Enless Wireless
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BETTER ENGINEERING

IoT
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ENERGY EFFICIENCY

SETUP GUIDE

169MHz TX ENERGY+ PULSE

IG EN INSTALLENERGY-c

M-Bus wireless

Guide for configuration and installation of 169MHz energy meter transmitter

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PRODUCTS COVERED

TRANSMITTERS FOR ENERGY METERS

- TX ENERGY + PULSE RS232 800-013
- TX ENERGY + PULSE RS485 800-015

SUMMARY

PRODUCTS DESCRIPTION

PREPARING FOR INSTALLATION

INSTALLATION

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PRODUCTS DESCRIPTION

MODBUS TRANSMITTERS FOR ENERGY METERS

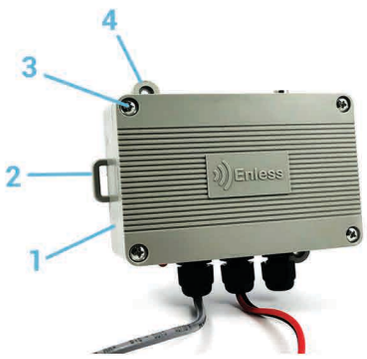
References

• TX ENERGY RS232 + PULSE 800-013
• TX ENERGY RS485 + PULSE 800-015

Weight
196gr

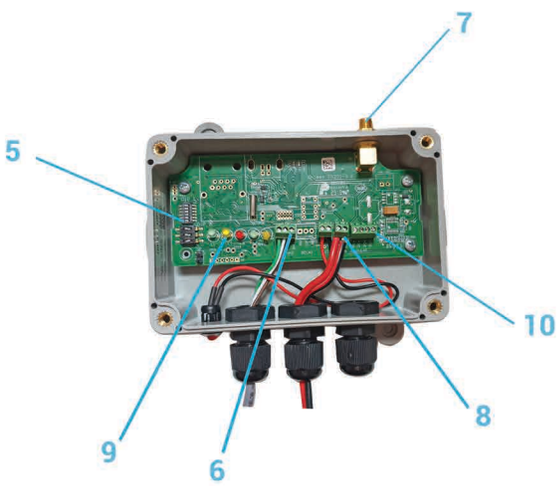
Power supply
from 7.5 to 24VDC max.

ID
8 numbers under the barcode



CASING CLOSED

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



CASING OPENED

5) DIP Switches
6) Terminal block RS232 & RS485
7) SMA connector for antenna
8) Power supply terminal block
9) LED lights (L1, L2, L3, L4, L5)
10) Pulse cable terminal block

MODBUS RECEIVERS

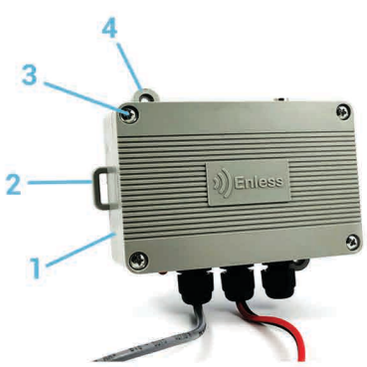
References

• RX MODBUS RS232 500-002
• RX MODBUS RS485 500-022

Weight
196gr

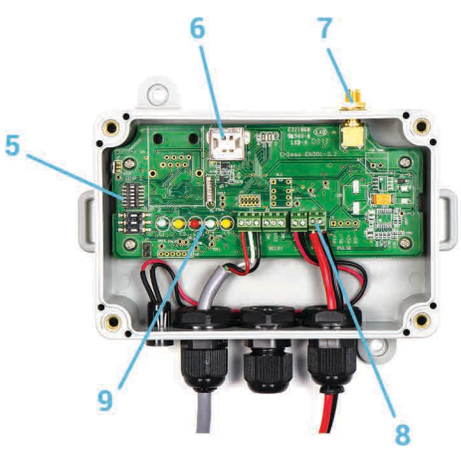
Power supply
from 7.5 to 24VDC max.

ID
8 numbers under the barcode



CASING CLOSED

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



CASING OPENED

5) DIP Switches
6) USB Port
7) SMA connector for antenna
8) Power supply terminal block
9) LED lights (L1, L2, L3)

PRODUCTS DESCRIPTION

REPEATER

Reference

• RX REPEATER 600-001

Weight
196gr

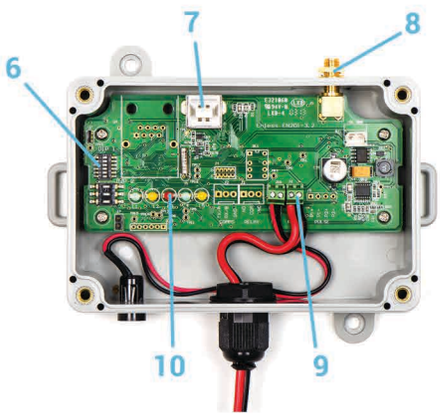
Power supply
from 7.5 to 24VDC max.

Transmission power
500mW

ID
8 numbers under the barcode

CASING CLOSED

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



CASING OPENED

6) DIP Switches
7) USB Port
8) SMA connector for antenna
9) Power supply terminal block
10) LED lights (L1, L2, L3)

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PREPARING FOR INSTALLATION

At the outset

Before starting the configuration of the transmitters, please download our Field Configuration Tool (FCT) software.

