Installation guide LoRa proprietary

Installation help guide

Learn how to configure products in proprietary LoRa mode

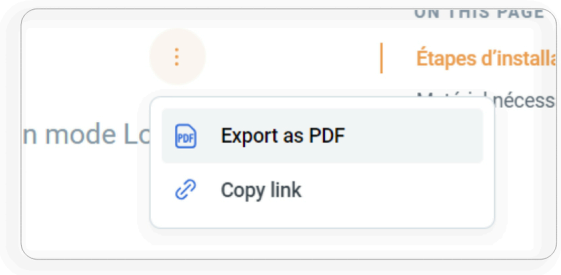
Whether for use with a Modbus receiver or with a BACnet receiver , the product configuration principle is identical. You will find on the left of this document the details of the steps to follow.

> We recommend following the setup steps one by one.

Good practices

1. Export the document to PDF

We know that when you work on site you do not always have access to the internet. For your on-site installations we recommend that you export this installation guide in pdf format. To do this please click on the three action buttons on the top right corner of this page, then click on Export to PDF.



2. Do some testing!

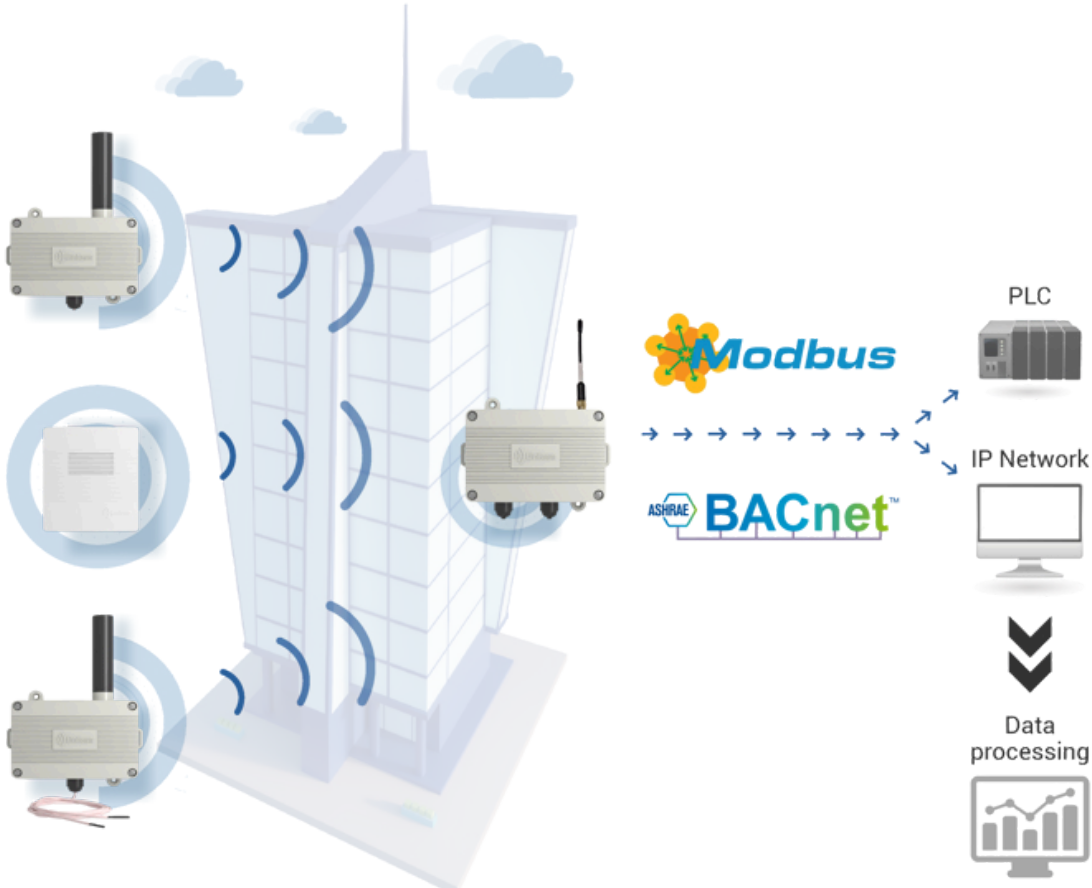
If this is your first time using Enless products, we recommend carrying out a test setup/installation in your office before moving on to the final on-site installation. This will no longer be necessary once you are familiar with the installation procedure.

About proprietary LoRa

Reminder regarding proprietary LoRa mode

Proprietary LoRa architecture

In proprietary LoRa, the sensors communicate with an Enless receiver (Modbus or BACnet). The receiver stores the sensor data and makes it available to a PLC/BMS.



With the Modbus receiver

RX MODBUS

Enless sensors send their information to the receiver. The latter stores the data received in a Modbus Table. It is then connected to the BMS via Modbus TCP/IP or RTU.

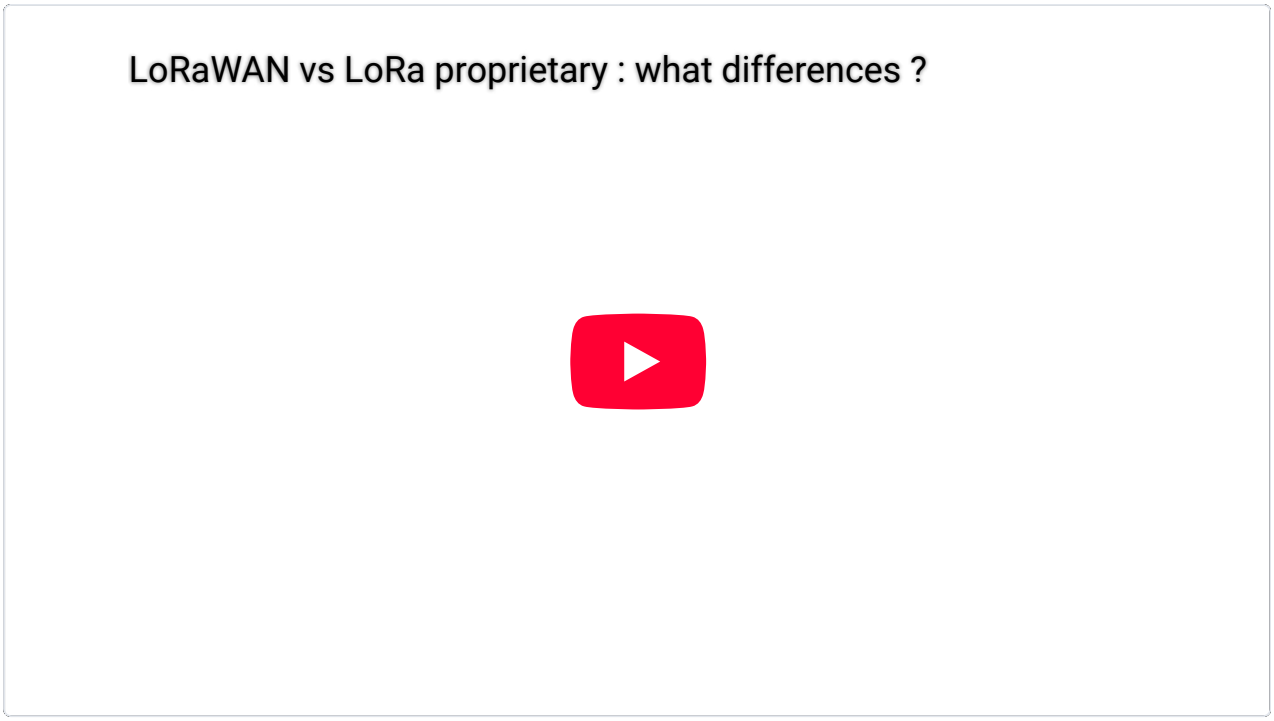
With the BACnet receiver

RX BACNET

Enless sensors send their information to the receiver. The latter converts the data into BACnet objects. It is then connected to the BMS via BACnet IP or MSTP.

One receiver can manage up to 50 Enless sensors

Differences between LoRaWAN and Enless proprietary LoRa



If you wish to use the sensors in LoRaWAN mode, please refer to the LoRaWAN mode installation help guide.

Installation steps

Installation Steps and required materials

Installation steps

IP Configuration

Configure the PC's IP settings to be able to access the receiver's configuration server.

Server access

Preparation of the receiver (antenna, power supply) before accessing the configuration server.

Configuring sensors

Declaration and configuration of the sensors you wish to pair with the receiver.

Activation of sensors

Powering the sensors so that they pair with the receiver and recover their configuration parameters.

Data reception

Validating that the sensors communicate correctly with the receiver and that the RSSI is good.

Installation of devices

Installation of devices on site following our best practices.

Receiver settings

Configuration of receiver communication parameters before connecting to the BMS

Connection to PLC

Guide to connecting and wiring your receiver to the PLC/BMS.

The TX IO and TX MODBUS have specific installation procedures. Please refer to the summary for installation procedures for these products.

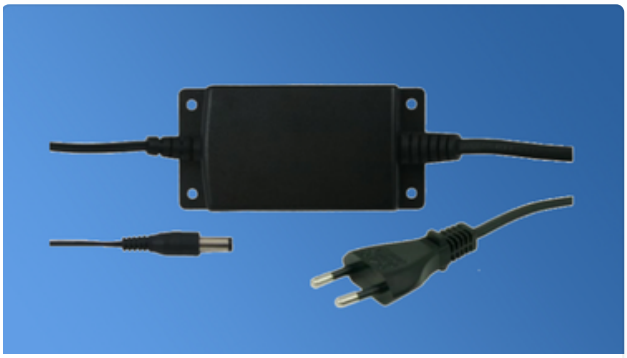
Necessary material

PC with ethernet port

Use an ethernet/USB adapter if your PC does not have an ethernet port

Long range antenna for the receiver

Use the Enless Long Range Antenna



Power supply for the receiver

Power the receiver with 7.5 to 24VDC.

Enless 12V power supply available

Screwdriver

1x Phillips screwdriver

1x flat screwdriver (ø 2.5mm)

Installation

IP Configuration

Configure your PC's IP settings to access the receiver's configuration server

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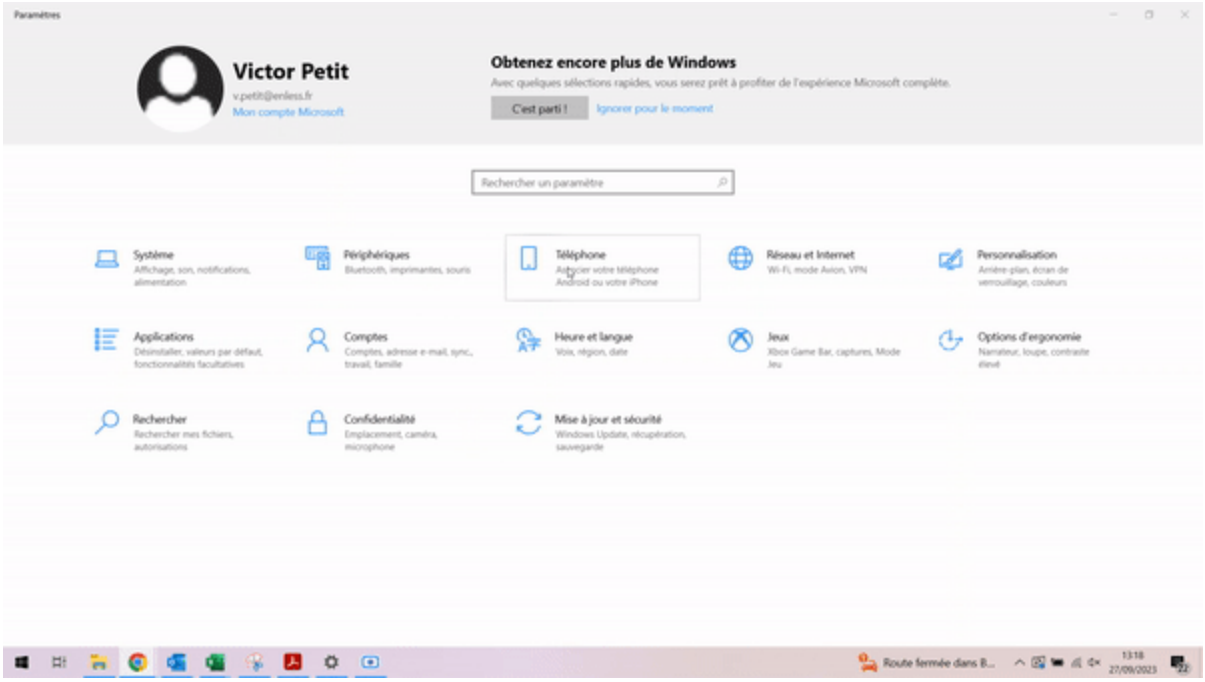
The configuration of the sensors will be done from the server embedded in the receiver. It will therefore be necessary for you to be able to access the configuration interface of your RX MOBDUS or RX BACNET. The receiver configuration server is accessible at the address 192.168.77.77

Configuring IP settings from your PC

On your PC, configure the IP settings so that the configuration server is accessible.



Example of IP settings

- IP address: 192.168.77.2
- Subnet prefix length: 24

- Default gateway: 192.168.77.1
- Preferred DNS: 8.8.8.8
- Subnet mask (if available): 255.255.255.0

Once these settings are configured, the configuration server IP should be accessible from your browser at 192.168.77.77 (please avoid use on Microsoft Edge and favor use on Google Chrome).

You can now move on to the next step.

> This configuration is also valid for access to the configuration servers of the **TX IO** and **TX MODBUS** .

Access to the server

Prepare your receiver and access the configuration server

Receiver preparation

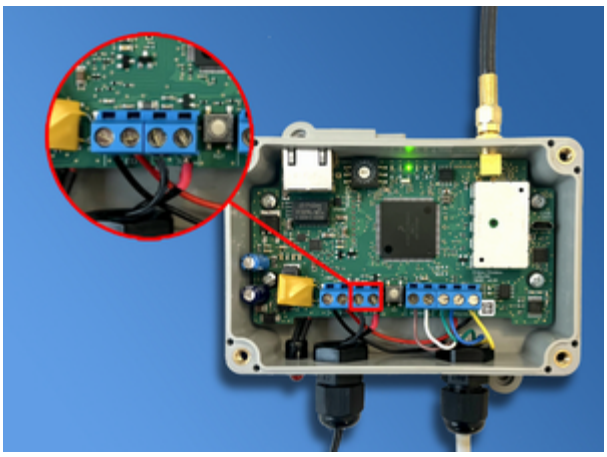
Step 1 : Connect an antenna to the receiver

First of all, don't forget to connect the long-range antenna to the SMA connector of the receiver.

Step 2 : Power the receiver (7.5 - 24VDC)

1. Open the receiver case by unscrewing the 4 cover screws.
2. Externally power your receiver (between 7.5 and 24VDC). If you use our 12V power supply, connect your power supply to the POWER terminal of the receiver.

- **Red wire** connected to the V+ terminal block
- **Black wire** connected to the 0V terminal block



The **LED C** should light up when your receiver is properly powered.

Consumption is normally less than 50mA at 12V. During the sensor installation phase, there may be peaks at 500mA. To avoid any problems please maintain 1A 12V on the power terminal block

Step 3 : Connect the receiver via Ethernet to the PC

The receiver is supplied without RJ45 cable. You need to obtain an RJ45 cable to continue the installation. Connect the RJ45 cable to the port on your receiver and also to the Ethernet port on your PC.

If your PC does not have an Ethernet port, we invite you to use a USB / Ethernet adapter.

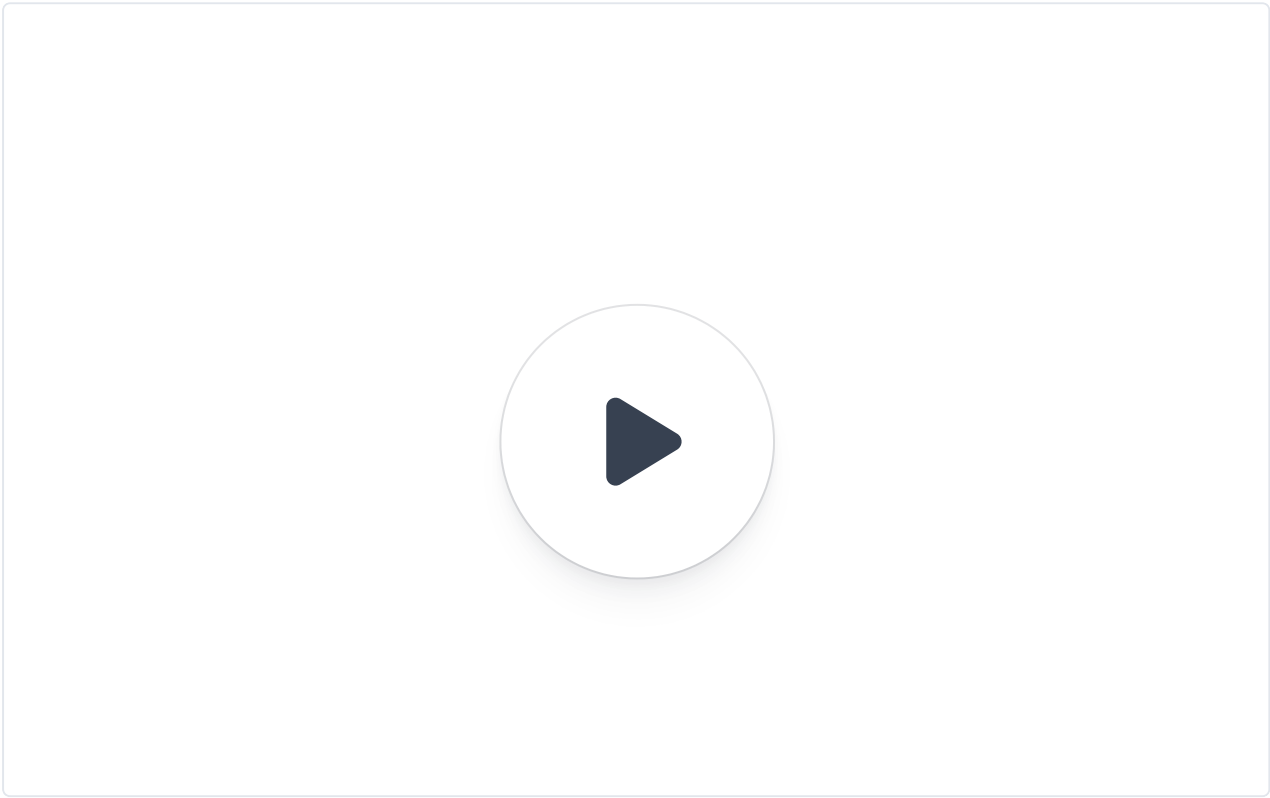
Step 4 : Validate the receiver LED behavior

Once your receiver is powered and connected to your PC, you can validate the correct behavior of the product using its LEDs. Description of LEDs here .

Access to the receiver server

Once your receiver is powered and connected to your PC, you will be able to access its configuration server. From your browser, enter the address **192.168.77.77** to access the server.

Choose to use Google Chrome for access to the configuration server



If you want to change the receiver IP address, please see this article ↗.

