QUICK-START GUIDE (QSG)

CAIRNET 3G/4G 6 sensors

APRIL 2021

ENVEA RECOMMENDS TO READ ALL THESE INSTRUCTIONS
BEFORE POWERING ON AND USING THE EQUIPMENT

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– Download the application.

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1. PRESENTATION

(1) Sample gas inlet, (2) Air exhaust, (3) antenna

Figure 1–1 – CAIRNET box presentation

(DO NOT obstruct the sample gas inlet, nor air exhaust).

In standard, each assembly is composed of:

- A CAIRNET box (serial number and cloud key – association code for CAIRCLOUD – supplied) including the following internal elements (see Figure 1–2):
  - An IQ-LINK electronic box (1) providing power supply, measurement recovery and cellular communication (by default, data is sent each 15 minutes).
  - A 23 Ah 3.7 V nominal [3.0:4.2 V] Li-ion battery, disconnected for transport (2).
  - An additional board (3) managing the autonomous operation (via battery + solar panels).
  - An angle-bracket (4) for CAIRSENS PM adaptation.
  - Six slots to insert CAIRSENS gas, closed with plugs (5).
  - Six micro-USB cables (6) to be connected to the CAIRSENS sensors.
  - A fan (7) to draw air into the manifold (8).
  - A temperature, relative humidity and atmospheric pressure probe (9).
  - A coaxial cable (10) for connecting the IQ-LINK to the external antenna.
  - A radio antenna (11) to be screwed outside the box (unscrewed for transport).
  - Three cable glands (12) for cable passage from outside.
- A fastening system (plate + stirrups) for CAIRNET fixation.

The following items can be provided as an option:

- An 18 VDC / 1A power supply for indoor use, for one-off battery recharging before on-site installation.
- A 12 VDC/ 2.1A power supply for outdoor use in its waterproof box, for the continuous power supply of the CAIRNET via the 8-30 VDC input of the IQ-LINK.
- Two 13.5W solar panels to be mounted on a tilting support, and a fixation system on mast. These solar panels are supplied with cables fitted with telemechanical ends, to be connected to the CAIRNET.
- A mobile tripod or fix holders (tube 0.30m x 0.28mm or 1.5m x 0.28mm) for installation.

WARNING : **The communication system requires a (data) M2M SIM card in (3FF) Micro-SIM format, compatible with GSM networks (3G/4G).**

The type of subscription with the provider must be for sending and receiving data (data package).

CAIRNET (incoming and outgoing) data consumption is less than 100 Mo per month. Plan a package adapted to this volume.

The user has to activate the SIM card before use and get the corresponding APN to configure the modem.

The SIM card used must not be blocked by a PIN code. If it is, unlock the SIM card with a smartphone or ask the provider.

Wireless/cellular remote communication mode: network deployment over a large area in an urban, industrial or rural environment is performed within the telephone coverage limits (3G/4G).

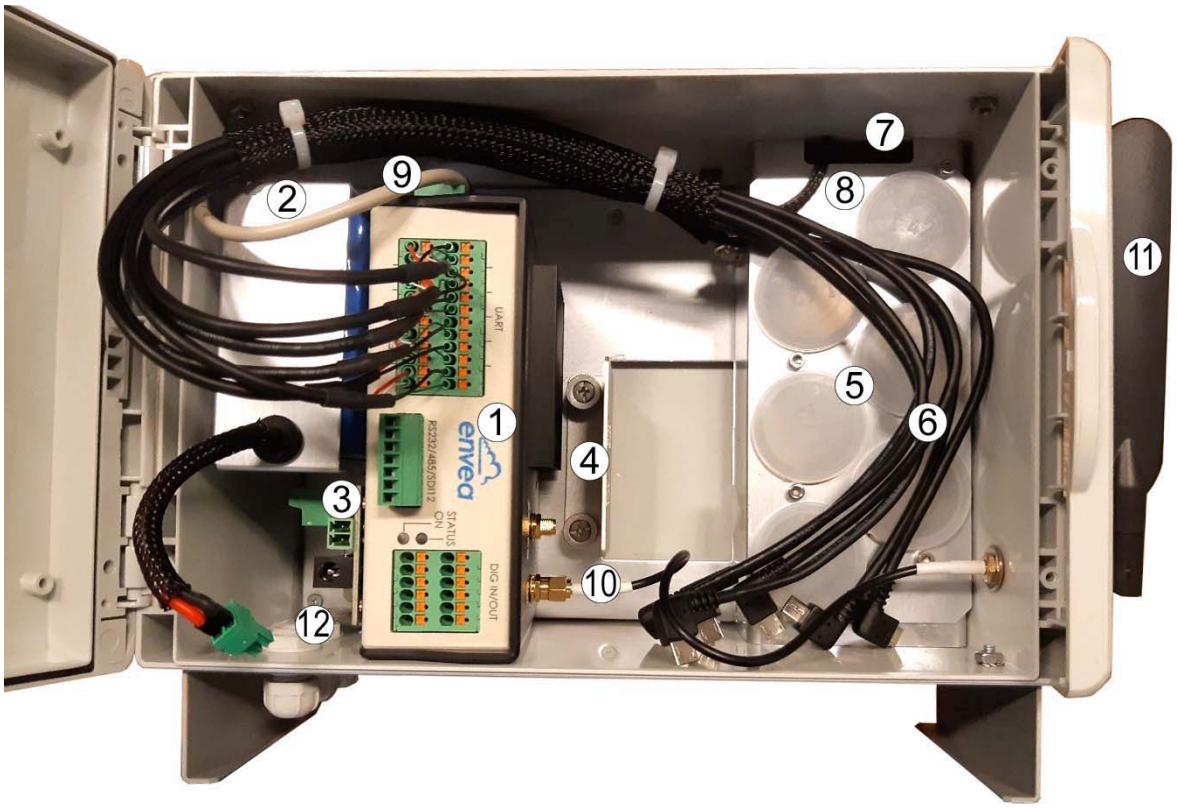


Figure 1–2 – Internal elements of the CAIRNET box

Figure 1–3 – On-mast fixation system

IQ-LINK connectics description:

– On the IQ-LINK top panel, the connectors have the following functions :

- DC mains power supply (1), 8-30 VDC, 2A. The 2-pin male connector is only supplied with the 12 VDC/ 2.1A waterproof power supply option for outdoor use.
- Temperature Humidity Pressure sensor (THP) (2).
- Fan (3).
- Cellular communication switch (4). The user presses down this button once to wake up (reactivate) the cellular communication system which switches to APN configuration mode (see 2.6), or forces a data sending cycle to the cloud.
- Not used (5).
- Not used (6).
- Not used (7).
- Heat sink (8).

