

IoT BOX

Installation Guide



Simplify BMS



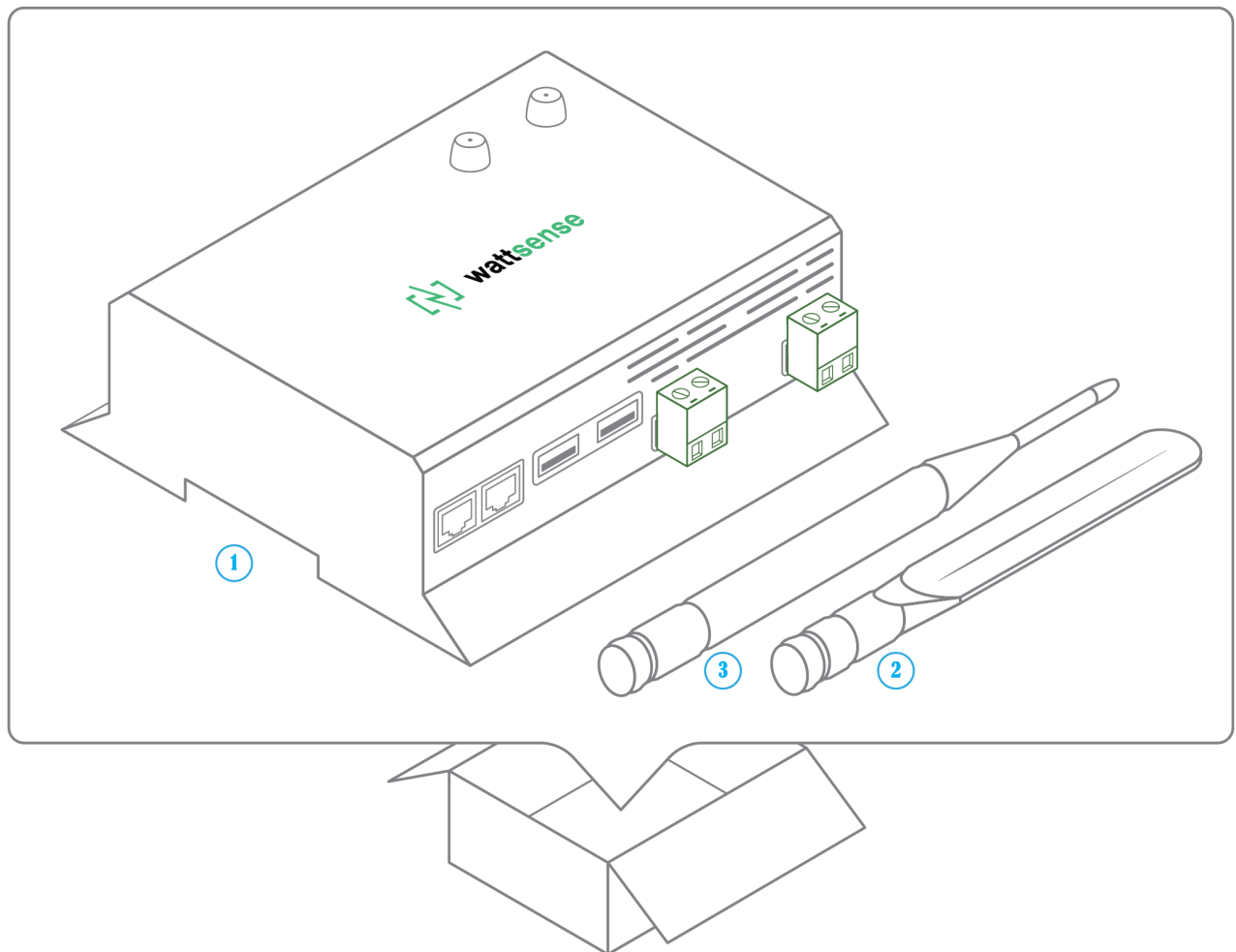
Table of Contents

What do you need before starting?	2
Provided material	2
Optional hardware depending on the type of connection	3
Computer access to the Wattsense console	3
The power supply of the Box	4
GSM Antenna	10
To connect the Box to the BMS	11
In case of IP network (Except LON)	12
In case of LON IP-852 network	14
In case of LON FT10 network	16
To connect the Box directly to the technical equipment in the absence of a BMS	18
The equipment communicates in Modbus IP	18
The equipment communicates in Modbus RTU (RS485)	23
The equipment communicates in BACnet IP	27
The equipment communicates in LON FT10	30
The equipment communicates in LON IP-852	32
The equipment communicates in LPB	34
The equipment communicates in KNX	35
The equipment communicates in M-BUS	36
To connect the Box to LoRaWAN sensors	37

What do you need before starting?

Provided material

- Box
 - Dimensions: 160 x 110 x 55 mm
 - Weight: 340 g
- GSM standard antenna
- LoRa standard antenna



Required material

- Powerline voltage (100 to 250VAC) to 12-24V DC +/-10%, 2A Max. Power supply
- Cable between the power supply and the Box: 2 wires (red, black), 22 AWG, minimum section: 0.35 mm²
- Flat screwdriver
- Cutting pliers
- Wire stripper

Optional hardware depending on the type of connection

- Bus connection cable: 2 wires, 24 AWG, minimum section: 0.22 mm² + braid
- Ethernet cables
- Ethernet switch
- Echelon U60 FT DIN USB Gateway (for LON FT10)
- High-gain GSM antenna
- High-gain LoRa antenna
- GSM or LoRa antenna cable
- Double-sided high performance adhesive tape
- Technical documentation of equipment
- Technical documentation of IoT sensors
- Schematic of the communication network(s) of the BMS

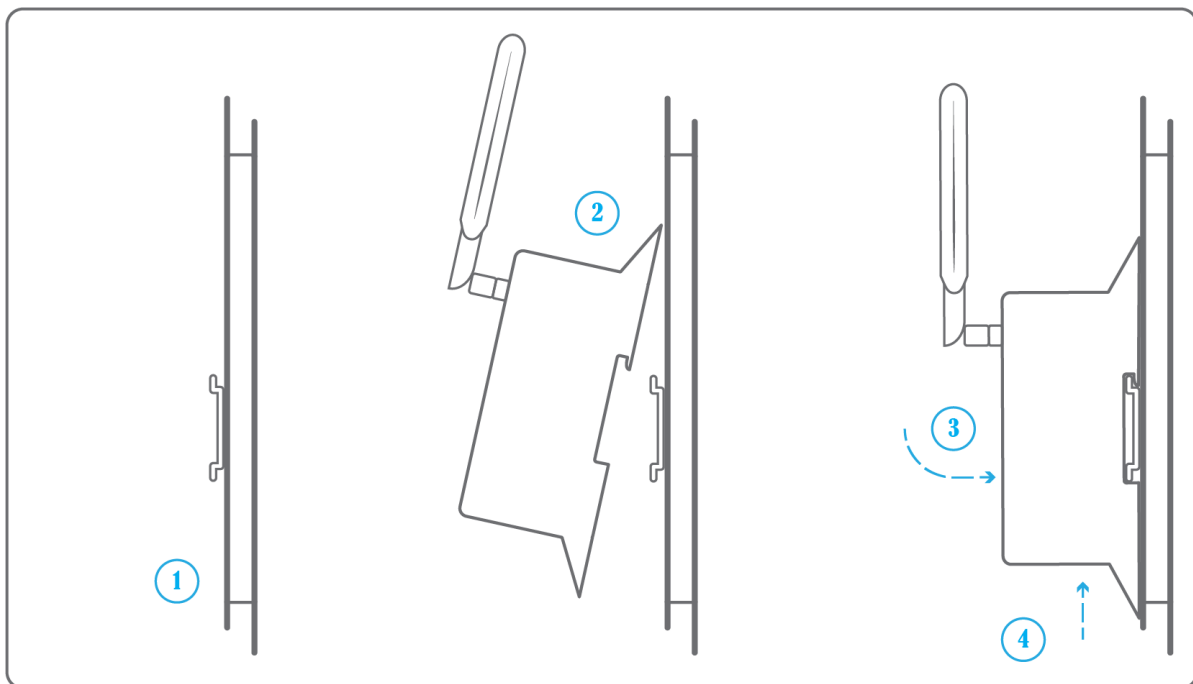
Computer access to the Wattsense console

- Each customer has a dedicated space on the Wattsense User Console at <https://console.wattsense.com>. This interface allows them to manage their fleet of Boxes.
- A Box must have been activated in advance before it can be fully installed and configured.
- If the Box hasn't been activated, ask the administrator of the account to create an "installation" access on the Wattsense user console and retrieve the login information (email address and password).
- Once on-site, activate the Box on the console:
 - Log in to the console: enter the email and password provided by the administrator and click on "Log in".
 - Enter the alphanumeric identifier of the Box in the search rectangle at the top.
 - Click on "Activate".
 - It is required to give the Box a name in the "Name" field (for example, the name of the site where it will be installed).
 - If necessary, add additional information in the "Description" field in order to clearly identify the Box (for example the floor or the exact location of where the Box is installed if there are several Boxes on the same site).
 - Click on "Activate the Box".
- You will then be able to access the configuration tools.

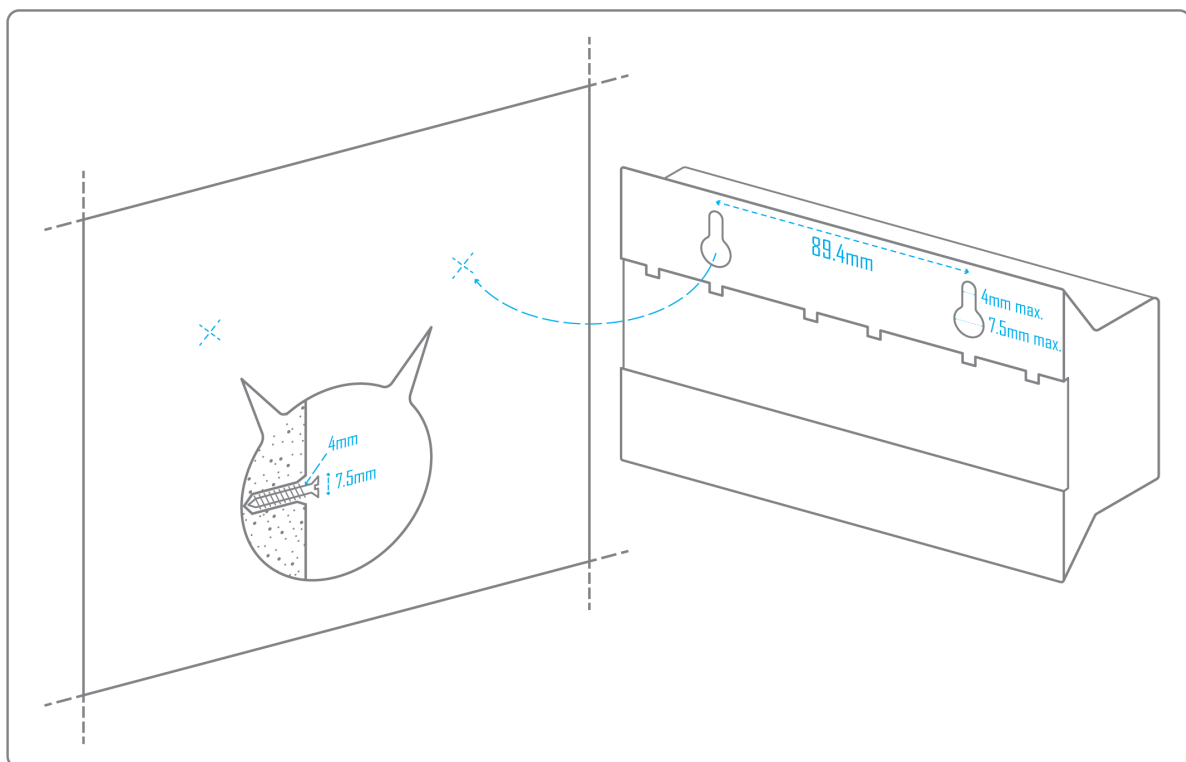
The power supply of the Box

Make sure that the Box has been activated beforehand on the user console.

- Ideally, place the Box in an electrical enclosure or cabinet.
- This type of equipment is not suitable for installation in places that can accommodate children.
- Attach the Box:
 - Mount the Box on a DIN rail.

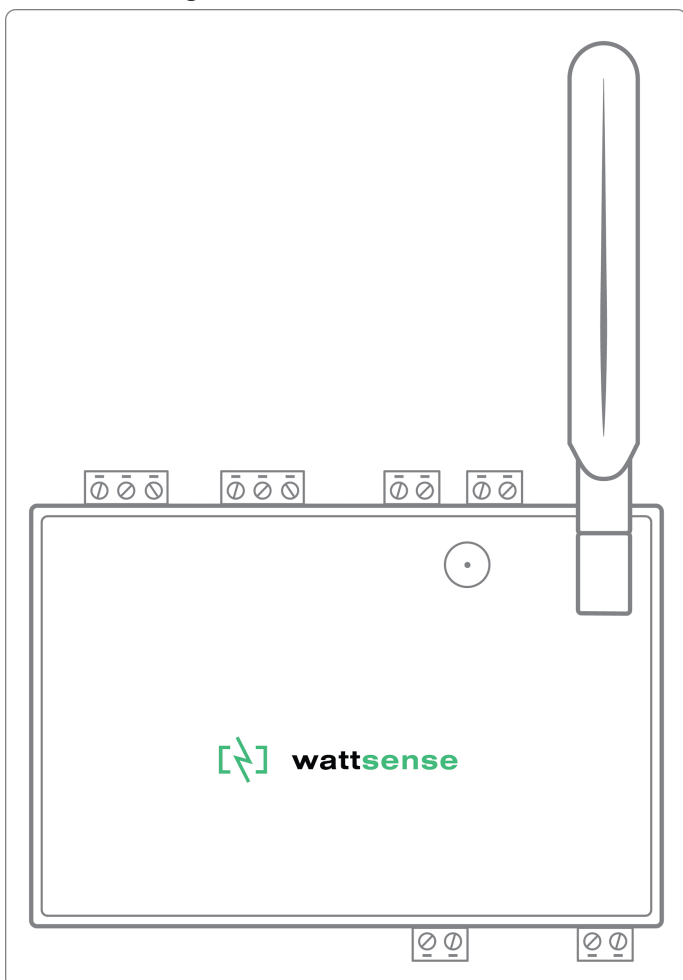


- Or attach 2 screws to a wall and hook the Box using the notches on the back of the case: Screws of maximum 4 mm in diameter, with a head of maximum 7.5 mm diameter, a spacing of 89.4 mm.

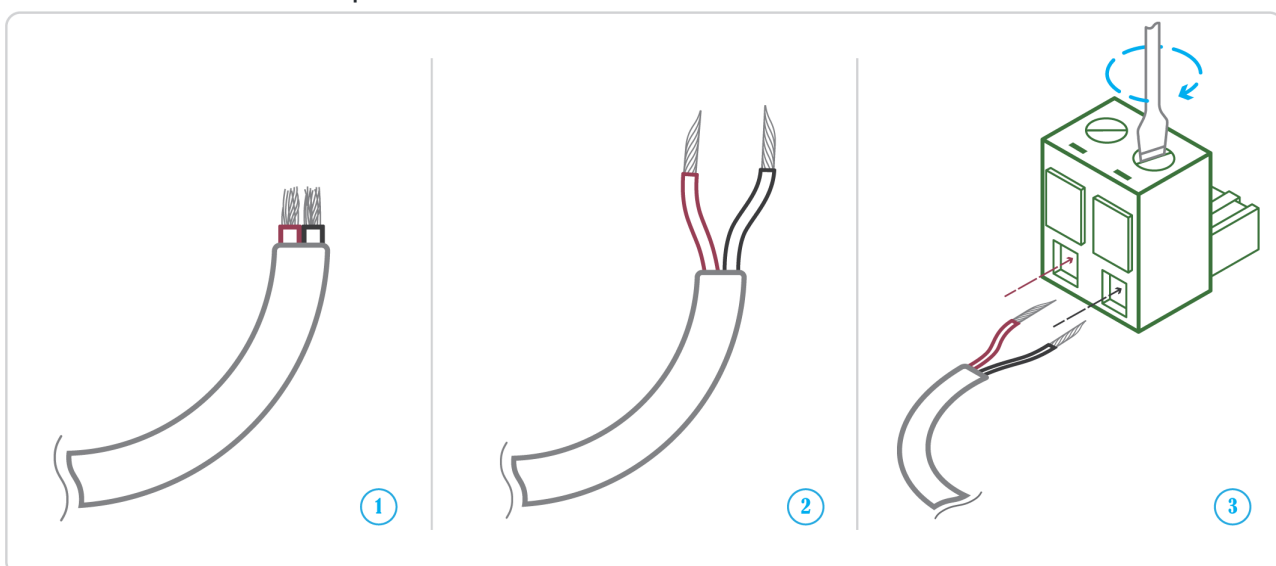


- To avoid any risk of injury caused by the Box falling, the Box must not be installed more than 2 meters from the ground.

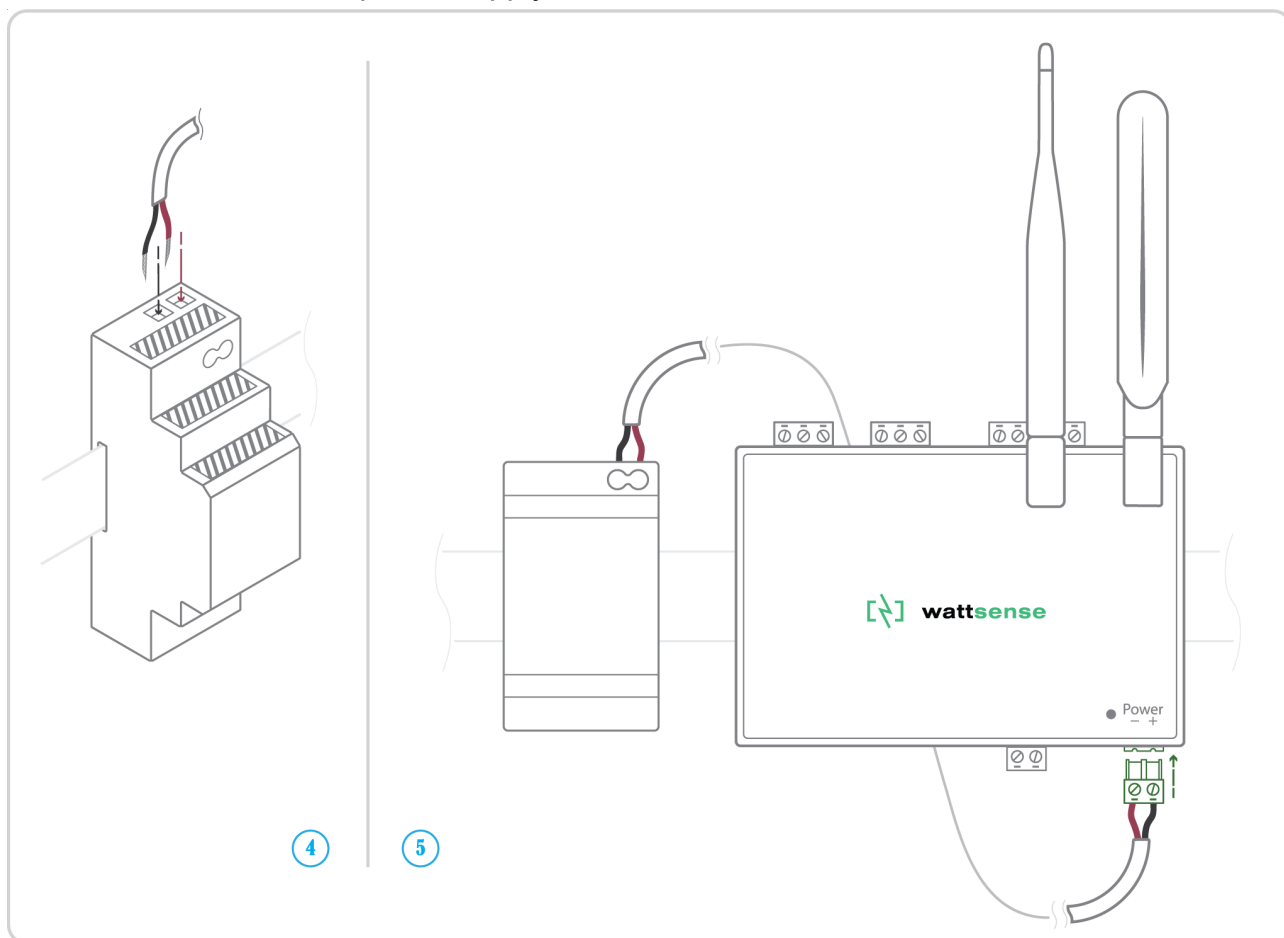
- Install the original antenna delivered with the Box.



