SQUID Pro USA - English

by Ewattch Documentation

1. Introduction

Electrical Sub-Metering with 12 Channels and LoRaWAN Wireless Communication

Introducing the **SQUID Pro**, a revolutionary 12-channel energy meter for electrical sub-metering of your single-phase and three-phase installations.

Capable of measuring and transmitting via **LoRaWAN** wireless communication: **active power, reactive power, power factor**, and other information. This PRO version surpasses the performance of traditional meters for optimized management of your installations.

With its 12 snap-on current measurement clamps, 3 voltage inputs, long-range and secure connectivity, the SQUID Pro transmits real-time energy data, providing you with complete control over your consumption and a comprehensive view of your electrical network.

Experience unparalleled performance and intelligent energy management for energy savings and improved operational efficiency.

Advantages

- Electrical sub-metering with **12 measurements per snap-on clamps**.
- Accurate measurement of **active power, reactive power, and power factor** for optimized energy management.
- **LoRaWAN** wireless communication for reliable, long-range, and secure connectivity.
- **Real-time data** transmission for optimal tracking of your energy consumption.
- **Configuration and updates** via a simple and intuitive application.
- 4 sizes of clamps available from 10mm (75A) to 36mm (600A). No configuration required.

Measurements

- Energy: consumed active energy, produced active energy, positive reactive energy, negative reactive energy, apparent energy.
- Power: active power, reactive power, apparent power.
- Voltages.
- Frequency.

Use Cases

- **Building Management**: The SQUID Pro is the ideal solution for monitoring and optimizing energy consumption in tertiary buildings such as offices, shopping centers, and hospitals. With its advanced technology, it detects energy-intensive equipment, analyzes consumption peaks, and identifies energy-saving opportunities, allowing you to reduce costs and improve energy performance.
- **Industry**: Industrial companies can benefit from the SQUID Pro to effectively monitor and control the energy consumption of their machines and equipment. This leads to optimized preventive maintenance, improved production processes, and significant reduction in energy costs.
- **ISO 50001 Compliance and Tertiary Decree**: By choosing the SQUID Pro, you facilitate the implementation of your energy management project and ensure compliance with ISO 50001 standards and the tertiary decree. Opt for a high-performance and accurate solution for efficient and sustainable energy management.

2. Dangers and Warnings

The manufacturer cannot be held responsible if the instructions in this manual are not followed.
The product may only be installed by a professional.
Any intervention on the product must be carried out by a professionnal.
The product must be replaced by a professionnal.
The device must be used in accordance with the specifications in this documentation, otherwise there is a risk of danger. If the device is used in a manner not specified by the manufacturer, the protection provided by the device may be compromised.
No part of the device should be replaced or removed.
Disconnect all power supplies before servicing this unit.
Only accessories conforming to the manufacturer’s specifications should be used (current clamps and connecting cables).
The product must be used at a distance of at least 20cm from user’s body.

3. Installation and Implementation

Positioning of the product

The product must be positioned in a way that does not make it difficult to operate disconnector devices.
The product must be installed in an indoor environment.

Mounting on DIN rail

The product must be installed on a 35mm DIN rail fixed in an electrical panel.
Be careful to lock the housing on the DIN rail.

The DIN rail mount consists of 2 parts: a base and a movable and adjustable latch.
It is used to fix the Tyness horizontally or vertically on a DIN rail.

The product can be removed from the DIN rail by manipulating the movable latch with a screwdriver like any other bracket of the same type.

Installation

Before starting the installation of the SQUID Pro, ensure that you use a 24VDC – 0.5A power supply positioned at the head to power the device. It is important to maintain and separate the wiring of Low Voltage Safety Circuits (TBTS) from the circuits under dangerous voltage to ensure safety and proper system operation.

When wiring, make sure to observe the polarity of the power connector of the SQUID Pro.

The connection of the measurement clamps to the SQUID Pro is simplified using a quick connector, eliminating the need for tools. Connect the measurement probes to the 12 connectors located on the top and bottom of the device. Make sure not to exceed the maximum current specification for each measurement clamp to avoid the risk of damage or overheating.

To ensure safety during the installation of the clamps, it is imperative to perform this operation when the circuit is de-energized. Use exclusively Ewattch measurement clamps with the reference CURCLAMP-HC-SX, specially designed for optimal compatibility with the SQUID Pro.

The current measurement clamps of the SQUID Pro have a specific orientation, which must be respected. The clamps must be installed so that the arrow on the clamp points towards the energy consumer.

By following these installation and implementation recommendations, you will ensure safe and efficient operation of your SQUID Pro electrical sub-metering system.

