IoT M2M

ENERGY EFFICIENCY

))) **Enless Wireless**
M2M & IoT Wireless Expert

SET UP GUIDE

LORA / LORAWAN PRODUCTS

IG FR INSTALL-LORA-i

LoRa LoRaWAN™

Guide for configuring and installating LoRa / LoRaWAN products

FOR MORE INFORMATION CONTACT US

+33 (0)5 56 35 97 47 **:TEL**
contact@enless.fr **:EMAIL**

www.enless-wireless.com

PRODUCTS COVERED

Enless Wireless
M2M & IoT Wireless Expert

AMBIENT TRANSMITTERS

- TX T&H AMB 600-021
- TX VOC / T&H AMB 600-022
- TX CO2 / VOC / T&H AMB 600-023

TEMPERATURE TRANSMITTERS

- TX TEMP INS 600-031
- TX TEMP CONT1 600-032
- TX TEMP CONT2 600-232
- TX T&H 600-034

SMART METERING TRANSMITTERS

- TX PULSE 600-036
- TX PULSE ATEX 600-037
- TX PULSE LED 600-038

ANALOGUE AND CONTACT TRANSMITTERS

- TX 4/20mA 600-035
- TX CONTACT 600-039

REPEATER

- RX REPEATER 600-301

RECEIVERS

- RX MODBUS 500-302
- RX BACNET 500-312

SUMMARY

PRODUCT DESCRIPTION

TECHNICAL REMINDER REGARDING THE USE OF LORA/LORAWAN PRODUCTS

USE IN LORA PROPRIETARY PRIVATE MODE

1. WITH THE MODBUS RECEIVER

2. WITH THE BACNET RECEIVER

USE IN LORAWAN MODE

APPENDICES (PAGE 29)

PRODUCT DESCRIPTION

AMBIENT TRANSMITTERS

Références
• TX T&H AMB 600-021
• TX VOC / T&H AMB 600-022
• TX CO2 / VOC / T&H AMB 600-023
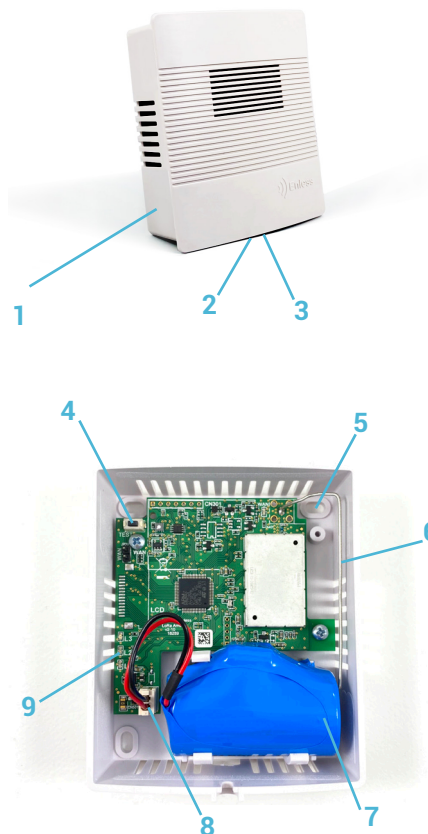
Weight
125g

Battery
C type 3.6V Lithium
(600-021 & 600-022)
D type 3.6V Lithium
(600-023)

Transmission power
25mW

ID
DEVEUI (LoRaWAN) /
LoRa ID (LoRa proprietary)

LoRa LoRaWAN™

CASING CLOSED

1) ID label
2) Hood closing screw
3) Closing tab for housing

CASING OPENED

4) Push button to test the sending of data frames
5) Hole for wall fixing
6) Antenna
7) Replaceable battery
8) Connector for battery plug
9) LED lights (L1, L2, L3)

TEMPERATURE TRANSMITTERS

References
• TX TEMP INS 600-031
• TX TEMP CONT1 600-032
• TX TEMP CONT2 600-232
• TX T&H EXT 600-034

Weight
196g

Battery
D type 3.6V Lithium

Transmission power
25mW
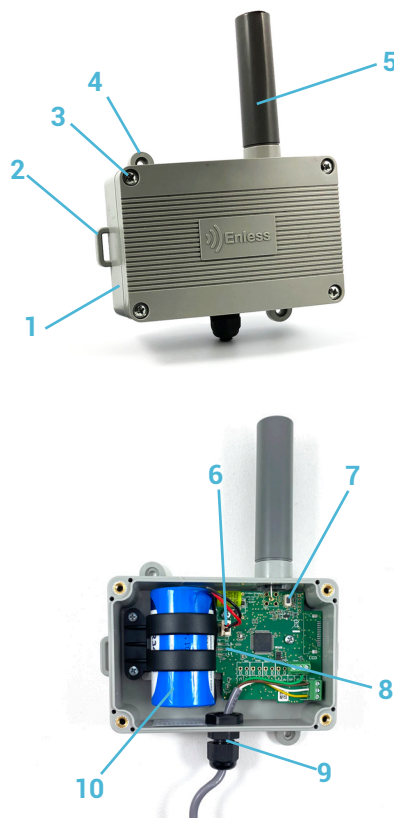
ID
DEVEUI (LoRaWAN) /
LoRa ID (LoRa proprietary)

LoRa LoRaWAN™

CASING CLOSED

1) ID label
2) Loop for fixing collar
3) Hood closing screw
4) Hole for wall fixing
5) Antenna

CASING OPENED

6) Connector for battery plug
7) Push button to test the sending of data frames
8) LED lights (L1, L2, L3)
9) Cable gland for contact and external probes (temperature / humidity)
10) Replaceable battery

PRODUCT DESCRIPTION

CASING CLOSED

1) ID label
2) Loop for fixing collar
3) Hood closing screw
4) Hole for wall fixing
5) Antenna
6) Meter connection cable / contact cable
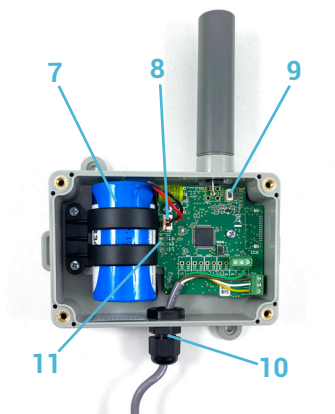
CASING OPENED

7) Switchable battery
Replaceable batteries can be supplied by Enless Wireless (contact@enless.fr)
Warning : There is a risk of explosion if the replacement battery is incorrect, so please do not hesitate to contact us. Dispose of used batteries according to the instructions.
8) Connector for battery plug
9) Push button to test the sending of data frames
10) Cable gland for meter and contact connection cables
11) LED lights (L1, L2, L3)

CASING CLOSED

1) ID label
2) Loop for fixing collar
3) Hood closing screw
4) Hole for wall fixing
5) Antenna

CASING OPENED

6) Replaceable battery
7) Connector for battery plug
8) Push button to test the sending of data frames
9) Cable gland for analogue probe 4/20mA
10) LED lights (L1, L2, L3)

RECEIVERS

References
• RX MODBUS 500-302
• RX BACNET 500-312

Weight
196g

Power supply
from 7.5 to 24Vdc

Serial number
8 numbers under the barcode

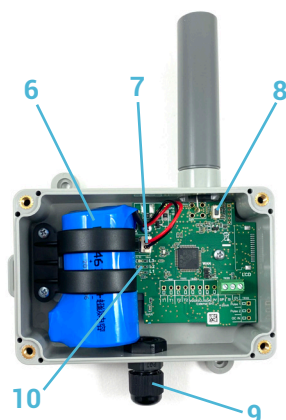**ID**
DEVEUI (LoRaWAN) /
LoRa ID (LoRa proprietary)
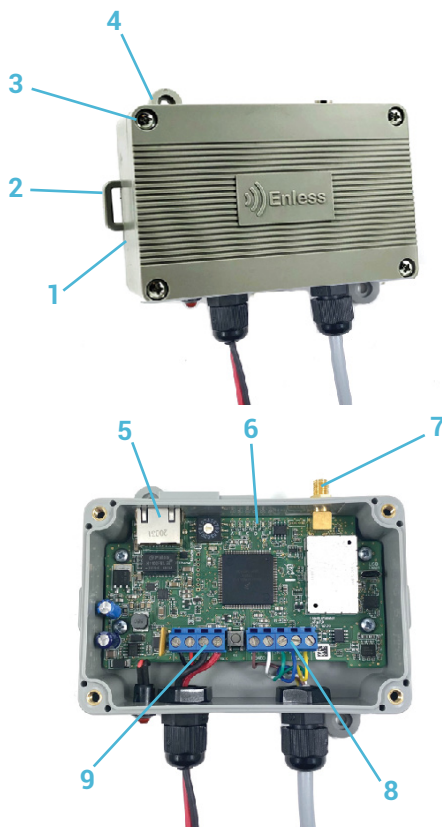
CASING CLOSED