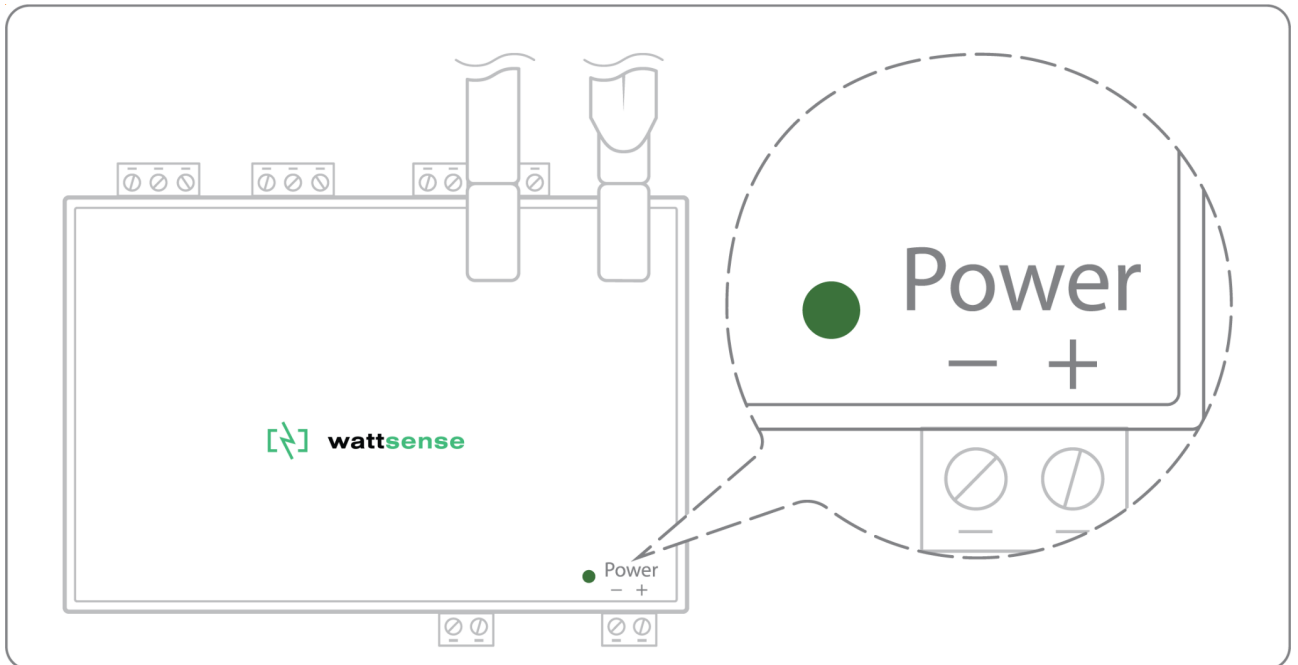
- Use a DC power supply of 12-24V DC +/-10%, 2A Max. .
- Screw the cable into the power connector of the Box.



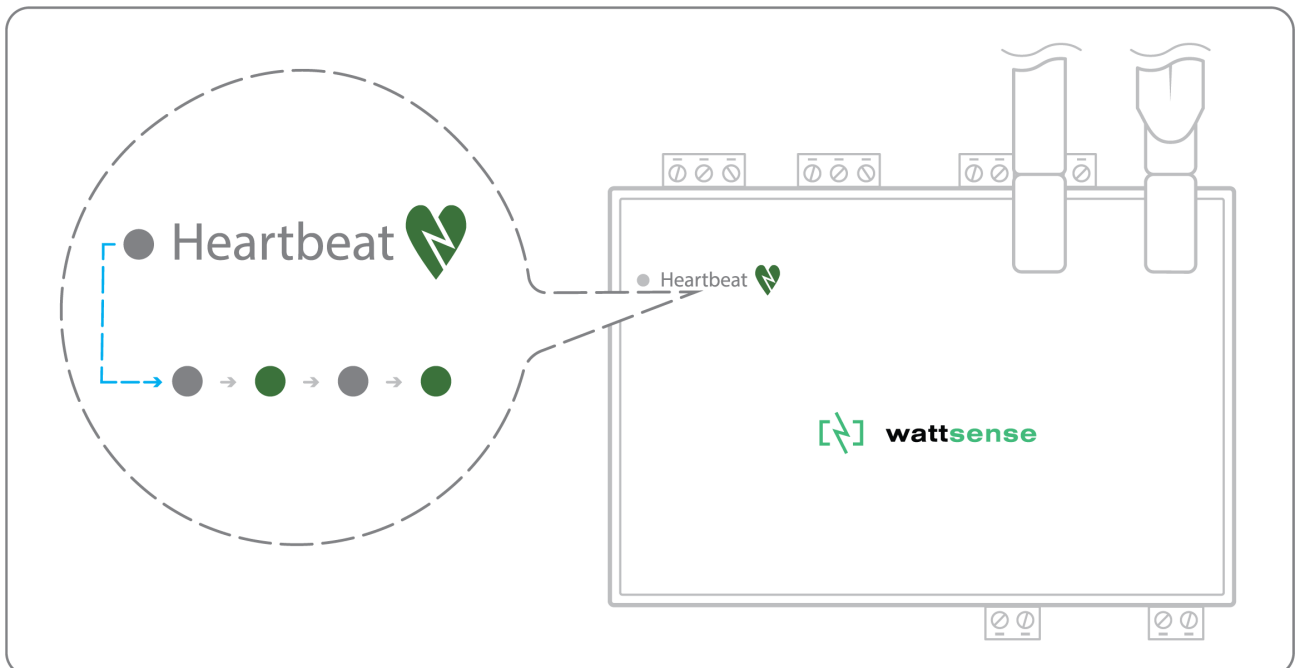
- Connect the cable to the power supply.



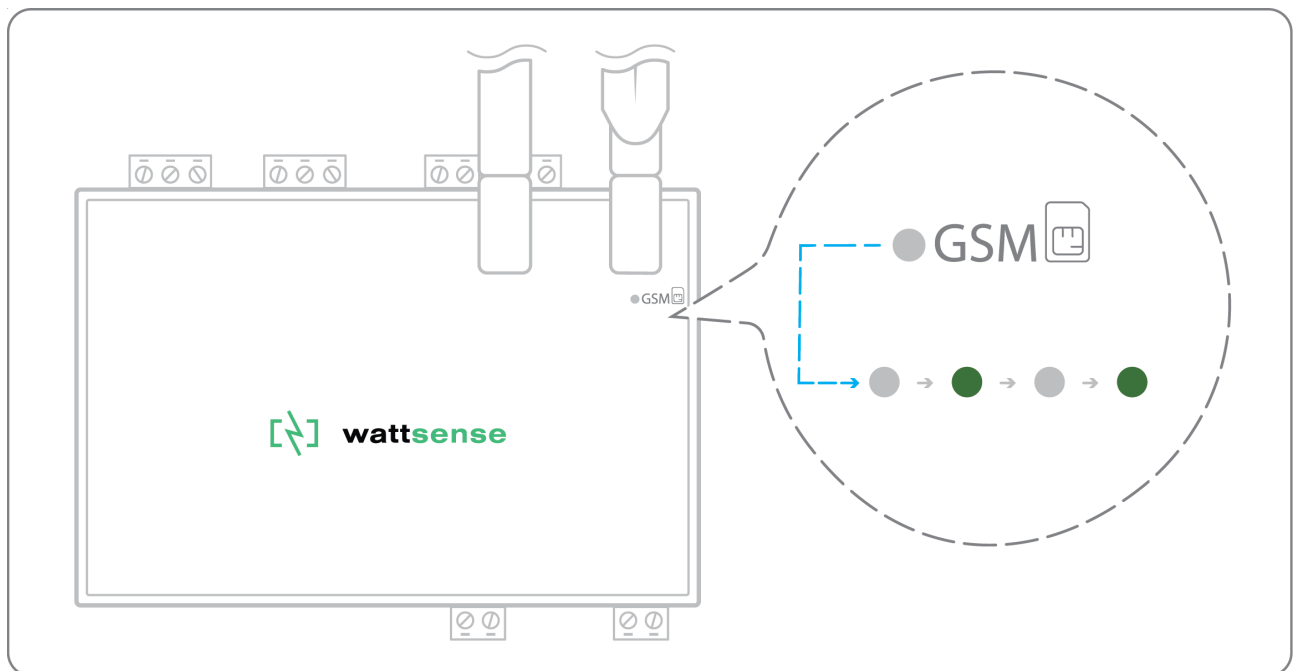
- Check that the "Power" LED is lit (steady green light).
- The Box is protected against overvoltage, undervoltage, overcurrent from the power supply with indication by LED: green LED when the power supply is compatible, red LED if it is not suitable.



- Wait for ten seconds: the "Heartbeat" LED flashes (green light).



- Wait for the GSM LED to flash; if the LED does not flash after a few minutes, see the GSM Antenna chapter.

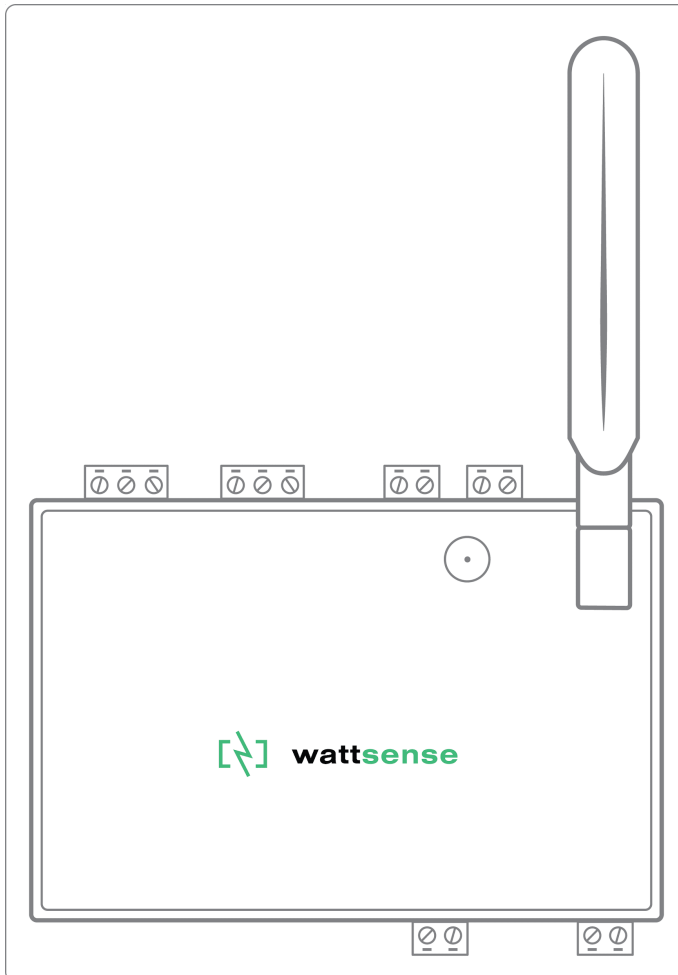


- Check that the Box appears on the console: the presence indicator of the Box changes from red to green.
- If the Box appears on the console, it is functional; you can go to the connection step of the Box to the equipment and/or the network of the building.
- If the Box does not appear on the console, see the GSM Antenna chapter.

GSM Antenna

The Box is supplied with a standard GSM antenna.

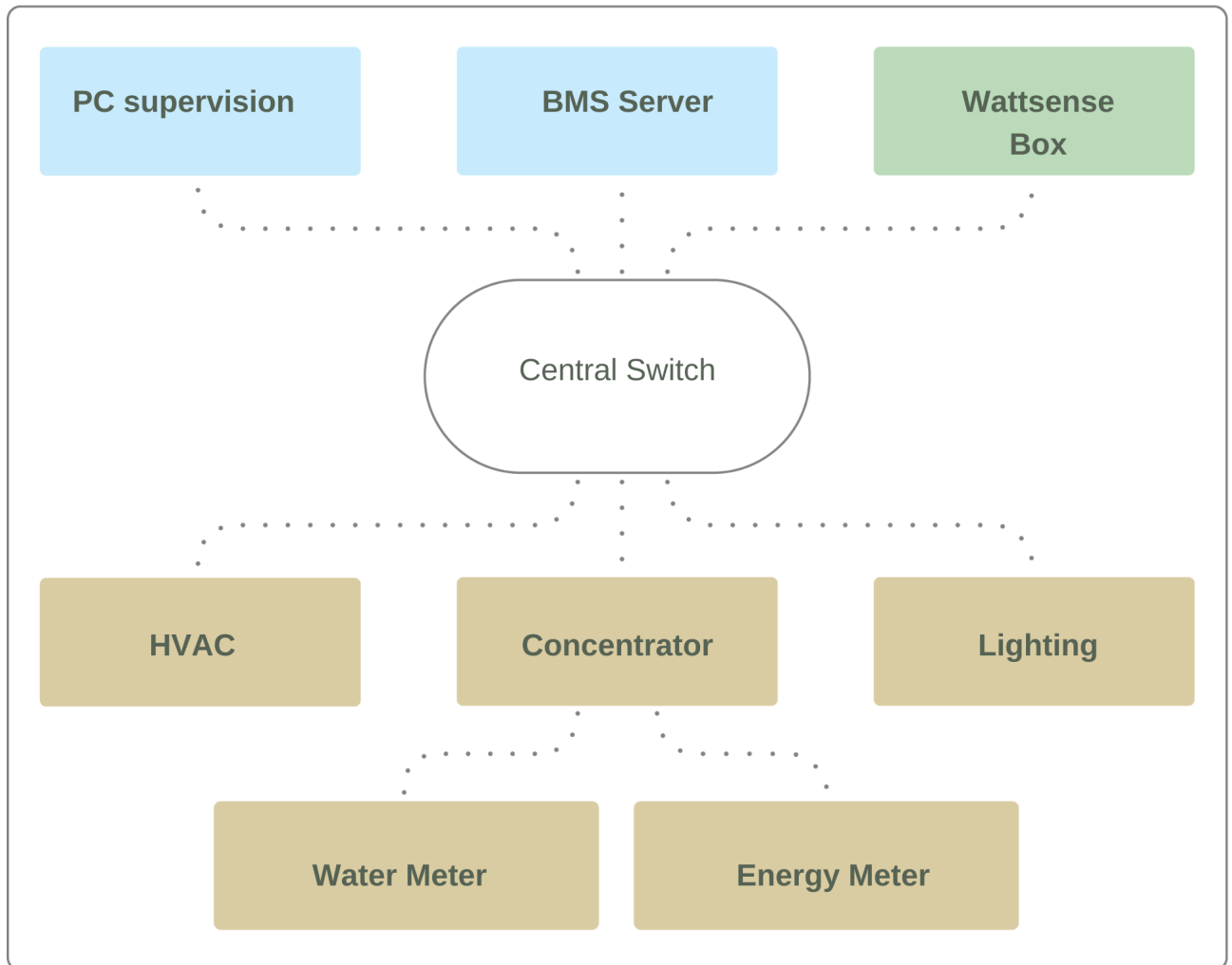
- If the quality of the GSM signal is good: keep the original antenna installed on the Box.



- If the signal quality is insufficient: move the original antenna out of the cabinet; use an RF extension cord with SMA connector, up to 2 meters, + 1 adhesive support to hold the antenna.
- If the signal quality is still insufficient: use a high-gain antenna with a maximum of 10 meters of cable; this antenna can, for example, be moved to the outside or to the other floors to obtain a better signal quality. Please note that, beyond 15 meters of cable, the GSM signal is significantly weakened.

To connect the Box to the BMS

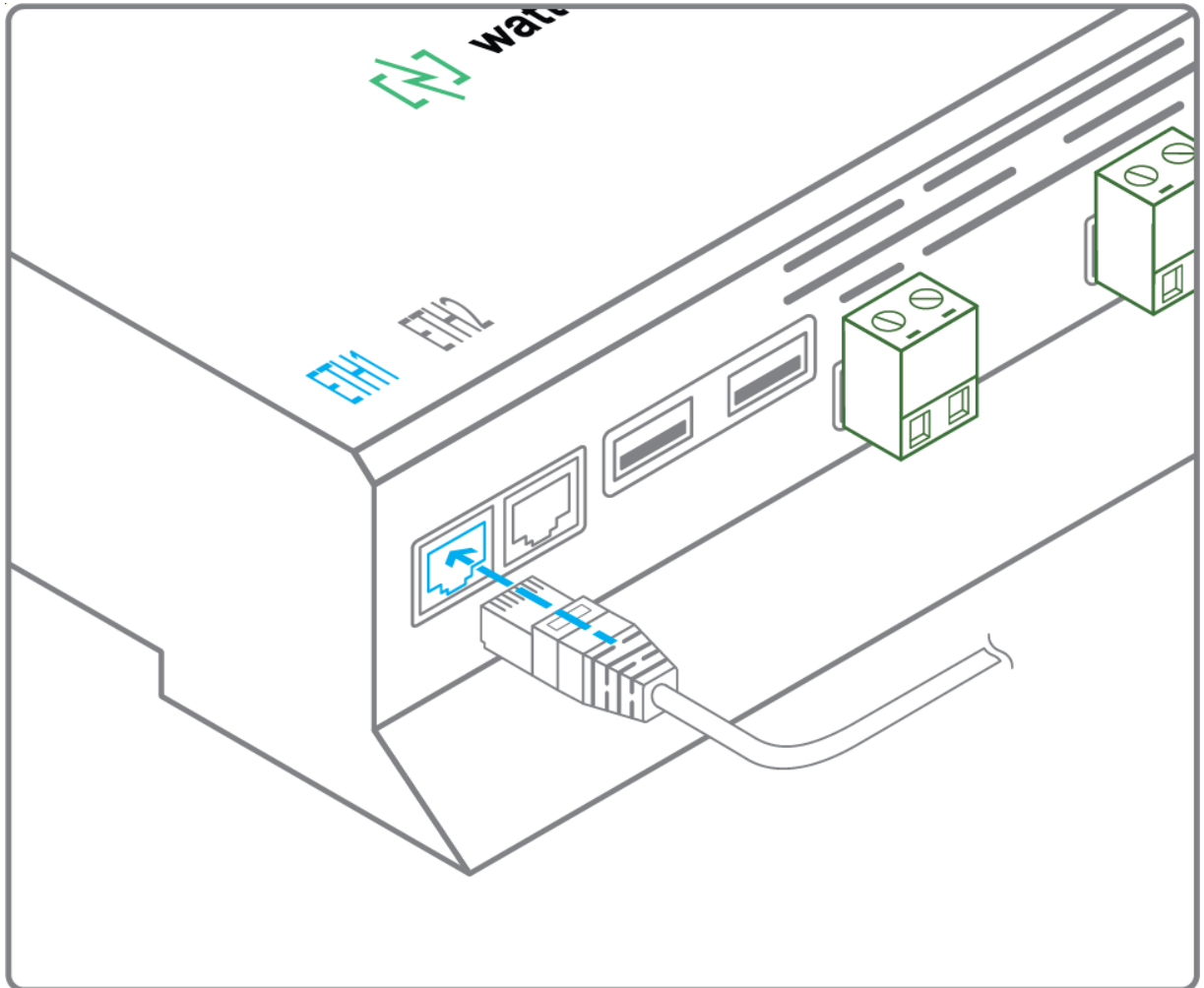
- Determine the type(s) of network(s) associated with the BMS (communication protocols between the BMS server and the technical equipment).
- Obtain, if possible, the schematic of the communication network(s) of the BMS.
- Identify where and how the BMS server connects to the building's network.