There are 2 possible wiring modes with the SQUID Pro:

- Three-phase mode, allowing the measurement of 4 three-phase circuits.

Caution: It is necessary to follow the indications presented in diagram 1 for the wiring.

- Single-phase mode, allowing the measurement of 12 single-phase circuits.

Caution: It is necessary to follow the indications presented in diagram 2 for the wiring.

Three-phase wiring

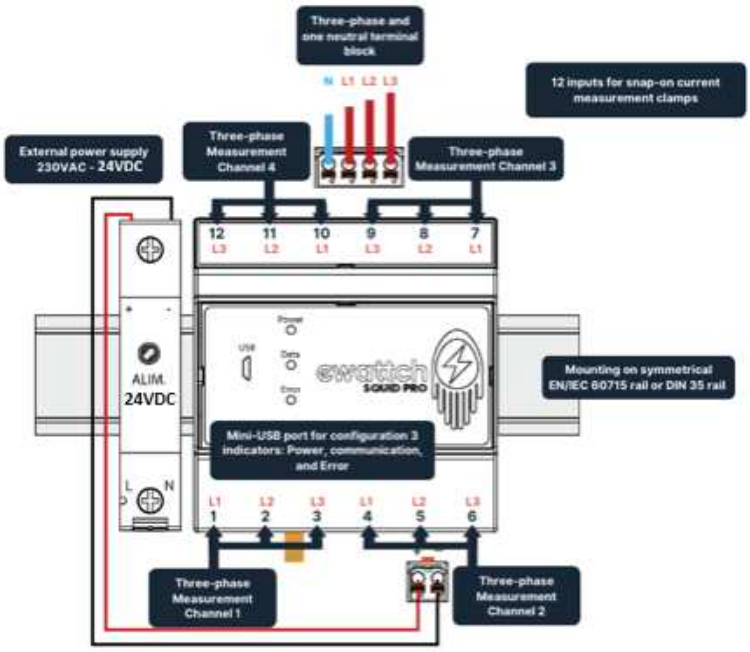
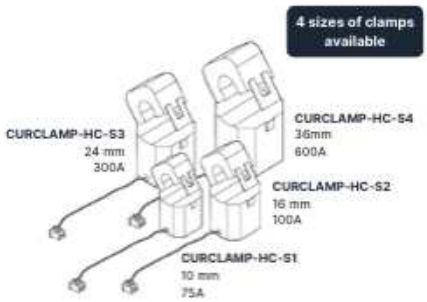


Diagram 1



Single-phase Wiring

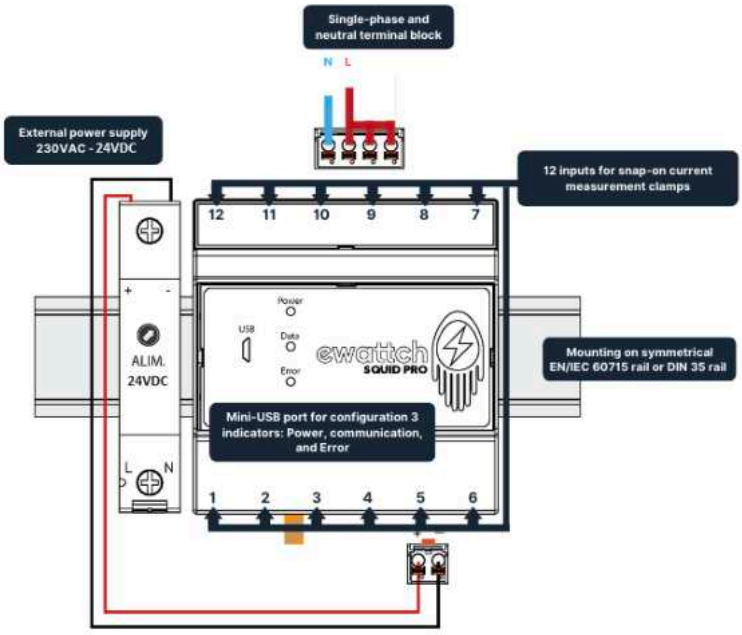
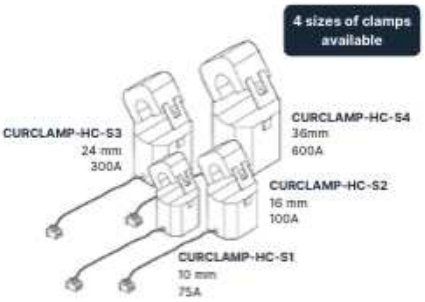


