EWATTCH
CONNECTED SENSORS FOR
ENERGY MANAGEMENT

SQUID-HC-LORAWAN

Technical manual for the LoRaWAN version SQUID.

Version 1.1

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HAZARDS AND WARNINGS

Manufacturer cannot be held responsible for failure by user to comply with the instructions in this manual. Any service performed on this product must be completed by a qualified individual. Replacement of this product must be performed by a qualified individual. Failure to use this equipment in accordance with the specifications in this documentation could lead to a hazard. No parts in this device should be replaced or removed. Disconnect all power supplies before working on the equipment.

CERTIFICATIONS AND CONFORMITIES

CEM

- EN 61000-6-2 Immunity for industrial environments
- EN 61000-6-3 Emissions for residential environments
- EN 55022 Immunity IT equipment

Radio

- EN 300220

Safety

- EN 61010 IT equipment

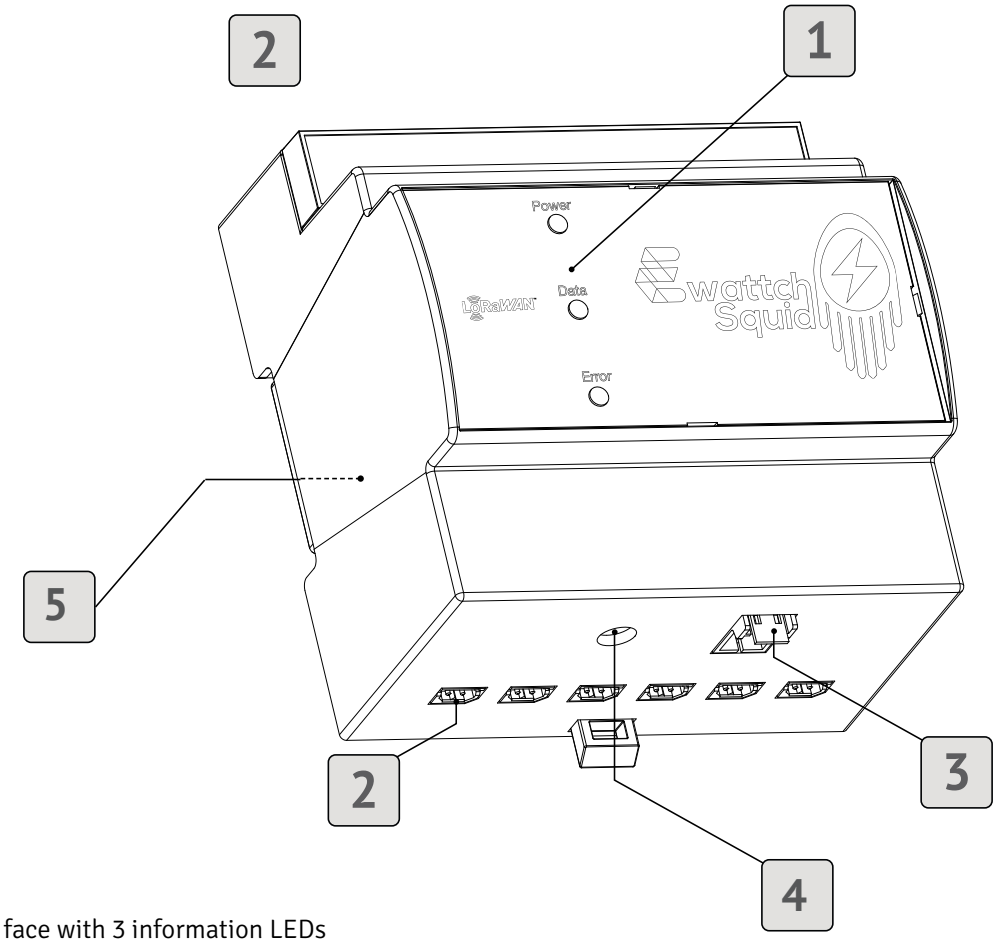
REFERENCES

SQUID-LORA-HC	The LoRaWAN version of the SQUID allows currents to be measured up to 600A.

