

SenseNL



CARA MET Cube

— User Manual —

Please read this User Manual thoroughly before any operation of the CARA MET Cube and its Related Items

IMPORTANT SAFETY INSTRUCTIONS



The CARA MET Cube bears sharp pins which, if not handled with care, could result in serious injury. When handling the Product, take the appropriate measures for handling objects with sharp elements at all times.

I. IMPORTANT SUMMARY OF TERMS AND CONDITIONS

The 'Terms and Conditions of SenseNL B.V.' - please see at www.caramet.com (hereinafter referred to as "T&C SenseNL" - are applicable to this User Manual. The words written with an initial capital letter have the meanings as defined in the T&C SenseNL.

II. LIMITED WARRANTY SUMMARY

SenseNL B.V. warrants the included Products against Nonconformity for a period of twenty four (24) months from the date of original Order Confirmation. SenseNL B.V. does not warrant against normal wear and tear, nor damages caused by and/or attributable to a) faulty installation and/or operation, b) misuse and/or abuse, c) accidents, dropping and/or pressuring. See for full terms and detailed information concerning the Product Warranty and Nonconformity, the specific Articles within the T&C SenseNL.

III. LIMITED LIABILITY

In the T&C SenseNL the liability of SenseNL B.V. is limited on several situations and reduced in respect of compensation of damages. See for full terms and details concerning liability, the specific Articles within the T&C SenseNL.

NOTICE



OBJECTIVE

This User Manual addresses any person which handles, installs, operates or is in contact with the Products and its Related Items.

Those responsible for the application and use of this product must satisfy themselves that all necessary steps have been taken to assure that application and use meets all performance and safety requirements, including any applicable laws, regulations, codes and standards.

The installation, operation and/or use of the Products and its Related Items do not provide installation for growth strategy or crop management.

Since there are many variables and requirements associated with any particular installation, SenseNL B.V. does not assume responsibility or liability based upon the examples shown in this publication.



PICTOGRAMS AND EXAMPLES

Throughout this User Manual pictograms are used to draw your attention to important safety, installation, program or usage requirements.

The illustrations, charts and examples shown in this manual are intended solely for demonstrative purposes, SenseNL B.V. or associated partners are not liable for any misuse, injury, damage occasioned by the application of the content of this User Manual.



SAFETY

Please always follow local safety regulations and use appropriate safety equipment preconized by your local regulations when installing and manipulating this product and its annexed delivered products.

Various hazards are present when using, maintaining and installing the Products and/or its Related Items. Please follow preconized advice from this User Manual.

Pictograms and meaning of these ones which are used throughout this manual are as shown here under:

	Please pay attention
	Sharp elements hazard
	Recycling and disposing in a responsible way

RED statement

Product Name	CARA MET Cube
Applicant	SenseNL B.V.

Radio characteristics

Frequency band	868 MHz
Maximum RF power output	< 10 dBm

SenseNL B.V. hereby declares that the radio equipment is in compliance with Directive 2014/53/EU.

The complete EU declaration of conformity can be found at the following address:
www.caramet.com

SenseNL B.V. verklaart hierbij dat de radioapparatuur voldoet aan de richtlijnen volgens 2014/53/EU.

De volledige EU-conformiteitsverklaring is te vinden op het volgende adres:
www.caramet.com

FCC and IC statement

Product Name	CARA MET Cube
Applicant	SenseNL B.V.
FCC ID	2AWXW-MSCBL01
IC ID	26309-MSCB01

Radio characteristics

Module	NiceRF LORA1276-C1
Transmission	FHSS (Frequency-hopping spread spectrum)
Number of channels	8 out of 64. One subband per gateway. Default to FSB2.
LoRa TM	1 903.9 MHz 5 904.7 MHz 8 905.3 MHz
Tx Frequency	LoRa: 903.9 -- 905.3 MHz
Rx Frequency	LoRa: 903.9 -- 905.3 MHz
Antenna	Antenna plane 0 dBd
Type of modulation	CSS

FCC Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference; and
2. This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

FCC and IC Regulatory Statement

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Warning: Changes or modifications not expressly approved by SenseNL B.V. could void the user's authority to operate the equipment. This portable transmitter with its antenna complies with FCC/IC RF exposure limits for general population / uncontrolled exposure.

