

TEMP V4 IP68 LoRaWAN 863-870

Ready-To-Use Temperature Device

Guide utilisateur / User Guide
Version 3.1.1

Ce Guide utilisateur s'applique à partir des versions logiciel suivantes :

Version RTU : V02.00.01
Version APP : V02.01.00

ATTENTION : Ces versions de software ne sont pas compatibles avec des versions précédentes du produit.

Ce Guide utilisateur s'applique pour les deux versions de produit suivantes :

- TEMP sonde ambiante et sonde déportée
- TEMP double sonde déportée

This User Guide applies from the following firmware versions:

Version RTU : V02.00.01
Version APP : V02.01.00

WARNING : These software versions are not compatible with previous hardware versions of the device.

This User Guide applies from the following product versions:

- TEMP ambient probe and remote probe
- TEMP two external probes



NOUVELLE DOCUMENTATION / NEW DOCUMENTATION

FR

USER GUIDE

- | ENGLISH | FRANÇAIS |
|--|--|
| <ul style="list-style-type: none">• Dedicated to a product• Cautions & electrical warnings• Declaration of conformity• Product functionalities and modes• Casing dimensions• Characteristics (casing and electrical)• LED explanations• Specific wiring on terminal blocks | <ul style="list-style-type: none">• Dédié à un produit• Recommandations et avertissements électriques• Déclaration de conformité• Fonctionnalités et modes du produit• Dimensions du boîtier• Caractéristiques (boîtier et électrique)• Explication des LED• Câblage sur bornier spécifique au produit |

TECHNICAL REFERENCE MANUAL

- | | |
|--|---|
| <ul style="list-style-type: none">• Dedicated to a product• Registers content• Frame explanations (uplink and downlink) | <ul style="list-style-type: none">• Dédié à un produit• Contenu des registres• Explication des trames (uplink et downlink) |
|--|---|

INSTALLATION GUIDE

- | | |
|--|---|
| <ul style="list-style-type: none">• For all adeunis® products• Configuration of the products• Installation and fixing• Start-up of the products• Opening and closing the case• Replace battery | <ul style="list-style-type: none">• Pour tous les produits adeunis®• Configuration des produits• Installation et fixation• Démarrage des produits• Ouvrir et fermer les boîtiers• Remplacer la batterie |
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PRODUCTS AND REGULATORY INFORMATION

Document Information	
Title	TEMP V4 IP68 LoRaWAN 863-870 - User Guide
Sub-title	/
Document type	User Guide
Version	3.1.1

This document applies to the following products :

Name	Part number	Version firmware
TEMP V4 IP68 LoRaWAN 863-870 ambient probe and remote probe	ARF8180BCA	Version RTU : V02.00.01 Version APP : V02.01.00
LoRaWAN 863-870 TEMP two external probes	ARF8180BCB	Version RTU : V02.00.01 Version APP : V02.01.00

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TECHNICAL SUPPORT

Website

Our website contains a lot of useful information: information on modules and wireless modems, user guides, and configuration software and technical documents which can be accessed 24 hours a day.

E-mail

If you have technical problems or cannot find the required information in the provided documents, contact our Technical Support on our website, section « Technical Support ». This ensures that your request will be processed as soon as possible.

Helpful Information when Contacting Technical Support

When contacting Technical Support, please have the following information ready:

- Product type
- Firmware version (for example V1.0)
- A clear description of your question or the problem
- A short description of the application

EU Declaration of Conformity

WE

Adeunis

283 rue LOUIS NEEL
38920 Crozilles, France
04.76.92.01.62
www.adeunis.com

Declare that the DoC is issued under our sole responsibility and belongs to the following product:

Apparatus model/Product: TEMP LoRaWAN
Type: ARF8180BC

Object of the declaration:



The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:

Directive 2014/53/EU (RED)

The following harmonised standards and technical specifications have been applied:

Title	Date of standard/specification
EN 300 220-2 V3.1.1	2017/02
EN 301 489-1 V2.1.1	2016/11
EN 301 489-3 V2.1.0	2016/09
EN 62368-1	2014
EN 62311	2008

July, 6th, 2020

Monnet Emmanuel, Certification Manager



INTRODUCTION

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Adeunis

283, rue Louis Néel
38920 Crolles
France

Web www.adeunis.com

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ENVIRONMENTAL RECOMMENDATIONS

All superfluous packaging materials have been eliminated. We have done everything possible to make it easy to separate the packaging into three types of materials: cardboard (box), expanded polystyrene (filler material) and polyethylene (packets, foam protective sheets). Your device is composed of materials that can be recycled and reused if it is dismantled by a specialist company. Please observe local regulations concerning the manner in which waste packaging material, used batteries and your obsolete equipment are disposed of.

WARNINGS

Valid for products indicated in the declaration of conformity



Read the instructions in the manual.



The safety of this product is only guaranteed when it is used in accordance with its purpose. Maintenance should only be carried out by qualified persons.



Risk of explosion if the battery is removed with an incorrect type. Contact Adeunis for more information if needed.



Risk of explosion if the battery is replaced by an incorrect type

Please note: Do not install the equipment close to a heat source or in damp conditions.

Please note: When the equipment is open, do not carry out any operations other than the ones set out in this document.



Please note: Do not open the product as there is a risk of electrical shock.



Please note: For your own safety, you must ensure that the equipment is switched off before carrying out any work on it.



Please note: For your own safety, the power supply circuit must be SELV (Safety Extra Low Voltage) and must be from limited power sources.

Please note: When the aerial is installed outside, it is essential to connect the cable screen to the building's earth. We recommend using lightning protection. The protection kit chosen must permit the coaxial cable to be earthed (eg: coaxial lightning arrester with earthing of the cable at different places on the aerial at the base of pylons and at the entrance, or just before entering the premises).

RECOMMENDATIONS REGARDING USE

- Before using the system, check that the power supply voltage shown in the user manual corresponds to your supply. If it doesn't, please consult your supplier.
- Place the device against a flat, firm and stable surface.
- The device must be installed in a location that is sufficiently ventilated so that there is no risk of internal heating and it must not be covered with objects such as newspapers, cloths, curtains, etc.
- The device's aerial must be free and at least 10 cm away from any conducting material.
- The device must never be exposed to heat sources such as heating equipment.
- Do not place the device close to objects with naked flames such as lit candles, blowtorches, etc.
- The device must not be exposed to harsh chemical agents or solvents likely to damage the plastic or corrode the metal parts.

DISPOSAL OF WASTE BY USERS IN PRIVATE HOUSEHOLDS WITHIN THE EUROPEAN UNION



This symbol on the product or on its packaging indicates that this product must not be disposed of with your other household waste. Instead, it is your responsibility to dispose of your waste by taking it to a collection point designated for the recycling of electrical and electronic appliances. Separate collection and recycling of your waste at the time of disposal will contribute to conserving natural resources and guarantee recycling that respects the environment and human health. For further information concerning your nearest recycling centre, please contact your nearest local authority/town hall offices, your household waste collection company or the shop where you bought the product

 This symbol on the device or its packaging means the use of a DC voltage.



Warning: If the charger is used with any other batteries or products whatsoever, there is a risk of an explosion. After use, the batteries must be disposed of at an appropriate recycling centre. They must not be thrown away to degrade in the environment. When batteries are replaced, the device must be correctly implemented.



Warning for Switzerland : the annex 4.10 of SR 814.013 Standard must be applied for batteries.

1. PRODUCT PRESENTATION

IMPORTANT NOTE: The TEMP V4 IP68 LoRaWAN 863-870 can be started with a magnet or switching the product in PRODUCTION mode using the IoT Configurator.