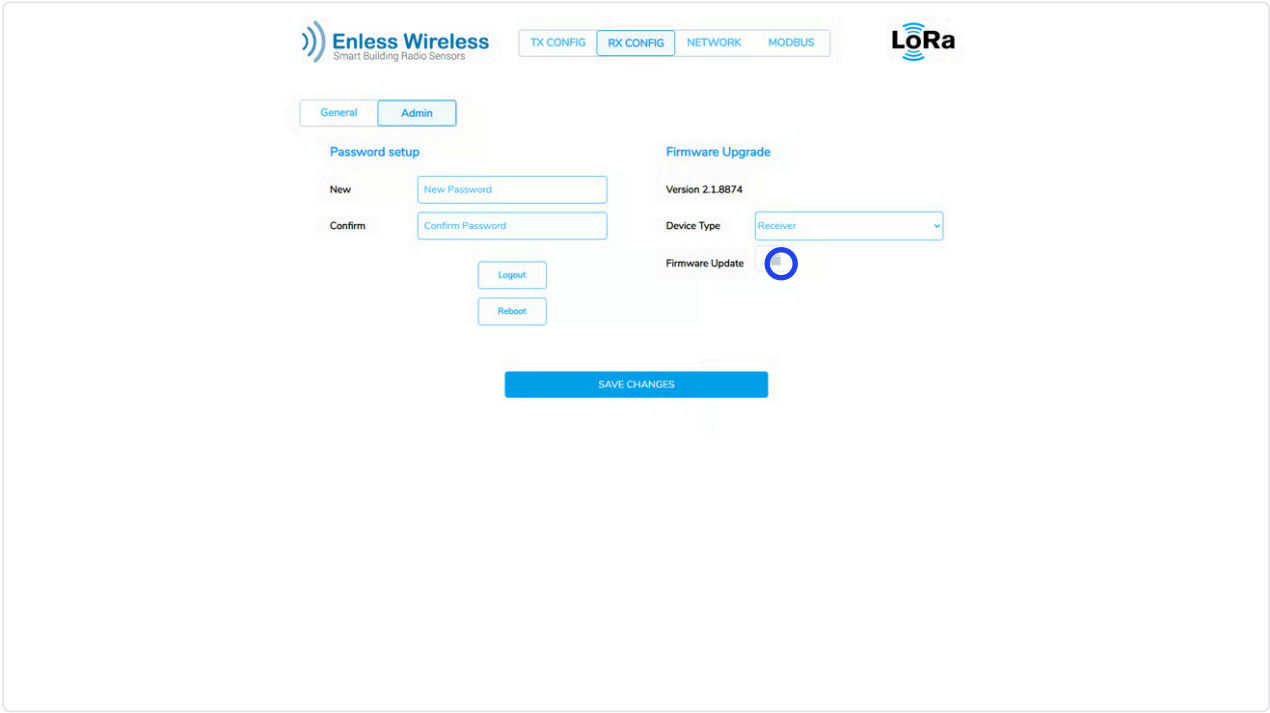
Receiver update (optional)

Update your receiver to the latest available firmware version (optional)

We invite you to update your receiver to the latest available firmware version before proceeding to the following steps (optional).

Below are the latest firmware files available and the update procedure.

Update Procedure



Receiver update procedure

Firmware files

EU 868 RX Modbus 500-302

338KB Enless_LoRaModRx_EN412_V2.01.8896_NA_NA_NA_0.upg

Latest RX Modbus 500-302 firmware file

US 915 RX Modbus 500-502

337KB Enless_LoRaModRx_EN442_V2.11.8897_NA_NA_NA_0.upg

Latest RX Modbus 500-502 firmware file

EU 868 RX BACnet 500-312

329KB Enless_LoRaBacRx_EN413_V2.02.8904_NA_NA_NA_0.upg

Latest RX BACnet 500-312 firmware file

US 915 RX BACnet 500-512

328KB Enless_LoRaBacRx_EN443_V2.12.8899_NA_NA_NA_0.upg

Latest RX BACnet 500-512 firmware file

Please be sure to use the correct type of firmware file to update your receiver or you may damage your product. The RX MODBUS firmware is not compatible with an RX BACNET, and vice versa. The EU 868 version is not compatible with the US 915 version and vice versa.

Configuring sensors

Declare and configure sensors from the CONFIG TX tab

If you wish to configure a TX IO or a TX MODBUS , please refer to the specific installation procedure for these products (see left menu).

Only those receivers with firmware version X.X.8864 and above can manage 50 sensors. Previous versions can manage 40 sensors.

Video Example

Configuration settings

As shown in the above video, once we have accessed the configuration server, the declaration of sensors is done from the tab **CONFIG TX** by clicking on the button +**Add Sensor**.

Below are the details of the configuration parameters:

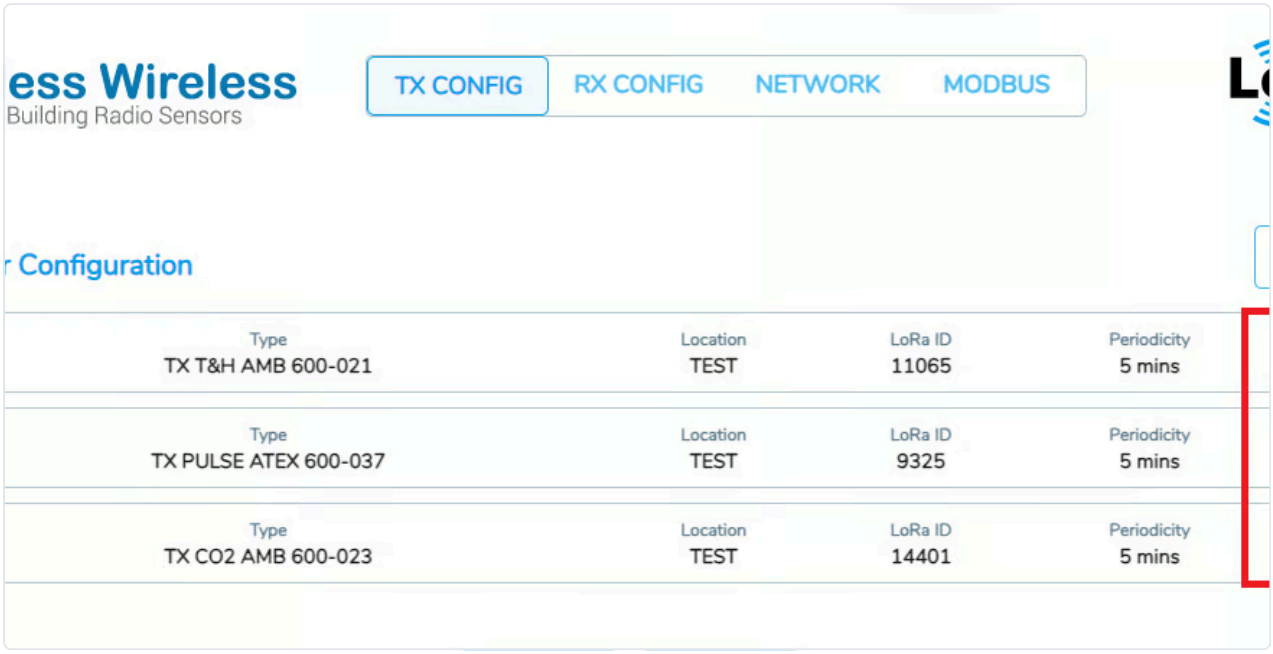
Field	Meaning
Type TX	Choose the sensor type
Location	Indicate the location of the sensor (e.g. office)
LoRa ID	Enter the LoRa ID (provided on the sensor label).
Periodicity	Choose the transmission periodicity. The transmission periodicity directly influences the battery autonomy of the products.
+ Advanced	Show advanced settings.

Repeat for all sensors to configure.

The list of sensors you have declared is displayed on the CONFIG TX page.

Editing the configuration

You can resume the configuration of a sensor at any time or delete it using the edit or delete buttons.



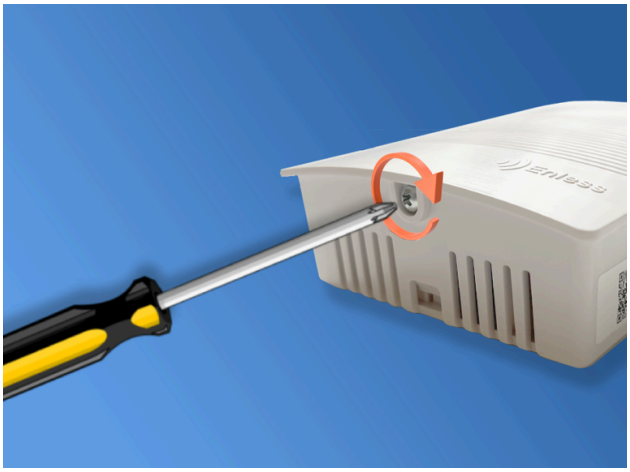
We recommend exporting your configuration file in CSV format to preserve your configuration.

Activation of sensors

Power the sensors so they pair with the receiver.

Step 1 : Open the sensor housing

Open the sensor boxes that you have just declared and that you wish to activate.



Check that the sensors are in proprietary LoRa mode. Validate that the jumper of each sensor is correctly positioned on the two pins and that it is in proprietary LoRa mode (see appendix). If this is not the case, please position the jumper correctly before proceeding to activate the products.

Step 2 : Power the sensors

Power the first sensor (of your choice) by connecting the Molex connector.

Monitor the sensor LED behavior.
A **LED L3** fixed will confirm that the sensor is correctly paired to the receiver.
Repeat for all sensors to activate.

Step 3 : Validate sensor activation from the server

In the **CONFIG TX** tab, refresh the page in your browser.

A validation sticker should appear in front of the sensor(s) you have just activated. A red dot means that the configuration is being recovered. Do not hesitate to wait a few moments and refresh your page if the green dots do not appear.

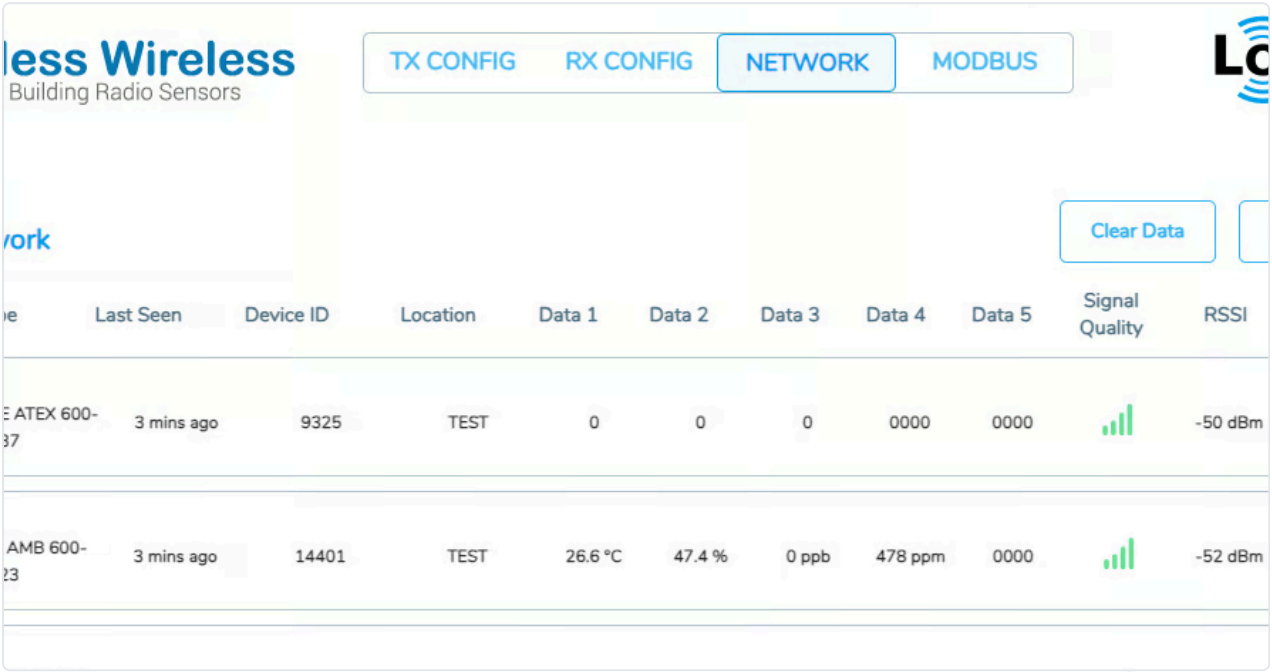
Data reception

Validate that messages are correctly received from the NETWORK tab.

The sensor frames that you have just activated should go up in the **NETWORK** tab at the periodicity that has been configured. This tab allows you to validate the correct reception of sensor frames.

We recommend using this page as an on-site audit tool, to validate that the RSSI levels for receiving sensors are good.

Validation of data reception



Use of the push button

Position the transmitters where they will be installed on site. We invite you to use the push button located on the electronic boards of the sensors to force the sending of test frames.

The **LED L2** flashes when you press the push button. This means that a frame has been sent by the transmitter. You should see in the NETWORK tab that the test frame has been received correctly.

RSSI analysis

Strong signal 😀

Up to -105 dBm

☆☆☆☆☆

Medium signal 😀

from -106 to -112 dBm

☆☆☆☆☆

Weak Signal 😟

beyond -112 dBm

☆☆☆☆☆

In case of weak RSSI, we recommend installing a signal repeater. To learn more about signal repeater installation, please visit this page .

Installation of devices

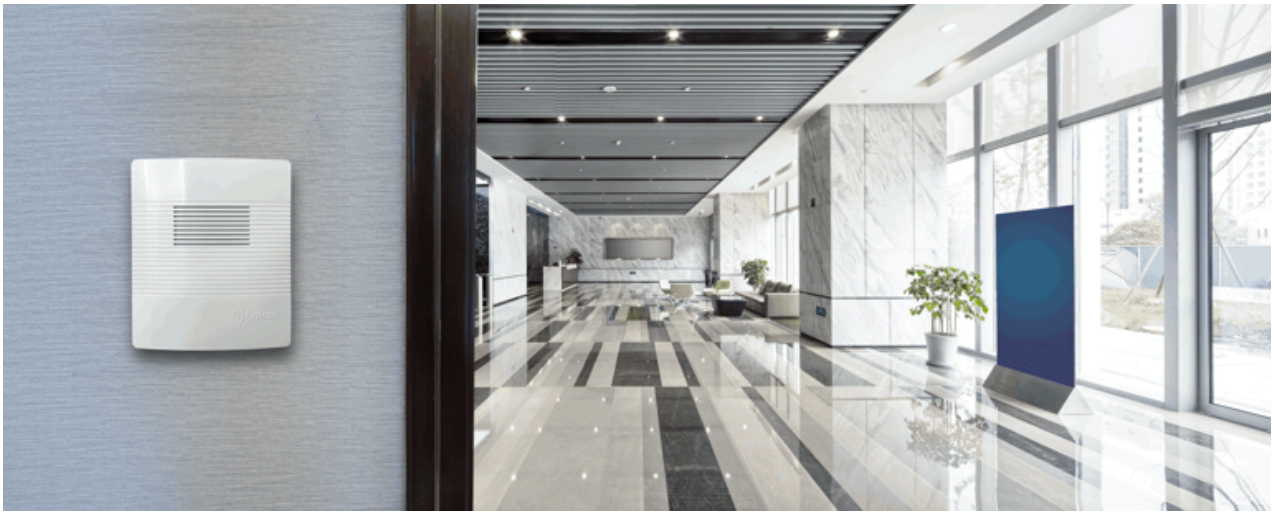
Position and secure the devices in their final locations

Once you have paired the sensors to the receiver and validated that they are communicating correctly with the receiver, you can move on to installing them.

Positioning of sensors

The correct positioning of sensors is very important and significantly influences the quality of radio wave propagation. If your sensor is poorly positioned, you will reduce the radio coverage distance. To maximize transmitter performance, please follow the points described below:

- Position the sensors **as high as possibl**e
- We recommend positioning the transmitters at a **minimum height of 1.50m**
- Make sure **the transmitter antenna is always pointing upwards**

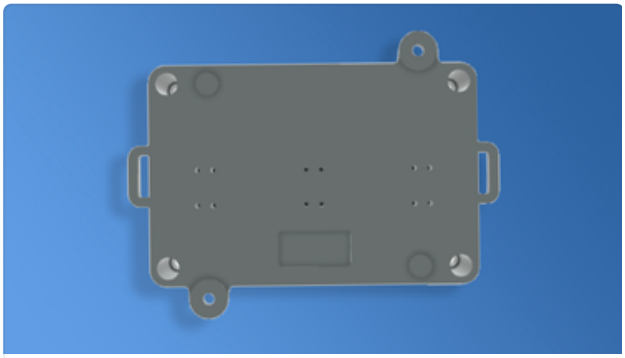


Fixation

The sensors are fixed using wall mounting lugs. These lugs are intended for fixing by screw. The lugs of the room sensors (white boxes) are located inside the sensors. For rugged sensors and receivers (grey housings), you can also use the mounting collar passages on the sides of the housing.

Ambient sensors

The sensors are fixed using wall mounting lugs. These lugs are intended for screw fixing and are located inside the sensors



Rugged sensors and receivers

The product can be fixed using clamps, lugs for screws, or on a DIN rail using mountings sold separately (ref. 1000-005).

Receiver settings

Configure the communication parameters of your receiver from the CONFIG RX tab

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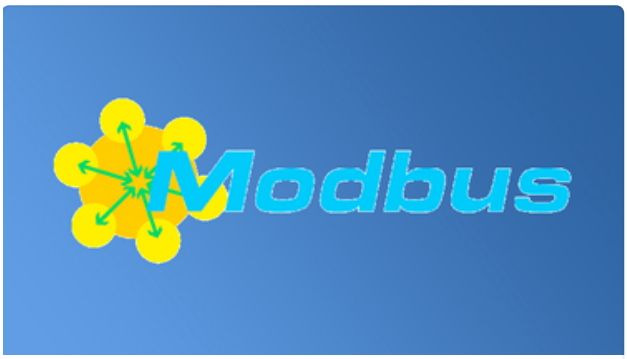
Once the configuration and activation of the sensors is complete, the last phase consists of determining the communication parameters of the receiver before connecting it to the BMS.

The configuration options will therefore be different depending on the type of receiver you are using (Modbus or BACnet). Choose the receiver you want to configure below.