Industry Canada Statement

This device complies with ISSED's license-exempt RSSs. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. this device must accept any interference received, including interference that may cause undesired operation.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be chosen so that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Le présent appareil est conforme aux CNR d'ISED applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

1. le dispositif ne doit pas produire de brouillage préjudiciable, et
2. ce dispositif doit accepter tout brouillage reçu, y compris un brouillage susceptible de provoquer un fonctionnement indésirable.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada.

Dans le but de réduire les risques de brouillage radio électrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

FCC and IC Regulatory Statement

SUMMARY

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1. CARA MET CUBE KIT

The following table shows the content of your new CARA MET Cube kit.

DESIGNATION	QUANTITY	DESCRIPTION	PICTURE
User Manual	1	This User Manual	
CARA MET Cube	10 or 5 (see the Order Confirmation)	Sensor for measuring Moisture Content (MC) Electrical conductivity (EC) and Temperature (T) in Substrate (Product)	
Strap	10 or 5 (see the Order Confirmation)	Element for a correct fixation of the sensor in the substrate and limits movement during operation (Related Item)	
Base Station	1	Equipment which coordinates the communication between the CARA MET Cube and the cloud (Product)	
Power supply	1	Device supplies power to the Base Station (Related Item)	
Ethernet cable 5m	1	Cable for connecting the Base Station to your local network (LAN) (Related Item)	
Mounting ties	2	Elements for fixing of the Base Station (Related Item)	

2. SPECIFICATION

2.1 CARA MET CUBE

CHARACTERISTICS

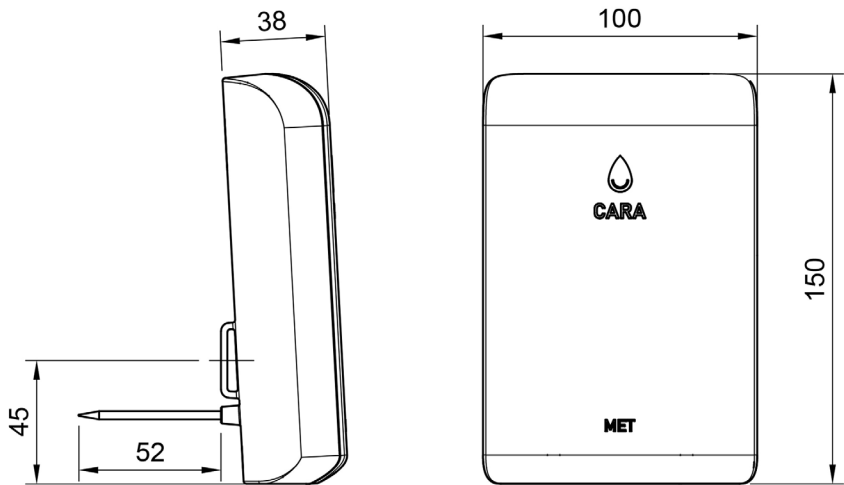
CRITERIA	SPECIFICATION
Type:	MC, EC and T in the block
Standard measurement interval:	5 min.
Communication type:	Wireless, License Free ISM band
Range:	50 meter radius from base station in fully developed crop, (following installation instructions)
Configuration:	2 Pins measurement
Power:	3x AA alkaline batteries
Substrate calibration type:	High-density stone wool 40 - 60 kg/m3
Protection	IP65 or equivalent

RANGE AND ACCURACY

TYPE	RANGE	ACCURACY	RESOLUTION
EC	0-10* mS/cm	+/-0.3 mS/cm	0.1 mS/cm
MC	0-100%	+/-5%	0.1%
T	0-50 °C	+/-1 °C	0.1 °C

*For measurements above 10 mS/cm, please contact SenseNL.

