

SenNet Easy Compact Meter Sigfox

Energy Meter with 1 or 3 Trifasic Meter CT/Rogowski

General description

SenNet Easy 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.

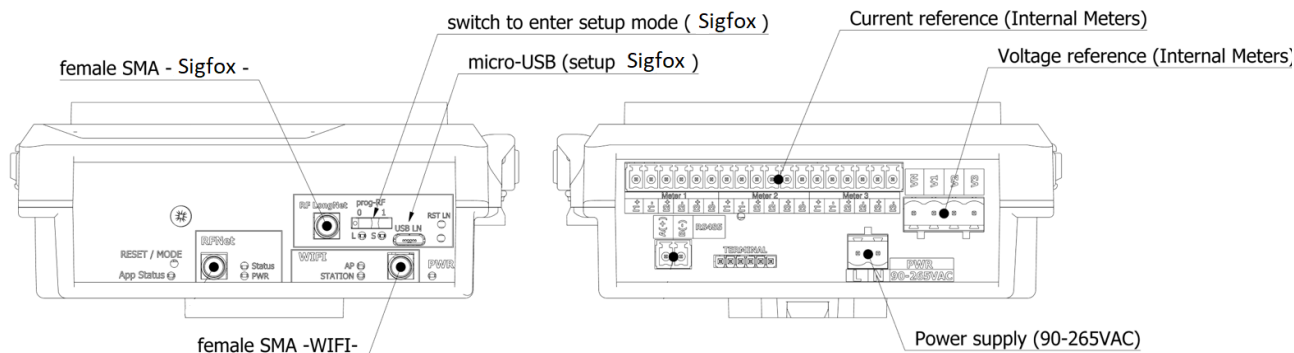
- Downlink message on Sigfox backend. (Type data & sample time)
- Micro-usb connection and console/terminal. (Type data & sample time)
- Wifi network on Access Point mode , through webserver.

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 One Compact 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 the type of message to use and take note to parse this data on your preferred platform.
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 following structure:

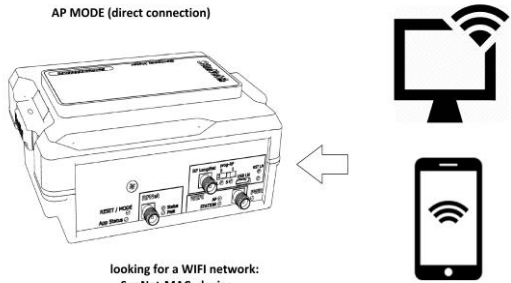
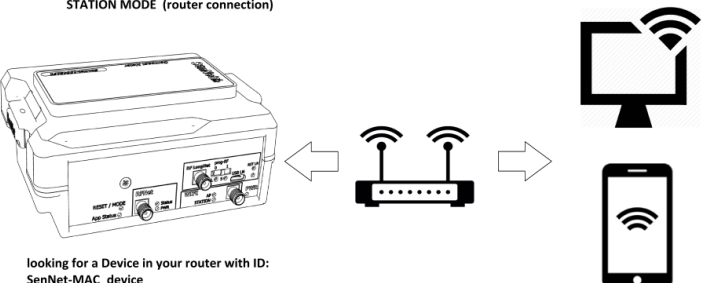
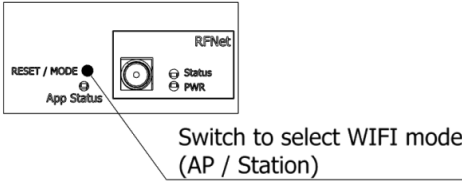
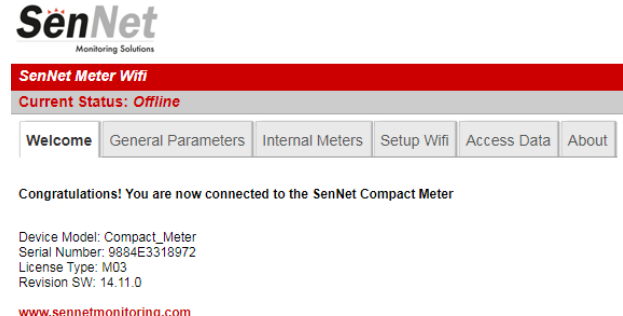
SSID_WIFI : SenNet-device_MAC example: SenNet-C4BE847654D8
AP WIFI Password: 123456789

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.