Take care of burn hazard due to heat sink contact

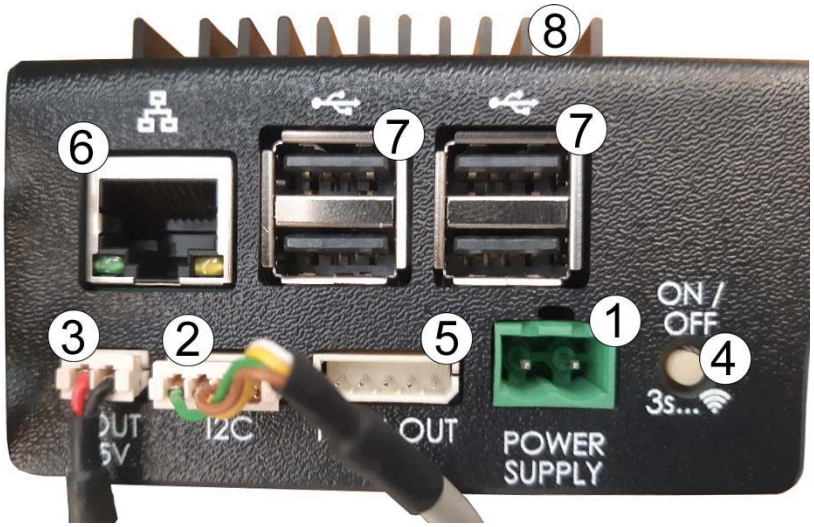


Figure 1–4 – IQ-LINK top panel connections

– On the IQ-LINK front panel, connectics is as follows:

- 6 micro-USB cables for connection to the CAIRSENS (2) range sensors. The color code of cables is as follows (see Figure 1–5 to view the (black/red/green/white) connection order :

Black	Red	Green	White
GND	VDC	D+	D-

- Two ON and STATUS LEDs (1) to indicate the system operation status. Only one LED operates at once: ON is blue, STATUS is green or red. The LEDs status are described below :

  ⇨ Both ON and STATUS LEDs are off AND the battery is correctly connected: the battery is completely unloaded or the electronics malfunctions.

  ⇨ The ON LED is blue and flashes: the system operates autonomously via the battery and the solar panels.

  ⇨ The ON LED is continuously blue: the system is supplied with direct current from the IQ-LINK mains (8-30 VDC, 2A).

  ⇨ The STATUS LED is continuously red: the system has a power supply problem OR the battery is almost unloaded.

  <u>Sending data to the cloud:</u>

  When sending data to the cloud, both these LEDS respect the next cycle:

  1 – The ON LED is blue and flashes: the CAIRNET is powered on and operates properly.

  2 – The ON LED turns off and the STATUS LED is green and flashes: wake-up (reactivation) of the cellular communication system.

  3 – The STATUS LED turns red and flashes: measurement recovery from the various sensors and data sending preparation.

  4 – The ON and STATUS LEDs turn off: connection to CAIRCLOUD and data sending.

  5 – The ON LED turns again to flashing blue: the data sending cycle is completed, and the CAIRNET operates normally.

- (3) and (4) not used.

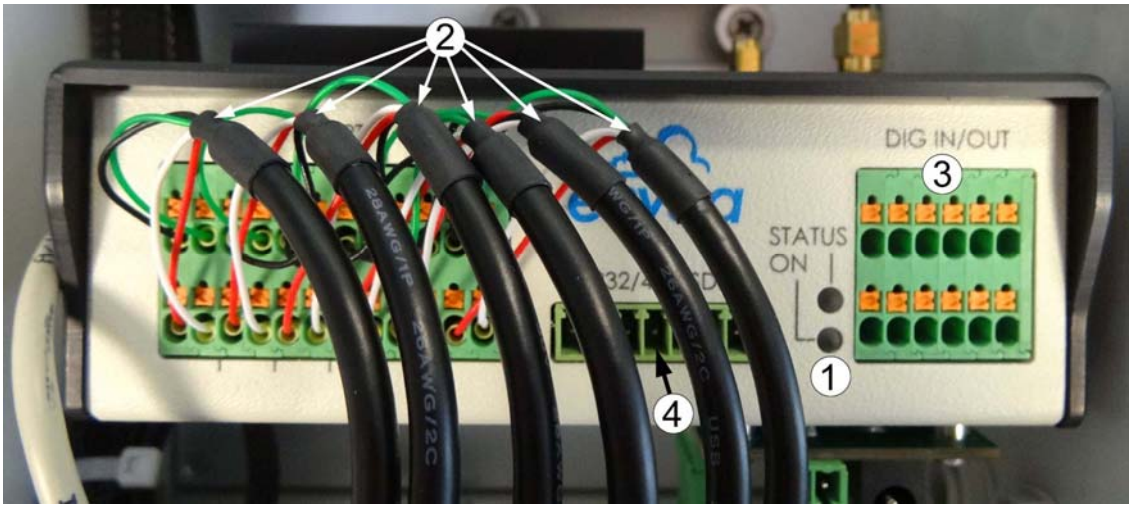


Figure 1–5 – IQ-LINK front panel

2. INSTALLATION AND COMMISSIONING PROCEDURE

2.1. OPEN THE BOX

See Figure 1–1.

The CAIRNET box is fitted with two hinges used to close and ensure water tightness of the top cover. One of the two hinges opens manually and enables to access inside the CAIRNET (see Figure 2–1, Manual opening hinge).