Communication settings

RX MODBUS

Communication settings

RX BACNET

Modbus receiver communication parameters

Configure the Modbus receiver communication parameters from the CONFIG RX tab

Configuring Modbus parameters

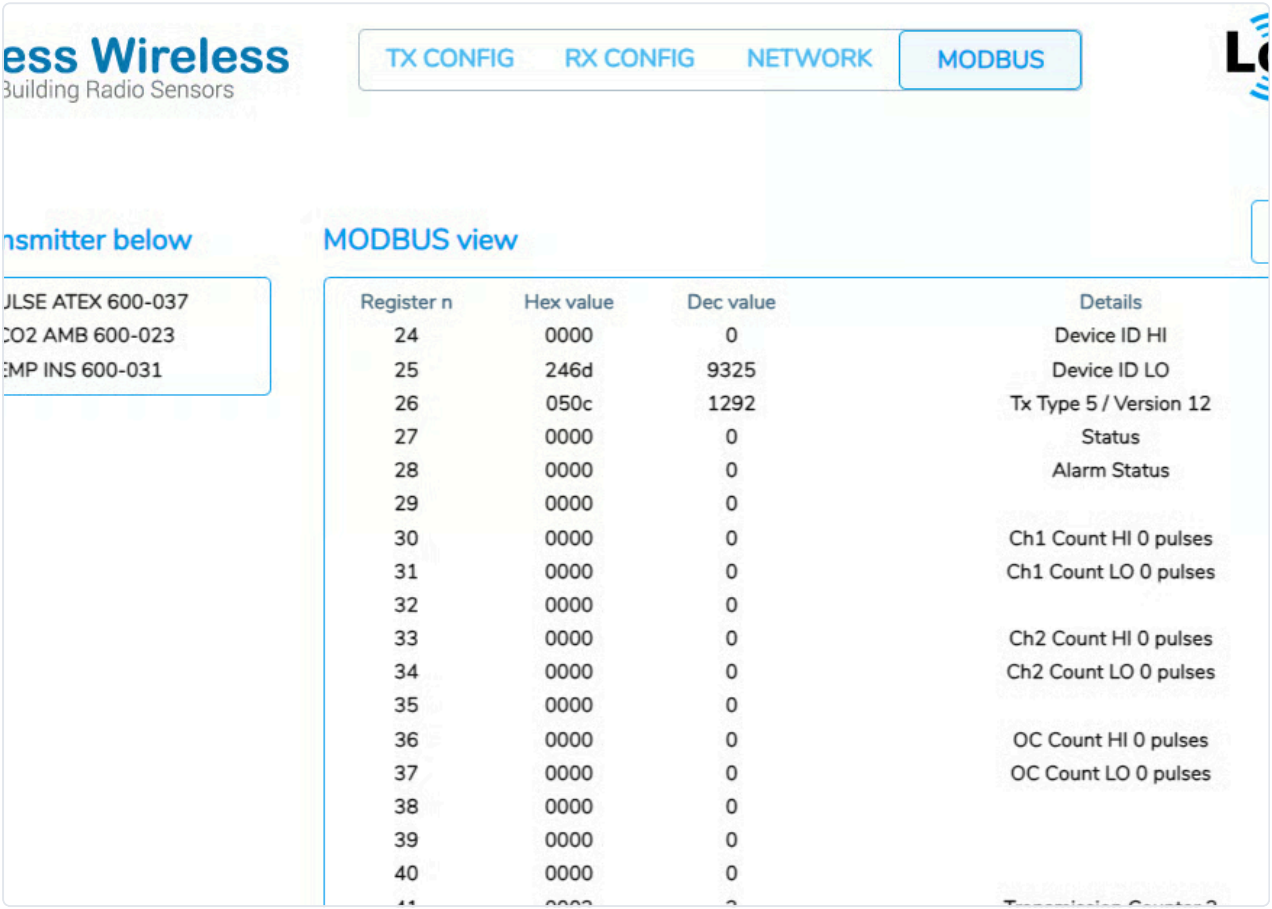
Configuration of the Modbus receiver parameters is done from the CONFIG RX tab

Field	Meaning
Baud rate, Data and stop bits, Parity	Match the receiver's communication settings with those of your controller.
Modbus ID	Modbus ID of the receiver.
1st register	Register number from which the sensor information will be incremented in the Modbus table.

RS232 / RS485	Determine the receiver's communication interface when you want to communicate via Modbus RTU: RS232 or RS485
Advanced settings	IP parameters for Modbus TCP/IP communication

Viewing the Modbus table

Once the receiver configuration is complete, you can click on the **MODBUS tab** to access the receiver table. When you select a transmitter on the left of the screen, the registers in which its information is stored are displayed in the Modbus Table. You can save this Modbus table with the “Export CSV»



Modbus table Excel file

The Excel file detailing the receiver's Modbus table is available below.

60KB EN_EU868_Enless_Receiver_Modbus_Table_Rev 10_02-.xlsx

55KB EN_US915_Enless_Receiver_Modbus_Table_Rev 1_0.xlsx

We recommend that the Modbus request frequency on our Modbus receivers falls no lower than 5 seconds between each request.

BACnet receiver communication parameters

Configure the BACnet receiver communication parameters from the CONFIG RX tab

If you want to configure a Modbus receiver, go to the Modbus receiver communication settings page .

Configuring BACnet settings

The configuration of the BACnet receiver parameters is done from the CONFIG RX tab

Field	Meaning
Baud rate, Data and stop bits, Parity	Match the receiver's communication parameters with those of your PLC (valid for BACnet MSTP communication).

MODE Device mode	Each sensor paired to the receiver will appear as a BACnet device on the network during discover. Only objects from sensors paired to the receiver will be accessible after the discover.
MODE **Object mode**	The receiver will display any BACnet objects it may contain during discover.
Protocole	Select the desired communication protocol: • MSTP • IP • MSTP + BBMD • IP+ MSTP
DHCP DHCP	You can enable (or not) DHCP
[illegible]	Additional parameters (IP address, subnet

Connecting the receiver to the PLC or the BMS

Connect your receiver to the PLC / BMS

Congratulations, the configuration part is complete! 👏🎉

You can now connect the receiver to the PLC / BMS.

Below are the details of the receiver wiring.

Wiring the RX MODBUS

Use the RJ45 Ethernet port on the receiver to connect via TCP/IP

Wiring details

Wiring details

Wiring the RX BACNET

IP

Use the RJ45 Ethernet port on the receiver to connect via IP

MSTP

Wiring details

Recommendations

Guide to good practices regarding the communication of Enless receivers with BMS

RX MODBUS

- We recommend maintaining a delay of at least two seconds between two consecutive sendings of Modbus requests to the receiver. As a reminder, the minimum periodicity with which Enless transmitters can be configured is one minute. It is therefore not necessary to configure very high polling frequencies.
- In order to optimize the polling process, we recommend that you read consecutive Modbus points in bulk. This helps reduce the number of Modbus requests sent to the receiver.
- When reading Modbus points in bulk, we recommend that you do not exceed 64 points at a time.
- The Enless receiver behaves like a server and can only accept one TCP client at a time. Being requested by another Modbus device can disrupt Modbus communication with the connected TCP client.

RX BACNET

- If you are not using COV, we recommend maintaining a delay of at least two seconds between two consecutive sending of BACnet requests to the receiver. As a reminder, the minimum periodicity with which Enless transmitters can be configured is one minute. It is therefore not necessary to configure very high polling frequencies.
- The number of COV (Change of Value) subscriptions must not exceed 80.

INSTALLATION TX IO

Installation procedure

Find out how to install the TX IO

Sections

Reminder on the use of TX IO and the different control possibilities.

Installing the TX IO in remote control mode.

Installing the TX IO in local control mode.

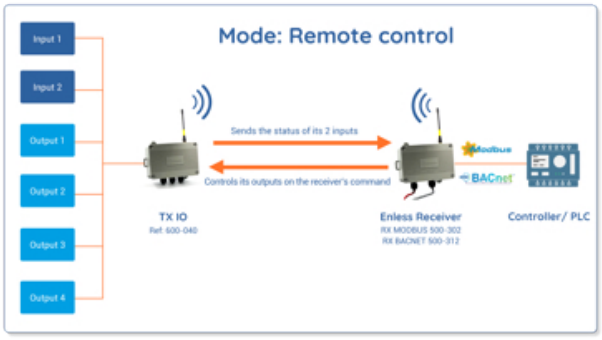
Installing the TX IO in D2D mode.

Reminder

Rappel concernant les possibilités d'utilisation du TX IO 600-040

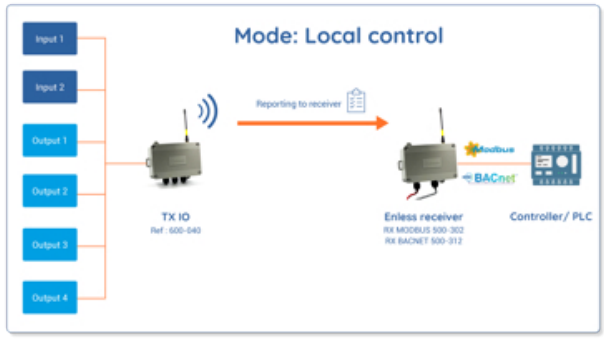
The TX IO offers Enless integrators different control possibilities. As a reminder, the TX IO has 2 contact-dry inputs and 4 controllable relay outputs. It can be used in 3 distinct modes which will be configurable from the server embedded in the transmitter.

By default, the TX IO is delivered ready to be used in remote control mode.



Remote control mode

The TX IO outputs are controlled by commands from the receiver. The TX IO also reports the status of its inputs to the receiver. In remote control mode, the TX IO behaves like any other Enless transmitter (sending periodic messages) while having the possibility of receiving commands from the receiver to control its 4 relay outputs



Local control mode

The TX IO controls its relay outputs according to the status of its inputs. It can send reporting messages to the receiver. The TX IO can be configured to synchronize inputs to relay outputs with a configurable delay (to ensure that the relay does not instantaneously match if there is a momentary change in the input state).

D2D (Device To Device) mode

The TX IO communicates with LoRa Enless sensors (4 maximum) and controls its outputs according to the alarm thresholds configured on the sensors

To change the mode of use of the TX IO, please access its configuration server (same procedure as for accessing the receiver server).

Remote control mode

Control of relay outputs on receiver commands

Step 1 : Configuring TX IO from the RX server

The configuration of the TX IO will be done from the receiver server with which the TX IO will communicate.

Below are the steps for configuring the TX IO.

Access the receiver configuration server

The procedure for accessing the receiver configuration server is detailed in the following sections:

- IP Configuration
- Server access

Configure TX IO

The TX IO declaration procedure is the same as for other transmitters. Please visit the section Configuring sensors

Step 2 : TX IO Activation

Once declared on the receiver server and configured, you will need to activate the TX IO to pair it with the receiver. Below are the steps for activating the TX IO.

Power the TX IO (7.5 - 24VDC)

- Open the TX IO case by unscrewing the 4 cover screws.
- Externally power your TX IO (between 7.5 and 24VDC). If you use our 12V power supply, connect your power supply to the POWER terminal of the receiver.
  - **Red wire** connected to the V+ terminal block
  - **Black wire** connected to the 0V terminal block

Validate the TX IO LED behavior

Once your TX IO is powered and connected to your PC, you can validate the correct behavior of the product using its LEDs. LEDs behavior

Step 3 : Validation of TX IO activation

Validate that the TX IO communicates with the receiver.

From CONFIG TX tab

In the **CONFIG TX** tab, refresh the page in your browser. A validation sticker should appear in front of the TX IO that you have just activated.

A red dot means that the configuration is being recovered. Do not hesitate to wait a few moments and refresh your page if the green dot does not appear.

From Network tab

In the **NETWORK** tab, the TX IO frames that you have just activated must be sent at the periodicity that has been configured. This tab allows you to validate the correct reception of the TX IO frames.

Step 4 : Relay control

From a RX MODBUS

The relays are controlled by writing to the **Status** registers of the relays from the Modbus table. For example, you can activate relay 1 by changing the value of the corresponding status register (0 = OFF / 1 = ON).

From a RX BACNET

Relays are controlled by writing to the Relay Status objects. For example, you can activate relay 1 by changing the value of the corresponding status object (0 = OFF / 1 = ON).

The minimum delay between sending two commands to the TX IO is 2 seconds. If you send a second command before this 2 second delay, it will not be taken into account by the TX IO.

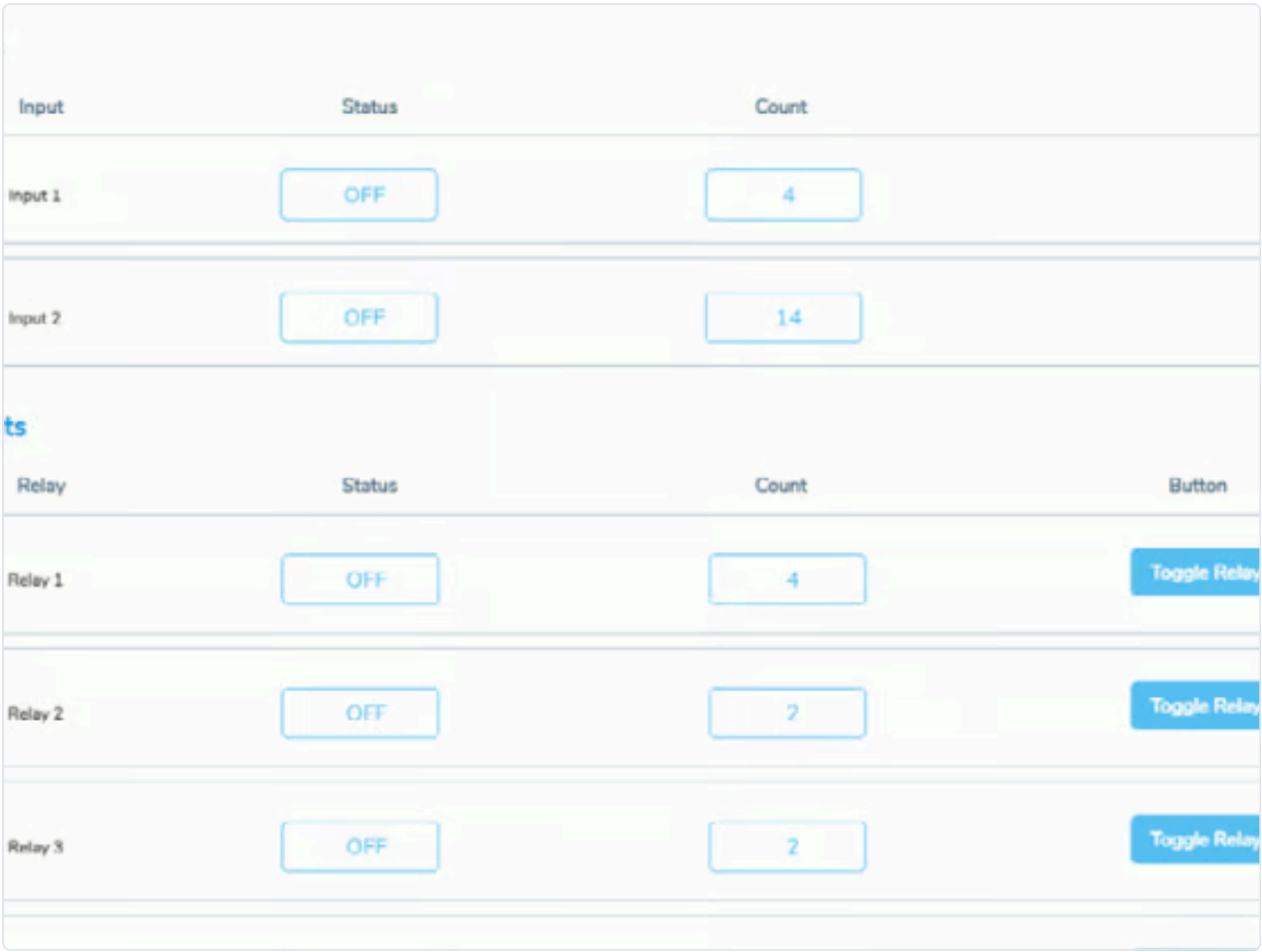
To decode the status of the TX IO inputs from the receiver's Modbus table, please refer to this article ↗.

Optional step: Displaying the status of inputs/outputs

The procedure for accessing the TX IO configuration server is identical to that of the receiver. The default address for accessing the TX IO server is 192.168.77.77 (please avoid use on Microsoft Edge and favor use on Google Chrome).

In the STATUS tab you can see the status display of the digital inputs and the counts since power-up. At the bottom of the tab you can see the relay status display ON or OFF and the number of times the status has been switched from the TX IO power supply.

You can test the relay status by clicking the Toggle Relay button. The relay activates for one second.



The TX IO relays are contact type, electronic mosfet relays without polarity. The maximum voltage between the two relay terminals is 48 VDC and the maximum current is 500 mA.

Local control mode

Control of relay outputs based on TX IO input status

TX IO power supply

- Open the TX IO case by unscrewing the 4 cover screws.
- Externally power your TX IO (between 7.5 and 24VDC). If you use our 12V power supply, connect your power supply to the POWER terminal of the receiver.
    - **Red wire** connected to the V+ terminal block
    - **Black wire** connected to the 0V terminal block

Access to the TX IO configuration server

The procedure for accessing the TX IO configuration server is identical to that of the receiver. The default address for accessing the TX IO server is 192.168.77.77 (please avoid use on Microsoft Edge and favor use on Google Chrome).

Selecting local control mode

Select the Local Control operating mode from the *TX IO config* tab . Once selected, restart your TX IO so that the mode change is taken into account using the Reboot button from the TX IO server Admin tab.

Configuring TX IO parameters from its server

In the CONFIG TX IO tab , configure your relays by selecting for each relay:

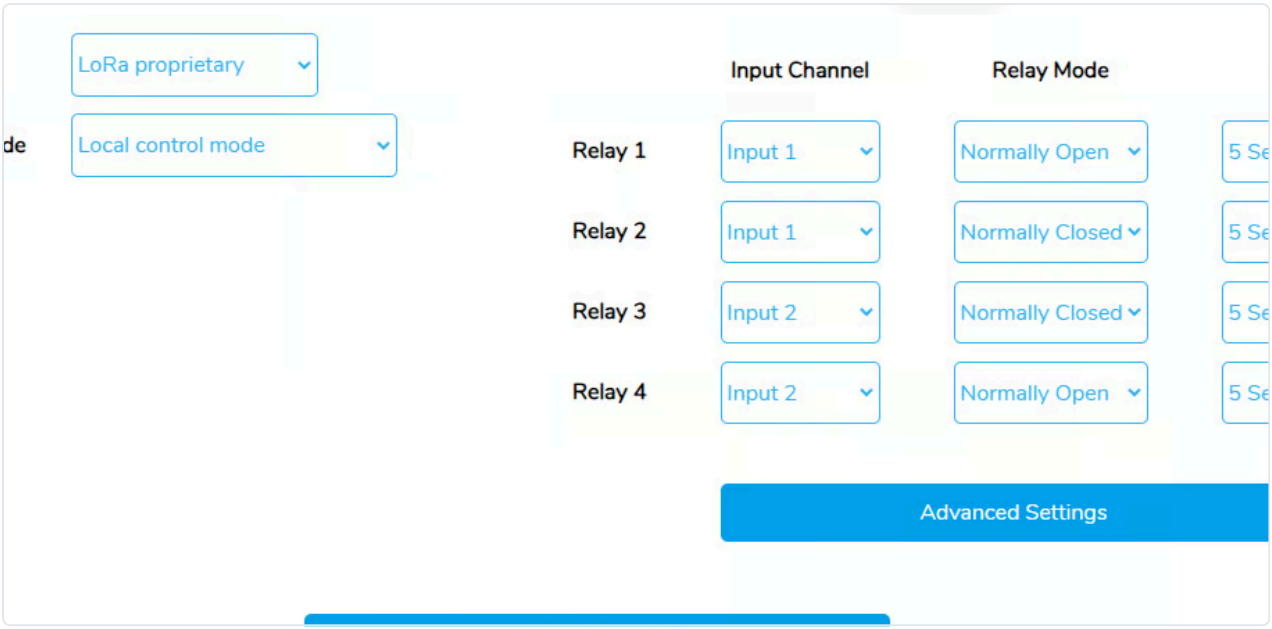
• Input: input 1 or input 2

• The relay mode: normally closed or normally open

Normally closed : corresponds to a closed rest state. When the status is 0, the relay is closed. When the status is 1, the relay is open.