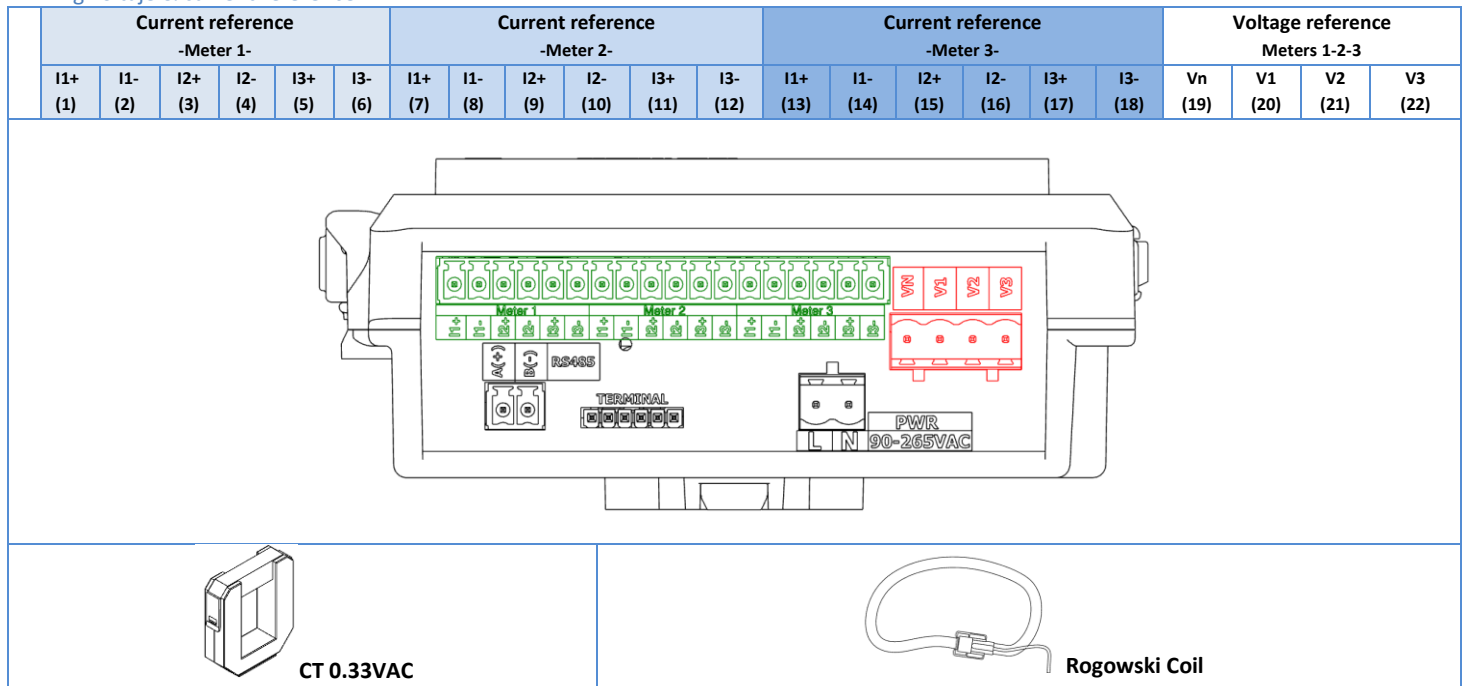
<p>AP MODE (direct connection)</p>  <p>looking for a WIFI network: SenNet-MAC_device</p> <p>Direct connection Access Point WIFI</p>	<p>STATION MODE (router connection)</p>  <p>looking for a Device in your router with ID: SenNet-MAC_device</p> <p>Connection through wifi router Station WIFI</p>
 <p>Switch to select WIFI mode (AP / Station)</p>	 <p>Address webserver : www.sennet.net</p>

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 One Compact Meter	

Wiring voltage & current reference.