In case of IP network (Except LON)

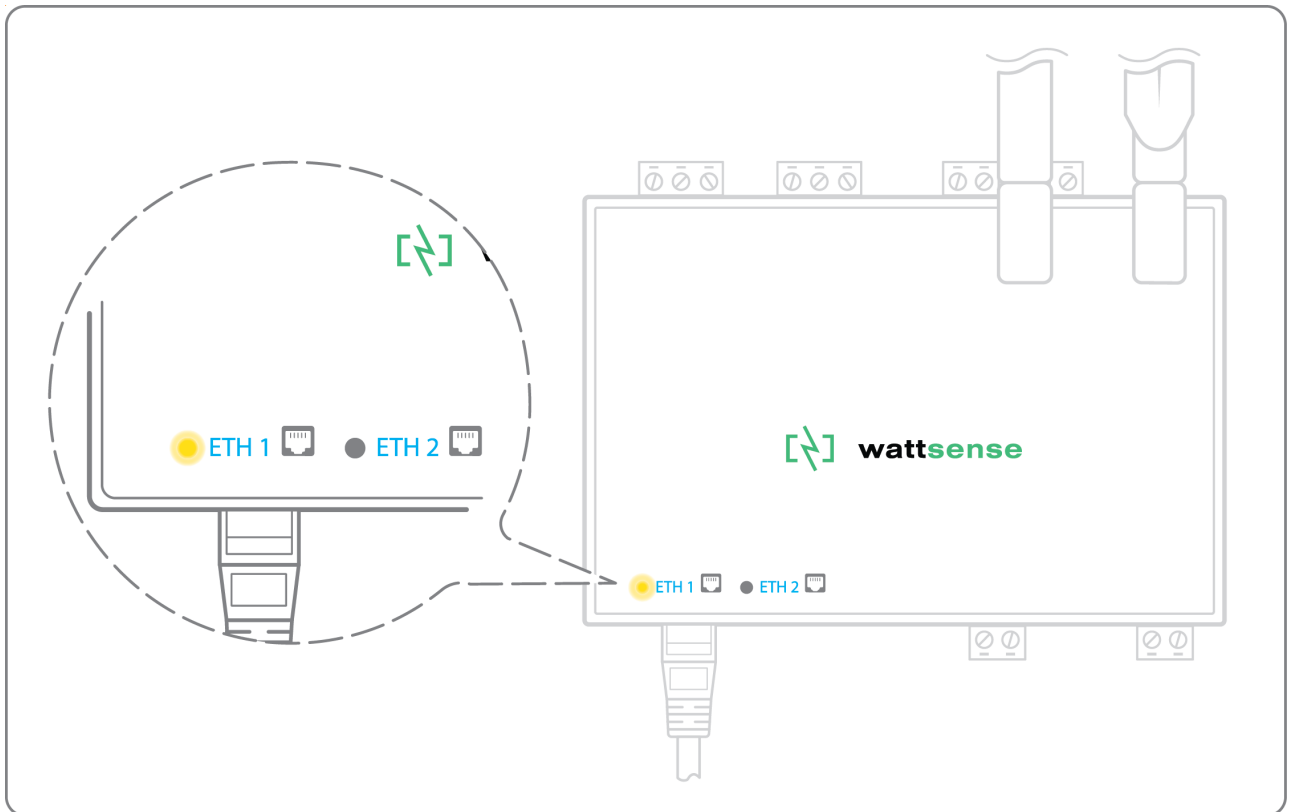
Connection:

- Make sure to have an Ethernet cable
- Connect the cable to the Ethernet port of the Box ETH1 or ETH2.



- Connect the Box to the switch (IP network) on which the supervision PC/BMS server is connected.

- Check that the ETH1 or ETH2 LED lights up.



Configuration:

- If there is no DHCP server on the network, attribute a static IP address, its mask and the gateway if necessary to the Box (Discuss with the building's IT manager).
- If there is a DHCP server on the network, the address is automatically assigned.

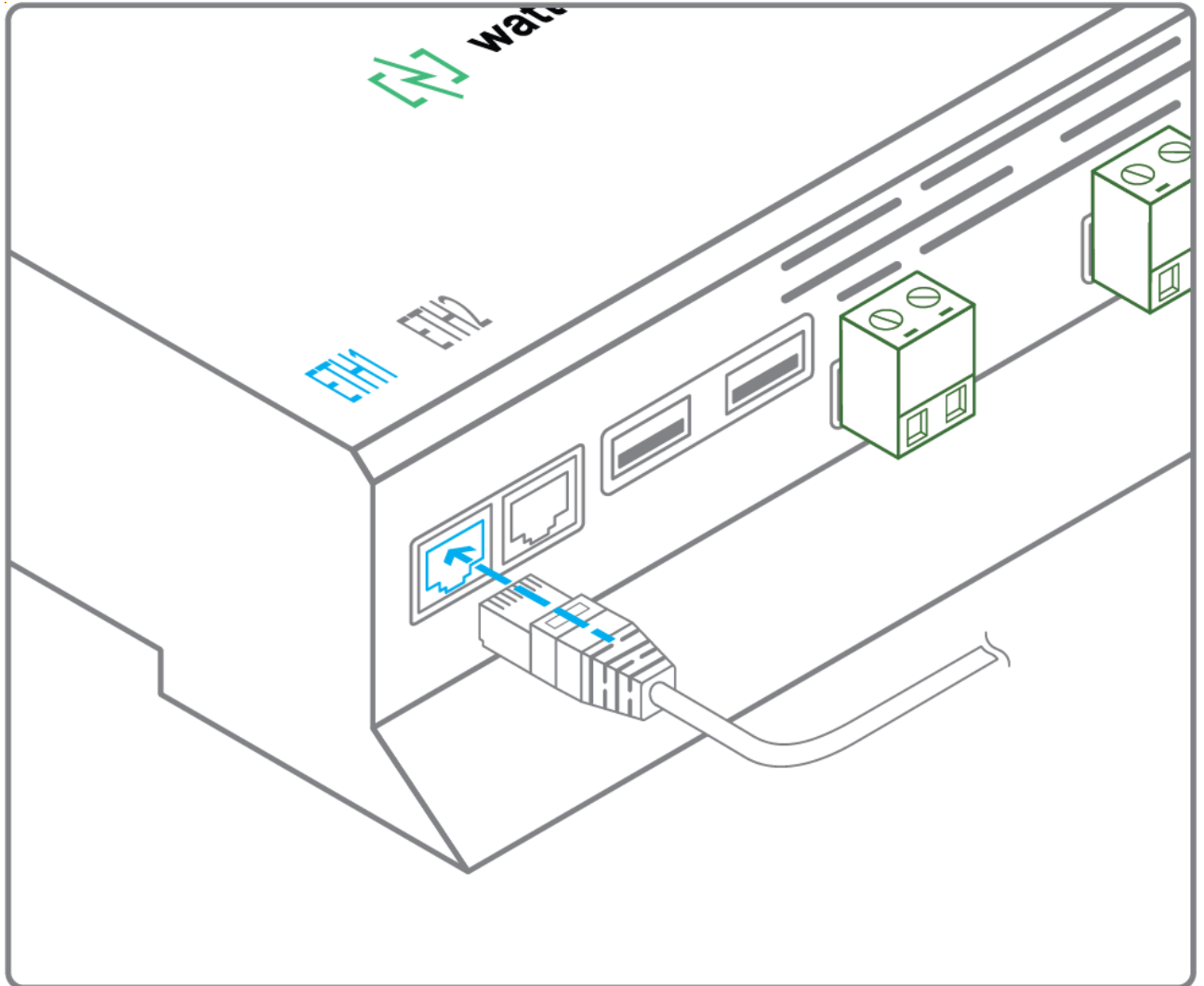
Information to retrieve in preparation for the configuration:

- For each device that communicates in Modbus IP
 - From the BMS software, perform an extract of the available properties: list the data types provided by the different devices to which the BMS has access.
 - If it is impossible to retrieve this information, get the IP address and TCP port (and if needed, for some devices, the slave address (Slave ID), the brand, and model of the equipment, and extra identifying information. This information is necessary for the installation configuration and to retrieve data.
- In the case of a BACnet IP network
 - Write down the BACnet port of the network. This information will be necessary for the installation configuration and to retrieve data.

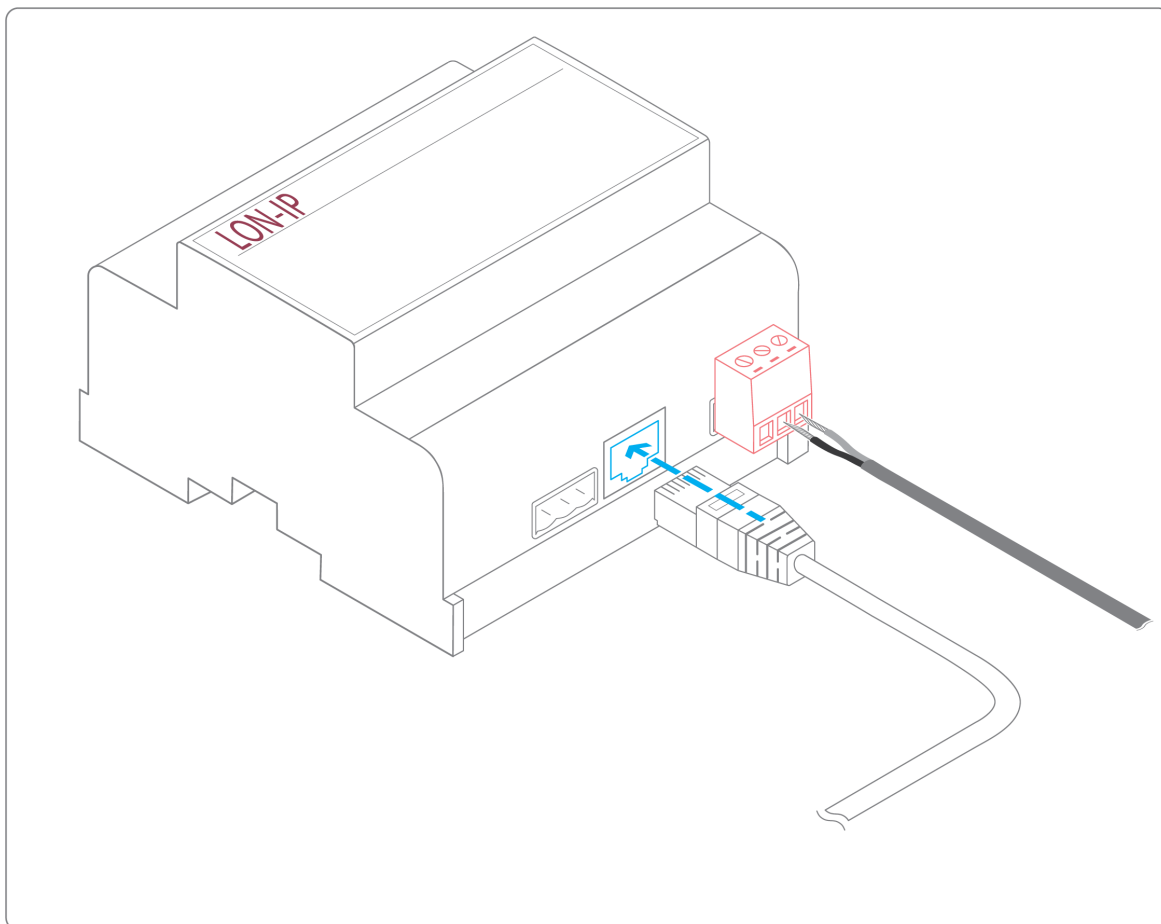
In case of LON IP-852 network

Connection:

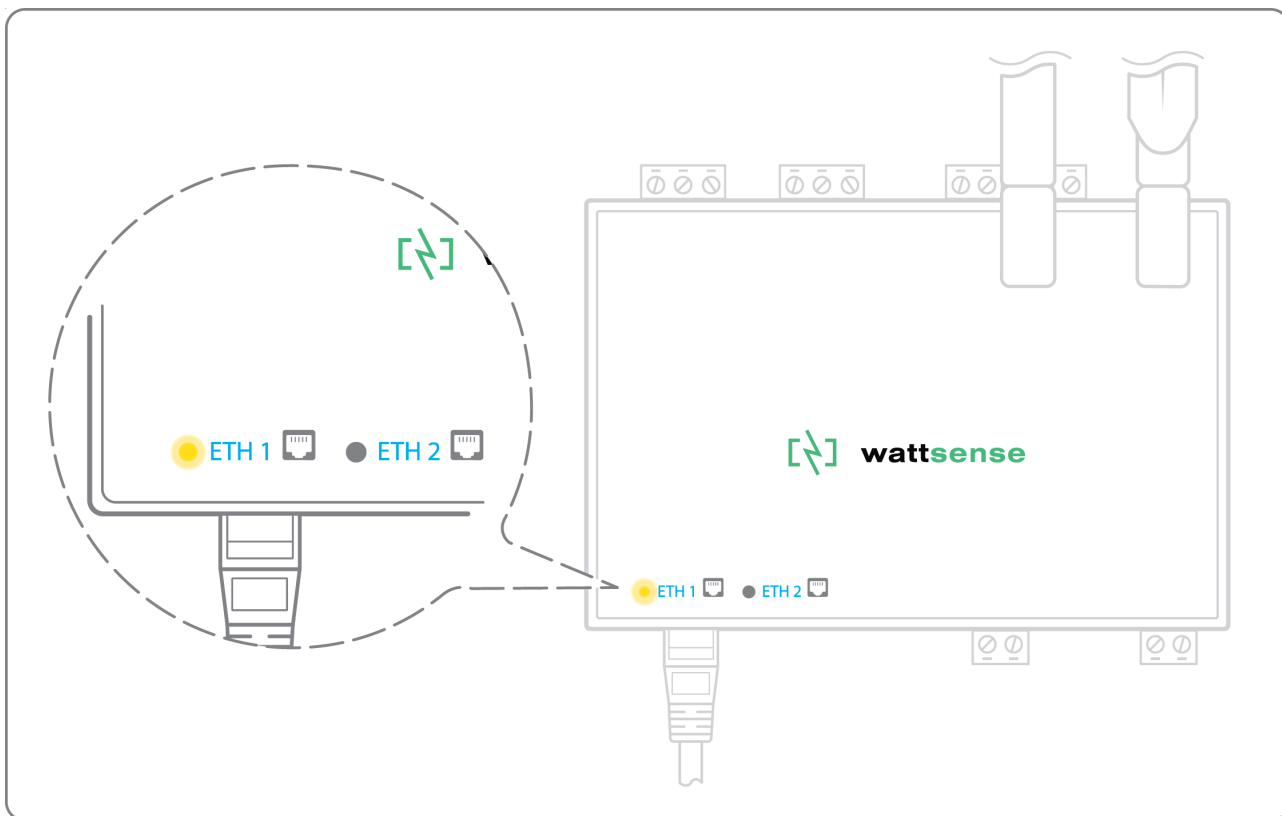
- Make sure to have an Ethernet cable.
- Connect the cable to the Ethernet ports of the Box ETH1 or ETH2.



- Connect the other end of the cable to the IP-852 server on the LON network.



- Verify that the ETH1 or ETH2 LED lights up



- Register the IP address of the Box on the IP-852 server of the LON network; the IP-852 server's password is probably required.

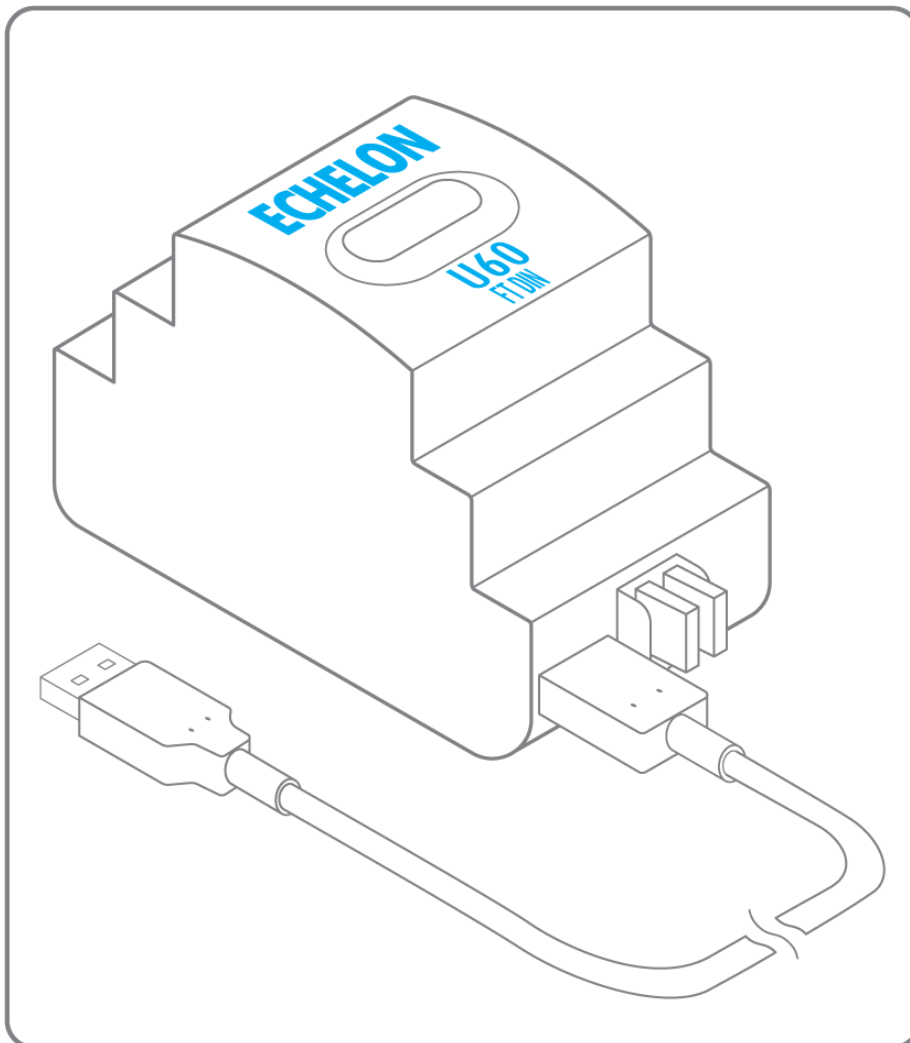
Information to retrieve in preparation for the configuration:

- Write down the Neuron-ID, brand and model of the equipment, and any identifying information. This information will be necessary for the installation configuration and to retrieve data.
- If you have the NL220 software, export the LON database as an archive file or as an NLC file.