Description :

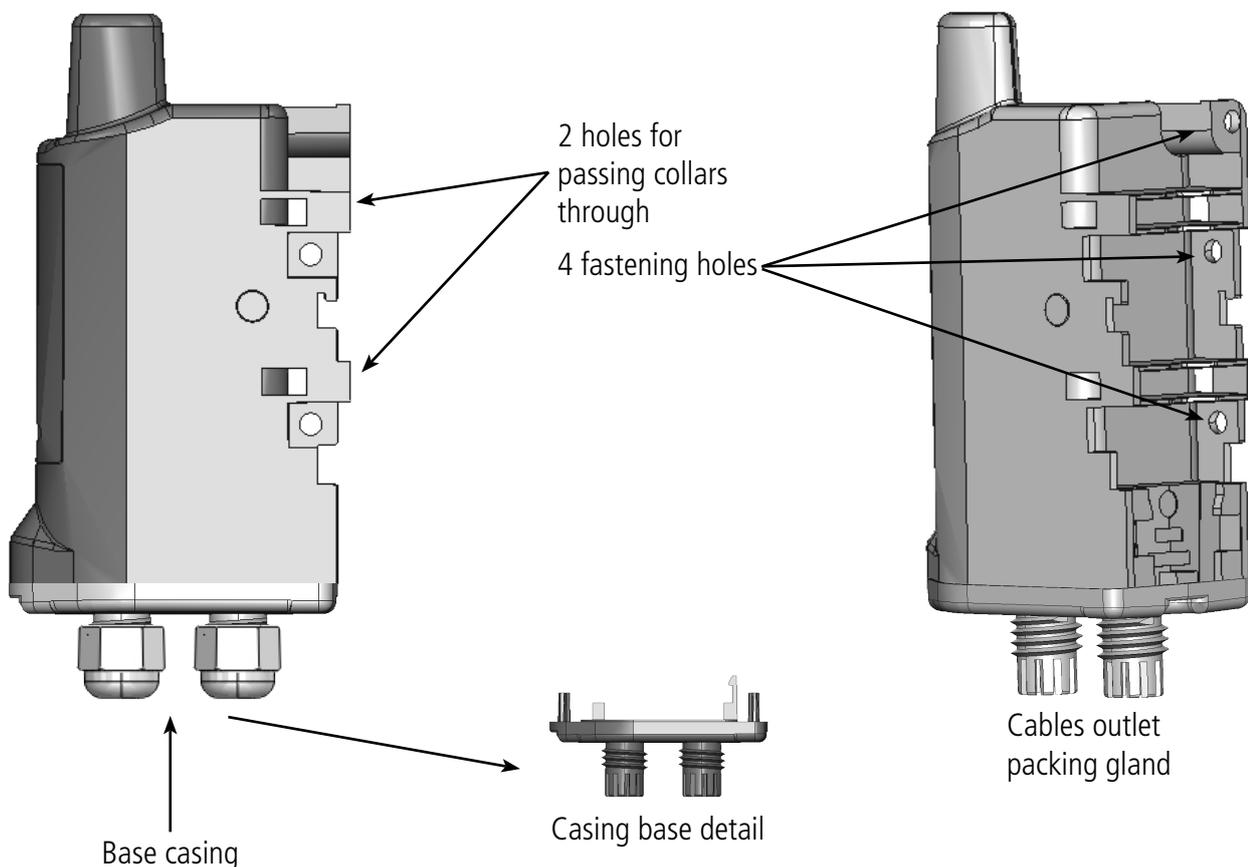
- The adeunis® LoRaWAN TEMP is a ready-to-use radio device enabling temperatures to be measured and transmitted by wireless communication network.
- This product exists in 2 versions: one including an ambient probe and a remote probe and a second one with two remote probes.
- These two products answer the users need to monitor the temperature (ambient or contact) of a storage room, cold room or all rooms needing a product able to withstand more or less harsh environment.
- The use of the LoRaWAN protocol allows the user to integrate the TEMP V4 IP68 LoRaWAN 863-870 into any network that is already deployed.
- The product emits the data from the sensors either periodically or in an event-based way based on top and/or bottom thresholds.
- The configuration of the transmitter is accessible by the user via a micro-USB port or via the network, allowing in particular a choice of modes of transmission, periodicity or triggering thresholds.
- The TEMP V4 IP68 LoRaWAN 863-870 is powered by a replaceable internal battery and/or an external supply.
- The product is compatible with the Class C of the LoRaWAN Network and can be used as a Class C product but only if it is powered by an external supply.

IMPORTANT NOTE : The LoRaWAN TEMP is delivered by default with OTAA configuration, allowing the user to declare the product to a LoRaWAN operator.

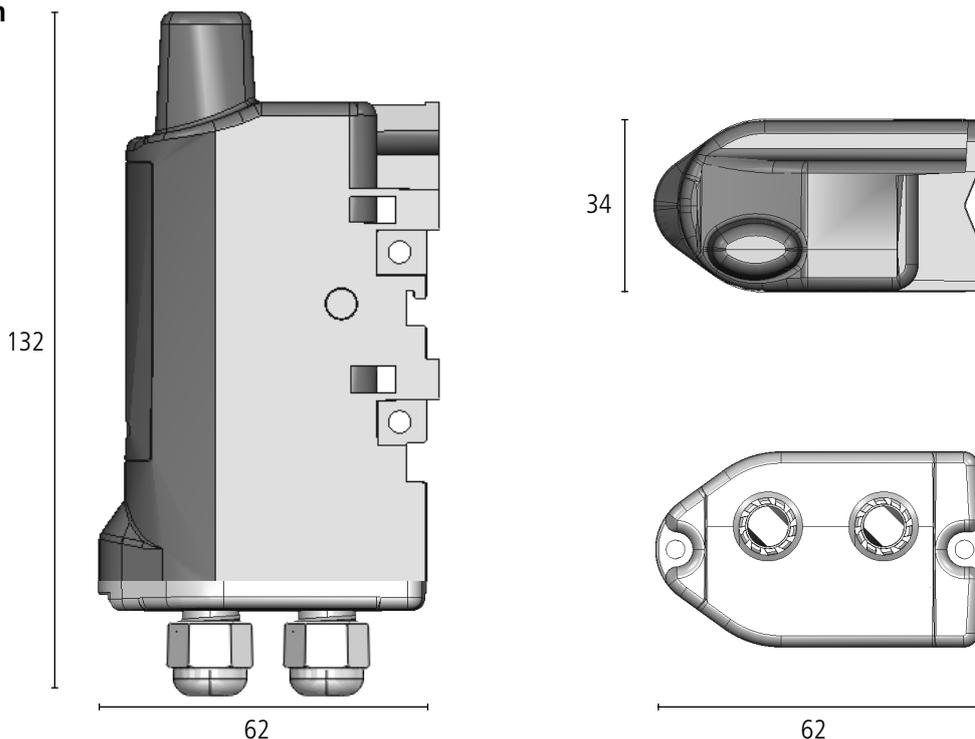
Composition of the package

The product is supplied in a cardboard box containing the following items:

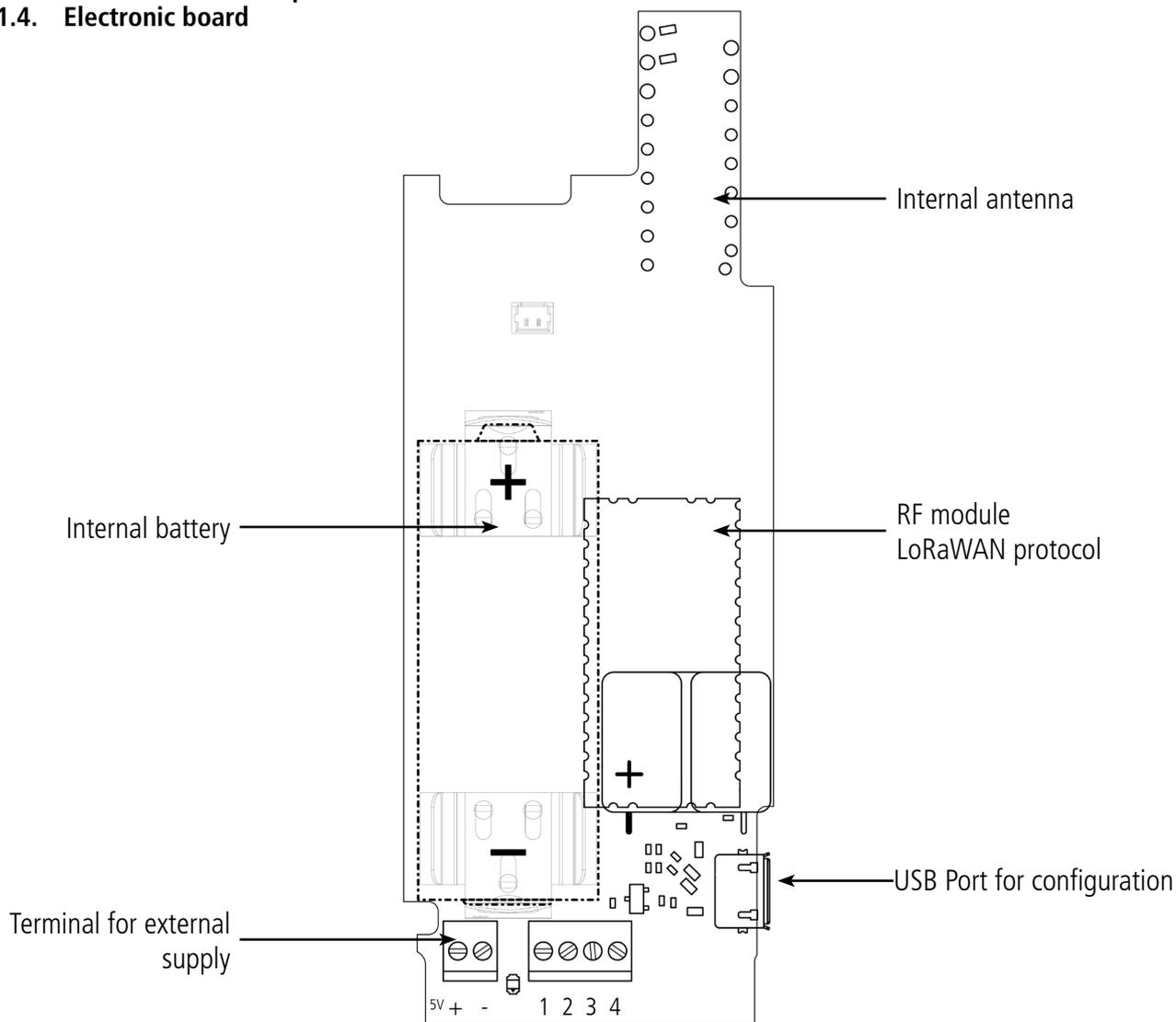
top casing, electronic card, casing base plate, 2 screws for the plate, cable gland, 3 gland seals, 2 CBLZ 2.2 x 19mm screws, 2 Fischer SX4 plugs, Removable LiSOC12 FANSO (battery-pack ER18505H+W36+51021)



1.1. General description
1.2. Dimensions



1.3. Two versions of the product
1.4. Electronic board



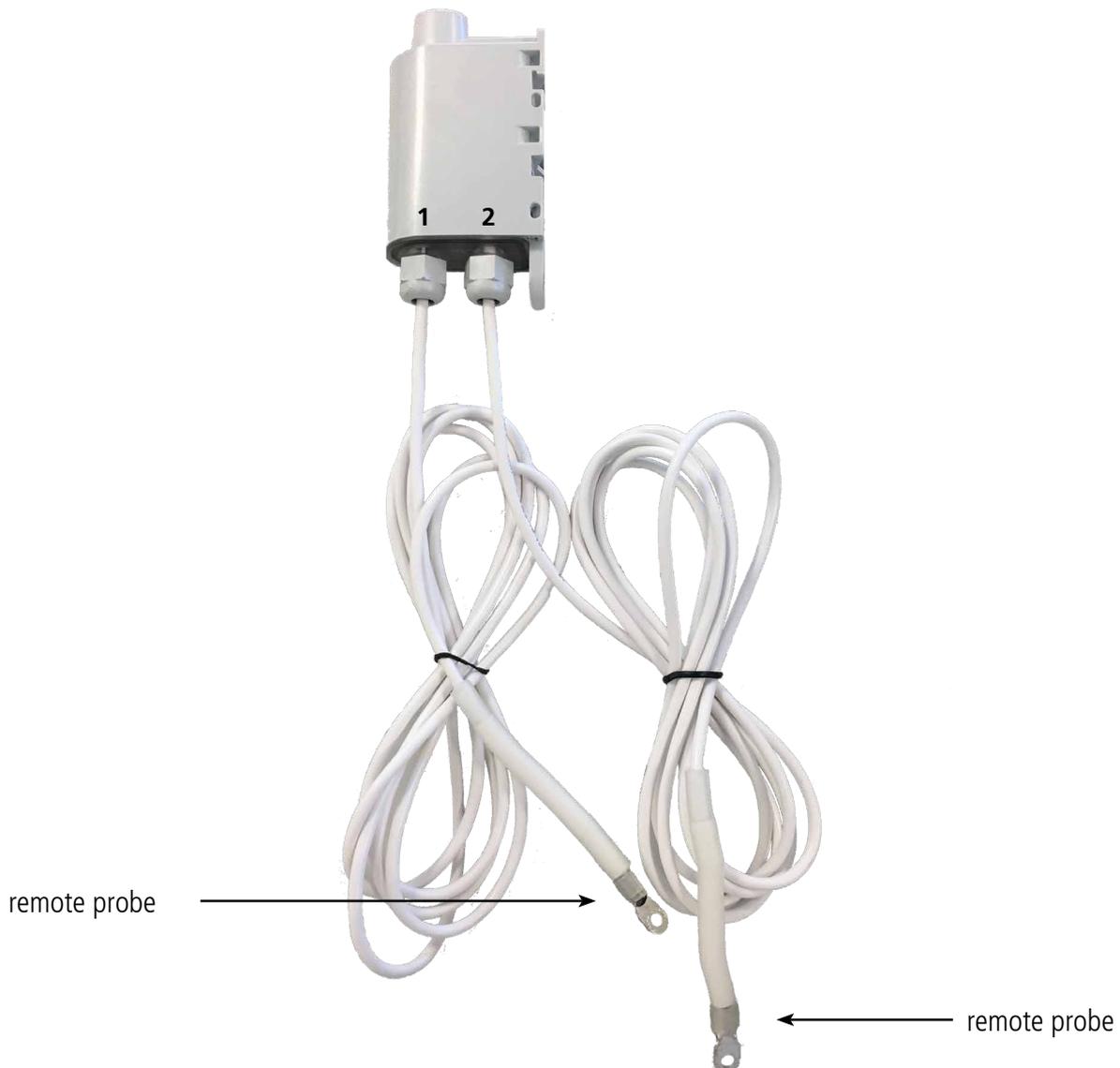
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Values in millimeters

Product with ambient probe and remote probe:



Product with two external probes:



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1.5. Technical specifications

1.5.1 General characteristics

Parameters	Value
Working temperature	-25°C / +70°C
Dimensions	132 x 62 x 34mm
Weight	148g 1 Remote probe, 185g 2 remote probes
Casing	IP 68
Radio standards	EN300220-1 et EN300220-2
LoRaWAN network	EU863-870
LoRaWAN class	Class A and Class C (if power by external supply)
Max power transmission	14 dBm
Applicative port number (downlink)	1
Daily clock drift at 25°C	5 to 7 seconds

1.5.2 Electric characteristics

Supply	Characteristics	Value	Unit
Battery FANSO ER18505H+W36mm+51021 connector	Voltage	3.6	V
	Current max	150	mA
External	Input range	4.5 to 6.5	V
	Current max	110	mA
USB	Tension	5	V
	Courrent max	110	mA

The external power supply chosen must comply with the above electrical characteristics and must conform to the standards EN/IEC 62368-1 and EN 61000-3-2, EN 61000-4-2, EN 61000-4-4, EN 61000-4-5.

Example of reference tested by adeunis and functional with the product by cutting the wires: GS05E-USB - Wall Mount AC Adapters 5W 5V 1A W/Euro Plug WallMount USB Output from Mean well.