Diagram 2



4. Configuration Software

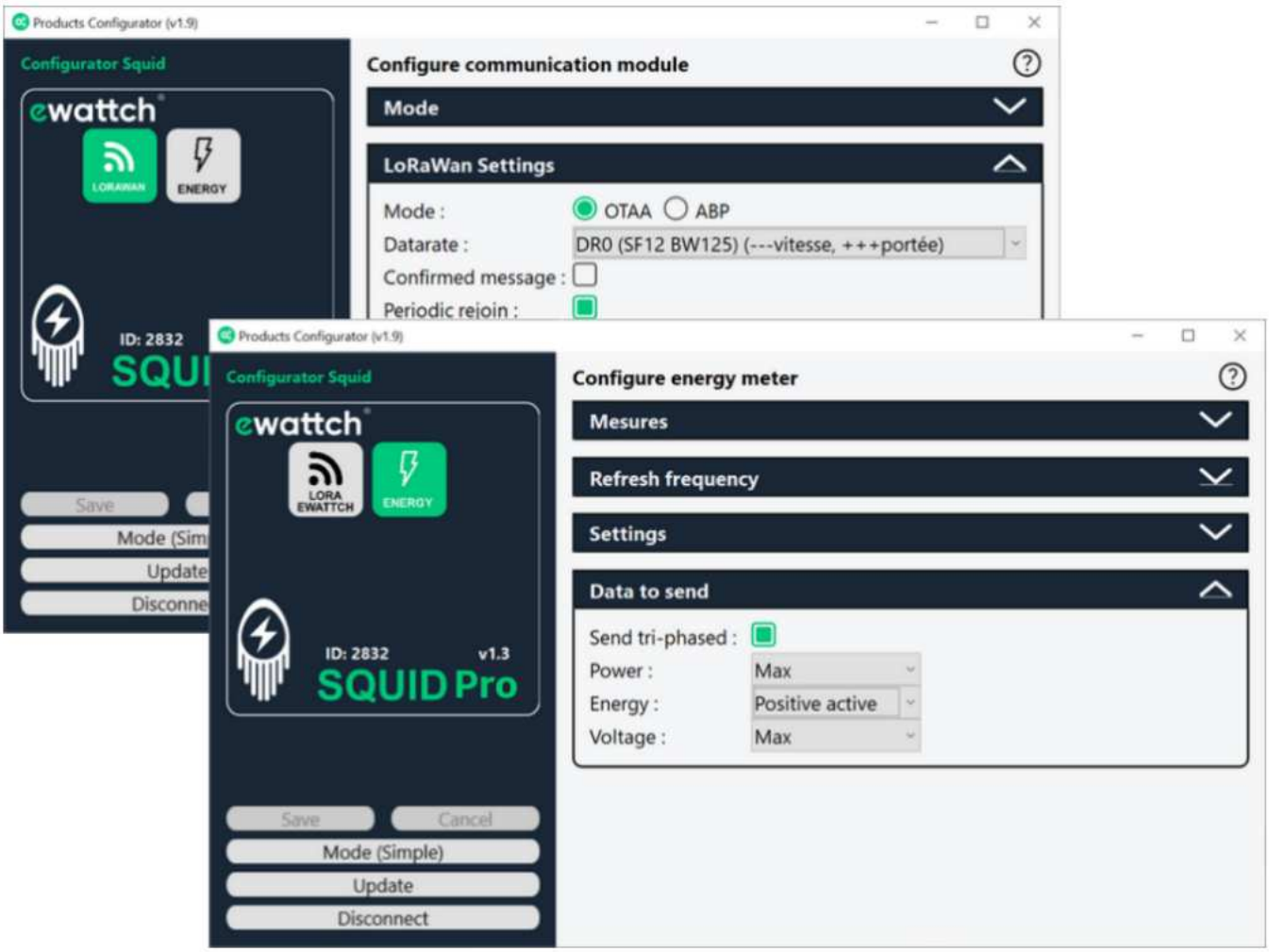
The SQUID Pro comes equipped with user-friendly and intuitive configuration software, specifically designed to facilitate the updating and customization of your electrical sub-metering device. With its micro-USB connection, you can easily connect the SQUID Pro to your computer and access the software to personalize the settings according to your needs.

The software is available at the following link:

https://ewattch-documentation.com/?page_id=540(/?page_id=540)

The software allows you to configure the desired types of measurements, transmission intervals, LoRa communication, and many other options with just a few clicks.

Furthermore, you benefit from firmware update support, ensuring that your device stays up to date with the latest improvements and features. With the SQUID Pro configuration software, you have complete control over your sub-metering system, guaranteeing accurate monitoring and continuous optimization of your energy consumption.



