



DATASHEET INSTALLATION GUIDE

V1.4



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1. Safety and Security rules

! CAUTION	
	Incorrect wiring or operating outside specifications Risk of device damage and other hazards • Use only qualified personnel to install the device. • Qualified for consigning equipment • Qualified for carrying out operations on electrical installations • Ensure that the device is wired correctly before turning on power. • Operate the device within the specified operating ranges (temperature, humidity, voltage, shock, mounting direction, atmosphere, etc.). • Use only for the intended purpose of monitoring and control. To avoid loss of data or damage, do not use it for any other purpose • Operate inside only. • Do not operate over a power-over-ethernet (POE) network. Connecting the device to a network segment supplying power may cause a device failure. In this case, disconnect the device from the POE network segment, turn it off and on again.

! CAUTION	
	Improper device handling during installation, maintenance, and mounting Risk of electric shock! • Always disconnect the power supply before installation or maintenance. • Turn off power before wiring, removing, or mounting the device. • Do not touch electrically connected parts, such as power terminals. • Do not disassemble the device. • Keep out of reach of children. • Install the device in a controlled environment relatively free of contaminants. • The cover, front panel or back panel of the device should not be removed. No configuration or maintenance action of the components (e.g. jumpers or battery) by the user requires the removal of the cover; all elements are accessible as connectors on the top, bottom, and side of the device.

! CAUTION	
	Operating outside specifications or loose electrical wires Risk of fire! • Operate the device within the specified operating ranges (temperature, humidity, voltage, shock, mounting direction, atmosphere, etc.). • Tighten the electrical wires on the connector. • Install the device in a controlled environment relatively free of contaminants

 CAUTION	
	National safety regulations Failure to comply with national regulations may result in personal injury and other damage. • Use only copper conductors. Connect the device in accordance with local, state, and national electrical codes and regulations.

NOTICE	
	EN 60730-1 Power supply considerations • Electrical safety in building automation and control systems relies primarily on the use of extra-low voltage, strictly separated from the main voltage. This low voltage is either SELV or PELV, according to EN 60730-1 • Protection against electric shocks is ensured by the following measures • Voltage limitation (low voltage supply DC 24V DC +/-10%, SELV or PELV), • Protective separation of the SELV system from all circuits other than SELV and PELV, • Simple separation of the SELV system from other SELV systems, PELV systems and the ground • Field devices such as sensors, status contactors, or actuators connected to the low voltage inputs and outputs of the I/O modules must comply with SELV or PELV requirements. Interfaces to field devices and other systems must also comply with SELV or PELV requirements. • When power of SELV or PELV circuits is obtained from higher voltage power systems, it shall be provided by a safety transformer or converted designed for continuous operation to power the SELV or PELV circuit.



2. Type summary

Introduction

The Box is an electronic device:

- Created to connect a big amount of equipment from all buildings: IoT sensors, meters, heating, air conditioning, air handling systems, building management systems (BMS).
- Easy and quick to install: accessible for all. If the building already has a BMS, the Box connects to the main bus as the third party. If there's no BMS, a BMS network is directly created by the Box.
- Telemetry and control: collects data and controls equipment.
- Gateway: unifies the field communication protocols.
- Web-Connected: automatically connects to the cloud via 3G/4G or ethernet cable.
- Powerful IoT device: combines the functionality of a gateway, a modem and an edge device.
- Edge computing: hosts and runs schedulers and automation scenarios.

References

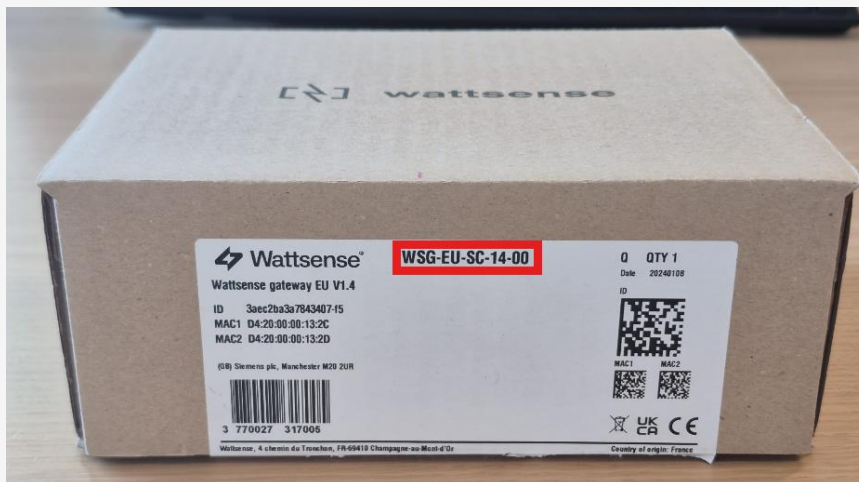
NOTICE	
!	LoRa and cellular frequency band restrictions The use of LoRa and cellular frequencies may be restricted in your region: • Verify compatibility with local LoRaWAN and cellular frequency bands when selecting the hardware type for your region – refer to Technical data section for details. • Products using wireless technology are subject to international and national approvals - do not import and operate in regions where required approvals are not confirmed.

Box reference	Description
WSG-EU-SC-14-00	Wattsense Box - EU 868, IN 868
WSG-NA-SC-14-00	Wattsense Box - US 915, AU 915

Product identification

This document is applicable to the following products: Box WSG-EU, WSG-NA version 1.4

You can identify your product by its model, which can be found on the right side of the device or on the cardboard.



Software

- Secured Linux Yocto distribution.
- Built-in drivers for all buses, protocols, and building equipment.
- Automatic discovery of equipment on BACnet and M-Bus networks.
- Remote configuration.
- Secure server communication via MQTT.
- Automatic and secure software updates.
- LoRaWAN server remote backup

Licensing

A software license is required to activate the Wattsense Box.

Data frequency

Data is read by default at a 10-minute interval, excluding LoRaWAN sensors that have their own frequencies to minimize battery consumption. Commands (downlink) are sent instantly when the targeted device listens.

Optional hardware and additional material

Not provided with the hardware

The optional hardware depends on connection type and protocol:

- Power supply cable (see specifications in the Technical data section)
- Bus connection cables (see specifications in the Technical data section)
- Ethernet cables
- Ethernet switch
- LoRaWAN network tester
- High-gain external GSM antenna (following the antenna specification in the datasheet) High-gain external LoRaWAN antenna (following the antenna specification in the datasheet)



3. Intended use and foreseeable misuse

Intended use

The product has the following intended applications:

- To enable data gathering and processing from local building automation devices its wired and wireless interfaces and to enable transmission to the console hosted on a remote web server.
- To enable secure transmission of processed data to a local MQTT broker using authenticated and authorized cloud endpoints or to a local building management system via its RS485 and Ethernet interfaces.
- To be installed and operated exclusively by authorized personnel in physically secured locations, such as locked rooms or inside locked cabinets.
- To be configured by personnel who are both sufficiently trained and trusted.
- To operate in a protected network zone when the Ethernet interfaces are used, with firewall separation from public internet access.

Reasonably foreseeable misuse

The product has the following reasonably foreseeable misuse applications:

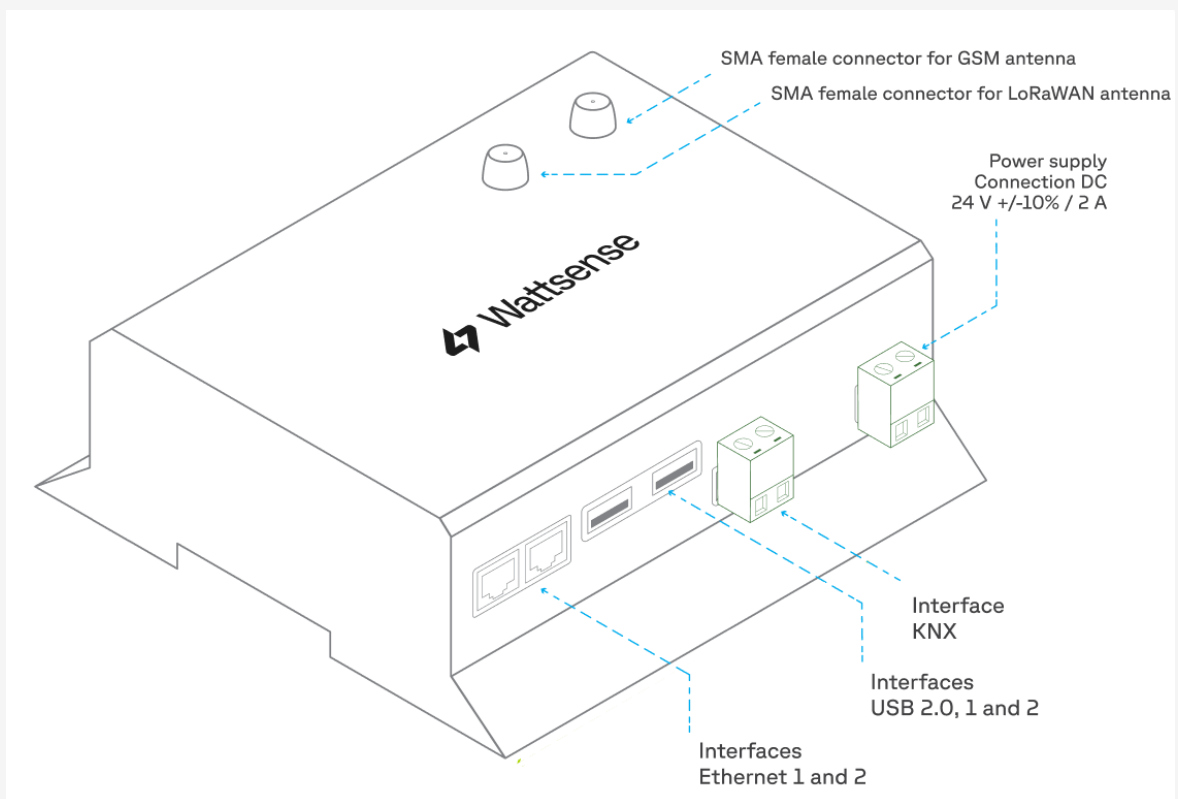
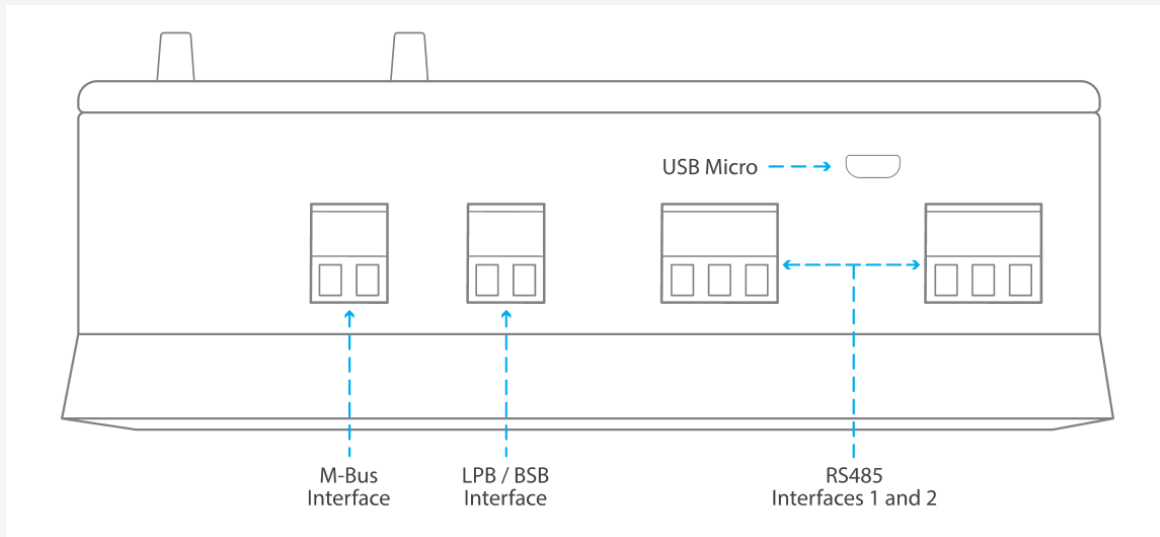
- To connect directly to the internet without network protection / building owner's firewall
- To be used as network security device.
- To load and run a Python script with other goals than using gathered data.
- To install and configure the device wrongly by inadequately trained people (for example bridging two separate networks by connecting the LAN ports).
- To install the device in publicly accessible or unsecured areas, allowing unauthorized physical access.
- To operate the device with outdated firmware or applications, exposing known vulnerabilities.

The product has the following prohibited applications:

- To store or forward network communication for malicious purposes.
- To deploy and run life-critical applications, as the device is not designed for such use cases.