Our FCT Software is available in the following link:
http://enless-wireless.com/en/support.html

What you'll need

- ☑ Transmitters & receiver to install
- ☑ Long range antenna for receiver
- ☑ Phillips screwdriver
- ☑ Flat screwdriver (2mm)

Installation steps

Receiver preparation

You are going to prepare and configure your receiver before installing the transmitter.

Product configuration

You will first have to create a configuration file from which you will determine the configuration of your transmitter. You will configure the transmission periodicity and the registers to address.

Transmitter installation

Once the configuration file is edited, you can install your transmitter and validate that it communicates with your receiver.

Pairing the transmiter to the receiver

Once the validation is done, you can pair your transmitter to your receiver. You will then be able to view the Modbus registers in which the transmitter holds its information.

Paring the receiver to the PLC / Gateway

Once all the steps below have been completed, you have to configure the communication interface of your receiver (RS232 or RS485) and connect it to the PLC.

WARNING

The Tx Energy transmitter only supports function code 03 (Holding Registers).

Ensure your energy meter supports Code3 command. The picture below is an extract from a Kamstrup Multical 602 Modbus communications manual and shows the memory map. All registers can be read with Code3 and 4.

Data model mapping for byte-addressed region

Memory	Memory (hex)	Individual description	Size in bytes	Table	Contents	Data type	Update status
0	0x0000	Heat energy E1	4	1	Values in float	IEEE Float - 32 bit	Dynamic
4	0x0004	Actual flow	4	1	Values in float	IEEE Float - 32 bit	Dynamic
8	0x0008	Volume V1	4	1	Values in float	IEEE Float - 32 bit	Dynamic
12	0x000C	Actual power	4	1	Values in float	IEEE Float - 32 bit	Dynamic
16	0x0010	Inlet temperature T1	4	1	Values in float	IEEE Float - 32 bit	Dynamic
20	0x0014	Outlet temperature T2	4	1	Values in float	IEEE Float - 32 bit	Dynamic
24	0x0018	Pulse input A	4	1	Values in float	IEEE Float - 32 bit	Dynamic
28	0x001C	Pulse input B	4	1	Values in float	IEEE Float - 32 bit	Dynamic
32	0x0020	Heat energy E1	2	2	Units	Word - 16 bit	Dynamic
34	0x0022	Actual flow	2	2	Units	Word - 16 bit	Dynamic
36	0x0024	Volume V1	2	2	Units	Word - 16 bit	Dynamic
38	0x0026	Actual power	2	2	Units	Word - 16 bit	Dynamic
40	0x0028	Heat energy E1	4	3	Values in integer	Double Word - 32 bit	Dynamic
44	0x002C	Actual flow	4	3	Values in integer	Double Word - 32 bit	Dynamic
48	0x0030	Volume V1	4	3	Values in integer	Double Word - 32 bit	Dynamic
52	0x0034	Actual power	4	3	Values in integer	Double Word - 32 bit	Dynamic
56	0x0038	Inlet temperature T1	4	3	Values in integer	Double Word - 32 bit	Dynamic
60	0x003C	Outlet temperature T2	4	3	Values in integer	Double Word - 32 bit	Dynamic
64	0x0040	Pulse input A	4	3	Values in integer	Double Word - 32 bit	Dynamic
68	0x0044	Pulse input B	4	3	Values in integer	Double Word - 32 bit	Dynamic
72	0x0048	Heat energy E1	2	4	Decimal	Word - 16 bit	Dynamic
74	0x004A	Actual flow	2	4	Decimal	Word - 16 bit	Dynamic
76	0x004C	Volume V1	2	4	Decimal	Word - 16 bit	Dynamic
78	0x004E	Actual power	2	4	Decimal	Word - 16 bit	Dynamic
80	0x0050	Pulse input A	2	4	Decimal	Word - 16 bit	Dynamic
82	0x0052	Pulse input B	2	4	Decimal	Word - 16 bit	Static
84	0x0054	Version	2	5	Program version	Word - 16 bit	
86	0x0056	Info code	2	6	Info code	Word - 16 bit	Dynamic
88	0x0058	Reserved	4	N/A		IEEE Float - 32 bit	

The Tx Energy transmitter can read up to 50 registers.

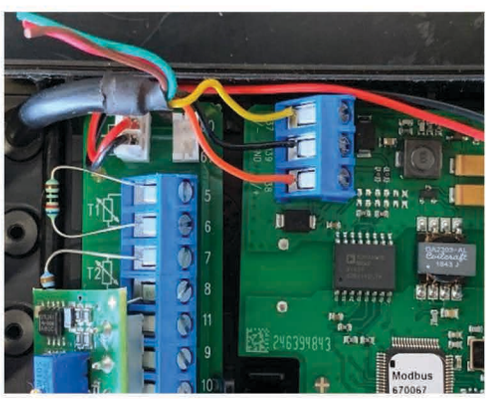
In RS232
Up to 1 slave - 50 registers maximum for this slave.
The Tx Energy transmitter can't be configured to read more than 5 consecutive registers. If you wish to read more than 5 registers for one slave, you must duplicate its configuration line.