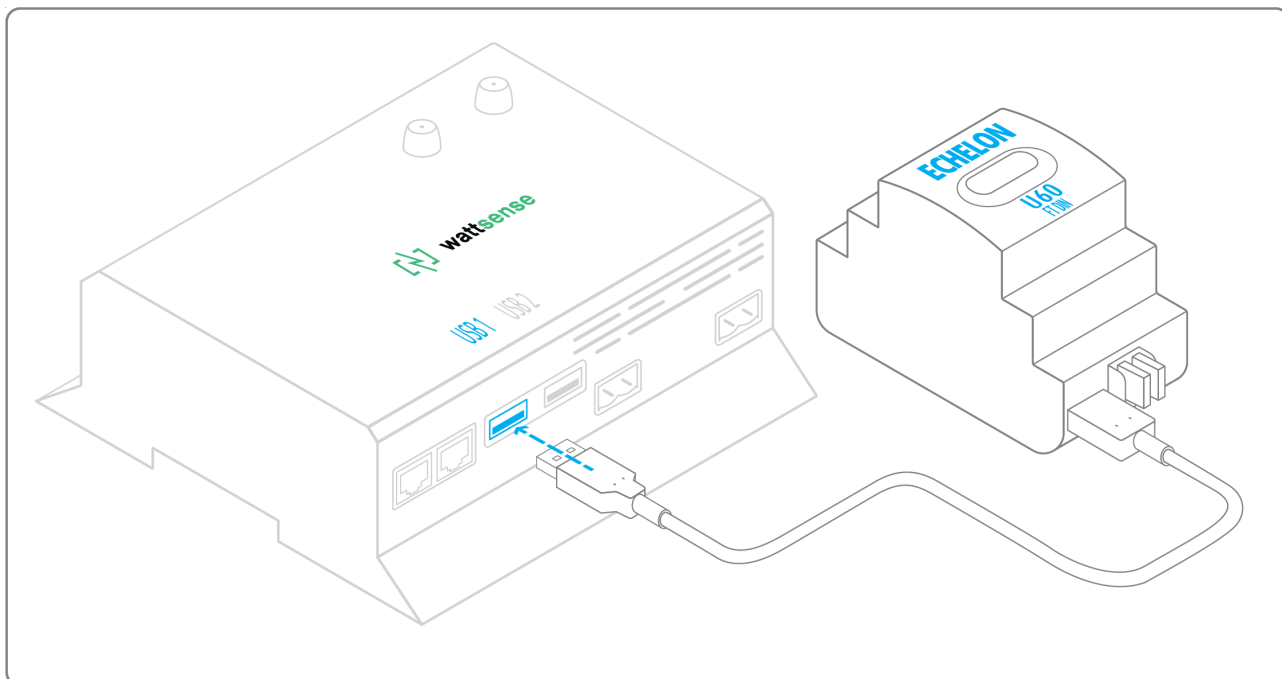
In case of LON FT10 network

Connection:

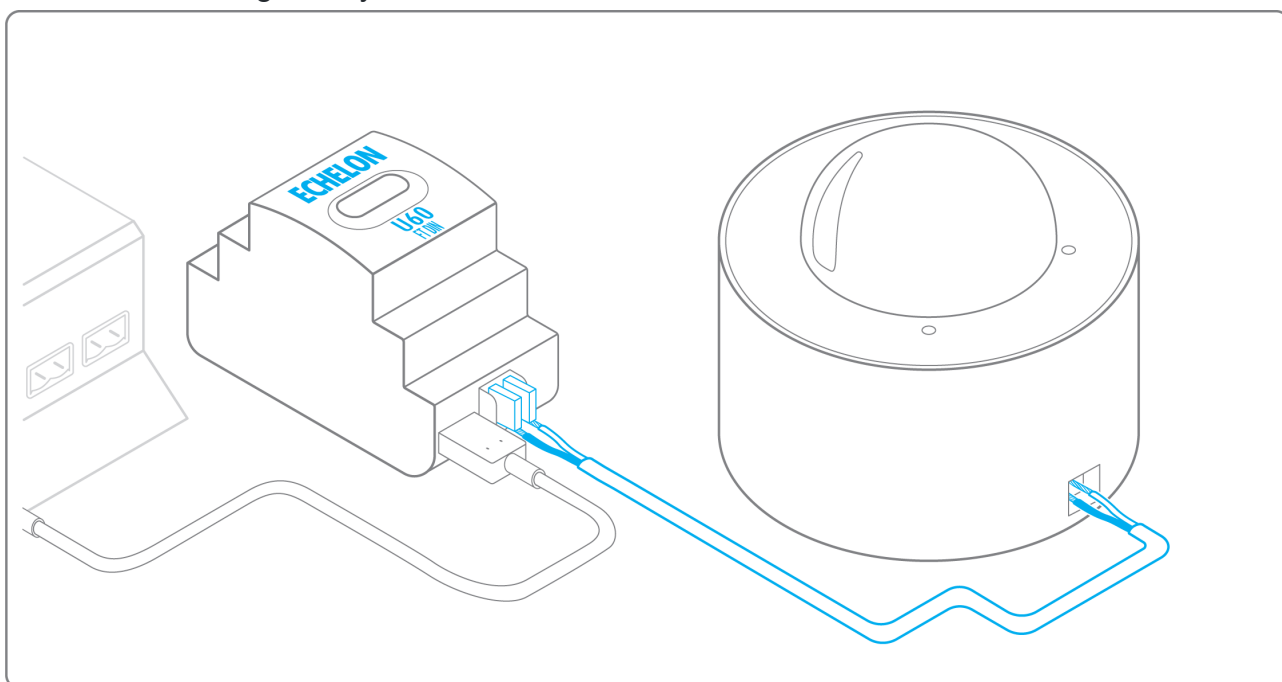
- Make sure to have a USB Echelon U60 FT DIN gateway.



- Connect this gateway to the USB port 1 or 2 of the Box.



- Connect also this gateway to the LON FT10 network.



Information to get in preparation for the configuration:

- Write down the Neuron-ID, brand and model of the equipment, and any identifying information. This information will be necessary for the installation configuration and to retrieve data.
- If you have the NL220 software, export the LON database as an archive file or as an NLC file.

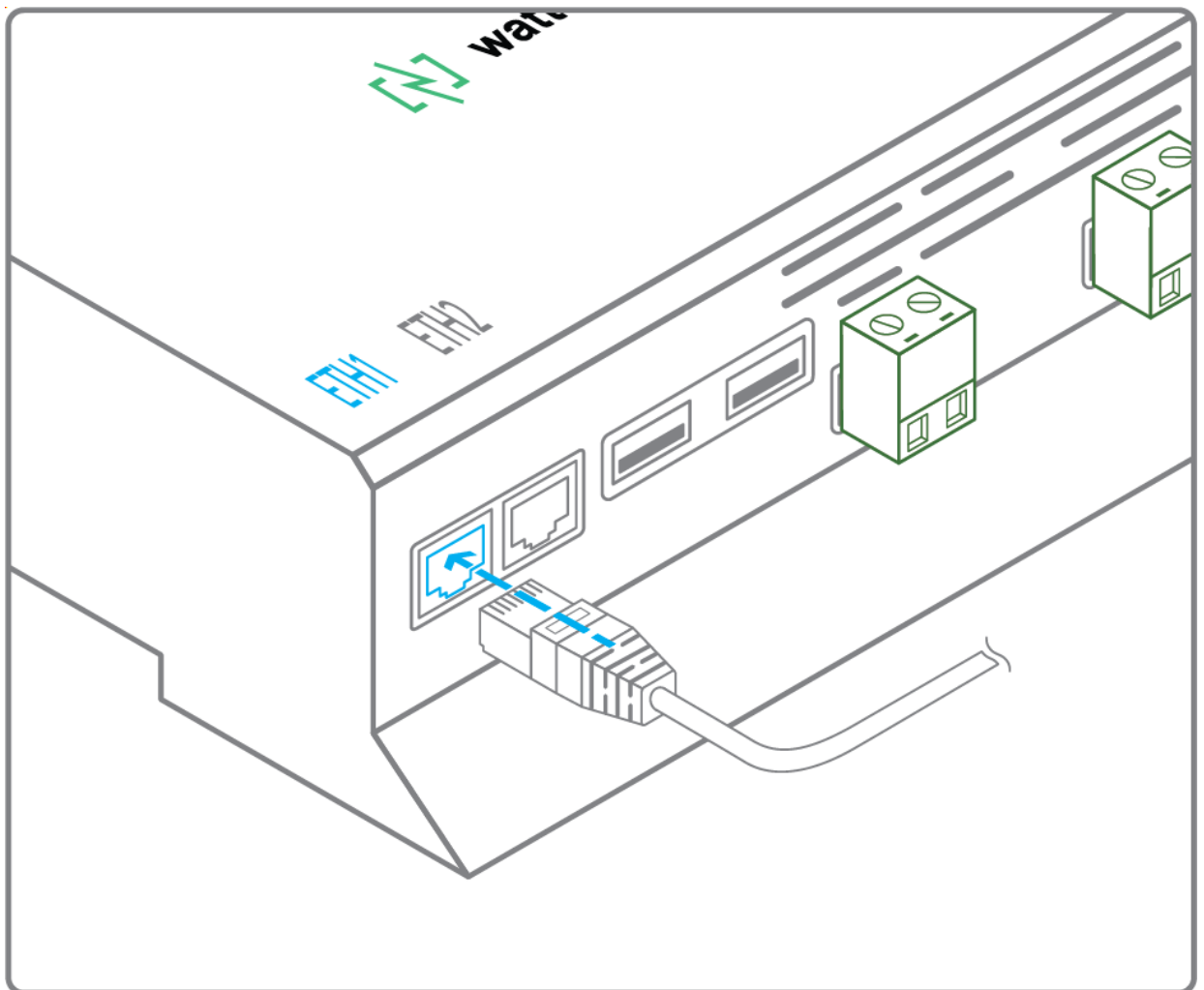
To connect the Box directly to the technical equipment in the absence of a BMS

- Prepare the list of equipment to be connected and their respective communication protocols.
- Collect the technical documentation of each manufacturer to know where and how to connect to its devices (user console, configuration wizard, manufacturer's site, etc.).
- Draw up an installation schematic.

The equipment communicates in Modbus IP

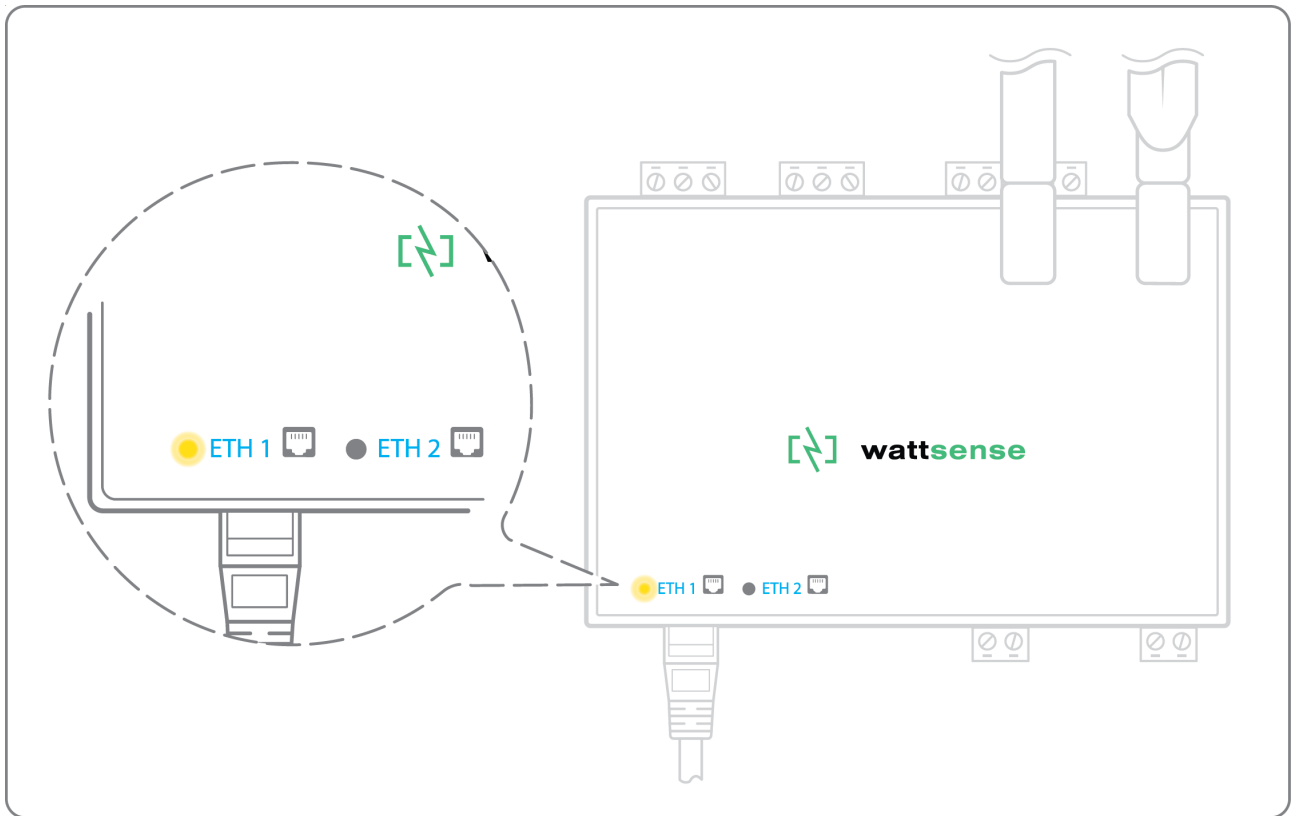
To connect only one equipment

- Make sure to have an Ethernet cable.
- Connect the cable to the Ethernet port of the Box ETH1 or ETH2.



- Connect the other end of the cable to the equipment.

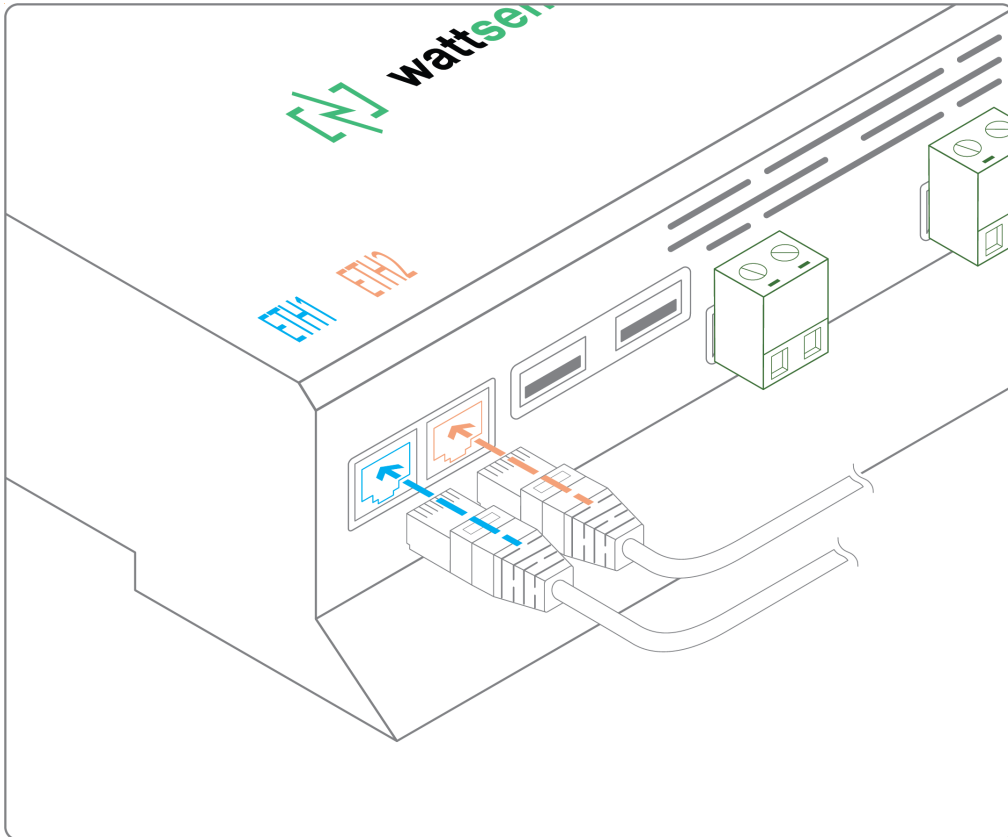
- Verify that the ETH1 or ETH2 LED lights up.



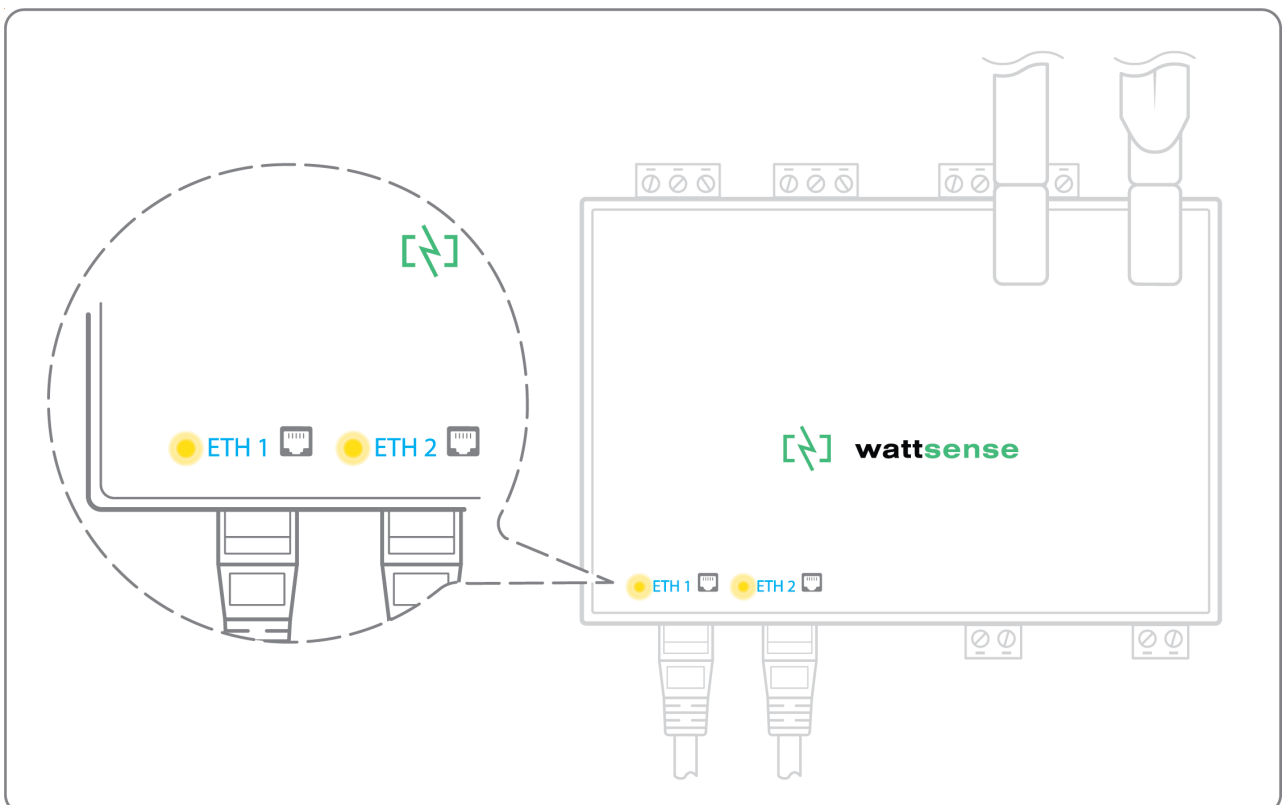
To connect two devices

- Make sure to have 2 Ethernet cables.

