SenNet Easy Single/Compact Meter Sigfox

Energy Meter with 1 or 3 Trifasic Meter CT/Rogowski

General description

SenNet Easy Single/Compact Meter Sigfox is a device that monitors 1 or 3 power energy trifasic meter electrical circuits, with two options of current transformer, 0.33Vac or flexible Rogowski, and send all this information in one Sigfox message.

The configuration of all features of this device is possible by these ways.

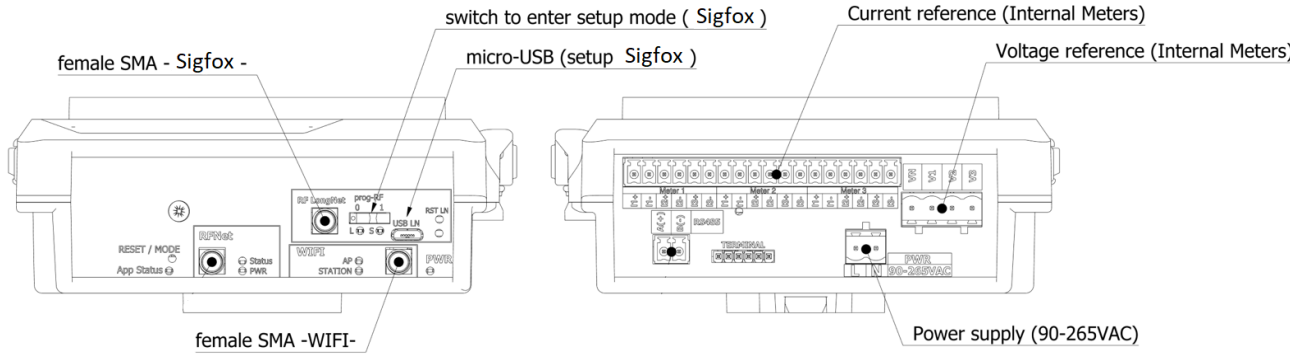
- Downlink message on Sigfox backend. (Type data & sample time)
- Micro-usb connection and console/terminal. (Type data & sample time)
- Wifi network on Access Point mode , through webserver.

The end-user can select what kind of energy data and remote device wants to upload to the cloud, must select the type of message (see on the next section).

Reference	Description
Easy Single Meter	1 trifasic power meter
Easy Compact Meter	3 trifasic power meter

Power supply

Voltage power supply	100-265VAC @ 50HZ
Power	<1W



Sigfox Ready Certification / Class U0

Power Meter
Class 1
(CT's 0.33v -Rogowski)

Basic steps to intall:

1. Set power meter by Wifi network.
2. Set type of message and time to send and take note to parse this data on your preferred platform. (By default, time to send = 15 minutes)
3. Take note ID / PAC to sign the device on Sigfox Cloud.
4. Connect voltage reference (feed internal power supply) and current reference.
5. Check by wifi network the parameters of power meter.

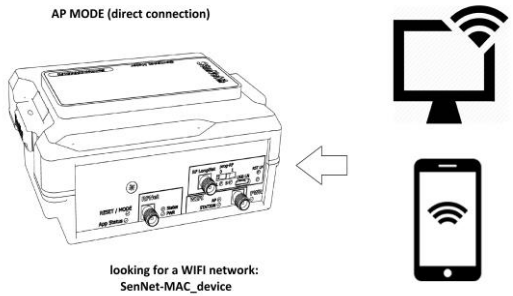
Power meter setup

Through Access Point Wifi may setup typical parameters of our power meters, type and value of current CT.
Scan wifi networks and choose the one that corresponds to the folowing structure:

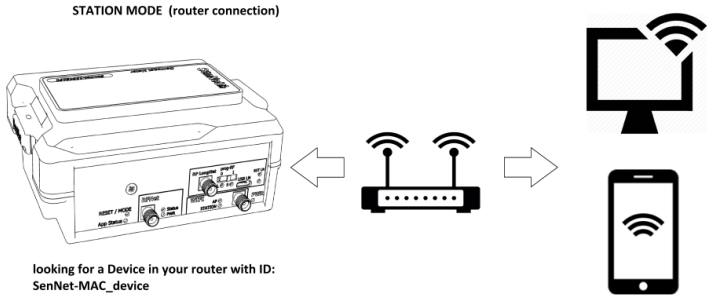
SSID_WIFI : SenNet-device_*MAC* example: SenNet-C4BE847654D8
AP WIFI Password: 123456789