Normally open : corresponds to an open rest state. When the status is 0, the relay is open. When the status is 1, the relay is closed.

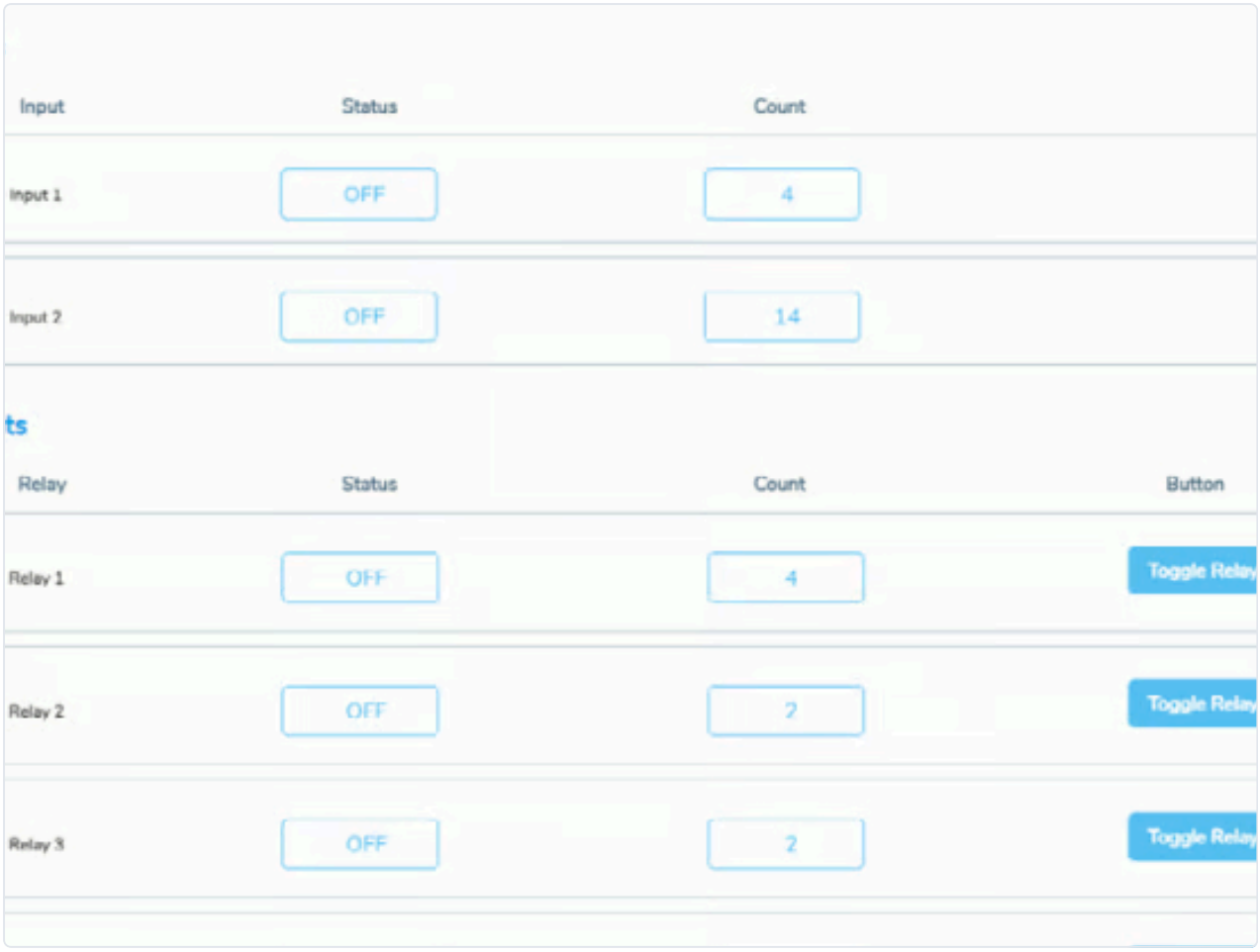
• The delay: 1 sec, 5 sec, 10 sec, 30 sec, 60 sec or 120 sec.



⚠ Click Save to save your configuration.

Viewing the status of inputs and outputs

In the STATUS tab you can see the status display of the digital inputs and relays, as well as the number of status changes since power-up. You can test the status of the relays by clicking on the Toggle Relay button. The selected relay activates for one second. The TX IO is now configured, you can power it off.



Declaration and configuration of TX IO from the receiver server

The procedure declaration of the TX IO is the same as for other transmitters.

Activation of TX IO

Step 1

Power the TX IO (7.5 à 24VDC)

Open the TX IO case by unscrewing the 4 screws on the cover then supply your receiver externally (between 7.5 to 24VDC).
Detail of the TX IO power supply .

Step 2

Validate the TX IO LEDs behavior

Once your TX IO is powered and connected to your PC, you can validate the correct behavior of the product using its LEDs.

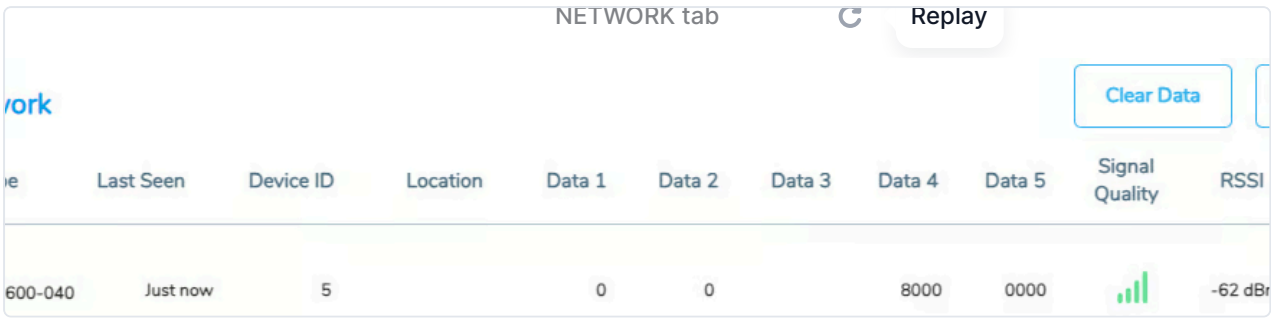
LEDs behavior

Validation of TX IO activation from the receiver server

In the CONFIG TX tab, refresh your browser page. A validation sticker should appear in front of the TX IO that you have just activated.

A red dot means that the configuration is being recovered. Do not hesitate to wait a few moments and refresh your page if the green dot does not appear.

In the NETWORK tab, the TX IO frames that you have just powered must be sent at the periodicity that has been configured. This tab allows you to validate the correct reception of the TX IO frames.



To decode the status of the TX IO inputs from the receiver's Modbus table, please refer to this article ↗.

The TX IO relays are contact type, electronic mosfet relays without polarity. The maximum voltage between the two relay terminals is 48 VDC and the maximum current is 500 mA.

D2D mode

In D2D mode, the TX IO communicates with LoRa Enless sensors (4 maximum) and controls its outputs according to the alarm thresholds configured on the sensors

---

TX IO power supply

- Open the TX IO case by unscrewing the 4 cover screws.
- Externally power your TX IO (between 7.5 and 24VDC). If you use our 12V power supply, connect your power supply to the POWER terminal of the receiver.
  - **Red wire** connected to the V+ terminal block
  - **Black wire** connected to the 0V terminal block

Access to the TX IO configuration server

The procedure for accessing the TX IO configuration server is identical to that of the receiver. The default address for accessing the TX IO server is 192.168.77.77 (please avoid use on Microsoft Edge and favor use on Google Chrome).

Selecting local control mode

Select the D2D operating mode from the **CONFIG TX IO** tab . Once selected, restart your TX IO so that the mode change is taken into account using the Reboot button from the TX IO server Admin tab

Declaration and configuration of sensor alarm thresholds

In the CONFIG D2D tab, you must declare the sensors you want to pair to the TX IO. The procedure is the same as when you declare sensors on a receiver

> Configuring alarm thresholds is done from the advanced options

Relay configuration

In the CONFIG TX IO tab, the relays can be associated with the alarm thresholds of the sensors that we have just configured.

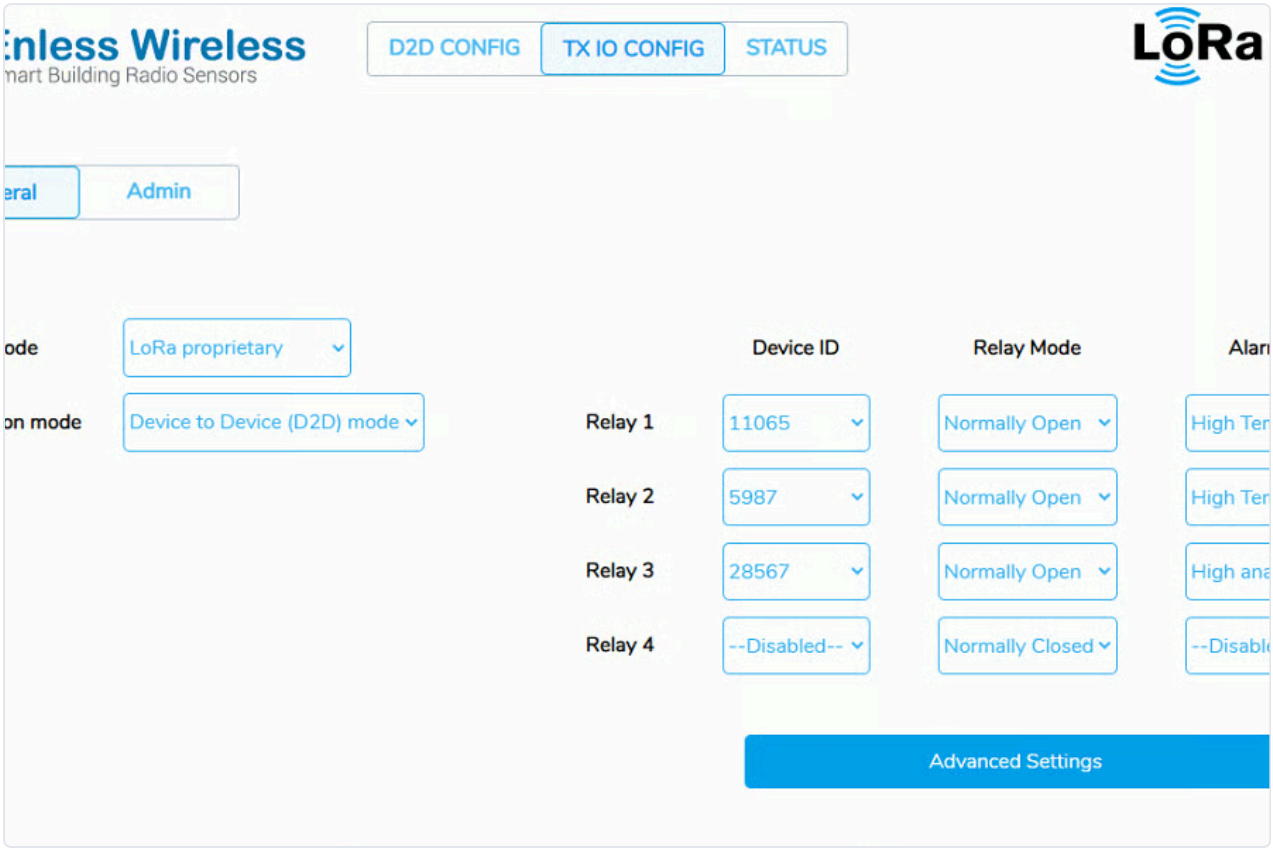
To do this, for each relay select:

- The LoRa ID of the configured sensor
- The relay mode: normally closed or normally open

Normally closed : corresponds to a closed rest state. When the status is 0, the relay is closed. When the status is 1, the relay is open.

Normally open : corresponds to an open rest state. When the status is 0, the relay is open. When the status is 1, the relay is closed.

- The type of alarm to trigger a relay.

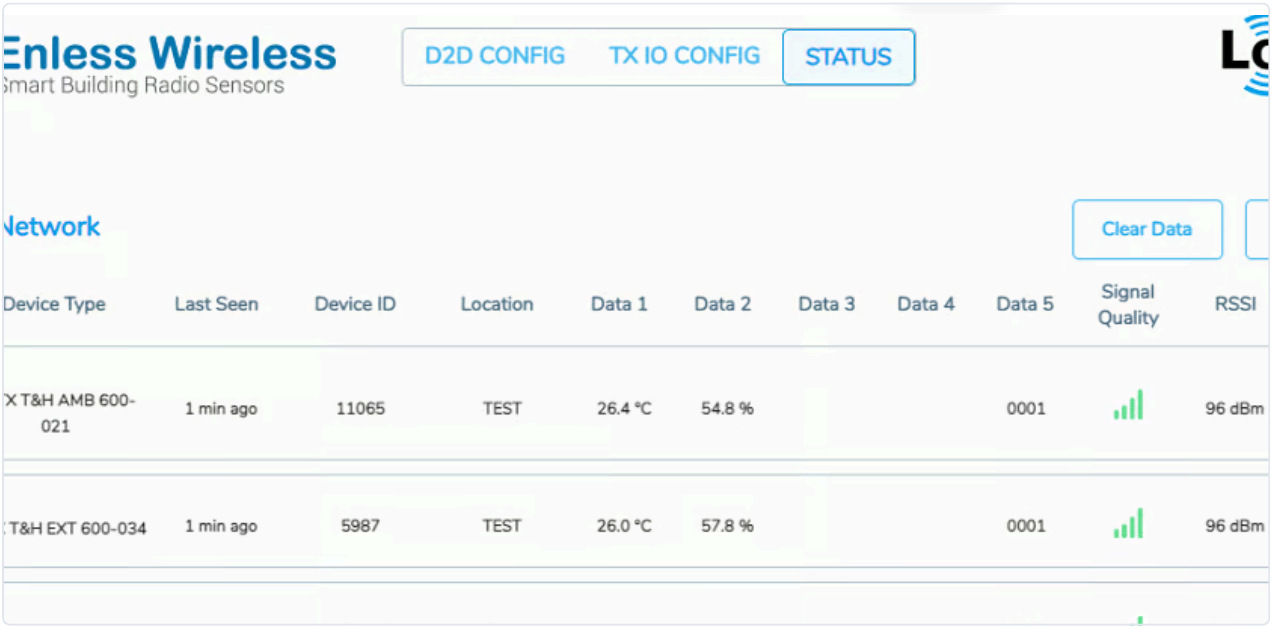


Activation of sensors

The activation of the sensors is done in the same way when pairing the sensors to the receiver.

Validation of reception of sensor information

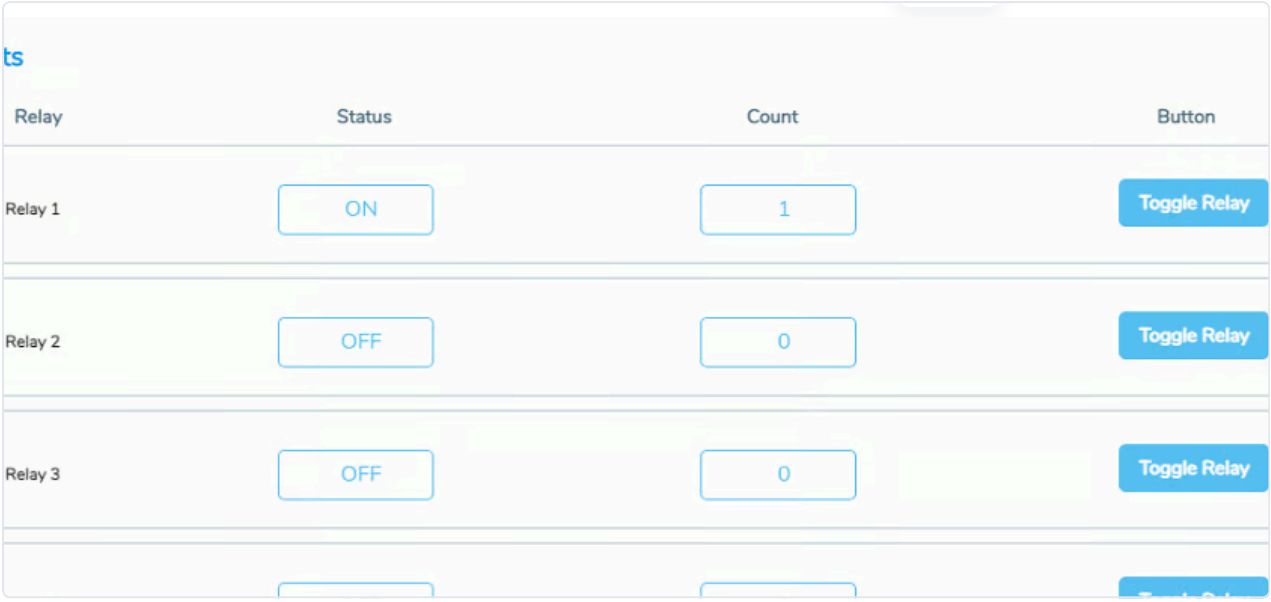
In the STATUS tab , in the Transmitter Network section, the frames from the sensors that you have just activated must be sent at the periodicity that has been configured. This tab allows you to validate the correct reception of sensor frames. We recommend using this page as an on-site audit tool, to validate that RSSI levels for receiving probes are good.



⚠ Click Save to save your configuration.

Viewing output status

In the **STATUS** tab in the Outputs section you can see the relay status display ON or OFF and the number of times the status has been switched from the TX IO power supply. You can test the relay status by clicking the Toggle Relay button. The relay activates for one second.



The TX IO relays are contact type, electronic mosfet relays without polarity. The maximum voltage between the two relay terminals is 48 VDC and the maximum current is 500 mA.

