User Guide | PULSE ARF8230ARA | LoRaWAN EU863-870

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Product/Service	PULSE
Area	LoRaWAN EU863-870
Etat	Terminé

PRODUCTS AND REGULATORY INFORMATION

This User Guide applies to the following product:
PULSE ARF8230ARA LoRaWAN EU863-870

Reference: ARF8230ARA
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1. PRODUCT PRESENTATION

📌 **NOTE**
The PULSE can be started using a magnet, or by switching the product from “PARK” mode to “PRODUCTION” mode in the IoT Configurator.

1.1. General Description

The PULSE is a **ready-to-use sensor** for monitoring multi-fluid consumption and detecting anomalies (leaks and overconsumption).

It can be interfaced with any **gas**, **electricity**, **water** or **heat** meter, or any other equipment (rain gauge, odometer, etc.) with a **pulse output** (dry contact interface or open collector input).

Thanks to its **IP68** protection rating, the PULSE can operate in any type of environment.

The product transmits meter data **periodically**, with or without history. It also enables **fraud** and **leak** detection, as well as **flow calculation**, with the option of transmitting data when thresholds are exceeded.

Transmitter **configuration** can be accessed **locally** via a USB-C port, or **remotely** via the network.

The PULSE is powered by a **replaceable internal battery**.

This product is compatible with Adeunis' KARE **Device Management** platform and the KARE+ service for **Over-The-Air** updating of a fleet of sensors. This adeunis sensor management offer helps to **optimize operating costs** by intervening on

site at the right time and avoiding unnecessary travel, to **consolidate a business model** by ensuring a product's service life and adjusting its configuration, **and to increase end-customer satisfaction by ensuring continuity of service.**

1.2. Features

- **Universal pulse counter**: 2 configurable pulse inputs enable communication between 1 or 2 meters or pulse output devices such as dry contacts, REED, S0 relays or open collectors
- **Quick configuration locally via USB-C port and remotely via the network:** including setting of acquisition period, transmission modes and alarm thresholds
- **Customizable data transmission modes:** periodic with configurable transmission frequency and/or event-driven (flow rate thresholds exceeded)
- **Data logging**: up to 23 samples per frame
- **Programmable acquisition time:** select the exact time at which the product will perform the first acquisition, and save the index
- **Timestamping**
- **Automatic daily synchronization of the internal clock:** to guarantee index acquisition and storage at a fixed time and without drift
- **Redundancy**: with configurable number of data repeats per frame
- **Fraud and leak detection**
- Configurable **lifetime frame**
- **Network test at start-up**
- **Customizable join phase**
- **Pulse detection test at startup**, either locally via LED indicator or remotely via LoRaWAN server
- **Over 15 years' autonomy:** Powered by a replaceable battery, designed to operate for many years without replacement (see autonomy table)

- **Low battery warning:** When the product detects a low battery level, the user is alerted locally via a light signal and remotely via the “Low Battery” alarm in the status byte of each frame.
- **Integrated mounting system**: DIN-rail, tube, wall, clamp
- **IP68 protection rating**: PULSE can operate in any environment

📌 **NOTE 1**
The PULSE is delivered by default with an OTAA (Over-The-Air Activation) configuration, allowing the user to register the product with a LoRaWAN operator.

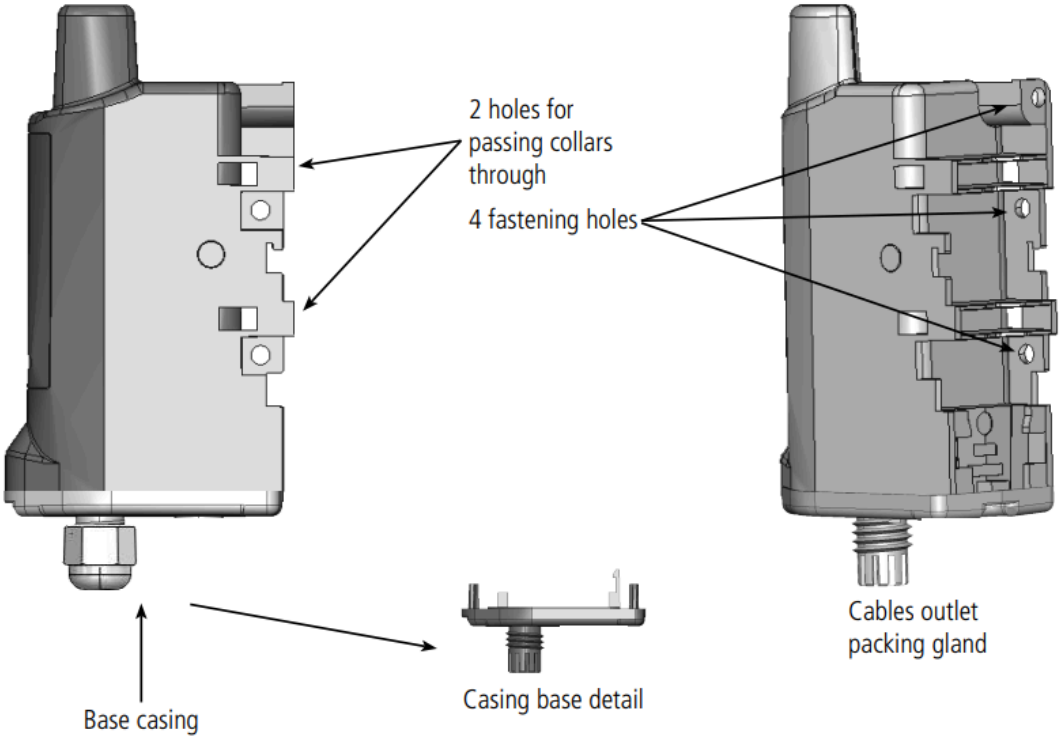
NOTE 2
The PULSE can transmit meter readings but does not power them.

1.3. Delivery Package Composition

The product is delivered in a cardboard package containing the following items:

- Upper casing, circuit board, casing soleplate and 2 Torx 10 screws for the soleplate
- Cable gland locknut and 2 cable gland seals
- FANSO ER18505H battery

1.4. Casing presentation



1.4.1 Environmental Conditions and Protection Rating

The product enclosure has been tested to ensure a certain level of dust and water resistance.

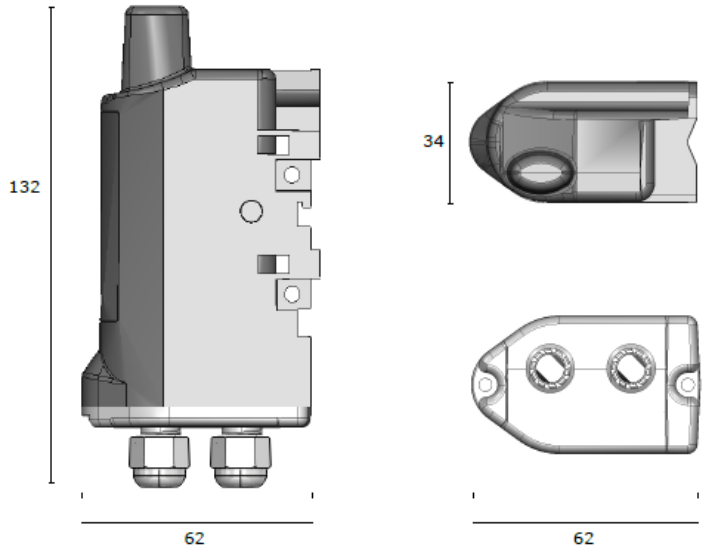
- For dust: Level 6 guarantees complete dust tightness.
- For water: Level 8 guarantees at least water resistance up to one meter for 1 hour.

Therefore, we can guarantee the water resistance of our IP68 enclosure for immersions less than or equal to this duration. Any use of our sensor outside the criteria mentioned above cannot be guaranteed by Adeunis.

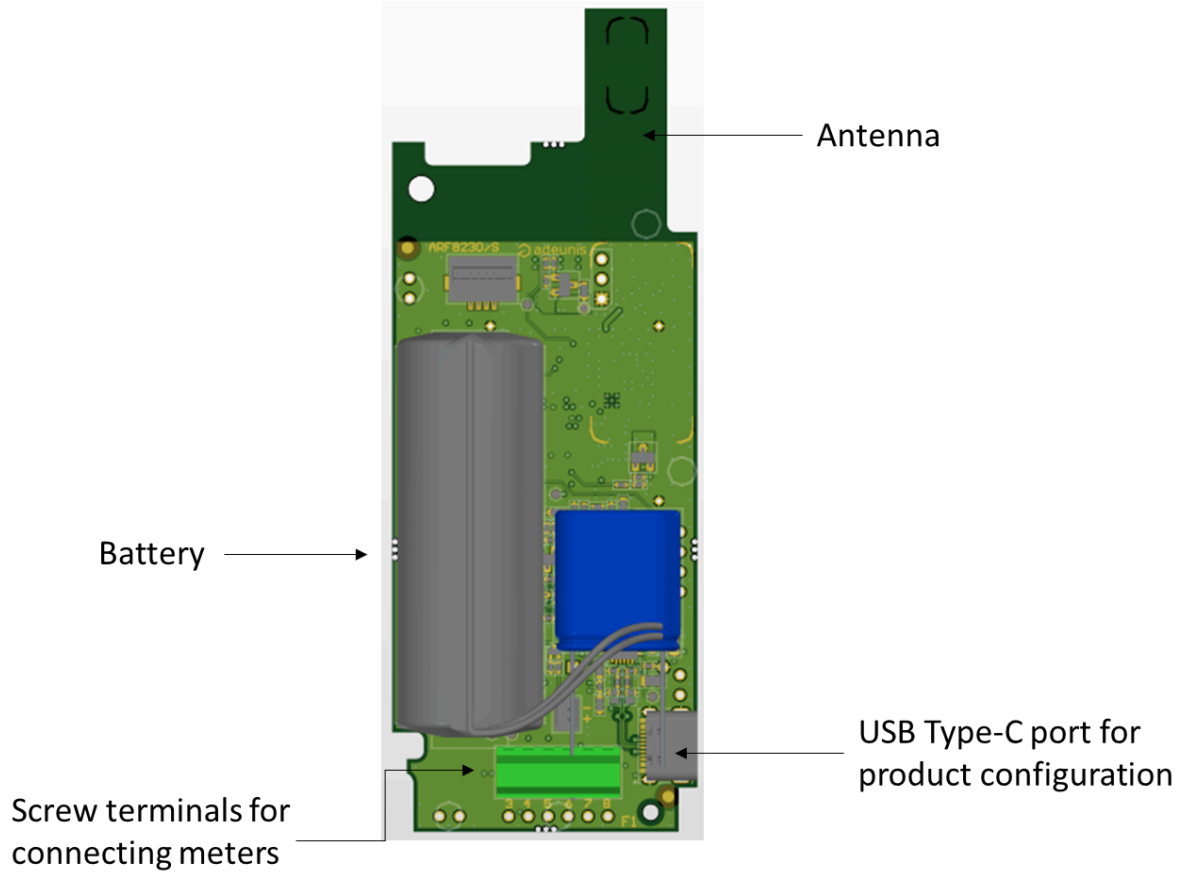
> 📌 **NOTE**
> The IP68 protection rating does not guarantee protection against condensation due to ambient humidity and temperature variations. Prolonged exposure to high-temperature variations and/or high relative humidity can lead to premature product failure.