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

Internal meter + SenNet flexible

Class 1

Class 1 factory calibrated

Isolated voltage

CT

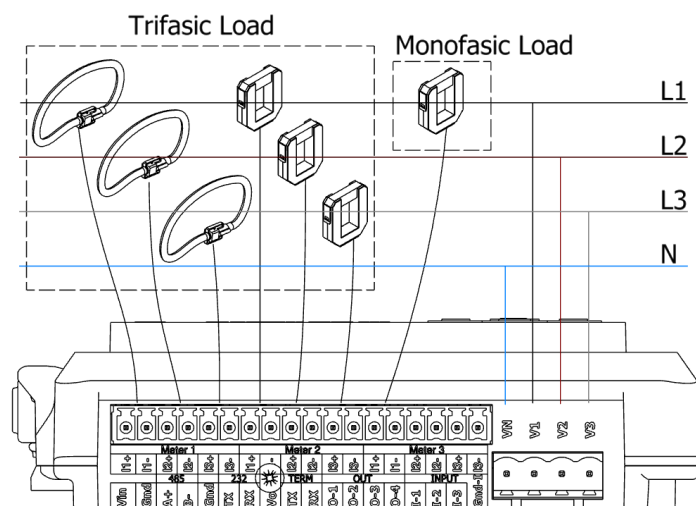
Flexible

2.5KV / 0.5mA / 3sec

600V CAT IV

Measurement Acquisition
Intensity channel sampling
Voltage channel sampling
Voltage channel sampling
Zero crossing sampling

8000 samples / sec
8000 samples / sec
24 bits
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%)

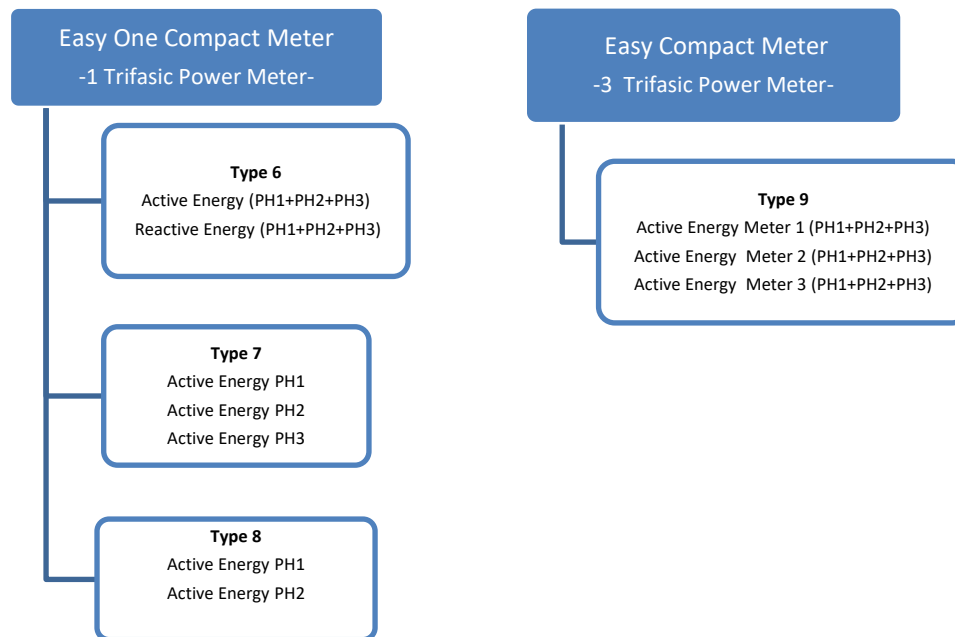
(*) Class 0.5 (+/-0.5%) special feature (under requirement to our factory)

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 6 : Active + Reactive Energy + Remote Node										
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 7: Active Energy PH1 + Active Energy PH2 + Active Energy PH3											
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

Type 8: Active Energy PH1 + Active Energy PH2 + Remote Node Data										
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 9: Active Energy Meter 1 + Active Energy Meter 2 + Active Energy Meter 3											
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								
	<u>Type Device</u>			<u>Type Message</u>			Some Phase in generation mode	Voltage sequence error	Overvoltage / SAG / Internal meter error	<u>Type Remote Nodes</u>			<u>ID Remote Nodes</u>			
	01 - Easy Meter (EM) / Easy Compact Meter (ECM)			type 0 (info) type 1 (EM) type 2 (EM) type 3 (EM)						0x00 – No local Network			No Remote = 000			
	02 – Pulse Counter			type 4 (EM-free)									Type Message 0 (Debug)			
	03 – Not defined			type 5 (EM-free)									= 111 ₁₀ = 07 ₁₀			
	04 – Enviroment Sensor			type 6 (ECM)												
	05 - PM			type 7 (ECM)												
	06 – GW Modbus			type 8 (ECM)												
	07 – Not defined			type 9 (ECM)												
				..												
				type 15 (not defined)												
							Feedback Error									
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 Message				
	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} 06 0F 00 → With this downlink message set the remote device on time, with type of message 06 & 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 three 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:



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.