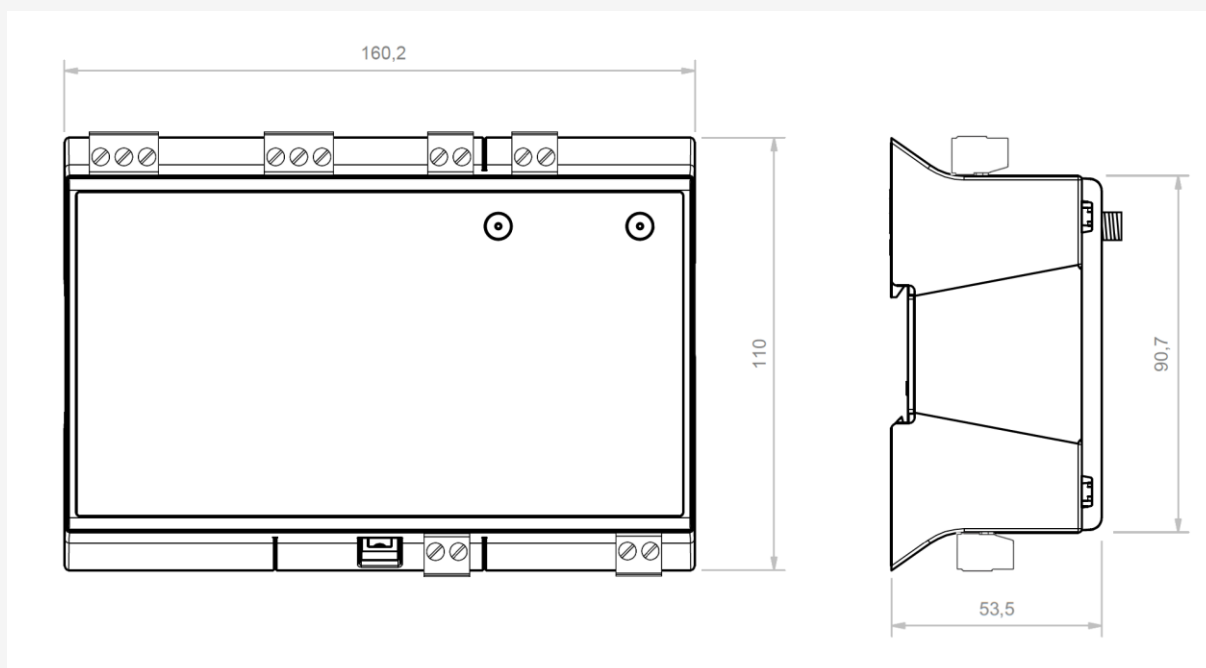
4. Technical and mechanical design

Designations



Mechanical and climate information

All dimensions are in mm



Other mechanical information	
Weight	350g without antennas 385g with antennas
Dimensions	160 x 110 x 55mm without antennas 160 x 110 x 95mm with antennas
Degree of protection of housing to EN 60529	IP2X
Operating temperature	From 0°C to +45°C
Humidity	5% to 95% humidity – no condensation
Mounting	DIN rail Omega profile (TN35) DIN 1015 / 1070 / 3070 wall mounted (2 screws)

LED Display

Interfaces

LED	Color	Status	Description
Cellular modem	Green	ON Flashing 1.2s Flashing 0.4s	Not connected Connected Communicating
ETH-1 ETH-2	Orange	OFF Flashing	Not communicating Communicating
RS485-1 RS485-2	Orange	OFF Flashing	Not communicating Communicating
KNX	Orange	OFF Flashing	Not communicating Communicating
LPB	Orange	OFF Flashing	Not communicating Communicating
M-BUS	Orange	OFF Flashing	Not communicating Communicating

Others

LED	Color	Status	Description
Power 24V	Green	OFF ON	Device not powered Device powered
Heartbeat	Green	OFF ON Flashing	Device not operational Device not operational Device operational

5. Disposal



Electrical and electronic equipment may not be disposed of with household waste. This also applies to products that do not carry this logo. Electrical and electronic equipment contain materials and substances that can harm the environment and human health. At the end of their life, electrical and electronic equipment must therefore be disposed of in an appropriate way.

The European WEEE Directive 2012/19/EU applies throughout the European Union. The directives and laws that transpose it into national law may vary from country to country. Environmentally sound disposal is good for your health and protects the environment from harmful substances in electrical and electronic equipment.

- Observe national and local regulations regarding the disposal of electrical and electronic equipment.
- Erase all data stored on electrical and electronic equipment.
- Drop off or send your electrical and electronic equipment to your local specialized collection point

This symbol is only valid in the European Union please contact your local authorities or dealer and ask for the correct method of disposal

6. Technical data

Power supply

Power supply	
Voltage	24VDC +/- 10%
Power	5VA
Internal protection	1A soldered fuse
Cabling	In an electrical cabinet: 2 insulated wires Out of electrical cabinet: 2 insulated wires cable not shielded with protective sheath.
Cable colors	+: Red -: Black
Cable length	EU: 2m maximum if non permanent connection
	USA, Canada: 1.5m minimum if non permanent connection
Wires size	2 wires, 22 AWG, minimum section: 0,35mm ²

Power supply requirements	
Input	85-264 VAC
Output	DC 24V +/-10% 2A

Function Data

Hardware information	
Processor	ARM Cortex-A7 – 528MHz
Operating System	Linux
Memory	512MB RAM 4GB Flash

Wired interfaces

KNX interface		
Physical interface	KNX	
Interface type	KNX S KNX LTE mode	
Baud rate	9600 bauds	
Cable type	2-wires braided cable, shielded cable recommended (shield must be connected to building earth in the mounting panel)	
Cable length	Max. 1000 m per segment (each segment requires a local power supply)	
Wires size	Rigid wire	0.2 ... 1.5 mm ² / 20 ... 14 AWG
	Flexible wire	0.75 ... 1.5 mm ² / 20 ... 14 AWG
	Flexible wire with ferrule	0.25 ... 1 mm ² / 20 ... 14 AWG
Bus current	Wattsense box max consumption: 5 mA External KNX bus power supply needed.	
Protection	40 V overvoltage protection Polarity inversion protection	
System limits	Device limitations as per general KNX system limitations KNX S and LTE mode cannot run at the same time	

LPB interface		
Physical interface	X-BUS	
Cable type	2-wires braided cable, shielded cable recommended (shield must be connected to building earth in the mounting panel)	
Cable length	250m per connected device Max 1000m	
Wires size	Rigid wire	0.2 ... 1.5 mm ² / 20 ... 14 AWG
	Flexible wire	0.75 ... 1.5 mm ² / 20 ... 14 AWG
	Flexible wire with ferrule	0.25 ... 1 mm ² / 20 ... 14 AWG
Protection	40 V overvoltage protection Polarity inversion protection	
System limits	Max. 16 devices	

M-Bus interface		
Physical interface	M-BUS	
Baud rates	300, 600, 1200, 2400, 4800, 9600, 19200, 38400 (depending on the configuration)	
Cable type	2-wires braided cable, shielded cable recommended (shield must be connected to building earth in the mounting panel)	
Cable length	Max. 350 m between a slave and the Wattsense Box which acts as a master	
Wires size	Rigid conductor	0.2 ... 1.5 mm ² / 20 ... 14 AWG
	Flexible conductor	0.75 ... 1.5 mm ² / 20 ... 14 AWG
	Flexible conductors with ferrule	0.25 ... 1 mm ² / 20 ... 14 AWG
Protection	Short-circuit protection with resettable fuse 40 V overvoltage protection	
System limits	Max. 3 UL	

Modbus RTU Interface		
Physical interfaces	RS485-1 RS485-2	
Interface type	EIA-485, not isolated	
Baud rate	1200, 2400, 4800, 9600, 19200, 38400, 57600, 76800, 115200 (depending on the configuration)	
Internal bus polarization	no	
Cabling (in-house cabling only)	3-wires braided cable, shielded cable recommended (shield must be connected to building earth in the mounting panel)	
Cable length	Max. 500 m (1640 ft) at 38400 bauds Max. 1000 m (3281 ft) at 19200 bauds	
Wires size	Rigid conductor	0.2 ... 1.5 mm ² / 20 ... 14 AWG
	Flexible conductor	0.75 ... 1.5 mm ² / 20 ... 14 AWG
	Flexible conductors with ferrule	0.25 ... 1 mm ² / 20 ... 14 AWG
Protection	Short-circuit protection with resettable fuse -7 V to +12 V common-mode 15 V overvoltage protection	
System limits	Up to 247 devices. For a reliable installation, it is recommended not to exceed 30-32 devices per segment	

Ethernet Interfaces	
Physical interface	ETH-1 ETH-2
Plug	2 x RJ45, shielded
Interface type	10Base-T / 100Base-TX, IEEE 802.3 compatible
Bit Rate	10/100 Mbps, autosensing
Protocol	BACnet/IP on UDP/IP, TCP/IP, and HTTPS on TCP/IP
Cable type	10 Mbps: Min. CAT3, shielded cable is recommended 100 Mbps: Min. CAT5, shielded cable is recommended
Cable Length	Max. 100 m (330 ft)
Protocols and system limits	• BACnet IP (client): Device limitations as per general BACnet system limitations and connected network • BACnet IP server / gateway: Important: BACnet IP client and BACnet gateway / server cannot run at the same time • Modbus TCP/IP client: Device limitations as per general Modbus TCP/IP • Modbus TCP/IP gateway / server: Device limitations as per general Modbus TCP/IP

USB-A interface	
Not currently in use	
Physical interface	USB 1 USB 2
Plug	2x USB-A
Interface type	USB 2.0
Cable length	Max. 2 m
Voltage output	5V +/- 10%
Current	Max. 500mA
Protection	Short circuit protection with power switch

Radio interfaces

Cellular interface	
Physical interface	Cellular
Interface type	Cellular 3G - 4G CAT1
Supported standards Frequency band and antenna gain Maximum radio-frequency power	GSM850 33dBm EGSM900 33dBm DCS1800 30dBm PCS1900 30dBm GSM850 (8-PSK) 27dBm EGSM900 (8-PSK) 27dBm DCS1800 (8-PSK) 26dBm PCS1900 (8-PSK) 26dBm WCDMA B1-2-5-8 24dBm LTE-FDD B1-3-4-5-7-8-12-13-18-19-20-26-38-40-41 23dBm Rx sensitivity -110dBm 698~960MHz 1.0~5.0dBi 1710~2690MHz -1.0~3.8dBi
Antenna type	Omnidirectional rubber antenna with SMA connector
Typical impedance	50 Ohm

LoRa interface		
Physical interface	LoRa	
Interface type	Long range wide area network (LoRaWAN) 1.0	
Supported standards Frequency band and antenna gain Maximum radio-frequency power	LoRa 868 or 915-923 From 863 to 870 MHz 3.56dBi or 902 to 928 MHz 4.51 dBi Tx power up to 14dBm Rx sensitivity -139dBm@SF12, BW 125 kHz	
Supported frequency bands	WSG-EU-SC-14-00	Europe - EU_863_870 • All SF5 to SF12 • Uplink: 868.10 MHz, 868.30 MHz, 868.50 MHz, 867.10 MHz, 867.30 MHz, 867.50 MHz, 867.70 MHz, 867.90 MHz • Downlink: 869.525 MHz

		India - IN_865_870 • All SF5 to SF12 • Uplink: 865.0625 MHz, 865.4025 MHz, 865.985 MHz • Downlink: 866.550 MHz
	WSG-NA-SC-14-00	North America - US_902_928 • All SF5 to SF12 • Uplink (sub-band 2): 903.90 MHz, 904.10 MHz, 904.30 MHz, 904.50 MHz, 904.70 MHz, 904.90 MHz, 905.10 MHz, 905.30 MHz • Downlink: 923.3 MHz Australia - AU_915_928 • All SF5 to SF12 • Uplink: 916.8 MHz, 917.0 MHz, 917.2 MHz, 917.4 MHz, 917.6 MHz, 917.8 MHz, 918.0 MHz, 918.2 MHz • Uplink (sub-band 2): 903.90 MHz, 904.10 MHz, 904.30 MHz, 904.50 MHz, 904.70 MHz, 904.90 MHz, 905.10 MHz, 905.30 MHz • Downlink: 923.3 MHz
Antenna type	Omnidirectional rubber antenna with SMA connector	
Typical impedance	50 Ohm	
System limits	Max. 500 devices	

Availability of frequencies depends on the hardware version. The product requires wireless approval testing and documentation. Do not use in countries where the respective approval has not been obtained and the product has not been released.

Cybersecurity

Enterprise-grade security based on SSL/TLS with the following properties:

- Two-way authentication between Box and server with x509 certificates.
- End-to-end encryption.
- Message integrity checks.

Contact information

For more information on cyber security and on dealing with known security weaknesses contact security@wattsense.com.

Further information

The table lists where you can find further information on the specific topic of cyber security in the product documentation. Some product documentation can be retrieved from the Cybersecurity Guidelines on <https://www.wattsense.com/resources/>.

Topic	Further information
Secure commissioning and ensuring secure conditions when the product is in operation	<i>Cybersecurity Guidelines:</i> Device security during the lifecycle Operation and maintenance
Data security effects of modifications to the product or its configuration	<i>Cybersecurity Guidelines:</i> Operation and maintenance
Installation of product software updates or product firmware updates that are relevant to security	<i>Cybersecurity Guidelines:</i> Operation and maintenance <i>Installation guide:</i> Benefitting from security product updates
Deactivation of product software updates or product firmware updates that are relevant to security	<i>Installation guide:</i> Deactivating product updates <i>Cybersecurity Guidelines:</i> Phase-out and disposal
Software version or firmware version currently installed on the product	<i>Installation guide:</i> Identifying the current version
Secure decommissioning and secure removal of all user data	<i>Cybersecurity Guidelines:</i> Phase-out and disposal
Information for systems integrators	<i>Cybersecurity Guidelines</i>
Software parts list	[Link to SBOM]
CE declaration for the product	EU Declaration of Conformity

Conformity

Standards, directives and approvals	
Product standards	EC/EN 62368-1 - Information Technology Equipment
Electromagnetic compatibility (EMC)	For residential and commercial environments
EU conformity (CE)	See CE declaration
IMDA	See IMDA declaration
RCM	See RCM declaration
FCC	Contains - FCC ID: 2AJYU-8PYA008 - FCC ID: 2AF6B-RAK5146
ISED	Contains - IC: 23761-8PYA009 - IC: 25908-RAK5146
Environmental compatibility	The product environmental declaration contains data on environmentally compatible product design and assessments (SVHC declaration, disposal)

European Union conformity

Wattsense declares that this device is manufactured in accordance with the technical specifications of the product and is in compliance in all respects with the relevant standards and regulations.