1.5. Dimensions

Values in millimeters



1.6. Electronic card

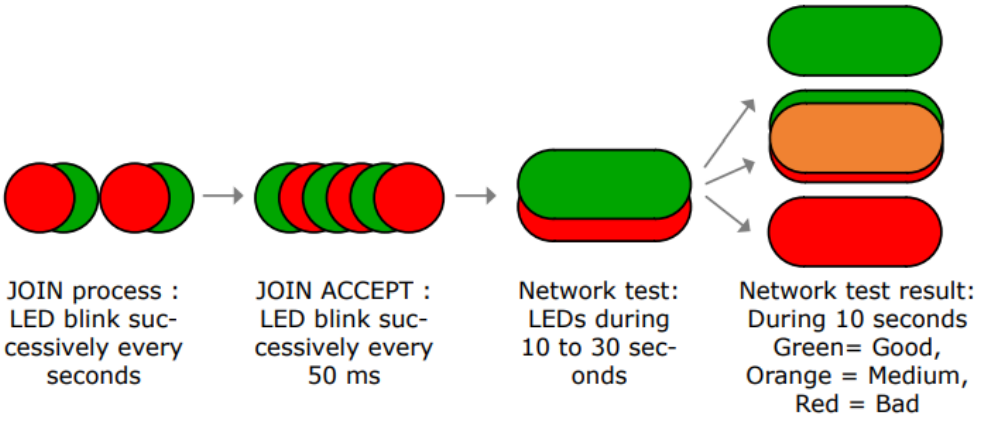


1.7. Operation of the LEDs

Product status	LED red state	LED green state
Product in PARC mode	OFF	OFF
Magnet detection process (1 to 6 seconds)	OFF	ON from detection of the magnet up to a maximum of 1 sec
Product start (after detection of the magnet)	OFF	Rapid flashing 6 cycles 100 ms ON / 100 ms OFF
JOIN process running	Flashing 50 ms ON / 1 sec OFF	Flashing 50 ms ON / 1 sec OFF (just after the red LED)
JOIN process completed (JOIN accept)	Flashing 6 cycles 50 ms ON / 50 ms OFF	Flashing 6 cycles 50 ms ON / 50 ms

Product status	LED red state	LED green state
		OFF (just before the red LED)
Network Quality test running	10 to 20 sec ON	10 to 20 sec ON
Network Quality test result	Bad coverage : 10 sec ON Medium coverage : 10 sec ON Good coverage : OFF	Bad coverage : OFF Medium coverage : 10 sec ON Good coverage : 10 sec ON
Pulse detection test in progress	ON for 2 sec for each valid pulse on channel B 10 cycles	ON for 2 sec on each valid pulse on channel A 10 cycles
Low battery level	Flashing 500 ms ON every 60 seconds	OFF
Switching to the Command mode	ON	ON
Product faulty (return to factory)	ON	OFF

LEDs scenario for a sensor configured in Class A OTAA:



1.8. Power Supply

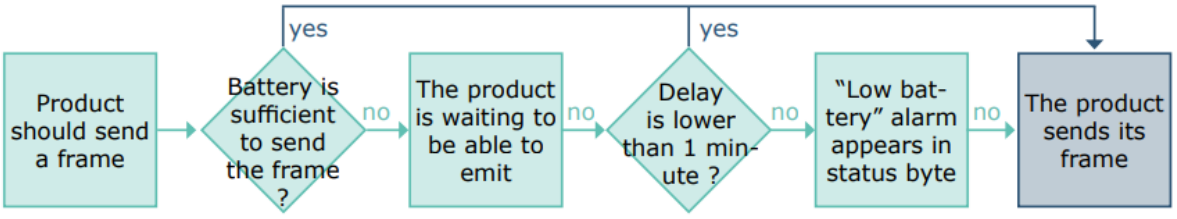
1.8.1 Power Supply Type

The PULSE should be powered by a FANSO ER18505H battery (maximum current 200 mA).

- The USB-C port cannot be used to recharge the battery.

1.8.2 Low battery management

When the product detects that the battery is not anymore in capacity to deliver the energy needed to send a frame (extreme temperatures or end-of-life of the battery) it waits to be in capacity to transmit. If it detects that the delay generated is longer than 1 minute it informs the user that the battery level is low.



The user can be informed of the product's battery status:

- Locally via LED display,
- remotely via the “Battery Low” alarm in the status byte of each frame.

2. TECHNICAL SPECIFICATIONS

2.1. General characteristics

Mechanical Specifications	
Dimensions	132 × 62 × 34mm
Weight	103 g
Enclosure	IP68 Indoor/Outdoor use

Mechanical Specifications	
Mounting System	DIN rail, tube, wall, collar

Electrical Specifications	
Supply Voltage	3.6V nominal
Power Supply	FANSO ER18505H 3.6V Battery (max current 200 mA)
Battery Capacity	4000 mAh

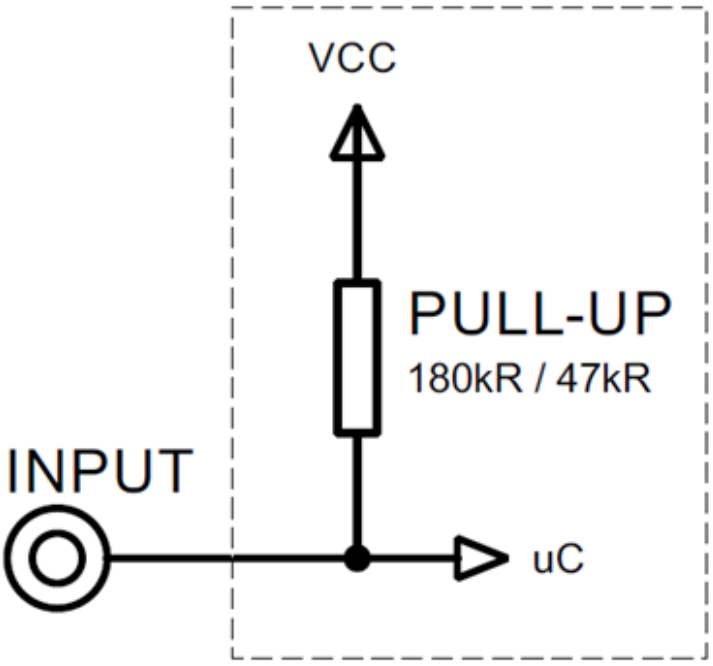
Operating Conditions	
Operating range	-25°C / +70°C
Altitude during operation	2000 m or less

RF Specifications	
LoRaWAN Region	EU 863-870 MHz
LoRaWAN Specification	1.0.4
Max Transmit Power	+14 dBm
Sensitivity at SF7	-130 dBm
Application Port (downlink)	1
Timestamp Daily Drift between [-10°C and 60°C]	< 3 seconds per day

2.2. PULSE Signal Input Interface

The PULSE product features 2 configurable pulse inputs, enabling communication between 1 or 2 counters or equipment with pulse outputs such as dry contacts, REED, S0 relays or open collectors.

THE BLOCK DIAGRAM IS AS FOLLOWS



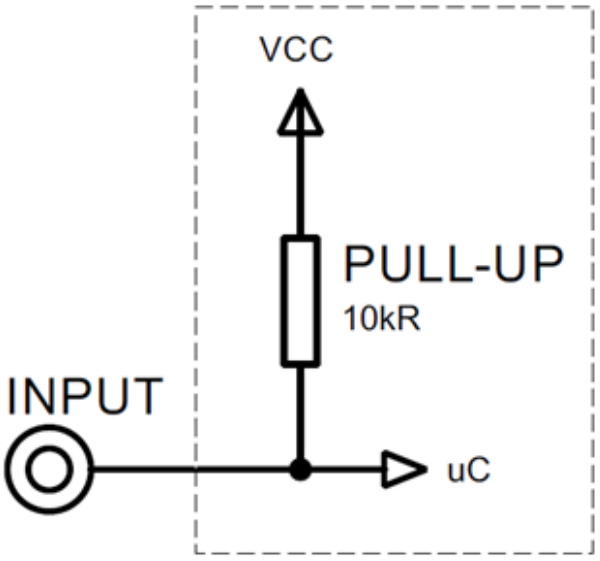
Maximum Absolute Values	Values
Minimum Input Voltage	-0.7 V
Maximum Input Voltage	3.6 V

Electrical Specifications	Values
Minimum Input Voltage	0 V
Maximum Input Voltage	3.3 V
Equivalent Input Resistance	180 kΩ (Water) 47 kΩ (Gas)
Input Frequency	<100 Hz
High-Level Input Current Consumption	0 µA
Low-Level Input Current Consumption	28 µA (Water) 99 µA (Gas)

Values above the maximum absolute values will damage the product.