1) ID label
2) Loop for fixing collar
3) Hood closing screw
4) Hole for wall fixing

CASING OPENED

5) Ethernet connector for access to embedded IP server and communication via Modbus IP or BACnet IP
6) LED lights (A,B,C,D,E,F)
7) SMA connector for antenna
8) Communication cable terminal block (RS232/RS485)
9) Power supply terminal block

REPEATER

Reference
• RX REPEATER 600-301

Weight
196g

Power supply
from 7.5 to 24Vdc

Transmission power
25mW

ID
8 numbers under the barcode

CASING CLOSED

1) ID label
2) Loop for fixing collar
3) Hood closing screw
4) Hole for wall fixing
5) Antenna

CASING OPENED

6) Ethernet cable (only for firmware update)
7) LED lights (A,B,C,D,E,F)
8) SMA connector for antenna
9) Power supply cable gland

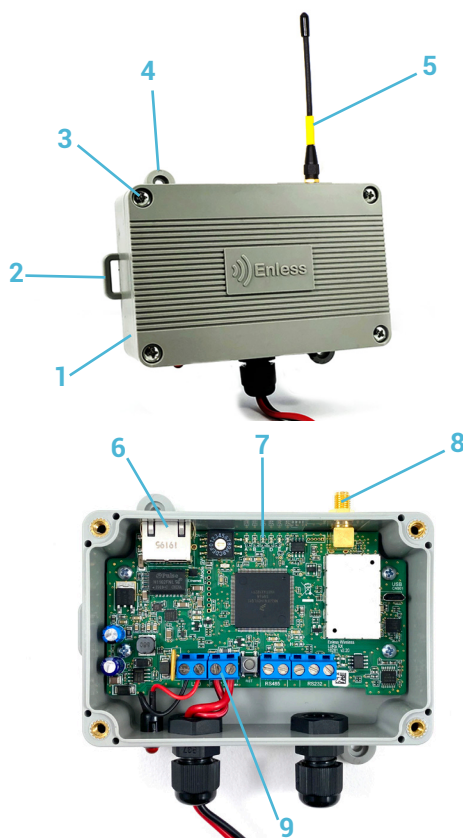# TECHNICAL REMINDER REGARDING THE USE OF LoRa PROPRIETARY/ LoRaWAN PRODUCTS

Our transmitters integrate both LoRa private proprietary Enless and LoRaWAN modes.

Here, we explain the differences between these two communication protocols.

> 💡 **Select the communication mode using the jumper supplied and located on the electronic card of the transmitters. See Appendix #1**

LoRa 100% Enless proprietary private mode

The transmitters communicate with a receiver (either Modbus or BACnet).

When used with the Modbus receiver, the transmitters send their information to the receiver. The receiver collects the information from the transmitters in its Modbus table. It is then connected to a PLC via Modbus RTU RS232 / RS485 or to an IP network.

When used with the BACnet receiver, the receiver can be connected to the BACnet network or to the PLC in several modes (BACnet IP / BACnet MSTP).
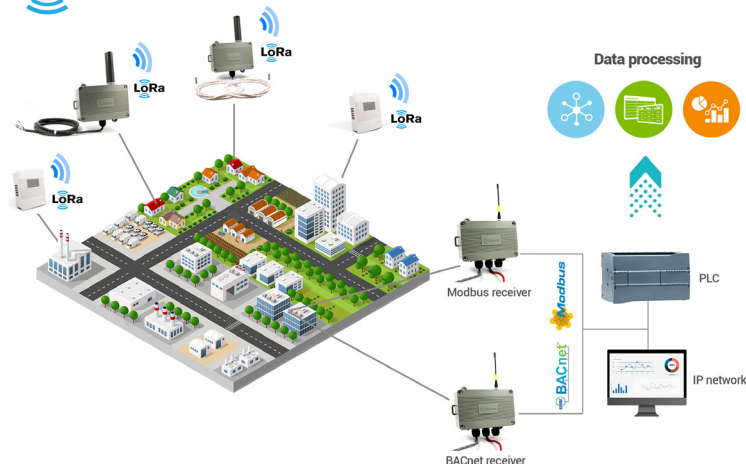
LoRaWAN operated and private modes

Operated mode : The transmitters are positioned in an area covered by a LoRaWAN operator's network. They are provided with a subscription from that operator. They send their information directly to the operator's cloud.
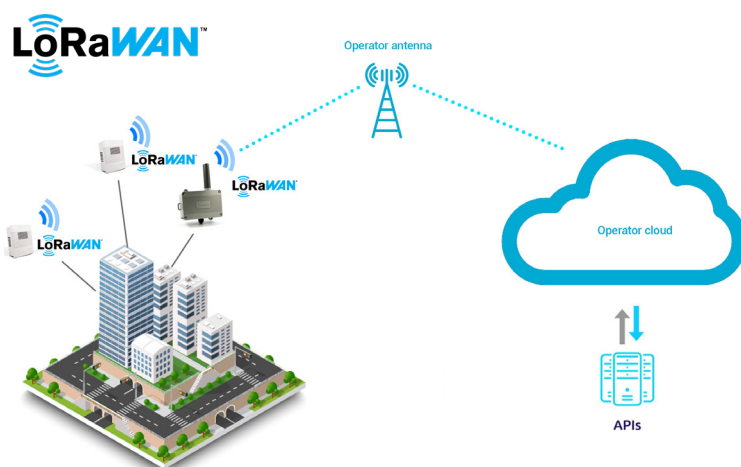
Private mode : The transmitters communicate to a LoRaWAN gateway based on the principle of a private network. The LoRaWAN gateway usually pushes information to a server.
NB : Enless Wireless does not supply the LoRaWAN gateway.
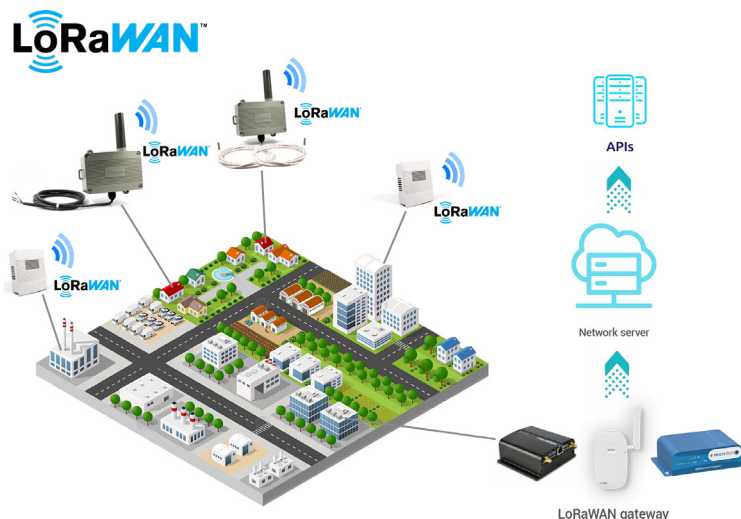
USE IN LORA PROPRIETARY PRIVATE MODE
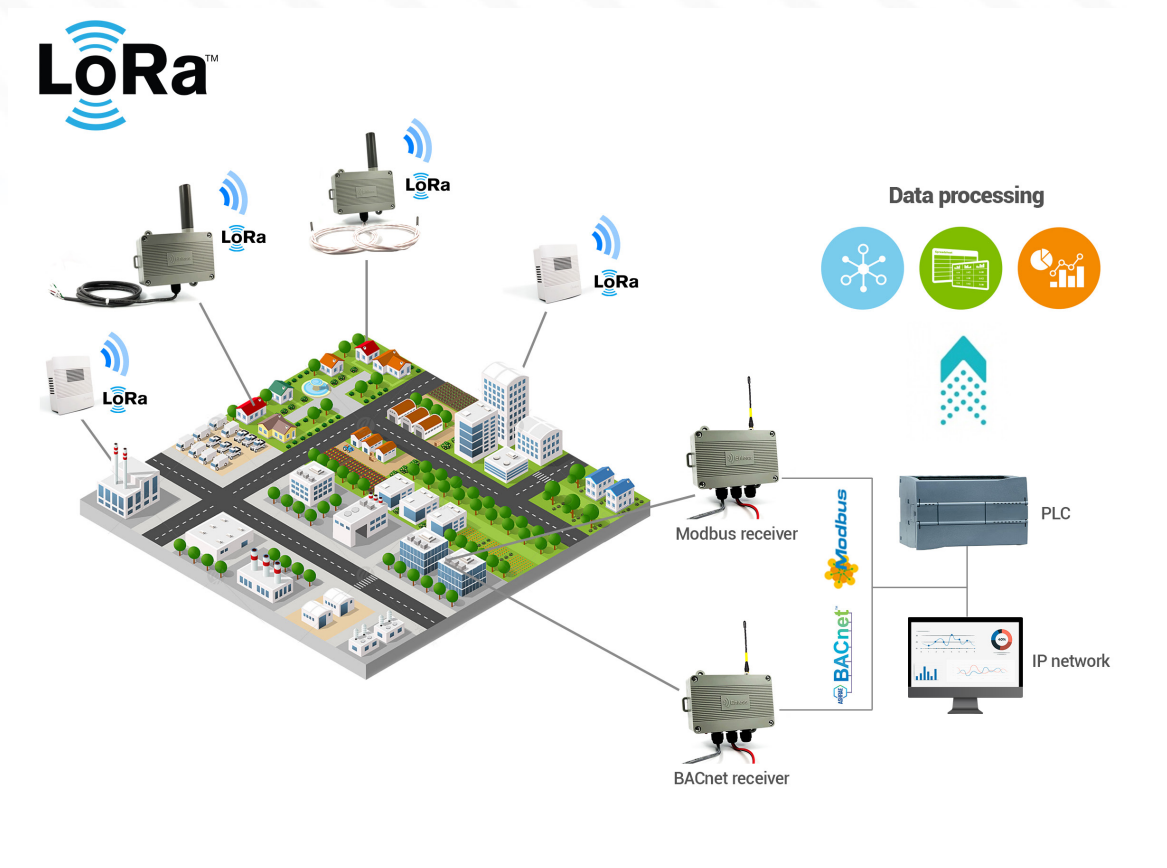
CONFIGURATION OF ETHERNET PARAMETERS ON YOUR PC
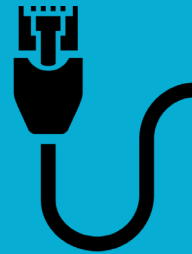
On your PC, enter the IP address of the configuration server.

