Enless Wireless
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BETTER ENGINEERING

IoT M2M

ENERGY EFFICIENCY

SETUP GUIDE

TX ENERGY + PULSE - SIGFOX RANGES -

IG EN INSTALLENERGYSIGFOX-a

sigfox

Guide for configuration and installation of Modbus transmitters for energy meters - Sigfox ranges -

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PRODUCTS COVERED

MODBUS TRANSMITTERS FOR ENERGY METERS

- TX ENERGY + PULSE RS232 SIGFOX 300-013
- TX ENERGY + PULSE RS485 SIGFOX 300-014

SUMMARY

PRODUCTS DESCRIPTION

PREPARING FOR INSTALLATION

INSTALLATION

READING OF THE DATA

PRODUCTS DESCRIPTION

MODBUS TRANSMITTERS FOR ENERGY METERS

References

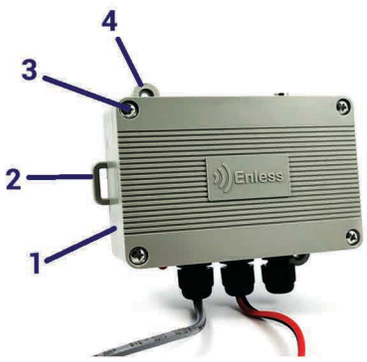
• TX ENERGY RS232 + PULSE 300-013
Certification
P_0043_53E7_01

• TX ENERGY RS485 + PULSE 300-015
Certification
P_0043_53E7_01

Weight
196gr

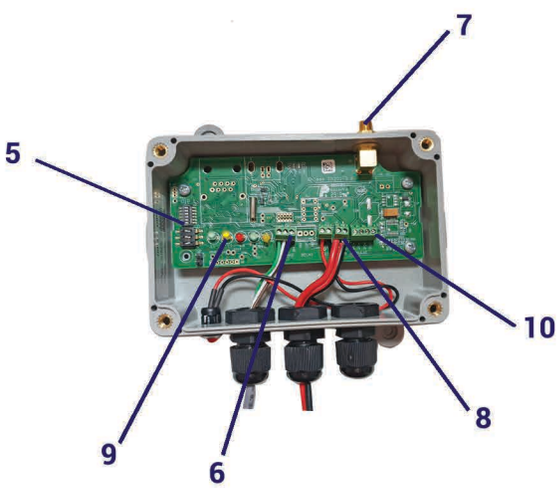
Power supply
from 7.5 to 24VDC max.

ID & PAC
Shown on the product label



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

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PREPARING FOR INSTALLATION

At the outset

Before you begin configuring transmitters, you will need to **purchase a Sigfox subscription for each device you want to install.**

You can purchase Sigfox subscriptions at this address:

https://buy.sigfox.com/

In addition, 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 will need

- ☑ Transmitters to install
- ☑ Classic cruciform screwdriver
- ☑ ID, PAC and products certificate numbers

Installation steps

Transmitter declaration on the Sigfox BackEnd

You will have to create a Device Type for Tx Energy.

You will then have to declare your transmitter and associate it with the Tx Energy Device Type.

Transmitters installation and configuration

Once your transmitter is declared, you will be able to install it.

The Tx Energy is configured and installed from the **Field Configuration Tool (FCT) software.**

The installation consists of powering the transmitters and validating, thanks to their LED sets and from the Sigfox backend, that the frames are correctly sent.

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.

DECLARATION OF THE TRANSMITTER ON THE SIGFOX BACKEND

First of all, you must declare the transmitter on the BackEnd portal of Sigfox.
Go to https://backend.sigfox.com/.
Log in to access the BackEnd portal interface.

Edit a family group

You need to edit a family group for the TX ENERGY + PULSE transmitter. Family groups make it possible to differentiate each transmitter according to its nature. When you configure a transmitter you must associate it with a family.