Dimensions (mm)

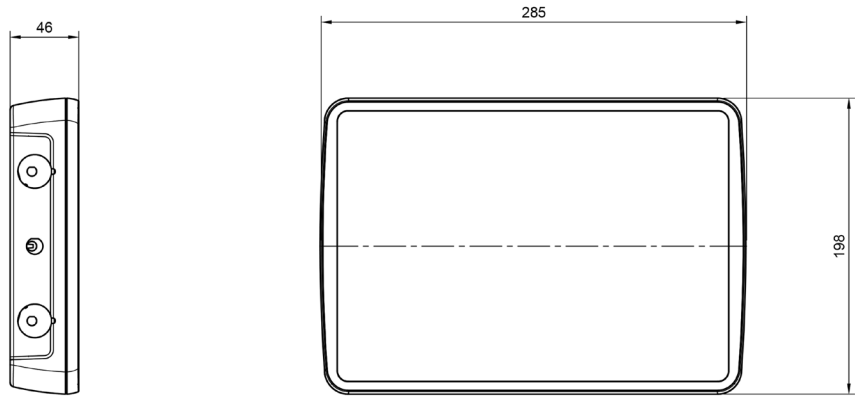


2.2 BASE STATION

CHARACTERISTICS

CRITERIA	SPECIFICATION
Type:	Base Station
Power:	Input: 127-240Vac (50/60Hz) Output: 5V/2A
Connectivity:	4G or Ethernet
Antennas:	4G and ISM
Protection:	IP54

Dimensions (mm)



3. INSTALLATION

3.1 BASE STATION

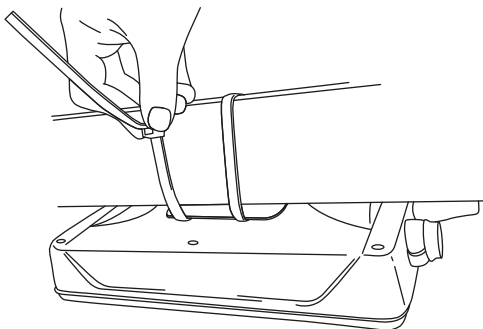
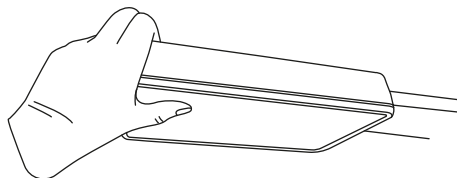


Please read all the instructions carefully. Follow the steps exactly as described below by first installing the Base Station and then the CARA MET Cubes.

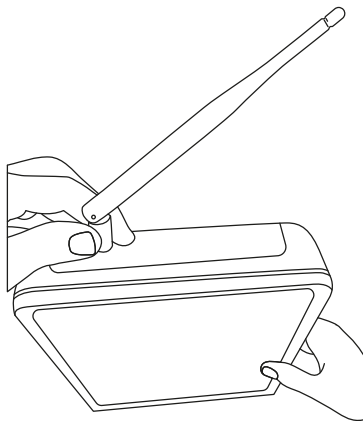
STEP 1 - Choose your internet connection method: 4G or Ethernet cable.



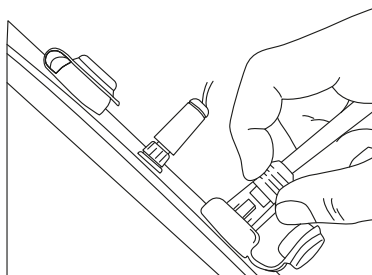
STEP 2 - Secure your Base Station on the highest possible point (e.g.: beam of greenhouse; this will permit better communication ranges).



STEP 3 - Connect the white antenna to the ANT connector. The antenna should point towards the crops.



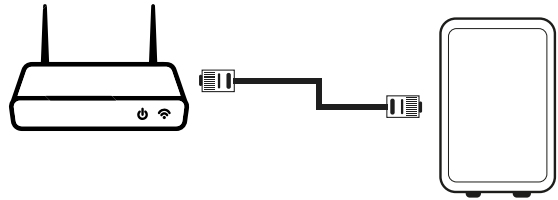
STEP 4a - When using internet cable, plug the Base Station's ethernet cable into the ETH IN connector.