Access path :
Settings/ Network and internet/ Ethernet/ Change adapter options/ Ethernet/ Properties/ Internet Protocol version 4 (TCP/Ipv4)
Use the following IP address:
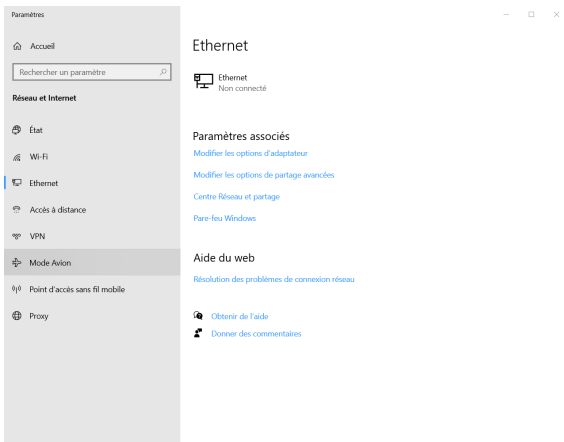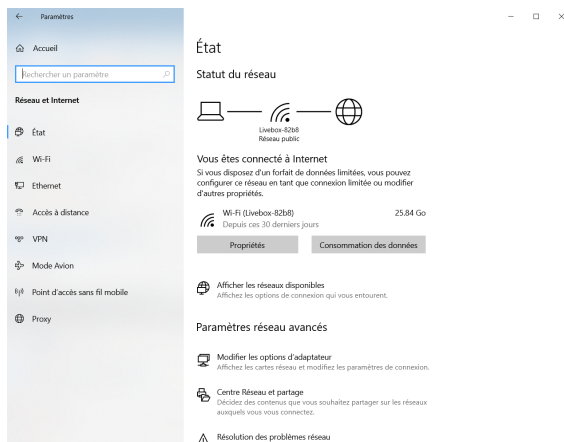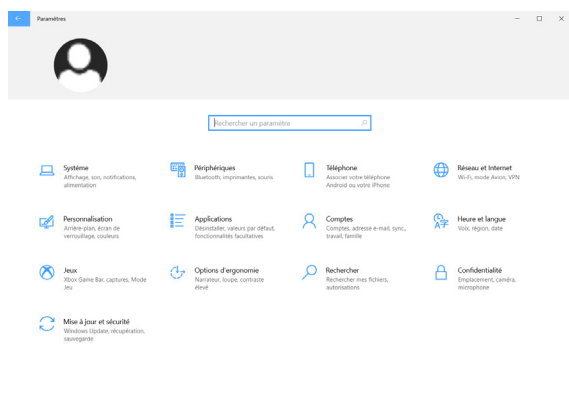
Enter the parameters below :

IP address : 192.168.77.2

Default gateway : 192.168.77.1

Once these parameters have been entered, the configuration IP server is accessible from your browser.

Externally power the receiver

It is imperative that you supply external power to your receiver during the configuration phase.

Power supply is possible from 7.5 to 24V.

We recommend that you use our 12V power box (Ref.: POWER 1000-002).

Connect your power supply to the receiver's POWER terminal.

• **Black wire** connected to **0V terminal**
• **Red wire** connected to **V+ terminal**

Connect the receiver to the PC

The receiver is supplied without a RJ45 Ethernet cable.

You will need a RJ45 cable to continue the product installation.

Connect the RJ45 cable to your receiver port and also to the Ethernet jack on your PC.

RJ45 Ethernet
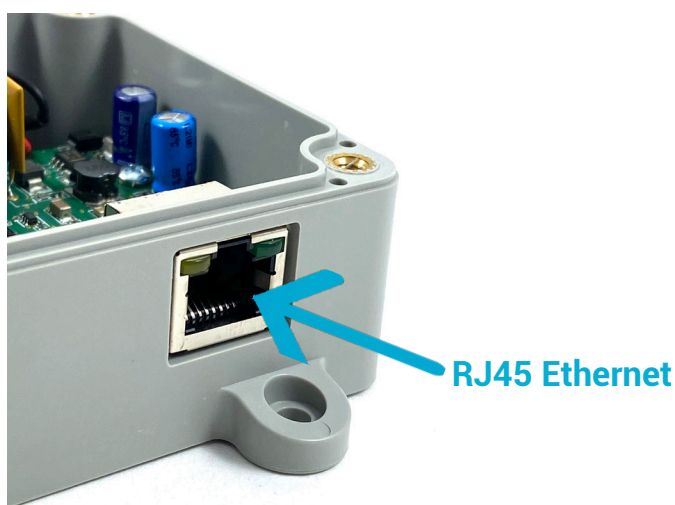
Validate the operation of the receiver LEDs

LEDs inside the casing :

LA Flash	The receiver receives a message.
LB Flash	The receiver transmits a message.
LC ON	The receiver is properly powered.

LEDs outside the casing :

External LED flashes every minute	The receiver is fully operational.
Ethernet LED Flashes	The receiver connects to the Ethernet network.
Ethernet LED Flashes	The receiver sends information to the Ethernet network.

Connect the long-range antenna to the receiver

Remember to connect the long-range antenna (Ref : ANT REN SMA LR 868MHz 1000-008) to the receiver SMA connector.

Access to the IP configuration server

From your browser, enter the following address : **192.168.77.77**

Access the IP server interface.

USE IN LORA PRIVATE MODE
WITH THE MODBUS RECEIVER

Getting started

Before starting the configuration of LoRa devices, you will need to check that your computer recognises the receiver configuration IP server address.

The configuration of Ethernet parameters is explained on page 9.

It is from this server that you will configure the products.

Requirements checklist

☑ Transmitters and receiver to install

☑ Long range antenna for the receiver

☑ Cross head screwdriver

☑ RJ45 Ethernet cable

Installation steps

Configuring and installing the transmitters

On the IP server, declare your transmitters and apply their configuration settings.
Power the transmitters and confirm that they have taken their configuration settings.

Receiver configuration

Set the receiver communication settings.

Validate the Modbus table

Vew the Modbus table registers in which the transmitters information appear.

Connect your receiver

Connect your receiver to the PLC in Modbus RS232 / RS485 or over IP.

DESCRIPTION OF THE MODBUS RECEIVER CONFIGURATION SERVER INTERFACE

01. « TX CONFIG » TAB

Tab for declaring and configuring the sensors that will be associated with the receiver. You can configure the following parameters:

- Periodicity of transmission
- Alarm thresholds
- Remote configuration function

02. « RX CONFIG » TAB

Receiver communication parameters configuration tab. Set the RTU or IP communication settings of your receiver.

03. « NETWORK » TAB

Tab for viewing the frames sent by the transmitters. You can evaluate the RSSI signal levels of your sensors and control the correct reception of the data.

04. « MODBUS » TAB

Tab for viewing the Modbus table of the receiver. The registers to be addressed to collect information from our transmitters are displayed.