1.5.3 Probes characteristics

Characteristics	
Ambient probe - temperature range	[-25°C / +70°C]
Remote probe - sensor temperature range	-55°C..+155°C
Remote probe - wire temperature range	-30°C+105°C
Remote probe - wire length	2m
Precision [0°C/+60°C]	+/- 0,2°C
Precision [-35°C/0°C]	+/- 0,5°C
Precision [-55°C/-35°C]	-0,6 /+0,8°C
Precision [+60°C/105°C]	+/- 2°C

CAUTION: Allow a few minutes for the probe to come back to room temperature before any manual operations to avoid mechanical damages. In addition, please respect the minimum and maximum temperatures for the sensor and the wire (cf. Table here-above).

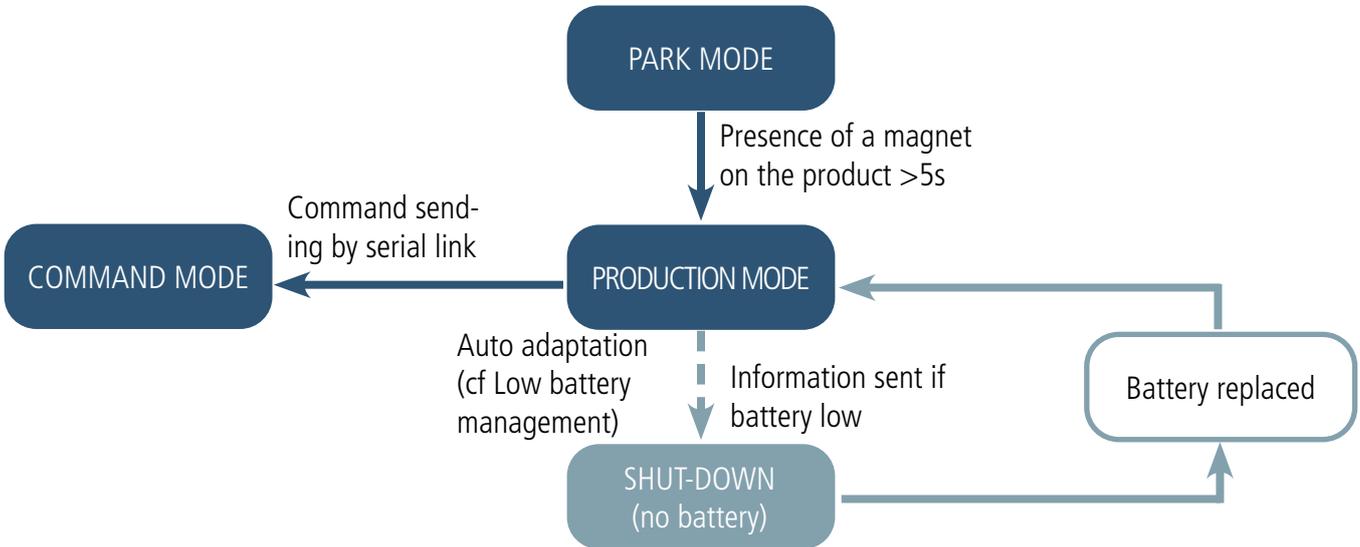
1.5.4 Autonomy

Usage conditions	Nb of frame per day	Event per day	Autonomy (years) SF7	Autonomy (years) SF12
Product in stock : maximum 1 year. Calculations done for a temperature of 20°C.	2	0	> 10	> 10
	2	10	> 10	> 10
	24	0	> 10	6.1
	24	10	> 10	4.5
	48	0	> 10	3.3
	48	10	> 10	2.8
	144	0	> 10	1.2
	144	10	> 10	1.1

Values above are estimations done under certain conditions of use and environment. They do not represent in any case a commitment on the part of adeunis®.

2. PRODUCT OPERATION

2.1. Global operation



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IMPORTANT NOTE : adeunis® use the most significant byte first format.
The product has several operating modes:

2.1.1 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 5 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.

2.1.2 COMMAND mode

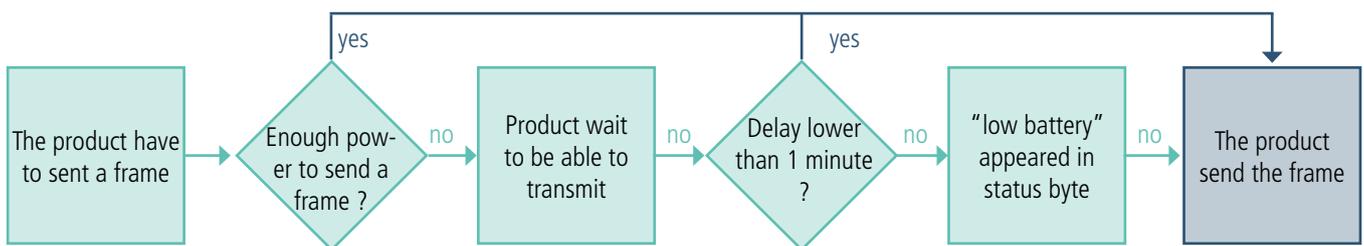
This mode allows the user to configure the registers of the product. To enter in this mode, plug the micro-USB cable and use the IoT configurator or AT command. Exit from command mode is done when USB is disconnected or with an ATO command. The product will return in its previous state, PARK or PRODUCTION.

2.1.3 PRODUCTION mode

This mode allows the user to operate the product in its finale use.

2.1.4 Low battery management

When the product detect that the battery is not able to deliver the level of power required for a emission (extreme temperature or end-of-life of the battery), it waits to be able to transmit. If it detect that the generated delay is longer than 1 minute, it informs the user activating the "low battery" flag in the status byte of each frame sent.



battery" flag in the status byte of each frame sent.

The "battery low" flag is automatically disappearing when the battery is replaced or when temperature conditions are favorable to the proper

functioning of the battery.

2.2. JOIN process

2.2.1 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 attempts.

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

2.2.2 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.

2.3. 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.

In any case, the product will send the first frames directly in the SF determined by the result of the test.

2.4. Transmission modes

The product allows to measure temperature on 2 probes or 1 probes only, to save the information and to send it according to 3 modes of emission.

	Periodical transmission	Over threshold transmission	Periodical and over threshold transmission
Definition	The periodical transmission allows the temperature to be collected according to a specified period of time, to be saved and sent on a regular basis for analysis over time.	The over threshold transmission enables to read the temperature according to a specified period of time but to send the alarm frame only if a threshold is over passed.	Mix of the 2 modes to measure temperature regularly in order to be alerted if a threshold is over passed and to save the information to make analysis over time.
Concrete case of usage	I want to measure my temperature on the 2 probes every 30 minutes. I want to minimize the number of frame per day and to optimize the autonomy so I prefer to send the maximum of data in each frame without losing data.	I want that the product send me an alarm if the temperature is lower than 10°C on probe 1.	I want to know the temperature on the 2 probes along the day and be informed if the temperature go under 10°C on the probe 1. The product will send me a frame twice a day with the temperature measured each hour and an alarm if the temperature is under 10°C on the probe 1.
Associated configuration	<ul style="list-style-type: none"> • Sampling period (S321) = 900 (900s x2 =1800 seconds so 30 minutes) • Number of samples before saving (S320) = 1 (1 saving at each reading) • Number of saving before transmission (S301) = 12 (12 savings per frame) • Probe 1 alarm (S330) = 0 (alarm disabled) • Probe 2 alarm (S340) = 0 (alarm disabled) 	<ul style="list-style-type: none"> • Sampling period (S321) = 300 (300s x2 =10 minutes) • Number of saving before transmission (S301) = 0 (no periodical transmission) • Alarm temperature on probe 1 (S330) = 1 (low threshold) • Low threshold on probe 1(S333) = 100 (in tenth of °C) • Low threshold hysteresis on probe 1 (S334) = 50 (in tenth of °C) the alarm is raised only if my temperature exceeds 15 °C. 	<ul style="list-style-type: none"> • Sampling period (S321) = 300 (300s x2 =10 min) • Number of samples before saving (S320) = 6 (6 x 10 min = 1h) • Number of saving before transmission (S301) = 12 (12 X 1h = 12h) • Alarm temperature on probe 1 (S330) = 1 (low threshold) • Low threshold on probe 1 (S333) = 100 (in tenth of °C) • Low threshold hysteresis on probe 1 (S334) = 50 (in tenth of °C) the alarm is raised only if my temperature exceeds 15 °C.
			See here under explanation

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WARNING: the number of data per frame depends on the network used. Here the case is available on a LoRaWAN Network.