Use browser and input this link:
www.sennet.net
user: admin Password: admin

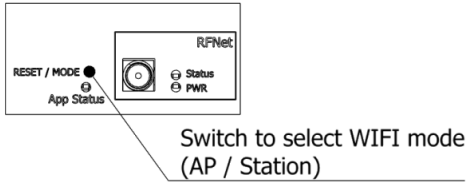
Once inside the webserver we can configure the parameters of the electric power meters and check values readed.

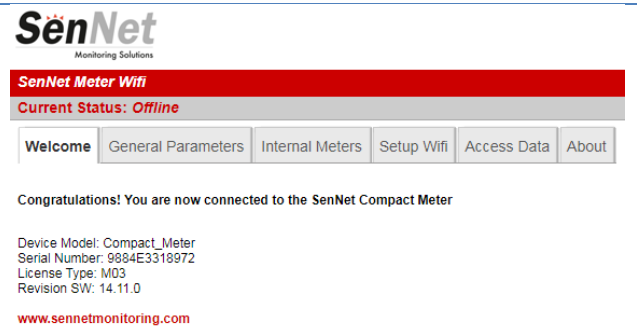


Direct connection
***Access Point* WIFI**



Connection through wifi router
***Station* WIFI**





Address webserver : www.sennet.net

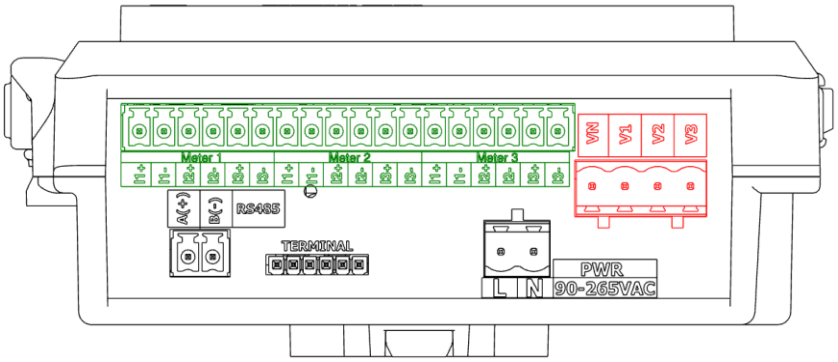
Power Meter

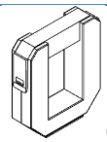
Easy IoT/Compact Meter is a power meter that included 1 or 3 power meters integrated.

3 trifasic meters or 9 monophasic meter	***Easy Compact Meter***	Both device with Sigfox connection.
1 trifasic meter or 3 monophasic meter	***Easy Single Meter***	

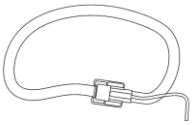
Wiring voltaje & current reference.

Current reference -Meter 1-						Current reference -Meter 2-						Current reference -Meter 3-						Voltage reference Meters 1-2-3			
I1+ (1)	I1- (2)	I2+ (3)	I2- (4)	I3+ (5)	I3- (6)	I1+ (7)	I1- (8)	I2+ (9)	I2- (10)	I3+ (11)	I3- (12)	I1+ (13)	I1- (14)	I2+ (15)	I2- (16)	I3+ (17)	I3- (18)	Vn (19)	V1 (20)	V2 (21)	V3 (22)





CT 0.33VAC



Rogowski Coil

Voltage reference

Range	110-220/240VAC (CAT III – 400V)
Frecuency	50-60Hz
Isolated range	2.5Kv @ 60seg
Consumption	0.1 VA per phase
Accuracy	Class 0.2 (+/-0.2%)
⚠	Use protection before connecting at this device.

Current reference

Accuracy for current reference: Class 0.2 (+/-0.2%)

It's possible use two types of current transformers CT(0.33V) or Rogowski Coils SenNet, at depend of range of current to measure.