CONFIGURATION OF TRANSMITTERS

You must declare the transmitters you want to pair to the receiver.

Go to the « TX CONFIG » tab

To declare a sensor, click the following button **+ Add Sensor**

Fill in the configuration information.

Choose the type of transmitter

Enter the transmitter location (eg : office)

Enter the LoRa ID (available on the product label)

Choose the periodicity of data transmission

Bring up the additional options
The advanced functionalities are explained in appendix #10 of this document

Save settings button

Repeat for all sensors to be configured.

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

You can resume the configuration of a transmitter at any time or delete it using the following buttons highlighted in the red box.

The configuration phase is completed, we can now proceed to the transmitter activation.

Check that the transmitters are in LoRa proprietary mode

Confirm that the jumper of each transmitter is properly positioned in LoRa proprietary mode on the electronic board (see Appendix #1).
If not, please position the jumpers correctly before proceeding with product

Activate the first transmitter
(to be chosen)

Connect the battery of one of your transmitters and validate its LED set (see next paragraph).

Validate the LED set of your transmitter

Step 1 : starting the transmitter

L1 L2 L3 flash successively

Step 2 : the transmitter tries to dialogue with the receiver

L1	L2	L3
Flashes every 5s	Flashes when the transmitter sends a message	Flashes when the receiver answers

Step 3 : installation status

	L1	L2	L3
Failure	ON during 30sec	OFF	OFF
Success Low signal	OFF	ON during 30sec	OFF
Success Good signal	OFF	OFF	ON during 30sec

Step 4 : regular mode

L1	L2	L3
Flashes every 1min when an alert threshold is exceeded	Flashes for each data frame sent	Flashes every 1min

Repeat for all other transmitters.

Validate the activation of transmitters from the server

In the « TX CONFIG » tab, refresh your browser page.

A validation pad should appear in front of the transmitters you have just activated **(see screenshot below).**

Wait a few moments and refresh your page again if the pad does not appear.

CONFIRM RECEPTION OF TRANSMITTERS INFORMATION

In the « **NETWORK** » tab, the frames of the transmitters that you have just supplied must appear according to the periodicity that has been configured.

This tab allows you to validate the correct reception of the frames of the transmitters.

We recommend that you use this page as an on-site audit tool to validate that the RSSI signal levels for transmitter data reception are good.

Position the transmitters where they will be installed on site.

You have the option to force sending test frames via the push button on the electronic boards of the transmitters (see below).

LED L2 (orange) flashes when you push the button. This confirms a frame has successfully been sent from the transmitter.

By controlling the RSSI signal levels, you can determine if repeaters need to be installed.

Up to -105 dBm
Good signal

From -106 to -112 dBm
Signal ok

Above -112 dBm
Low signal -
(installation of a repeater required)

The procedure for installing repeaters is explained in Appendix #6.

Positioning and connections for the sensors

Please refer to the Appendices for more details on installing our sensors:

- Positioning and attaching the equipment
- Sensor connections
- Calibrating the CO2 sensor

CONFIGURE YOUR RECEIVER AND VIEW THE MODBUS TABLE
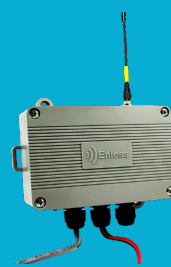
Set up your receiver

Go to the « RX CONFIG » tab and fill in the receiver configuration parameters.

The receiver can communicate in Modbus IP and Modbus RTU RS232 / RS485 simultaneously.
The communication in Modbus IP is continuously activated.
The configuration settings below are mainly related to RTU communication.
For IP settings, please click on the advanced settings button.

Modbus ID of the receiver
First register from which the information of the transmitters will increase in the Modbus table

Choose the receiver communication interface:
- **RS232**
- **RS485**

IP settings for communication in Modbus IP.

Match the receiver communication parameters with those of your PLC.

View the Modbus table

Click on the « **MODBUS** » tab.

When you select a transmitter on the left side of the screen, the registers in which its information appears are displayed in the Modbus Table.

You can save this Modbus table with the following button « **Download** »

The configuration is complete.

You can disconnect your receiver from its power supply and from the Ethernet port of the PC.

Connection of the receiver

RS232 RTU connection to the PLC

Receiver terminal block	Description	Connection to the PLC
Tx	Transmission output	Rx
Rx	Reception input	Tx
GND	GND signal	GND signal

RS485 RTU connection to the PLC

Receiver terminal block	Description	Connection to the PLC
A	RS485 - A	RS485 - A
B	RS485 - B	RS485 - B
GND	GND signal	GND signal

IP connection

Connect the receiver over IP via the Ethernet connector.

RJ45 Ethernet
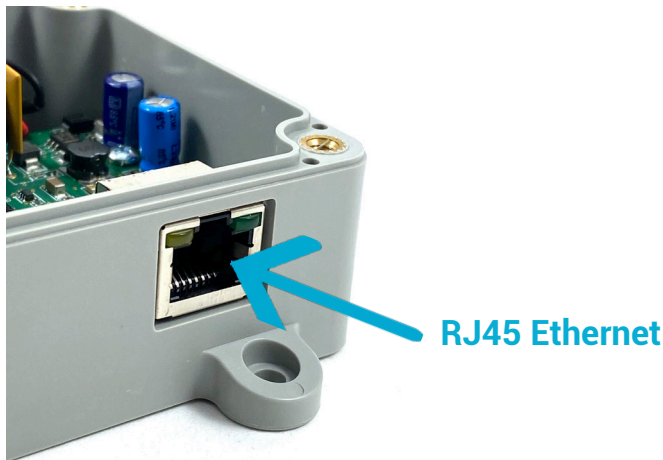
> ⚠ ***** Only receivers with a firmware version later than or equal to **V1.01.07** have an Modbus IP interface *(check the label on the receiver)*

Power supply to the receiver

The Modbus receiver can be powered either :
• by an Enless 12V power supply Ref : POWER 1000-002 - Recommended
• by a 7.5 to 24V main power supply.

Electrical power characteristic for 12Vdc receiver power supply : 1A max
Use only CE certified 12V power supply.

In both cases, the wires will be connected to the POWER terminal block of the Modbus receiver.

• **Black wire** connected to **0V terminal**
• **Red wire** connected to **V+ terminal**

LED combinations of the receiver

Please refer to the LED combinations of the Modbus receiver.

LEDs inside the casing :

LA Flash	The receiver got a message.
LB Flash	The receiver transmitted a message.
LC ON	The receiver is properly powered.
LD Flash	Communication message transmitted.
LE Flash	Communication message received.
LF OFF	Functionality not defined.

LEDs outside the casing :

External LED flashes every minute	The receiver is fully operational.

The Modbus receiver is operational.
It receives data from all the transmitters associated with it.

USE IN LORA PRIVATE MODE

WITH THE BACNET RECEIVER

The BACnet receiver meets the B-ASC profile.

The BACnet receiver can be used in 4 different modes:

1. BACnet over IP
2. BACnet MSTP
3. BACnet MSTP with BBMD
4. Both BACnet IP and BACnet MSTP

The different possible modes of use and the BiBBs supported by the BACnet receiver are documented in **Appendices #8 and #9.**

Getting started

You must access the BACnet receiver configuration IP server in order to select the receiver operating mode (see above).

Access to the configuration server is explained on pages 9 and 10 of this document.

Requirements checklist

☑ Transmitters and receiver to install

☑ Long range antenna for the receiver

☑ Cross-headed screwdriver

☑ RJ45 Ethernet Cable

Setting the discover mode

From the receiver configuration interface, you will be able to select the discover mode of the receiver (Device mode or Object mode).

- In Device mode, only the transmitters that you have paired with the receiver will display their BACnet objects during the discover

- In Object mode, all BACnet objects that may be contained in the receiver will be displayed during the discover

Communication protocol setup

Also from the configuration interface of the receiver you have to determine the communication protocol of the BACnet receiver:
- IP only
- MSTP only
- IP and MSTP simultaneously
- MSTP with BBMD

Configuring the transmitters

The transmitters can be configured from the TX CONFIG page of the receiver server.
Once the sensors have been declared and powered, you can validate from the configuration server that the data has been received.

DESCRIPTION OF THE BACNET RECEIVER CONFIGURATION SERVER INTERFACE

01. « TX CONFIG » TAB

Tab for declaring and configuring the sensors that will be associated with the receiver. You can configure the following parameters:

- Periodicity of transmission
- Alarm thresholds
- Remote configuration function

02. « RX CONFIG » TAB

Receiver communication parameters configuration tab. For MSTP use you can configure the communication settings of the receiver. The configuration of IP settings is also available.

03. « NETWORK » TAB

Tab for viewing the frames sent by the transmitters. You can evaluate the RSSI signal levels of your sensors and control the correct reception of the data.