INSTALLATION TX MODBUS

Installation procedure

Find out how to install the TX Modbus

Sections

Reminder

Configuration

Activation of TX Modbus

Checking

Reminder

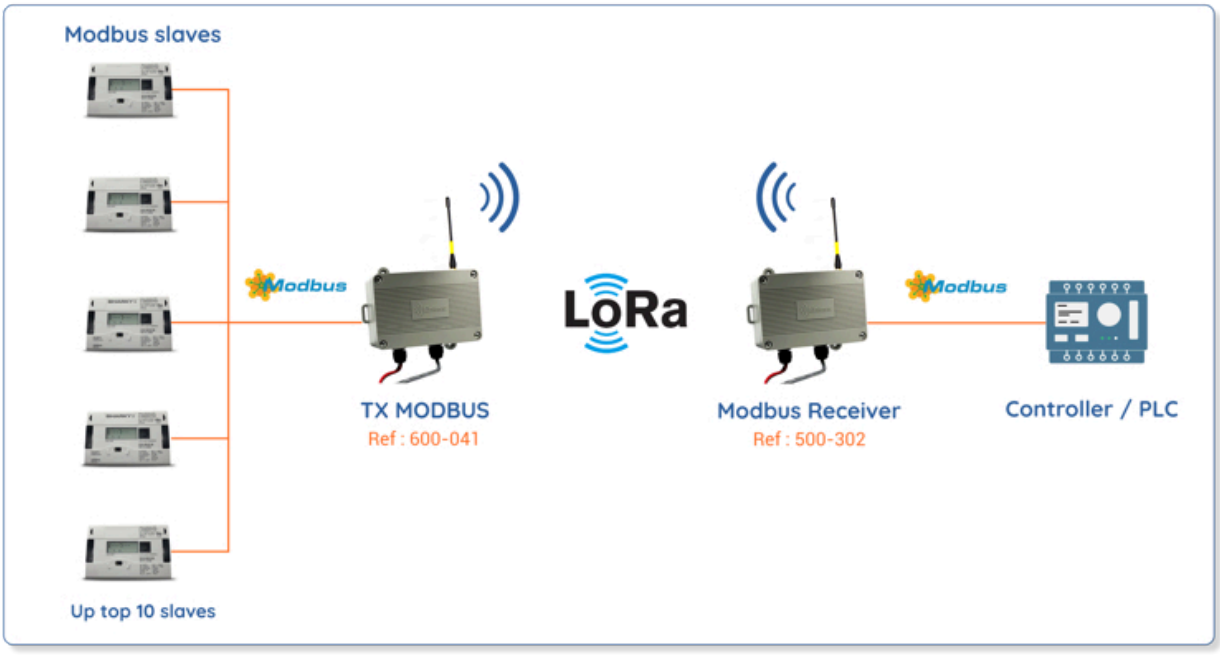
Rappel concernant l'utilisation du TX MODBUS 600-041

The TX Modbus allows reading/writing in 60 Modbus registers.

These registers can be distributed across a maximum of 10 Modbus slaves.

> As a reminder, the TX Modbus will communicate with an RX Modbus Enless, in proprietary LoRa mode.

Radio architecture with a TX MODBUS



Configuration

Configure the slaves that the TX MODBUS must read from the receiver server

Declaration and configuration of TX MODBUS

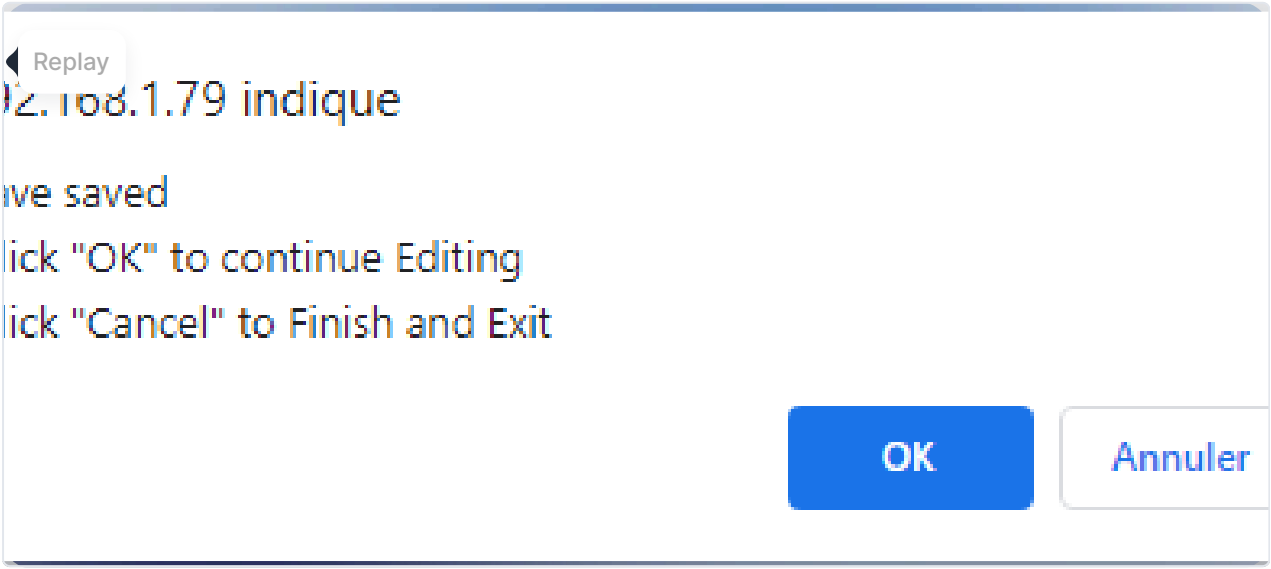
Go to the receiver configuration server . On the receiver configuration server, the Config TX tab allows the declaration and configuration of the TX MODBUS which will be paired with the receiver. To configure your TX MODBUS, click on the button **+Add Sensor**. A new window appears.

Below is the list of fields to configure:

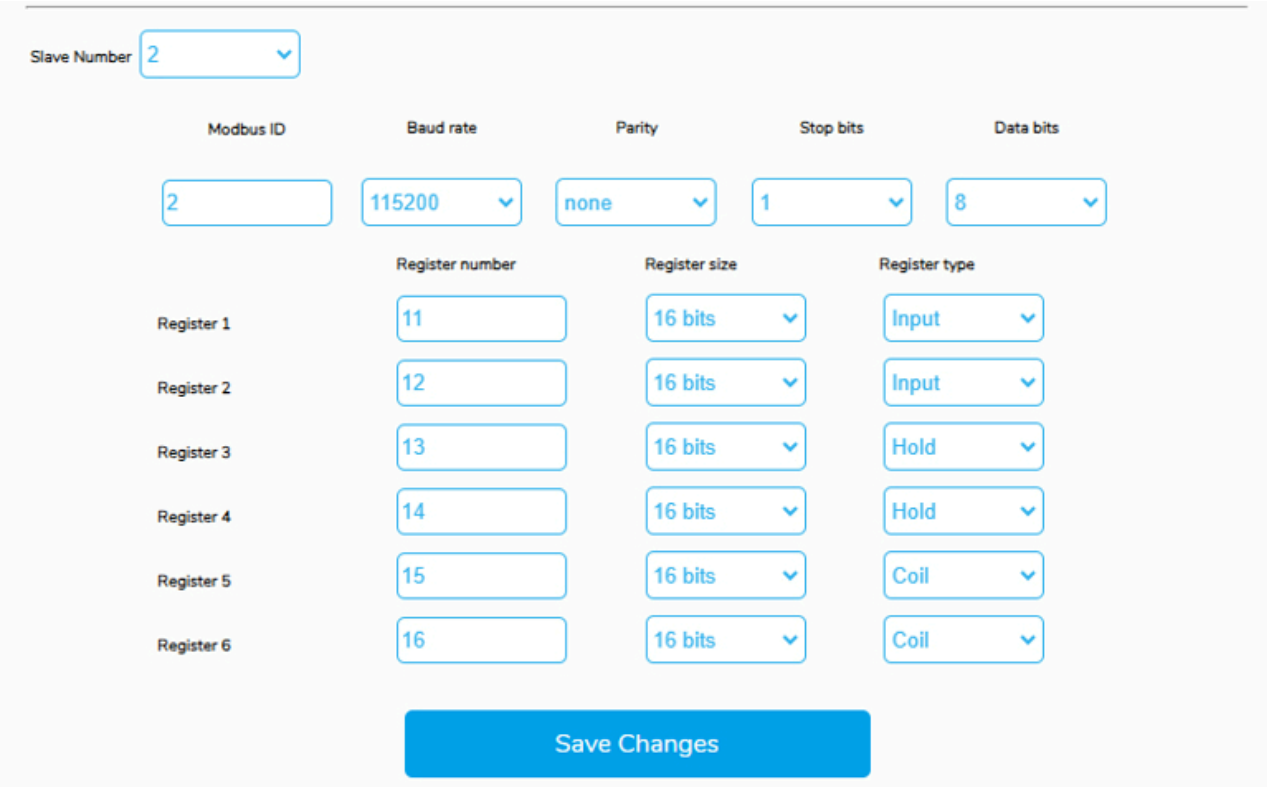
Field	
Type TX	Choose the transmitter type

Location	Indicate the transmitter location
LoRa ID	Enter the LoRa ID (provided on the transmitter label)
Periodicity	Choose the transmission periodicity
+ Advanced	Click the +Advanced button to configure the registers to read/write on the slave
Slave number	Select a slave number between 1 and 10
Modbus ID	Enter a Modbus ID for the slave (from 1 to 254)
Baud rate, Data and stop bits, Parity	Communication settings
Configuration of registers	Provide the addresses of the registers to read/write on the slave (maximum 6 registers per slave). Select the size and type

When you click Save, a message appears



If you wish to declare other slaves on this same TX MODBUS , you can click **OK** and continue editing by indicating a new slave number.



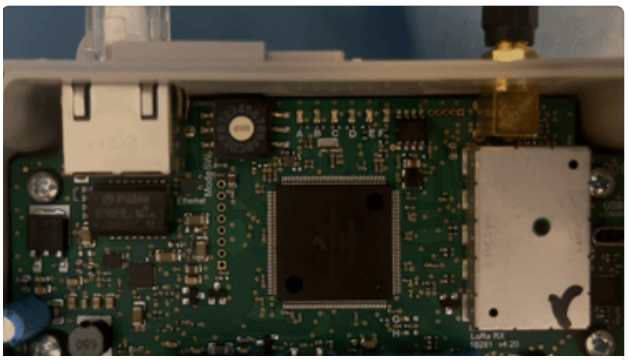
Once your configuration is complete, you can click Save Changes, then Cancel to finish and exit.

The RX MODBUS receiver supports up to 50 transmitters. Each slave configured on a MODBUS TX is equivalent to a transmitter in the receiver's Modbus table.

It is possible to configure several slaves with the same Modbus ID in order to read or write in more than 6 registers on this slave. For more details, please see this article ↗.

Activation of TX MODBUS

Preparation of TX Modbus



Step 1

Power the TX Modbus (7.5 to 24VDC)

Open the TX Modbus case by unscrewing the 4 cover screws then externally power your TX Modbus (between 7.5 to 24VDC). Details of the TX Modbus power supply

Step 2

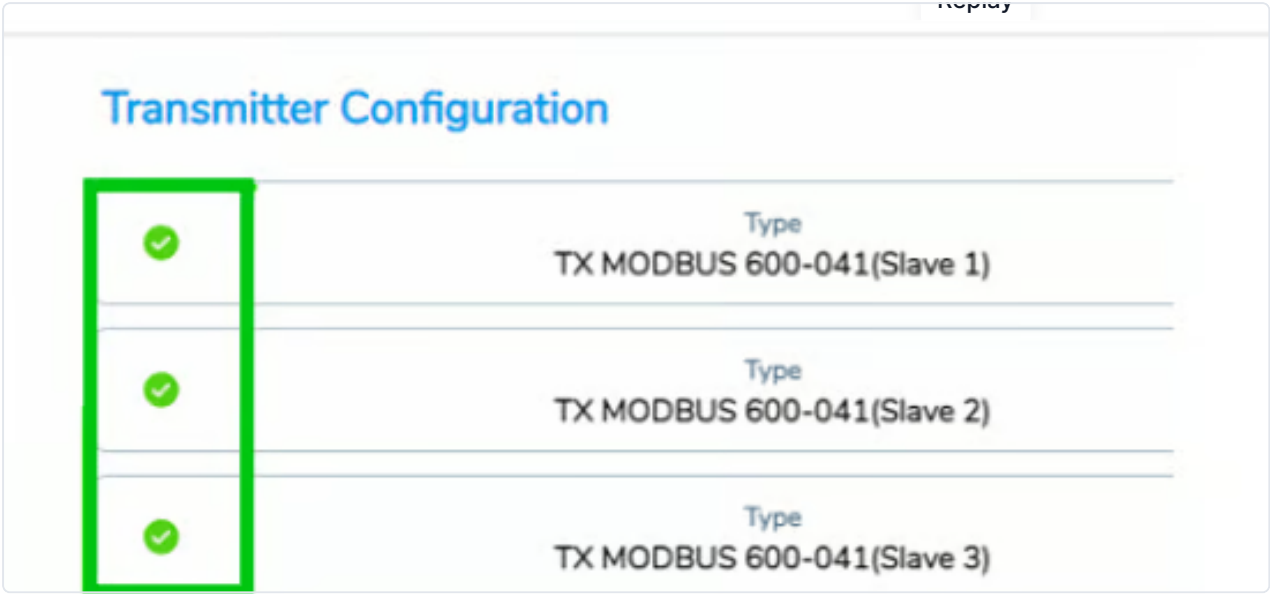
Validate the TX Modbus LEDs behavior

When you power it, the TX Modbus tries to communicate with the receiver. You can refer to the TX Modbus LEDs to learn more about the installation status. Description of LEDs here

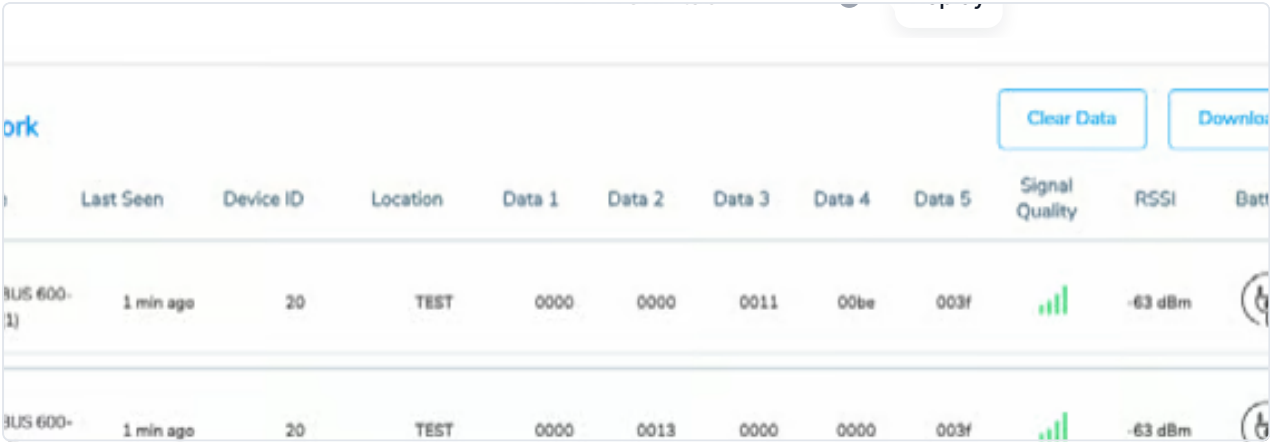
To avoid any problems please maintain 1A 12V on the TX Modbus power terminal block

Validation of TX Modbus activation from the receiver server

In the **CONFIG TX** tab , refresh your browser page. A green validation dot should appear in front of the TX Modbus slaves that you have just activated. A red dot means that the configuration is being recovered. Do not hesitate to wait a few moments and refresh your page if the green dots do not appear.



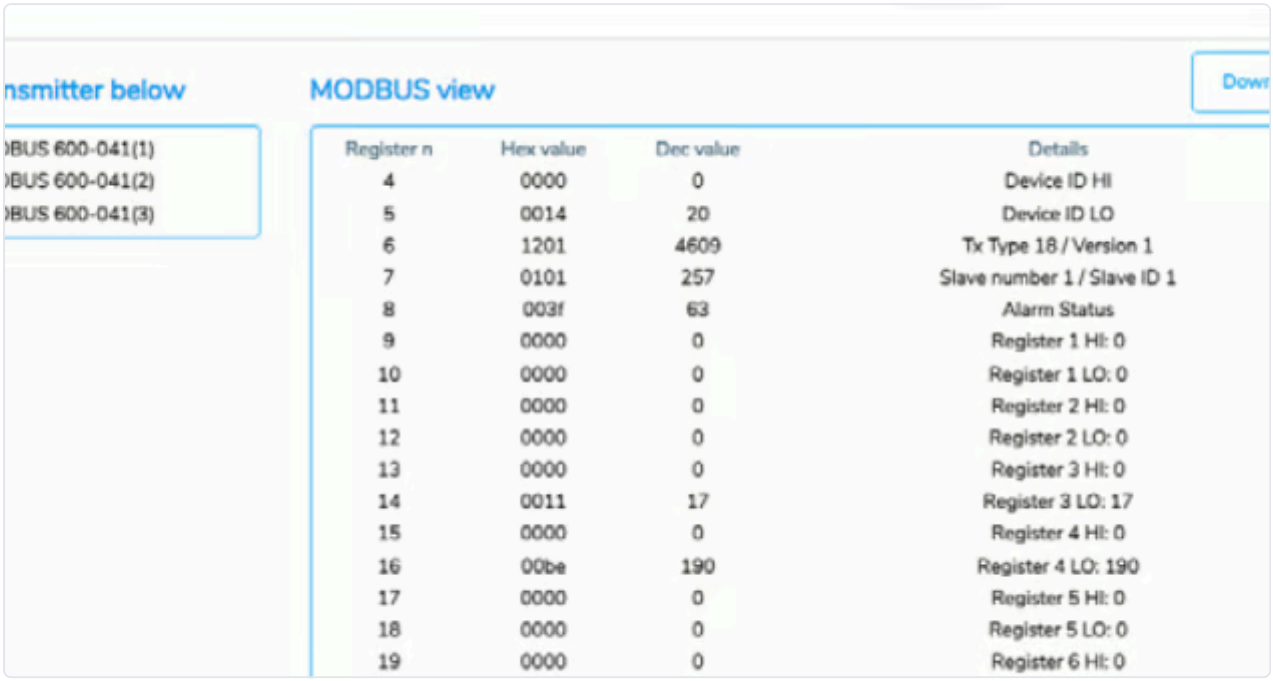
In the “NETWORK” tab, the frames containing the contents of the slave registers read by the Modbus TX that you have just activated must be sent at the periodicity that has been configured. This tab allows you to validate the correct reception of Modbus TX frames



We recommend using this page as an on-site audit tool, to validate that RSSI levels for receiving frames are good

Viewing the Modbus table

Click on the “MODBUS” tab. When you select a slave on the left of the screen, the registers in which its information is stored are displayed in the Modbus Table. You can save this Modbus table with the “Export CSV” button.



Writing to the Modbus table

It is possible to write to the Modbus table registers for each slave.

Writing can only be done on “Hold” or “Coil” type registers.