5. Default parameters

- Radio communication: LoRaWan
- LoRaWan mode: OTAA
- ADR: activated
- Messages confirmed: deactivated
- Periodic reconnection to the LoRawan network: deactivated
- Time between two radio communication of mesures: 10 minutes
- Activated measurements: Active energies

6. LoRaWAN Frame Description (Payloads)

The Squid Pro transmits its data in a raw format over various LoRaWAN public and private networks. The section below shows you how to decode the frames (payloads) sent by the Squid Pro.

Periodic Frames

Periodic frames contain the data measured by the Squid Pro.

Example of a transmitted periodic frame (HEX format):

00 26 40 C3 860400 040000 28E866 3C6692 D29766 9FB967 040000 040000 DF0C01 040000 050000 32A400

Index	Name	Example	Description
1	Frame type	00	Translated into English: Periodically Sent Data Other possible values: 0x01: Data sent during an event 0x10: Sensor status data
2	Payload size	26	Number of bytes sent. 0x26 in hexadecimal corresponds to 38 bytes (excluding the header: Frame type and Payload Size)
3	Object Type	40	Energy Meter
4	Measurement Type	C3	4 bits MSB = number of measurements, and 4 bits LSB = measurement type C: 12 measurements 3: Active Energy Consumption Index (10Wh) Refer to Measurement Type Table
The data below is in either 16 or 24-bit format, signed or unsigned, depending on the measurement type, and encoded in little endian. As mentioned above, there will be 12 measurements of the type "Active Energy Consumption Index," which should be divided by 10Wh.			
5-7	Channel 1	**860400**	0x860400 => 0x000486 => 1158 soit 11 580 Wh
8-10	Channel 2	**040000**	0x040000 => 0x000004 => 4 soit 40 Wh
11-13	Channel 3	**28E866**	0x28E866 => 0x66E828 => 6744104 soit 67441040 Wh
14-16	Channel 4	**3C6692**	0x3C6692 => 0x92663C => 1205820 soit 12058200 Wh
17-19	Channel 5	**D29766**	...
20-22	Channel 6	**9FB967**	...
23-25	Channel 7	**040000**	...
26-28	Channel 8	**040000**	...
29-31	Channel 9	**DF0C01**	...
32-34	Channel 10	**040000**	...
35-37	Channel 11	**050000**	...
38-40	Channel 12	**32A400**	0x32A400 => 0x00A432 => 42034 soit 420340 Wh

Measurement Type	Code (Hex)	Frame Format	Measurement Size
Current Index (10mAh)	0	x Index in multiples of 10mAh	3 bytes
Current (mA)	1	x Current measurements in mA	3 bytes
Current Index (10mAh) + Current (mA)	2	x Index in multiples of 10mAh followed by x Current measurements in mA	3 bytes
Active Energy Consumption Index (10Wh)	3	x Index in multiples of 10Wh	3 bytes
Active Power (W)	4	x Active power measurements in W	3 bytes (signed)
Active Energy Production Index (10Wh)	5	x Index in multiples of 10Wh	3 bytes
Positive Reactive Energy Index (10varh)	6	x Index in multiples of 10varh	3 bytes
Negative Reactive Energy Index (10varh)	7	x Index in multiples of 10varh	3 bytes
Reactive Power (var)	8	x Reactive power measurements in var	3 bytes (signed)
Apparent Energy Index (10VAh)	9	x Index in multiples of 10VAh	3 bytes
Voltage (100mV)	10	x Voltage measurements in multiples of 100mV	2 bytes
Apparent Power (VA)	11	x Apparent power measurements in VA	3 bytes
Frequency (0.01Hz)	12	x Frequency measurements in 0.01Hz	2 bytes

Tip – Rollover Management

To facilitate the management of energy measurement rollovers, the most significant bit of these measurements is used to indicate if a rollover has already occurred. It is never reset to 0. Therefore, during a rollover, the measurement will transition from 0xFFFFFF to 0x800000.

Tip – LoRaWAN Payload Decoding

To facilitate the integration of products communicating via the LoRaWAN network, Ewattch has developed a payload decoder available at this address: https://ewattch-documentation.com/?page_id=2215(/?page_id=2215)
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7. Display Examples

8. Compatible Platforms

We are committed to providing extensive compatibility for our products, including the SQUID PRO, with various platforms in the market. We understand the importance of flexibility and interoperability for our customers, which is why we strive for seamless integration of our solutions with the most popular and innovative platforms. If you wish to use a platform that is not yet listed as compatible, please feel free to contact us.