Contact for regulatory topics: (EU) Wattsense, 4 chemin du Tronchon, Racing Park - Immeuble Daytona, FR-69410 Champagne-au-Mont-d'Or

United Kingdom conformity assessed

Contact for regulatory topics: (GB) Siemens plc, Sir William Siemens House, Princess Road, Manchester, M20 2UR

FCC Statement

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 instruction, 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 interference by one or more of the following measures:

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

FCC Caution

Cellular communication

This device contains a cellular RF module with FCC ID: 2AJYU-8PYA004

This device contains a cellular RF module with IC: 23761-8PYA005

- This equipment must be installed and operated in accordance with provided instructions and the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be collocated or operating in conjunction with any other antenna or transmitter. End-users and installers must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.
- Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the equipment.
- This Transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
- Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user authority to operate the equipment.

LoRaWAN RF

This device contains a cellular RF module with FCC ID: 2AF6B-RAK5146

This device contains a cellular RF module with IC: 25908-RAK5146

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.
- (2) This device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This module complies with FCC radiation exposure limits set forth for an uncontrolled environment .This equipment should be installed and operated with minimum distance 20 cm between the radiator & your body.

The LoRaWAN antenna delivered by Wattsense meets the FCC-IC regulations. If the installer makes the choice to use another antenna, the maximum antenna gain allowed is 5.8 dBi to comply with FCC/IC regulations limiting both maximum RF output power and human exposure to RF radiation.

CAN ICES-003 Compliance

This device complies with FCC and ISSED RF radiation exposure limits set forth for general population. This device must be installed to provide a separation distance of at least 20cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

This radio transmitter (23761-8PYA005 and 25908-RAK5146) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

This device contains license-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

1. this device may not cause interference, and
2. this device must accept any interference, including interference that may cause undesired operation of the device.

FCC and CAN ICES-003 Cellular antenna characteristics

The cellular antenna delivered by Wattsense meets the FCC-IC regulations.

If the installer makes the choice to use another antenna, it must follow the specifications listed below for the device used to comply with FCC/IC regulations limiting both maximum RF output power and human exposure to RF radiation.

1. Whip antenna type
2. 50 Ohm typical impedance
3. Maximum antenna gain

Frequency band	Antenna gain (dBi)
GSM850	-1

GSM1900	6
GPRS840 4TS	-1
GPRS1900 4TS	-1
WCDMA Band2	10
WCDMA Band4	9
WCDMA Band 5	7
LTE Band2	10
LTE Band4	11
LTE Band7	10
LTE Band12	6
LTE Band13	6
LTE Band25	10
LTE Band26	8
LTE Band41	9
LTE Band66	9

FCC and CAN ICES-003 LoRa antenna characteristics

The Lorawan antenna delivered by Wattsense meets the FCC-IC and CAN ICES-003 regulations.

- Whip Antenna type
- 50 Ohm typical impedance
- Gain: 5.8dB

SVHC declaration

Date	27/09/2022
References	WSG-EU-SC-14-00 WSG-NA-SC-14-00

Regulation	Substance	Limit	Exemption
RoHS substance restrictions (Directive 2011/65/EU)	Lead/lead compounds	0.1%	Exempt in the EU under Annex III Exemption 6
REACH candidate list substances (Regulation 1907/2006)	Lead	0.1%	

Proposition 65 substances which may be found in mechanical and electrical products	Lead/lead compounds	0.009% (90 ppm) of any material	
Industry restricted and declarable substances	Brominated flame retardants (other than PBBs, PBDEs or HBCDD) -PWB	0.09% w/w total bromine content from BFRs in printed wiring board laminate	

7. Installation Guide

What do you need to know before starting?

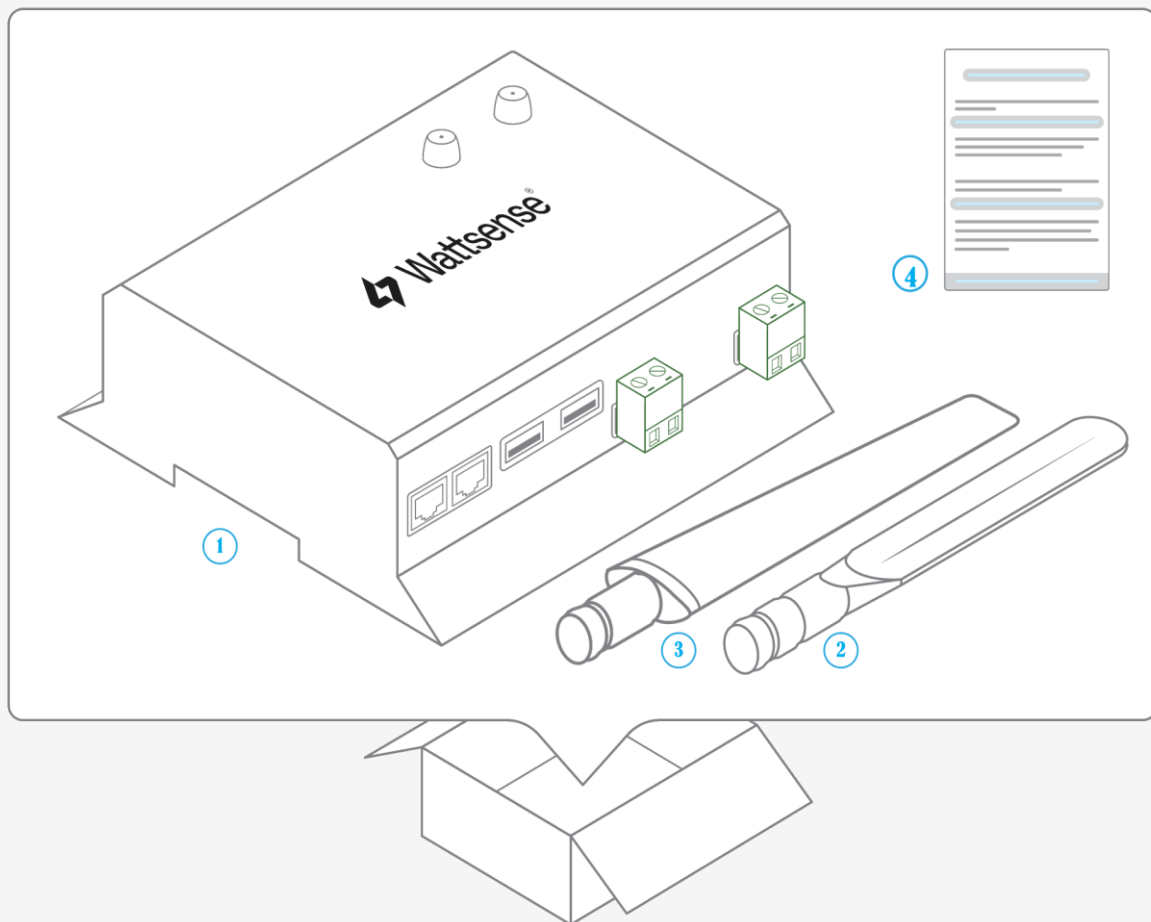
The Box can be snapped onto standard DIN rails.

! CAUTION	
	Do not install in environments • with excessive moisture, corrosive fumes, or explosive vapors, • exposed to vibration or shock, • subject to electrical interference (near large electrical installations, electrical machinery, welding equipment, etc.). Other installation requirements: • The device must be mounted on a DIN rail in a cabinet or in an electrical box. • If mounted in a control cabinet, the cabinet must maintain the specified operating temperature range (allowing for 24 watts of heat dissipation by the controller). This is especially important if it is mounted inside an enclosure with other heat-producing equipment • This device is intended for indoor use only. The box is designed for installation in a secure, restricted physical area to ensure access is limited to authorized individuals only. The local area networks connected through the box's Ethernet ports must remain isolated, not exposed to external networks, meaning inbound ports must be closed. • Do not install outdoors.

NOTICE	
	Radio frequency energy Interference to radio communications • Install and use equipment in accordance with installation guide. • Read all regulatory compliance information.

Package content

ID	Qty	Designation
1	1	Box
2	1	Cellular standard antenna
3	1	LoRa standard antenna
4	1	Quicklaunch flyer



Required material

- Stabilized power supply input: 85-264 V AC output: DC 24 V +/-10% / 2 A
- Cable between the power supply and the device: 2 wires (red, black), 22 AWG or 0.35 mm²
- Flat screwdriver
- Cutting pliers
- Wire stripper

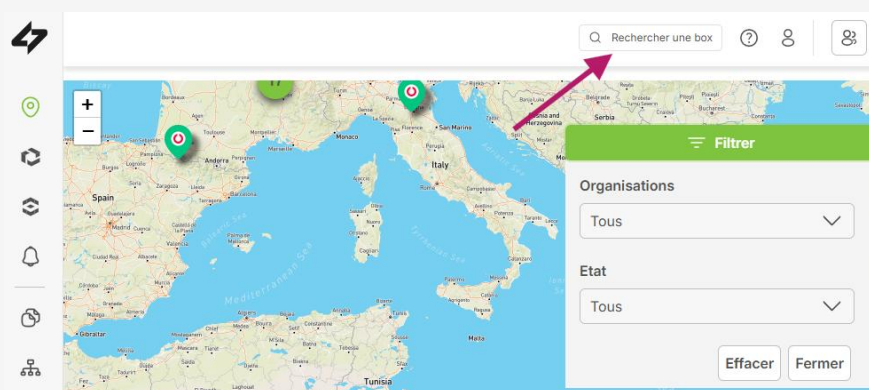
Optional hardware depending on the type of connection

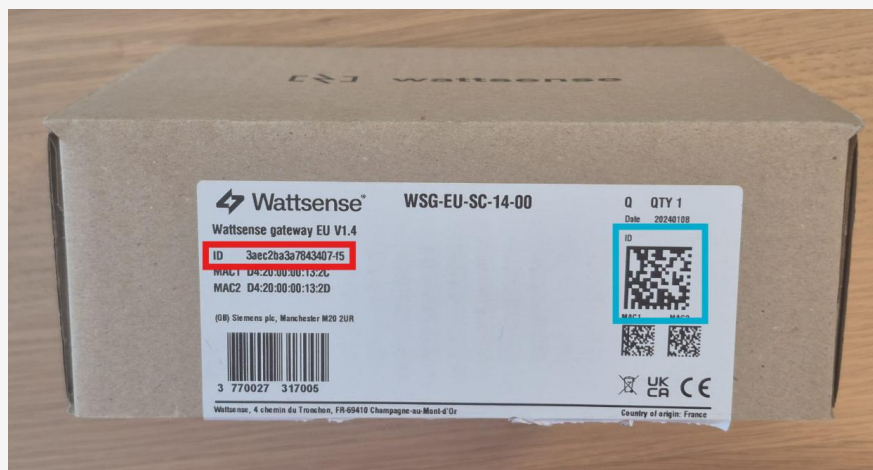
- Bus connection cable (see specifications in "Technical Data")
- Ethernet cables (see specifications in "Technical Data")
- Ethernet switch
- High-gain GSM antenna (see specifications in "Conformity")
- High-gain LoRa antenna (see specifications in "Conformity")
- Cellular or LoRa SMA cable
- Technical documentation of equipment
- Technical documentation of IoT sensors
- Schematic of the communication network(s) of the BMS

Computer access to the Wattsense console

NOTICE	
!	All hardware products leverage an integrated cellular connection for remote activation, firmware updates, configuration and troubleshooting. The SIM card is pre-mounted in all hardware types and compatible in all supported regions, the GSM/4G plan is part of all software license types and does not need to be purchased separately.

- Each customer has a dedicated account 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 serial number 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 can then access the configuration tools.

Power supply of the Box

NOTICE	
	Make sure that the Box has been activated beforehand on the user console.
	When using a detachable power supply cord with this product, the detachable cord serves as the means of disconnection from the power supply.

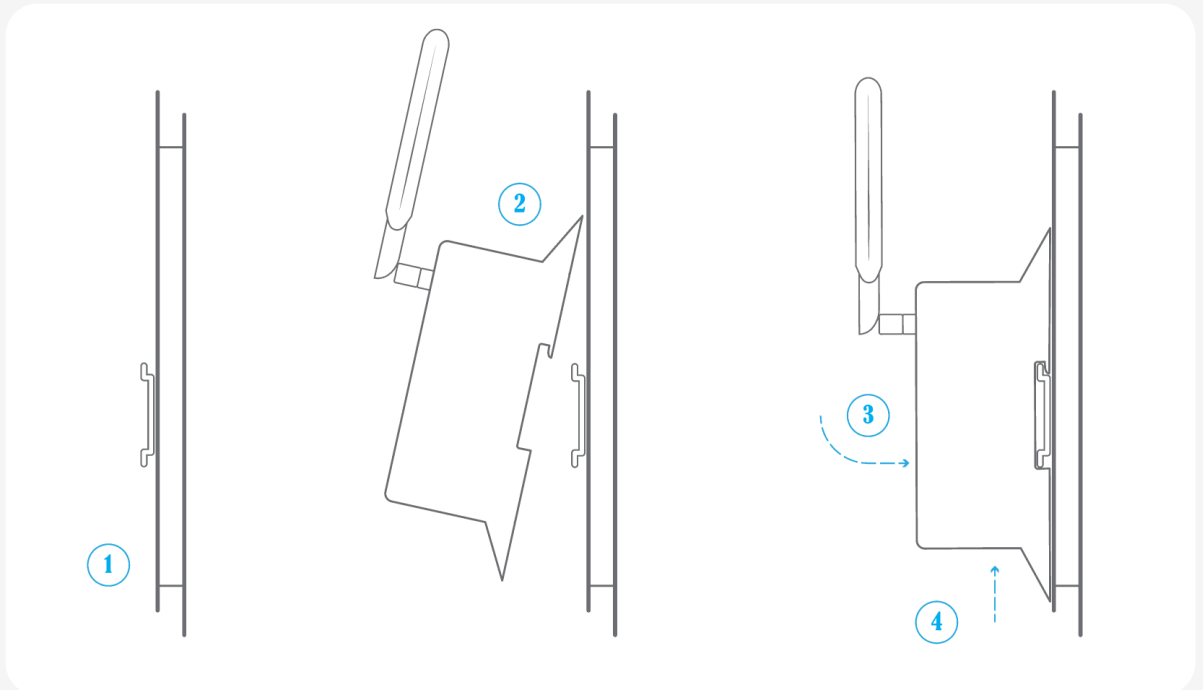
CAUTION	
	Risk of electric shock!
	• Incorrect installation of the device may lead to injuries from electric shock when touching the device! • Do not install the device in locations where children are likely to be present. • Conductors with a cross-section of 0.5 mm² (AWG24) or greater must meet requirements per IEC 60332-1-2 and IEC 60332-1-3 or IEC TS 60695-11-21. • Cut the power supply before installing the device