In which mode I want my product?

Periodical

Periodical +
Alarm

Alarm with
thresholds

What is my sampling period?

A sample every X
seconds

A sample every X
seconds

A sample every X
seconds

I divide by 2 this value
and indicate it in the
register S321

I divide by 2 this value
and indicate it in the
register S321

I divide by 2 this value
and indicate it in the
register S321

When do I want to save the information?

I want to save each
sample

I want to read
regularly in case of a
threshold is overpassed
but I want to save the
information only each Y
samples

In alarm mode I do
not need to save the
information

I indicate 1 in the regis-
ter S320

I indicate this Y value in
the register S320

No need to indicate a
value in the register
S320

When the frame will be sent ?

I want to optimize the
frame in order to send
the minimum of frame
per day

I want to optimize the
frame in order to send
the minimum of frame
per day

The frame is sent
when a threshold is
overpassed

I indicate the number of
samples I want in the
frame in the register
S301 (in LoRaWAN 24
being the max for 1
probe activated and 12
for 2 probes activated)

I indicate the number of
samples I want in the
frame in the register
S301 (in LoRaWAN 24
being the max for 1
probe activated and 12
for 2 probes activated)

I indicate 0 in the reg-
ister S301 to deactivate
the periodical transmis-
sion

I configure the
thresholds in registers
S330 to S334
and S340 to S344

I configure the
thresholds in registers
S330 to S334
and S340 to S344

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To program registers, here are the steps to follow depending on the chosen mode.
Example of possible configurations:

Case (no 100% alarm) with 2 probes activated	Associated configuration	Theoretical number of periodical frame sent per day
<ul style="list-style-type: none"> Reading/sampling : 10 minutes Historisation : every hour (so each 6 readings) Transmission : twice a days (each 12 historisations) 	<ul style="list-style-type: none"> 321 = 300 320 = 6 301 = 12 	2 frames
<ul style="list-style-type: none"> Reading/sampling : 10 minutes Historisation : at each reading Transmission : maximum allowed per frame (here in LoRaWAN 863-870) 	<ul style="list-style-type: none"> 321 = 300 320 = 1 301 = 12 	12 frames
<ul style="list-style-type: none"> Reading/sampling : 5 minutes Historisation : every 15 minutes (so each 3 readings) Transmission : every hour (so each 4 historisations) 	<ul style="list-style-type: none"> 321 = 150 320 = 3 301 = 4 	24 frames
<ul style="list-style-type: none"> Reading/sampling : each hour Historisation : at each reading Transmission : at each historisation 	<ul style="list-style-type: none"> 321 = 1800 320 = 1 301 = 1 	24 frames
<ul style="list-style-type: none"> Reading/sampling : each hour Historisation : at each e reading Transmission : every 4 hours (so each 4 historisations) 	<ul style="list-style-type: none"> 321 = 1800 320 = 1 301 = 4 	6 frames
<ul style="list-style-type: none"> Reading/sampling : every 10 seconds Historisation : every minutes (so each 6 readings) Transmission : every 10 minutes (so each 10 historisations) 	<ul style="list-style-type: none"> 321 = 5 320 = 6 301 = 10 	144 frames
<ul style="list-style-type: none"> Reading/sampling : every minutes Historisation : at each reading Transmission : every 10 minutes (so each 10 historisations) 	<ul style="list-style-type: none"> 321 = 30 320 = 1 301 = 10 	144 frames

Reminder : In LoRaWAN, the technology enables to have 24 samples per frame (12 samples per probe). If only one probe is activated, it is possible to configure 24 in register S301 without losing data. If the 2 probes are activated, it is mandatory to configure at maximum 12 in the register S301 to not lose data. If there is too much data for the capacity of the frame, the flag "configuration incoherency" will appear in the concerned frame and the oldest samples will be lost.

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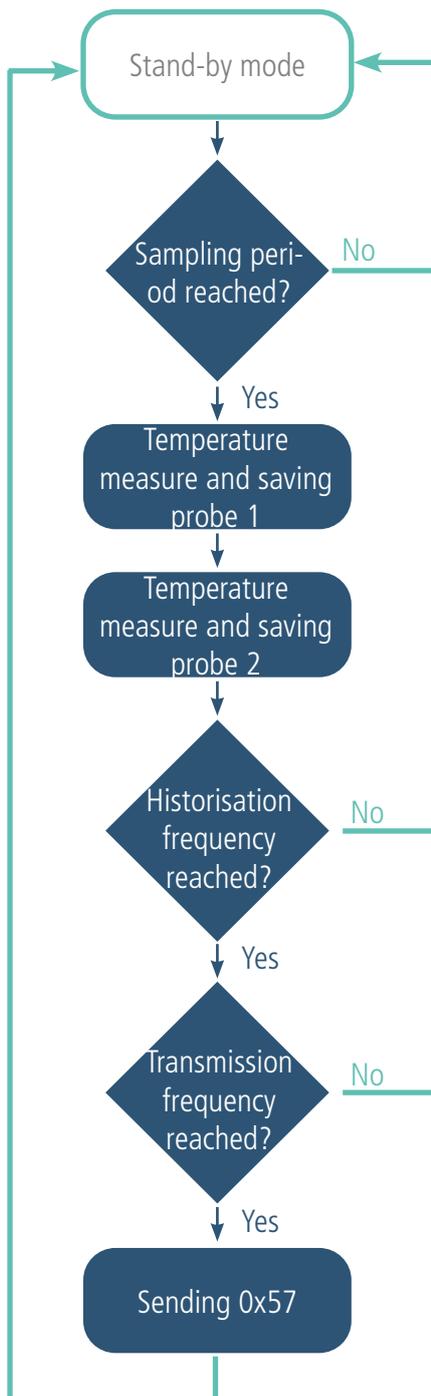
2.4.1 Periodical transmission with or without historisation

The product enables to measure and send the data from the probe following the diagram bellow. This periodical transmission can be done with or without historisation of the data. The product enables to activate or deactivate a probe. The 0x57 frame will be different depending if 1 or 2 probes are activated.

Parameters associated to this mode are:

- Sampling period (register S321), historisation frequency (register S320) and transmission frequency (register S301)
- Activation of the probes (register S324).

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Example without historisation:

Register	Encoding	Value	Result
S321	Decimal	1800	1 sample every hour (1800 x 2 seconds = 60 minutes)
S320	Decimal	1	1 historisation for each sample
S301	Decimal	1	1 transmission for each historisation
S324	Decimal	3	The 2 probes are activated

In this example:

- 1 sample (reading) every hour (1800 x 2 seconds = 60 minutes)
- 1 historisation at each sample and the frame is sent immediately (so every hour)
- The 2 probes are activated so the product will read the temperature on the 2 probes every hour.

Example with historisation:

Register	Encoding	Value	Result
S321	Decimal	1800	1 sample every hour (1800 x 2 seconds = 60 minutes)
S320	Decimal	1	1 historisation for each sample
S301	Decimal	12	1 transmission every 12 historisations
S324	Decimal	3	The 2 probes are activated

In this example:

- A sample (reading) every hour (1800x2secondes = 60 minutes)
- An historisation done at each sampling (so every hours)
- A transmission is done every 12 historisations (so every 12 hours, so 2 times a day)
- The 2 probes are activated so the product will read the temperature on the 2 probes every hour.

2.4.2 Periodical transmission with redundancy

The product enables to add redundancy in the frame sent (cf diagram bellow). Thanks to the redundancy the product will save samples locally in order to resend them in the next frame.