2.3. Fraud Signal Input Interface

THE BLOCK DIAGRAM IS AS FOLLOWS



Maximum Absolute Values	Values
Minimum Input Voltage	-0.7 V
Maximum Input Voltage	3.6 V

Electrical Specifications	Values
Minimum Input Voltage	0 V
Maximum Input Voltage	3.3 V
Equivalent Input Resistance	10 kΩ
High-Level Input Current Consumption	98 µA
Low-Level Input Current Consumption	330 µA

Values above the maximum absolute values will damage the product.

2.4. Compatible Meters

Examples of sensors tested by Adeunis (non-exhaustive list)

Manufacturer	Meter / Pulse emitter reference	Meter type
ITRON	CF Echo II	Thermal
FLUDIA	FM230	Electric
SOCOMEC	Countis E00	
MCI	DDS-1Y	
HAGER	ECP140D	
SCHNEIDER	IEM3210	
GAVAZZI	EM110DINAV81XO1X	
LEGRAND	EMDX³	
KAMPSTRUP	Pulse Adapter	Water
ITRON	Cyble Sensor V2	Water
SAPPEL-DIEHL	Izar Pulse	Water
ELSTER	PR6	Water
MADDALENA	Flow Pulse	Water
SENSUS	MS8100	Water
ELSTER	Reed PSMT T-Probe	Water
B-Meter	IWM-PL3	Water
WEHRLE MODULARIS	TRK-HYX / ETK-EAX	Water
DIEHL	REED SWITCH 570 REF: 630-061	Water
MADDALENA	Reed Switch WMAP	Water
MADDALENA	Reed Switch ONE	Water
MADDALENA	Flow Pulse WMAP	Water
ZENNER	Zenner - ZNREED 133802	Water
SENSUS	Capteur Reed RD	Water

Depending on the mission profile of your product, we recommend contacting us for further assistance.

3. PRODUCT AUTONOMY

Operating conditions :

Storage maximum of the product: 1 year maximum.

Calculations performed at a temperature of 20°C

Based on 500 pulses/day with a PULSE configured for the monitoring of a water counter without Pull-up

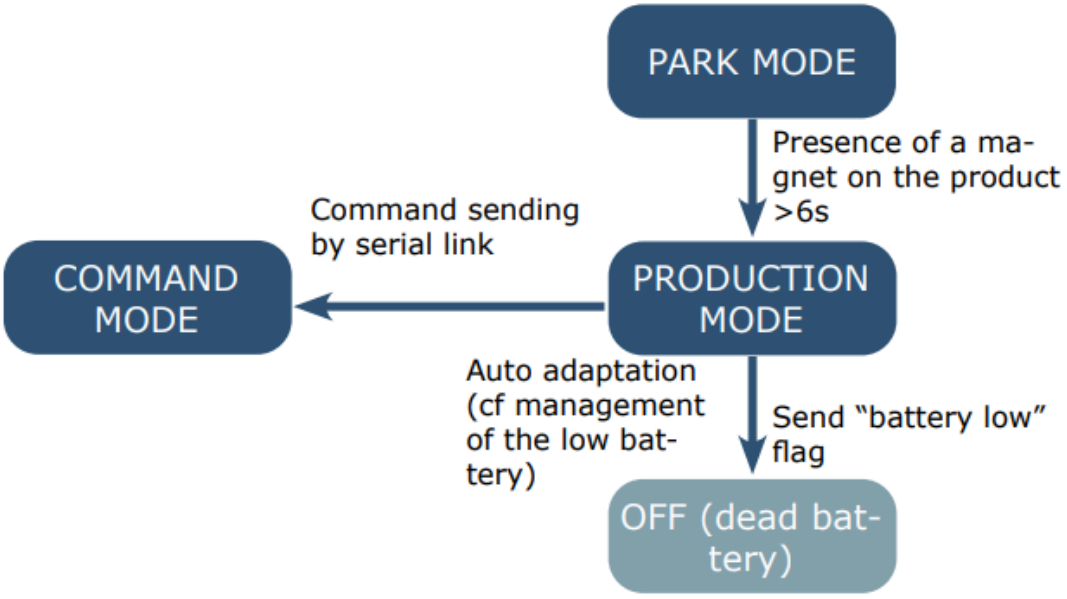
Sending period	Number of meters	Autonomy SF7 (years)	Autonomy SF12 (years)
144 frames/day	1	> 15	2.1
144 frames/day	2	13	2
96 frames/day	1	> 15	3
96 frames/day	2	> 15	2.9
48 frames/day	1	> 15	5.5
48 frames/day	2	> 15	5.2
24 frames/day	1	> 15	9.5
24 frames/day	2	> 15	8.6
12 frames/day	1	> 15	14.9
12 frames/day	2	> 15	12.7
6 frames/day	1	> 15	> 15
6 frames/day	2	> 15	> 15
4 frames/day	1	> 15	> 15
4 frames/day	2	> 15	> 15
2 frames/day	1	> 15	> 15
2 frames/day	2	> 15	> 15

The above values are estimations based on certain conditions of use and environment. They do not represent a commitment on the part of Adeunis.

4. PRODUCT OPERATION

4.1. Global Operation

The product has several operating modes:



4.1.1 PARK mode

The product is delivered in PARK mode, it is in standby mode and its consumption is minimal. To switch the product out of the Park Mode pass a magnet across it for a duration higher than 6 seconds.

The green LED illuminates to indicate the detection of the magnet and then flashes quickly during the product starting phase.

The device then sends its configuration and data frames.

4.1.2 COMMAND mode

This mode allows you to configure the registers of the product.

Please note that it is necessary to install the official Silabs driver, which is available here: **Silabs USB to UART Bridge VCP Drivers**.

To enter this mode, you need to connect a cable to the USB-C port of the product and use the IoT Configurator.

To exit this mode, you can either use the disconnect function in the IoT Configurator or disconnect the USB-C cable. The product will then return to its

previous mode, either PARK or PRODUCTION.

4.1.3 PRODUCTION mode

This mode allows the user to operate the product in its final use. It should allow a maximum of autonomy to the product.

4.2. JOIN Process

4.2.1 Start-up of the product, JOIN process and configuration

The product start the JOIN process after entering PRODUCTION mode (after the detection of the magnet or after the exit of the command mode).

By default, the device make 10 successive trials, in case of failure the device waits for 12 hours and then restarts the process. This process will be repeated until the device receive an accept from the gateway called Join Accept.

It is possible to configure the JOIN process through the IoT Configurator.

With the App you can decide :

- How many trials you want for each authentication attempt,
- The delay maximum between 2 attempts,
- The weighting factor, used to reduce the delay for the first

Registers concerned by the configuration:

- S312: Maximum delay between 2 authentication attempts
- S313: Weighting factor for initial authentication attempts
- S314: Number of tries for each authentication attempt

Example:

Register	Encoding	Value	Result
S312	0x2A30	10800	The maximum delay between each attempts is 4 hours.
S313	0x04	4	The weighting factor indicated that the first attempt will be spaced by 1 hour, then it will increase after each attempt until it reaches the maximum delay specified in S312.
S314	0x0F	15	Each attempt is composed by 15 successive trials

4.2.2 Launch a JOIN process remotely

The product receives a 0x48 downlink frame and restart after a defined delay (indicated in the frame).

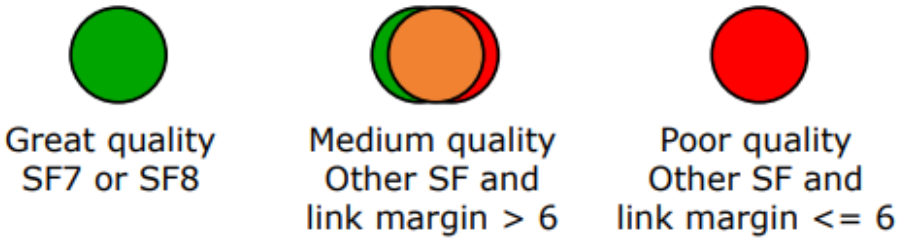
This function of restart enables the device to start a JOIN process remotely. It can be useful for a change of operator or when you have to restart a gateway.

To know the content of the 0x48 frame refers to the Technical Reference Manual (TRM) of the product.

4.3 Network Quality Test

During the JOIN Process, a device configured in Class A OTAA will make a network quality test (patented algorithm). When the test is running the device shows the 2 LEDs green and red simultaneously (from 10 to 20 seconds).

The result of the test is given by the devices after around 20 seconds following the Join Accept. It is
visible through the sole thanks to the LED.



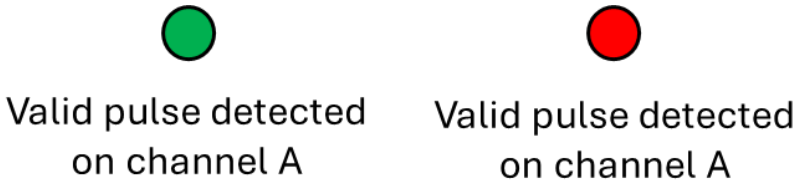
With this information the installer know the quality of the network and can move the product to a place with a better coverage.

4.4. Pulse Detection Test

4.4.1 Via LED Indicator

10 seconds after completion of the network test, the product automatically switches to pulse detection test mode.

- Each valid pulse detected on channel A turns on the green LED steadily for 2 seconds.
- Each valid pulse detected on channel B turns on the red LED steadily for 2 seconds.



The start-up pulse detection test is automatically deactivated after 10 valid pulses (per channel).

This allows the installer to visually confirm pulse increments when connecting the device to a meter or equipment, without needing access to a back-end server.

📌 **NOTE 1**
The LED detection test is only possible if the product is started using a magnet.

NOTE 2
The detection of the first 10 pulses does not interfere with user-configured Lora transmissions.

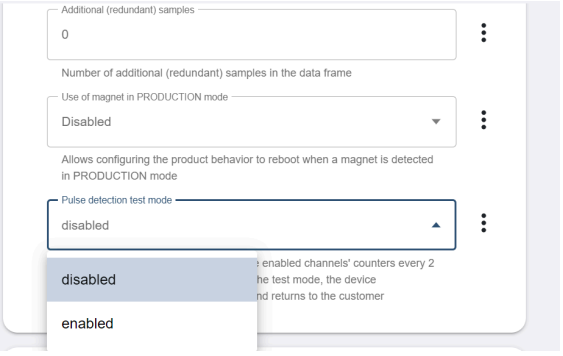
4.4.2 Via LoRaWAN server

This function allows quick and remote validation, via a LoRaWAN server, that the device detects pulses (as a complement to the LED indicator test).