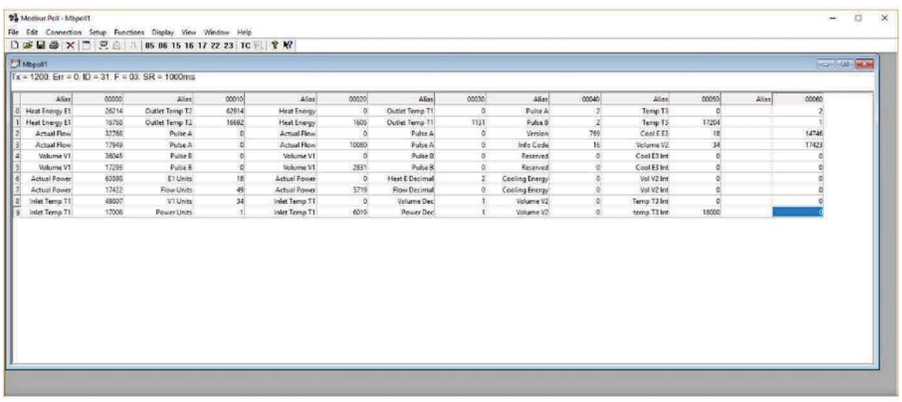
In RS485
Up to 10 slaves - 50 registers maximum for the total slaves.
Example : 10 slaves - 5 registers per slave / 5 slaves - 10 registers per slave / 4 slaves - 12 registers per slave.
The Tx Energy transmitter can't be configured to read more than 5 consecutive registers. If you wish to read more than 5 registers for one slave, you must duplicate its configuration line.

UNDERSTAND ITS METER

It is very important to get a good understanding of its meter before starting the configuration of your TX ENERGY + PULSE. We recommend to use beforehand a software such as Modbus Poll to validate the locations of the values in the table of your counter and validate that they are properly read.

You can use an RS485 USB cable to connect the meter to your PC.





In order to well understand the data transmitted :
The image below shows the correspondence between the values from the registers and the values shown on your meter screen.

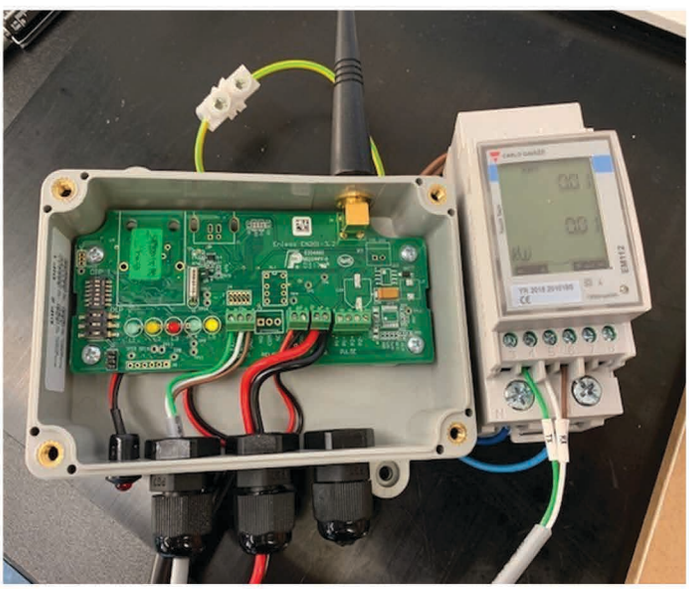
	Alias	00000	Alias	00010	Alias	00020	Alias	00030	Alias	00040	Alias	00050	Alias	00060
0	Heat Energy E1	26214	Outlet Temp T2	62914	Heat Energy	0	Outlet Temp T1	0	Pulse A	2	Temp T3	0		2
1	Heat Energy E1	16768	Outlet Temp T2	16692	Heat Energy	1605	Outlet Temp T1	113	Pulse B	2	Temp T3	17204		1
2	Actual Flow	32768	Pulse A	0	Actual Flow	0	Pulse A	0	Version	769	Cool E E3	18		14746
3	Actual Flow	17949	Pulse A	0	Actual Flow	10080	Pulse A	0	Info Code	16	Volume V2	34		17423
4	Volume V1	36045	Pulse B	0	Volume V1	0	Pulse B	0	Reserved	0	Cool E3 Int	0		0
5	Volume V1	17293	Pulse B	0	Volume V1	2831	Pulse B	0	Reserved	0	Cool E3 Int	0		0
6	Actual Power	63898	E1 Units	18	Actual Power	0	Heat E Decimal	2	Cooling Energy	0	Vol V2 Int	0		0
7	Actual Power	17422	Flow Units	49	Actual Power	5719	Flow Decimal	0	Cooling Energy	0	Vol V2 Int	0		0
8	Inlet Temp T1	49807	V1 Units	34	Inlet Temp T1	0	Volume Dec	1	Volume V2	0	Temp T3 Int	0		0
9	Inlet Temp T1	17008	Power Units	1	Inlet Temp T1	6019	Power Dec	1	Volume V2	0	temp T3 Int	18000		0

Attention néanmoins car l'adressage Modbus peut être déroutant !