Accessories

CURCLAMP-HC-S1	Measurement clamps for SQUID-HC - Ø10mm - 100A eff max
CURCLAMP-HC-S2	Measurement clamps for SQUID-HC - Ø16mm - 100A eff max
CURCLAMP-HC-S3	Measurement clamps for SQUID-HC - Ø24mm - 300A eff max
CURCLAMP-HC-S4	Measurement clamps for SQUID-HC - Ø36mm - 600A eff max

PRESENTATION



1 Front face with 3 information LEDs
Power: Presence of supply voltage
Data: Transmission of radio frame
Error: Operation error or product reset

2 12 x configurable current sensor inputs

3 Power connector 5VDC-1A

4 Antenna output (option)

5 Configuration switch (located under the cover on the bottom of the product)

PRODUCT DESCRIPTION

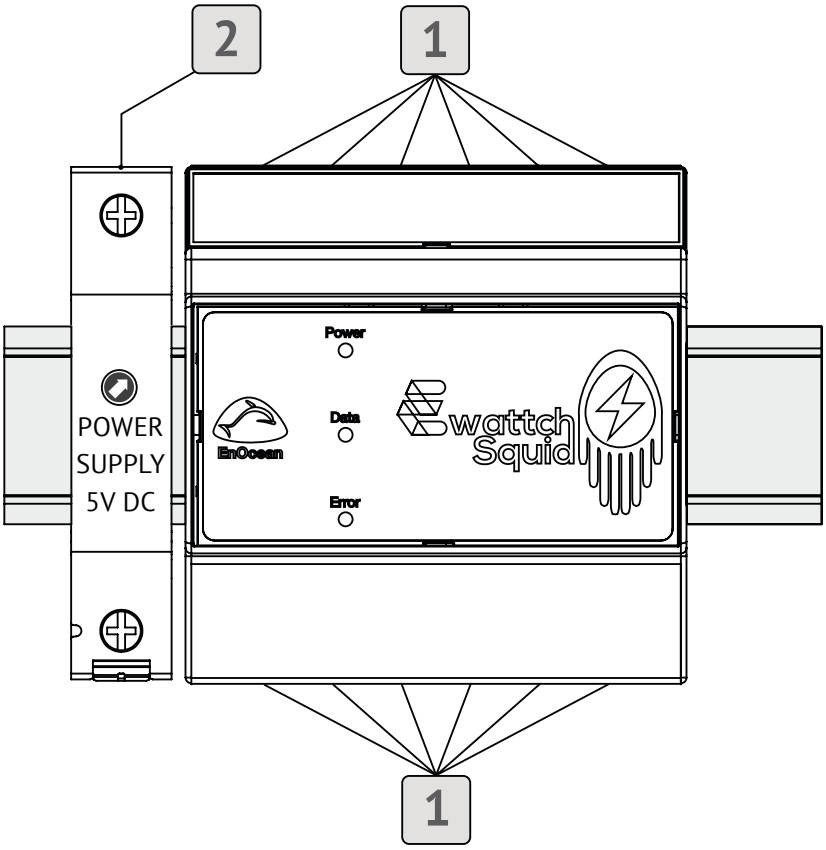
The SQUID is a sensor equipped with 12 current measurement clamps which send measured current values by means of a wireless LoRaWAN link.
The product sends the consumption index of the 12 clamps in Ah at configurable intervals.
The SQUID is powered by 5V DC by means of an external power supply.

PRODUCT INSTALLATION

RISK OF ELECTROCUTION, EXPLOSION OR ELECTRICAL ARC

Disconnect all power supplies before working on the equipment.
Manufacturer cannot be held responsible for failure by user to comply with the instructions in this manual.

Installation of the sensor



Mounting and disassembly

This equipment must be installed on a DIN 35mm rail mounted horizontally on the electrical panel.
Make sure to snap the box properly into the DIN rail.
Make provision for the location of 5 modules to install the product on the electrical panel. To disassemble, use a flat head screwdriver to loosen the clip

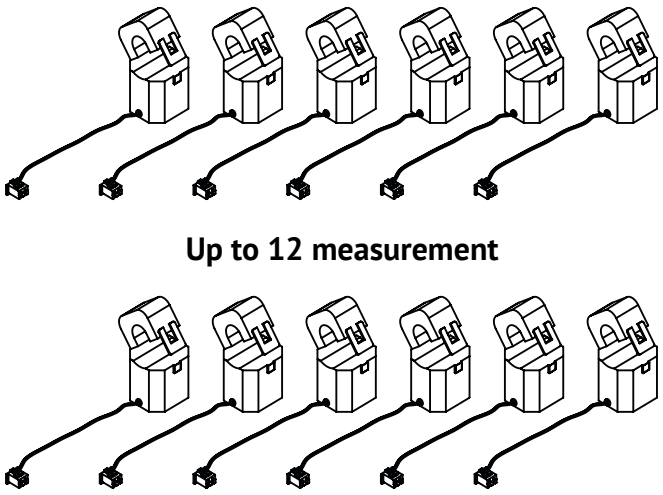
Prerequisite

A 5V DC-2A power supply must be placed in the lead, before coming to supply the SQUID. The wiring of the Extra Low Voltage Safety circuits must be maintained and kept separated from circuits carrying hazardous voltages.