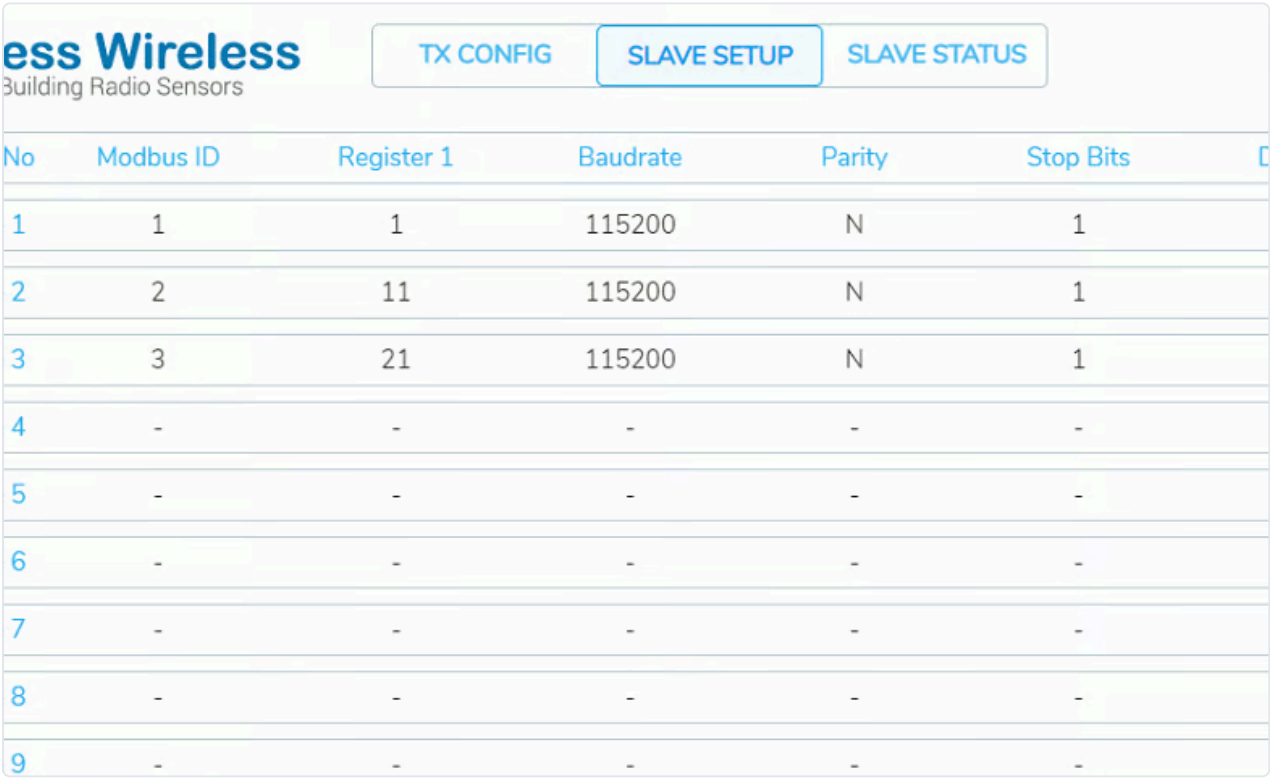
You can check if the slave registers have been read and written by consulting this article: [Proprietary mode] Verification of reading/writing of TX Modbus registers ↗

Checking

This step allows you to validate the configuration of the registers and the values of the slave registers from the Modbus TX server.

The ↗procedure for accessing the TX MODBUS configuration server is identical to that of the receiver. The default address for accessing the TX MODBUS server is **192.168.77.77** .

The **SLAVE SETUP** tab of the TX Modbus server will show you how slave reading has been configured from the receiver.



No	Modbus ID	Register 1	Baudrate	Parity	Stop Bits
1	1	1	115200	N	1
2	2	11	115200	N	1
3	3	21	115200	N	1
4	-	-	-	-	-
5	-	-	-	-	-
6	-	-	-	-	-
7	-	-	-	-	-
8	-	-	-	-	-
9	-	-	-	-	-

The **SLAVE STATUS** tab will show you the data read by the TX MODBUS on the slaves. You can confirm the reporting of the same data and register values as in the Modbus table of the receiver.

Appendices

Applicability

This guide is applicable to devices listed below.

EU868 Range

- TX T&H AMB 600-021
- TX CO2/VOC/T&H AMB 600-023
- TX TEMP INS 600-031
- TX TEMP CONT1 600-032
- TX TEMP CONT2 600-232
- TX T&H EXT 600-034
- TX 4/20 mA 600-035
- TX PULSE 600-036
- TX PULSE ATEX 600-037
- TX PULSE LED 600-038
- TX CONTACT 600-039
- TX IO 600-040
- TX MODBUS 600-041
- RX MODBUS 500-302
- RX BACNET 500-312
- RX REPEATER 600-301

US915 Range

- TX T&H AMB 600-121
- TX CO2/T&H AMB 600-123
- TX TEMP INS 600-131
- TX TEMP CONT1 600-132
- TX TEMP CONT2 600-332

- TX T&H EXT 600-134
- TX 4/20 mA 600-135
- TX PULSE 600-136
- TX PULSE LED 600-138
- TX CONTACT 600-139
- TX MODBUS 600-141
- RX MODBUS 500-502
- RX BACNET 500-512
- RX REPEATER 600-501

Safety

Safety recommendations

- The safety of Enless products can only be guaranteed if they are used for their intended purpose. They must only be serviced by qualified persons
- Risk of explosion if sensor batteries are replaced with an incorrect reference. Please refer to the appendix for replacing sensor batteries.
- The sensors must be installed in an adequately ventilated environments to ensure there is no danger of internal overheating. They must not be covered with things such as newspapers, cloth, curtains, etc
- Sensors must never be exposed to high temperature sources (E.g.: attached to heating equipment, etc.)
- Do not place the sensors near objects that generate flames (E.g.: candles, blowpipes, etc.)
- The sensors must not be exposed to aggressive chemical agents or solvents that may damage plastic or corrode metal parts
- The ANT-REN-SMA LR 915 MHz 1000-101 used with LoRa receivers, repeater, TX MODBUS should be installed indoor only.

Reminder relating to the use of the TX PULSE ATEX 600-037 transmitter

As required by the ATEX 1999/92/EC Directive, only persons trained for working in hazardous areas are authorised to install the TX PULSE ATEX 600-037 transmitter. The TX PULSE ATEX 600-037 transmitter must not be modified in any way

Special conditions for safe operation

When used with a gas meter, the output wires of the TX PULSE ATEX 600-037 transmitter must be connected to certified intrinsically safe equipment. This combination must be compatible with the Uo, Io, Po, Co, Lo intrinsic safety regulations specified on the label attached to the transmitter.

Certification

The TX PULSE ATEX 600-037 transmitter is ATEX certified:

II 1 G

Ex ia IIC T3 Ga

LCIE 14 ATEX 3013 X

-20°C ≤ Tamb ≤ +55°C

Battery: 3,6 V Ramway ER34615 only.

Uo:3,9 V ; Io : 11,47 mA ; Po : 11,18 mW ; Co : 617 µF : Lo : 270 mH.

Battery

The TX PULSE ATEX 600-037 transmitter is delivered with a RAMWAY ER34615 model battery. Only the RAMWAY ER34615 battery can be used with the TX PULSE ATEX 600-037 transmitter. These batteries can be obtained from Enless Wireless - 45 ter avenue de Verdun 33520, Bruges (France). Telephone: 05 56 35 97 47 – email: contact@enless.fr

WARNING - POTENTIAL RISK OF STATIC DISCHARGE

The TX PULSE ATEX 600-037 transmitter must only be cleaned using a damp cloth.

Legal information for 915MHz devices

This device complies with part 15 of the FCC Rules and with Innovation, Science and Economic Development Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

NOTE: The grantee is not responsible for any changes or modifications not expressly approved by the party responsible for compliance. Such modifications could void the user’s authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions,

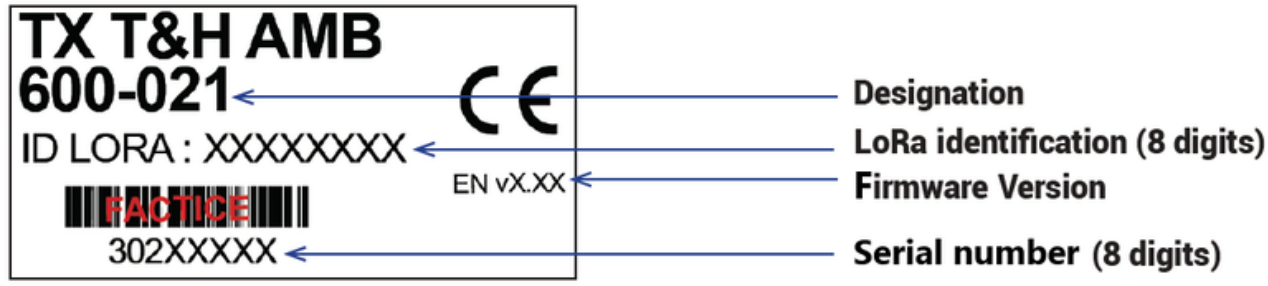
may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

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

CAN ICES-003(B) / NMB-003(B)

Labels

Labels description



Label example

LED behavior

The description of the LED behavior for Enless products is given below

Sensors

LEDs behavior of sensors

TX IO 600-040

LEDs behavior of TX IO

TX MODBUS 600-041

LEDs behavior of TX MODBUS

Receivers

LEDs behavior of Modbus et BACnet receivers

Repeater

LEDs behavior of the repeater

Sensors

LEDs behavior of Enless sensors

Phase 1 : Starting the sensor and communicating with the receiver

LED	Behavior
L1	Flash every 5s
L2	Flash when the sensor sends a message
L3	Flash when the receiver responds

Phase 2 : Installation status

Installation status	Behavior of L1	Behavior of L2	Behavior of L3
	L1	L2	L3
Success strong signal	OFF	OFF	ON **(30s)**
Success weak signal	OFF	ON **(30s)**	OFF
Installation failed	ON **(30s)**	OFF	OFF

Phase 3 : Operation

LED	Behavior
L1	Flash every 1 minute in the event of an alarm

L2	Flash on each frame send
L3	Flash every 1 minute

Do not power the sensors simultaneously. Power them one by one and wait for the previous one to be correctly activated before powering the next one.

TX IO

LEDs behavior of TX IO

Phase 1 : Installation

LED	Behavior	Meaning
L1	Always ON	Powered sensor
L2	ON	Installation failed
L3	ON	Successful installation but weak radio signal
L4	ON	Successful installation and good signal

TX Modbus

LEDs behavior of TX MODBUS

Phase 1 : Installation

LED	Behavior	Meaning
A	OFF	
B	OFF	
C	Flash every 5 seconds	
D	Flash when a message is sent	ON for 30 secs if installation successful but weak signal
E	Flash when a message is received	ON for 30 secs if installation successful
F	OFF during installation sequence	ON for 30 secs if installation fails

Phase 2 : Operation mode

LED	Signification
A	Flash when message is sent on Comms
B	Flash when a message is received on Comms
C	ON
D	Flash when message is sent over RF
E	Flash when message is received over RF
F	OFF

Modbus & BACnet receivers

Behavior of LEDs on Modbus & BACnet receivers

LEDs on the electronic card

LED	Behavior	Meaning
A	Flash	The receiver has received a message
B	Flash	The receiver has sent a message
C	ON	The receiver is correctly powered
D	Flash	Communication message transmitted
E	Flash	Communication message received
F	OFF	LED not used

LEDs outside the product

LED	Behavior	Meaning
Exterior red	Flash Every 1 minute	The receiver is in operation
Green Ethernet port	Flash	The receiver connects to the Ethernet network
Orange Ethernet port	Flash	The receiver sends information to the Ethernet network

Repeater

Behavior of the signal repeater LEDs

LEDs on the electronic card

LED	Comportement	Signification
A	Flash	The repeater has received a message
B	Flash	The repeater has transmitted a message
C	ON	The repeater is correctly powered

LEDs outside the product

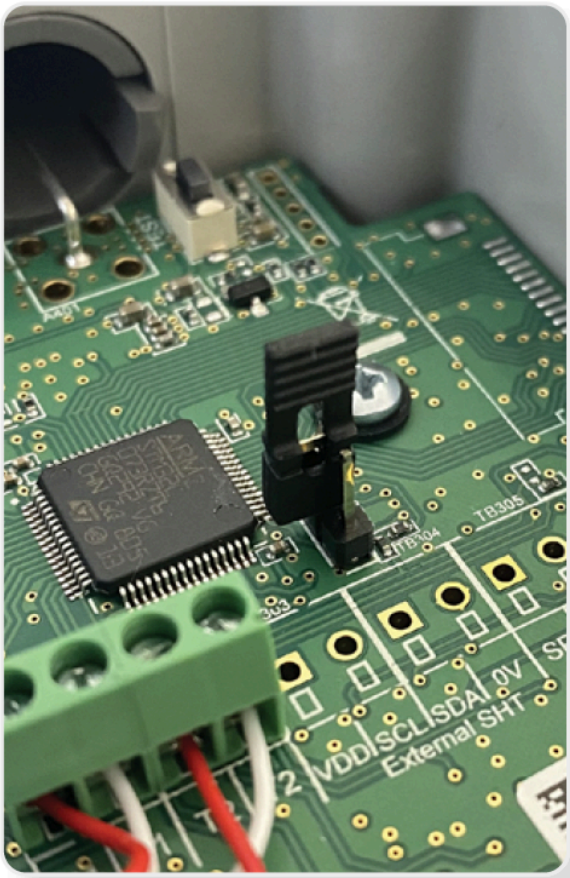
LED	Behavior	Meaning
Exterior red	Flash Every 1 minute	The repeater is in operation

Communication mode

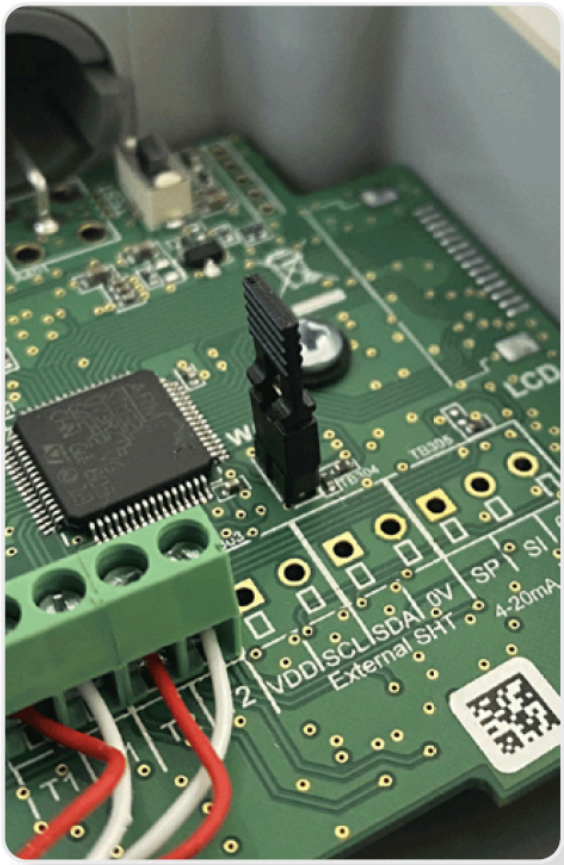
Proprietary LoRa vs LoRaWAN

This documentation describes the procedure for installing sensors in proprietary LoRa mode. Therefore, it is imperative that the sensors you use communicate in proprietary LoRa mode. The selection of the communication mode is done using a jumper present on the electronic card of each sensor.

Example below :



LoRaWAN Mode
Jumper positioned on a single pin



Proprietary LoRa mode
Jumper positioned on both pins

The mode change will only be taken into account if the jumper switching is carried out when the sensor is depowered.

CO2 sensor calibration

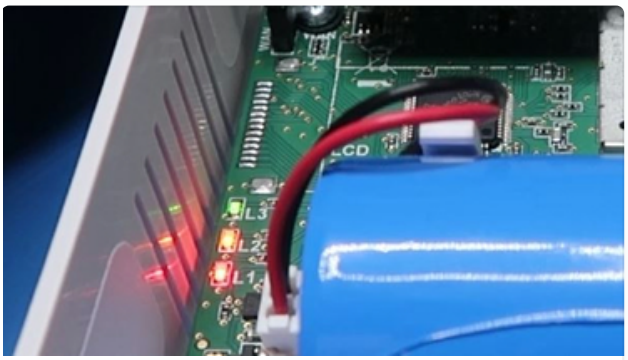
TX CO2 COV T&H AMB 600-023/ TX CO2 T&H AMB 600-123

The TX CO2 VOC T&H AMB 600-023 and TX CO2 T&H AMB 600-123 sensors are delivered pre-calibrated.

You can re-calibrate them manually on a “fresh-air” basis if you notice a shift in the CO2 values measured over time. To ensure the best possible calibration, we recommend that you calibrate the products by following the procedure below:

1. When the sensor is powered, position it on a table near a window, the window must be open so that the air in which the transmitter will calibrate is healthy.

2. Press the push button located on the transmitter electronic board for 15 seconds. Only release the pressure when LEDs L1, L2, L3 light up. This means that the calibration process has been activated.



3. Walk away from the sensor and let the calibration take place. The process takes approximately 3 minutes.

4. When the LEDs stop flashing, this means that the calibration is complete. You can take the sensor and install it in its final location.

We recommend that you press the push button using a screwdriver or pen so as not to damage the CO2 sensor with your finger.