By default, this function is disabled.

The pulse detection test can be enabled via the IoT Configurator.

- To activate the pulse detection test, open the IoT Configurator, go to the “Applicative Configuration” menu, under the “Global Configuration” section, and enable “pulse detection test mode”.



- If the product is in PARK mode, start test mode by passing a magnet over it for > 6 seconds or switch to “PRODUCTION” mode via the IoT configurator. If the product is in PRODUCTION mode, send the configuration to the sensor to start pulse detection test mode.

In test mode, the product uses its applicative configuration (channel activation, pull-up activation, debounce period filter, redundancy), except for the transmission (register 301) and acquisition (register 321) intervals, which are fixed to 2 minutes.

- For 1 hour, the product automatically sends frame 0x46 (channel A and/or B index value) every 2 minutes to the LoRaWAN server.
- 1 hour after entering test mode, the product reboots automatically, performs a new network join, and sends the index value of channel A and/or B (frame 0x46), based on the initially configured acquisition and transmission intervals.

📌 **NOTE 1**
Once started, the test mode is automatically deactivated. To perform a new test, the user must re-enable the “pulse detection test mode”

4.5. Reboot by magnet in PRODUCTION mode

It is possible to force a reboot of the device in PRODUCTION mode by placing a magnet for more than 6 seconds.

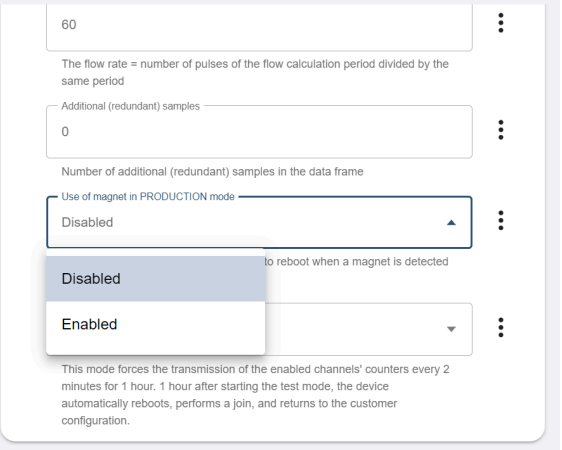
The green LED lights up to indicate magnet detection.

The device then automatically performs a new JOIN phase, a network test, and a pulse detection test.

This function is useful for quickly and easily restarting the product (without using a downlink or the IoT Configurator), for example after a network operator change, gateway update, or product relocation.

By default, this function is disabled. It can be enabled via downlink (register 305) or the IoT Configurator.

To activate reboot in PRODUCTION mode, open the IoT Configurator, go to the “Applicative Configuration” menu, under the “Global Configuration” section, and enable “Use of magnet in PRODUCTION mode”.

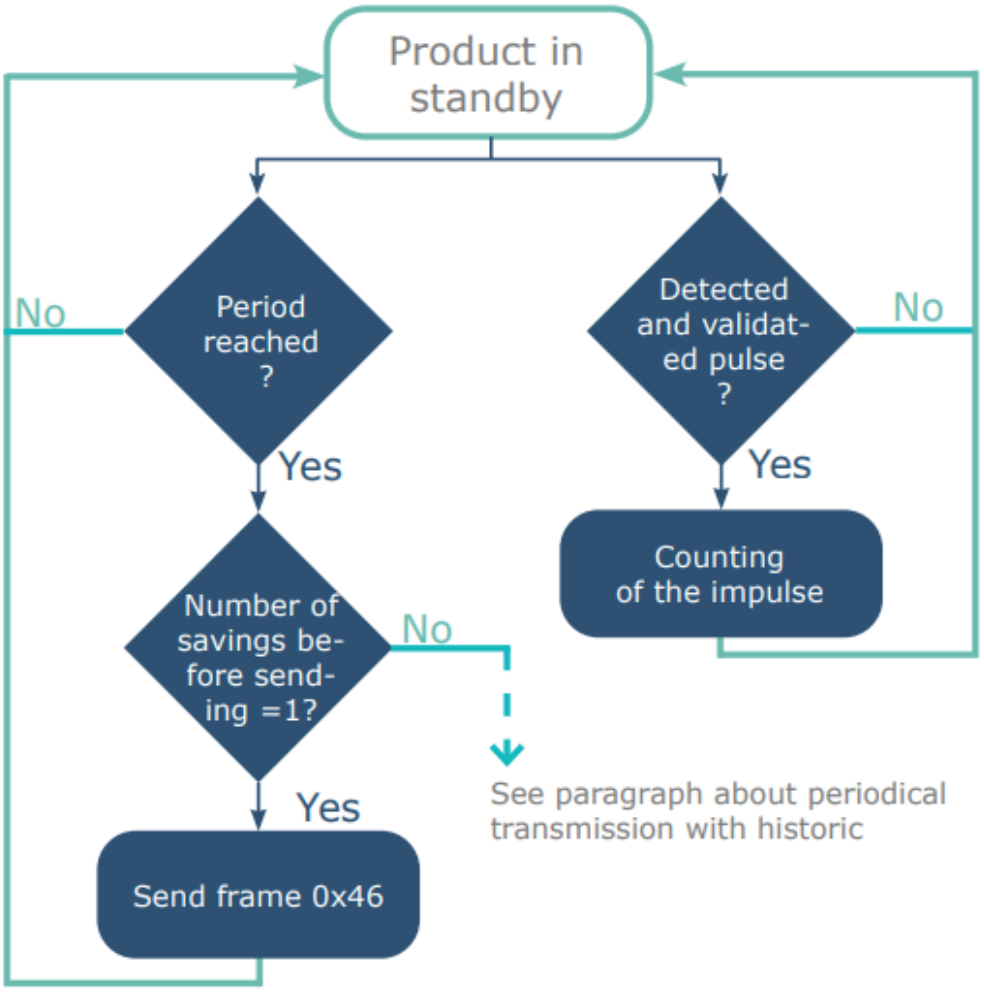


NOTE
During a reboot, the product retains the current counter value. However, any logged but unsent data will be lost.

4.6. Application Operation

4.6.1 Periodic transmission

The product allows the measurement and the periodic transmission of the values of the sensors according to the following diagram:



The settings associated with this mode of operation are:

- Transmission frequency (register S301)
- Historisation period of the data (register S321)
- Enabling and Configuring inputs (register S320)
- Anti-bounce timer period (registers S322)

Example:

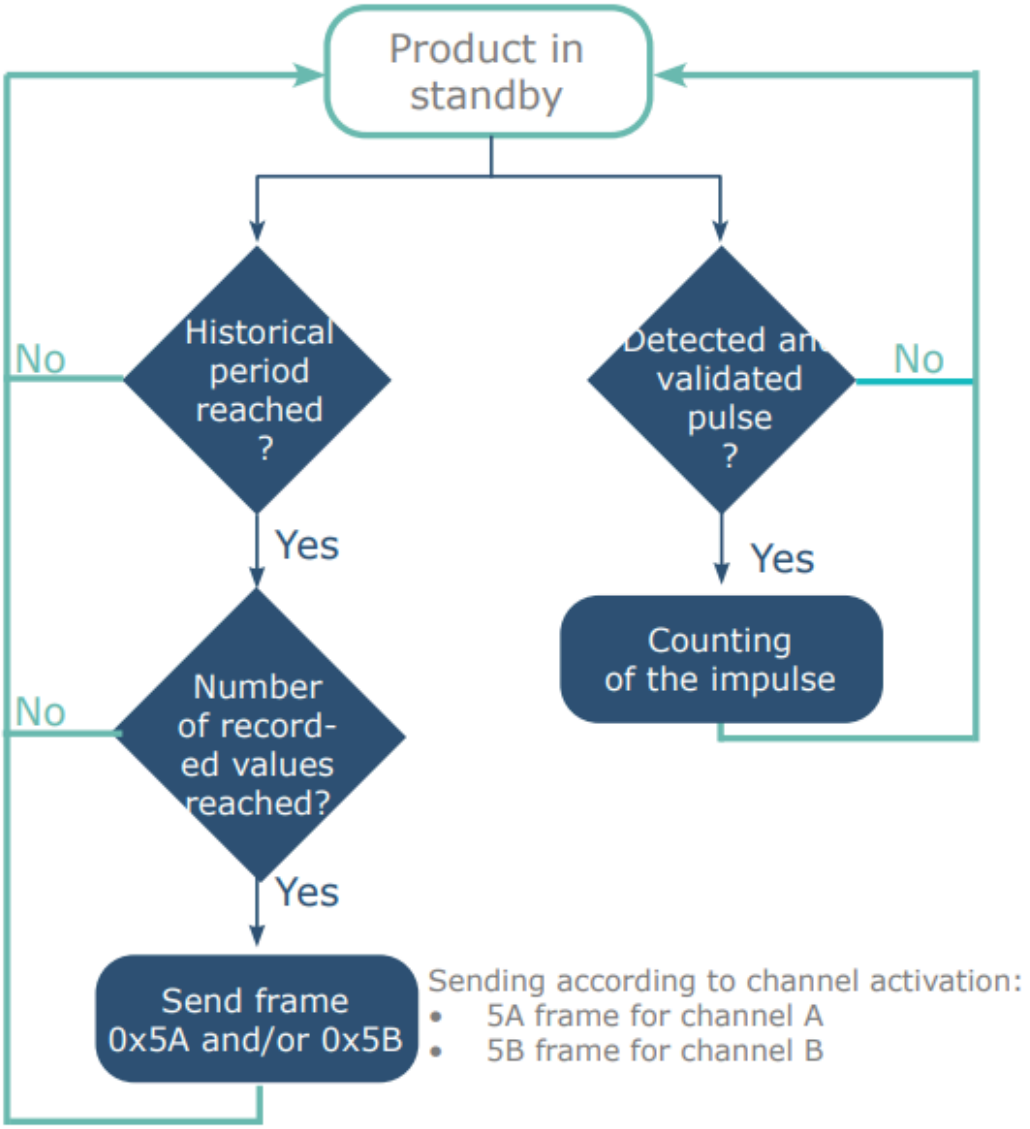
Register	Value encoding	Value	Result
S301	Decimal	1	Number of historisation (savings) to be done before sending
S321	Decimal	43200	Period of historisation/saving of the data (43200× 2 seconds = 24h).