The other closing hinge can be open with a flat screwdriver size 3.0 (see Figure 2–1, Screwdriver-opening hinge).

For on-site locations where dimensions does not allow the CAIRNET box cover to be opened correctly, the two hinges can be interchanged in order to reverse the opening direction.

The cover can be directly screwed on the box to block up the manual opening, from one side or the other, or both at the same time. The (M3x8 type, not supplied) screws are under the locking hinge and thus are hidden. (See Figure 2–1, Screw holes).

Manual opening hinge | Screwdriver-opening hinge | Screw holes

Figure 2–1 – CAIRNET box opening

2.2. SCREW THE EXTERNAL RADIO ANTENNA

The antenna is dismounted before transport, it has to be reassembled during installation. To do this:

- Screw the antenna on the lateral side of the CAIRNET box (Figure 2–2).
- Make sure that the antenna is pointing upwards, with no obstacles around, to ensure an optimum signal.

Figure 2–2 – Radio antenna of CAIRNET

The cable linking the external antenna to the IQ-LINK is fixed on one side to the internal panel of the box, and on the other side to the IQ-LINK box connector identified with an "Antenna" icon:

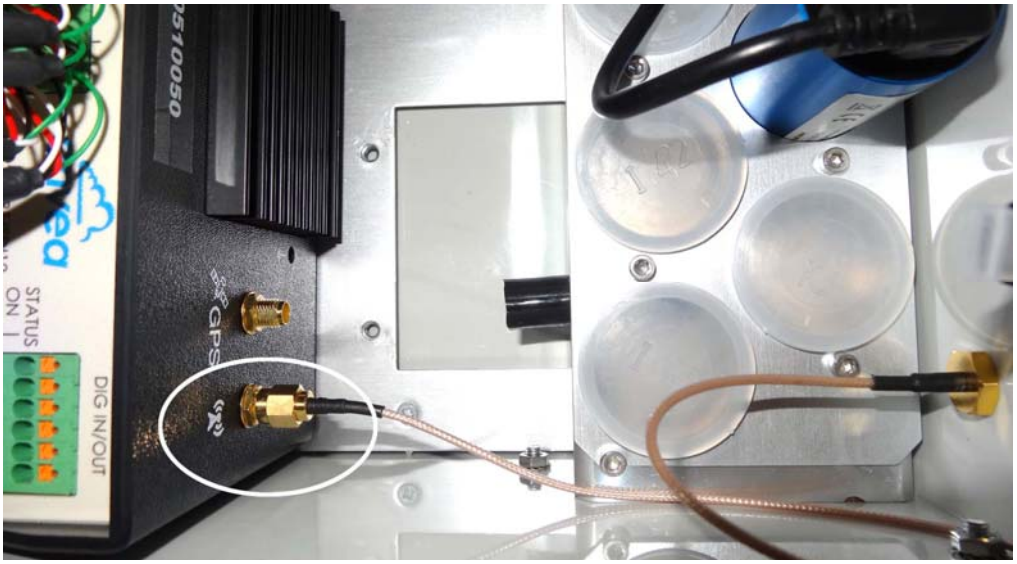


Figure 2–3 – Connection of antenna cable to IQ-LINK

2.3. FREE THE IQ-LINK

The IQ-LINK box is screwed on two angle brackets fixed to the bottom plate of the CAIRNET: it is necessary to free it to make easier access during the various commissioning operation. To do that:

- Unscrew the screws of the two angle brackets holding the IQ-LINK to the bottom plate,
- Gently pull the IQ-LINK upwards to remove it from the CAIRNET.

2.4. INSTALL THE CAIRSENS PM

The procedure to be applied is as follows:

- Free the IQ-LINK as indicated in section 2.3 to access the CAIRSENS PM angle bracket. See (4) Figure 1–2.
- Unscrew the CAIRSENS PM angle bracket with a flat screwdriver and remove it.
- Remove the plug sealing the hole on the left side of the manifold.
- Take the CAIRSENS PM in its kit: it is delivered with a sampling tube, and is equipped with 4 screws inserted on its side. Fix the CAIRSENS PM on the angle bracket with these 4 screws (see Figure 2–4).
- Cut the sample tube to a 3.5 cm length.
- Connect the sample tube to the CAIRSENS PM sample inlet on one side, and into the manifold opening on the other side.
- Reassemble the CAIRSENS PM screwed on its angle bracket in the box and adjust the sampling tube.

Figure 2–4 – Screwing the angle bracket on the CAIRSENS

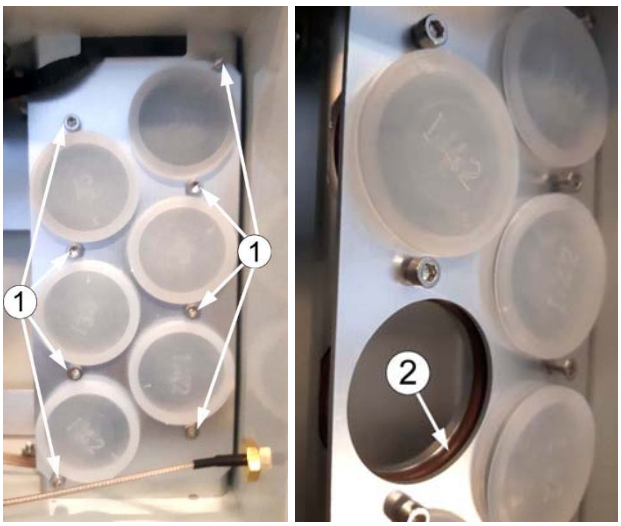
2.5. INSTALL THE CAIRSENS

See Figure 2–5 :

- Unscrew the 8 hexagonal screws of the sensor holding plate with a 2.5 mm Allen wrench (see (1) of Figure 2–5). Remove the plug(s) where the CAIRSENS will be inserted.
- Slightly unpaste the holding plate of seals (2). This reduces the seal compression caused by the plugs to recover their initial shape and be correctly adapted to the CAIRSENS cylinder.
- Insert the CAIRSENS until limit stop, into the air sampling system body, by placing the fan inside and the screen outside, as shown at (4) of Figure 2–6.
- Tighten all screws. Check that the CAIRSENS is correctly held by the seal to avoid any air "leak".