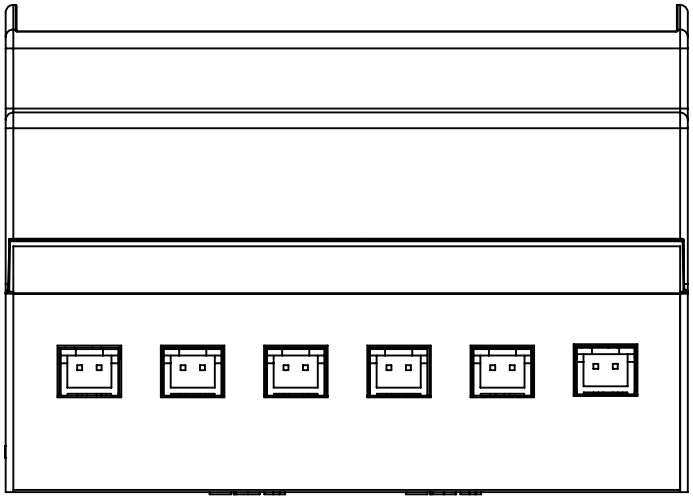
- Connection of the measurement clamps 1

Connect the measurement probes to the 12 connectors on the top and bottom of the equipment.
It is possible to pass several phases into a single clamp in order to add them; however, the phases must be passed in the same direction and the sum of the currents must not exceed the maximum specification of the clamp.

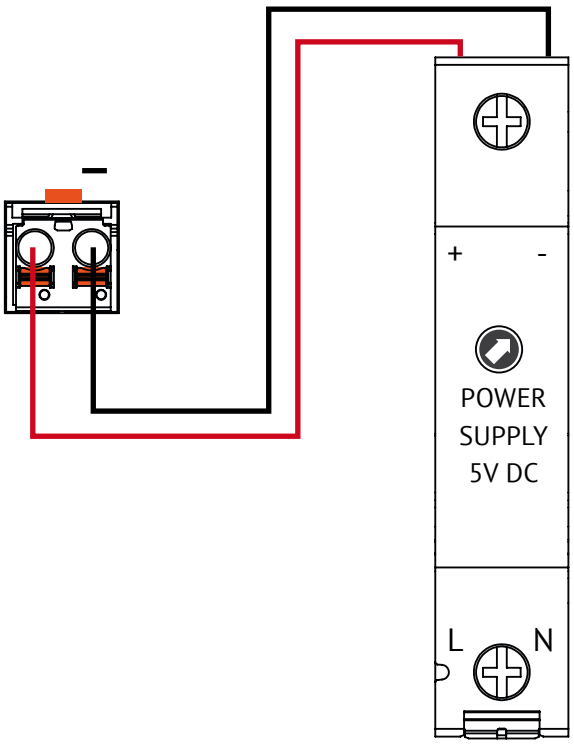
⚠ **CAUTION:** Only install the probes when the circuit is powered off.
It is essential only to use reference measurement clamps: CURCLAMP-HC-SX.
These are type C clamps.



Up to 12 measurement



- Power cable 2



Prerequisite
Use a 5V DC power supply with minimum output current of 2A

⚠ Make sure to use the correct polarity.

RADIO COMMUNICATIONS

LoRaWAN configuration

The SQUID periodically sends the current measurements performed on its 12 measurement clamps in the form of consumption indexes (Ah) via a LoRaWAN radio link

To be able to configure a SQUID on the LoRaWAN network, you must use the following codes:

- DevEUI: This is a factory programmed identifier which makes each object unique and is indicated on the label of each product.
E.g. 70B3D54750120168

- AppEUI: This single application identifier allows the objects to be grouped together. This 64-bit address allows the peripherals to be classified by application.
AppEUI Ewattch: 70B3D54750080001

- AppKey: This is a key shared between the peripheral and the network and used to derive the session keys. This parameter might need to be changed.

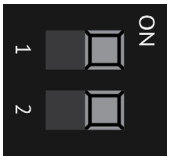
Transmission period

Switches 1 and 2 allow the transmission period to be chosen

One transmission every 10 minutes

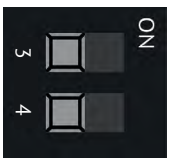
One transmission every 20 minutes

One transmission every 30 minutes



One transmission every 60 minutes

Switches 3 and 4 are currently not used



Not used

Payload descriptions

The SQUID-LoRaWAN transmits its data in a raw format on different public and private LoRaWAN networks.
The section below shows you how to decode the frames (Payload) sent by the SQUID.