PRODUCT CONFIGURATION ON THE BACNET RECEIVER

As mentioned earlier, the receiver can be used in two discover modes:

- In Device mode, only the transmitters that you have paired with the receiver will display their BACnet objects during the discover
- In Object mode, all BACnet objects that may be contained in the receiver will be displayed during the discover

On the following pages we will show you how the receiver works in these two modes.

Determine the Discover mode and the communication protocol of the receiver

These parameters are configured from the « **RX CONFIG** » interface of the server. As a reminder, access to the configuration server is explained on **pages 9 and 10** of this do-

Select the desired configuration settings and save the changes.

When switching from **Device mode** to **Object mode** (or the other way around), please click on the REBOOT button in the ADMIN tab of the RX CONFIG page for the change to take effect.

Configuration of the transmitters on the configuration server

You must declare the transmitters you wish to pair with the receiver. Select the « **TX CONFIG** » tab. To declare a sensor, click on the button **+ Add Sensor** Fill in the configuration information.

Choose the type of sensor

Indicate the location of the sensor (e.g. office)

Fill in the LoRa ID (provided on the transmitter label)

Choose the periodicity of transmission

Bring up the additional options
The advanced functionalities are explained in appendix #10 of this document

Save settings button

Repeat for all sensors to be configured.

The configuration phase is complete, we can move on to activating the transmitters.

PRODUCT CONFIGURATION ON THE BACNET RECEIVER
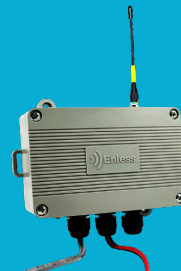
Sensor power supply

Check that the transmitters are in LoRa mode

Confirm that the jumper of each transmitter is properly positioned in LoRa mode on the electronic board (see appendix #1). If not, please position the jumpers correctly before proceeding to product activation.

Activate the first transmitter (to be chosen)

Connect the battery of one of your transmitters and validate its LED set (see next paragraph).

Validate the LED set of your transmitter

Step 1 : starting the transmitter

L1 L2 L3 flashes successively

Step 2 : the transmitter tries to dialogue with the receiver

L1	L2	L3
Flashes every 5s	Flashes when the transmitter sends a message	Flashes when the receiver answers

Step 3 : installation status

	L1	L2	L3
Failure	ON during 30sec	OFF	OFF
Success Low signal	OFF	ON during 30sec	OFF
Success Good signal	OFF	OFF	ON during 30sec

Step 4 : regular mode

L1	L2	L3
Flashes every 1min when an alert threshold is exceeded	Flashes for each data frame sent	Flashes every 1min

Repeat for all other transmitters.

Validate the activation of transmitters from the server

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

A validation pad should appear in front of the transmitters you have just activated (see screenshot below).

Wait a few moments and refresh your page again if the pad does not appear.

PRODUCT CONFIGURATION ON THE BACNET RECEIVER

Validate the data reception of the transmitters

In the **« NETWORK »** tab, the frames of the transmitters that you have just supplied must appear according to the periodicity that has been configured.

This tab allows you to validate the correct reception of the frames of the transmitters.

We recommend that you use this page as an on-site audit tool to validate that the RSSI signal levels for transmitter data reception are good.

Position the transmitters where they will be installed on site.

You have the option to force sending test frames via the push button on the electronic boards of the transmitters (see below).

LED L2 (orange) flashes when you push the button. This confirms a frame has successfully been sent from the transmitter.

By controlling the RSSI signal levels, you can determine if repeaters need to be installed.

Up to -105 dBm
Good signal

From -106 to -112 dBm
Signal ok

Above -112 dBm
Low signal -
(installation of a repeater required)

The procedure for installing repeaters is explained in Appendix #6.

Positioning and connections for the sensors

Refer to the Appendices for more details on installing our sensors:

- Positioning and attaching the equipment
- Sensor connections
- Calibrating the CO2 sensor

EXAMPLES OF DISCOVER IN DEVICE MODE OR OBJECT MODE
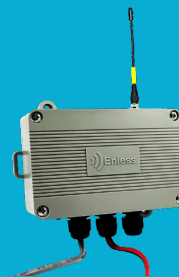
Once you have completed the configuration of the receiver and it is connected to your BACnet network according to the chosen communication protocol, you can initiate the discovery of BACnet objects.

Below is an example of the feedback from BACnet objects depending on the selected mode.

Device mode

Only the BACnet objects of the sensors previously declared on the configuration server are returned.

In blue BACnet objects related to the receiver
In green BACnet objects related to two sensors previously declared on the configuration server

Object mode

All BACnet objects that can be contained in the receiver are displayed.

USE IN LORAWAN MODE

Operator antenna

Operator cloud

APIs

APIs

Network server

LoRaWAN gateway

USE IN LORAWAN MODE

Getting started

Before you start using our transmitters in LoRaWAN mode, you must first have positioned the jumper (supplied with each product) on the electronic board of your transmitters.

See Appendix #1 for explanations.

Requirements checklist

☑ Subscriptions and cloud access from a LoRaWAN operator (if used in operated mode)

☑ LoRaWAN gateway (if use in private mode)

☑ Keys (DEV EUI, APP EUI, APP KEY) displayed on each transmitter label

As a reminder

The multiplicity of modes of use of our LoRaWAN transmitters (either in operator cloud mode or in private mode via gateways) makes it difficult to set up a standard installation procedure.

LoRaWAN sensor activation methods are specific to each LoRaWAN operator or gateway manufacturer. The installation of our sensors cannot therefore be standardised.

On the following pages, we will document the elements that will be necessary for you to declare and configure our transmitters, either in operated mode or in private mode.

Please refer to the procedures of the gateway operators or manufacturers for activating LoRaWAN transmitters on their hardware.

USE OF LORAWAN TRANSMITTERS

Declaration of the LoRaWAN transmitters

Our transmitters use the OTAA (Over The Air Activation) mode.

This mode uses a JOIN phase before being able to transmit on the LoRaWAN network.

For OTAA activation, we provide the codes below :

DEVEUI : Transmitter ID

APPEUI : Global application ID

APPKEY : Transmitter Application Key

These activation keys are available on the labels on the back of each transmitter but also by flashing the QR codes pasted on each transmitter.

Reminder on the LoRaWAN protocol

LoRaWAN technology is bi-directional and enables :

• Transmission of sensor frames to network (uplink)

• Transmission of information from the network to the sensor (downlink)

Our transmitters are operating under **Class A LoRaWAN.**

Class A allows transmitters to receive network information (downlink) by opening a listening window after each rising frame (uplink).

Activation of the transmitters

Once reported on a cloud or gateway, LoRaWAN transmitters must be powered to start communicating with the network.

1) Open the transmitter casing

2) Connect the transmitter battery

3) Validate the transmitter LED set
(see table on next page)

USE OF LORAWAN TRANSMITTERS

Validate the LED set of the transmitter

Transmitter Power Supply

L3 , **L2** , **L1** + **WAN**   flashing successively

Installation of the transmitter

	L1	**L2**	**L3**
	OFF	Flashes when the transmitter sends a message	OFF
Failure	ON during 30sec	OFF	OFF
Success Low signal	OFF	ON during 30sec	OFF
Success Good signal	OFF	OFF	ON during 30sec

Standard communication mode

L1	**L2**	**L3**
Flashes every 1m when an alarm is detected	Flashes when a data frame is sent	Flashes every 1m

If the transmitter does not communicate, check that the jumper on the electronic board is in the LoRaWAN position. **(See appendix #1)**

Behaviour of LoRaWAN transmitters

1) When they are powered, the transmitters send a **JOIN** ∗.

2) After 24 hours, they send a LinkCheckReq message which should be confirmed by a LinkCheckAck. And so on every 24 hours.
As long as the LinkCheckReq are confirmed by a LinkCheckAck, the transmitter will not send a new JOIN.

3) If the LinkCheckReq message does not receive a LinkCheckAck response, then new LinkCheckReq will be sent in the process.

If 6x LinkCheckReq does not get a response, then the transmitter initiates a new JOIN procedure.

∗**JOIN**: This is a network access phase LoRaWAN network that allows the network parameters to be dynamically renewed between the end-device and the LoRa Server.

USE OF LORAWAN TRANSMITTERS

Decoding the uplinks

Once the sensor is declared and powered, the first data frames (uplinks) begin to arrive on the Cloud or gateway.

In order to interpret the raw frames sent by our transmitters, we can provide you with either :

- **Documentation to help you decode our LoRaWAN frames**

- **Decoding CODECs in JSON format**

These elements are available, upon request, from our technical support department. Do not hesitate to ask us.

support@enless.fr / +33 (0)5 56 35 97 47

Downlinks configuration

Downlinks are used to send information to the transmitters from the LoRaWAN network. This allows the configuration of the transmitters (frequency of transmission, retransmission of data, alarm thresholds, etc.).