See Figure 2–6 :

- Remove the CAIRSENS cap on front panel to connect the micro-USB cable (4).



(1) screws to be unscrewed, (2) seal

Figure 2–5 – Dismounting seals from the holding plate

(4) Micro USB cable

Figure 2–6 – Setting up the CAIRSENS in the sampling area

2.6. CONFIGURING THE ACCESS POINT NAME (APN) AND TESTING THE CONNECTION TO THE TELEPHONE NETWORK

The parameter setting must be done on a CAIRNET assembly equipped with an IQ-LINK having the antenna correctly mounted and the coaxial cable correctly connected to the IQ-LINK. (See Figure 2–2 and Figure 2–3).

WARNING : DO NOT insert the SIM board at this step.

1) Power on the IQ-LINK by connecting the CAIRNET battery to the board managing the autonomous mode (battery + photovoltaic panels) mounted rear the IQ-LINK (see (2) and (3) Figure 1–2).

   If the system operates correctly, the ON LED of the IQ-LINK gets on and blue, and flashes.

   If the battery load is too weak, the ON LED gets on and red: load the battery using the 18V power supply.

2) Press down the ON/OFF button (4) of Figure 1–4 to launch the APN configuration mode: the STATUS LED gets green and flashes, which indicates the configuration mode is active. This mode remains active during 20 minutes while the IQ-LINK generates a WI-FI signal to be connected to.

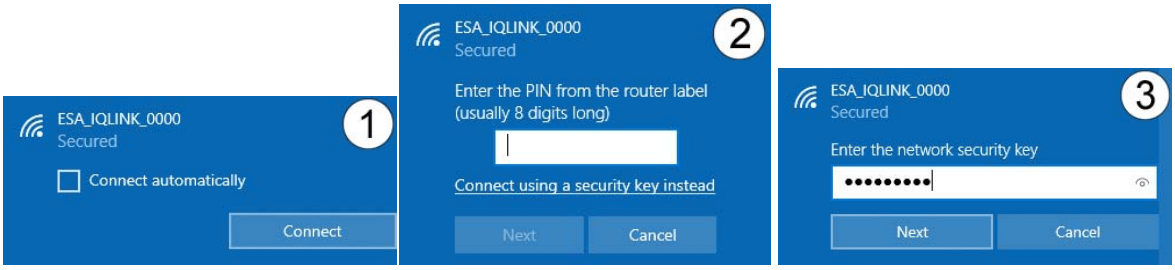
   When time is over, it is necessary to power off and repeat steps 1) and 2).

3) Get a hardware (computer, smartphone, tablet) having a WI-FI network.

4) Activate WI-FI and search for the list of devices.

5) Connect to the « ENVEA_IQLINK_0000 » network: it is necessary to wait for 1 to 2 minutes after the STATUS LED gets on and green to see the network. Three windows open successively :

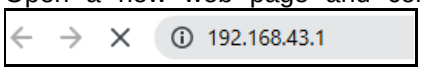
   - In the window (1), check the « Connect automatically » box and press down « Connect ».
   - In the window (2), click on « Connect using a security key instead »,
   - In the window (3), enter the network security key « 123456789 » and press down « Next ».



From this point on, two possibilities are available for model configuration: either via a web browser (different from Internet Explorer), or via the ENVEA Connect application.

A – Via a WEB browser (Google Chrome, Mozilla Firefox, Safari …), not compatible with Internet Explorer

See Figure 2–7.

1) Open a new web page and connect to the address 192.168.43.1 in the web site address bar 

: the ENVEA IQ-LINK configuration page is launching.
2) In the INFO section: check that the displayed numbers of CAIRNET serial and CAIRCLOUD key (1) correspond well to the CAIRNET being configured.
3) In the GSM CONFIG section: fill in the three « APN », « Username », « Password » fields corresponding to the mobile network operator of the used SIM card. See « Network operator information (2) ». Note: the Username and Password fields can be left blank. Pay attention to press down « Save (3) ».
4) Refresh the page and check the APN parameters are well taken into account.
5) Test the modem communication. To do that :
   a. Insert the micro SIM card as described in section 2.7.
   b. Check the antenna and its extension cord are correctly linked to the IQ-LINK.
   c. Press down « Connect » (4) to start the cellular connection test. It may last a few minutes. When the test is finished, the « Operator », « State » and « Signal » fields are filled in. See (5) giving the results of the network connection tests.
   d. If the test fails, run it again.

OPERATOR field: it indicates the operator used by the SIM card to be connected to a cellular network.