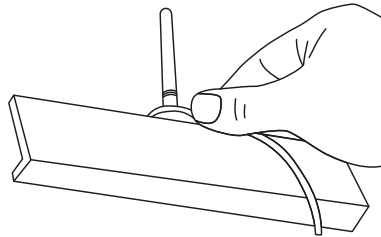
STEP 4b - If you prefer a 4G connection, just make sure that there is a good 4G coverage in your place. If not, SenseNL B.V. advises the ethernet connection for a better working of the Products and its Related Items.



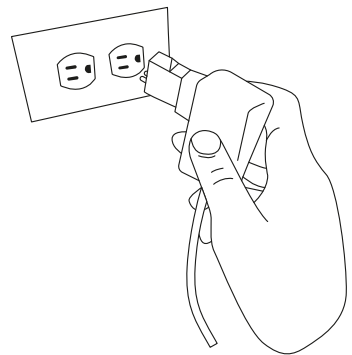
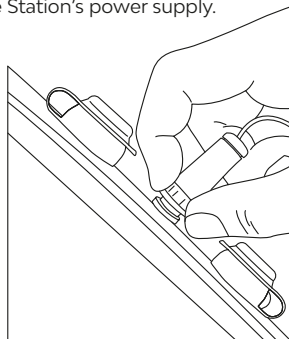
STEP 5a - Plug the other end of the ethernet cable into the router in your local network.



STEP 5b - For 4G connection, install the black antenna as high as possible, preferably above any screening. It has a magnetic bottom which can easily be fixed to a metal beam.



STEP 6 - Plug in the Base Station's power supply.



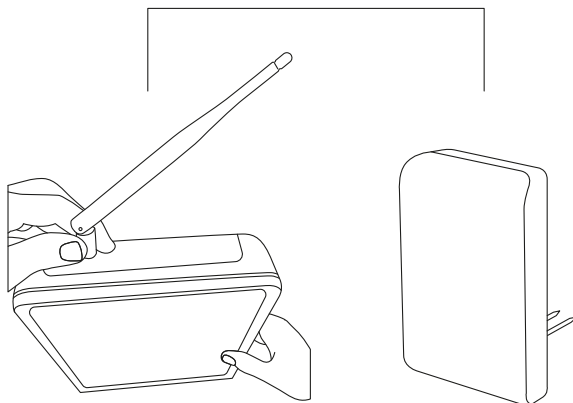
3.2 CARA MET CUBE



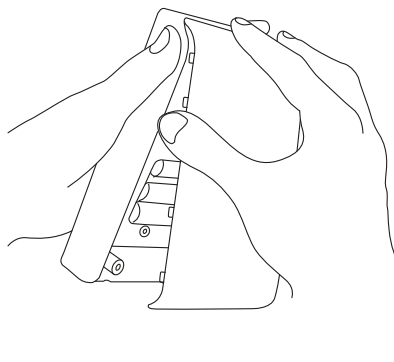
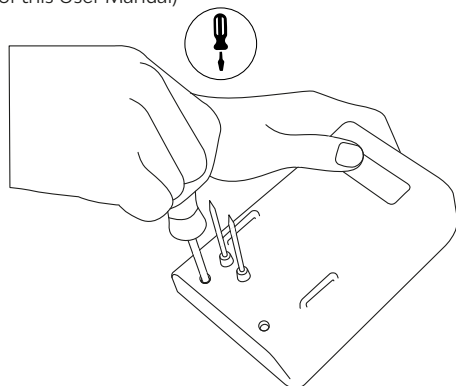
WARNING: following steps involve sharp elements which, if not handled with care, could result in serious injury. Take the appropriate measures for handling objects with sharp elements at all times.

STEP 1 - Walk to area where the CARA MET Cubes will be used (max. 50 meter (164 feet) radius from the Base Station).

Max. 50 meter (164 feet)



STEP 2 - Dismount enclosure lid and battery cover. (see chapter 6 'Replacing Batteries' of this User Manual)



STEP 3 - Insert batteries.