Ici, si l'on se réfère à l'exemple ci-dessus, la requête Modbus est de lire 70 registres à partir du registre 0. Si l'on se base sur la table Modbus remontée par le logiciel Modbus Poll, on peut supposer que la valeur « Heat Energy » doit se lire sur le registre Modbus n°20. Ce n'est en fait pas le cas ! C'est bien le registre 40 qui doit être adressé pour récupérer la valeur de « Heat Energy », comme indiqué dans la table Modbus du compteur (voir page 6).
Veuillez donc être vigilant sur ces aspects d'adressage Modbus.

PREPARATION OF THE TX ENERGY

Connect the transmitter to the meter



RS232

• Wire labeled GND (Ground) connected to GND terminal block on the meter.

• Wire labeled TX (Transmision) connected to RX terminal block on the meter.

• Wire labeled RX (Reception) connected to TX terminal block on the meter.

RS485

You need to provide the 2 wires cable

• Wire labeled GND (Ground) connected to GND terminal block on the meter.

• Wire labeled TX (Transmision) connected to RX terminal block on the meter.

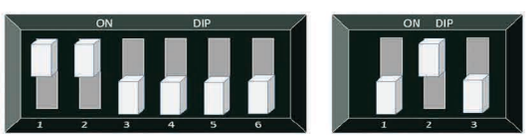
Configure the transmitter

• Connect the HELI antenna to the transmitter.

• Open the transmitter's enclosure.

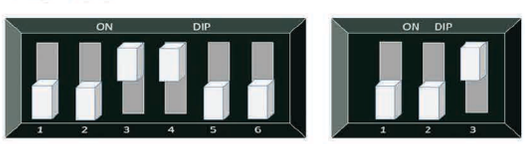
• Position the switches in function of your communication interface :

RS232



DIP 1 : 1,2 ON - 3,4,5,6 OFF
DIP 2 : 1,3 OFF - 2 ON

RS485



DIP 1 : 1,2,5,6 OFF - 3,4 ON
DIP 2 : 1,2 OFF - 3 ON

RECEIVER PREPARATION

The second step consists of preparing the Modbus receiver for transmitter installation.

You are going to configure the receiver in USB mode, to validate that it behaves correctly during its power supply and connection to the PC .

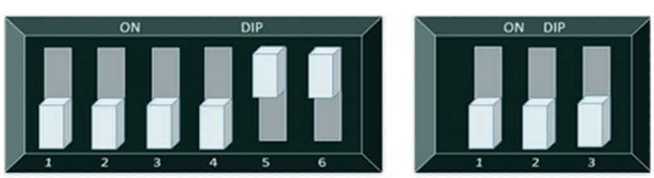
Please follow these steps

Open the receiver casing

To open the receiver casing, use a Philips screwdriver to remove the four screws on the four corners.

Configure the receiver in USB mode

Position the switches as follows :



DIP1: 5 and 6 ON, the other switches must be OFF
DIP2: Switches 1, 2 and 3 must be OFF

Connecting an antenna to the receiver

For better reception quality, we recommend you to use a long-range antenna.

References:

- ANT REN SMA HP EXT 169 100-010
- ANT REN SMA HP INT 169 100-027

Power the receiver

You can power the receiver:

- With the 12V Enless Power Supply - Recommended
- With a power supply from 7.5V to 24VDC maximum

⚠ **Make sure not to exceed 24VDC**

Connect the power supply to the power terminal block of the receiver

Validate the LED behaviour of the receiver

L1 **L2** **L3** **L4** **L5** successively blink while powering when the receiver starts.

Then, **L5** remains on.

The external LED blink every 20 seconds.

Connect the receiver to your PC

Connect the receiver to your PC with the USB cable supplied.

When you connect the receiver to the USB port of your PC, the receiver driver should install automatically.

If this is not the case, you can download the driver corresponding to your configuration at this address:

http://www.ftdichip.com/Drivers.D2XX.html

Then check the COM port number you are connected to: (Control Panel / Peripherals and Printers).

PRODUCTS CONFIGURATION

Start the F.C.T software

- Enter a user name and click **OK**.
- Click **"Refresh List"** in the COM tab. The communication port is displayed, select it.
- Click **"Connect to COM Port"**. A message in the dialog box tells you that you are successfully connected.

Edit your configuration file

Configuring the TX ENERGY + PULSE

- Please add the transmitter by clicking **Edit / View** on the Tx Energy Meter family.
- A new window appears. Please click this button to add a transmitter : 
- Please configure your transmitter by filling in the following boxes :

Address: It corresponds to the ID on the label (under the barcode)

Tx Time (1 to 250 min): Frequency of data sending

Re-Try (0 or 1): 0 by default, when set to 1, two frames will be sent instead of one

Pulse count 1 / Pulse count 2: These configuration fields apply to pulse inputs. These are the index values of counters 1 and 2 (if you do not want to start pulse recovery from 0 put the current pulse count on the meter)

Modbus ID : indicate the slave device(s) Modbus ID

Baud rate : possible values are 2400 / 4800 / 9600 / 19200 and 38400 bps. Default is set as 19200.