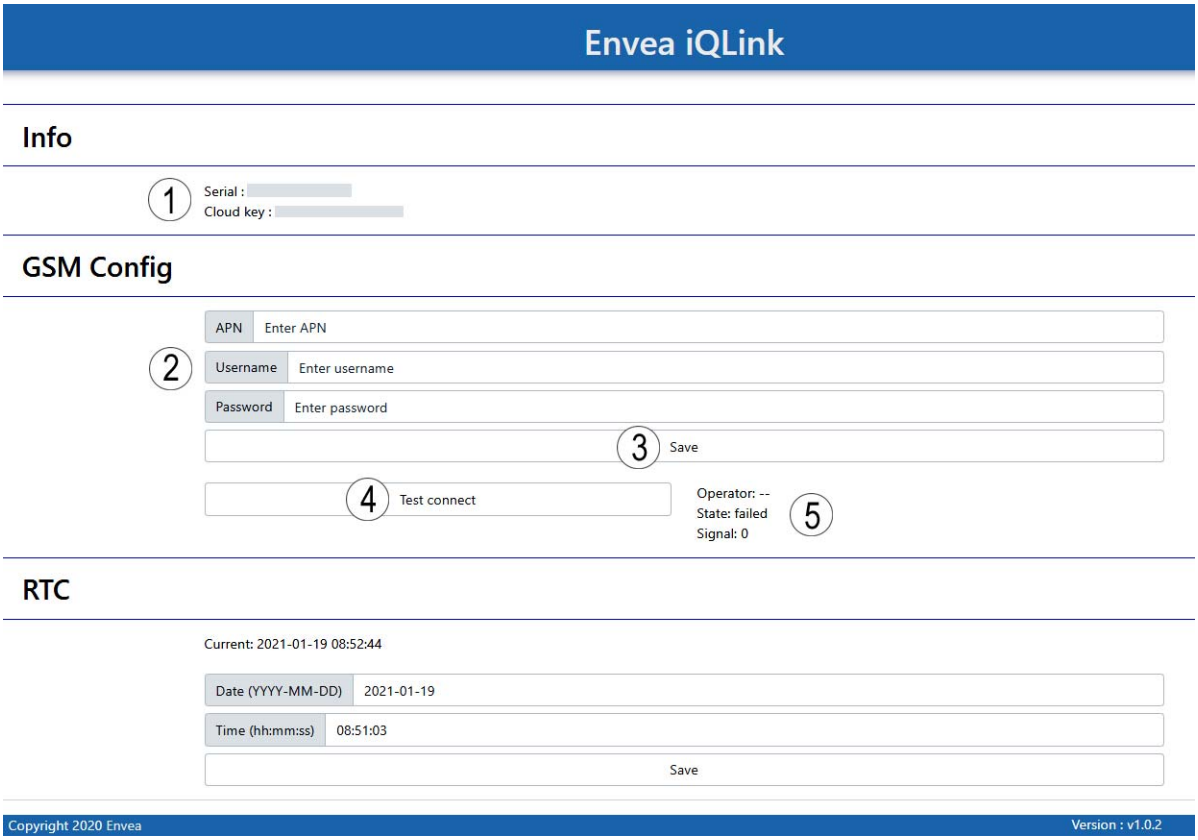
STATE field: it can send 4 status:

– « Connected »: the connection is on and operational,
– « Connecting »: the connection is being finalized and requires some additional waiting time,
– « Registered »: the modem is connected to a cellular relay, but is blocked before the network connection is finalized. Check that :
  - The setting of APN, USER and PASSWORD fields is correct,
  - The SIM card is well active, not blocked, not locked by a PIN code.
– « Not connected » or blank field: the connection cannot be established. Repeat the test.
– « Locked »: the SIM card is blocked by a PIN code. Unlock with a smartphone or check with the operator.

  If the connection is still not established, check that:
  - The APN, USER and PASSWORD information was well entered,
  - The SIM board is correctly inserted and the antenna is well wired.

  If it still does not work, contact technical support.

SIGNAL field: indicates the network signal quality based on a 0-100 % scale (0 %: bad, 100%: good).



(1) CAIRNET serial number and CAIRCLOUD key, (2) network operator information, (3) save button, (4) test connect button, (5) results of network connection test.

Figure 2–7 – ENVEA IQ-LINK configuration interface

B – Via the « ENVEA Connect » application

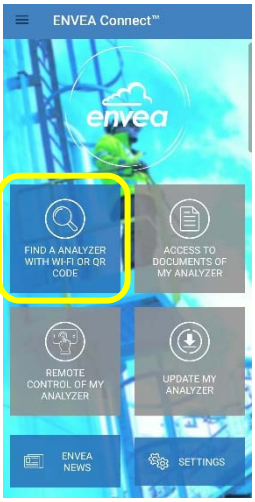
The “ENVEA Connect” application for Smartphone/Tablet can be download as follows:

- Enter the address « https://www.envea.global/envea-connect/ » in the Smartphone/Tablet internet browser, or directly enter “ENVEA connect” in the Play store (Android) or in the App store (iOS),
- Download the application.

When the application is downloaded:

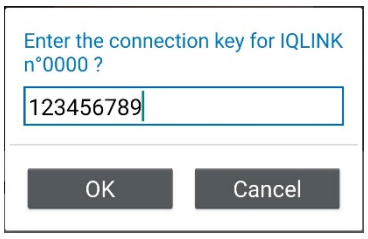
1 – Touch/click on the icon to start the ENVEA Connect application. If it is the first connection, accept the access authorization requests (WI-FI, Geolocation, etc.)

Touch the icon « FIND AN ANALYZER WITH WI-FI OR QR CODE ».



2 – Place two fingers on top of the screen and slide them down to display the list of Wi-Fi devices. Touch « IQLINK n°0000 » to select the IQ-LINK.

The input field is displayed: touch this field to display the input keyboard, enter the connection key 123456789 for the selected IQ-LINK and validate by touching « OK ». « Cancel » closes the input field without validating



Note: the camera section to scan a QR code is not used.

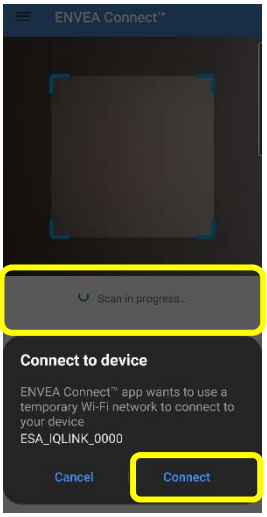
3 – Connect to device

The smartphone/tablet searches for the available Wi-Fi network to connect to. The following message is displayed on the screen:

« ENVEA Connect app wants to use a temporary Wi-Fi network to connect to your device».

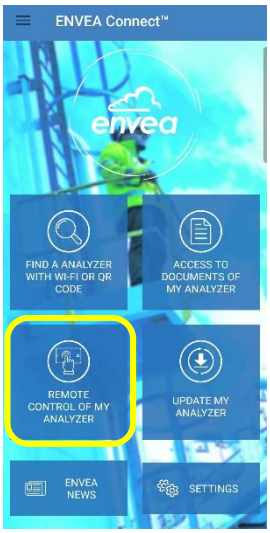
ESA_IQLINK_0000 is the CAIRNET Wi-Fi address.

Touch « Connect » to allow the smartphone connection to the CAIRNET Wi-Fi network.



4 – When the connection is established, the home screen is automatically displayed with the « REMOTE CONTROL OF MY ANALYZER » unlocked icon.