- Connect the cables to the Ethernet ports of the Box ETH1 and ETH2.

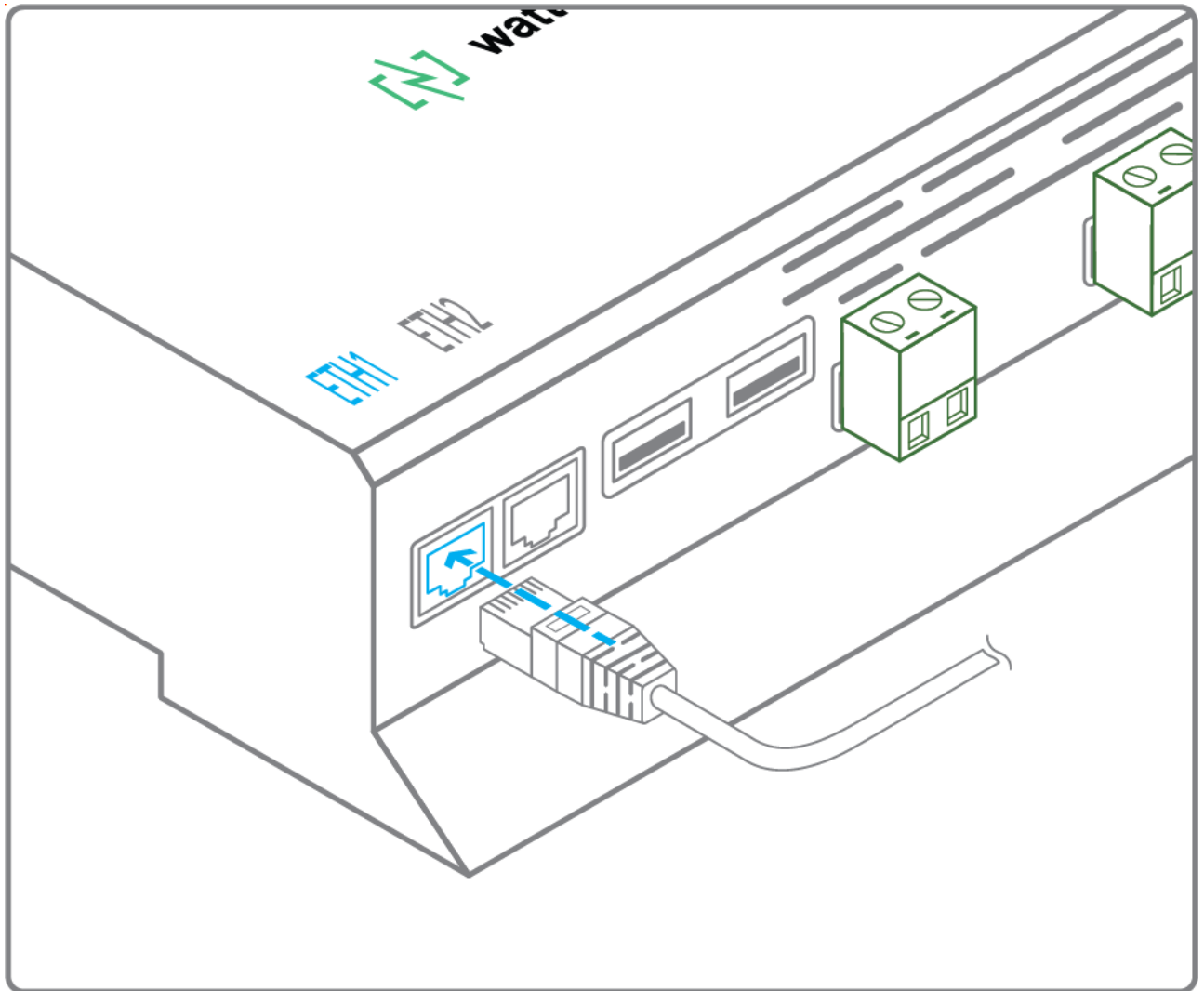


- Connect the cables to the 2 devices.
- Check that the ETH1 and ETH2 LEDs light up.

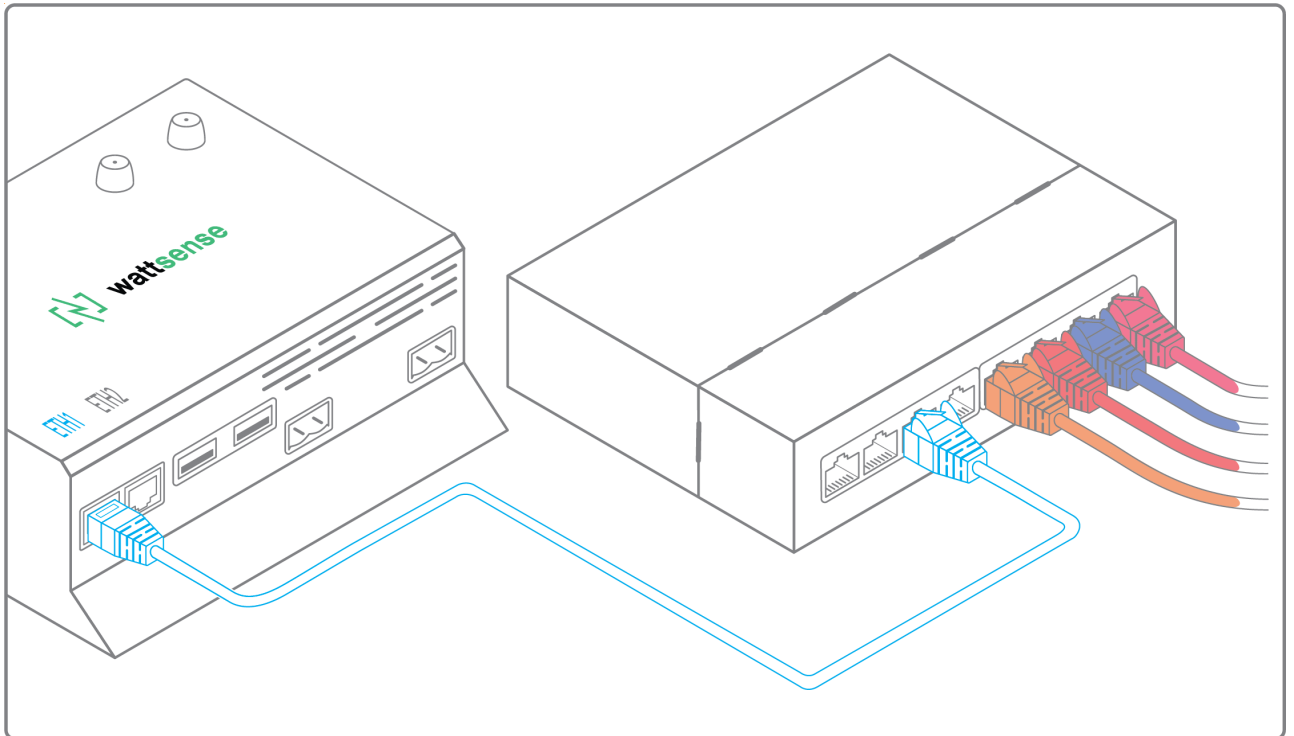


To connect three equipment or more make sure to:

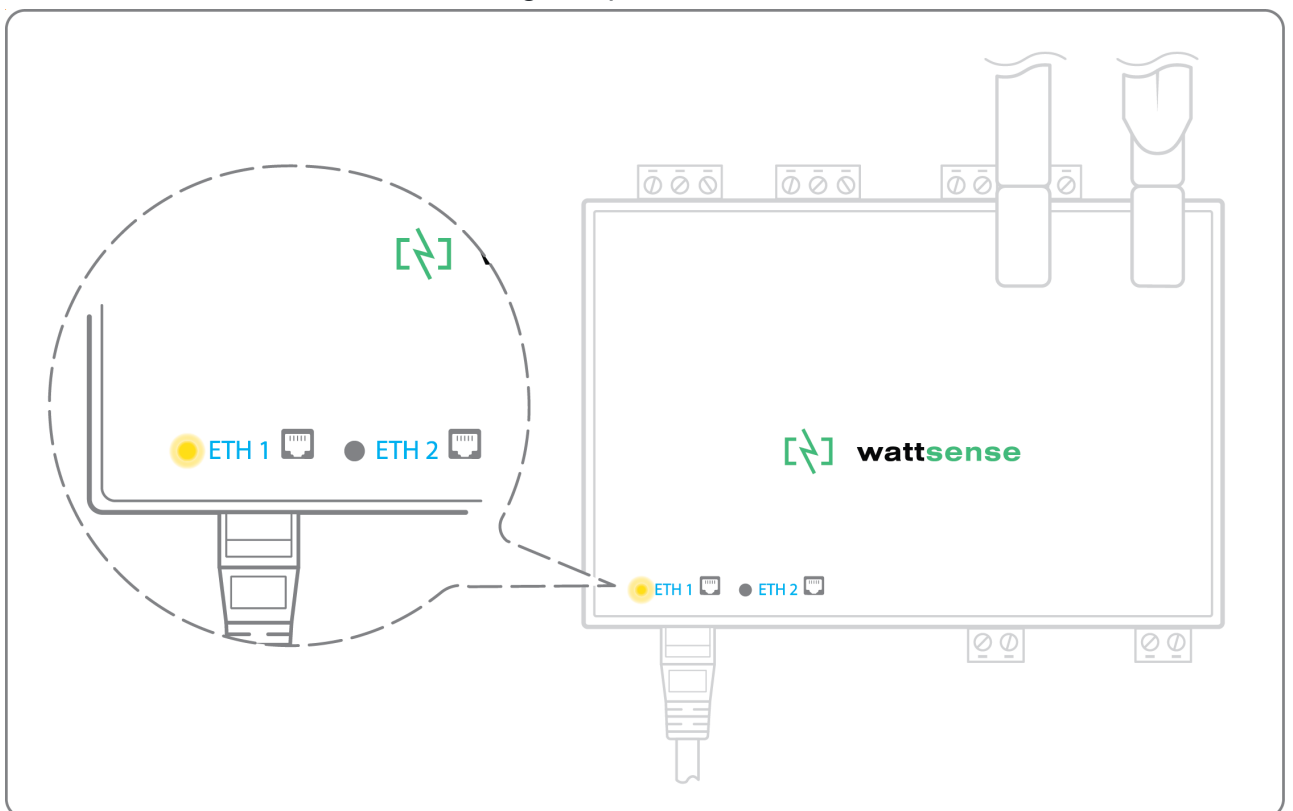
- Have an Ethernet cable for the Box.
- Have as many Ethernet cables as equipment to connect.
- Have an Ethernet switch.
- Connect the switch to the power supply
- Connect an Ethernet cable to the Ethernet port of the Box ETH1 or ETH2.



- Connect the other end of this cable to the Ethernet switch.



- Check that the ETH1 or ETH2 LED lights up.



- Connect all equipment to the switch via the Ethernet cables.

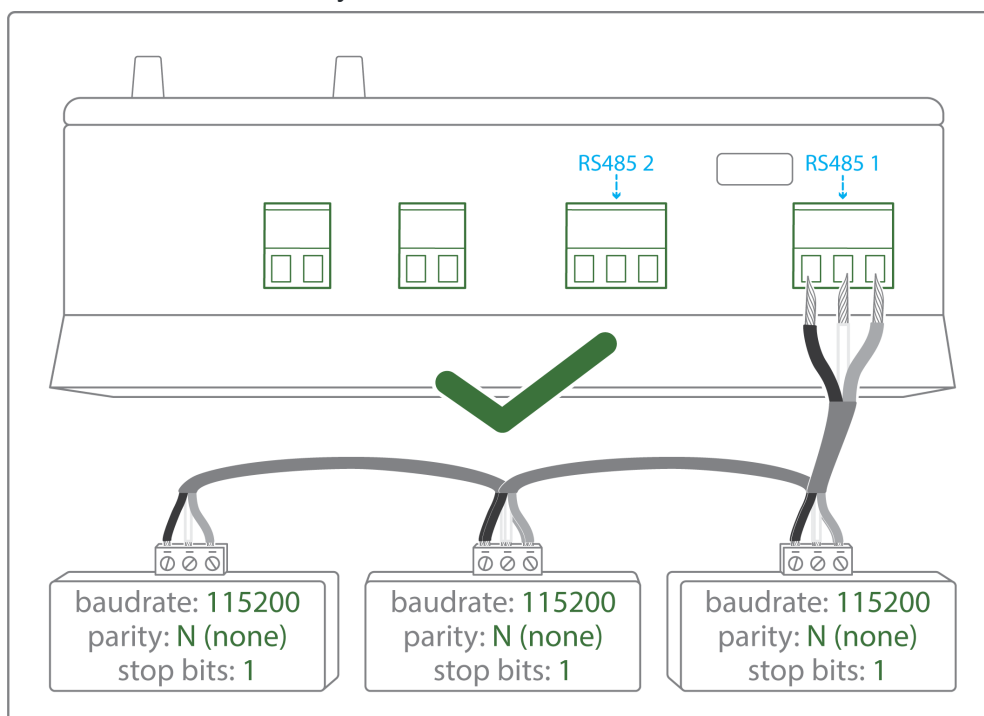
To configure each one of the equipment:

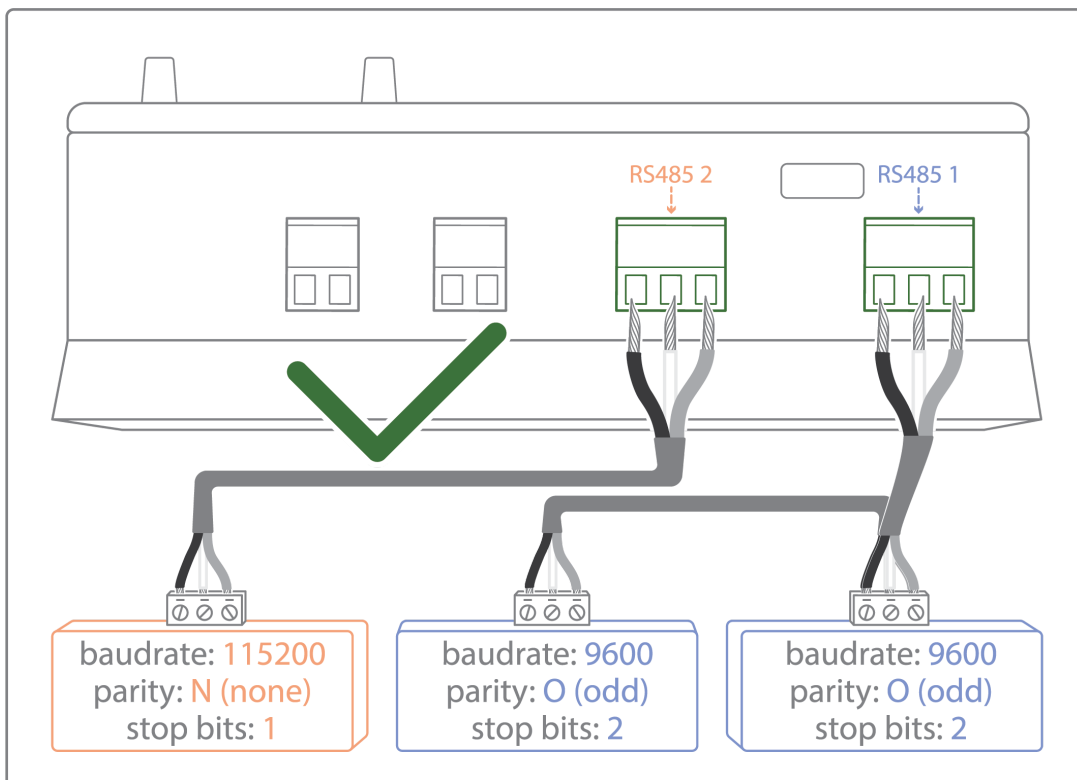
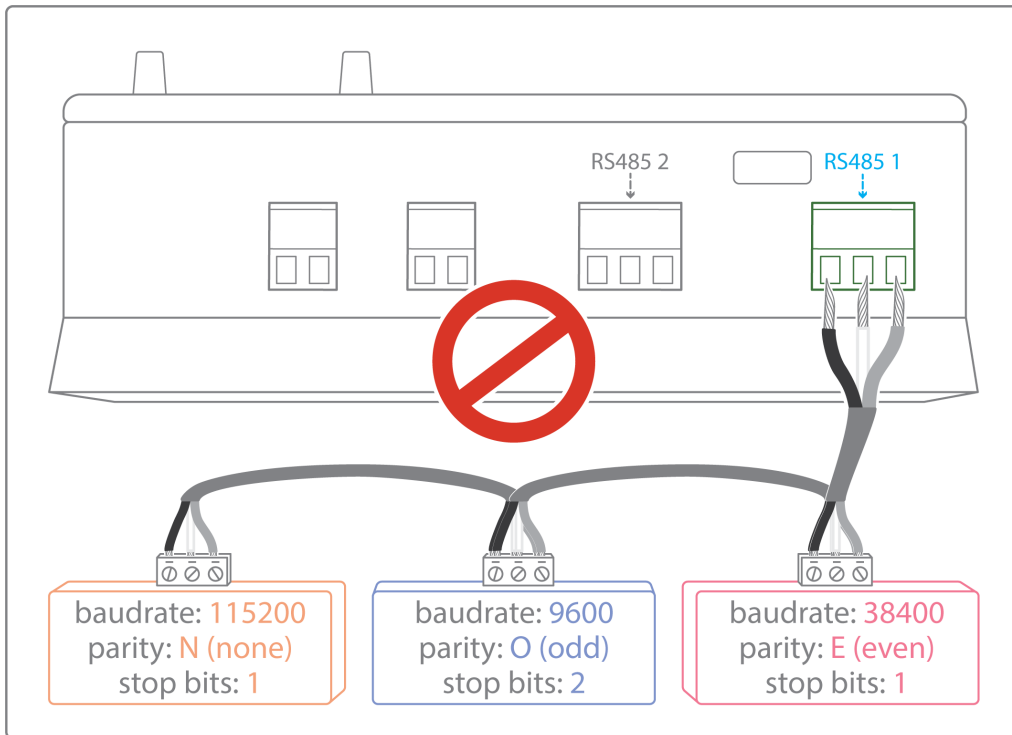
- Using the technical documentation of the equipment, find its IP address and TCP port (and if necessary, for some devices, the address of the slave "Slave ID").
- If the equipment does not have an IP address, assign one to it, 192.168.1.1 for the first device, then 192.168.1.2 for the second device, 192.168.1.3 for the third device, and so on.
- Write down the IP address and TCP port (and if necessary, for certain devices, the address of the Slave ID), the brand and model of the equipment, and any information that allows it to be identified. This information will be necessary for the installation configuration and to retrieve data.