Types of current transformers	Current to measure	Output	Accuracy
CT 50	1....50 A	0.33VAC	+/-1% (5%....100% In)
CT 100	1....100 A	0.33VAC	+/-1% (5%....100% In)
CT 150	1....150 A	0.33VAC	+/-1% (5%....100% In)
CT 400	1....400 A	0.33VAC	+/-1% (5%....100% In)
CT 800	1....800 A	0.33VAC	+/-1% (5%....100% In)
Flexible 5000 (7cm Ø) (*)	10....5000 A	Rogowski	+/-1% (center on cable to measure)
Flexible 5000 (12cm Ø) (*)	10....5000 A	Rogowski	+/-1% (center on cable to measure)
Flexible 5000 (20cm Ø) (*)	10....5000 A	Rogowski	+/-1% (center on cable to measure)

(*)Using SenNet flexible probes, we certify a Class 1 measurement, calibrated together with the analyzer from the factory.

Current measurement precision

Internal meter + SenNet CT — Class 1

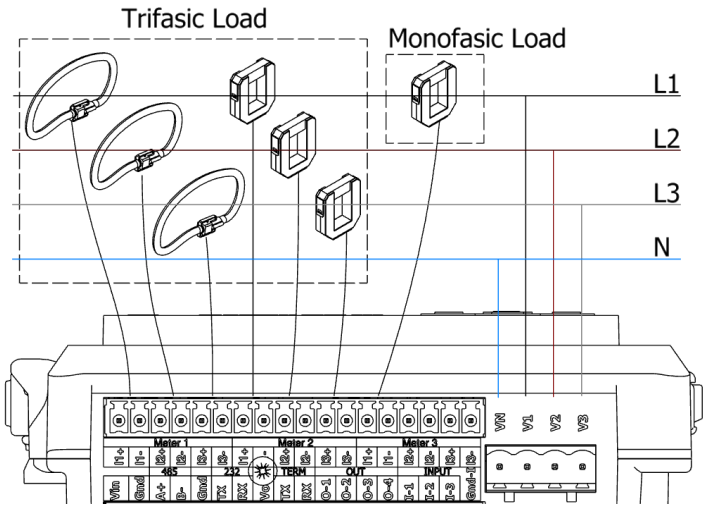
Internal meter + SenNet flexible — Class 1 factory calibrated

Isolated voltage

CT — 2.5KV / 0.5mA / 3sec

Flexible — 600V CAT IV

Measurement Acquisition	
Intensity channel sampling	8000 samples / sec
Voltage channel sampling	8000 samples / sec
Voltage channel sampling	24 bits
Zero crossing sampling	62.5 usec



Connection example for a single-phase and three-phase load, both configurations can be alternated on the meters. With pre-calibrated flexible SenNet probes it is important to maintain order to maintain Class 1 measurement.

Accuracy measure	
Voltage/current	Class 0.2 (+/-0.2%)
Power	Class 1* (+/-1%)
Energy	Class 1* (+/-1%)

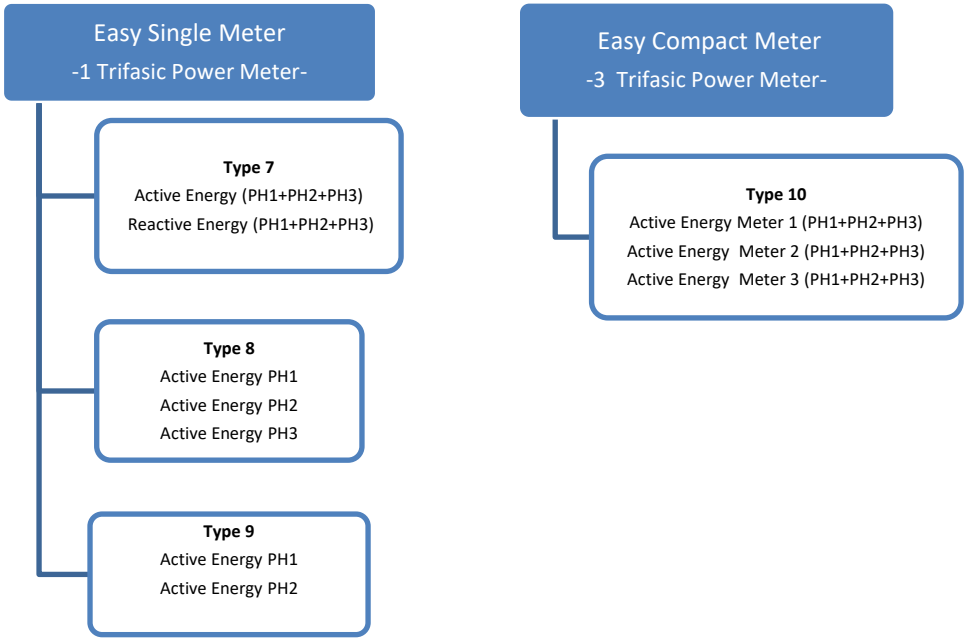
(*) Class 0.5 (+/-0.5%) special feature (under requirement to our factory)