Wiring to meters

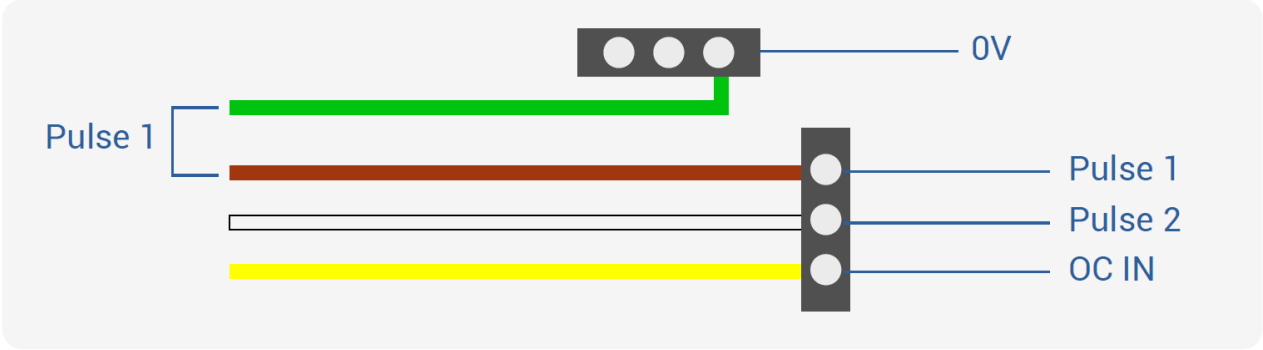
Connecting smart metering sensors to meters

TX PULSE

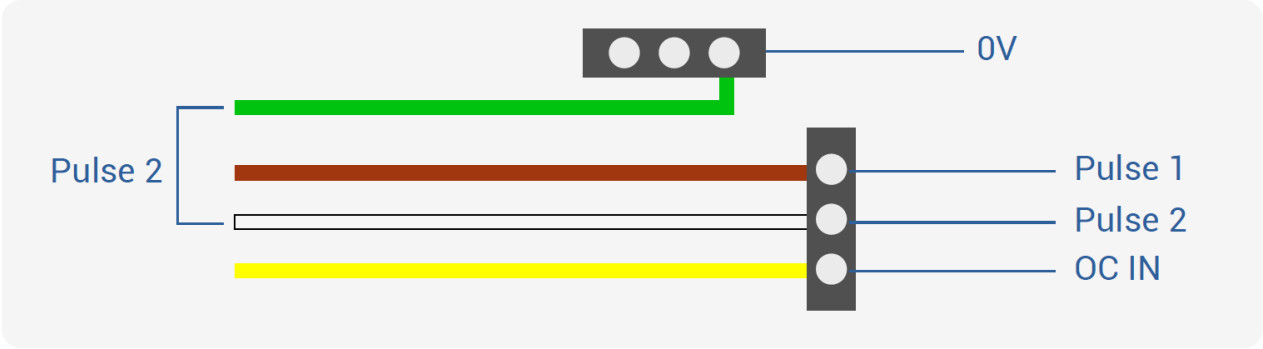
TX PULSE LED

TX PULSE

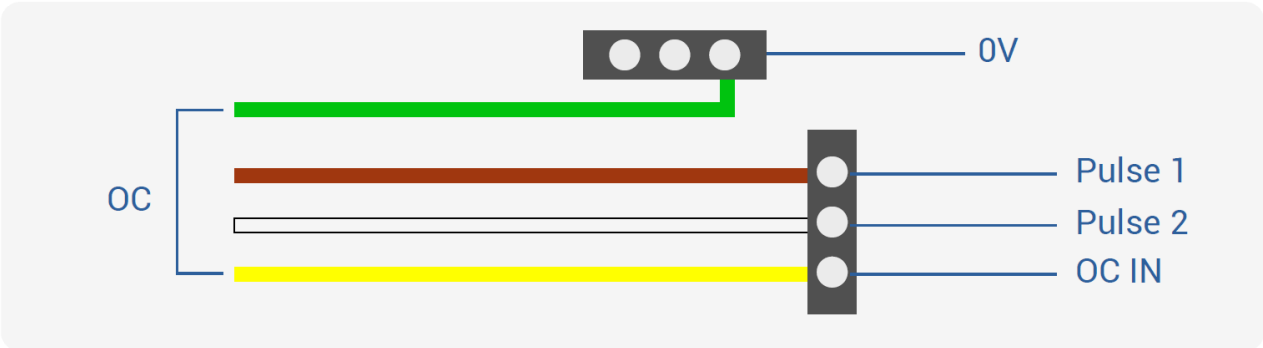
TX PULSE sensors can be wired in three ways:



Using Pulse 1 input (dry contact)



Using Pulse 2 input (dry contact)



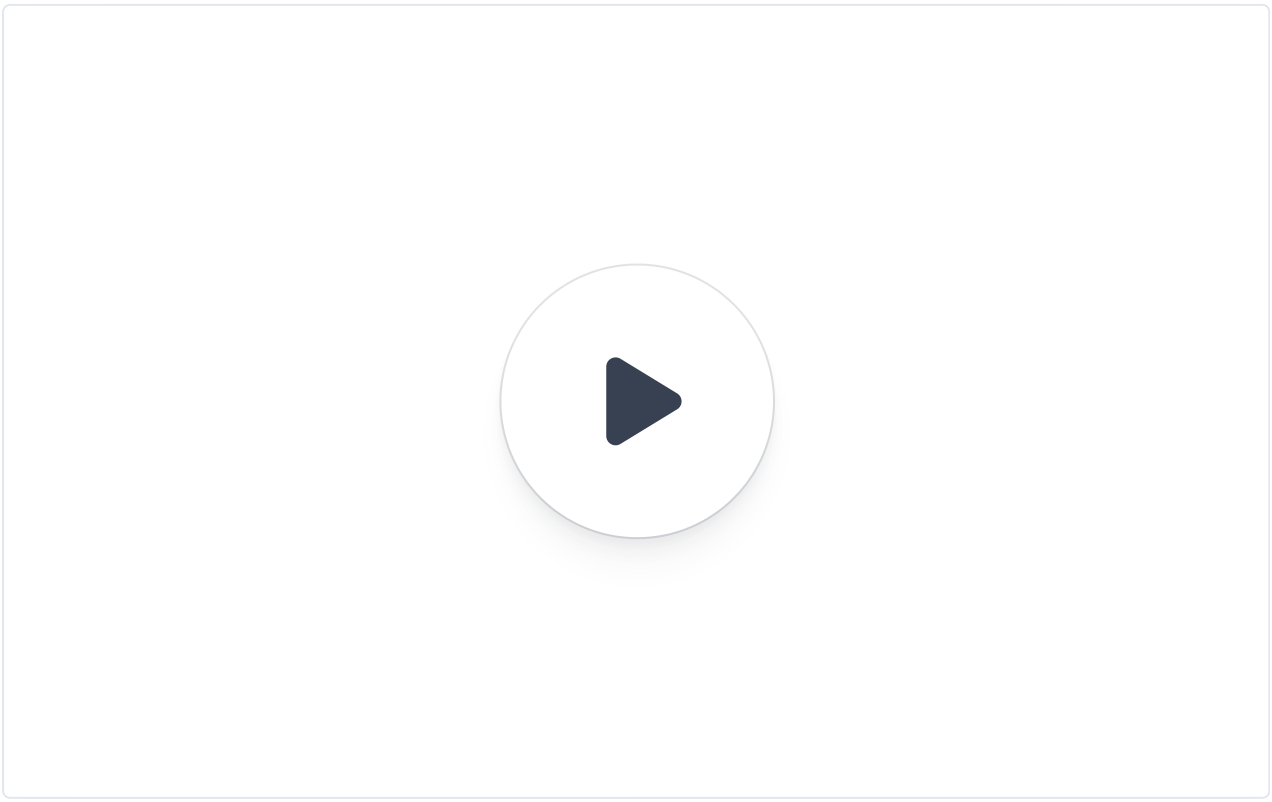
Using the OC (open collector) input

The TX PULSE and TX PULSE ATEX sensors are compatible with meters with pulse outputs in dry contact or open collector.

Pulse duration = 50ms minimum
Pulse frequency = 10Hz maximum

TX PULSE LED

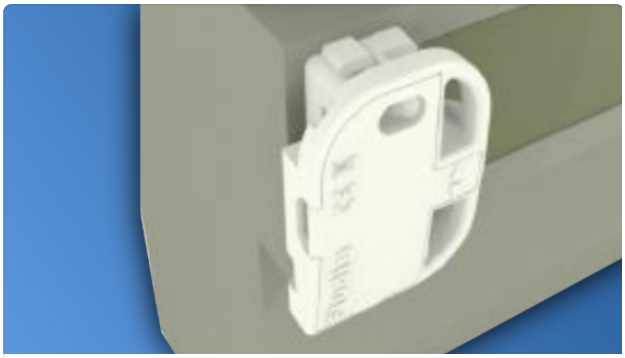
Installing the optical read head on the meter



Installing the optical read head

Viewfinder attachment

Locate the flashing diode on the meter and stick the viewfinder aiming the diode through the hole.

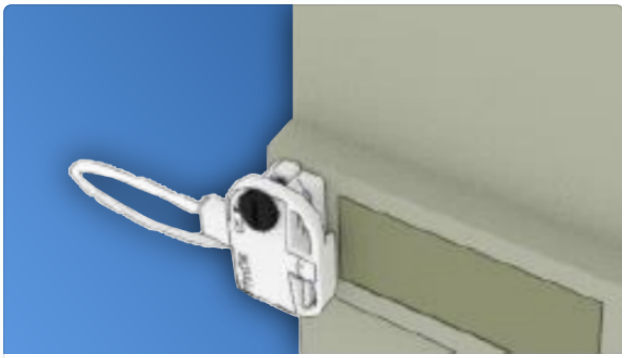


Locking the reader

Clip the reader into the viewfinder. Exert a uniform force over the entire surface of the sensor.

Fixation

Use the black screw to tighten the optical head to the viewfinder



Checking

Validate the correct positioning of the optical read head before powering the sensor

Consumption calculation

The pulse optical reader records 1 pulse every 5 flashes.

Calculation formula = **(A x 5) x B x C x D**

A = Number of pulses measured

B = Pulse weight
Blue tariff: 0.1W/pulse. In this case, enter 0.1 for B value in the calculation below. Other tariffs: Shown on the meter's interface (label or screen)

C = TC ratio (Current transformation) Blue tariff: 1

Yellow tariff: 20, 40 or 100 (shown on the meter’s interface)

D = TT ratio (Tension transformer)

Blue tariff: 1

Yellow tariff: 1
Green tariff: Shown on the meter’s interface.

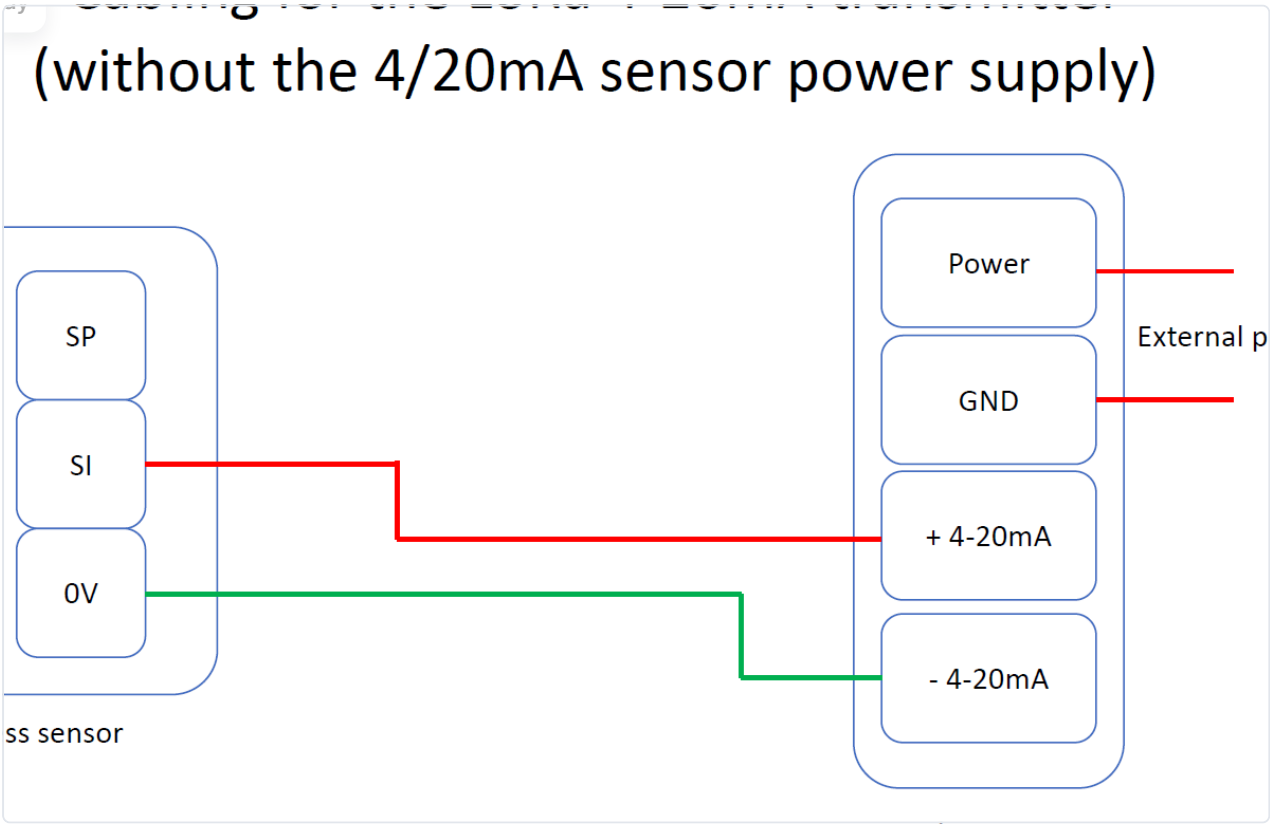
The calculation formula above is a calculation of consumption in Watt-hour (Wh). To get a value in Kilowatt-hour (kWh), you just need to divide the value by 1,000

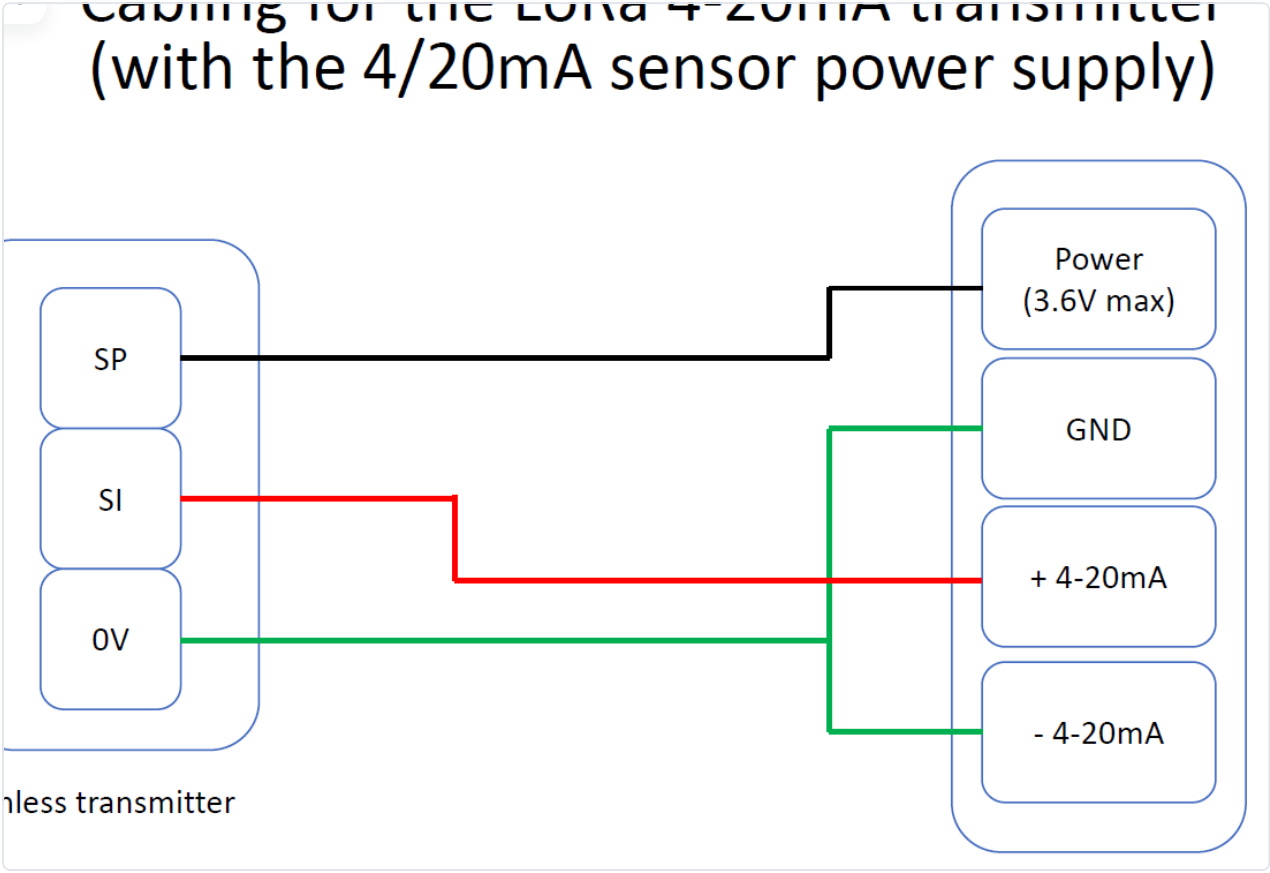
4/20mA probe wiring

Raccordement de votre sonde 4/20mA au transmetteur TX 4-20 600-035

The TX 4/20 transmitter is delivered without analog probe.

To connect your 4/20mA probe to the sensor, open the sensor housing and refer to the label located inside the transmitter under the terminal block for connection.





Powering your 4/20mA probe by the sensor is only possible if your probe can be powered with less than 3V.

Repeater installation

RX REPEATER 600-301

One or more sensors remain out of range of the receiver: you will have to install a repeater. **The repeater requires no configuration.**

Position your repeater

We recommend positioning your repeater halfway between the transmitters and the Modbus receiver. The repeater comes with a 1/4 wave antenna but you can also use a long range antenna to maximize the performance of the repeater. You can chain several repeaters together.

Power your repeater

Once positioned, power the repeater. The repeater can be powered either:

- By a 12V power box
- By a main power supply of 7.5 to 24VDC.

> Current characteristic for powering the repeater at 12Vdc: 1A max. Use only CE certified 12V power supply

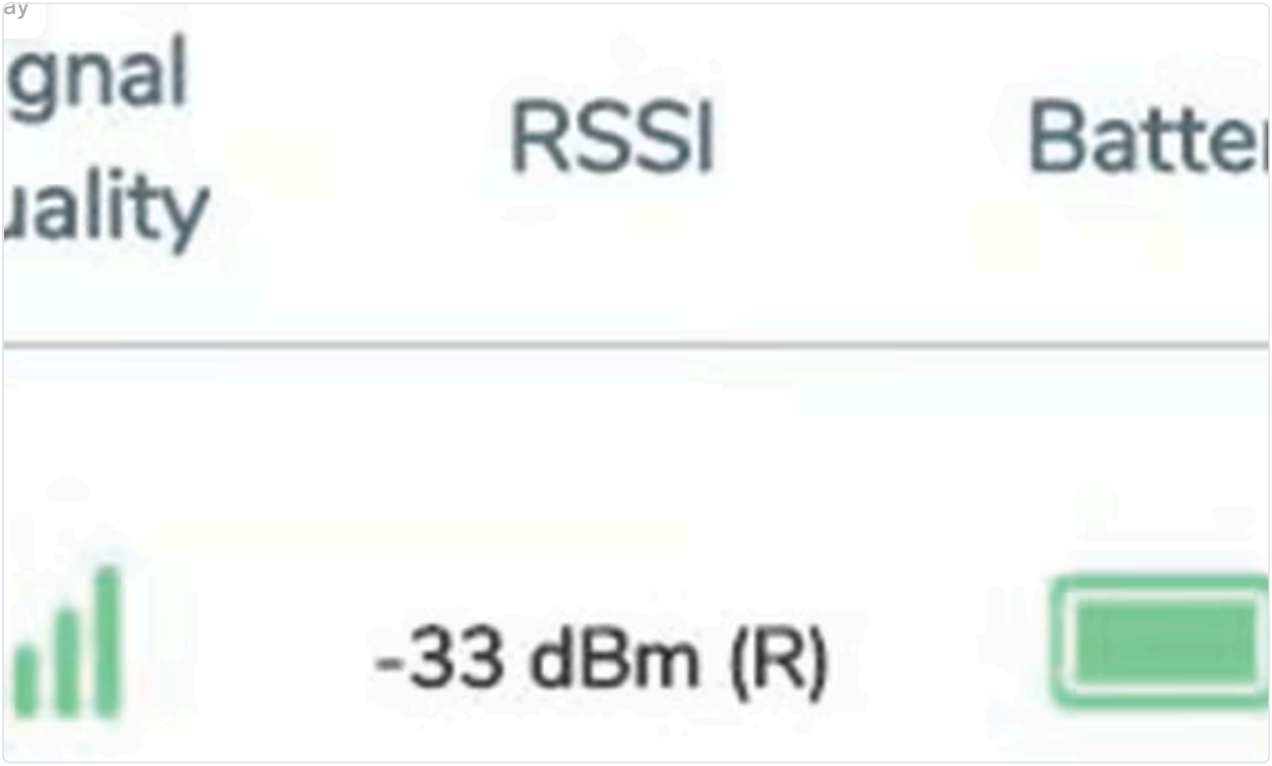
In both cases, the wires will be connected to the POWER terminal block of the repeater:

- Black wire connected to the 0V terminal block
- Red wire connected to the V+ terminal block

Meaning of the repeater LEDs

The repeater LED behavior is documented here

> On the configuration server, frames passing through a repeater indicate (R) next to the RSSI signal value.