The equipment communicates in Modbus RTU (RS485)

Organization of the Bus architecture:

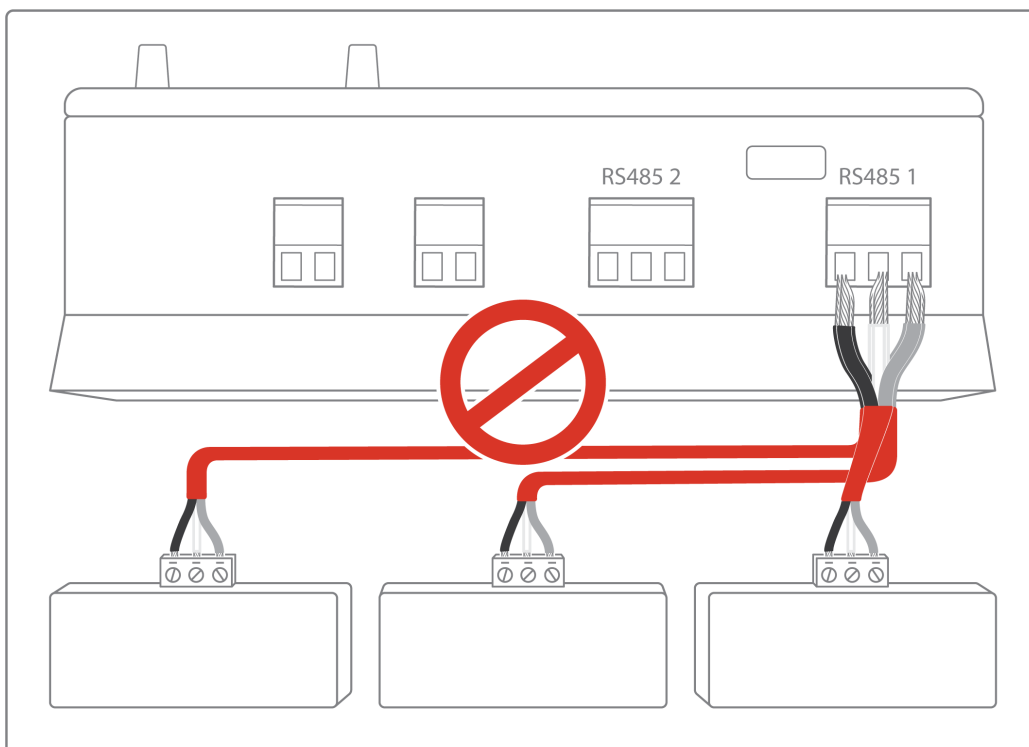
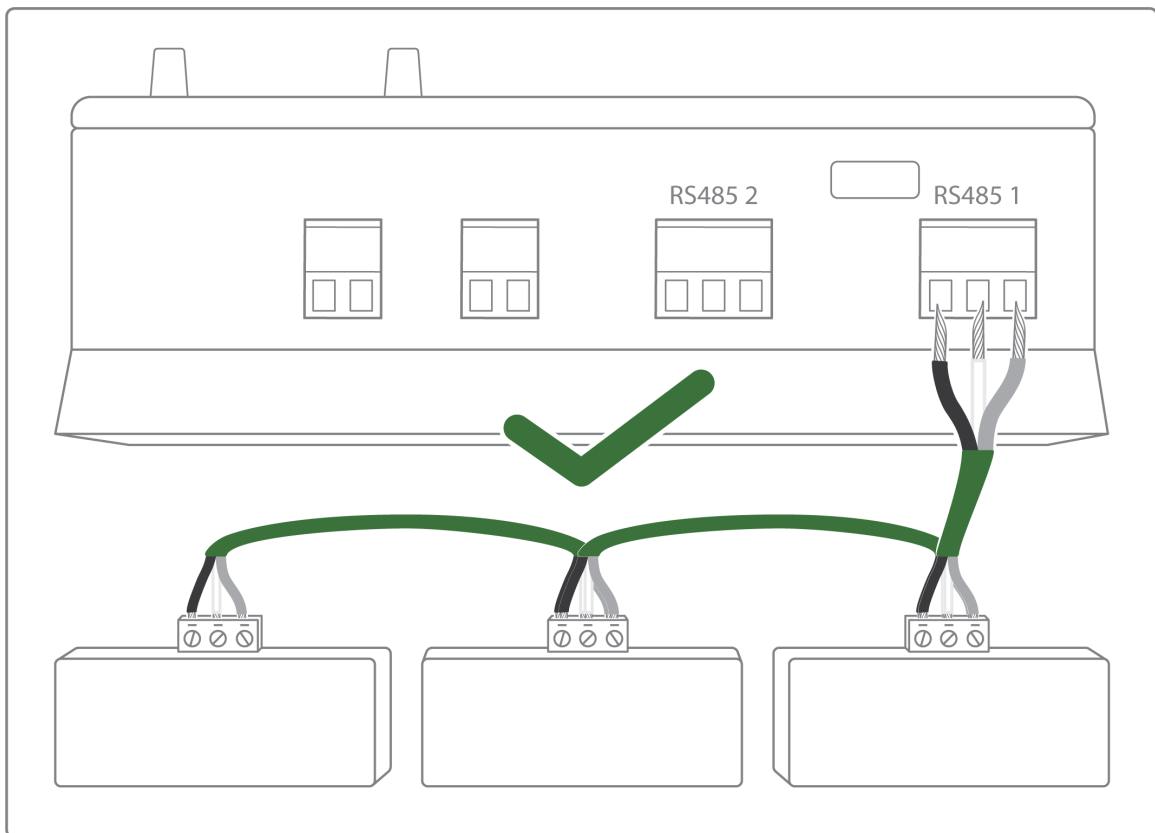
- Gather the necessary information for each device: Bus speed, character size, parity bit, stop bit (from the user console's configuration wizard, from the manufacturer's technical documentation, or directly from the control panels of the equipment).
- The goal is to create a maximum of two networks, each grouping equipment with the same communication configuration and assign them to the two RS485 ports of the Box.
- If the characteristics of the equipment require to set more than two homogeneous networks, it is necessary to order another Box.



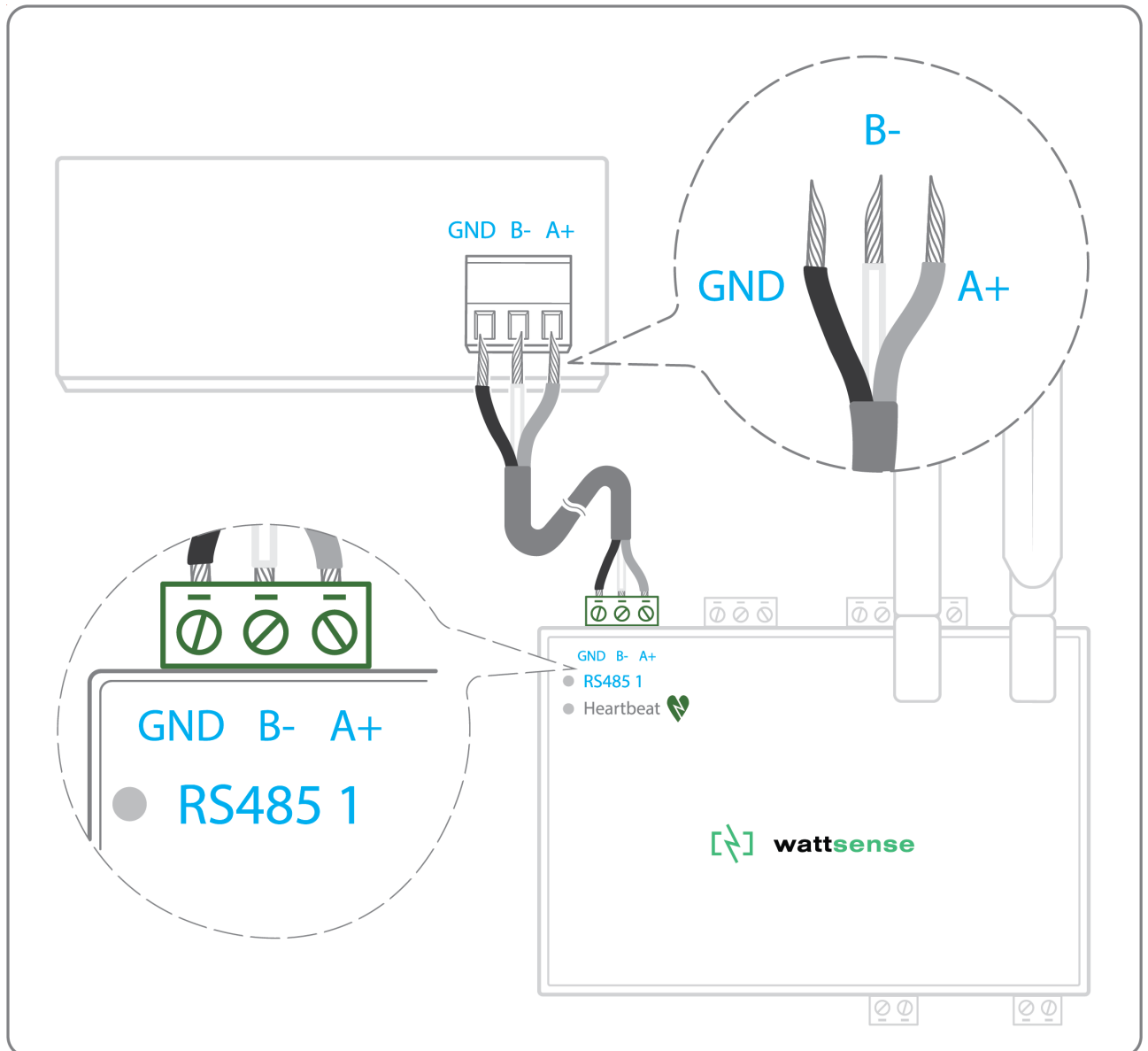


To connect the equipment:

- Caution: Do not group together devices with different communication parameters on the same Bus.
- Serial wire the network or each of the two networks.



- Connect the network to one of the RS485 ports of the Box



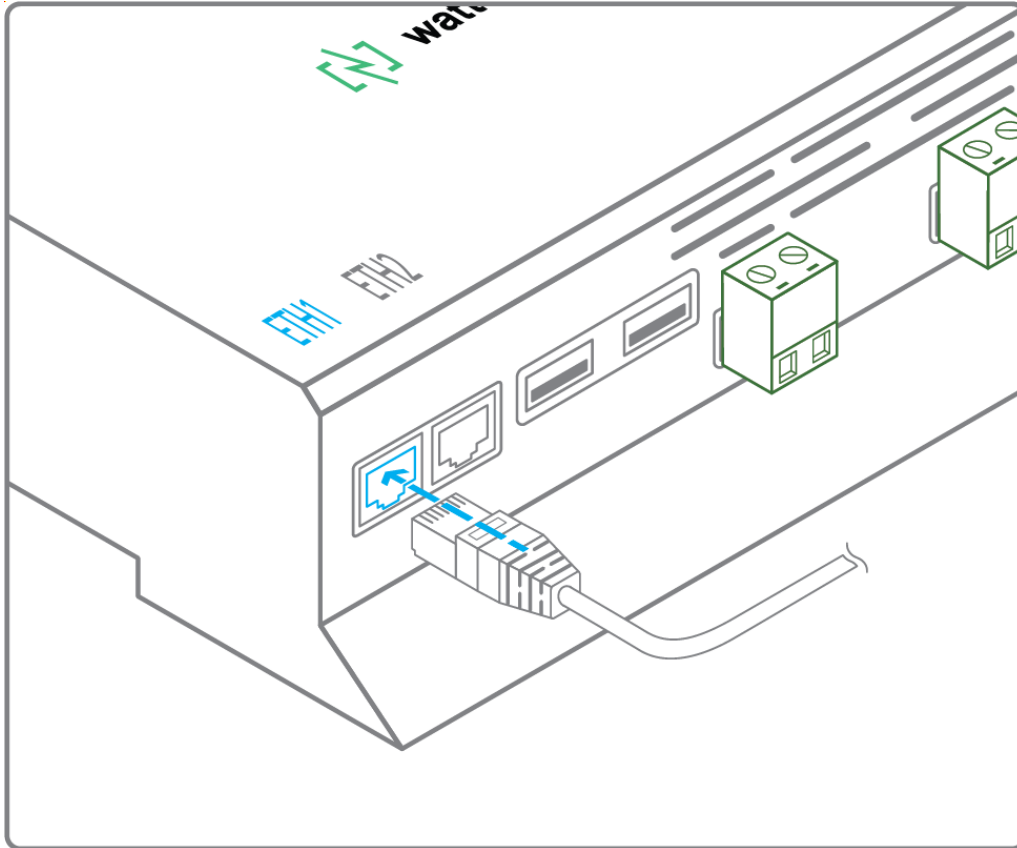
To configure each one of the equipment:

- Configure the address of the 1st Modbus slave to 1, the 2nd to 2, the 3rd to 3 and so on.
- Caution: a network must not contain multiple slaves with the same address.
- Write down the network to which the equipment is connected as well as its address, brand, and model of the equipment and any identifying information. This information will be necessary for the installation configuration and to retrieve data.

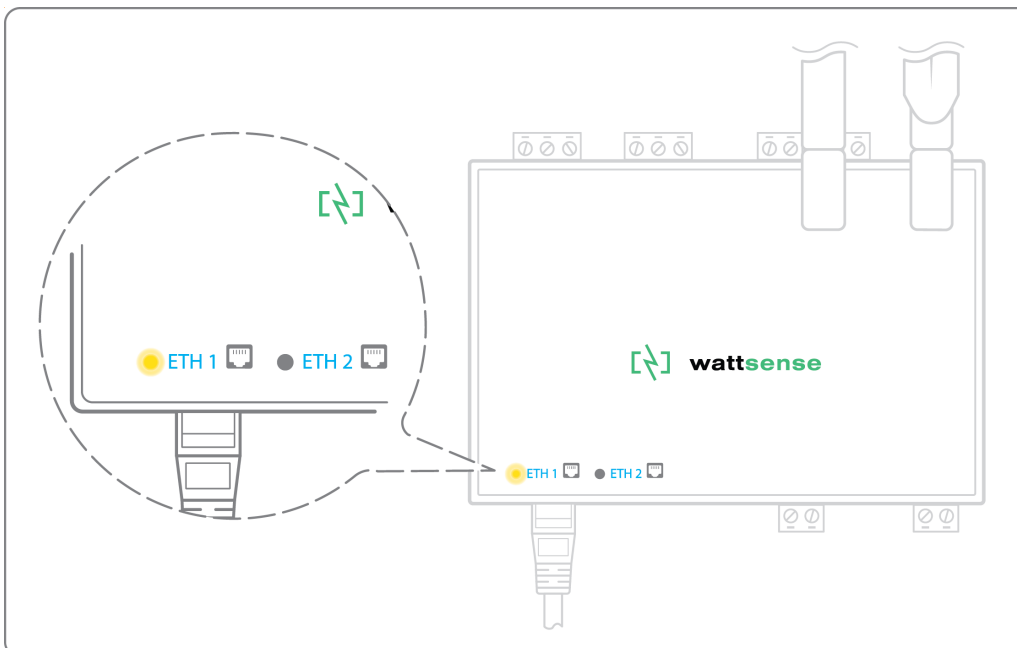
The equipment communicates in BACnet IP

To connect 1 equipment

- Make sure to have an Ethernet cable.
- Connect the cable to the Ethernet port of the Box ETH1 or ETH2.

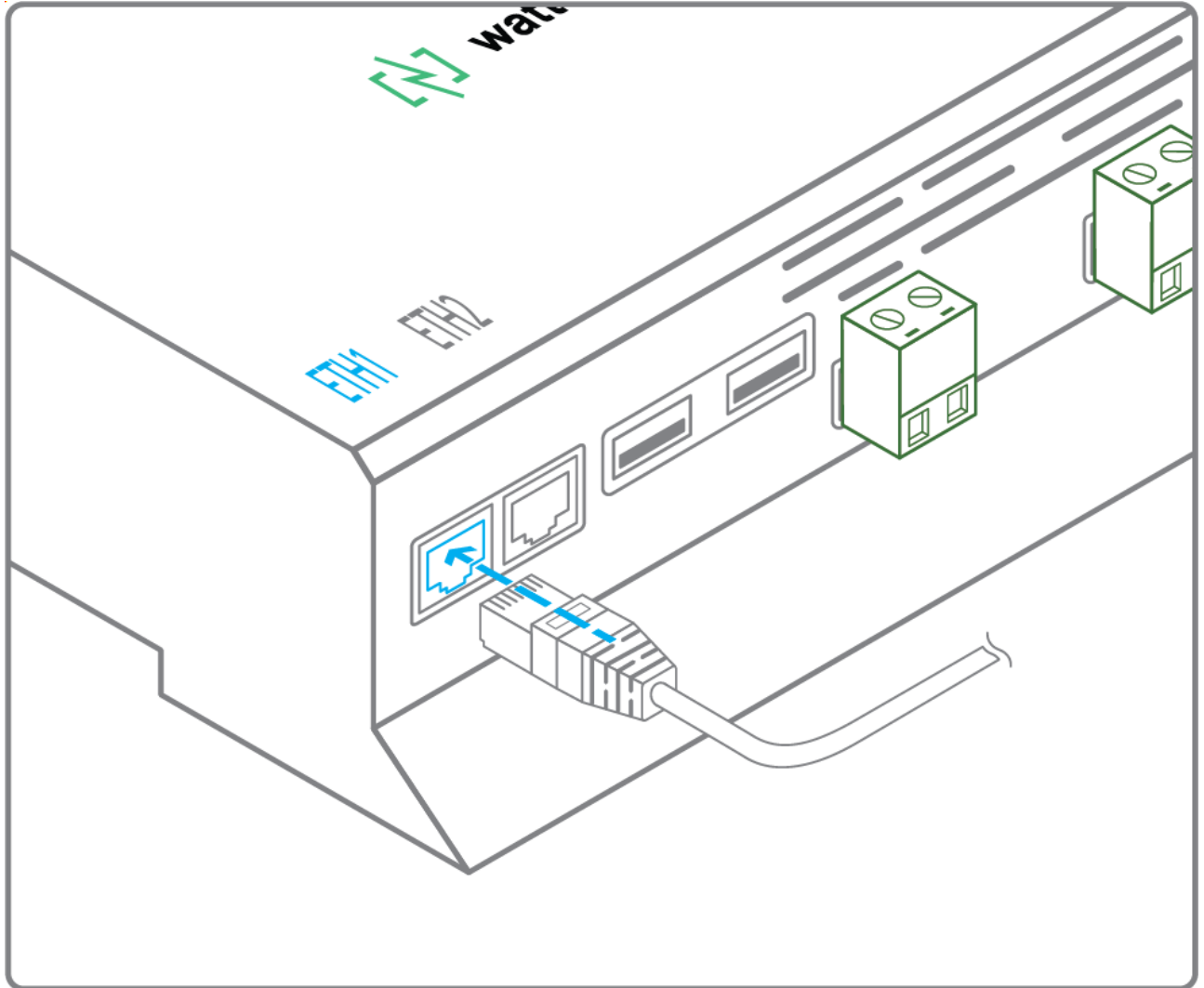


- Connect the other end of the cable to the equipment.
- Verify that the LED ETH1 or ETH2 lights up.