Type Sigfox Message

SenNet IoT Easy Compact Meter is a powerful Energy Meter, the client must select what kind of data will be uploaded to the platform. For that reason, the devices have been defined by default several types of message what includes the main information from each electricity measurement.

The main interest always is the total Energy accumulated, if your interest is on another parameter you can contact with our technical department to ask for it.

Depending on the type of Easy Meter you may choose these types of uplink messages:



Type 7 : Active + Reactive Energy (1 trifasic power meter)

Field	Info		Active Energy PH1+PH2+PH3				Reactive Energy PH1+PH2+PH3			
Type data	*See Table 1*		float 32 bits unit kWh				float 32 bits unit kvArh			
Byte	1	2	3	4	5	6	7	8	9	10

Type 8: Active Energy PH1 + Active Energy PH2 + Active Energy PH3 (1 trifasic power meter)

Field	Info		Active Energy PH1			Active Energy PH2			Active Energy PH3		
Type data	See Table 1		resolution=100wh unsigned integer 24 bits Max. 1.6Mwh / unit kWh			resolution=100wh unsigned integer 24 bits Max. 1.6Mwh / unit kWh			resolution=100wh unsigned integer 24 bits Max. 1.6Mwh / unit kWh		
Byte	1	2	3	4	5	6	7	8	9	10	11

Type 9: Active Energy PH1 + Active Energy PH2 (1 trifasic meter)

Field	Info		Active Energy PH1				Active Energy PH2			
Type data	See Table 1		float 32 bits / unit kWh				float 32 bits / unit kWh			
Byte	1	2	3	4	5	6	7	8	9	10

Type 10: Active Energy Meter 1 + Active Energy Meter 2 + Active Energy Meter 3 (3 trifasic power meter)

Field	Info		Active Energy PH1			Active Energy PH2			Active Energy PH3		
Type data	See Table 1		resolution=100wh unsigned integer 24 bits Max. 1.6Mwh			resolution=100wh unsigned integer 24 bits Max. 1.6Mwh			resolution=100wh unsigned integer 24 bits Max. 1.6Mwh		
Byte	1	2	3	4	5	6	7	8	9	10	11

A common point in all types of messages is the head (defined with 2 bytes) that includes important information embedded in the message (type device/type message/errors.. etc). In the next table are defined the mean of these info-fields.

Field **Info**																			
Byte	**Byte 1**								**Byte 2**										
	Type Device **01 - Easy Meter (EM) / Easy Single/Compact Meter (ECM)** 02 – Pulse Counter 03 – Not defined 04 – Enviroment Sensor 05 - PM 06 – GW Modbus 07 – Repeiter Sigfox			**Type Message** type 0 (info) type 1 (EM) type 2 (EM) type 3 (EM) type 4 (EM-free) type 5 (EM-free) type 6 (EM-free) **type 7 (ECM)** **type 8 (ECM)** **type 9 (ECM)** **type 10 (ECM)** .. type 15 (not defined)				**Some Phase in generation mode** **Feedback Error**	**Voltage secuence error**	**Overvoltage / SAG / Internal meter error**		**Type Remote Nodes** 0x00 – No local Network			**ID Remote Nodes** No Remote = 000 Type Message 0 (Debug) = $111_b = 07_d$		
Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0		
	Byte1 Bit 7-6-5			**Byte1** Bit 4-3-2-1				**Byte1** Bit 0	**Byte2** Bit 7-6		**Byte2** Bit 5-4-3			**Byte2** Bit 2-1-0				

Table 1

Downlink Message

It's possible to set the device in the cloud without interacting with it locally, defining this type of downlink message and CT value on the sigfox backend or in your platform. That method is optional but it's not necessary.