When Inserting the batteries, the LED on the CARA MET Cube should follow the sequence below.

LED FLASHING SEQUENCE

On start-up

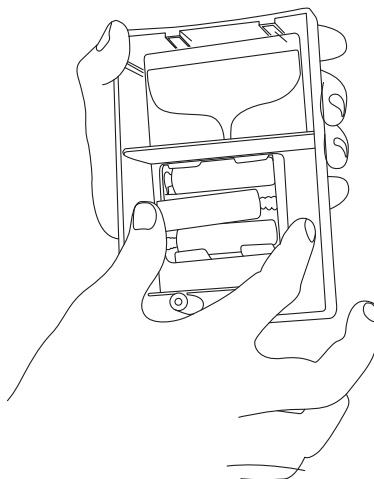
- 1 - Flash **RED** four times: Indicating microcontroller boot.
- 2 - Steady **RED** four seconds: Indicating CARA MET Cube startup.

Then, either:

- 3a - Flash **GREEN** three times: Indicating successful connection with the Base Station.
- 3b - Flash fast **RED**: Indicating connecting or connection problems. Please refer to chapter 7 'Troubleshooting' of this User Manual.

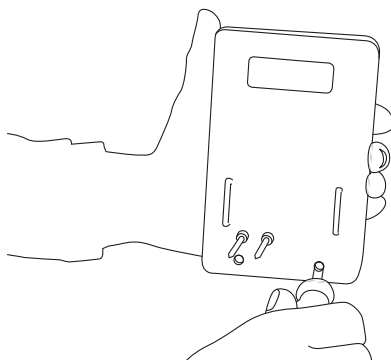
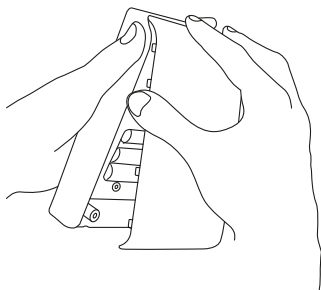
Mount battery cover.

Tighten battery cover sufficiently to limit possible leaks and damage of the CARA MET Cube.



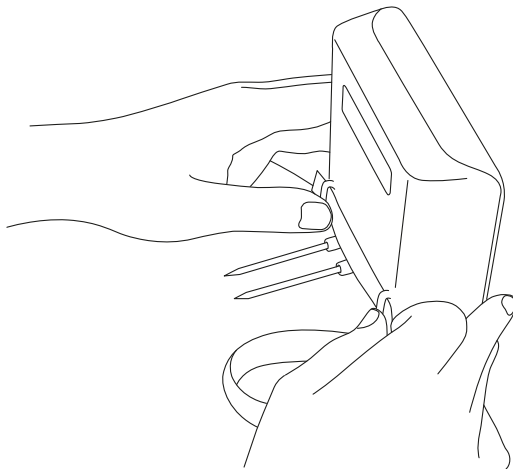
CAUTION: Risk of explosion if batteries are not inserted correctly or if an incorrect type of battery is inserted.

STEP 4 - Mount enclosure lid.

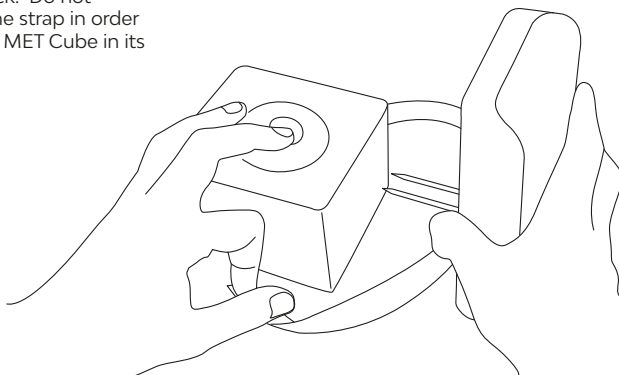


3.3 INSTALLING THE CARA MET CUBE

STEP 1 - Install the strap on the CARA MET Cube.