Touch this icon.



5 – The ENVEA IQ-LINK page opens: follow the procedure described from **A – 2). (page 15)**

WARNING: The functionalities of the ENVEA Connect application are only active when there is an available Wi-Fi network the user can connect to.

2.7. INSERT THE MICRO SIM CARD IN THE IQ-LINK

The micro SIM card should be inserted when the APN setting and connection test are completed.

- Access the IQ-LINK box previously freed from the bottom plate (see § 2.3).

  The SIM card is to be inserted in the lower part of the IQ-LINK, not shown when assembled inside the CAIRNET.
- Tilt over the IQ-LINK box or remove it from the CAIRNET. The cable length is sufficient to insert the micro SIM card without disconnecting the elements.
- Insert the micro SIM card until limit stop, into the intended-for slot, chip downwards, as shown in Figure 2–8. When completely inserted, the micro SIM card is no longer visible from the front.
- Replace the IQ-LINK box in the CAIRNET box and fix it again.

Figure 2–8 – Micro SIM card insertion

2.8. CAIRNET SYNCHRONISATION WITH THE CAIRCLOUD ACCOUNT

This operation has to be performed after the modem configuration step (§ 2.6) in order to synchronize the configured CAIRNETs with the CAIRCLOUD account on which the measurements will be visible.

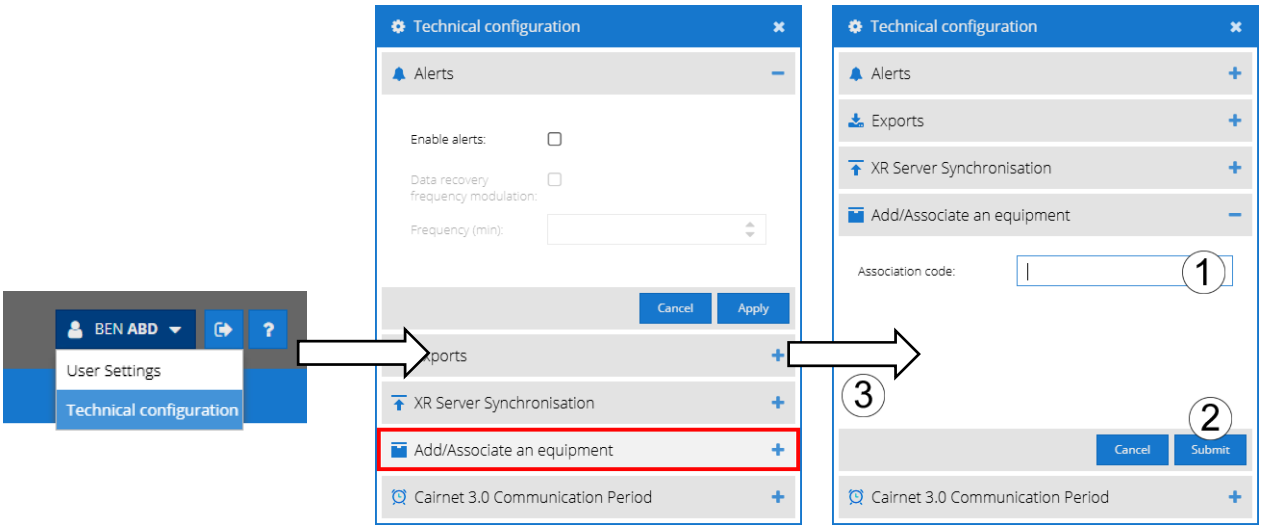
REMARK : The CAIRNET has to operate and send a first batch of data (at least one data transmission after 15 minutes of power supply) after the configuration step to be acknowledged in the CAIRCLOUD, before carrying out the synchronization step.

– The CAIRNETs are identified by their serial number. First, copy the cloud key of each CAIRNET present on the label pasted in the lower left corner of the box door (Figure 2–9). This cloud key is also visible in the ENVEA IQ-LINK interface previously used for modem information configuration. In this case, a copy and paste avoids typing errors of cloud key characters (see section 2.6).

Figure 2–9 – CAIRNET label with serial number and cloud key

– Connect to the http://caircloud.iseo.fr/login web site and identify with username and password corresponding to the user account. For more information about CAIRCLOUD operation, click on ? to open the available user guide.

– Then, perform the CAIRNETs association to be synchronized with this user account so that the data retrieved by the box be linked to this account, and only visible on this account. Follow the Figure 2–10 diagram.



At the top right, click on the registered account user name, then go to "Technical configuration".

Then, go to the “Add/ Associate an equipment” tab

(1) enter the code here,
(2) press down “Submit” to validate
(3) repeat the procedure for each cloud key

Figure 2–10 – CAIRNETs association with a CAIRCLOUD user account

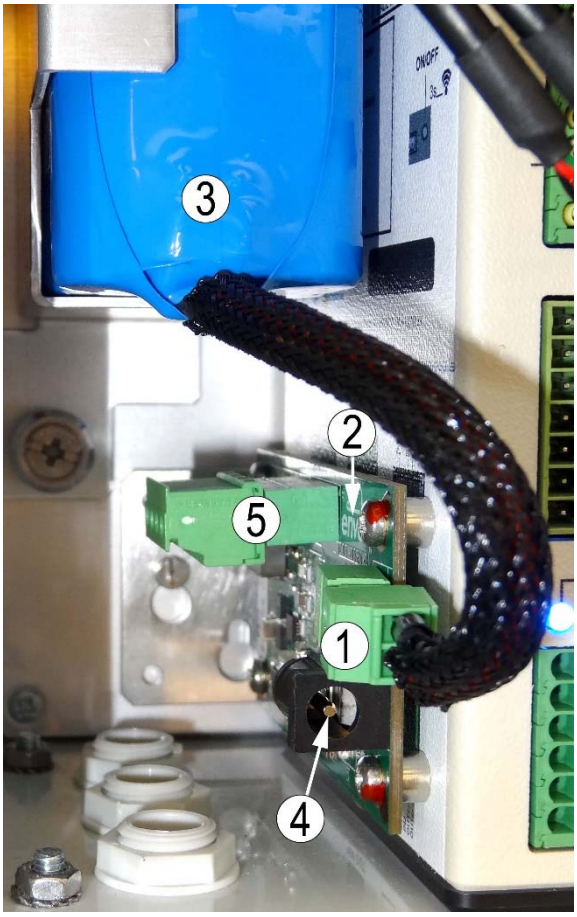
2.9. POWERING ON VIA THE BATTERY AND ONE-OFF RE-LOAD

– Connect the battery (3) to the connector (1) of the battery supply board (2), as shown in Figure 2–11. From this time on, the system is powered up and running.