Byte	**1**		**2 - 5**	**6**	**7**	**8**
Field	Setup byte (1byte)		Set time (4bytes)	Type uplink Message (1 byte)	Interval to send (minutes)	Not used
Value	Bit 7	1 (by default)	{Time-Epox}	06 07 08 09 ..	**[11…59]**	0x00
	Bit 6	1/0 enable/disable set Time				
	Bit 5	1/0 enable/disable set Type uplink Messsage				
	Bit 4	1/0 enable/disable set Interval to send				
	Bit 3	1/0 enable/disable Debug 1 (versión HW/FW)				
	Bit 2	1/0 enable/disable Debug 2 (instant power value Meter 1)				
	Bit 1	1/0 enable/disable Debug 3 (instant power value Meter 2)				
	Bit 0	1/0 enable/disable Debug 4 (instant power value Meter 3)				

Example for downlink message:

F0 {time} 07 0F 00 → With this downlink message set the remote device on time, with type of message 7 and interval to send 15 minutes, all debug messages are disables.

Debug option

It's possible debug on remote this device, it's necessary enable with downlink message this feature. There are tree types of debug message , Debug 1 (version HW/FW), Debug 2 (internals errors), Debug 3 (instant power meter values).

If this feature is enabled one time per day or in power up will be update these messages, with this sequence:

Debug 1 (9 bytes) → **Debug 2 (8 bytes)** → **Debug 3 (8 bytes)** → **Debug 4 (8 bytes)**

With this last one debug message is possible detect wrong installation issues, for example CT with wrong orientation. Use this extra feature to analysis or debug installation.

Type 0 : Debug 1 (9 bytes)						
Field	**Info**		**HW device**	**Version FW**	**Revision FW**	**Not used**
Type data	***See Table 1***					-
Byte	1	2	3	4	5	6-9

Type 0 : Debug 2 (8 bytes)					
Field	**Info**		**Active Power PH1 Meter 1**	**Active Power PH2 Meter 1**	**Active Power PH2 Meter 1**
Type data	***See Table 1***		signed integer (value*100)Watt	signed integer (value*100)Watt	signed integer (value*100)Watt
Byte	1	2	3 - 4	5 - 6	7 - 8

Type 0 : Debug 3 (8 bytes)					
Field	**Info**		**Active Power PH1 Meter 2**	**Active Power PH2 Meter 2**	**Active Power PH2 Meter 2**
Type data	***See Table 1***		signed integer (value*100)Watt	signed integer (value*100)Watt	signed integer (value*100)Watt
Byte	1	2	3 - 4	5 - 6	7 - 8

Type 0 : Debug 4 (8 bytes)					
Field	**Info**		**Active Power PH1 Meter 3**	**Active Power PH2 Meter 3**	**Active Power PH2 Meter 3**
Type data	***See Table 1***		signed integer (value*100)Watt	signed integer (value*100)Watt	signed integer (value*100)Watt
Byte	1	2	3 - 4	5 - 6	7 - 8

Warranty

Satel Spain guarantees its products against all manufacturing defects for a period of 1 year.

No return of material will be accepted, nor will any equipment be repaired if it is not accompanied by a report (RMA) indicating the defect observed or the reasons for the return.
The warranty will be void if the equipment has suffered "misuse" or the storage, installation or maintenance instructions in this manual have not been followed. “Misuse” is defined as any use or storage situation contrary to the National Electrical Code or that exceeds the limits indicated in this manual.
Satel Spain declines all responsibility for possible damage to the equipment or to other parts of the installations and will not cover possible penalties derived from a possible breakdown, poor installation, or "misuse" of the equipment. Consequently, the guarantee is not applicable to breakdowns produced in the following cases.

- Due to overvoltage and/or electrical disturbances in the supply.
- By water, if the product does not have the appropriate IP rating.
- For exposing the equipment to extreme temperatures, which exceed the operating or storage temperature limit.
- Due to a modification of the product by the client without prior notice to Satel Spain.

Faced with possible errors in this technical sheet, keep it updated in our website.