Parity : None (default) / Even / Odd

Stop bits : 1 or 2

Data bits : the only posible configuration value is 8

First register : determines the first register in the slave's Modbus table you wish to read

N° of registers : determines the number of consecutive registers (max 5) the transmitter will read after the first register

Example

Tx Energy Meter

Modbus ID	Baud Rate	Parity	Stop Bits	Data Bits	First Register	No. of Registers
31	19200	Even	1	8	0	4
31	19200	Even	1	8	8	4
31	19200	Even	1	8	16	4
31	19200	Even	1	8	24	4
31	19200	Even	1	8	40	4
31	19200	Even	1	8	48	4
31	19200	Even	1	8	56	4
31	19200	Even	1	8	64	4
0	9600	None	2	8	9000	5
0	9600	None	2	8	10000	5

In this example we only read the IEEE Float and Double Word - 32 bit registers (see green markup on the Modbus table page 6).

Here the data are grouped in blocks of 2 registers, that is why we declare 4 registers to read 2 data.

In this case the registers are read in pairs. It is therefore not possible for example to read 5 consecutive registers : the meter will certainly respond with an error message.

PRODUCTS CONFIGURATION

Configuring the receiver

- Please add your receiver by clicking **Edit / View** on the corresponding family
- A new window appears. Please click this button to add a receiver : 
- Please configure your receiver by filling in the following boxes :

Address
It corresponds to the ID on the label (under the barcode)

Modbus Address
Value between 1 and 254. The value 1 is given as an indication

Baud Rate
The possible values are 2400, 4800, 9600, 19200, 38400 bps. The default value is 19200.

Parity
None (default value) / Even / Odd

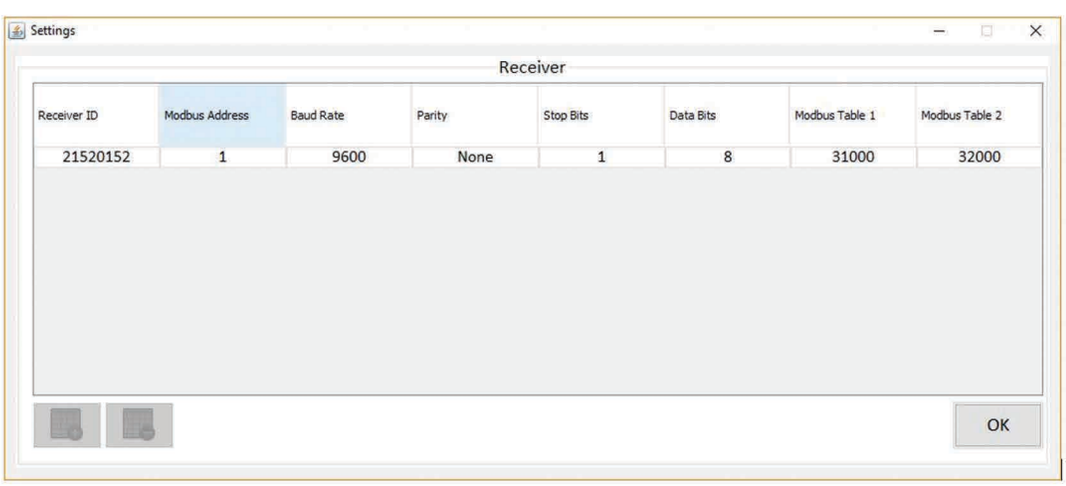
Stop bits
Possible values are 1 or 2

Data bits
The only posible value is 8

Modbus Table 1
You must specify the number of the first register from which the values of the transmitters will be saved in the table. The value of this first register can be between 0 and 64500. The default value is 31000.

Modbus Table 2
This table only applies to the "TX ENERGY + PULSE" values. Please refer to the installation aid sheet of this transmitter for more information.

Example



Once your configuration file is complete, your transmitter and receiver should appear as UNCONFIGURED.

So we can now move on to the installation of the transmitter.

TRANSMITTER'S INSTALLATION

The TX ENERGY transmitter have been added to your configuration file.

You must now activate it and validate that it communicates with your Modbus receiver.

Transmitter's activation procedure

On the FCT Software
Click on **Start configuration**.

Power your transmitter
Move at least 3 metres away from the Modbus receiver, then power on your transmitter.

You can power the transmitter :
- with a 12 V power supply Ref : POWER 1000-002 - Recommended
- with a 7,5 to 24 V power supply maximum

⚠ **Make sure not to exceed 24VDC**

Only use screwdriver bit 2mm width to handle screws on terminal block.

Red wire connected to POWER Terminal block (+VE)
Black wire connected to POWER Terminal block (GND)

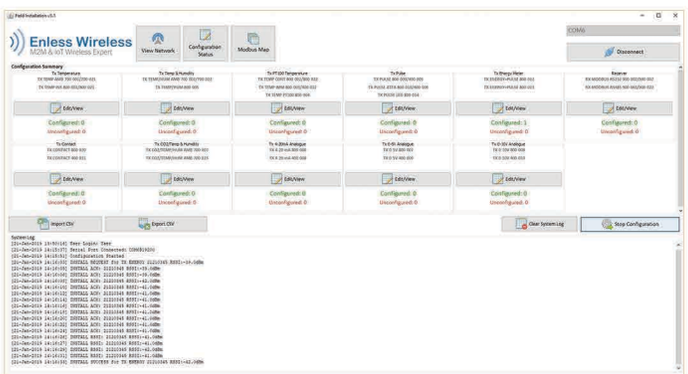
Check the LED set of your transmitter
Power LED indicator will switch on and will blink every 20 seconds.
L5 will blink during all installation process.