To edit a family group for TX ENERGY + PULSE transmitters, please follow the following steps :

- From the homepage, go to the **DEVICE TYPE** tab, then click on **NEW**.
- Confirm the group/folder in which you want to save the family group.
- Fill in the form fields :

DEVICE TYPE INFORMATION

Name : give a name to the group according to the family of transmitters you wish to install. In this case you can call the group "Energy meter transmitter".

Description : type a description for the group.

Contact : choose your Sigfox suscription formula.

DOWNLINK DATA

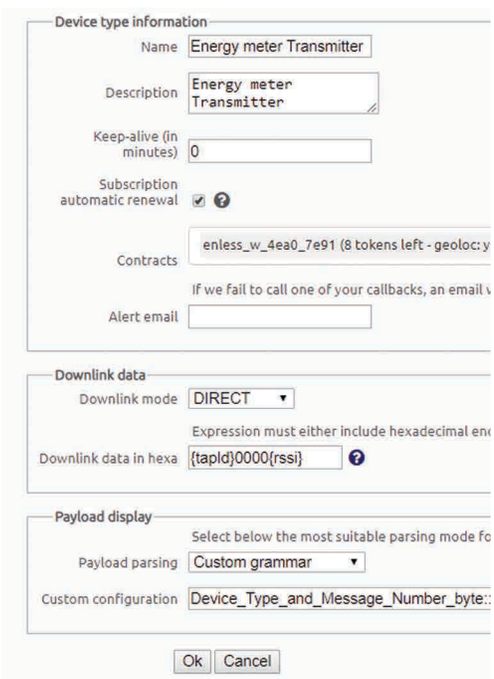
Downlink mode : choose DIRECT.

Downlink data in hexa : leave blank.

PAYLOAD DISPLAY

This section defines the way the data coming to the Sigfox BackEnd is displayed.

Payload parsing: choose Custom. **Custom configuration** : see below.



Transmitters code of configuration

You can configure the data display mode of the transmitters.
In the table below, we offer you a predefined code to enter in the Custom configuration window to optimize the data display mode of the TX ENERGY + PULSE SIGFOX 300-013 and the TX ENERGY + PULSE SIGFOX 300-014.

```
Device_Type_and_Message_Number_byte::uint:8 Status::uint:8 Pulse_count_1::uint:32:little-endian
Pulse_count_2::uint:32:little-endian Pulse_status_byte::uint:8
```

- Once the configuration is achieved, click on OK.
- Go to the DEVICE TYPE tab and check that your group is properly displayed.

DECLARATION OF THE TRANSMITTER ON THE SIGFOX BACKEND

Declare your transmitter

Once the family group is configured, you can start the declaration of your first Modbus transmitter for energy

- Click on the **DEVICE** tab, then click on **NEW**.
- Confirm to which group you want to associate the transmitter.
- Fill in the form fields :

DEVICE TYPE INFORMATION

TX ENERGY PULSE
ID : 000F374A
PAC : DC1C808406A1AD7B
13110041

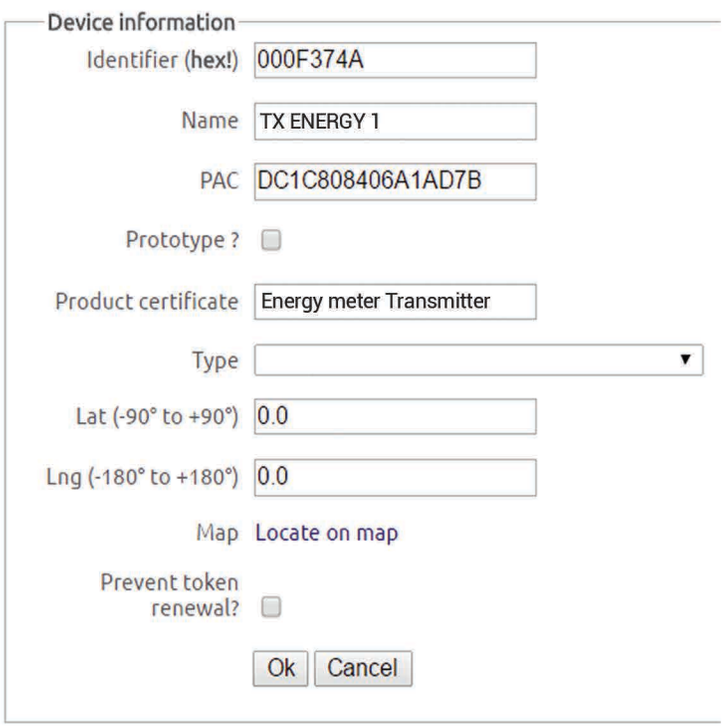
Identifier : ID displayed on the transmitters label.