9. Cleaning the product

The cleaning of the product should be done with a dry, soft and lint-free cloth. Remove embedded deposits with a slightly damp cloth.
Do not use any cleaner, alcohol or thinner.

10. Technical Specifications

MEASUREMENTS

- **Energies**: Active consumed, Active produced, Reactive positive, Reactive negative, Apparent
- **Powers**: Active, Reactive, Apparent
- **Voltages :** max 265V per phase
- **Frequency :** 50Hz or 60Hz
- **Precision :** 1%

RADIO COMMUNICATION

- **Frequency :** 915MHz
- **Maximum transmission power :** 6.3mW
- **Communication distance :** up to 15km in open field
- **Version :** 1.0.1
- **Class :** A

POWER SUPPLY

- **Voltage :** 24 VDC via an external power supply
- **Power Supply Voltage Fluctuation:** 21V to 26V
- **Maximum consumption :** 0,1A

CONNECTORS

Measurement Current Inputs

- **12 inputs**
- **4 available clamp sizes :** 10mm (75A) / 16mm (100A) / 24mm (300A) / 36mm (600A max)
- **Clamp type :** Open current transformer
- **Cable length for clamps :** 2m

Voltage Inputs

- **4-pole connector :** for conductors from 0.2mm² to 2.5mm²
- **3 phases et neutral (230VAC)**

Configuration

- **1 micro-USB port**

Antenna

- **Connector type**: RP-SMA male

- **Impedance :** 50 ohms
- **Frequency :** 902-928 MHz

Alimentation

- **2-pole connector :** 24VDC and ground for conductors from 0.15mm² to 1.5mm²

ENVIRONMENTAL SPECIFICATIONS

- **Intended use :** Indoor (IP20)
- **Operating Temperature :** from 5 to 60°C
- **Storage Temperature :** From -20°C to +70°C
- **Operating Humidity :** From 10% to 80%, non-condensing
- **Storage Humidity :** From 10% to 80%, non-condensing
- **Maximum Altitude :** 2000 m
- **Pollution Degree :** 2
- **Overvoltage Category :** III

PHYSICAL SPECIFICATIONS

- **Dimensions (H X W X D) :** 90,5 x 87,8 x 62 mm
- **Occupies :** 5 modules
- **Weight :** 152 g
- **Mounting :** DIN EN 6 0715 rail (1 x 35 mm)

11. Certifications and Compliance

EUROPE

EMC

- EN 61000-6-2 : Immunity for industrial environment
- EN 61000-6-3 : Emission for residential environment
- EN 55022 : IT equipment immunity

Radio

- EN 300220 : Electromagnetic compatibility and radio spectrum for short-range devices

Safety

- EN 61010 : electrical test and measurement equipment

Logos

- CE European conformity symbol

- symbol of the WEEE directive (Waste Electrical and Electronic Equipment)

USA

FCC compliance statement

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

FCC §15.21

The Federal Communications Commission (FCC) warns the users that changes or modifications to the unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC §15.203

This equipment must be installed by qualified professionals or contractors in accordance with FCC Part 15.203, Antenna Requirements. Do not use any antenna other than the one provided with the unit.

FCC §15.105 (b)

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC ID: 2BBDC-SQUID-PRO-01

IC compliance statement

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

1. *This device may not cause interference;*
2. *This device must accept any interference, including interference that may cause undesired operation of the device;*

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence.
L'exploitation est autorisée aux deux conditions suivantes :

1. *L'appareil ne doit pas produire de brouillage;*
2. *L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement;*

IC: 31217-SQUIDPRO01

12. References

KIT SQUID-PRO-915MHz : Kits including a SQUID-PRO-915Mhz and all necessary accessories:

- 1 power supply with DIN rail mounting 230VAC-24VDC (ref.: ALIM-RAIL-24V)
- 1 magnetic antenna for external mounting (ref.: ANTMAGNSUP-915MHz)
- Note: The kit does not include any current clamps.

CURCLAMP-HC-S1 : Clip-on current clamp Ø10mm – 75A eff max

CURCLAMP-HC-S2 : Clip-on current clamp Ø16mm – 100A eff max

CURCLAMP-HC-S3 : Clip-on current clamp Ø24mm – 300A eff max

CURCLAMP-HC-S4 : Clip-on current clamp Ø36mm – 600A eff max

SQUID-PRO-915MHz : Product reference without accessories
ALIM-RAIL-24V : 230VAC 24VDC power supply with DIN rail mounting
ANTMAGNSUP-915MHz : Antenna with magnetic base (Cable length: 4m)

13. Contact

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