CAUTION	
	In case of permanent power supply connection, an isolating switch has to be installed nearby the device in order to be accessible to cut the power supply.
	USA and Canada: In case of non permanent power supply connection, the cable length has to be minimum 1.5m EU: In case of non permanent power supply connection, the cable length has to be maximum 2m

A – MOUNT THE DEVICE ON THE DIN RAIL

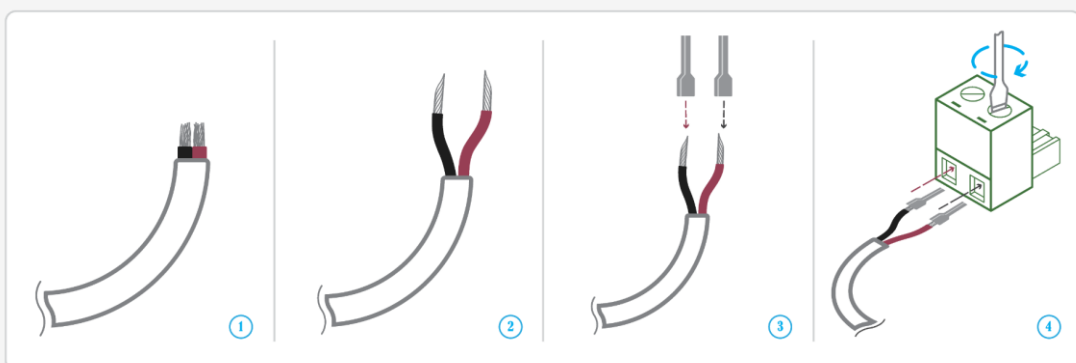
Make sure that the device has been activated beforehand on the user console.

- 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 (2-3)
 - Push the DIN rail lock (4)



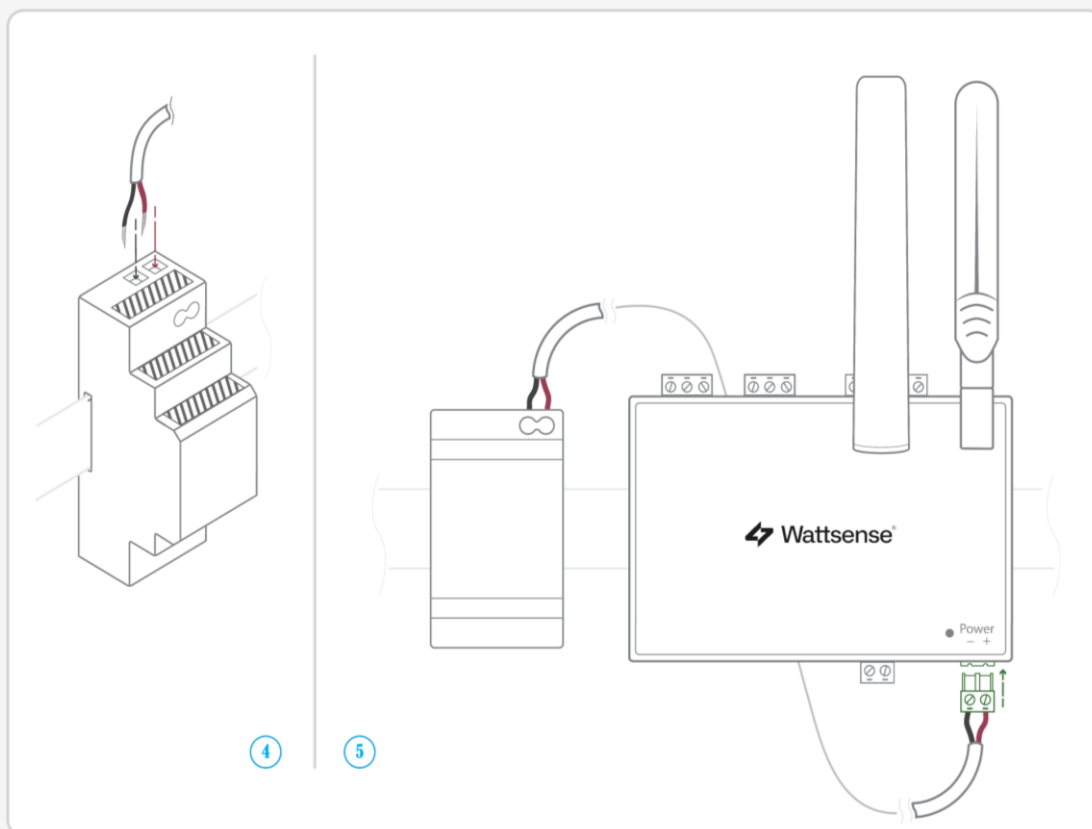
B - CONNECT THE CABLE

- To avoid any risk of injury caused by a fall, the box should not be installed more than 2 meters from the ground.
- Use a stabilized power supply input: 85-264 V AC output: DC 24 V +/-10% / 2 A
- Attach crimping ferrules to both wires
- Screw the cable into the power connector of the box

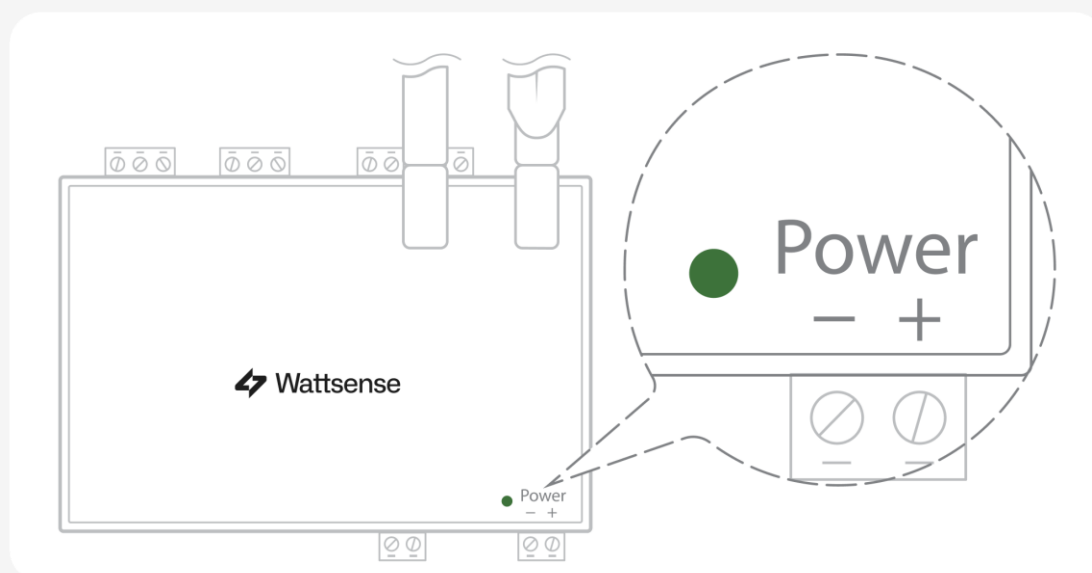


C – SUPPLY POWER

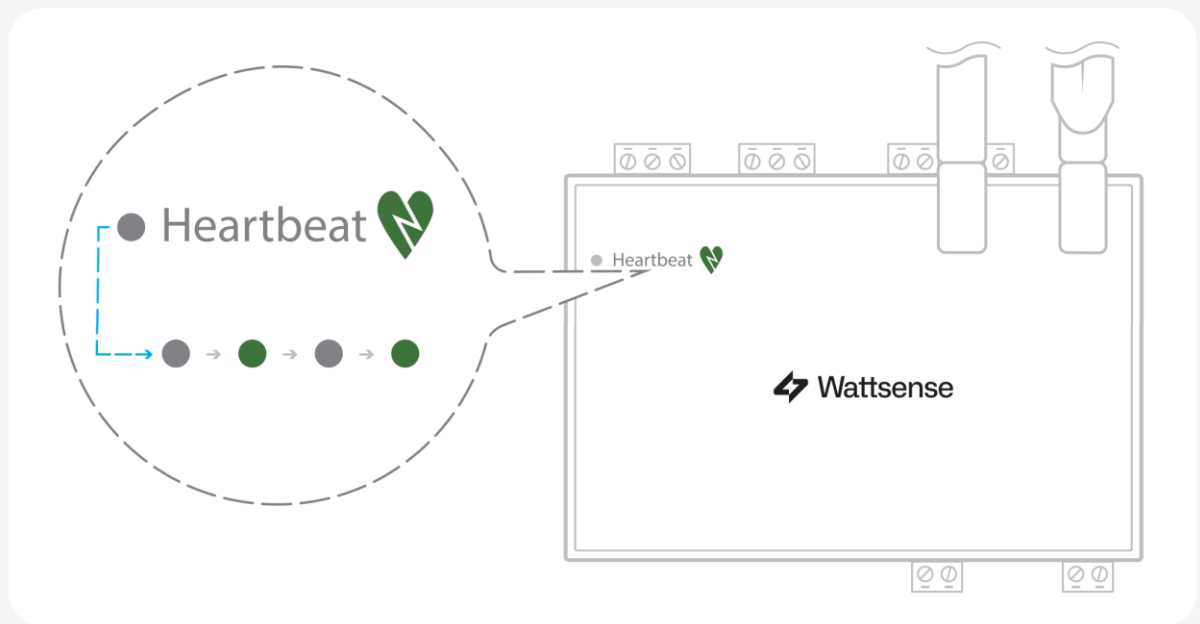
- Connect the cable to the power supply



- Check that the “Power” LED is lit (steady green light).



- Wait about 10 seconds: the "Heartbeat" LED flashes (green light).



- Wait until the GSM LED flashes; if the LED does not flash after a few minutes, see the chapter "Cellular Connectivity"
- 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 "Cellular Connectivity" chapter.

Cellular connectivity

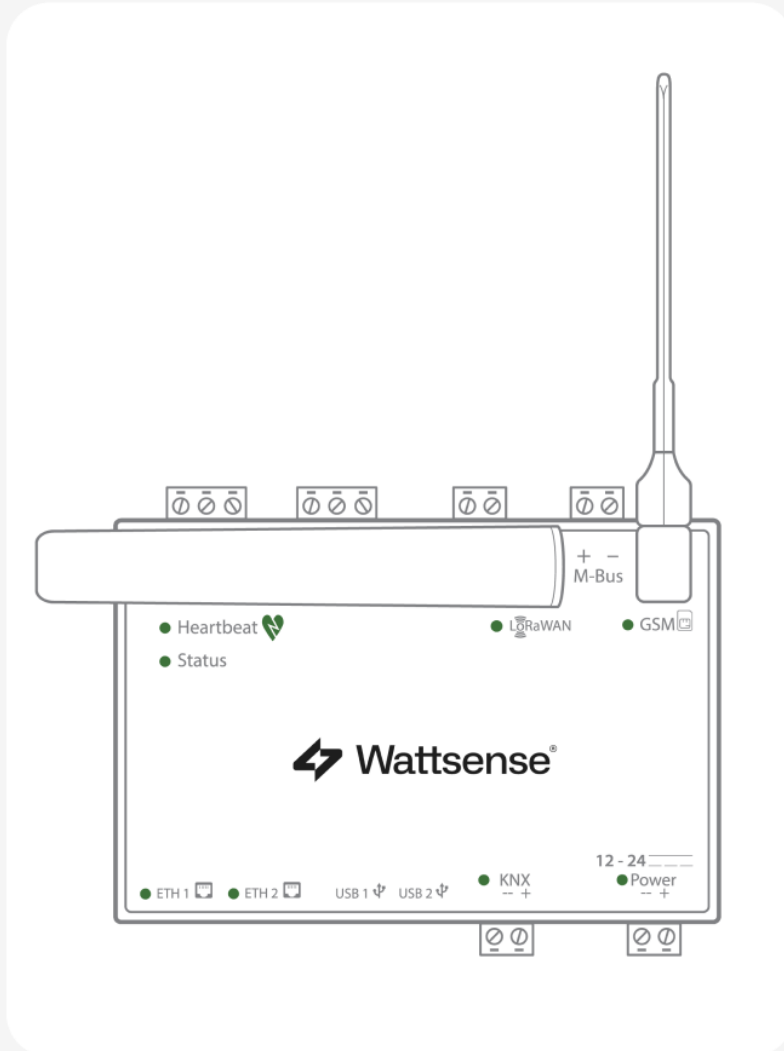
The Box is supplied with a standard Cellular antenna.