Name : give a name to the transmitter.

PAC : PAC number displayed on the transmitter's label.

Product certificate : The product certificate number is available on the product data sheet. You can download the product data sheets at www.enless-wireless.com
You can also find the product certificate numbers on the products description section of this user guide.

Type : indicate the family group to which the transmitter belongs. You will have previously created this group.

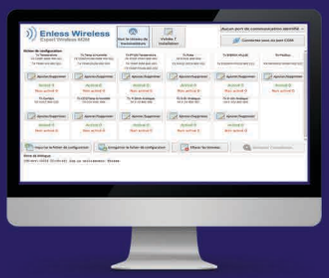


- Once the transmitter is declared, click on **OK**. A page appears which shows all the transmitters' information.
- Click on the **MESSAGES** tab and leave this page open (see following steps).

You are now about to start the configuration of your Modbus transmitter for energy meter.

The configuration of the TX ENERGY + PULSE SIGFOX has to be proceeded thanks to the F.C.T. software.

TX ENERGY + PULSE CONFIGURATION



The configuration of the Modbus transmitter for energy meter has to be proceeded thanks to **our Field Configuration Tool (F.C.T.) software**, unlike other products of the Sigfox range.

You will need to upload the F.C.T. software and prepare the transmitter for its installation.

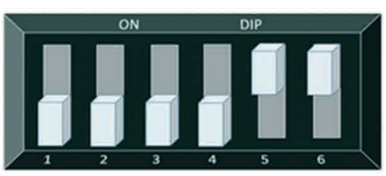
Open the F.C.T. software

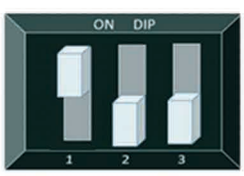
Once uploaded, start the F.C.T. software. A new window will open.

- Enter a user name of your choice.
- Select your langage.
- Select Sigfox.
- Click on OK.

Configure the TX ENERGY + PULSE interface

- Connect the HELI antenna to the transmitter.
- Open the transmitter's enclosure and position the switches in configuration mode. See below :





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

Connect the transmitter to the PC

Connect the transmitter to the PC using the USB bus.

Connect the antenna provided with the transmitter to the transmitter.
Open the transmitter's casing and position the switches in configuration mode.

The transmitter's LEDs flashes the following way :

Configuration mode	L1	L2	L3	L4	L5	Duration
1	X	Flashes	X	X	X	1 sec
2	X	Flashes	X	X	Flashes	1 sec

TX ENERGY + PULSE CONFIGURATION

Connect the transmitter to the communication port

• Once on F.C.T., click **"Refresh List"** in the COM tab. The communication port is displayed, select it.

• Click on **"Connect to COM Port"**. A message in the dialog box tells you that the connection is successfull.

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.

TX ENERGY + PULSE CONFIGURATION

Install the transmitter

• Click on "**Start installation**".

Messages in the dialog box tell you that you that the transmitter is successfully installed.

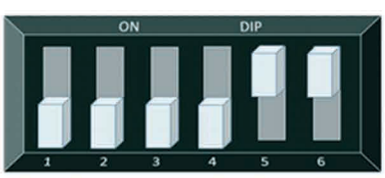
Its configuration settings have been taken into account.