Register	Value encoding	Value	Result
S320	Hexadecimal	0x39	Channel A : • Activated • Meter other than gas • Tamper input activated Channel B : • Activated • Gas meter • Tamper input disabled
S322	Hexadecimal	0x57	Anti-rebound : • Channel A = 500ms • Channel B = 100ms

N.B: for a periodical transmission without historisation of the data, S301 must be equal to 1.

4.6.2 Periodic transmission with history

The product allows the accumulation of several successive meter values before the periodic transmission of the set of values according to the following scheme :



The parameters associated with this mode of operation are:

- Enabling and Configuring inputs (register 320)
- Historisation period (register S321)
- Sending frequency (S301)
- Anti-bounce timer period (registers S322)

Example:

Register	Value encoding	Value	Result
S320	Hexadecimal	0x39	Channel A : • Activated

Register	Value encoding	Value	Result
			• Meter other than gas • Tamper input activated Channel B : • Activated • Gas meter • Tamper input disabled
S301	Decimal	4	Sending every 4 historisations (saving)
S321	Decimal	300	Historisation of the data every 10 minutes (300×2 seconds=600 seconds).
S322	Hexadecimal	0x57	Anti-rebound : • Channel A = 500ms • Channel B = 100ms

📌 The maximum number of samples per frame is 23 samples (or 21 samples maximum if timestamping is enabled).

4.6.3 Periodic transmission with redundancy

The product enables to ad redundancy in the frame with historisation (cf scheme here under). Thanks to redundancy the product will memorize a certain number of data and send them again in the next frame.

The parameters associated with this mode of operation are:

- Historisation period (register 321) and sending frequency (register 301)
- Enabling and Configuring inputs (register 320)
- Number of data to be repeated (register 340).

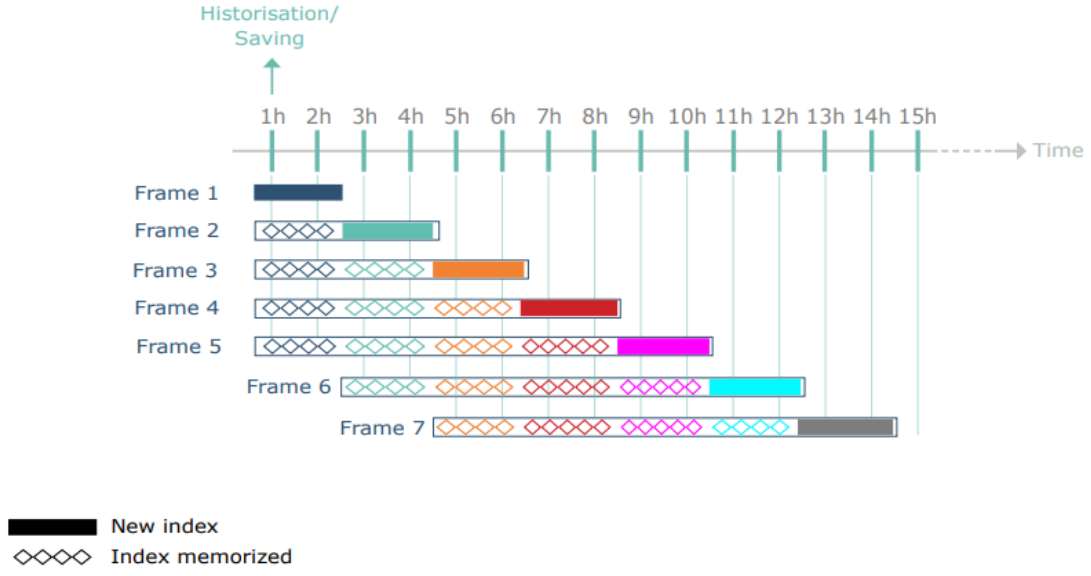
Example with redundancy:

Register	Encoding	Value	Result
S320	Hexadecimal	0x39	Channel A : • Activated • Meter different than gas • Tamper input activated

Register	Encoding	Value	Result
			Channel B : • Activated • Gas meter • Tamper input deactivated
S301	Decimal	2	Sending every 4 historisations (saving)
S321	Decimal	1800	Historisation of the channel A and channel B index every hours (1800×2seconds = 60 minutes)
S322	Hexadecimal	0x57	Anti-rebound : • Channel A = 500ms • Channel B = 100ms
S340	Decimal	4	4 redundant data per frame

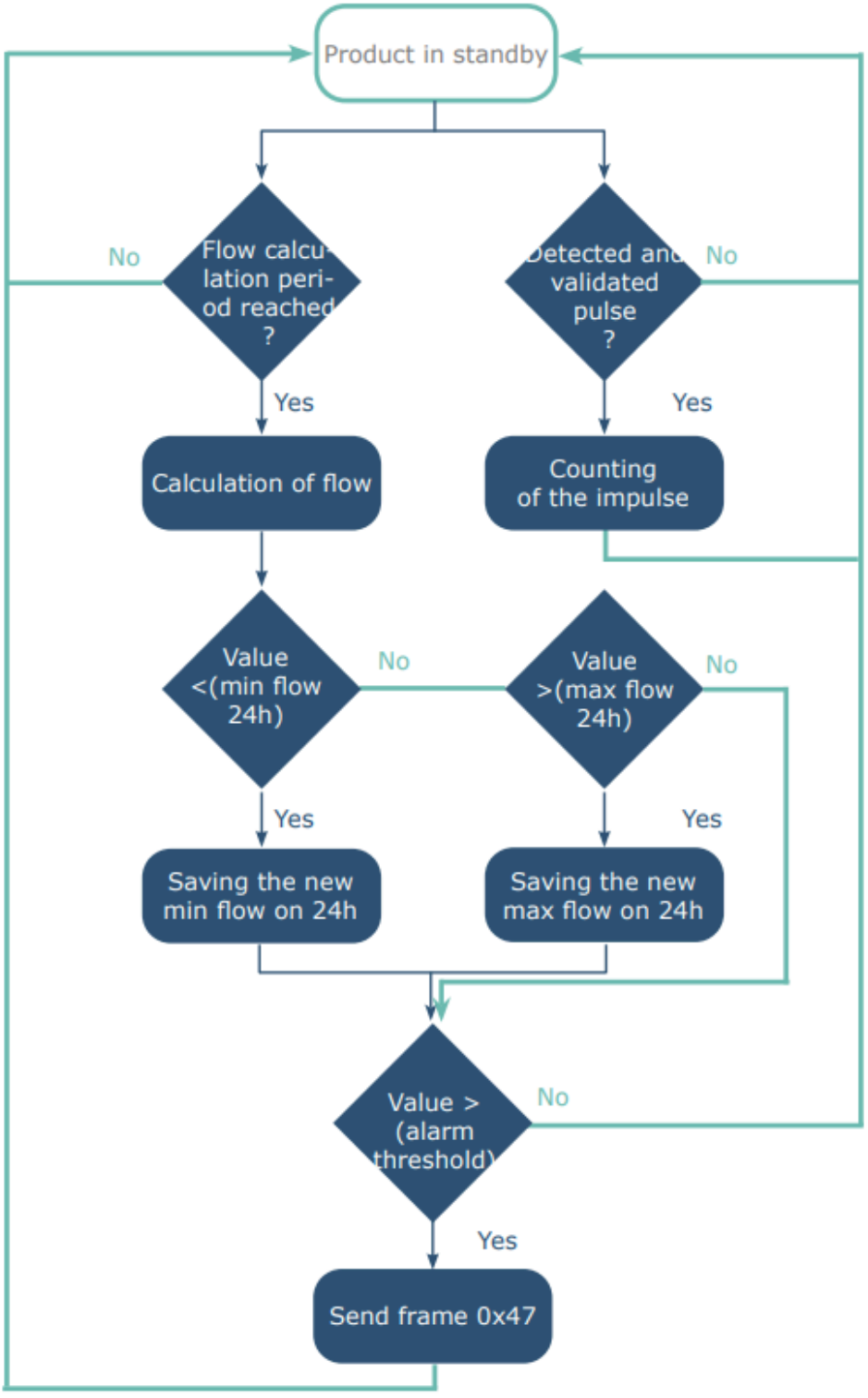
In this example:

- 1 historisation of the index each hours (1800×2seconds = 60 minutes)
- 1 sending every 2 savings so every 2 hours
- The 2 channel of the product are activated so the 2 periodic frame are sent (0x5A et 0x5B)
- When it is possible, the product will send for each channel the 2 recent index and the last 4 index memorized



4.6.4 Flow threshold alarm transmission

The product allows the detection of the exceeding of a flow threshold for each counting entry according to the following scheme:



The flow rate corresponds to the number of pulses of the flow calculation period divided by the same period. It is expressed in pulses / hour.

The alarm message (frame 0x47) is transmitted once, there is no new transmission if the flow rate returns above the threshold as long as the alarm remains active. The alarm is automatically deactivated after the daily frame is sent.

The settings associated with this mode of operation are:

- Enabling and Configuring inputs (register 320)
- Anti-bounce timer period (register S322)
- Flow calculation period (register S325)
- Alarm thresholds (registers S326 and S327)

Example:

Register	Value encoding	Value	Result
S320	Hexadecimal	0x39	Channel A : • Activated • Meter other than gas • Tamper input activated Channel B : • Activated • Gas meter • Tamper input disabled
S322	Hexadecimal	0x57	Anti-bounce : • Channel A = 500ms • Channel B = 100ms
S325	Decimal	60	Flow calculation period (channels A and B) = 60min
S326	Decimal	10 000	Flow alarm threshold (channel A) = 10,000 pulses per hour
S327	Decimal	30 000	Flow alarm threshold (channel B) = 30,000 pulses per hour

4.6.5 Tamper detection

The product allows detection of state change on the tamper input of each channel (rising edge detected on the input normally held to ground).

