot refresh the CO2 reading manually.

Behavior

Start-up behavior
The device starts when you press the Reset button on the side one time. At startup, the device measures the voltage of the supercapacitor, which is storing the energy harvested by the solar panel. If the voltage is within the working range of the device, the device will initiate a LoRaWAN Join-Request procedure on SF9.

Collecting and storing energy
The energy harvested by the Organic Solar Panel is stored in a supercapacitor. If the supercapacitor is discharged for some reason, the device will wake-up again when it has harvested enough power so that the voltage of the supercapacitor is within the working voltage of the device.
Example reasons for preliminary discharge can be:
- Device installed, but not provisioned in a LoRaWAN Network Server.
- Gateway not present.
- The device has been stored in packaging for too long.

If you want to get started quickly, you can use the USB-C port to charge the capacitor from a 5VDC power supply, which takes approx 20 minutes.

The time it takes to recharge will depend on the lighting conditions, but in a brightly lit office with 1000 lux, it should take around 12 hours.

Using multiple energy sources
The CO2 Display has two options for power supply:
- Organic Solar Panel
- USB-C

Data transmissions
Once joined, the device will execute two types of transmissions:
- Periodic, as configured
- All transmissions are subject to complying with the duty-cycle limitations of LoRaWAN end-devices.

Calibration
The device comes pre-calibrated with ABC algorithm enabled. By default, the ABC algorithm is based on a 8-day period. It keeps a log of the minimum measured CO2 in ppm and at the end of the period considers the minimum value as if it was 400 for the next period. Meaning - if during the previous period the minimum measured CO2 was 430ppm, in the next period this value will be measured as 400ppm.

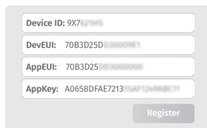
The ABC auto-calibration is a standard practice in the industry and is applicable for places with non-constant occupation. If a place is constantly occupied (e.g. manufacturing plant), you have to disable the ABC algorithm.

Apart from the ABC algorithm, if the device measures a value below 400ppm, it will run the ABC algorithm immediately, as CO2 values below 400ppm (background level) are considered impossible for smart building applications.

Commissioning

⚠ Before you install the device, we highly recommend that you first commission it on your LNS. Once the RESTART button is pressed, the device will initiate a LoRaWAN Join Procedure on SF9. Please, make sure you enable ADR in your LNS and/or mark the device as static. The lower the spreading factor, the better the performance of the energy storage will be.

1 Open your LoRaWAN® Network provider access panel and add the device using the supplied Serial Number, DevEUI, AppEUI (JoinEUI) and AppKey.



⚠ The data is example. Do not use.

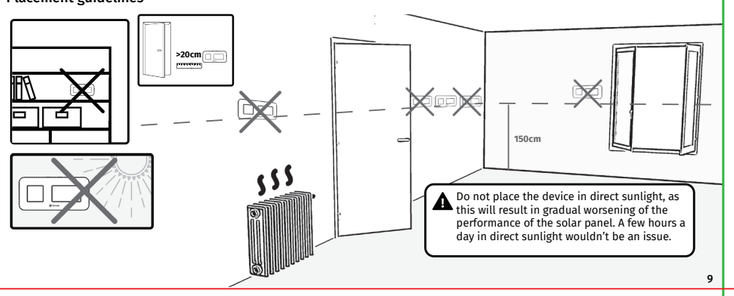
2 Continue the Installation with the instructions of your LoRaWAN® Network provider.

MClimate_LoRaWAN_51177

Serial Number	DevEui	AppEui	AppKey
[illegible]	70B[illegible]	70B[illegible]	5fc3[illegible]

You can get DevEUI, AppEUI (JoinEUI) & AppKey information from the LoRaWAN® credentials .csv file we sent you with the fulfillment confirmation.

Placement guidelines

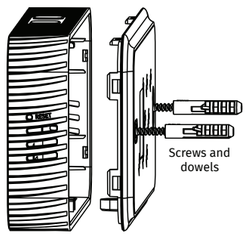


⚠ Do not place the device in direct sunlight, as this will result in gradual worsening of the performance of the solar panel. A few hours a day in direct sunlight wouldn't be an issue.

Installation

We recommend installing the device in an open environment (e.g. not in a recess) at 1.5m height. Do not install the device near big metal items as it will worsen the RF performance. Use double-sided tape to attach it to the surface or screws and dowels to attach the wall-mounting plate in a more permanent manner.

Once you've secured the wall-mounting plate either with the included 3M tape or with screws and dowels, place the main device part on top and press until it clicks in place.



Screws and dowels

Secure bolt

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