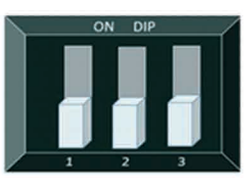
• Click on "**Stop configuration**".

• You must now **switch to normal communication mode** for the transmitter to be installed on the Sigfox server.

Switch to normal communication mode

• Without powering off the transmitter, place its switches in communication mode.
You must change the position of switch 1 DIP 2 to OFF.





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

The transmitter will measure the quality of the Sigfox signal. It tries to connect on the Sigfox server (2min max).
The LEDs of the transmitter tell you the status of communication:

Communication mode	L1	L2	L3	L4	L5	Duration
Installation	X	X	X	X	Flashes	2s
Success	ON	OFF	ON	OFF	OFF	30s
Succes - Low RSSI	ON	OFF	ON	OFF	ON	30s
Downlink failure	Flashes	OFF	Flashes	OFF	OFF	30s

• Come back to the MESSAGES tab on the Sigfox Backend.

• The first data frames start to arrive. At this stage, the transmitter is not yet connected to the meter, so no relevant values are returned.

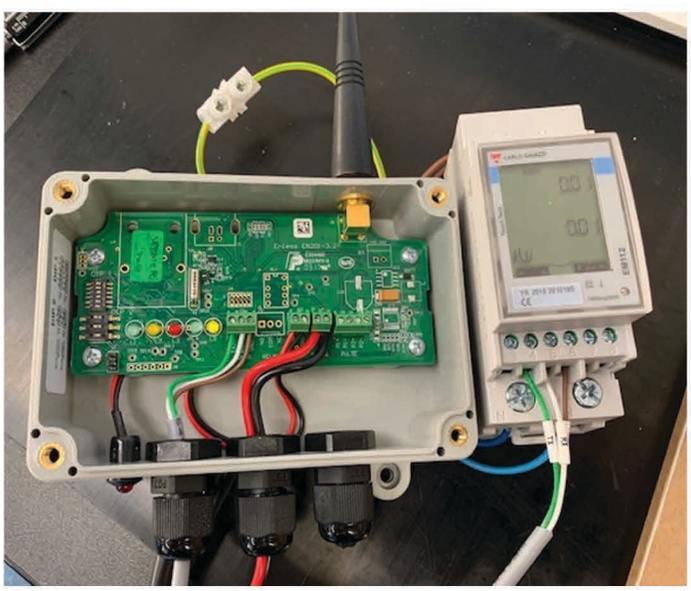
These test frames simply allow you to validate that the transmitter communicates at the correct frequency.

Time	Data / Decoding	Location	Link quality	Callbacks
2017-02-09 13:38:30	d0100000000000000088 Device_Type_Message_Number_byte: 208 Firmware_Version: 16 Puls_count_1: 0 Puls_count_2: 0 Puls_status_byte: 136			
2017-02-09 13:36:59	52535349			

• You can now disconnect the TX ENERGY from the PC.

CONNECTION OF THE TX ENERGY + PULSE TO THE METER

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

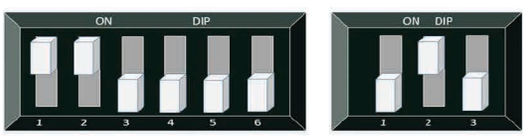
• Wire labeled GND (Ground) connected to GND terminal block on the meter.

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

Configure the transmitter

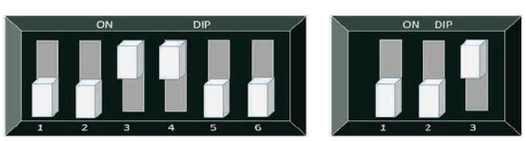
• Position the switches according to your communication interface :

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

Power the transmitter

You can power the transmitter :

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

DATA FRAMES INTERPRETATION OF THE TX ENERGY + PULSE

Data frames are properly displayed and show relevant messages.