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 better signal quality. Please note that, beyond 15 meters of cable, the GSM signal is significantly weakened.
- For the United States, please use an antenna with a gain not exceeding that shown in the table of the technical Data "FCC and CAN ICES-003 Cellular antenna characteristics"

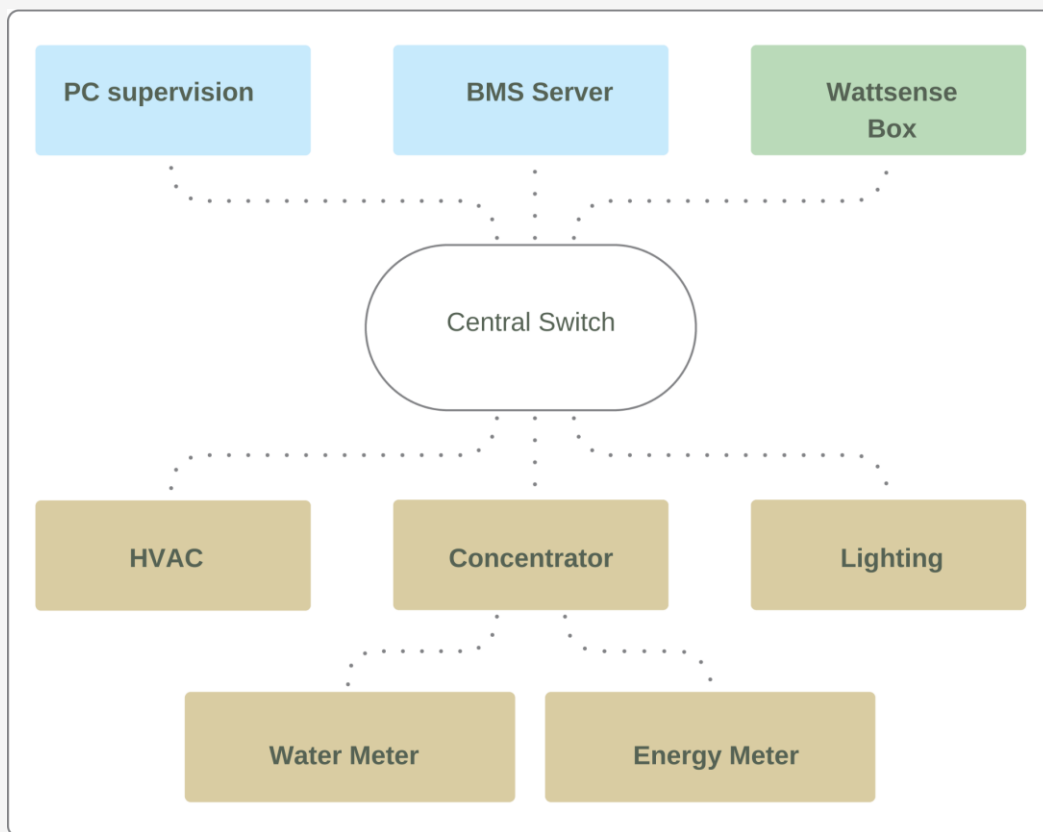
Antenna position (USA only)

For an installation in the United States of America, the GSM antenna and the LoRa antenna must be positioned at 90° to each other.



Connecting 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.



Connecting without a BMS system

- 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. Some equipment are preconfigured in the box. See <https://www.wattsense.com/compatibility/>
- Draw up an installation schematic.

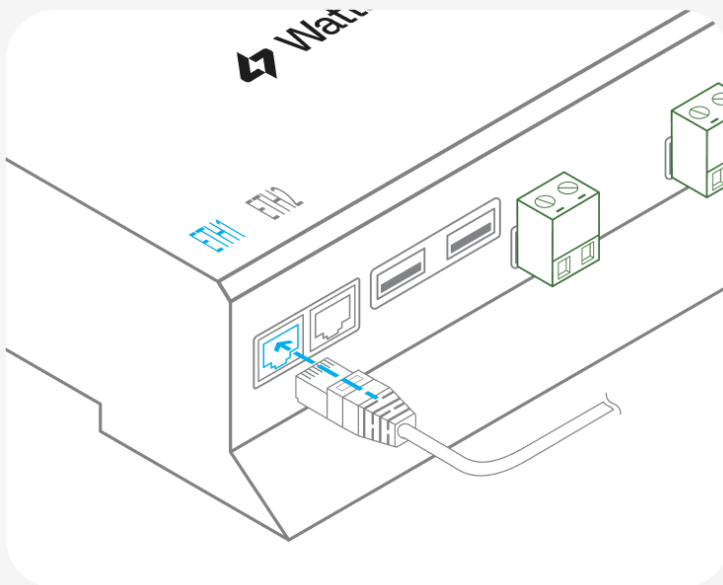
Bus Connections

Connecting to a Modbus IP network

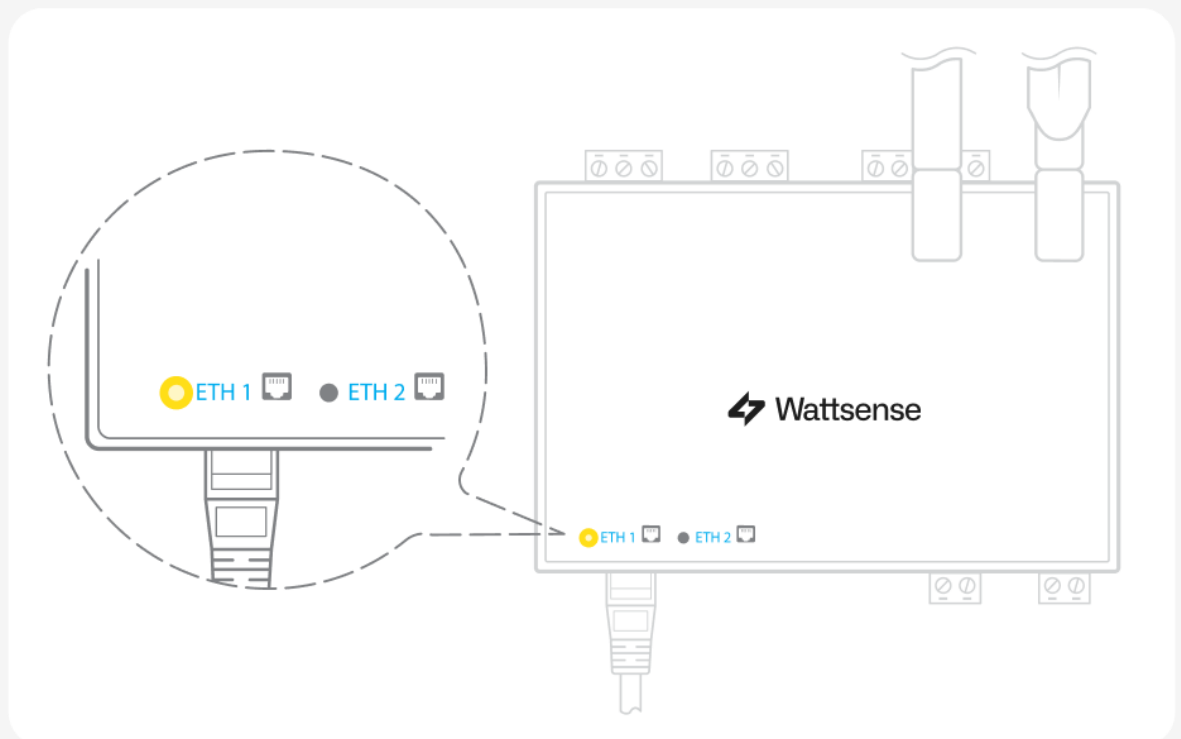
To connect only one equipment

- Make sure to have an Ethernet cable.

- Connect the cable to the Ethernet port of the Box ETH1 or ETH2.

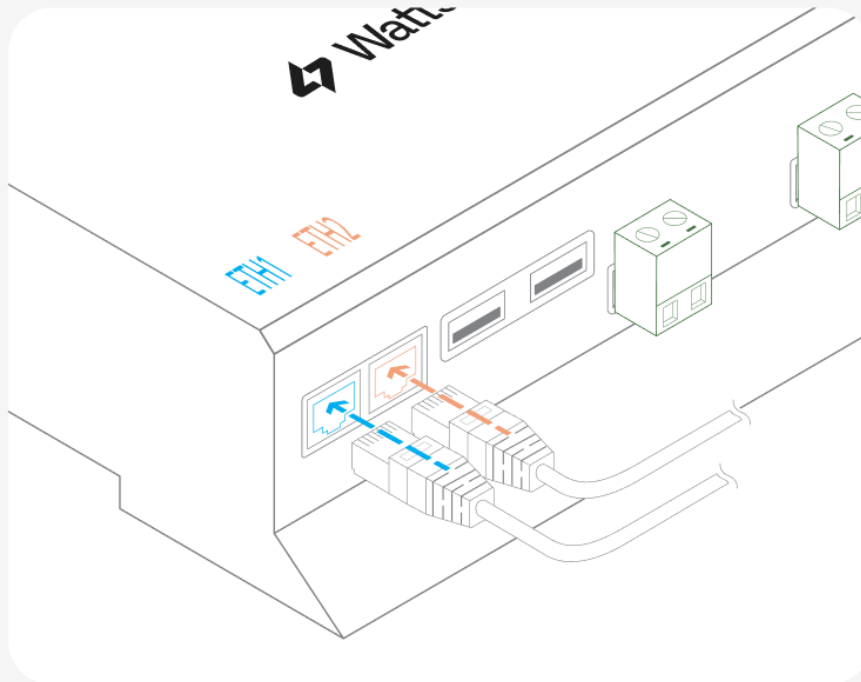


- Connect the other end of the cable to the equipment.
- Verify that the ETH1 or ETH2 LED lights up.

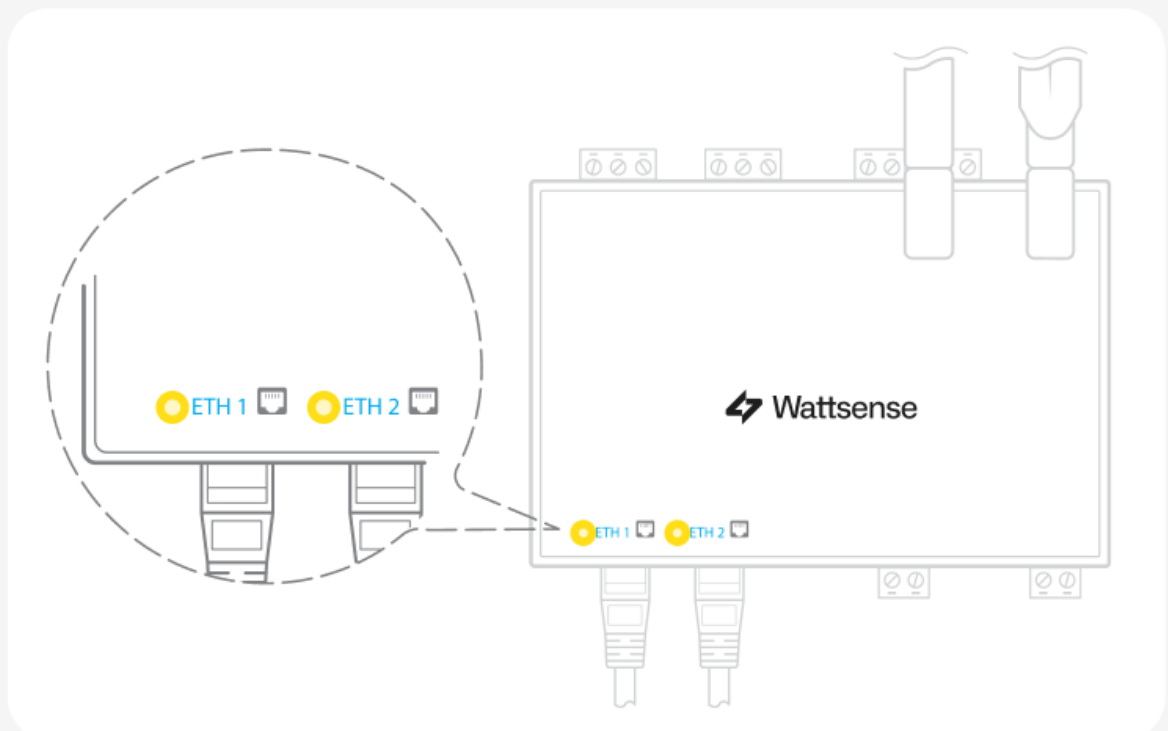


To connect two equipment

- Make sure to have 2 Ethernet cables.
- Connect the cables to the Ethernet ports of the Box ETH1 and ETH2.



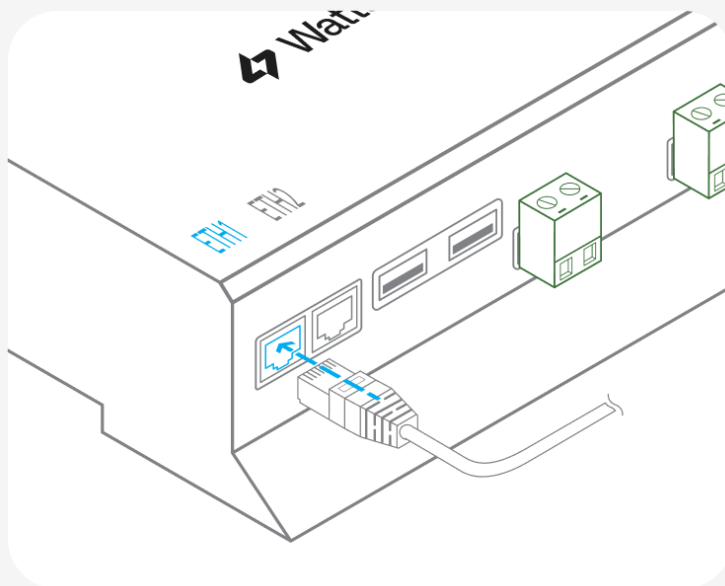
- Connect the cables to the 2 devices.
- Check that the ETH1 and ETH2 LEDs light up.