The product wakes up regularly (according to the periods defined in registers S332 and S334) and

checks the status of the tamper input of each of the channels having active fraud detection.

The tamper alarm is stored if there are several successive detections (configurable in registers S333

and S335) and transmitted within the next daily frame.

The alarm is automatically deactivated after the daily frame is sent.

The settings associated with this mode of operation are:

- Enabling and Configuring inputs (register 320)
- Fraud detection period 1 (register 332)
- Threshold for fraud detection 1 (register S333)
- Fraud detection period 2 (register 334)
- Threshold for fraud detection 2 (register S335)

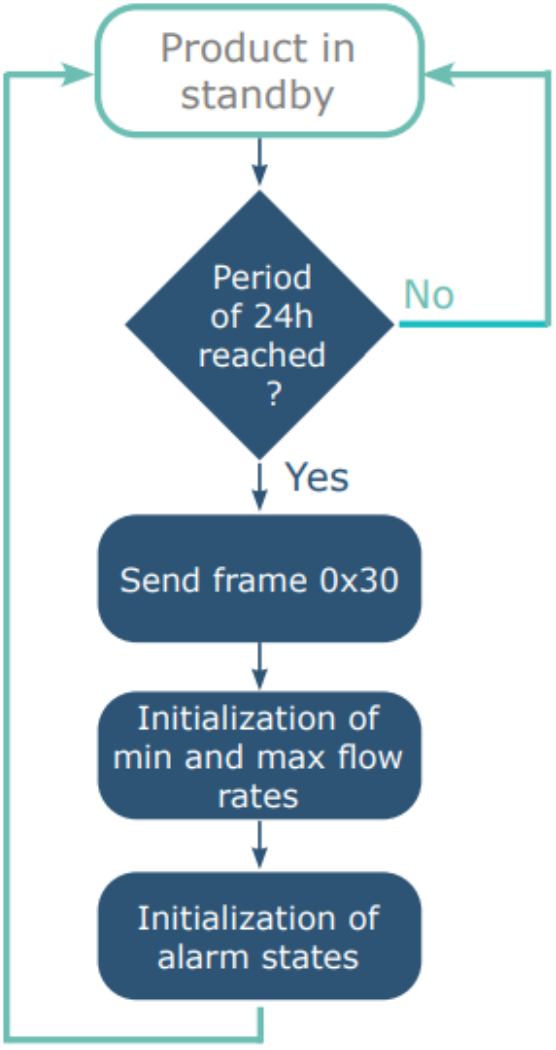
Example:

Register	Value encoding	Value	Result
S320	Hexadecimal	0x39	Channel A : • Activated • Meter other than gas • Tamper input activated Channel B : • Activated • Gas meter • Tamper input disabled
S332	Decimal	2	Scan period for A-channel tamper input is 2×10s = 20s
S333	Decimal	3	Tamper detection threshold for A-channel = 3 (positive scans of B-channel tamper before triggering the tamper alarm)
S334	Decimal	2	Scan period for B-channel tamper input is 2×10s = 20s

Register	Value encoding	Value	Result
S335	Decimal	3	Tamper detection threshold for B-channel = 3 (positive scans of B-channel tamper before triggering the tamper alarm)

4.6.6 Transmitting a Daily Frame

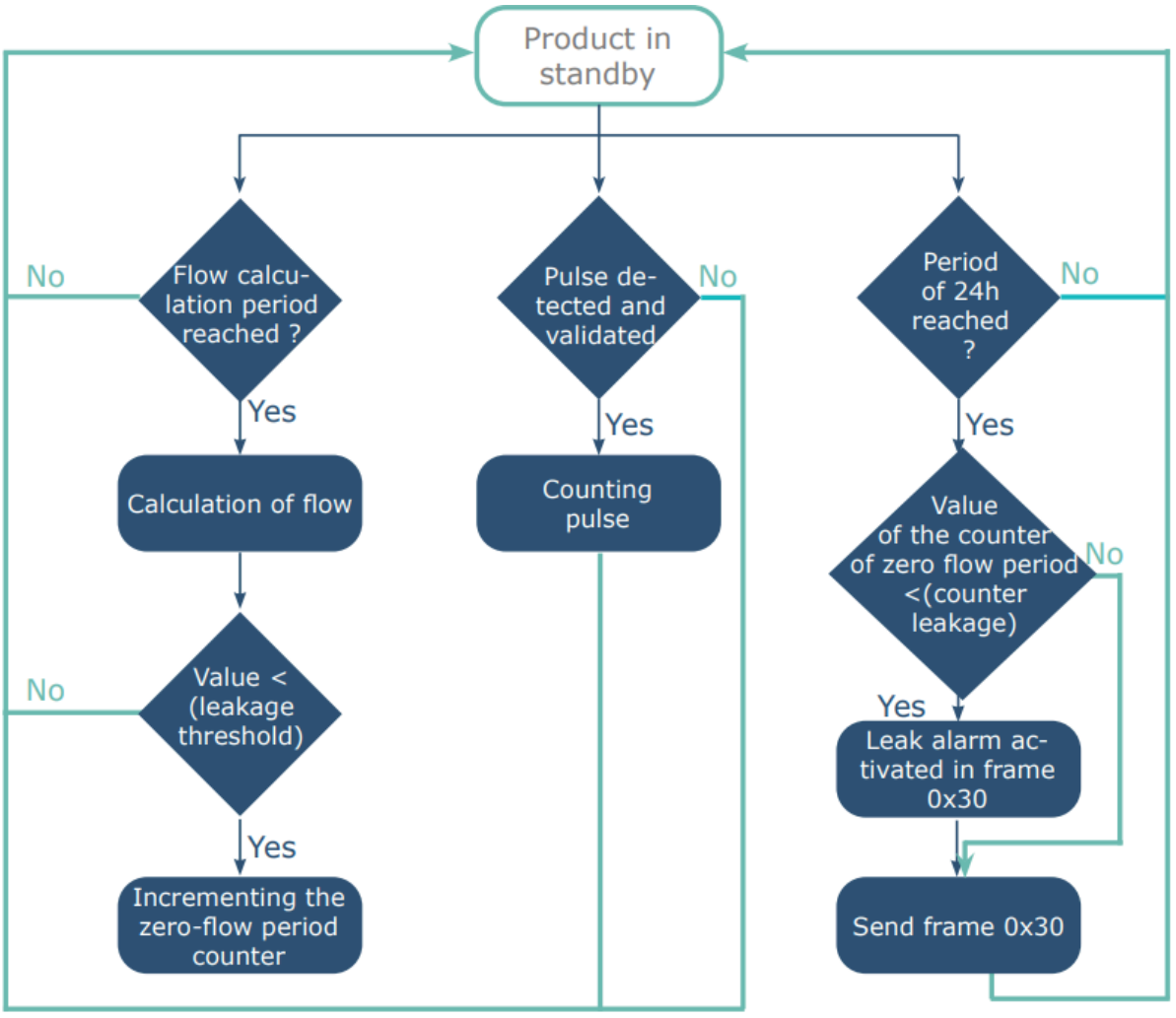
The product transmits every 24 hours a daily frame (0x30) according to the following diagram :



The transmission period of the daily frame is fixed (24 hours) and not configurable.

4.6.7 Leaks detection

The product allows leak detection on each count input as shown in the following diagram:



The flow rate corresponds to the number of pulses of the flow calculation period divided by the same period. It is expressed in pulses / hour.

The leak detection is performed by analyzing a number of occurrences (configurable by register: S330 and S331) where the calculated flow rate is less than a leakage threshold (configurable by register: S328 and S329).

The associated leak alarm is stored and transmitted with the next daily frame. The alarm is automatically deactivated after the daily frame is sent.

The settings associated with this mode of operation are:

- Enabling and Configuring inputs (register 320)
- Anti-bounce timer period (register S322)

- Flow calculation period (register S325)
- Leak thresholds (registers S328 and S329)
- Null flow period counters (S330 and S331)

Example:

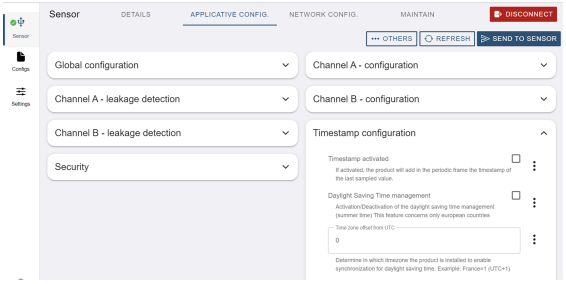
Register	Value encoding	Value	Result
S320	Hexadecimal	0x39	Channel A: • Activated • Meter other than gas • Tamper input activated Channel B : • Activated • Gas meter • Tamper input disabled
S322	Hexadecimal	0x57	Anti-bounce : • Channel A = 500ms • Channel B = 100ms
S325	Decimal	60	Flow calculation period (channels A and B) = 60min
S328	Decimal	10	Leak threshold (channel A) = 10 pulses par hour
S329	Decimal	0	Leak threshold (channel B) = 0 pulse par hour
S330	Decimal	3	Daily periods number under the leak threshold (channel A) = 3
S331	Decimal	5	Daily periods number under the leak threshold (channel B) = 5

In this example, all the periods during which the flow rate on the channel A is less than 10 pulses / hour are considered as periods of zero flow. If the total daily number of zero flow periods is less than 3 then it is considered that there is a leak on the channel A.

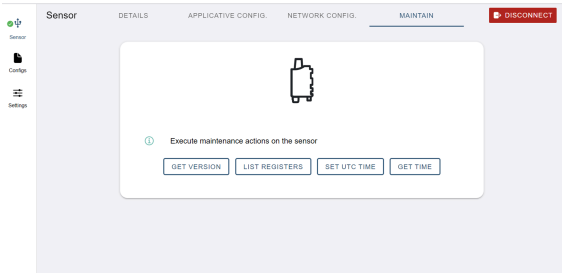
4.7. Data Timestamping

The sensor can integrate a timestamp in the various data frames if this option has been enabled in the configuration. The timestamp will be given in EPOCH 2013 format. (Refer to the product TRM for frame contents).