Parameters associated to this mode:

- Sampling period (register 321), historisation frequency (register 320) and transmission frequency (register 301)
- Activation of the probes (register 324).
- Number of samples to be repeated from a frame to another (register 323).

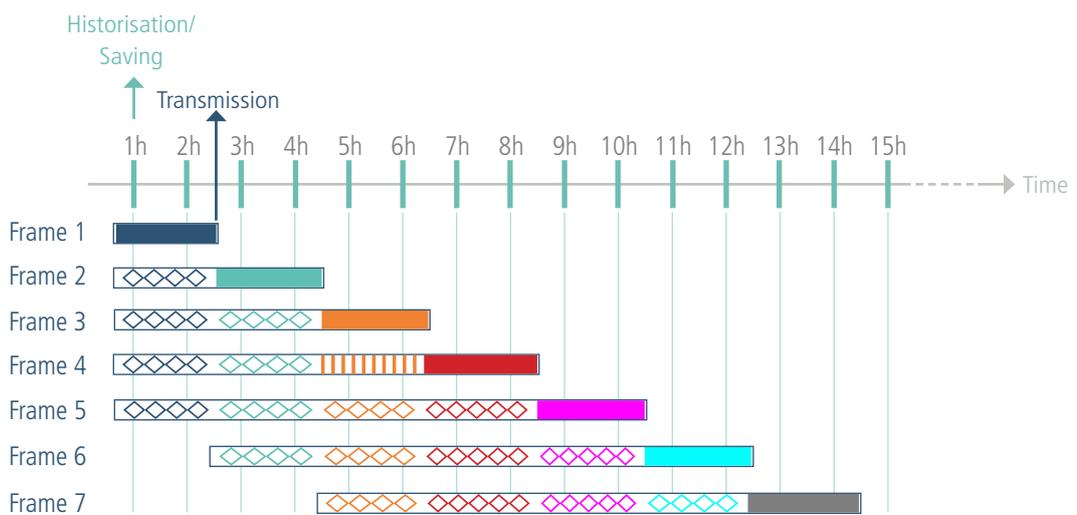
When redundancy is activated, the frame will contain the number of bytes corresponding to the total number of samples, so S301+S323. At the start-up of the product, bytes assigned to the redundant samples will be filled with zeros as long as there is no memorized samples.

Example with redundancy:

Register	Encoding	Value	Result
S321	Decimal	1800	A sample every hour (1800 x 2 seconds = 60 minutes)
S320	Decimal	1	1 historisation at each sampling
S301	Decimal	2	1 transmission every 2 historisations
S324	Decimal	3	The 2 probes are activated
S323	Decimal	4	4 samples are repeated in each frame

In this example:

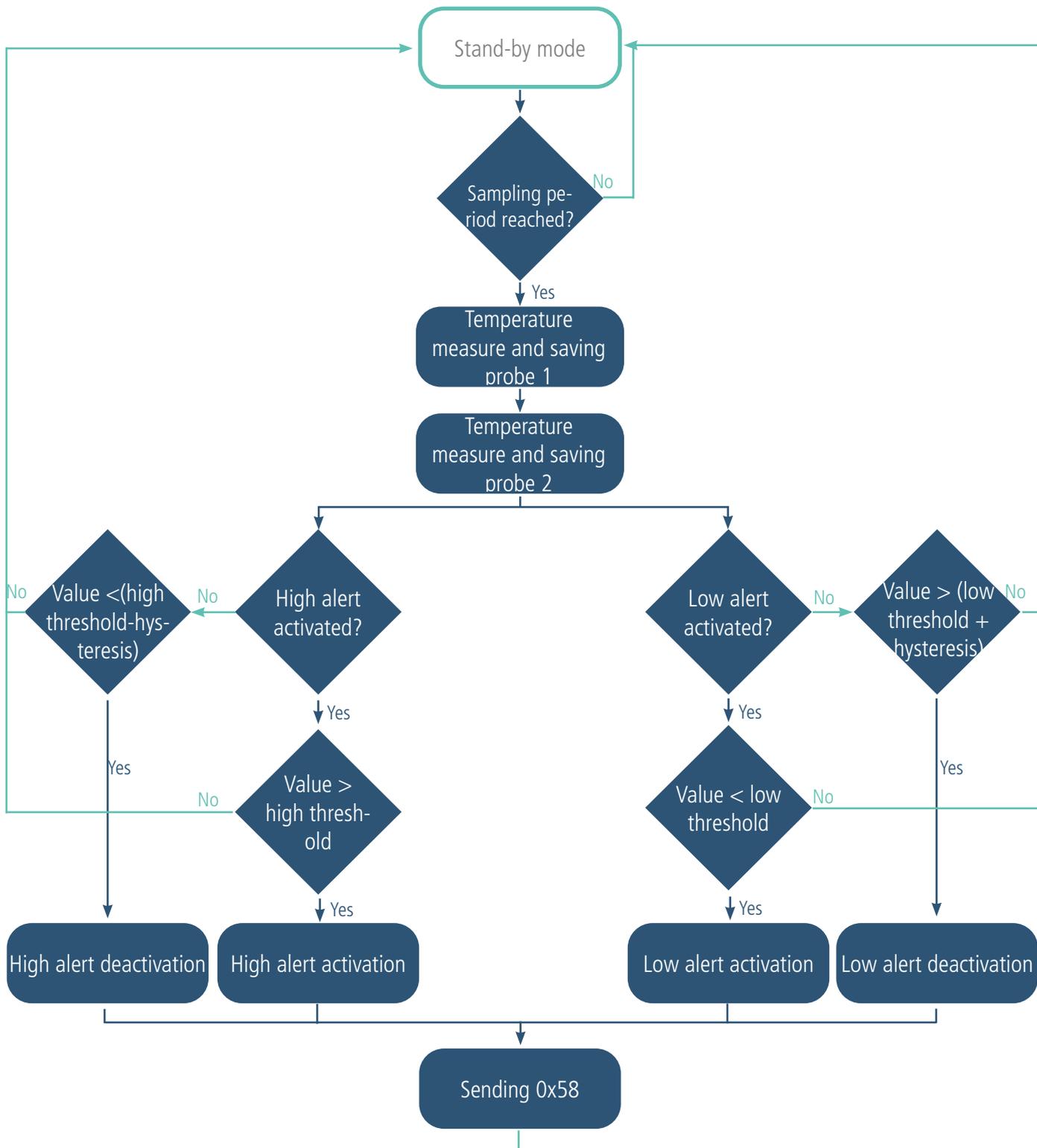
- A sample (reading) every hours (1800 x 2 seconds = 60 minutes)
- A historisation at each sampling
- A transmission done every 2 historisations (so every 2 hours)
- 2 probes are activated
- The product will send 2 new samples measured every hour and 4 memorized samples.