STEP 2 - Insert the CARA MET Cube into the block. Do not forget to secure the strap in order to keep the CARA MET Cube in its position.



4. POSITION IN THE BLOCK

In order to have a representative and consistent measurement between the CARA MET Cubes, the recommended distances from ground are:

- **65 mm** height block: insert CARA MET Cube on the surface level
 - **100 mm** height block: insert CARA MET Cube **20 mm** from the surface
 - **150 mm** height block: insert CARA MET Cube **35 mm** from the surface.
- For easy positioning of your CARA MET Cube, a separate holder accessory is available from SenseNL.



Figure 4.1 - Positioning the CARA MET Cube



Always position the CARA MET Cube at the wettest area. In the figure on the right, the CARA MET Cube would measure a lower MC and wrong EC measurements.

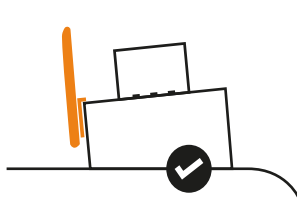


Figure 4.2 - Correct placement

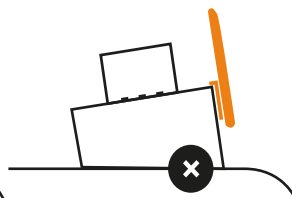


Figure 4.3 - Wrong placement

5. CLEANING THE CARA MET CUBE

Hygiene is of utmost importance in the greenhouses. Therefore, it is very important to keep a good cleaning strategy of the CARA MET Cubes. The design of the CARA MET Cubes is optimized to ease cleanability and reduce the possibility of water stagnation within it.

Thanks to its materials, many cleaning agents can be used.

HERE UNDER A LIST OF CLEANING AGENTS WHICH CAN BE USED TO CLEAN THE CARA MET Cube:

- Hydrogen Peroxide
- Amonia
- Alumonium, Chloride
- Diluted Ethanol (e.g. Enno Rapid)
- Dish soap



Use of an unspecified cleaning agent can damage the CARA MET Cube and is therefore not adviceable.

CLEANING PROCESS:

- STEP 1** - Clean the CARA MET Cube using a mild detergent such as liquid dish soap and a clean and non-abrasive sponge or cloth.
- STEP 2** - Use one of the cleaning agents mentioned above and clean the casing as well as the probes using a clean and non-abrasive sponge or textile. The cleaning agent can also be sprayed on the CARA MET Cube for a better result.
- STEP 3** - Thoroughly rinse the CARA MET Cube including every opening or gap noticed. The CARA MET Cube can be submerged in water.
- STEP 4** - Gently rinse with clean water or apply mid-temperature steam to the CARA MET Cube to finish the cleaning process.

6. REPLACING BATTERIES

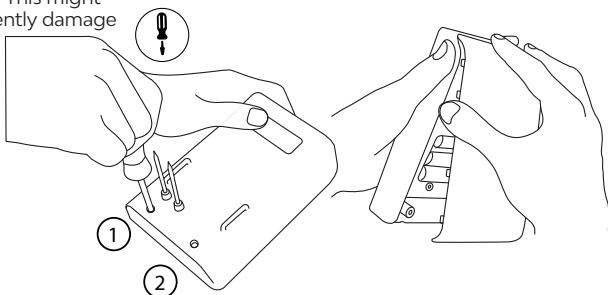


SenseNL recommends batteries "Procell Industrial AA" for an optimal battery lifetime.

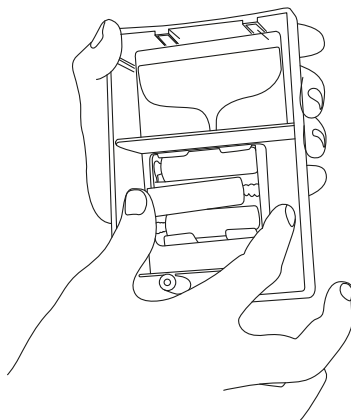
REPLACEMENT PROCESS:

STEP 1 - Unscrew screws 1 and 2.