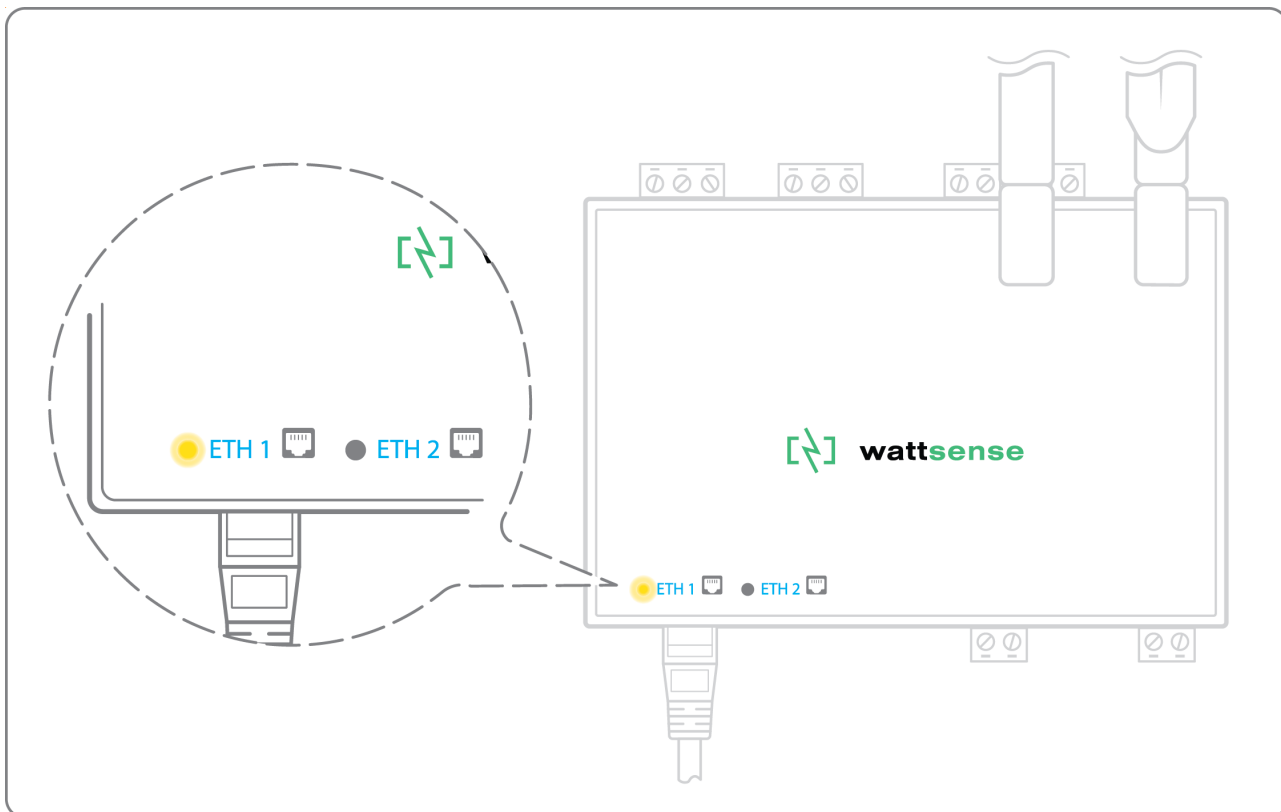
To connect two or more devices

- Make sure to have an Ethernet cable for the Box.
- Make sure to have as many Ethernet cables as equipment to connect.
- Make sure to have an Ethernet switch.
- Connect the power supply to the switch.
- Connect an Ethernet cable to the Ethernet port ETH1 or ETH2 of the Box.

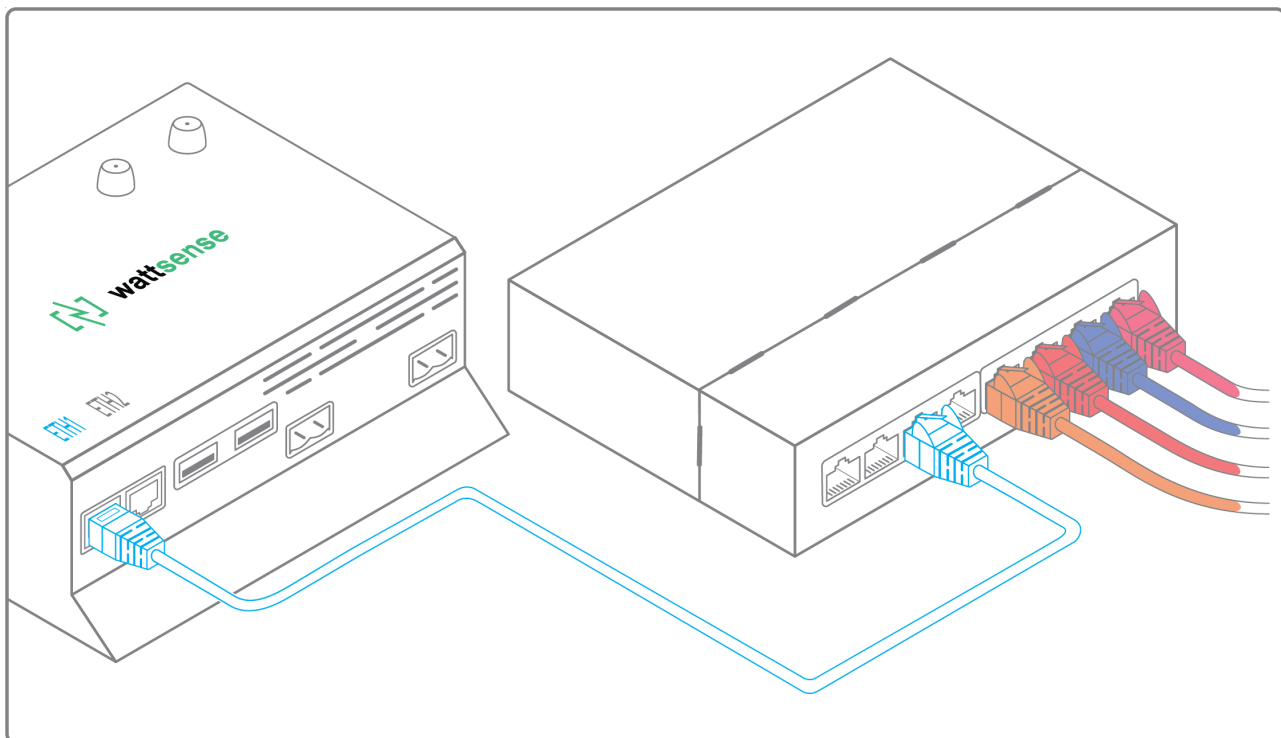


- Connect the other end of this cable to the Ethernet switch.

- Check that the ETH1 or ETH2 LED lights up.



- Connect all equipment to the switch via the Ethernet cables.



To configure each of the equipment:

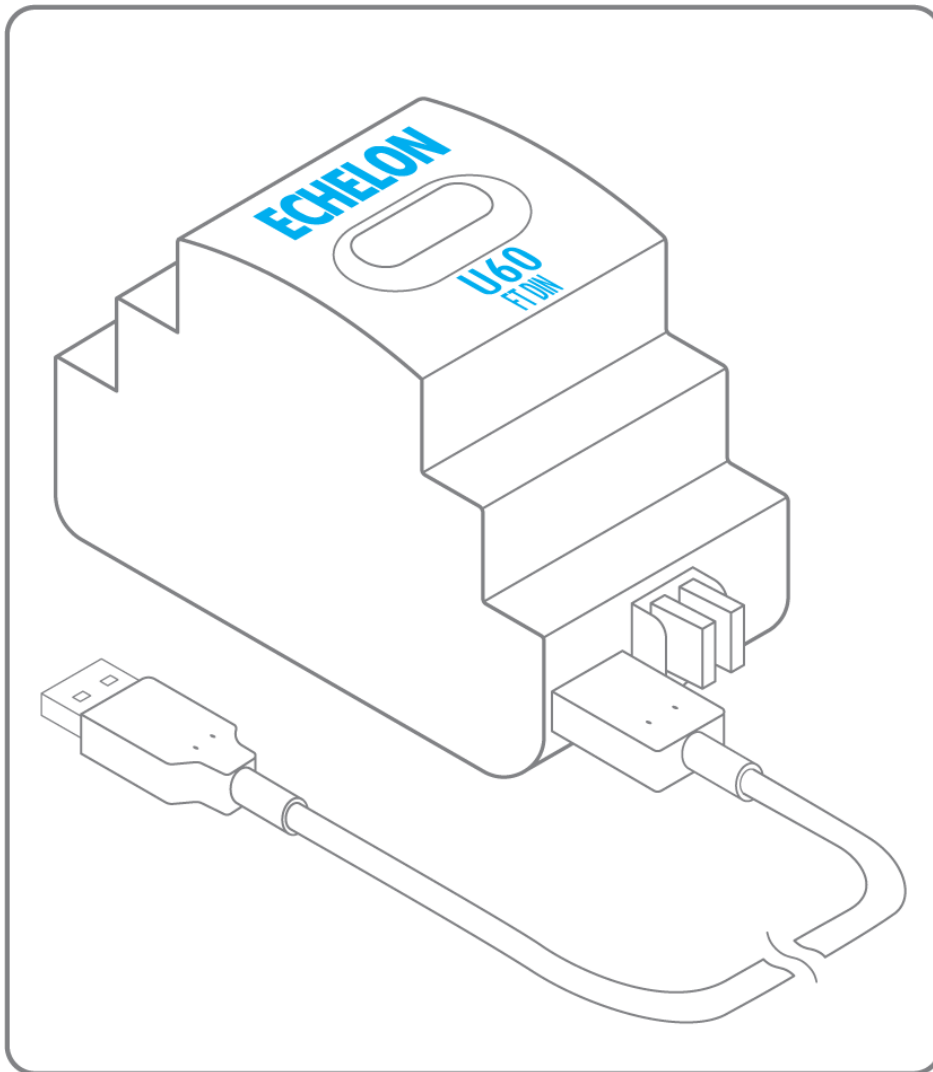
- From the technical documentation of the equipment, retrieve its IP address and the BACnet port.

- If the equipment does not have an IP address, assign one to it, 192.168.1.1 for the first device, then 192.168.1.2 for the second device, 192.168.1.3 for the third device, and so on.
- Write down the IP address and BACnet port, the brand, and model of the equipment, and any other identifying information. This information will be required to configure the installation and to retrieve data.

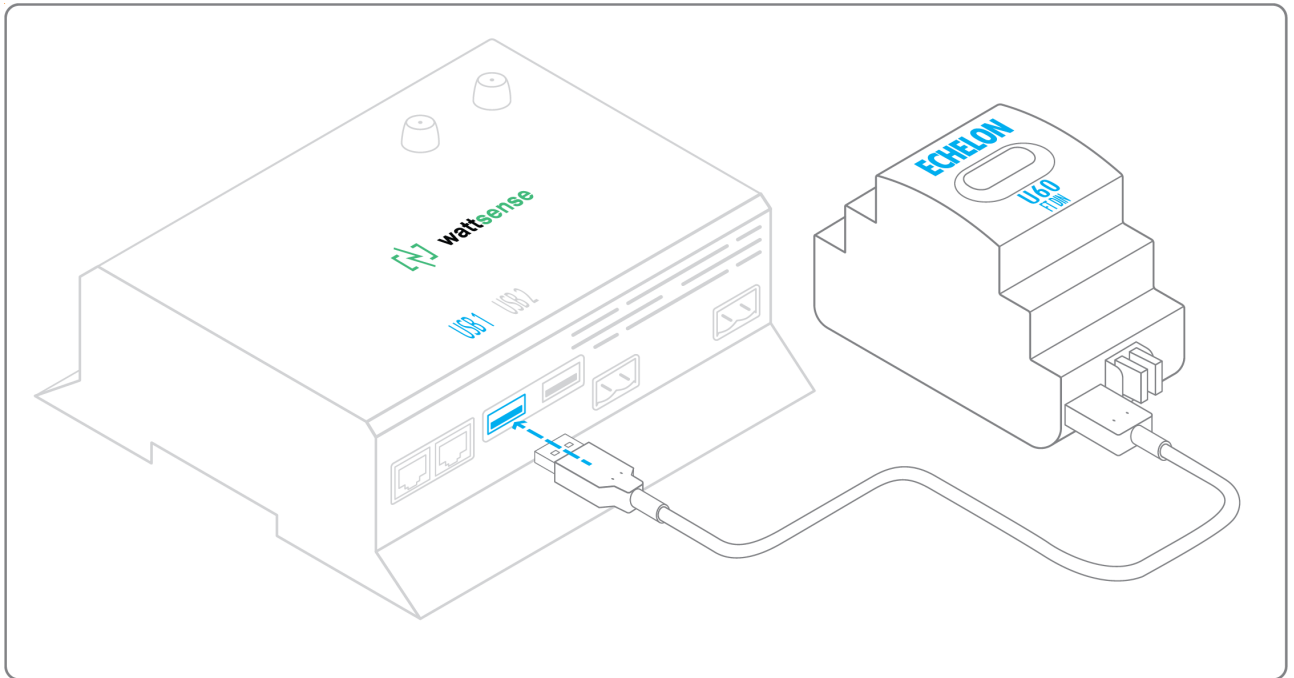
The equipment communicates in LON FT10

To connect the equipment:

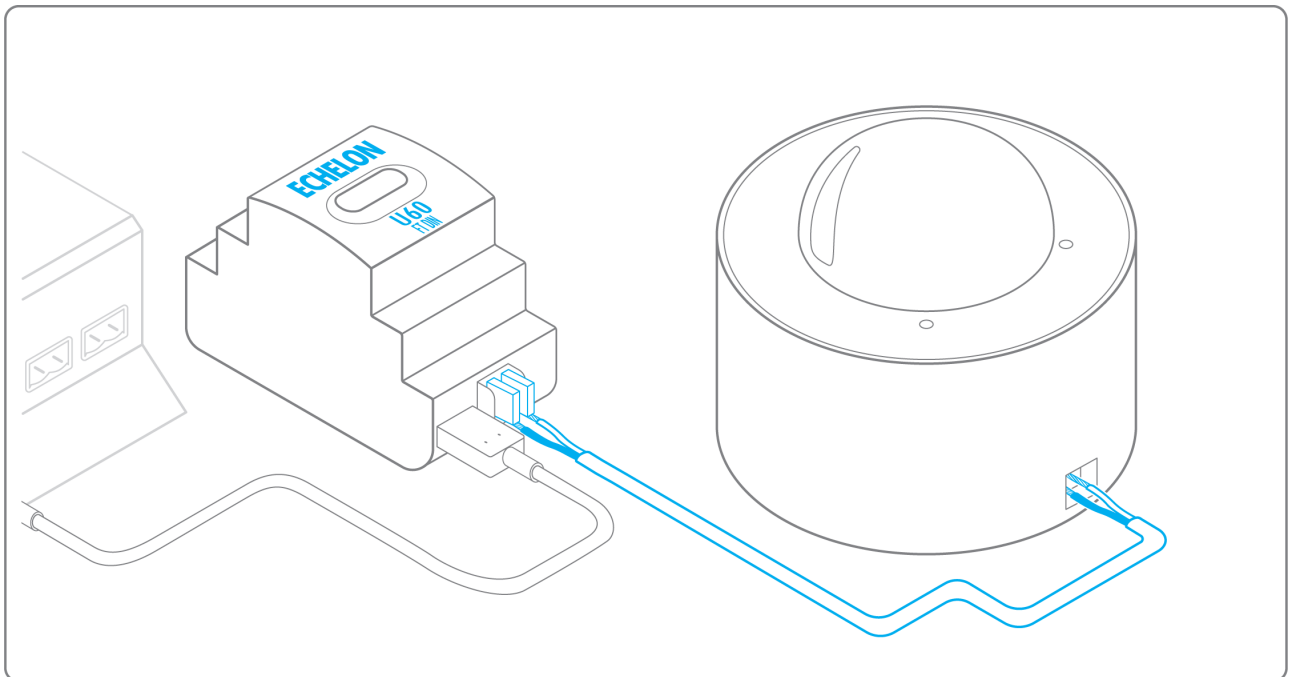
- Make sure to have an Echelon U60 FT DIN USB Gateway.



- Connect it to the USB port 1 or 2 in the Box.



- Wire the gateway to different devices as you wish, in serial, star, etc.



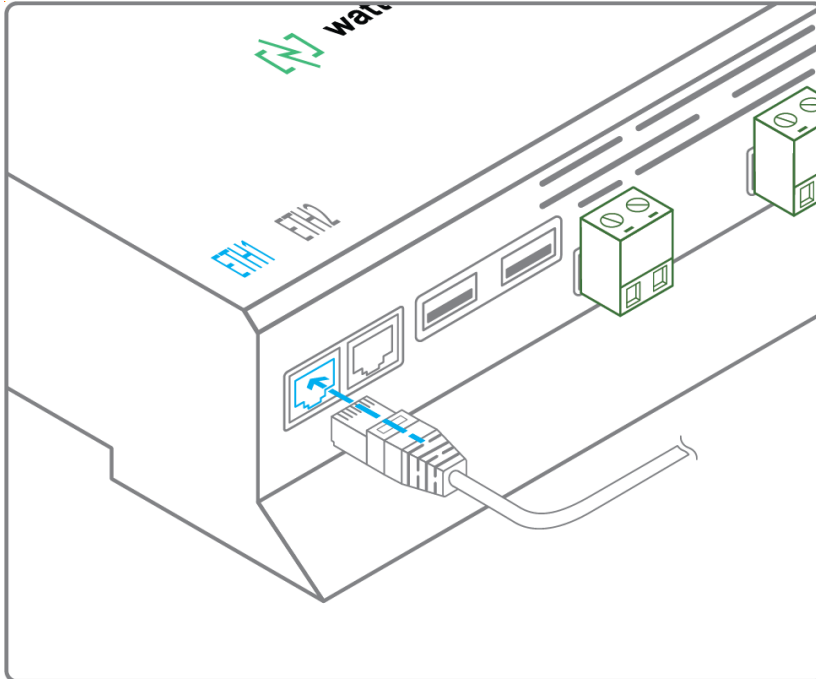
To configure each of the equipment:

- Retrieve the Neuron-ID that appears on the equipment.
- Write down the Neuron-ID, brand, model of the equipment, and any identifying information. This information will be necessary for the installation configuration and to retrieve data.
- If you have the NL220 software, export the LON database as an NLC file.