- New samples
- ◇◇◇◇ Samples memorized

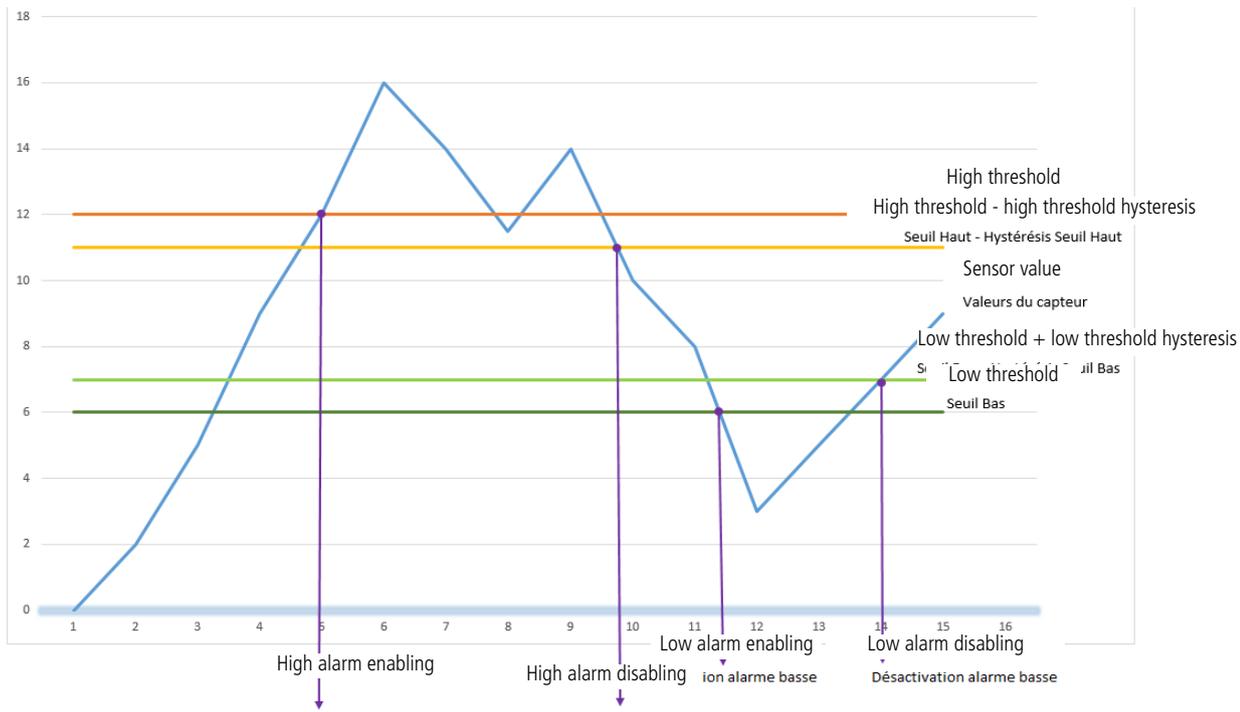
EN

2.4.3 Transmission on threshold overpassed



The product enables the detection of a threshold overpassed (high and low) for each probe, as described in the diagram below: The sampling period (reading) enables to determine when the product will do the temperature measure and so the frequency at which the product will detect an overpassed threshold.

The product will send the frame when a threshold is overpassed but also when temperature comes back to normal (cf status alarm).
Explication of the thresholds and their hysteresis:



The settings associated with this mode of operation are:

- Sampling period (register 321).
- The activation of the probes (register 324).
- Alarm configuration of the probe 1 (register 330) and probe 2 (register 340).
- High threshold of the probe 1 (register 331) and probe 2 (register 341).
- Hysteresis for the high threshold of the probe 1 (register 332) and probe 2 (register 342).
- Low threshold of the probe 1 (register 333) and probe 2 (register 343).
- Hysteresis for the low threshold of the probe 1 (register 334) and probe 2 (register 344).

Example :

Register	Encoding	Value	Result
S301	Decimal	0	Alarm mode
S321	Decimal	1800	A sample of the temperature every hour
S324	Decimal	3	The 2 probes are activated
S330	Decimal	3	An alarm is activated on high and low threshold on the probe 1
S331	Decimal	700	High threshold is 70°C
S332	Decimal	50	Hysteresis of the high threshold is 5°C, so the come back to normal is at 65°C
S333	Decimal	100	Low threshold is 10°C
S334	Decimal	20	Hysteresis of the low threshold is 2°C, so the come back to normal is at 12°C
S340	Decimal	2	An alarm is activated on high threshold only on probe 2
S341	Decimal	235	High threshold is 23.5°C
S342	Decimal	35	Hysteresis of the high threshold is 3.5°C, so the come back to normal is at 20°C
S343	Decimal	0	No low threshold determined
S344	Decimal	0	No low threshold determined

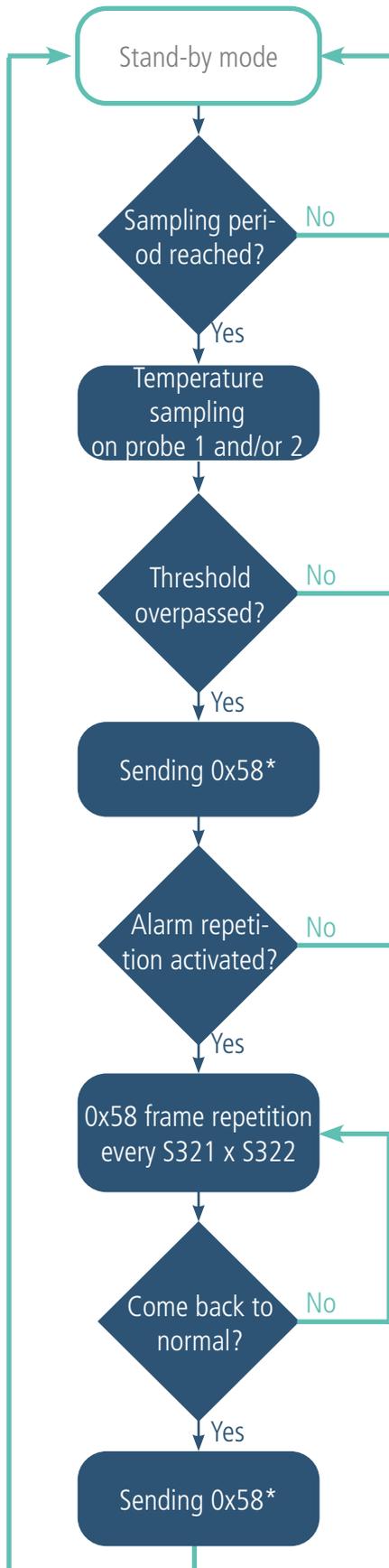
In this example:

- The product measure the temperature on the 2 probes every hour
- On probe 1, there is a high alert at 70°C with a come back to normal at 65°C and a low alert at 10°C with a come back to normal at 12°C
- On probe 2, there is only a high alert at 23.5°C with a come back to normal at 20°C.

2.4.4 Transmission on threshold overpassed with alarm repetition

The product enables the detection of a threshold overpassed (high and low) for each probe and to repeat this alert depending on a determined period (register S321 x S322).

EN



Settings associated to this operating mode are:

- Sampling period (register 321),
- Alarm repetition (register 322),
- Activation of the probes (register 324).
- Alarm configuration on probe 1 (register 330) and probe 2 (register 340).
- High threshold on the probe 1 (register 331) and probe 2 (register 341).
- Hysteresis for high threshold on probe 1 (register 332) and probe 2 (register 342).
- Low threshold on the probe 1 (register 333) and probe 2 (register 343).
- Hysteresis for low threshold on probe 1 (register 334) and probe 2 (register 344).

Example:

Registers	Encoding	Value	Result
S301	Decimal	0	Alarm mode
S324	Decimal	1	Only probe 1 is activated
S330	Decimal	3	High and low threshold activated on probe 1
S331	Decimal	700	High threshold is 70°C
S332	Decimal	50	Hysteresis for high threshold is 5°C, the come back to normal is at 65°C
S333	Decimal	100	Low threshold is 10°C
S334	Decimal	20	Hysteresis for low threshold is 2°C, the come back to normal is at 12°C
S321	Decimal	300	A sampling is done every 10 minutes (300 x 2 seconds = 10 minutes)
S322	Decimal	2	Alarm will be sent every 2 sampling if always activated

In this example:

- The product measure temperature only on probe 1
- On probe 1, there is a high threshold at 70°C with a come back to normal at 65°C and a low threshold at 10°C with a come back to normal at 12°C
- A sampling (reading) every 10 minutes (300 x 2 seconds = 10 minutes)
- As long as the alarm is active (threshold always overpassed), this alarm will be repeated every 2 samples (so every 20 minutes).

*The "alarm status" byte gives the information if the alert is activated or not and so allows to dissociate a 0x58 frame sent to alert that the threshold is overpassed from a 0x58 frame sent to inform about come back to normal.