As explained before, our transmitters listen a downlink after sending each rising frame (uplink).

If you configure a downlink from the cloud or gateway, the transmitter should retrieve it immediately after sending an uplink and change its settings accordingly.

The documentation to help decode our LoRaWAN frames mentioned above also includes a configuration downlink generator.

Do not hesitate to contact our support team to obtain this documentation.

support@enless.fr / +33 (0)5 56 35 97 47

> **The configuration downlinks are to be sent on Port #1**

Validation of the information reception

Before moving to the final installation of the products, we recommend you validate :

- **The quality of data reception on the cloud or on your gateway.**

You have the option to force sending test frames via the push button on the electronic boards of the transmitters (see below).
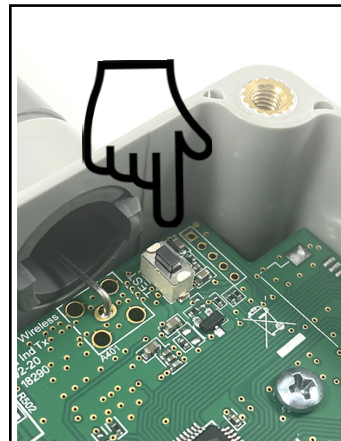
LED L2 (orange) flashes when you press the push button. This confirms a frame has successfully been sent from the transmitter.

> ⚠ Our LoRaWAN transmitters have Duty Cycle constraints.
> Do not press the push button more than once every 5 minutes.

Also confirm that **the configuration parameters have been successfully retrieved by the transmitter and that it is transmitting at the correct frequency.**

Product positioning and connection

The positioning and connection of our products are explained in our appendices.

APPENDICES

Selection of communication mode LoRa vs LoRaWAN

Appendix 1

• LoRa mode
• LoRaWAN mode

Positioning and fixing products

Appendix 2

• Positioning of transmitters
• Fixing the transmitters

Product connection

Appendices 3 to 5

• Connecting pulse transmitters to pulse counters
• PULSE LED transmitter connection and installation
• Connect the 4/20 mA probe to the analogue transmitter
• Connect the digital input transmitter to the contact interfaces

Repeater installation

Appendix 6

Calibration CO2

Appendix 7

BACnet receiver

Appendices 8 to 9

• Operating modes of the BACnet receiver
• BiBBS supported by the BACnet receiver

SELECTION OF COMMUNICATION MODE LORA PROPRIETARY VS LORAWAN

Each transmitter can communicate either in LoRa proprietary mode or in LoRaWAN mode (see page 7).

Mode selection is made via a jumper installed on the transmitter PCB.

LoRaWAN mode

Jumper positioned on a single pin.
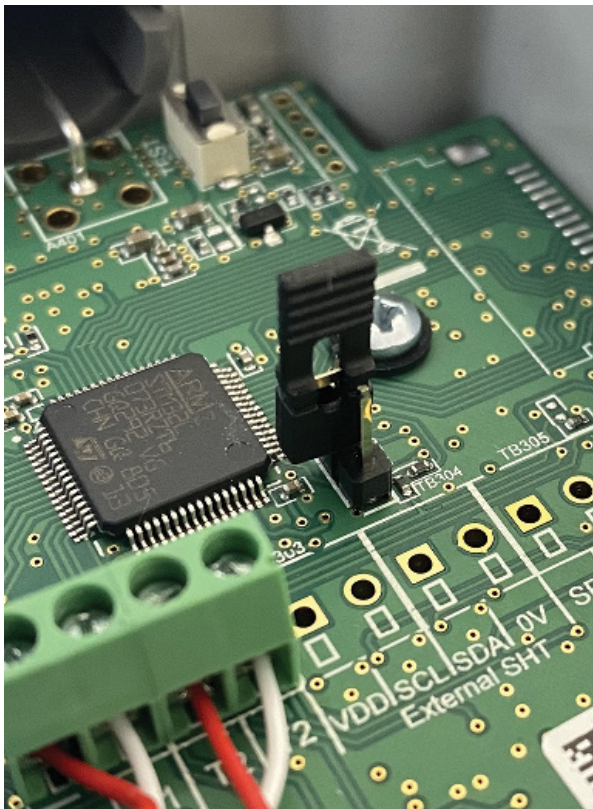
LoRa proprietary mode

Jumper positioned on the two pins.
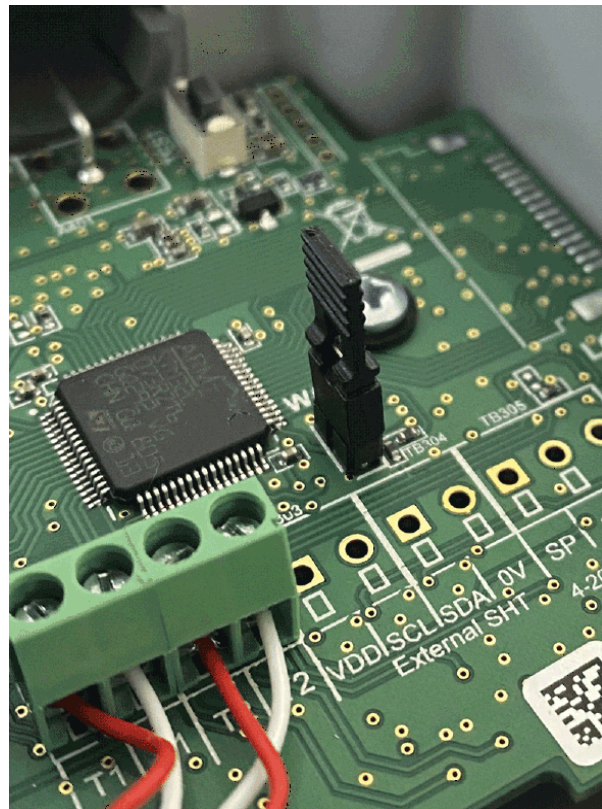
NB : The jumper is supplied with every transmitter.

It is imperative that you change the jumper position to select the communication mode (LoRa or LoRaWAN) when the transmitter is de-energised.

> (!) The jumper positions are reversed for transmitter versions prior to **ENV 1.01.05** (Check the label on the transmitters).

POSITIONING AND FIXING PRODUCTS

Positioning

The correct positioning of transmitters is very important and has a significant influence on the quality of transmission of radio waves. If your transmitter is incorrectly positioned you will reduce the radio coverage distance.

To maximise the transmitters' performance, please follow the instructions described below:

💡 **Ensure that the transmitter antenna is always up**

Position the transmitters as high as possible
We recommend positioning the transmitters at least 1.50m high

Fixing

The transmitters are fixed using the wall fixing lugs.

These lugs are provided for fixing with screws.

The lugs of the ambient transmitters are inside the transmitters.

For rugged transmitters you can also use the clamp collar loop on the side of the case.

CONNECTION OF THE TX PULSE TO THE METERS

Reminder concerning the use of the transmitter TX PULSE ATEX 600-037

According to ATEX Directive 1999/92/EC, only workers trained to work in risk areas are allowed to install the transmitter TX PULSE ATEX 600-037. No changes can be made to the transmitter TX PULSE ATEX 600-037.

Special conditions for safe use

In the case of an installation with a gas meter, the output wires of the transmitter TX PULSE ATEX 600-037 must be connected to certified intrinsic safety equipment. This combination must be compatible with the intrinsic safety rules Uo, Io , Po, Co, Lo specified on the label on the transmitter.

Certifications

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

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 transmitter TX PULSE ATEX 600-037 comes with a RAMWAY ER34615 battery.
Only this model of RAMWAY ER34615 battery can be used with the transmitter TX PULSE ATEX 600-037.
These batteries are available from Enless Wireless – 45 ter avenue de Verdu
33520 Bruges (France). Phone : +33 (0)5 56 37 97 47 – email : contact@enless.fr

WARNING – POTENTIAL ELECTROSTATIC CHARGE HAZARD

The transmitter TX PULSE ATEX 600-037 should only be cleaned with a damp cloth.

The PULSE transmitters are supplied with 4 wires and have 2 pulse inputs that can be used at the same time. Several combinations are possible.

Compatibility with the meters
• Dry contact interface (50 mseconds minimum / 10 Hz max)
• Transistor interface, open collector

Connection to the pulse meter

Input 1 : Dry contact

Green wire + brown wire

Input 2 : Dry contact

Green wire + white wire

Input 3 : open collector

Green wire + yellow wire

CONNECTION AND INSTALLATION OF PULSE LED TRANSMITTER

① KNOW YOUR METER

Indicator light

Find the flashing diode on the meter. The optical reader is positioned on this diode.
The optical reader can only interpret LED flashes with **a minimum flash duration of 3ms and a maximum of 100ms.**

Parameters

If it is a tariff meter higher than 36 kVA, it is necessary to know the transformation ratio of your meter. Use the buttons next to the digital display to read the value corresponding to the TC ratio (parameter n°6 or n°16 or n°64)

② SETTING UP THE SENSOR

Fixing the viewfinder

Clean the meter around the flashing diode. Affix the viewfinder by pointing the diode through the hole (the viewfinder is supplied with an adhesive).