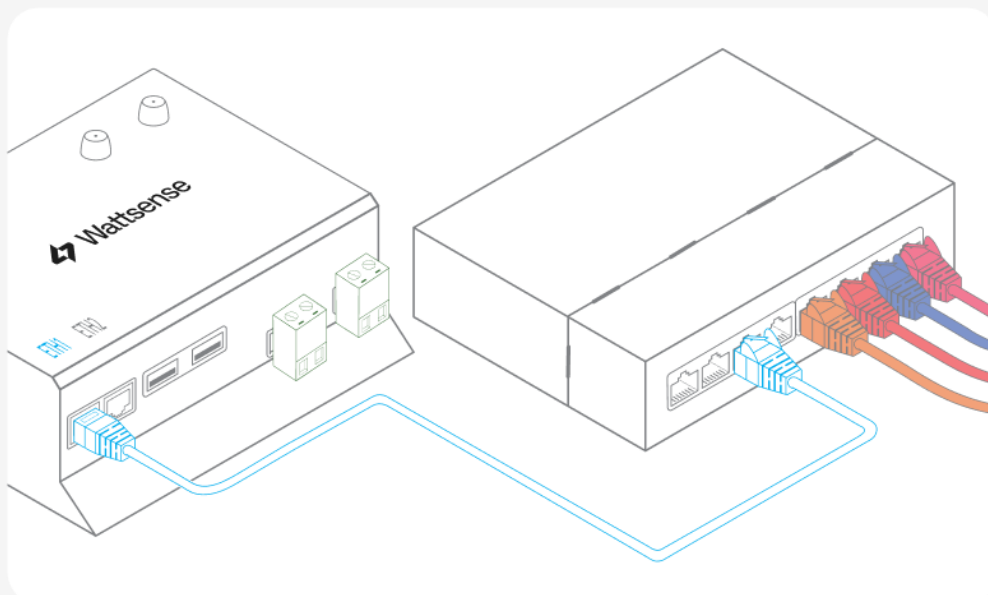
To connect three equipment or more

Make sure to:

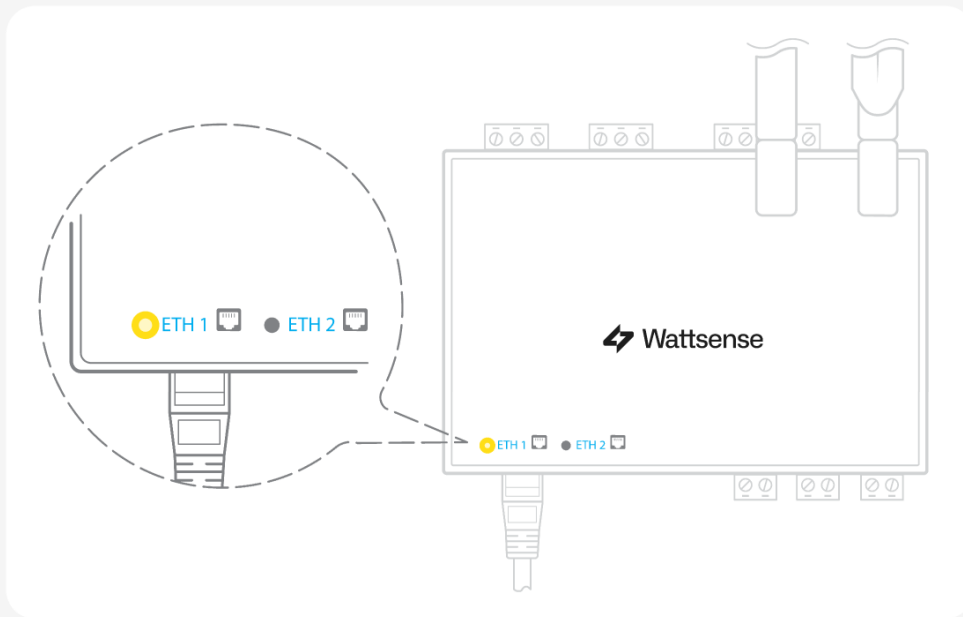
- Have an Ethernet cable for the Box.
- Have as many Ethernet cables as equipment to connect.
- Have an Ethernet switch.
- Connect the switch to the power supply
- Connect an Ethernet cable to the Ethernet port of the Box ETH1 or ETH2.



- 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.

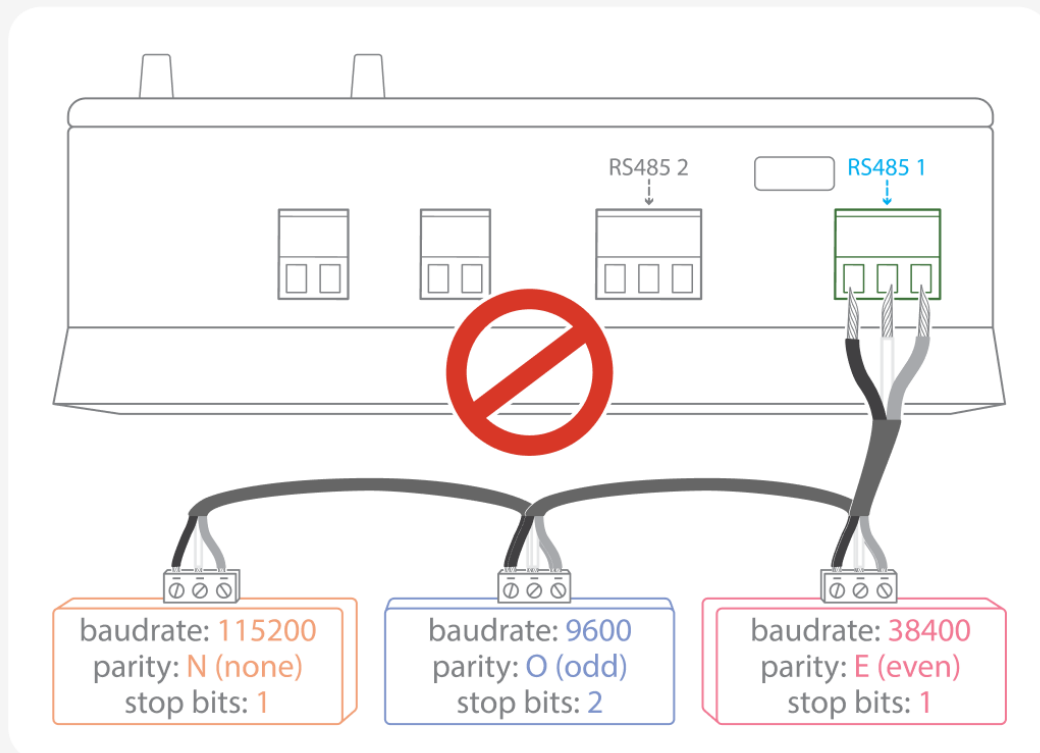
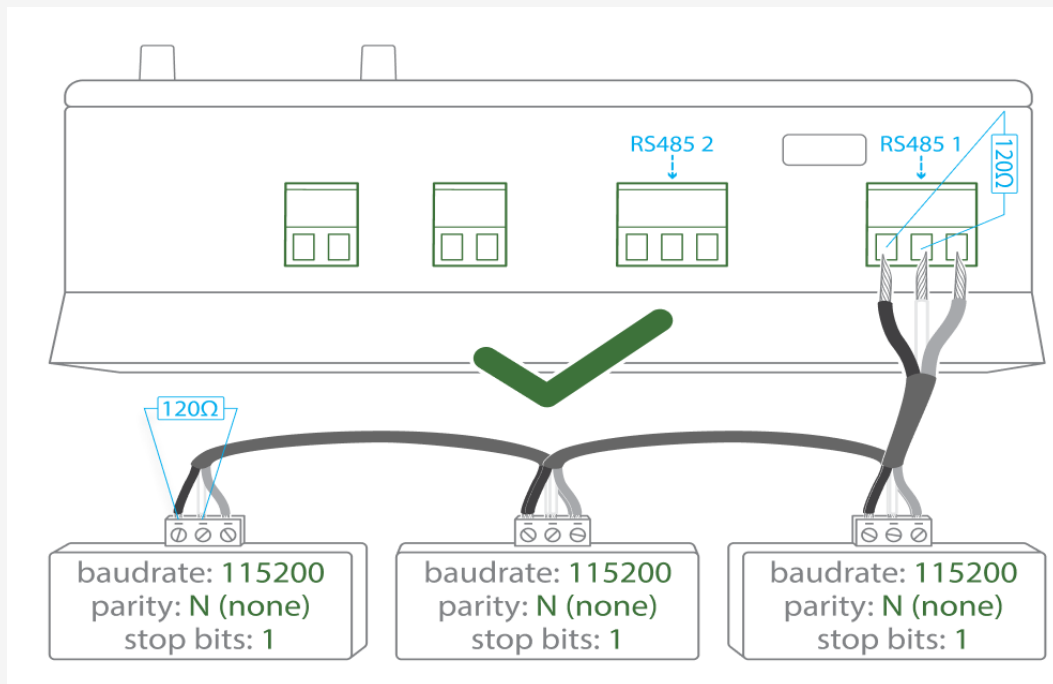
Connecting to a Modbus RTU (RS485) network

Organization of the Bus architecture:

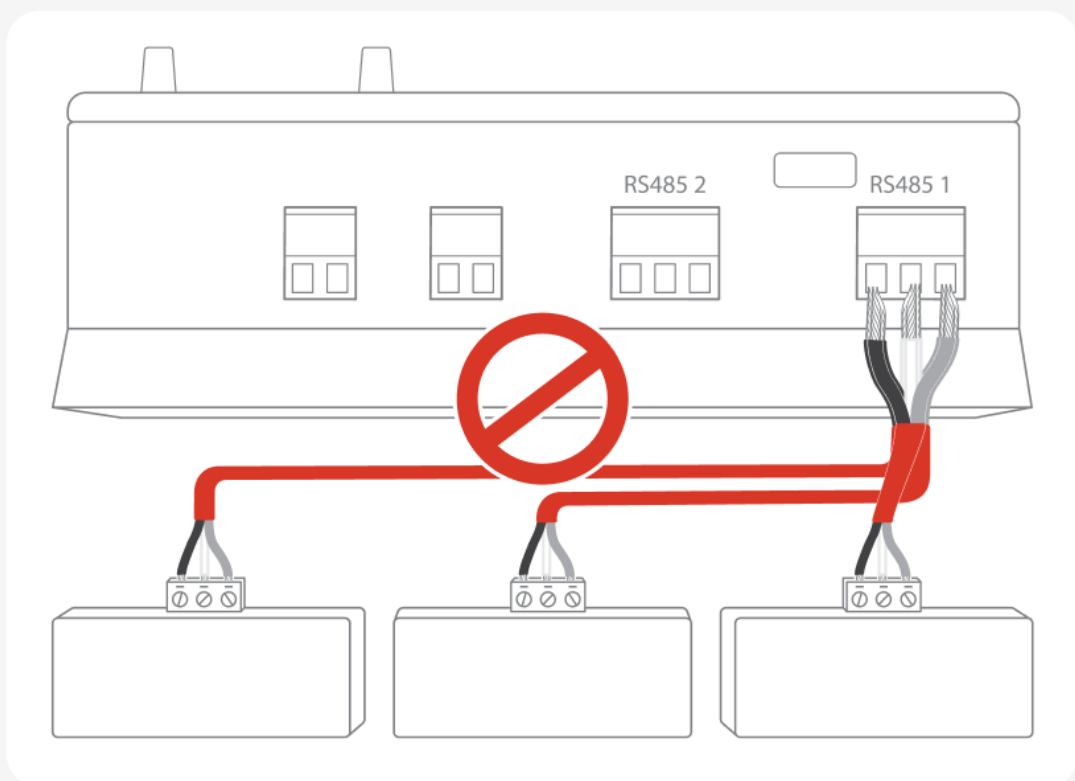
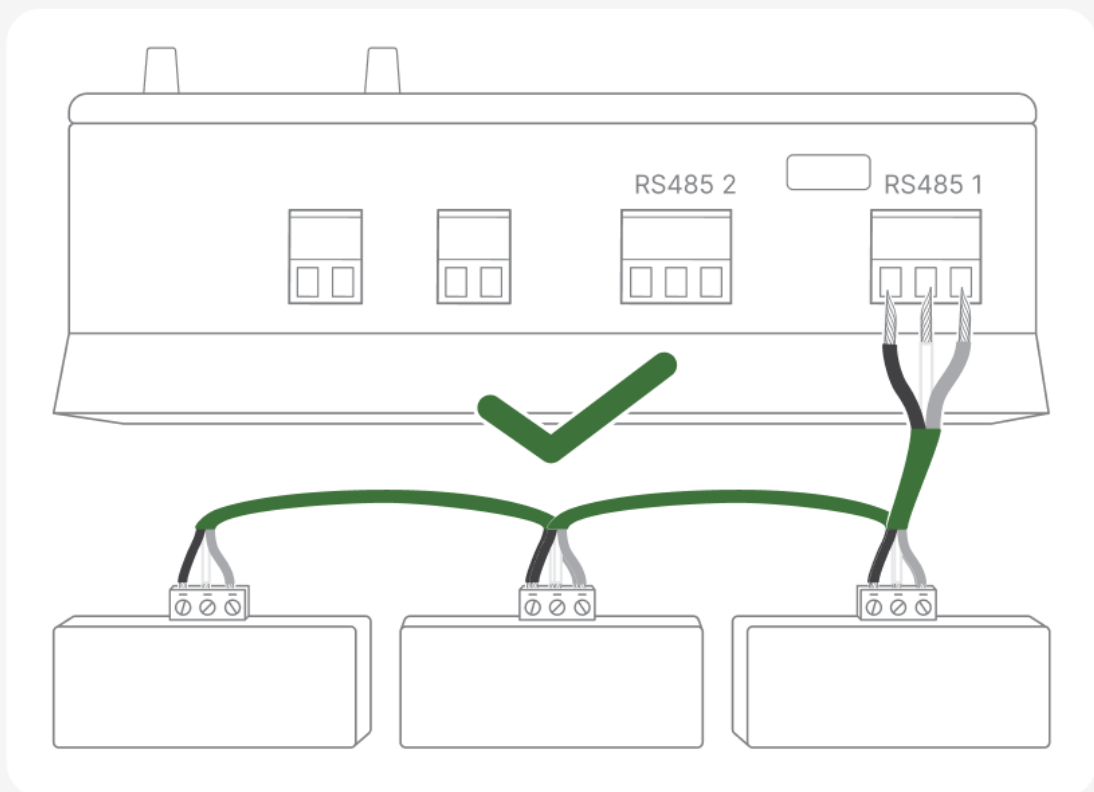
- Gather the necessary information for each device: bus speed, character size, parity bit, stop bit (from the [user console's](#) equipment database, from the manufacturer's technical documentation, or directly from the control panels of the equipment).
- The goal is to create a maximum of two networks, 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 setting up more than two homogeneous networks, it is necessary to order another Box.