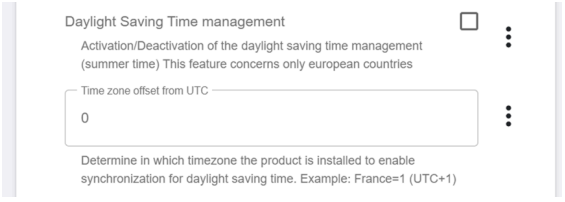
To activate timestamping, open the IoT Configurator, go to “Applicative config.” menu, section “Timestamp configuration” and check the “Timestamp activated” box.



Then go to the “Maintain” menu and set the UTC time using the “Set UTC time” button.



Optionally, and not recommended by Adeunis, it is possible to set a local time to be sent by the product. Go to “Applicative config.” menu, section “Timestamp Configuration”, and determine the time zone in which the product is located, and whether daylight saving time is to be managed by the product.



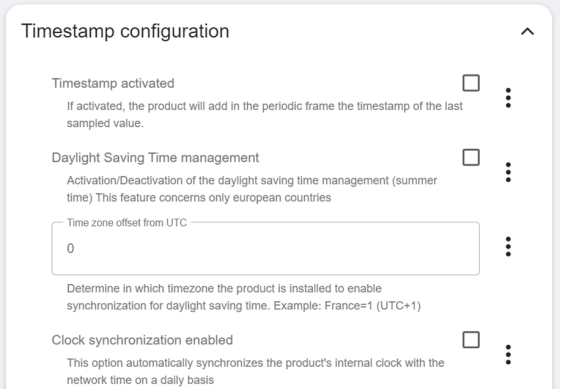
4.8. Clock Synchronisation

The product is equipped with an internal clock with a daily drift of less than 3 seconds per day.

It is possible to activate automatic daily synchronization of the product's internal clock with the network time, in order to guarantee acquisition and storage of the index at a fixed time and without drift.

Clock synchronization can be set via the IoT Configurator or downlink (register 319).

To enable clock synchronization, open the IoT Configurator, go to “Applicative config.” menu, section “Timestamp configuration” and check the “Clock synchronization enabled” box.



The first daily clock synchronization MAC command is sent at startup at the same time as frame 0x20. Daily clock synchronization MAC commands are then sent at the same time as the daily frame (0x30).

📌 **NOTE 1**
Sending MAC commands may be charged by the operator.

NOTE 2
If clock synchronization is enabled, the minimum historisation period of the data (register S321) is 2 minutes.

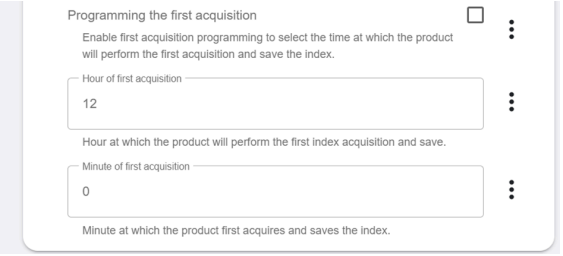
4.9. Programming the First Acquisition

By default, the product starts the acquisition period when it switches from PARK mode to PRODUCTION mode.

It is possible to program the time from which the product will make its first acquisition, independently of the time at which it was started.

The acquisition time can be set via the IoT Configurator or downlink.

To set the acquisition time, open the IoT Configurator, go to “Applicative config.” menu, section “Timestamp configuration”. Check the “Programming first acquisition” box and enter the “Hour of first acquisition” and “Minute of first acquisition”.



Registers concerned by this configuration :

- S370: Programming the first acquisition
- S371: Hour at which product will perform the first acquisition and save index
- S372: Minute at which the product will perform the first acquisition and save the index.

Example :

Registre	Coding	Value	Result
S301	Decimal	12	Sends frames every 12 historizations (backups)
S321	Decimal	1800	Save index once per hour (3600 seconds)
S318	Decimal	1	Activate timestamp
S315	Decimal	0	Product clock set to UTC time
S319	Decimal	1	Clock synchronization

Registre	Coding	Value	Result
			enabled
S370	Decimal	1	Programming the first acquisition enabled
S371	Decimal	12	First acquisition will be performed at 12 noon
S372	Decimal	0	First acquisition at 0 min

The installer connects the product to a water meter and starts it by passing a magnet (switching to PRODUCTION mode) at 09:30 UTC.

The product immediately starts counting the pulses detected on channel A.

The product sends its join frames and retrieves the time from the network to synchronize its internal clock for the first time.

At 12:00 UTC, the product saves the index for the first time. The product saves the index once per hour. After 12 backups, it sends its first frame of time-stamped data at 11:00 PM UTC.

The product resynchronizes its internal clock 24 hours after switching to production mode, then every 24 hours.

📌 **NOTE**

In order to avoid a possible collision problem in the event of numerous products being installed at the same site, a mechanism is provided to randomly offset frame transmission (between 0 sec and 1 min) in relation to data acquisition.

The frame's built-in timestamp indicates the exact time of data acquisition.

5. REGISTERS ET FRAMES

To know the content of the registers and of each frames (uplink and downlink) of the product, refers to the TECHNICAL REFERENCE MANUAL of the PULSE product, available on the adeunis website:

https:// www.adeunis.com/en/produit/pulse-impulse-interface/

6. CONFIGURATION AND INSTALLATION

To configure the product, it is recommended to use the IoT Configurator (android and Windows application).
- Google Play: https://play.google.com/store/apps/details?id=com.adeunis.IoTConfiguratorApp
- macOS : https://www.adeunis.com/wp-content/uploads/2024/09/IoT_Configurator_LoRa_Sigfox_v2.0.1_macOS.dmg_-1.zip
- Windows 10: https://www.adeunis.com/telechargements/

The product can also be configured remotely via the network by sending it downlink frames. For this, refer to the TECHNICAL REFERENCE MANUAL of the product, available online at the product page.

To configure the product using AT Command or radio recommendations, please refers to the INSTALLATION GUIDE Adeunis available on the website.

To install the product please refer to the Adeunis INSTALLATION GUIDE (IP67 / IP68 Industrial Box)

7. PREPARATION

7.1. Dismantling the Case

The product is supplied disassembled such that the lower electronic part can be accessed. This part is where the meter or meters are connected to the screw terminals and where the micro USB port for configuration of the device.
Once connection of the meters has been finalized and configuration carried out, the case may be
closed.

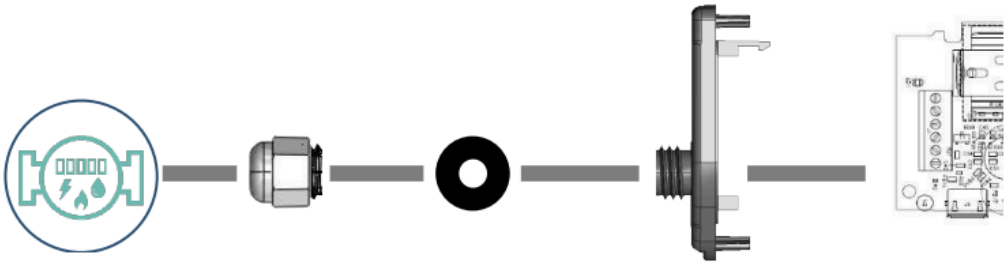
7.2. Installation of the Compression Seal

Before connecting your meter cables to the product's screw terminals, you must insert the compression gland nut and the appropriate seal for your configuration. 2 types of seals are supplied with the PULSE: for a 5 mm diameter cable and for a 4 mm diameter cable.

Seal 1 x 5,4 mm cable

Seal 1 x 4,2 mm cable

Assembly procedure:



1 - Your meter and its interface.

2 - Pass the cable through the compression gland nut.

3 - Pass the cable through the compression gland seal

4 - Pass the cable through the case plate.

5 - Connect the ends of the meter cable to the screw terminals.

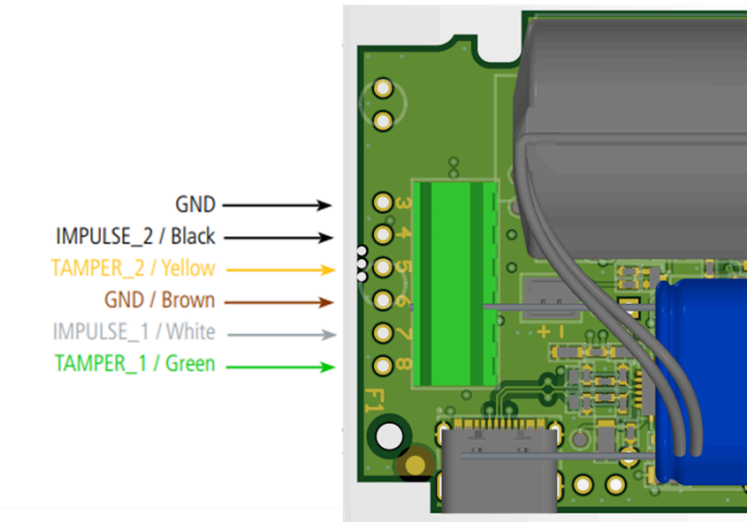
> **NOTE**
> When reassembling the enclosure, fully tighten the cable glands, then tighten the screws using a PZ.1 bit, applying a tightening torque of 0.6 Nm ± 0.05. Correct tightening ensures even compression of the seal and maintains the IP68 protection rating; excessive tightening may create unnecessary mechanical stress and lead to cracking.