Locking the reader

Clip the reader into the viewfinder and exert equal force across the entire surface of the sensor.

Checking

Once you power up your transmitter, the red LED will light up periodically for 20 seconds and then the green diode will take over.

③ CONSUMPTION CALCULATION

The pulse optical reader records 1 pulse every 5 flashes.

Calculation method = (A x 5) x B x C x D

A : Number of pulses

B : Pulse weight
Example : 0.1W/pulse. In this case, indicate 0.1 for B value in the below calculation.

C : TC ratio – Current transformation ratio
In general 1 for residential meters.
Can be another value for industrial meters (check this parameter on the meter's settings).

D : TT ratio – Tension transformation ratio
In general 1 for residential meters.
Can be another value for industrial meter (check this parameter on the meter's settings).

> The calculation formula below allows a calculation of consumption in Watt-hour (Wh).
>
> To get a value in Kilowatt-hour (kWh), you just need to divide the value per 1000.

Appendix 4

CONNECTION OF THE ANALOGUE PROBE 4/20 MA AND CONNECTION OF THE CONTACT TRANSMITTER

Connection of the analogue probe 4/20 mA to the analogue transmitter

When installing analogue transmitters, you must first connect the 4/20mA sensor to the transmitter.

Open the transmitter casing, you will connect the analogue sensor to the transmitter terminal.

Refer to the label inside the transmitter under the terminal block for connection.

Connecting the probe

Transmitter terminal block	Description	Connection from / to the probe
SP	Power (+V)	Use SP and 0V to power the probe
SI	4/20mA (+I)	Use SI and 0V for loop 4/20 mA
0V	Common 0-V	

Once the probe is connected to the transmitter, you can start configuring the transmitter.

Cabling for the 4/20mA sensor to the TX 4/20mA 600-035 transmitter

Cabling for the LoRa 4-20mA transmitter
(with the 4/20mA sensor power supply)

SP
SI
0V

Enless transmitter

Power (3.6V max)
GND
+ 4-20mA
- 4-20mA

4/20mA Probe
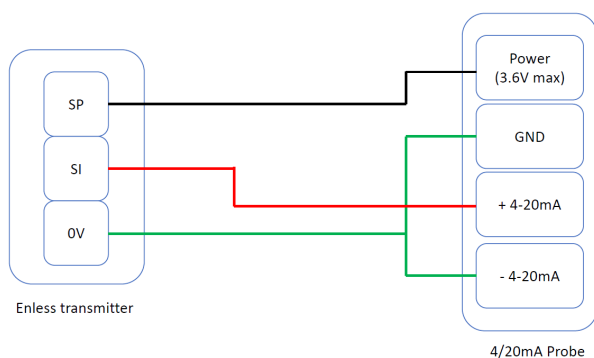
Cabling for the LoRa 4-20mA transmitter
(without the 4/20mA sensor power supply)

SP
SI
0V

Enless sensor

Power
External power supply
GND
+ 4-20mA
- 4-20mA

4/20mA probe
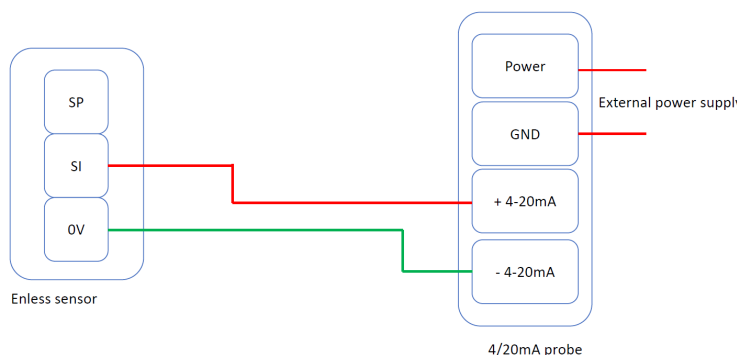
Connection of the digital input transmitter to the contact interfaces

The CONTACT transmitters are supplied with 4 wires and have **2 inputs that can be used at the same time**. Several combinations are possible.

Connection to the contact interfaces

Input 1 : Dry contact

Green wire + brown wire

Input 2 : Dry contact

Green wire + white wire

Input 3 : open collector

Green wire + yellow wire

Appendix 5

INSTALLATION OF THE REPEATER 600-301

If one or more transmitters remain out of range of the Modbus receiver, you will need to install a repeater.

The reapeter does not need to be configured !

Position your repeater

We recommend that you position your repeater halfway between the transmitters and the receiver.
Preferably use a long-range antenna and install as high as possible.
You have the option to chain several repeaters together.

Power your repeater

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

• Via 12V Power Charger Ref: POWER 1000-002 - Recommended
• Via 7.5 to 24V main power supply

Electrical power characteristic for the 12Vdc power supply : 1A max
Use only CE certified 12V power supply

In both cases, the wires will be connected to the repeater POWER terminal :
• **Black wire** connected to **0V terminal**   • Red wire connected to **V+ terminal**

Interpret the LED sets

LEDs inside the casing :

LA Flash   The repeater received a message.

LB Flash   The repeater transmitted a message.

LC ON   The repeater is properly powered.

LED outside the casing :

External LED   Repeater is working fine.
flashes every minute

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

Signal Quality	RSSI	Battery
▁▃▅	-33 dBm (R)	🔋

CALIBRATION PROCEDURE FOR CO2 VOC TEMP HUM TRANSMITTERS

So you can be certain that the ppm values returned by our CO2 VOC TEMP HUM 600-023 transmitters are consistent, they can be manually recalibrated.

To guarantee the best possible calibration, we recommend that the equipment is calibrated in "fresh air" mode. The calibration process for the transmitters takes just 3 minutes. Please follow the procedure described below:

1

With the transmitter powered up, place it on a table near a window, with the window open to ensure that the air in which the transmitter will be calibrated is fresh.

4

The LEDs will stop blinking when the calibration has been completed.
You can now take the transmitter and install it in its final position.

2

Hold down the button located on the transmitter circuit board for 15 seconds. Do not release the button until the **L1** **L2** **L3** LEDs come on. This indicates that the calibration process is active.

> ⚠ We recommend pressing the push button with a screwdriver or pen to avoid damaging the CO2 sensor with your finger!
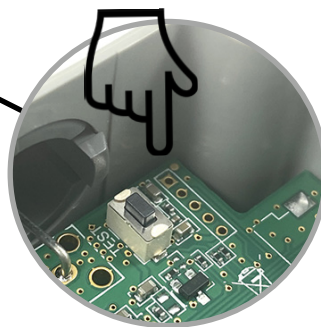
3

Move away from the transmitter and allow the calibration to complete. This process takes around 3 minutes.