When starting the system on battery, a red LED flashes for a few seconds indicating the system initialization. A blue LED indicates that the system is in standard operation. See the LED status in the Presentation section.

When initialization is finished, the upper fan draws in air, the CAIRSENS screen indicates the measurement performed and the data transmission to the cloud is done automatically at regular intervals.

The jack connector (4) is used to occasionally re-load the battery with the 18 VDC / 1A power supply for indoor use. Take care of burn hazard by contact with the power supply board during charging with power supply.



(1) Connector, (2) battery power supply board, (3) battery, (4) battery re-load via the 18 VDC / 1A power supply for indoor use, (5) solar panel connector.

Figure 2–11 – Battery connection to the power supply board

WARNING : **1 – It is strongly recommended to re-load the batteries (> 4 V) with the 18V 1A mains supply before autonomous operation on site.**

2 – If the autonomous power supply board is disconnected from the IQ-LINK, NEVER reconnect it with power on as this irreversibly damages the system.

2.10. SOLAR PANEL CONNECTION

This operation has to be done when the autonomous power supply board is mounted on the IQ-LINK.

Each of the two solar panels of the photovoltaic kit has a sheath containing 2 cables (blue= - / brown= +), fitted with telemechanical ends for connection to the 4-pin connector of the autonomous power supply board located on the lateral side of the IQ-LINK. To do that:

- Check that the device is powered off before performing this operation.
- Free the IQ-LINK electronic box from the CAIRNET to access more easily to the cable connection system (see § 2.3).
- Pass each of the cables through the cable glands at (12) of Figure 1–2.
- Connect the cables to the 4-pin connector to be screwed as indicated in Figure 2–12, from left to right (Solar panel PS2 (-), Solar panel PS2 (+), Solar panel PS1 (-), Solar panel PS1 (+).

  DO NOT cross the wires of 2 different solar panels.
- Check that the cables are well held in the connector to ensure electric contact.
- Put back in place the IQ-LINK in the CAIRNET.
- Power supply the assembly via the battery (see § 2.9) which will be re-loaded by these two solar panels.

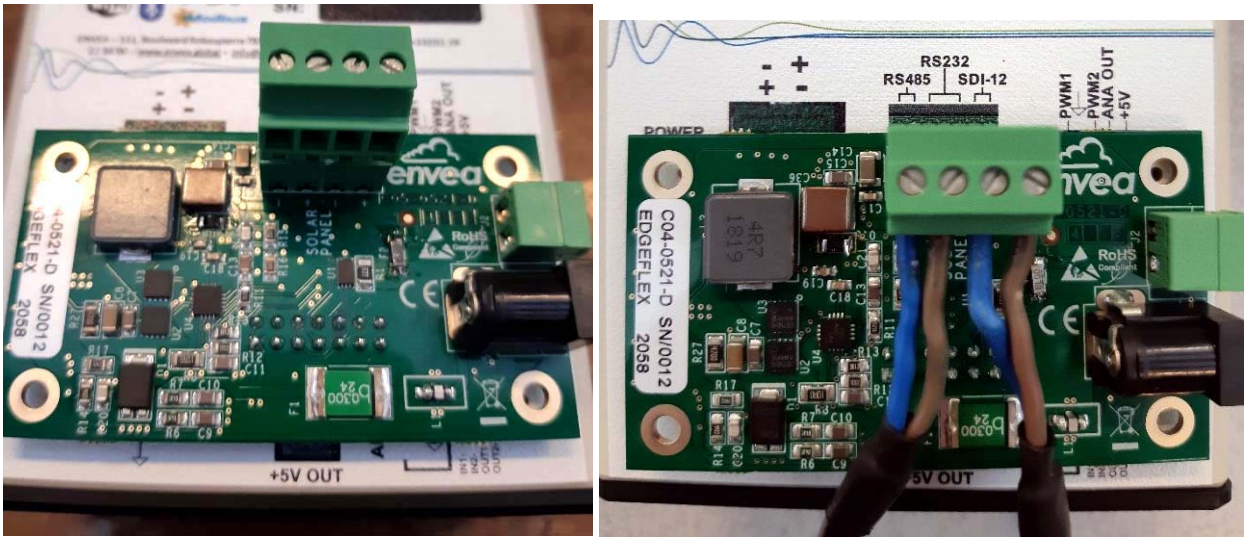


Figure 2–12 – Solar panel wiring on the power supply board

2.11. DC MAINS POWER SUPPLY

The CAIRNET can be supplied in continuous via the 8-30 VDC input of the IQ-LINK (see (1) Figure 1–4). This enables to bypass the autonomous power supply board and the battery. In this case, the 12 VDC/ 2.1A waterproof power supply option for outdoor use has to be used.

To install this option, it is first necessary to disconnect the autonomous power supply board from the IQ-LINK:

- Disconnect the battery,
- Free the IQ-LINK as detailed in section 2.3,
- Unscrew the 4 screws to extract the board. Then, replace the IQ-LINK in the box.