Time	Data / Decoding	LQI	Callbacks	Location
2019-04-30 16:23:51	d71f0000178400000046b0000 Device_Type_and_Message_Number_byte: 215 Status: 31 Pulse_count_1: 2216099840 Pulse_count_2: 1795424256 Pulse_status_byte: 0			
2019-04-30 16:23:29	d51f00005be0000026100000 Device_Type_and_Message_Number_byte: 213 Status: 31 Pulse_count_1: 3764060160 Pulse_count_2: 270925824 Pulse_status_byte: 0			

Data frames can be extracted from the Sigfox BackEnd in .csv format .

Data	Device ID	Data1 (Downlink answer status)	Downlink client status	Timestamp	
52535349	000D71D6	0000b7130000ff75	ACKED	2019-04-30 14:33:35	
d01000000000000000088	000D71D6			2019-04-30 14:36:30	Pulse
d11f828f436a400046180000	000D71D6			2019-04-30 15:07:30	Slave 1
d41f0000000000000000000	000D71D6			2019-04-30 15:08:00	Slave 4
d51f00005b9b000026100000	000D71D6			2019-04-30 15:08:15	Slave 5
d61f0000a189000015950000	000D71D6			2019-04-30 15:08:20	Slave 6
d71f000017830000046b0000	000D71D6			2019-04-30 15:08:30	Slave 7
d91f0002000000100010000	000D71D6			2019-04-30 15:08:50	Slave 9
da1f0002000203010000000	000D71D6			2019-04-30 15:09:00	Slave 10
d11f8ccc436a400046180000	000D71D6			2019-04-30 15:12:36	Slave 1
d31fc28f4270cccd41340000	000D71D6			2019-04-30 15:12:53	Slave 3
d51f00005b9f000026100000	000D71D6			2019-04-30 15:13:11	Slave 5
d61f0000a191000015960000	000D71D6			2019-04-30 15:13:21	Slave 6
d71f000017830000046a0000	000D71D6			2019-04-30 15:13:31	Slave 7
d91f0002000000100010000	000D71D6			2019-04-30 15:13:56	Slave 9
da1f0002000203010000000	000D71D6			2019-04-30 15:14:06	Slave 10
d01000000000000000088	000D71D6			2019-04-30 15:17:23	Pulse
d11f9999436a400046180000	000D71D6			2019-04-30 15:17:38	Slave 1
d21f473345812667440a0000	000D71D6			2019-04-30 15:17:45	Slave 2
d31fcccc4270f5c241340000	000D71D6			2019-04-30 15:17:53	Slave 3
d51f00005ba4000026100000	000D71D6			2019-04-30 15:18:13	Slave 5
d61f0000a199000015960000	000D71D6			2019-04-30 15:18:23	Slave 6
d81f0000000000000000000	000D71D6			2019-04-30 15:18:48	Slave 8

The decoding of the data frames sent by the TX ENERGY + PULSE is explained on the “Enless Data Message Format" document. This document is available on request. Please send an email to support@enless.fr.

• Example of data frames decoding

Data	Description	Value
D7	Device Type / Message Number	Type D, Msg No 7 (Slave7) According to the configuration, Slave 7 is to read register 56 onwards. So it is expected to read Inlet Temperature T1 (4bytes – 2 registers) and Outlet Temperature T2 (4 bytes – 2 registers)
1f	Slave ID	31
00	Meter Data	Register 0 – Inlet Temp T1 – value 0x00001783 = 6019 = 60.19degC
00	Meter Data	
17	Meter Data	
83	Meter Data	 Note: Picture not taken at same time as data, so difference in display and data
00	Meter Data	Register 4 - Outlet Temp T2 – value 0x0000046A = 1130 = 11.30 degC
00	Meter Data	
04	Meter Data	
6A	Meter Data	 Note: Picture not taken at same time as data, so difference in display and data
00	Meter Data	No data from meter as only 4 registers requested – value 0x0000
00	Meter Data	