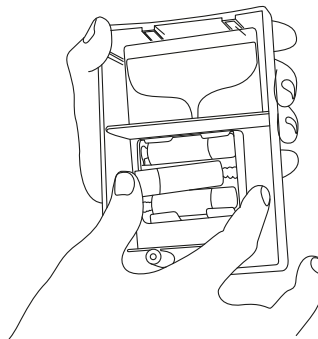
STEP 2 - Remove the enclosure lid and battery compartment cover. Never use a sharp tool to remove the cover. This might damage the seal and consequently damage the CARA MET Cube.



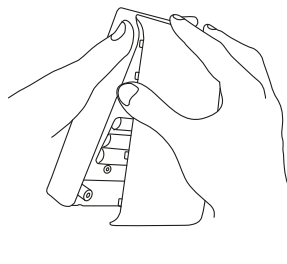
STEP 3 - Remove the batteries.



STEP 4 - Insert new batteries.
Please be aware of the polarity as shown on the battery holder.

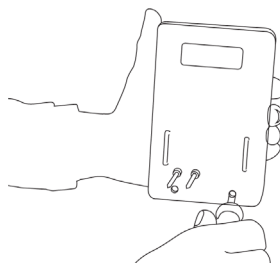


STEP 5 - Place battery cover and tighten well. Then place enclosure lid, ensuring it is correctly clicked in place and positioned in its grooves.



STEP 6 - Tighten screws to secure the enclosure lid.

Your CARA MET Cube is ready for use again.



CAUTION: Risk of explosion if batteries are not inserted correctly or if an incorrect type of battery is inserted.

7. TROUBLESHOOTING

The table below offers recommendations about what to do when problems with the CARA MET Cube arise. Before going through the questionnaire below, please ensure that the installation of the CARA MET Cube has been done precisely as described in chapter 3 and 4 of this User Manual.

Issue 1 - I cannot see my CARA MET Cube on the Web Application after installation.

QUESTION	YES	NO
a - Is the Base Station's power supply plugged in?	Proceed to the next question.	Plug the Base Station's power supply in and try again.
b - Is the LED on the Base Station continuously ON?	Proceed to question "f".	Proceed to the next question.
c - Is the LED on the Base Station flashing?	Reset the Base Station, if this condition continues, go to question "e".	Proceed to the next question.
d - Is the Base Station plugged into a working wall outlet?	Please contact Support for further assistance.	Turn ON the power of the wall outlet and try again.
e - Is there a good 4G-reception where the Base Station is installed?	Proceed to the next question.	Place the black antenna as high as possible and away from any metal object and try again.
f - Are all the CARA MET Cubes off?	Turn ONE of the CARA MET Cubes ON nearby the Base Station and proceed to the next question.	Turn all the CARA MET Cubes OFF. Turn only one (1) CARA MET Cube ON close to the Base Station and proceed to the next question.
g - Is the LED on the back of the CARA MET Cube turning GREEN after (max.) 1 minute?	The connection to the cloud is working correctly. Proceed to the next question.	Please contact Support for further assistance.
h - Are the data of the CARA MET Cubes visible on the Web Application now?	Ok, problem solved.	Proceed to the next question.
i - Are you using the SenseNL Web Application?	Please contact Support for further assistance.	Please contact the provider of your Web Application for further assistance.



SUPPORT

For any other question regarding installation and maintenance, please contact our Support department at support@sensenl.com.

Issue 2 - My CARA MET Cube stops working.

QUESTION	YES	NO
j - Are the batteries empty?	Please replace the batteries and proceed to the next question.	Proceed to question "g"
k - Are the battery connectors oxidated?	Clean the oxidated connection, replace the batteries and proceed to question "g"	Reset the CARA MET Cube by removing one of the batteries and placing it back again. Proceed to question "g".

Issue 3 - I cannot login into the Web Application. → Proceed to question "i"



RECYCLING

The environment we live in is unique. Save and cherish it, the future of this planet's biodiversity, fauna, flora and future generations is shaped by our actions today. There is no little action regarding environment.

Once the Products and Related Items have finished their life cycle, return it to sender, this will permit us to dispose of the Products and Related Items following local regulations.