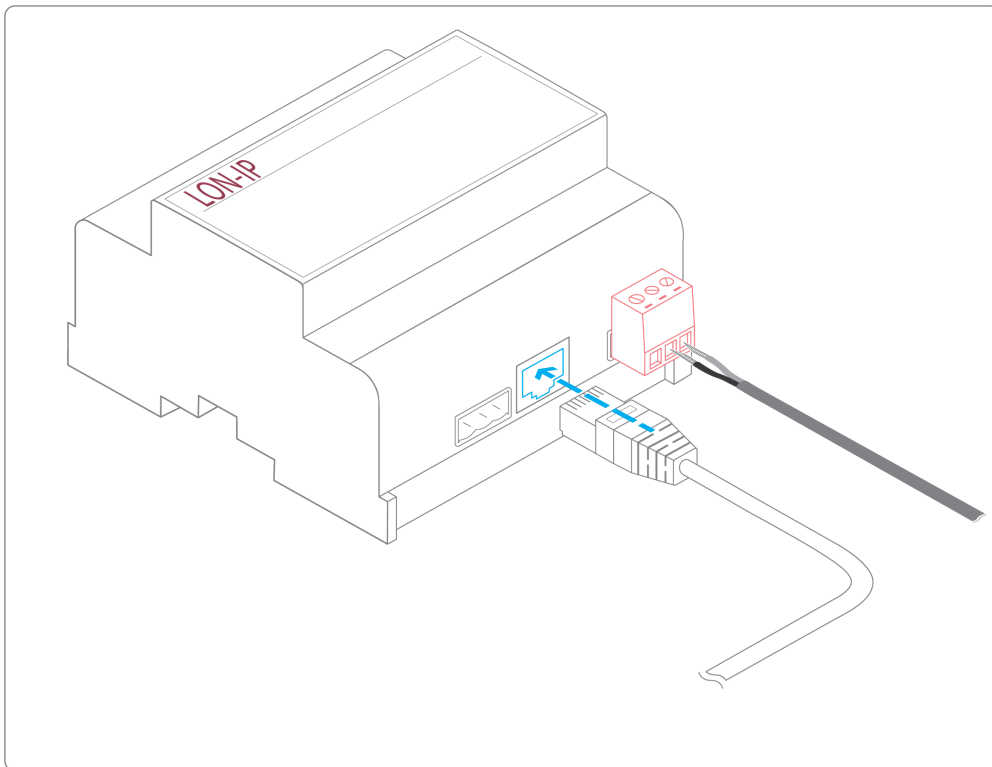
The equipment communicates in LON IP-852

To connect one or several types of equipment:

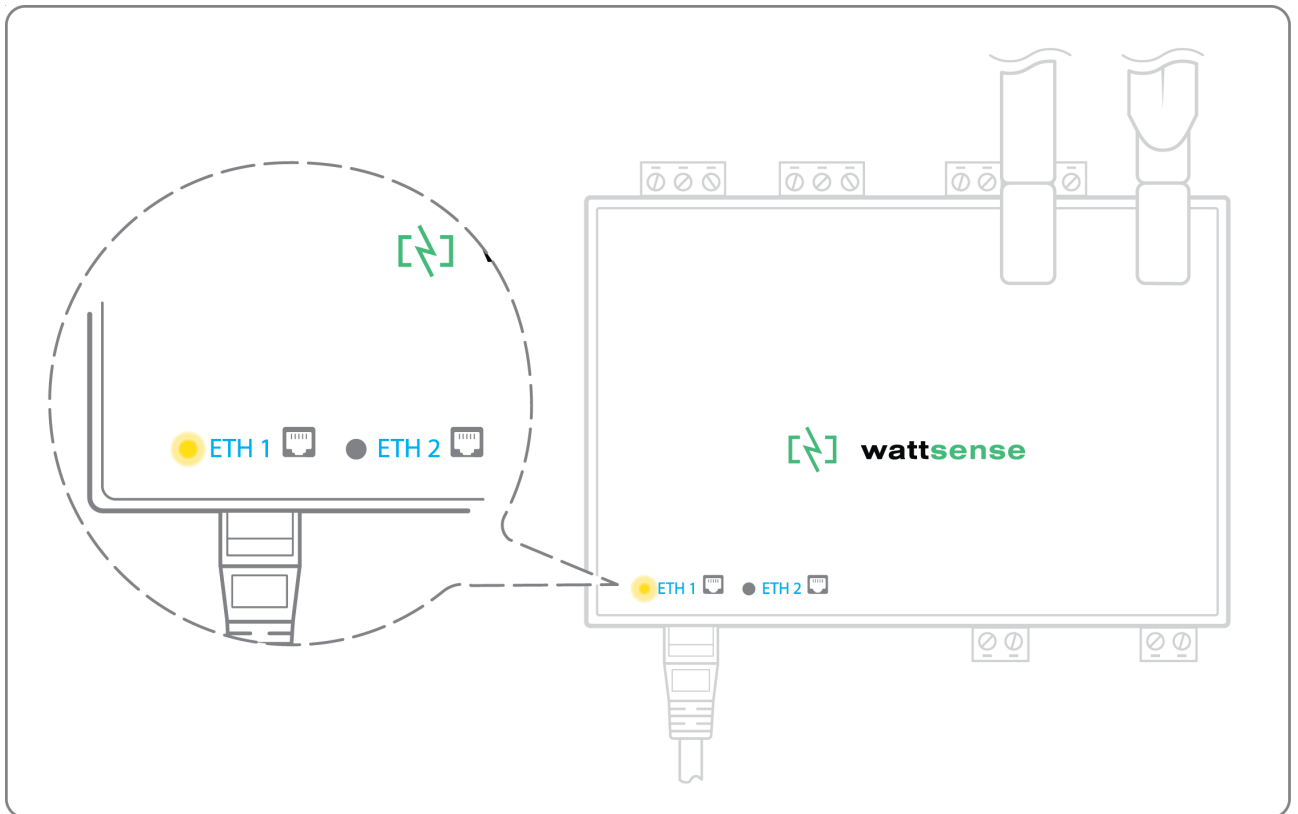
- Make sure to have an Ethernet cable.
- Connect the cable to the Ethernet port of the Box ETH1 or ETH2.



- Connect the other end of the cable to the IP-852 server of the LON network.



- Verify that the LED ETH1 or ETH2 lights up.



- Register the IP address of the Box on the IP-852 server of the LON network.

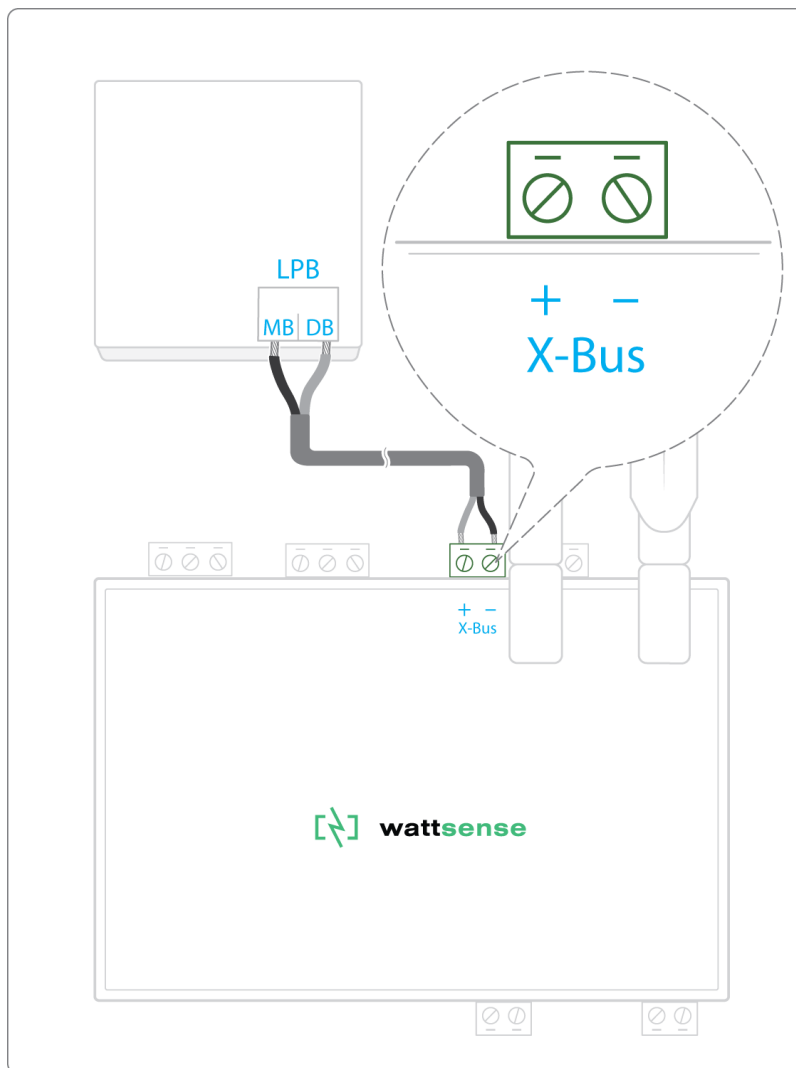
To configure each of the different equipment:

- Write down the Neuron-ID, brand, model of the equipment, and any identifying information. This information will be necessary for the installation configuration and to retrieve data.
- If you have the NL220 software, export the LON database as an archive file or as a NLC file.

The equipment communicates in LPB

To connect one or several equipment:

- Connect the LPB Bus to the X-Bus port of the Box.
- For each device, connect its MB cable to the X-Bus (-) port and its DB cable to the X-Bus (+) port on the Box.



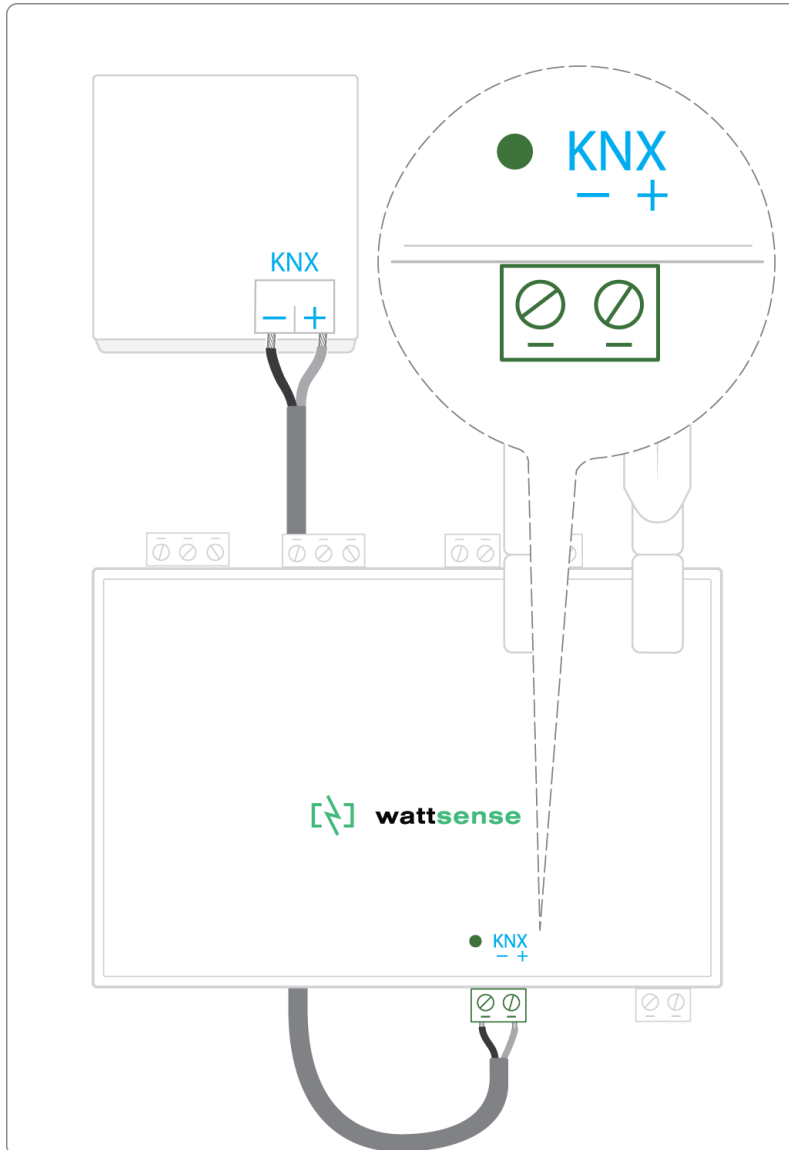
To configure each one of the equipment:

- As a precaution, check that the equipment does not power the LPB Bus.
- For each device, configure a unique segment address (from 1 to 14).
- Proceed to make the connection as indicated.
- Designate one and only one equipment as the one that supplies the Bus.

The equipment communicates in KNX

To connect one or several equipment:

- Connect the KNX Bus to the KNX Bus port of the Box.
- Each device must connect its (-) signal to the Hub's (-) signal and its (+) signal to (+) the Hub's (+).

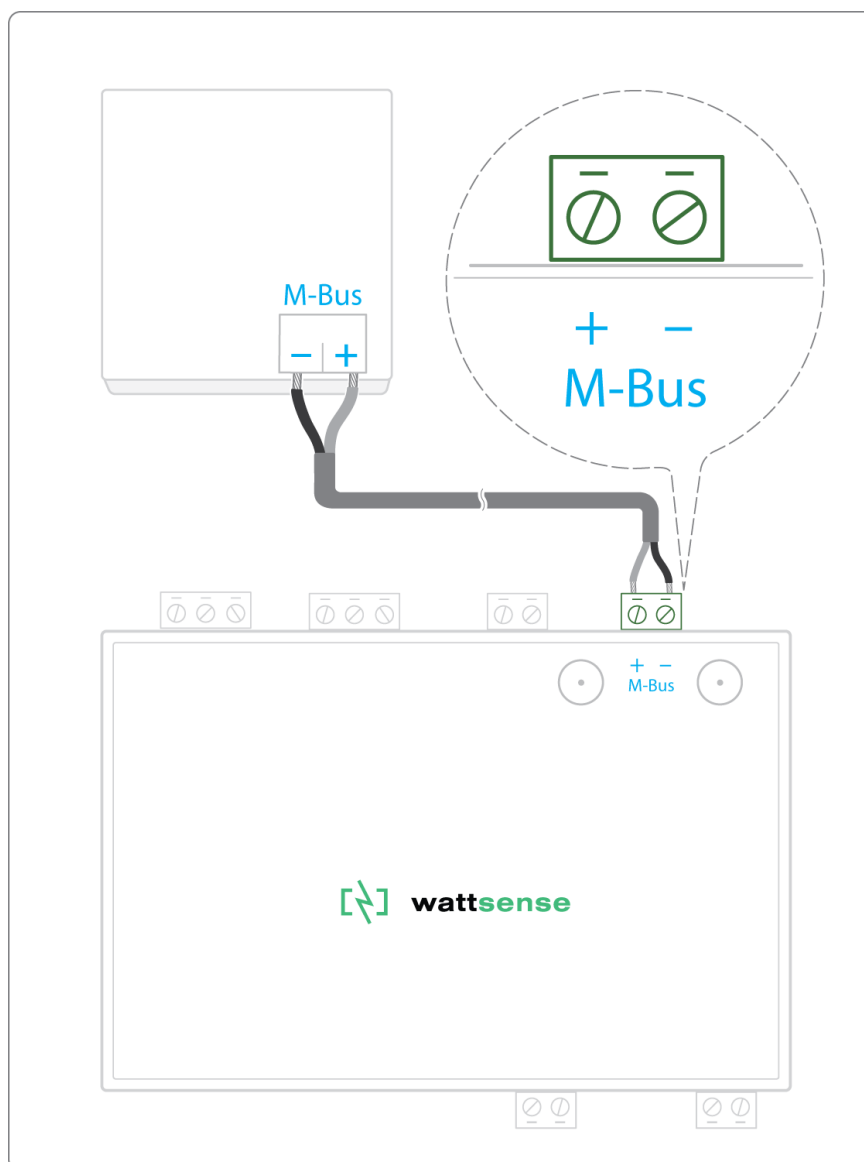


The equipment communicates in M-BUS

To connect one or several equipment:

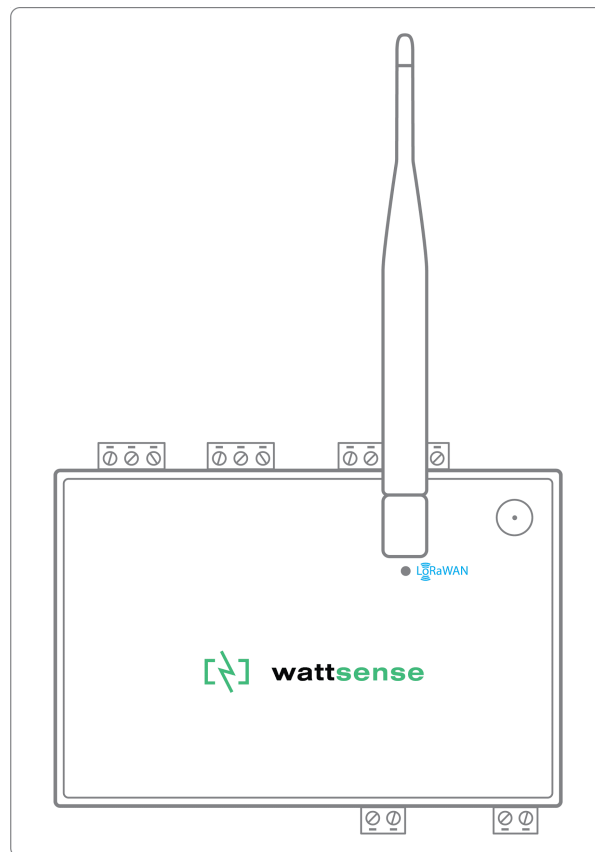
The maximum unit load that the Box can handle is three devices (3,6mA). If you want to connect more than three M-bus devices you'll have to use an M-bus signal repeater.

- Connect the M- Bus device to the M-Bus port of the Box.
- Each M-Bus device must connect its (-) signal to the M- Bus (-) signal in the Box and it's (+) to the (+) signal in the Box.



To connect the Box to LoRaWAN sensors

- Install the Box in a central location to ensure the reception of all sensors.
- If the quality of the LoRa signal is good: keep the original antenna installed on the Box. You can check the quality of the LoRaWAN signal with:
 - A field tester
 - The Wattsense User Console. Once the Box and the LoRaWAN device are paired you can verify the [quality of the signal](#).



- If the signal quality is insufficient: move the original antenna out of the cabinet; use an RF extension cord with a SMA connector up to 2 meters + 1 adhesive support to hold the antenna.
- If the signal quality is still insufficient: use a High-gain antenna with a maximum of 10 meters of cable; this antenna can for example be used outside or in other floors to obtain the best signal quality.

For each sensor, follow these steps:

Step 1: Add the sensor to the user console (available at <https://console.wattsense.com>) by naming it to be identifiable.

Step 2 : Save and send the configuration to the Box.

Step 3: Activate the sensor; to do this, use the manufacturer's technical documentation.

Step 4: Check on the user console that the sensor is detected.