7.3. Mounting the Counters on the Screw Terminals

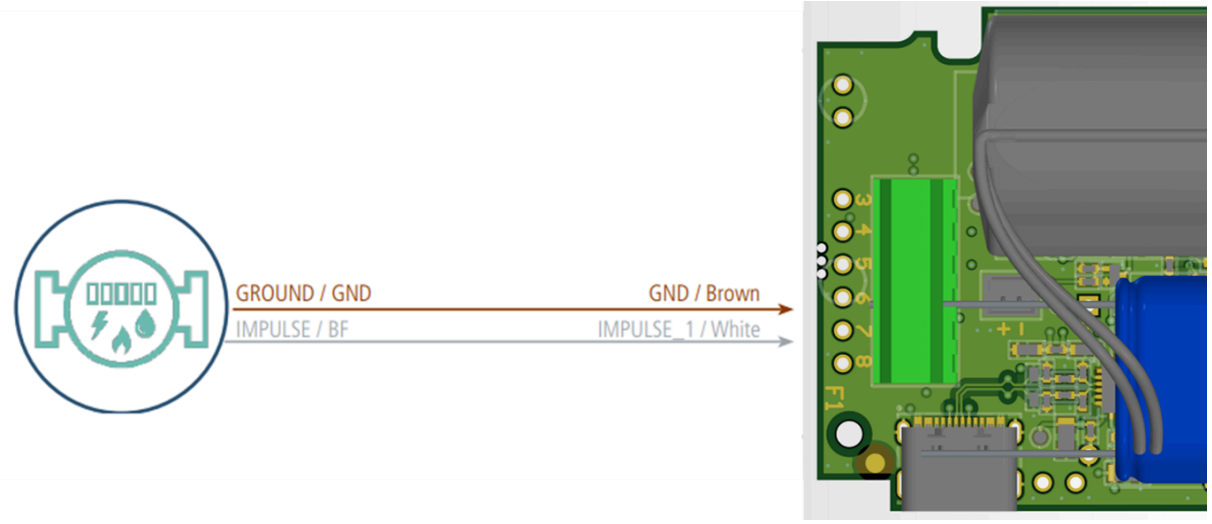
Once the nut and packing seal are installed, the strands of the meter cable can be connected to the screw terminals of the product.

Below is the identification of each terminal block:

Note: Up to 2 meters of the same type can be used in parallel. Below is a description of the terminal blocks:

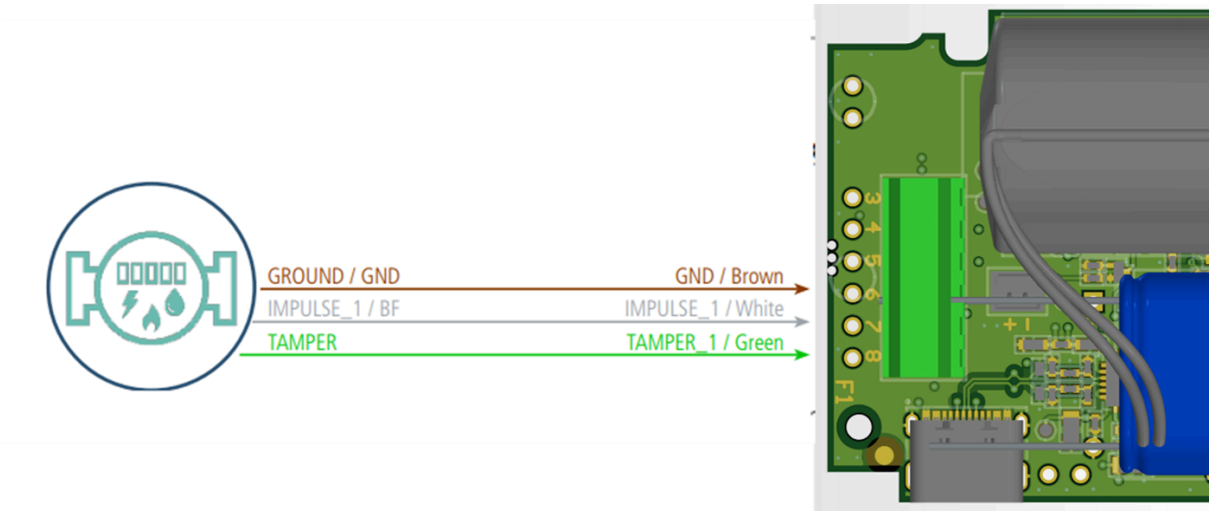


Meter with 2-wire output



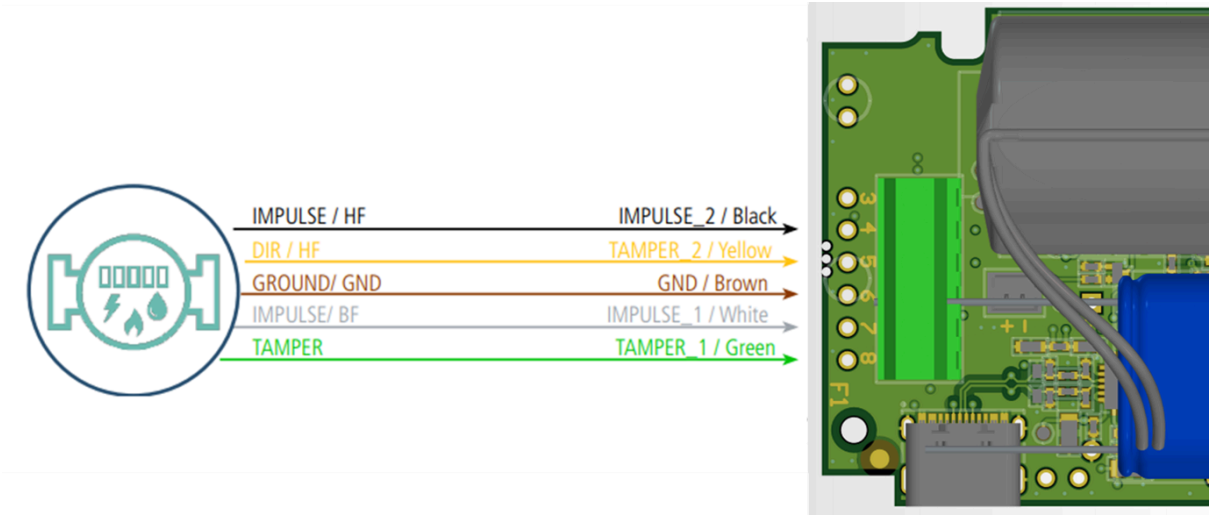
In this configuration, it is necessary to deactivate the input TAMPER of channel A (register 320 bit 3 = 0) and preferably deactivate channel B (register 320 bit 4=0) which is not no used.

Meter with 3-wire output



In this configuration, it is preferred to activate input TAMPER of channel A (register 320 bit 3 = 1) and deactivate channel B (register 320 bit 4=0) which is not no used.

Meter with 5-wire output

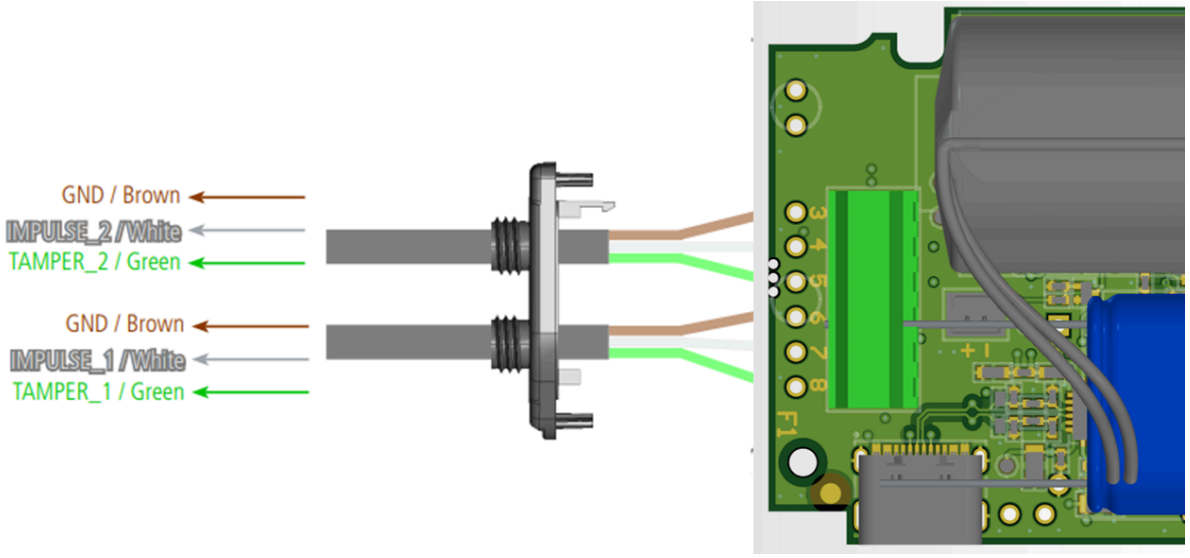


In this configuration, the 2 inputs (A & B) must be activated (register 320 bits 0 and 4 = 1). The combination of the pulse counts on inputs A & B (IMPULSION_1 & IMPULSION_2) allows to know the quantities measured in the 2 directions.
The activation of signals FRAUDE_1 & FRAUDE_2 (register 320 respectively bit 3 and 7 = 1) allows to
generate alarms of fraud and wrong flow direction.

NOTE
When reassembling the enclosure, fully tighten the cable glands, then tighten the screws using a PZ.1 bit, applying a tightening torque of 0.6 Nm ± 0.05. Correct tightening ensures even compression of the seal and maintains the IP68 protection rating; excessive tightening may create unnecessary mechanical stress and lead to cracking.

7.4. Version with 2 x 3-wire Cables

A version of the PULSE is proposed with 2 cables of 70 cm with 6 wires already linked to the terminal blocks. Here under the explanations of the colors:



NOTE
When reassembling the enclosure, fully tighten the cable glands, then tighten the screws using a PZ.1 bit, applying a tightening torque of 0.6 Nm ± 0.05. Correct tightening ensures even compression of the seal and maintains the IP68 protection rating; excessive tightening may create unnecessary mechanical stress and lead to cracking.

8. DOCUMENT HISTORY

Version	Content
V1.0	Creation
V1.1	Added pulse detection test at device startup (via LEDs) Added acquisition time scheduling Added automatic daily synchronization of the internal clock
V1.2	Added pulse detection test at device startup (via LoRaWAN server) Added device reboot by magnet in PRODUCTION mode