To connect the equipment:

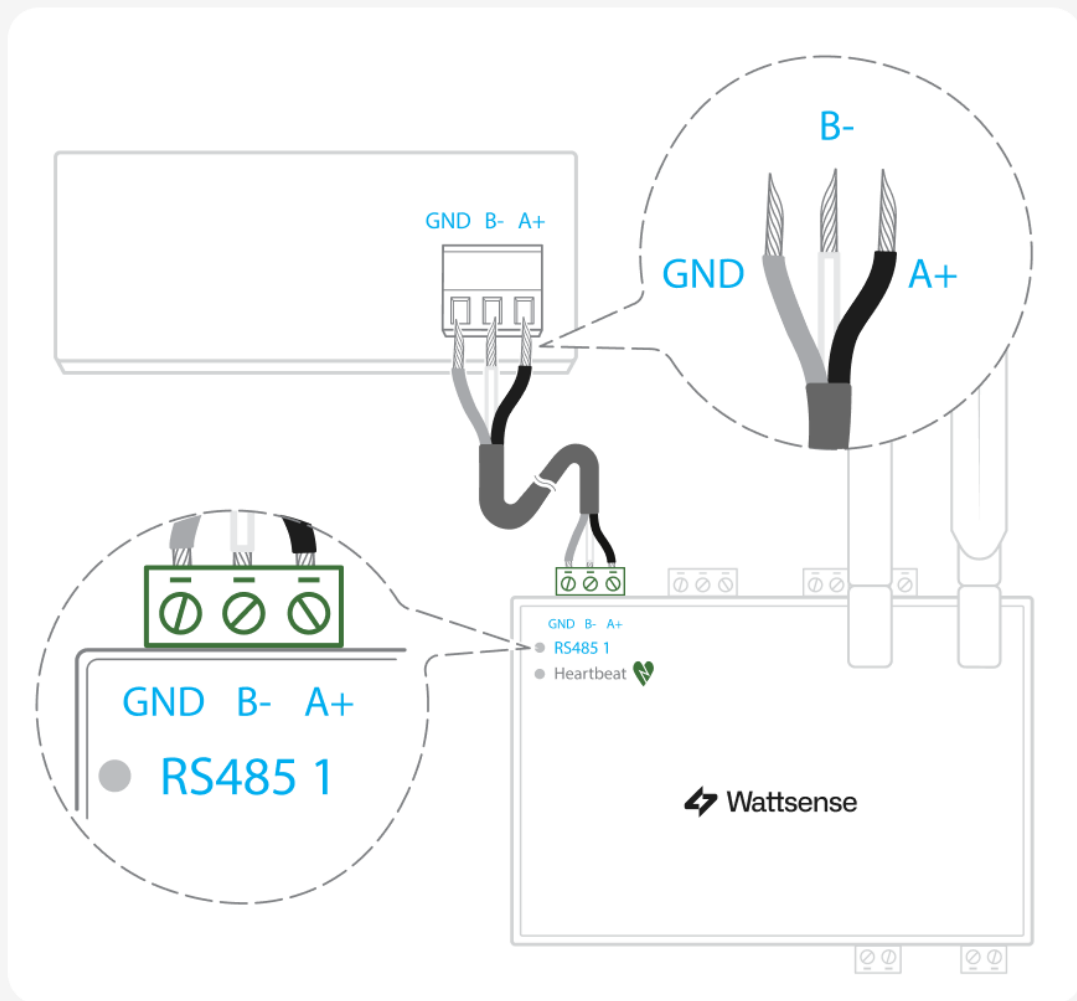
- Caution: Do not group together devices with different communication parameters on the same Bus.



- Serial wire the network on each of the two networks.



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



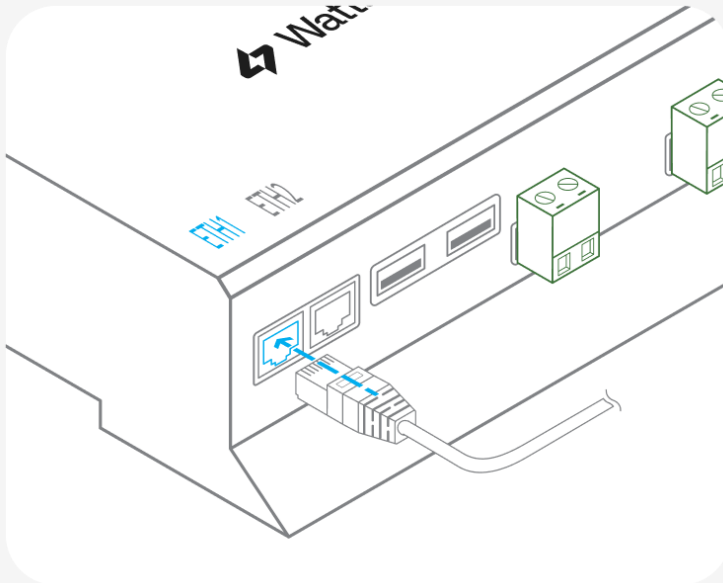
To configure each one of the equipment:

- 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.

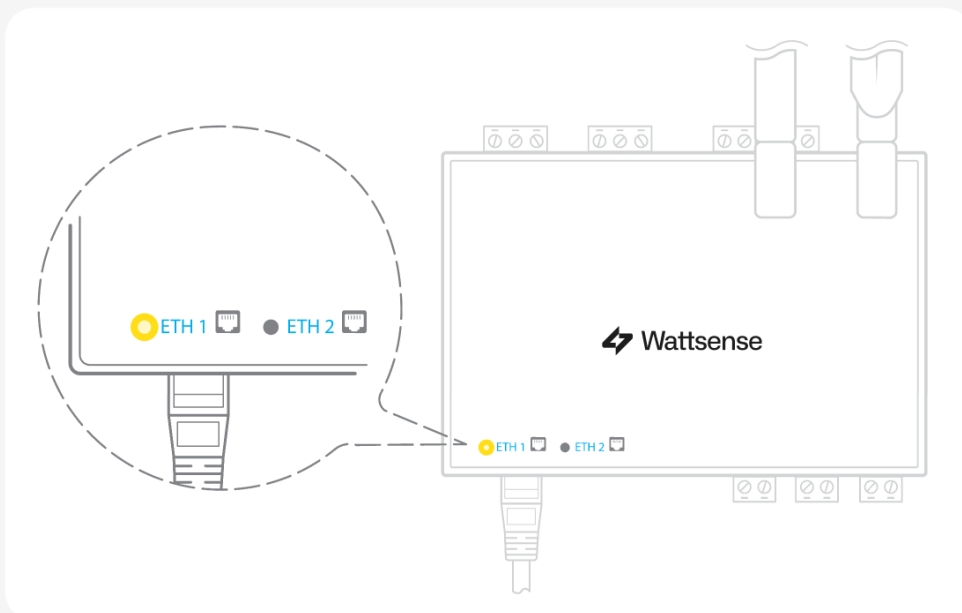
Connecting to a BACnet IP network

To connect one equipment

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

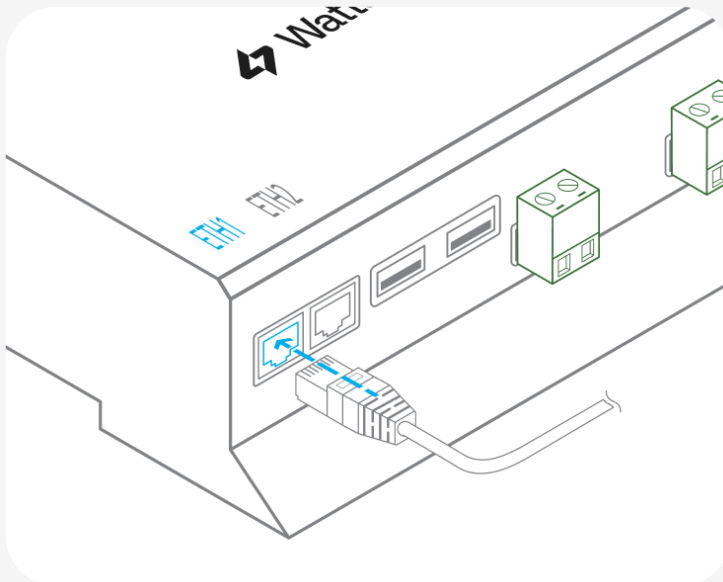


- Connect the other end of the cable to the equipment.
- Verify that the LED ETH1 or ETH2 lights up.

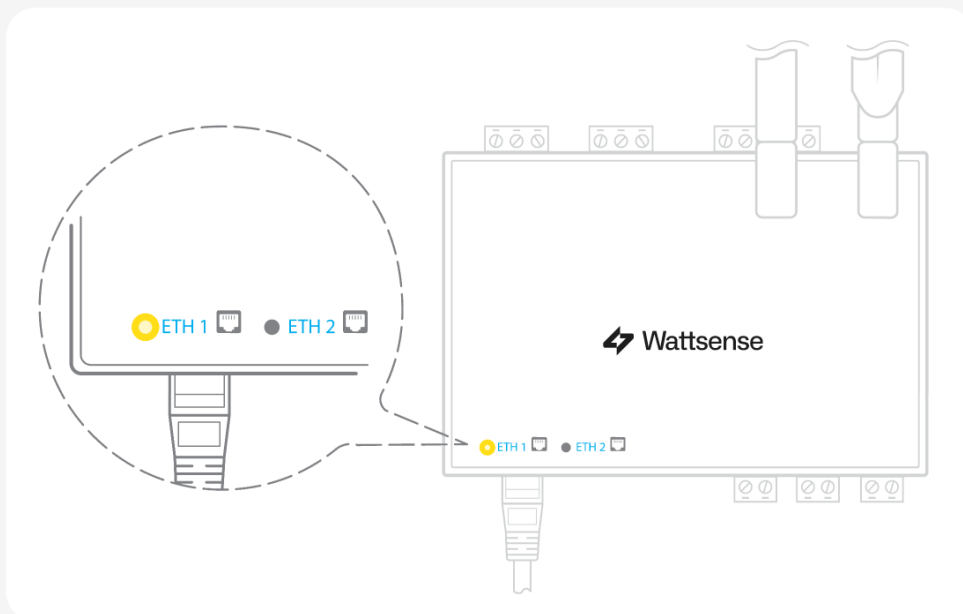


To connect two or more devices

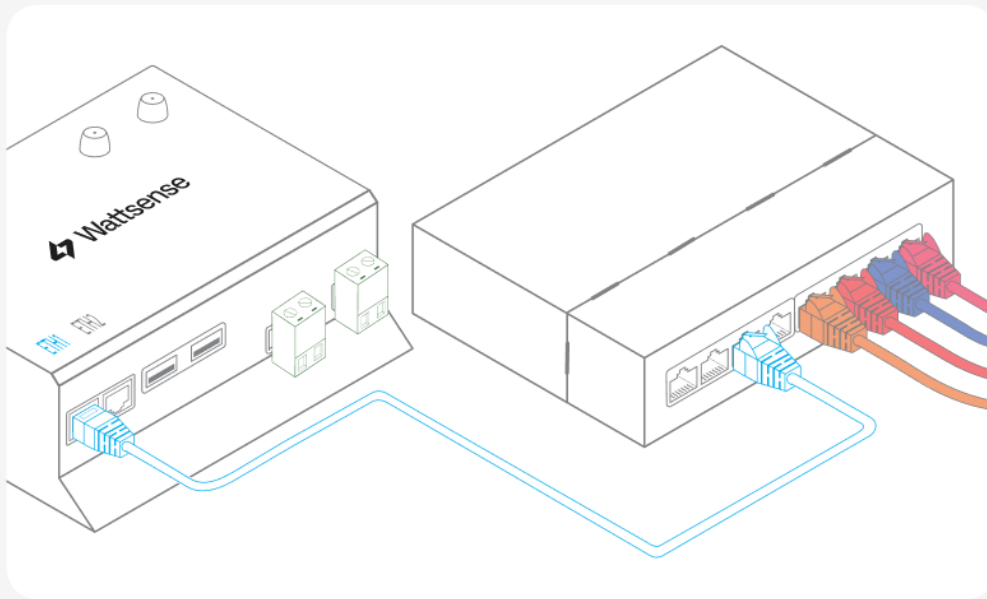
- Make sure to have an Ethernet cable for the Box.
- Make sure to have as many Ethernet cables as equipment to connect.
- Make sure to have an Ethernet switch.
- Connect the power supply to the switch
- Connect an Ethernet cable to the Ethernet port ETH1 or ETH2 of the Box.



- 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.