Once powered TX ENERGY will enter in configuration / installation mode. TX ENERGY will try to get connected to the RX MODBUS receiver during 1 minute maximum.

Indication	L1	L2	L3	L4	L5	Period
Installation	X	X	X	X	Flashes	2s
Installation success	ON	OFF	ON	OFF	OFF	30s
Success but low RSSI	ON	OFF	ON	OFF	ON	30s
Installation failure	Flashes	OFF	Flashes	OFF	OFF	30s
Normal mode	OFF	OFF	Flashes	OFF	OFF	1mn

** In normal communication mode, transmitter's L3 LED flashes every minute.*

Follow the messages in the dialog box
To learn more about the status of the installation, you can also refer to the messages received in the software dialog box.



When your transmitter has been installed, it appears as CONFIGURED on your configuration file.

The receiver remains UNCONFIGURED.
Its activation will be completed in the following steps.

Stop the installation
Once the installation of the transmitters is over, you can click on the button "**Stop Configuration**".

If you cannot install the transmitter or if you see a TIMEOUT message in the FCT software dialog box, please check the following :

- Check that the COM port you are connected to corresponds to the COM port selected in the software.
- Check that your receiver is powered externally in addition to the USB power supply.
- Confirm that you are far enough (3m or more) away from the receiver when connecting the transmitter batteries.

TRANSMITTERS INSTALLATION

Validate the installation of the transmitter

On the F.C.T software
Click **Configuration status.**
A new window opens.

Transmitters that have been activated appear in green.

The Modbus receiver will turn green when you pair with the transmitters (see next step).

Save your configuration file

We recommend you to back up your configuration file.

This is useful if you need to return to site after installation to add (or remove) transmitters to your existing configuration without having to reinstall from the beginning

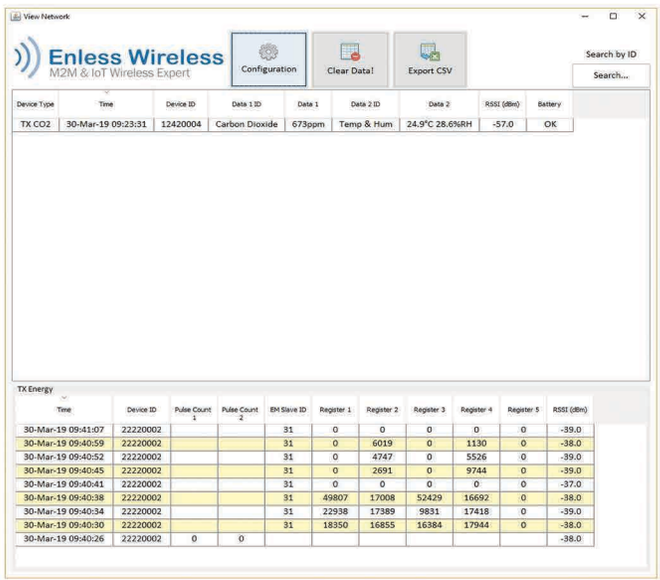
On the FCT software
Click on **Save configuration file**.

Position and connect the transmitter

For the positioning and attachment of transmitters, please refer to our appendix pages.

Validate data reception

On the FCT software
Click on **View network**
A new window opens



The frames sent by transmitters are displayed in real time according to the transmission periodicity chosen.

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

Until -70 dBm
Excellent signal

From -70 to -90 dBm
Correct signal

Beyond -90 dBm
Low signal

Beyond -90dBm we recommend to install a repeater between the transmitter and the receiver to secure the reception of data (see appendix).

Warning, the visualisation of the transmitters' frames on the view network tab can only be done when the switches are set on USB mode.

Once this validation is complete, you can switch to pairing the transmitter with the receiver.

PAIRING TRANSMITTERS TO THE RECEIVER

To pair the transmitters, carefully follow the steps below.

On the F.C.T software

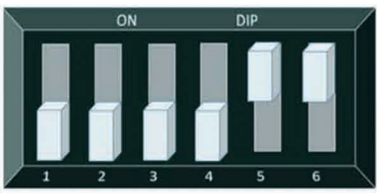
Click on **Disconnect** button.

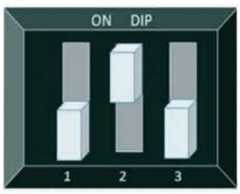
Power off the receiver

Unplug the receiver from the USB port and turn off the power from its main power supply.

Position the receiver's switches

Position the Modbus receiver's switches in pairing mode :





DIP 1 : switchs 5 and 6 ON, the others OFF
DIP 2 : switchs 1 and 3 OFF, 2 ON

Power on the receiver

Reconnect the receiver to its main power supply and then reconnect it to the USB port of your computer.

On the F.C.T software

Refresh the port com list and click on the **Connect** button.
Then click the **Start configuration** button.
The receiver installation will start automatically.

Validate the installation of the receiver

The messages in the dialog box indicates the success or failure of the receiver installation:

```
Configuration Started
INSTALL REQUEST for Receiver 20400353
INSTALL SUCCESS for Receiver 20400353
```

You can also refer to the LED behaviour of the receiver :

- Successful installation, L1 and L3 flash 5 times
- Failed to install, L1, L3 and L5 flash 5 times

Once the installation success is confirmed, the Modbus receiver appears as CONFIGURED on your configuration file.

You can click on the **Stop Configuration** button.