Periodic frames

The periodic frames contain the data measured by the SQUID.

Example of a periodic transmitted frame (HEXADECIMAL):

0025 48 509F06 A03E0D 407D1A F56900 EAD300 D4A701 509F06 A03E0D 407D1A F56900 EAD300 D4A701

Explanation of the frame structure:

Index (in bytes)	Name	Example	Description
1	Frame type	00	Data sent periodically Other possible values: 0x01: Data sent during an event 0x10: Sensor status data
2	Payload size	25	Number of bytes sent. 0x25 in hexadecimals gives 37 bytes (excluding header: Frame type and Payload Size)
3	Object Type	48	Type of object 0x48: SQUID (12 MEASUREMENT CLAMPS)
The data below are in an unsigned 24-bit format and little-endian encoded. The multiplying coefficient is x 10 mAh Example of conversion: 0x509F06 => 0x069F50 => 434000 decimal => x10mAh => 4,340,000mAh or 4,340Ah and to have the power in VAh, it must be multiplied by the network			
04-june	Channel 1	509F06	Channel 1: 4,340Ah
07-sept	Channel 2	A03E0D	Channel 2: 8,680Ah
10-dec	Channel 3	407D1A	Channel 3: 17,360Ah
13-15	Channel 4	F56900	Channel 4: 271.2Ah
16-18	Channel 5	EAD300	Channel 5: 542.5Ah
19-21	Channel 6	D4A701	Channel 6: 4,340Ah
...	...	...	
37-39	Channel 12	D4A701	Channel 12: 4,340Ah

Status frame

The status frames contain supplementary information concerning the sensors (battery level, firmware version, etc.)

Example of a transmitted (HEXADECIMAL) status frame :

100A 0008 020401 0408 083C00

Explanation of the frame structure :

Index (in bytes)	Name	Object	Description
1	Frame type	**10**	Status frame
2	Payload size	**0A**	Number of bytes sent. 0x0A in hexadecimals gives 10 bytes (excluding header: Frame type and Payload Size)
3-4	Type of sensor	**00 08**	0x08: Squid Other possible values: 0x00: Environment v0x01: Presence 0x02: Ambience 0x10: Pulse 0x20: TyNess
5-7	Firmware version	**02 04 01**	0x04: Minor MSB version 0x01: Major LSB version I.e. Version 1.4 firmware
8-9	Battery level	**04 08**	0x08: Mains power Other possible values: 0x07 -> 0x02: Battery level normal 0x01: Level low 0x00: Level critical
10-12	Periodicity	**08 3C 00**	Periodicity of transmissions in seconds. Value of 16-bit code in little-endian to multiply by 10. 3C 00 => 0x003C hexadecimal i.e. 60 decimal and 60 x 10 = 600 seconds i.e. a transmission every 10 minutes.

TECHNICAL SPECIFICATIONS

POWER SUPPLY

VOLTAGE
5 VDC

CLAMPS AVAILABLE
4 different sizes : 10, 16, 24 et 36mm

CONNECTIONS

Measurement clamp inputs

NUMBER OF INPUTS
12

MAXIMUM CONSUMPTION
0.5A

MAXIMUM CURRENT
60A - 100A - 300A - 600A

ACCURACY
± 4%

Antenna

TYPE OF PLUG
SMA female

RESISTANCE
50 ohms

FREQUENCY
868 MHz

RADIO COMMUNICATIONs

LoRaWAN

FREQUENCY
868MHz

UNIQUE SERIAL NUMBER
oui

MAXIMUM TRANSMISSION POWER
25mW

COMMUNICATION DISTANCE
Up to 15 km in open areas

ENVIRONMENTAL CONDITIONS

FIELD OF USE
Indoors

OPERATING TEMPERATURE
From 5 to 40°C

STORAGE TEMPERATURE
From -20°C to +70°C

OPERATING HUMIDITY
From 10 to 80 %, without condensation

MAXIMUM ALTITUDE
2 000 m

POWER SUPPLY VOLTAGE FLUCTUATION
±10% of the nominal voltage

DEGREE OF POLLUTION
2

OVERVOLTAGE CATEGORY
III

TECHNICAL SPECIFICATIONS (CONT.)

PHYSICAL

DIMENSIONS (H X L X D)
90,5 x 87,8 x 62 mm

BULK
5 modules

WEIGHT
152 g

MOUNTING
Rail as DIN EN 60715 (1 x 35 mm)

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