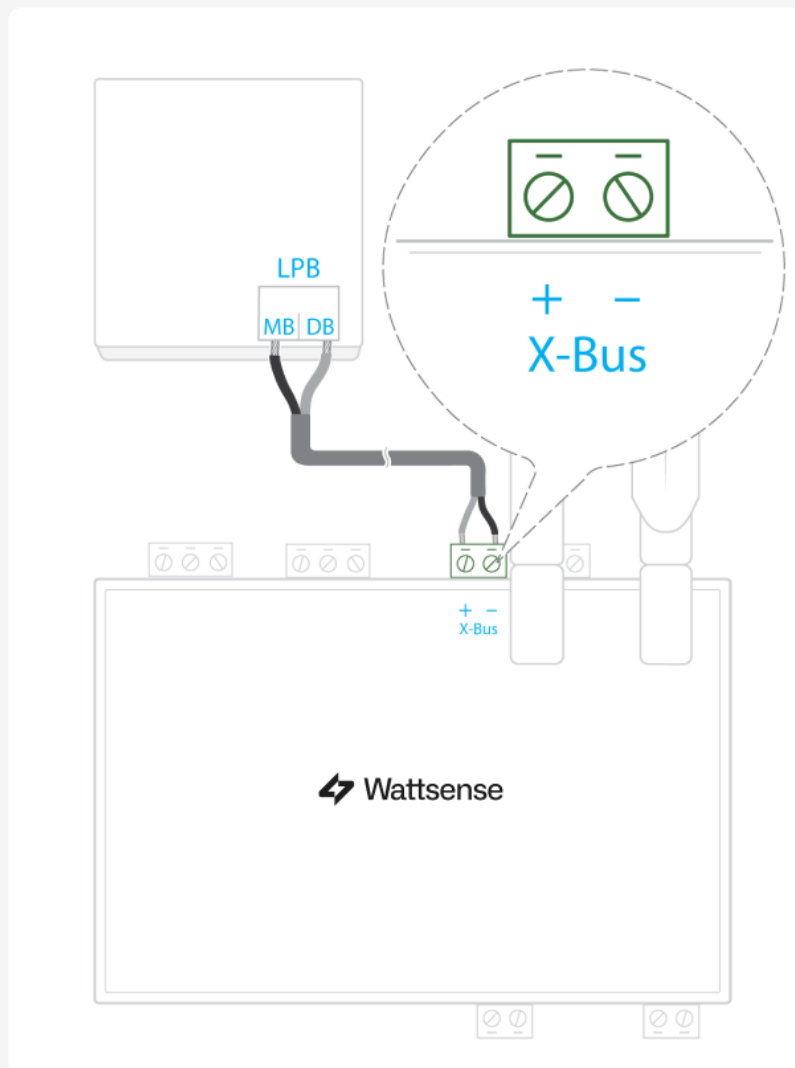
To configure each of the equipment:

- 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.

Connecting to an LPB-bus

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.



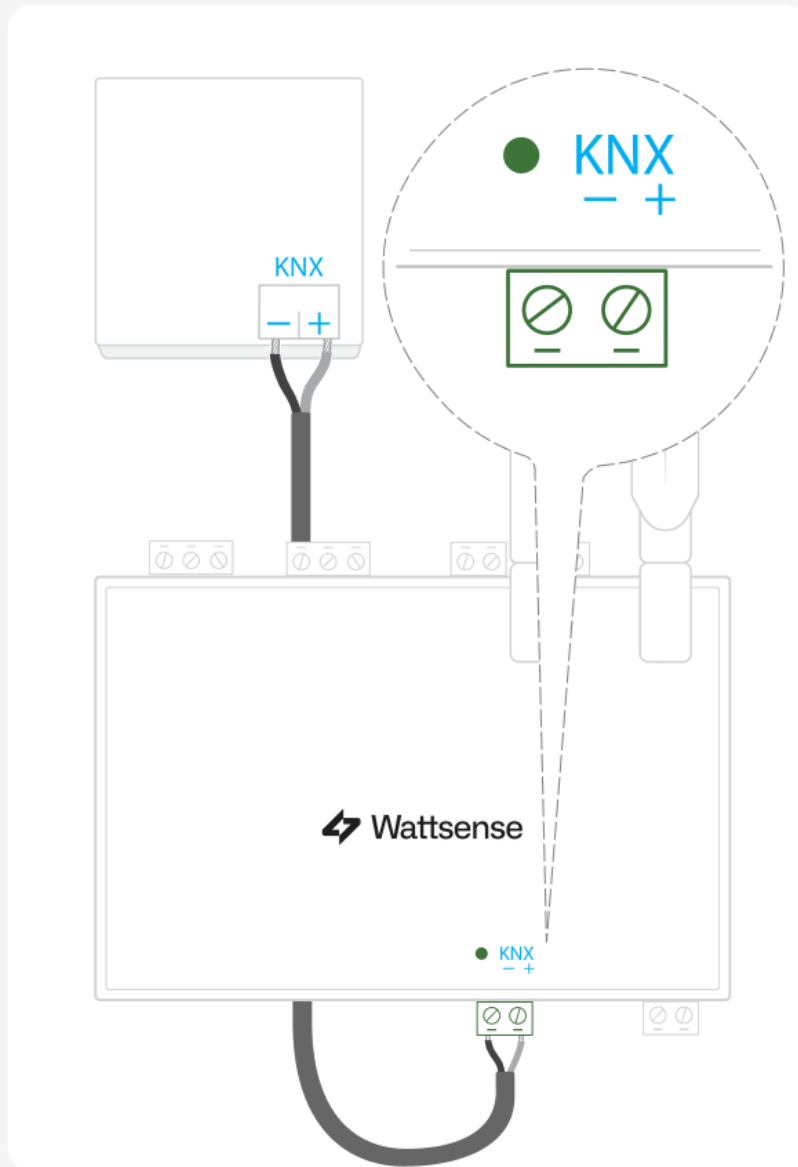
To configure each piece of equipment:

- Be sure that the LPB bus is not powered during your installation to avoid electrical issues. After your installation is completed remember to power it.
- 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.

Connecting to a KNX network

To connect equipment

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

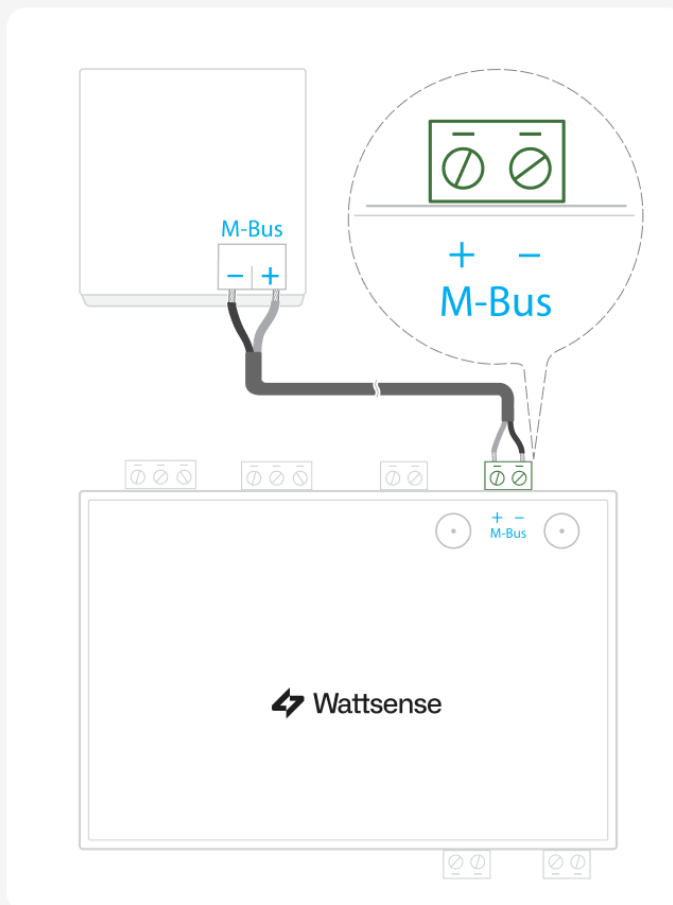


Connecting to M-Bus

To connect 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 its (+) to the (+) signal in the Box.

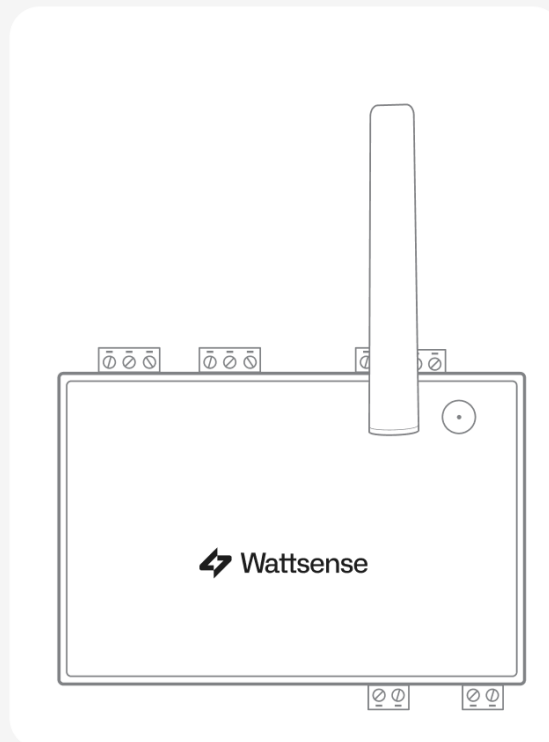


Connecting LoRaWAN equipment

- 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](#) on the console (more information on the Wattsense Support Portal [Equipments communication status in the Wattsense Console](#))
- 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:

1. Add the sensor to the user console (available at <https://console.wattsense.com>) by naming it to be identifiable.
2. Save and send the configuration to the Box.
3. Activate the sensor; to do this, use the manufacturer's technical documentation.
4. Check on the user console that the sensor is detected.



8. Operation and maintenance

Identifying the current version

The firmware version of the product can be found on the console:

1. On a web browser, log in to the console, <https://console.wattsense.com/>.
2. Enter the box ID visible on the label in the top search box and select the box.
3. In the box details, click on the "i" icon next to the box name. You can see the firmware version under **Software or APPs and BSP**.

Benefitting from security product updates

Security and functional product updates are delivered simultaneously and are automatically installed on your box. Three components are involved to use the product:

- The firmware is organized into two packages: BSP and APPs. BSP is usually reserved for core features, whereas APPs are dedicated to functional features. Every time a new firmware is introduced for the box, and the former is identified as a new major release, it will be installed by default on your device (providing it has access to the cloud servers). The new firmware can be a dedicated BSP version, an APPs version, or a bundle with both.
- The cloud software is organized in two layers: a back-end and a front-end. The back-end runs on the cloud servers while the front-end runs on the user's Internet browser. Back-end and front-end updates are released on a continuous basis. Front-end versions are automatically loaded when the user browses the console.
- Some functional features require synchronizing the versions of the three components. For this, the front-end allows certain functional features based on information provided by the back-end. The latter knows which APPs version supports the new features and passes it to the front-end. As a result, a specific feature might not be available for a box if its APPs version is not compatible.

This only applies for functional updates. Security updates are applied to the three components and do not require synchronization between them.

Deactivating product updates

Be careful when deactivating product updates - both product and security updates are deactivated.

To deactivate product and security updates, proceed as follows.

- On a web browser, log in to the console, <https://console.wattsense.com/>.
- In the left menu, select **Organization**.
- Go to the **Devices** tab.

- Select the organization under which the box is attached.
- Click on **Settings** on the right of the row corresponding to the box.
- Deactivate the **Automatic firmware updates** switch.

9. Open source software

This product, solution or service ("Product") contains third-party software components listed in this document. These components are Open Source Software licensed under a license approved by the Open Source Initiative (www.opensource.org) or similar licenses as determined by Wattsense ("OSS") and/or commercial or freeware software components. With respect to the OSS components, the applicable OSS license conditions prevail over any other terms and conditions covering the Product. The OSS portions of this Product are provided royalty-free and can be used at no charge.

If Wattsense has combined or linked certain components of the Product with/to OSS components licensed under the GNU LGPL version 2 or later as per the definition of the applicable license, and if use of the corresponding object file is not unrestricted ("LGPL Licensed Module", whereas the LGPL Licensed Module and the components that the LGPL Licensed Module is combined with or linked to is the "Combined Product"), the following additional rights apply, if the relevant LGPL license criteria are met:

- (i) You are entitled to modify the Combined Product for your own use, including but not limited to the right to modify the Combined Product to relink modified versions of the LGPL Licensed Module, and
- (ii) You may reverse-engineer the Combined Product, but only to debug your modifications. The modification right does not include the right to distribute such modifications and you shall maintain in confidence any information resulting from such reverse-engineering of a Combined Product.

Certain OSS licenses require Wattsense to make source code available, for example, the GNU General Public License, the GNU Lesser General Public License and the Mozilla Public License. If such licenses are applicable and this Product is not shipped with the required source code, a copy of this source code can be obtained by anyone in receipt of this information during the period required by the applicable OSS licenses by contacting the following address:

Wattsense
 Racing Park - Immeuble Daytona
 4 Chemin du Tronchon
 69410 Champagne-au-Mont-d'Or
 France

Keyword: Open Source Request Wattsense Box

Wattsense may charge a handling fee of up to 5 EUR to fulfil the request. Warranty regarding further use of the Open-Source Software:

Wattsense's warranty obligations are set forth in your agreement with Wattsense. Wattsense does not provide any warranty or technical support for this Product or any OSS components contained in it if they are modified or used in any manner not specified by Wattsense. The license conditions listed below may contain disclaimers that apply between you and the respective licensor. For the avoidance of doubt, Wattsense does not make any warranty commitment on behalf of or binding upon any third-party licensor.

All open-source software components used within the product copyright holders and the license conditions are contained on the website at: https://docs.wattsense.com/refs/LicenseInfo-WattSense%20Box-V6.1.7-2024-03_25.txt.

10. Support

The website <https://support.wattsense.com/hc/en-150> contains useful information about Wattsense's product (Tutorials, Knowledge base, etc...)

To alert the support team about any issues you are experiencing, please send an email to support@wattsense.com or create a ticket in our support platform. Please click here:

<https://support.wattsense.com/hc/en-150/requests/new>

The support team will get back to you as soon as possible.

Wattsense - <https://www.wattsense.com/>

Racing Park - Immeuble Daytona

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69410 Champagne-au-Mont-d'Or

France