Your transmitters have been paired to the Modbus receiver.

The transmitters information will be sent and stored in the receiver's Modbus table.

To determine the registers of the Modbus table in which the values of the transmitters are stored, you can use the **Modbus Table** function.

PAIRING TRANSMITTERS TO THE RECEIVER

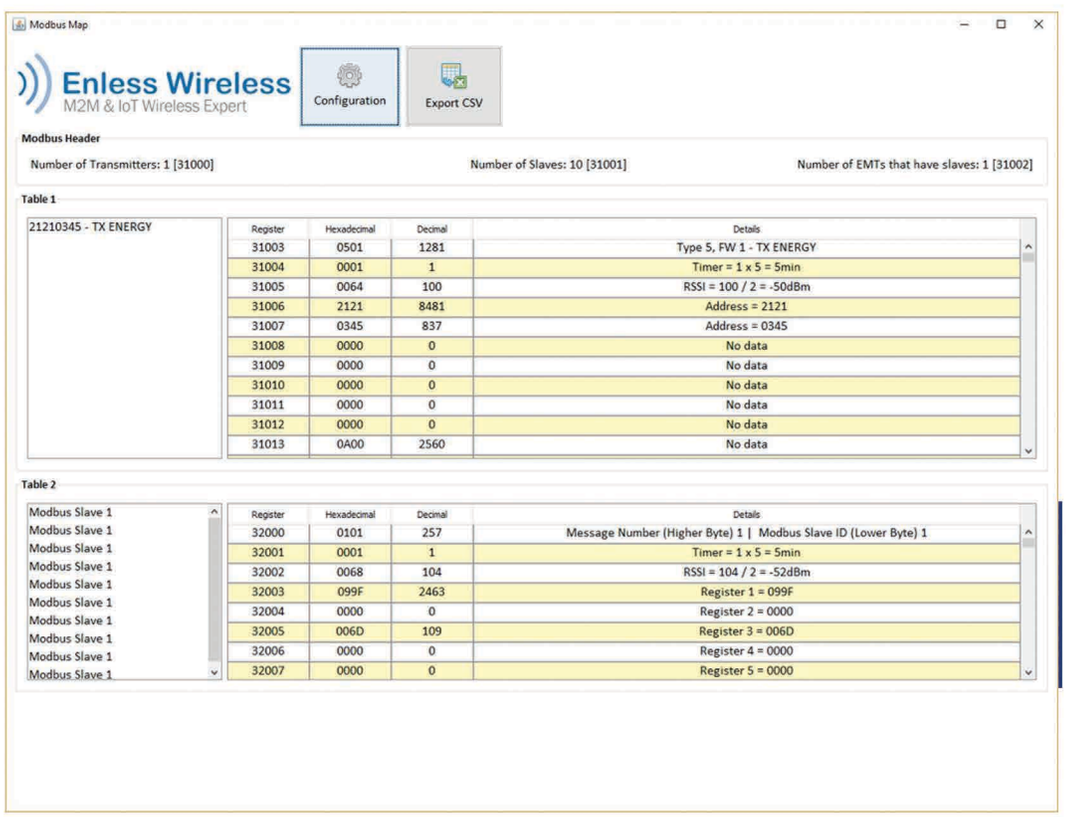
Visualize the Modbus table

The visualisation of the Modbus table is carried out from the FCT software

On the F.C.T software
Click the **Modbus Map** tab

A new window opens.

This window contains the contents of the Modbus table of the receiver.



Values from TX Energy + Pulse are shown on table 2.

For each transmitter, you will find the addresses of the registers to be addressed as well as the calculation methods to be applied for each register.

The values will increment in the table after receiving the first frames of data

You have completed the configuration and pairing of the products.

All you have to do is choose the interface of your receiver and connect it to your PLC (see next steps).

INSTALLATION OF THE RECEIVER WITH THE PLC

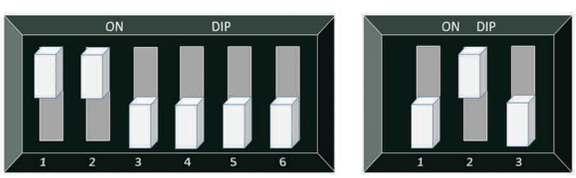
The configuration phase is now complete.

Please disconnect your receiver from its power supply and from the USB port of the PC.

Configuring the Modbus receiver interface

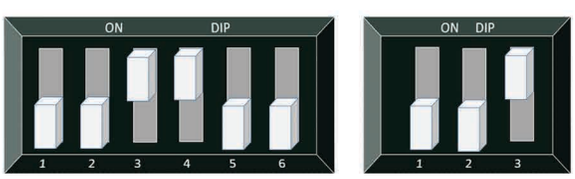
You must configure the Modbus receiver interface according to the chosen communication mode.