BACNET RECEIVER OPERATING MODES

BACnet IP seulement

BACnet/MSTP

BACnet/IP and BACnet/MSTP
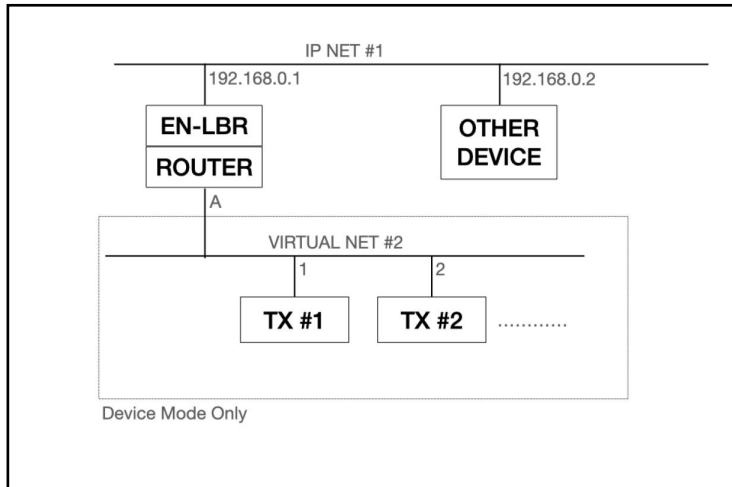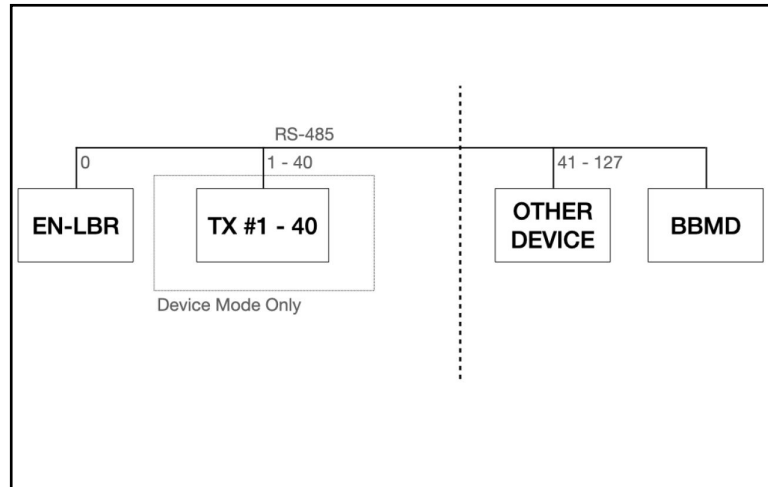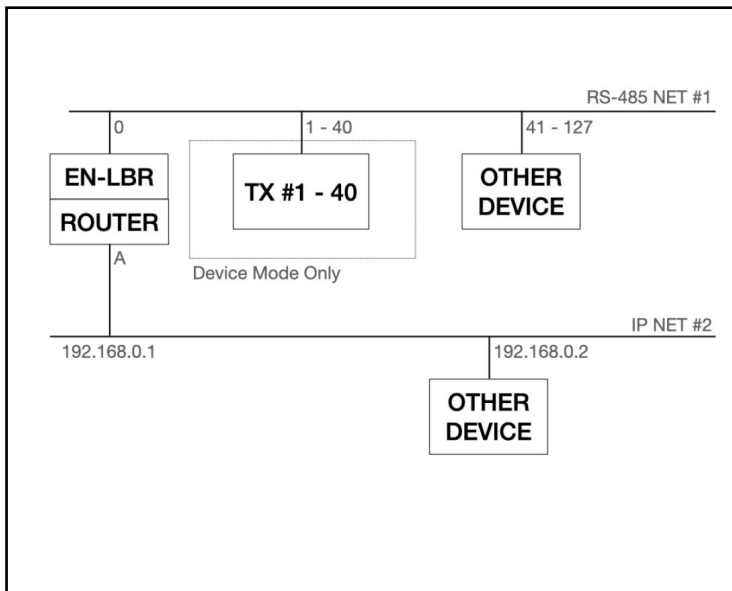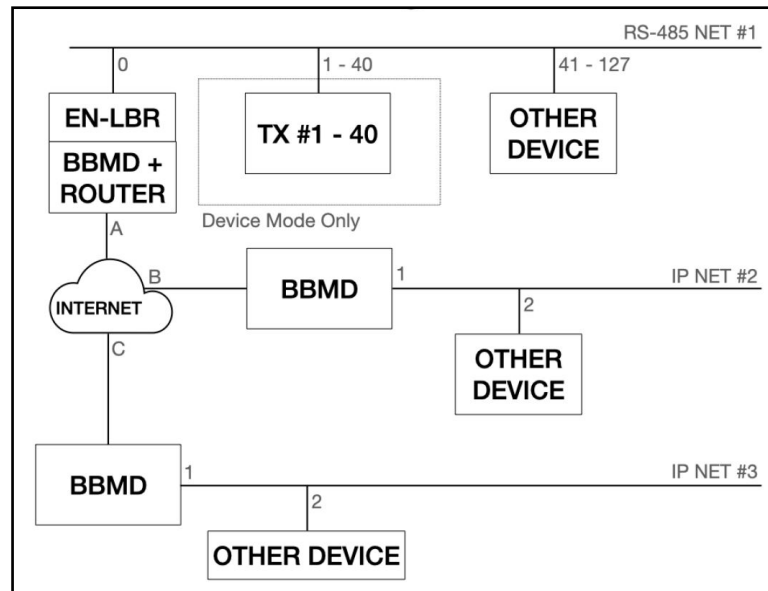

BACnet/MSTP + BBMD

BiBBS SUPPORTED BY THE BACNET RECEIVER

The BACnet receiver meets the B-ASC profile.

	Bacnet Operator Work Station	Bacnet Building Controllers	BACnet Advanced Application Controller	BACnet Application Specific Controller	BACnet Smart Acuator	BACnet Smart Sensor
	B-OWS	**B-BC**	**B-AAC**	**B-ASC**	**B-SA**	**B-SS**
Data Sharing	DS-RP-A,B DS-RPM-A DS-WP-A DS-WPM-A	DS-RP-A,B DS-RPM-A,B DS-WP-A,B DS-WPM-B DS-COVU-A,B	DS-RP-B DS-RPM-B DS-WP-B DS-WPM-B	DS-RP-B DS-WP-B	DS-RP-B DS-WP-B	DS-RP-B
Alarm, Event Management	AE-N-A AE-ACK-A AE-INFO-A AE-ESUM-A	AE-N-B AE-ACK-B AE-INFO-B AE-ESUM-B	AE-N-B AE-ACK-B AE-INFO-B			
Scheduling	SCHD-A	SCHED-E-B	SCHED-I-B			
Trending	T-VMT-A T-ATR-A	T-VMT-I-B T-ATR-B				
Device & Network Management	DM-DDB-A,B DM-DDB-B DM-DCC-A DM-TS-A DM-UTC-A DM-RD-A DM-BR-A NM-CE-A	DM-DDB-A,B DM-DDB-B DM-DCC-B DM-TS-B DM-RD-B DM-BR-B NM-CE-A	DM-DDB-B DM-DOB-B DM-DCC-B DM-TS-B DM-RD-B	DM-DDB-B DM-DOB-B DM-DCC-B	DM-DDB-B DM-DOB-B	DM-DDB-B DM-DOB-B

* in Green: the supported BiBBs

* in Red: the unsupported BiBBS

ADVANCED TRANSMITTER FUNCTIONALITIES

The advanced functionalities are displayed when you click the button [+ Advanced] on the **Add Sensor** window.

Two types of advanced functionalities are available.

A remote reconfiguration function
(see explanation below)

Alarm thresholds when thresholds are exceeded
(see explanation below)

New remote configuration

When you activate this function, every 24 hours the transmitter will ask the receiver if a new configuration is available. If you have changed the configuration of the transmitter in question from the Modbus table of the receiver, then the transmitter will take its new periodicity without you having to reset the sensor manually after 24 hours.

💡 It is possible to (re)configure the transmitters from the Modbus table of the receiver. If you would like to know more about the procedure for configuring sensors from the Modbus table, please contact our support team support@enless.fr

Alarm thresholds

For each type of transmitter different alarm thresholds are available. If you do not want to use this feature, do not fill in the fields for the alarm thresholds.Otherwise, fill in the fields with the high/low values of the selected thresholds. If the threshold is exceeded, the status byte in the Modbus table will indicate an alarm.
(see Modbus table document).

))) **Enless Wireless**
  Expert Wireless M2M

$\mathsf{C}\,\mathsf{E}$ ⟨Ex⟩

We   Enless Wireless
       45 ter avenue de Verdun
       33520 Bruges
       France

Declare under our sole responsibility that the product
Designation: Radio transmitters
Product Name(s) & References   TX PULSE HP ATEX 400-006
                                 TX PULSE ATEX 800-010
                                 TX PULSE ATEX SIGFOX 300-010
                                 TX PULSE ATEX SIGFOX HP 100-010
                                 TX PULSE HP ATEX 400-007
                                 TX PULSE ATEX SIGFOX HP 100-017
                                 TX PULSE ATEX 600-037

Attestation   LCIE 14 ATEX 3013 X

Notifiée par le LCIE 33 avenue du Général Leclerc - 92260 Fontenay aux Roses (France)
Numéro LCIE: 0081

To which this declaration relates satisfy the provision of **2014/34/UE** of the
European parliament and the council of 29 March 2014

➢ **is in conformity with the following standard(s) or other normative document(s)**

  • **EN IEC 60079-0 : 2018, EN60079-11 : 2012**

The marking is:
  ⟨Ex⟩ II 1 G Ex ia IIC T3 Ga

➢ **Fulfill the directives & standards**

  • **2014/53/UE April 2014**
  • **2014/30/UE February 2014**
  • **RoHS 2011/65/EU of 1 July 2011**
  • **EN300 220-1&2 V3.1.1 (2017-02)**
  • **EN301 489-1 V2.2.0 (2017)/ EN 301 489-3 V2.1.1 (2017)**
  • **EN 60950-1: 2006 + Am11:2009 + Am1:2010 + Am12 2011 + A2: 2013**
  • **EN 62479 :2010**

Date: 23/06/2021   Bruno Petit (Gérant)
Version 6.0