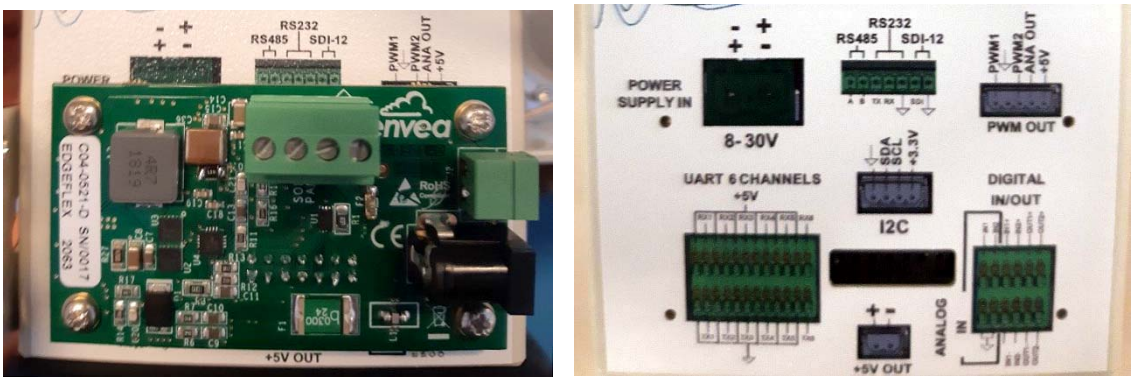


Figure 2–13 – Autonomous power supply board of the IQ-LINK

Then, the option connector has to be connected to the IQ-LINK. To do that:

- Remove the 2-pin connector from the 12 VDC option,
- Pass the sheath containing the 2 cables (1 red (+) 1 black (-)) through one of the cable glands,
- Reconnect the 2 cables to the 2-pin connector.

  NOTE: there is no polarity to be respected for connection to IQ-LINK.
- Connect the 2-pin connector to the 8-30 VDC IQ-LINK input (see Figure 2–14).
- Connect the 12 VDC power supply to mains: the CAIRNET is then supplied in continuous.

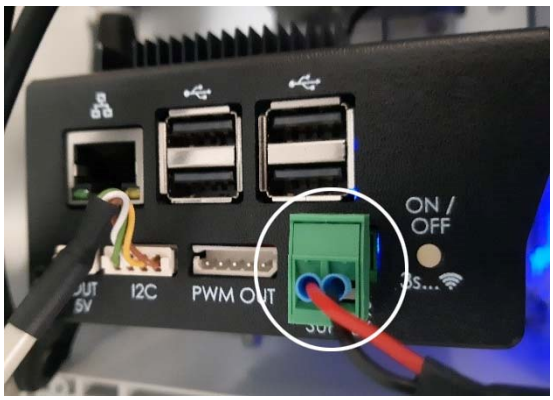


Figure 2–14 – Connection of the 2-pin connector to the 8-30 VDC IQ-LINK input

2.12. FIXATION ON HOLDER

For the box:

- Perform the installation with POWER OFF.
- Fix the CAIRNET holder on the intended-for tripod mast: loosen the 2 bolts to separate the holding jaws and install the assembly (see Figure 1–3).
- Then, position the CAIRNET on its fixation holder with the hexagonal screws fixed on the rear panel of the boxes to be inserted in the intended-for lock holes (Figure 2–16).

For solar panels:

- The black adapting piece with stirrups to be fixed on the solar panel holder is not assembled to facilitate transport: fix it with the 4 hexagon socket screws (5 mm Allen key).
- Fix the solar panels on their holder, block them with the hexagon screws (2.5mm).
- For installation on mast with jaws, do the same as for the box holder. See Figure 2–15.
- For a better yield, orient the solar panels to the South (for the northern hemisphere, and inversely for the southern hemisphere).
- Adjust the inclination angle of the solar panel holder with the pin.
- The optimum inclination angle varies with the seasons in order to optimize the yield: 60° in winter, 45° in spring, and 20° in summer.

Figure 2–15 – Fixation of CAIRNET holder and solar panels to the tripod mast

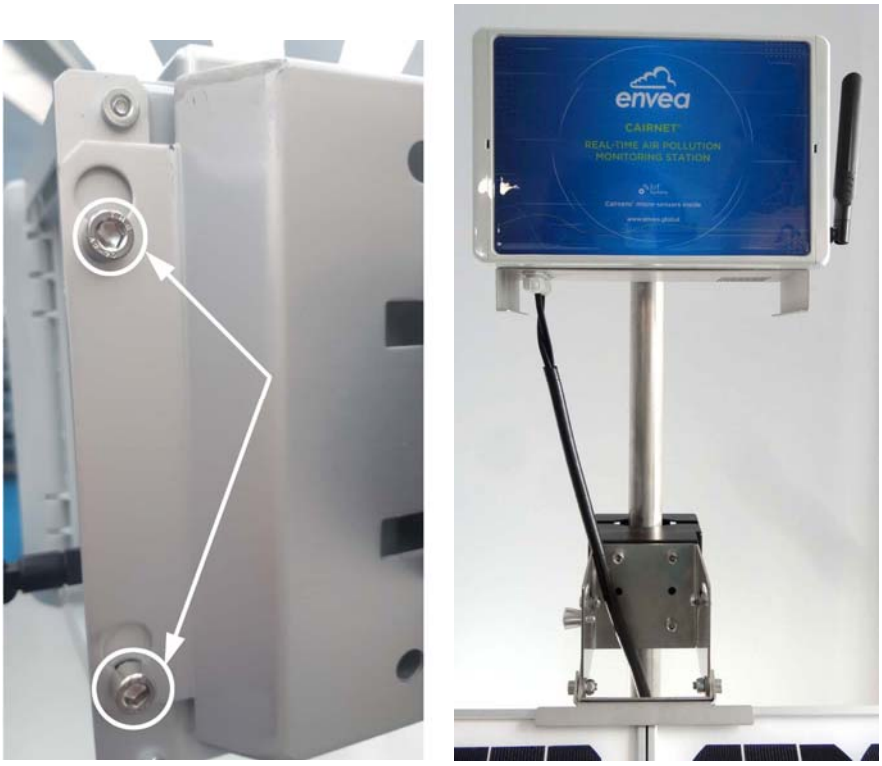


Figure 2–16 – CAIRNET installation on its holder

2.13. STARTING ON

There is no ON/OFF button. As soon as the box is powered on, it starts operating in its normal status.

Disconnect it to power off.

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