RS232 interface



DIP 1 : 1 et 2 ON, les autres OFF
DIP 2 : 1 et 3 OFF, 2 sur ON

RS485 interface



DIP 1 : 3 et 4 ON, les autres OFF
DIP 2 : 1 et 2 OFF, 3 sur ON

Connecting the receiver to the PLC

RS232 connection

- GND wire connected to the receiver's GND terminal
- TX wire connected to the RX terminal block of the Modbus receiver and to the TX terminal block of the PLC
- RX wire connected to the TX terminal block of the Modbus receiver and to the RX terminal block of the PLC

RS485 connection

- Wire 1: TX connected to terminal block TX / A
- Wire 2: RX connected to terminal block RX / B

Receiver power supply

The Modbus receiver can be powered by:
- A main power supply from 7.5 to 24v
- An Enless 12V Power Supply (Reference: POWER 1000-002)

Normal current for the supply of the receiver in 12Vdc is 1A maximum.
Use only a 12V power supply CE Certified.

In both cases, the wires will be connected to the POWER terminal of the Modbus receiver:
- Black wire connected to the terminal GND (Ground)
- Red wire connected to the terminal block + VE

LED combination of the receiver

Please refer to the LED combinations of the Modbus receiver.

Installation mode	L1	L2	L3	L4	L5	Period
Phase 1	OFF				Flash	1mn
Phase 2	Flash	OFF	Flash	OFF	Flash	5 times
Phase 3	OFF				ON	N/A

Normal mode	L1	L2	L3	L4	L5	Period
Data reception	OFF			Flash	ON	1 sec
Request from the PLC	Flash	OFF				1 sec
Receiver answer	OFF	Flash	OFF	OFF		N/A

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

APPENDIX

Positioning and fixing the products

Appendix 1

- Positioning the transmitters
- Attaching the transmitters

Repeater installation

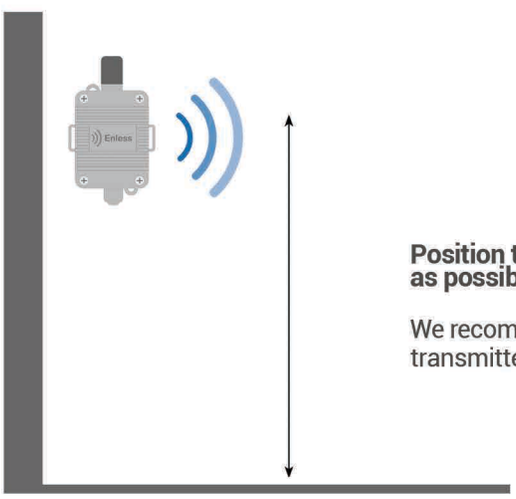
Appendix 2

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:



Position the transmitters as high as possible

We recommend positioning the transmitters at least 1.50m high

Ensure that the transmitter antenna is always up

Fixing

The transmitters are fixed using the wall fixing lugs.

These lugs are provided for fixing with screws.

You can also use the clamp collar loop on the side of the case.

REPEATER INSTALLATION

One or more transmitters remain out of range of the Modbus receiver.
You will have to install a repeater.

The repeater does not require any configuration !

Position your repeater

We recommend positioning your repeater midway between the transmitter and the Modbus receiver. Preferably use a long-range antenna and install it as high as possible. You can link multiple repeaters between them.

Power your repeater

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

- By a 12V power supply Ref: POWER 1000-02 - Recommended
- By a main power supply from 7.5 to 24VDC maximum

⚠ **Make sure not to exceed 24VDC**

Current specifications for 12 Vdc receiver power supply: 1A Max
Use only a 12V CE certified power supply

In both cases, the wires will be connected on the Power block of the repeater:
• Black wire connected on the ground block (GND) • Red wire on the red block (+VE)

The external power indicator (red) lights up and flashes every 20 seconds.
The yellow L5 light (Power) on the electronic board lights up.
The L3 LED flashes each time a data frame is received from field-installed transmitters.

Validate data reception

The “View Network” window of the FCT software will show:

- Transmitters received without passing through the repeater
- Transmitters received via the repeater. The lines of the transmitters concerned are displayed in green with the indication (r) in front of the RSSI signal.

Référence	Date et heure	Identifiant	Type de valeur 1	Valeur 1	Type de valeur 2	Valeur 2	Signal RSSI (dBm)	Niveau de batterie
TX PULSE	30-sept.-16 18:10:42	10801908	[CSTD] Nombre d'impulsions entrée 1	[0011] 0	[CSTD] Nombre d'impulsions entrée 2	[0011] 0	(r) -53.5	LOW
TX PULSE	30-sept.-16 18:10:41	10801908	[CSTD] Nombre d'impulsions entrée 1	[0011] 0	[CSTD] Nombre d'impulsions entrée 2	[0011] 0	-78.0	LOW
TX PULSE	30-sept.-16 18:05:17	10801908	[CSTD] Nombre d'impulsions entrée 1	[0011] 0	[CSTD] Nombre d'impulsions entrée 2	[0011] 0	(r) -57.0	LOW
TX PULSE	30-sept.-16 18:05:12	10801908	[CSTD] Nombre d'impulsions entrée 1	[0011] 0	[CSTD] Nombre d'impulsions entrée 2	[0011] 0	-79.5	LOW
TX PULSE	30-sept.-16 17:59:48	10801908	[CSTD] Nombre d'impulsions entrée 1	[0011] 0	[CSTD] Nombre d'impulsions entrée 2	[0011] 0	(r) -53.5	LOW
TX PULSE	30-sept.-16 17:59:46	10801908	[CSTD] Nombre d'impulsions entrée 1	[0011] 0	[CSTD] Nombre d'impulsions entrée 2	[0011] 0	-78.0	LOW