RESET factory settings

RESET procedure to factory settings of products

Only products with a configuration server can be reset to factory settings. Reset procedure no. 1 is valid for the following products, procedure no. 2 only applies to the TX IO .

Below are the RESET procedures:

<details>
<summary>RESET procedure n°1</summary>

1. Power down the receiver
2. Set the rotary switch to position D
3. Power up the receiver and wait for **at least 45s**
4. Power down the receiver
5. Set the rotary switch back to position 0
6. Re-power the receiver and connect it in Ethernet to the PC
7. Check that the Ethernet settings on the PC are as follows:

   IP address: 192.168.77.2
   Subnet prefix length: 24
   Gateway: 192.168.77.1
   Preferred DNS: 8.8.8.8

8. Access the server from your browser at 192.168.77.77
</details>

<details>
<summary>RESET procedure n°2 (TX IO)</summary>

1. Press the push button until LEDs L1 and L2 light up (15s)
2. Release the push button and wait **at least 45 seconds**
3. Restart the product electrically (turn off the power, then re-power)
4. Access the server from your browser at the address 192.168.77.77
</details>

Wiring diagrams

RX MODBUS 500-302

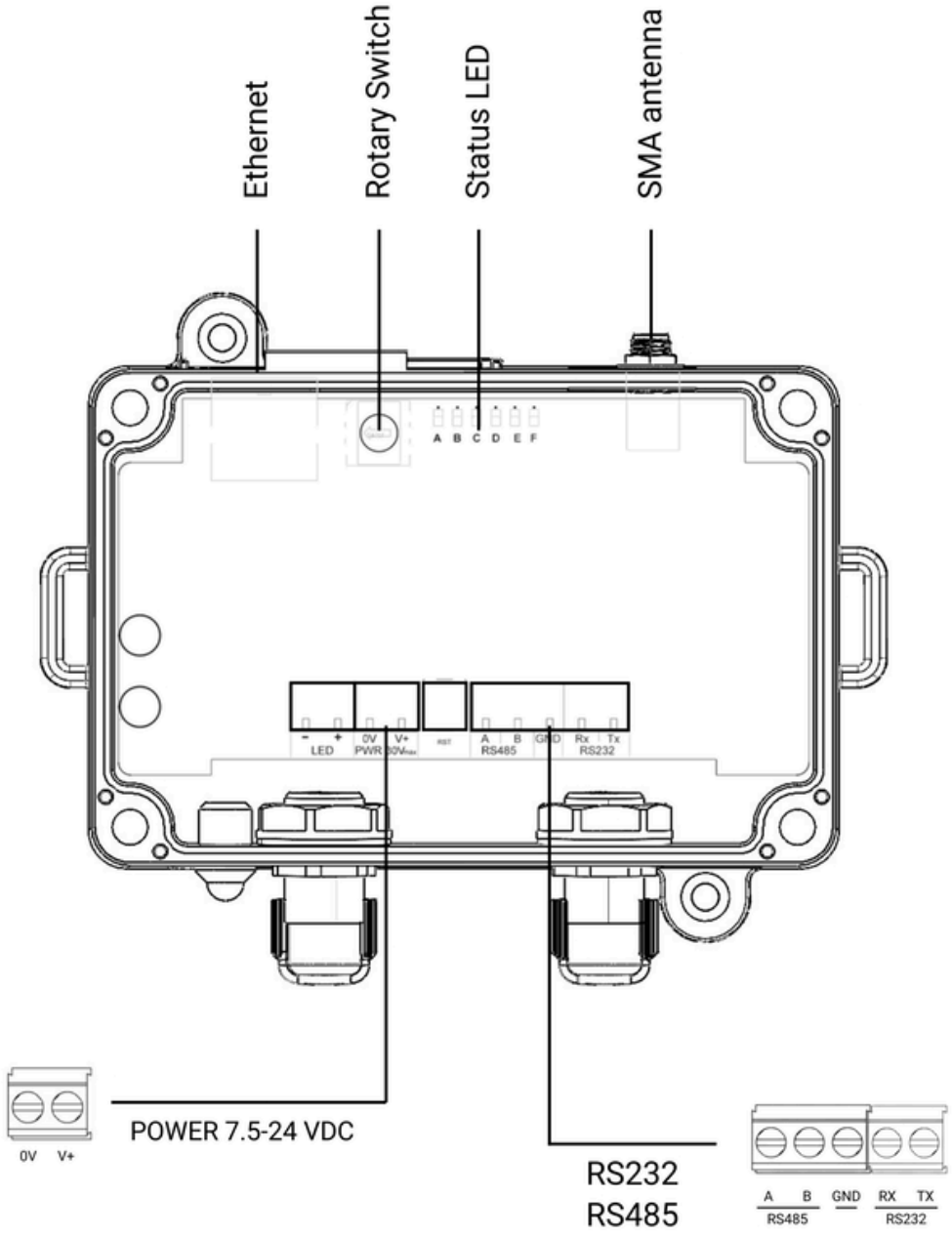
RX BACNET 500-312

TX IO 600-040

TX MODBUS 600-041

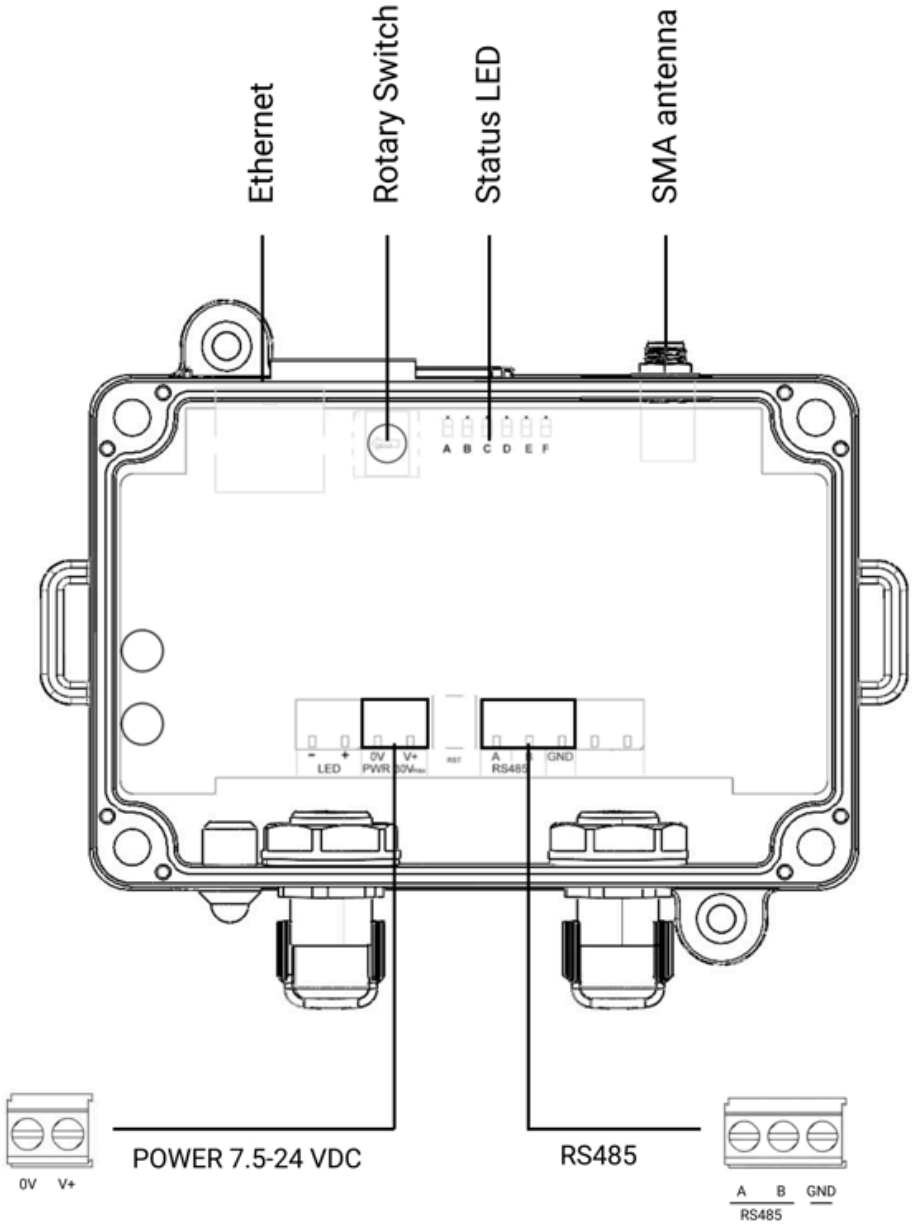
RX MODBUS 500-302

RX MODBUS 500-302 Wiring Diagram



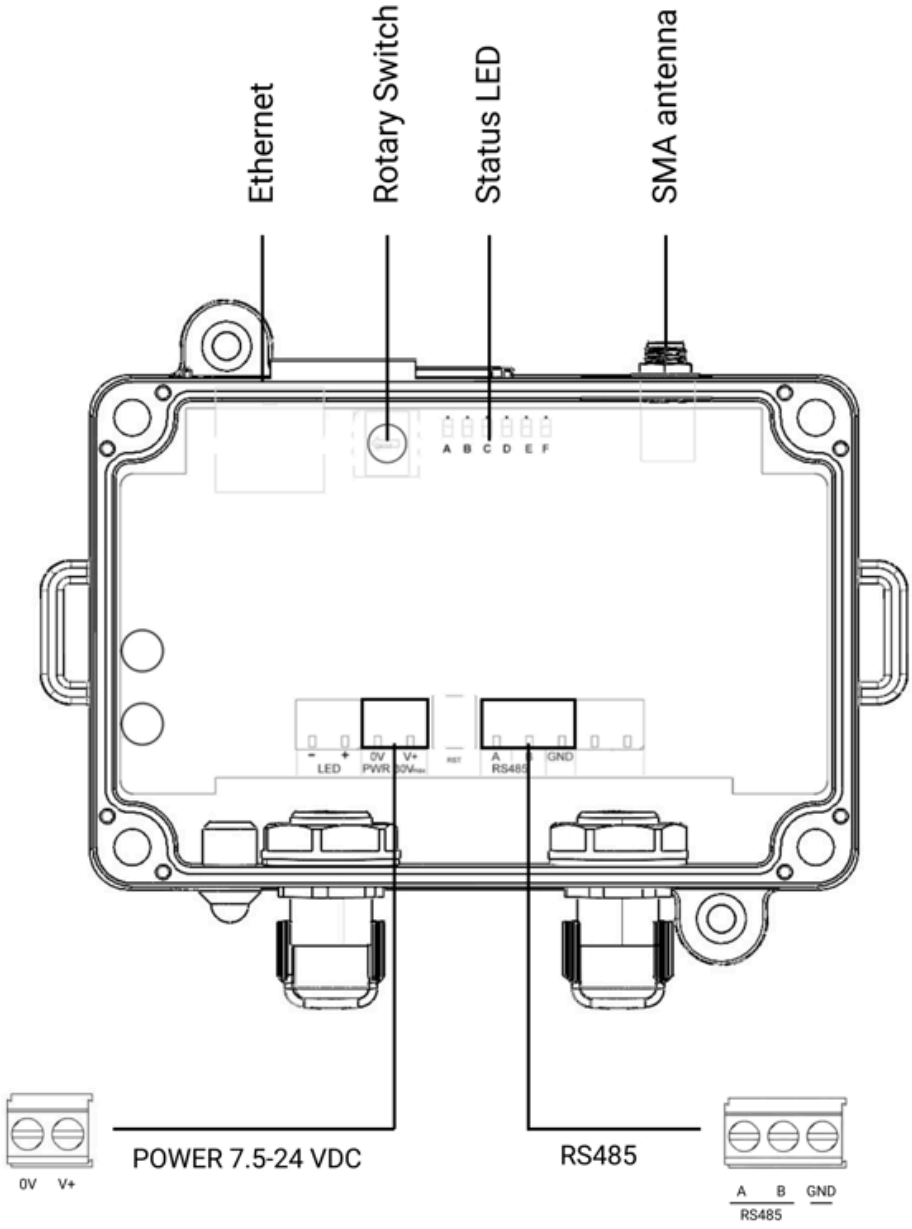
RX BACNET 500-312

RX BACNET 500-312 Wiring Diagram



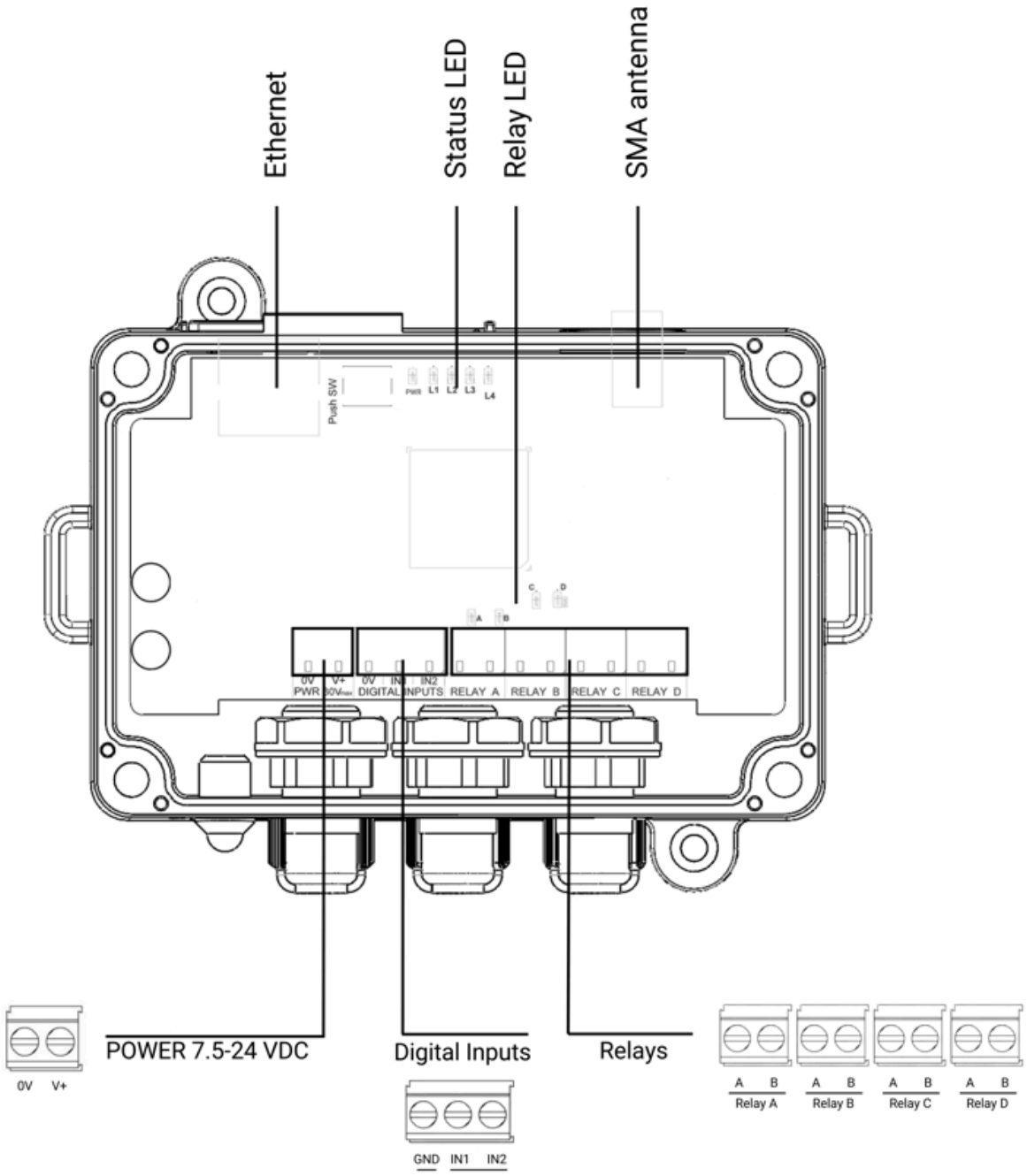
TX MODBUS 600-041

TX MODBUS 600-041 Wiring Diagram



TX IO 600-040

TX IO 600-040 Wiring Diagram



Autonomy of batteries

Battery autonomy based on transmission periodicities

Battery autonomy is given by the link below:

https://enless-wireless.com/battery-life-calculations/ ↗

⚠ Product storage before use = 6 months maximum

Battery replacement

Below is a table showing the battery reference to use for each sensor.

Type	Battery C	Battery D	Battery D	Battery D
Sensor	1000-028 (ER26500)	1000-029 (ER34615)	1000-030 (ER34615)	1000-031 (ER34615)
TX T&H AMB 600-021/600-121	X			
TX COV T&H AMB 600-022	X			
TX CO2 VOC T&H AMB 600-023/600-123			X	
TX TEMP INS 600-031/600-131				X
TX TEMP CONT1 600-032/600-132				X
TX TEMP CONT2 600-232/600-332				X
TX T&H EXT 600-034/600-134				X
TX 4/20 600-035/600-135				X

TX PULSE 600-036/600-136				X
TX PULSE ATEX 600-037		X		
TX PULSE LED 600-038/600-138				X
TX CONTACT 600-039/600-139				X

⚠ Risk of explosion if sensor batteries are replaced with an incorrect reference.

Battery replacement procedure

Ambient sensors

1. Disconnect the Molex connector of the used battery from the PCB connector
2. Remove the used battery from its slot
3. Insert the new battery in the slot
4. Reconnect the new battery Molex connector to the PCB connector
5. The sensor restarts.

Rugged sensors

1. Disconnect the used battery Molex connector from the PCB connector
2. Unscrew the screws on the battery clip
3. Remove the battery clip

4. Remove the used battery from its slot
5. Insert the new battery in the slot
6. Replace the battery clip
7. Secure the battery clip with the two screws provided
8. Reconnect the new battery Molex connector to the PCB connector
9. The sensor restarts.

⚠ Do not throw the battery into the fire.

Do not short-circuit the battery.

Do not crush the battery.

CE declaration

PDF
111KB

DT 39 - CE DECLARATION OF CONFORMITY.pdf
pdf

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