2.4.5 Transmission of the Keep Alive frame

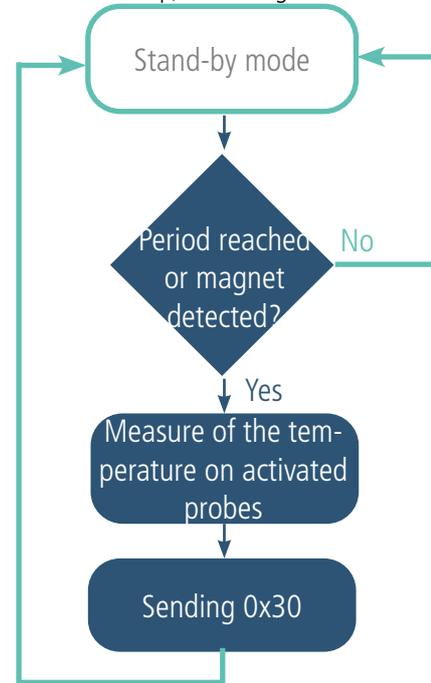
In the event mode, it is possible that the product would never send data frames. So to be sure that it is working properly a Keep Alive frame is transmitted regularly (following diagram). Furthermore, in order to enable to measure the temperature on demand it is possible to cause the sending of this frame using a magnet on the product during 3 seconds (at the same place of the start-up) or sending a 0x05 frame.

Parameters associated to this operating mode:

- Activation of the probes (register 324).
- Transmission period of the keep alive frame, from 20 seconds to 7 days (register 300).

Example:

Register	Encoding	Value	Result
S300	Decimal	8640	The keep alive frame is sent every: 8640x10 seconds = 1440min so 24h (so once per day)



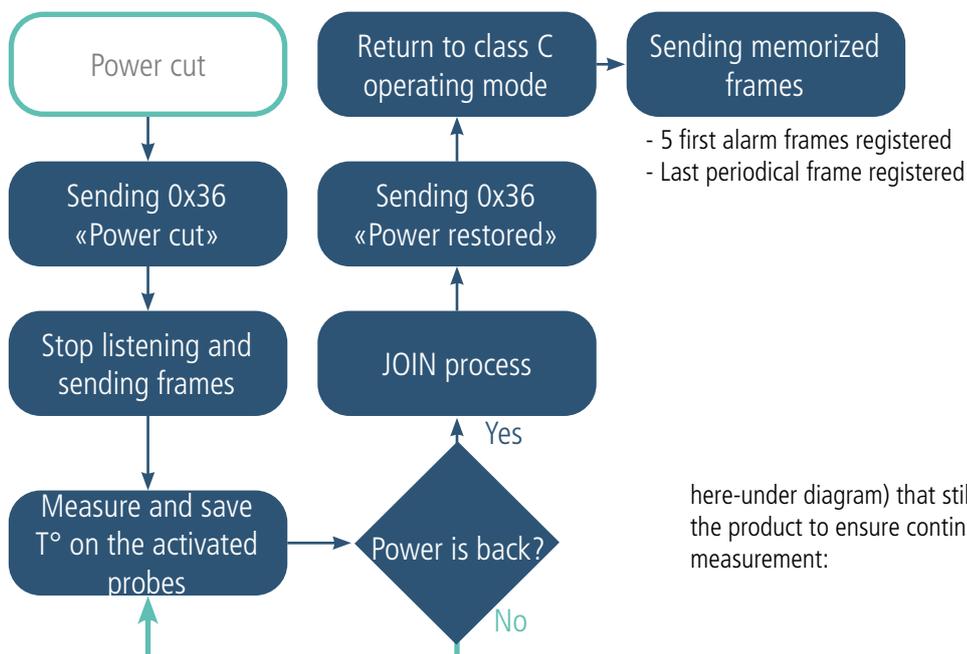
2.5. Class C LoRaWAN

The TEMP product is in class A by default but can be switched to Class C by configuration.

The class C enables the product to be in constant listening when it is not transmitting (no need for an uplink to receive a downlink). Thanks to this mode it is possible to measure at any moment remotely the temperature (manually with a downlink).

WARNING: this mode can be activated only if the product is supplied by an external supply.

When the product is running in Class C, if the supply is cut off, the product enter in safety mode and activate a degraded mode (explained in the



here-under diagram) that still allows the product to ensure continuity of measurement:

WARNING: a battery must be present and connected in the product to enable this "back-up" mode.

2.6. Timestamp of the data

The sensor can integrate the timestamp of the data in the frame if this option is activated. Timestamp is given in EPOCH 2013 (please, refer to the TRM of the product to know the content of each frame).

To configure the timestamp, you have to set the UTC time first, via Downlink or through the Advanced Menu of the IoT Configurator.

Then you can activate the timestamp in the Applicative parameters and choose if you want to set the timezone and if you want that the product take into account

the Daylight Saving Time.

Commands

Version | List | Set UTC time | Get Time

Timestamp configuration

Timestamp activated

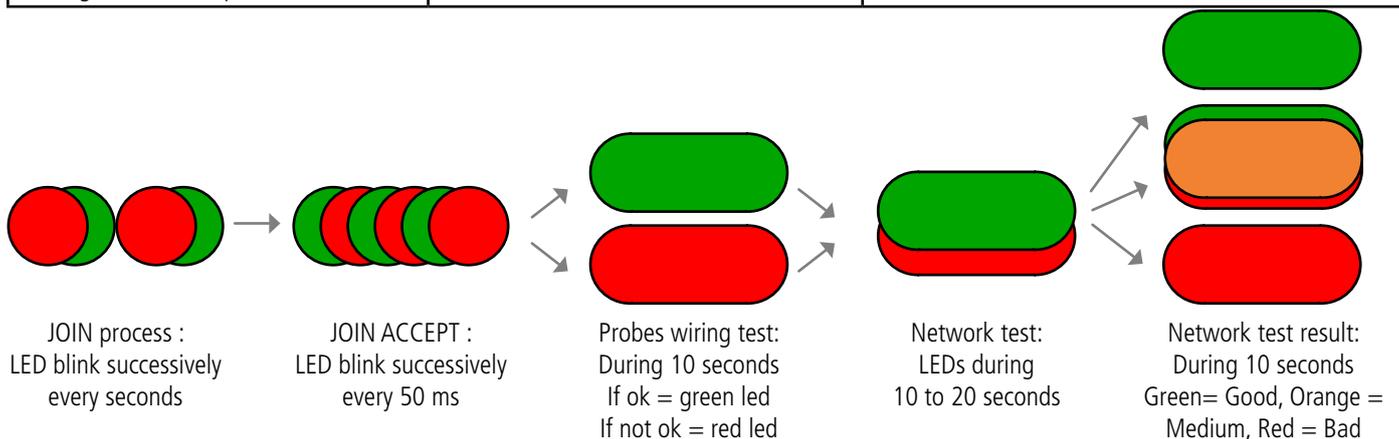
Daylight Saving Time management

Time zone offset from UTC (hours)
-12 ≤ value ≤ 14

Clock drift compensation (tenths of a second per day)
-100 ≤ value ≤ 100

2.7. Operation of the LED

Mode	Red LED state	Green LED state
Product in Park mode	OFF	OFF
Magnet detection process in PARK mode	OFF	ON from detection of the magnet during 5 seconds
Product start (after detection of the magnet)	OFF	Rapid flashing 6 cycles, 100 ms ON / 100 ms OFF
Joining process (LoRaWAN products)	During the JOIN phase: flashing: 50ms on / 1 s off If the JOIN phase is complete (JOIN accept): flashing: 50ms on / 50ms Off (6x)	During the JOIN phase: flashing: 50ms on / 1 s off (just after the red LED) If JOIN phase is complete (JOIN accept): flashing: 50ms on / 50ms off (just before the red LED)
Detection of the correct wiring of the probes at startup	10 seconds ON if a default is detected	10 seconds ON if no default is detected
Network Quality test running	10 to 20 seconds ON	10 to 20 seconds ON
Network Quality test result	Bad coverage : 10 seconds ON Medium coverage : 10 seconds ON Good coverage : OFF	Bad coverage : OFF Medium coverage : 10 seconds ON Good coverage : 10 seconds ON
Switching to the Command mode	Continuously lit	Continuously lit
Battery level low	Flashing (0.5s ON every 60s)	
Product faulty (return to factory)	Fixed ON	
Magnet detection in PRODUCTION mode	OFF	Flashing 50ms ON / 50ms OFF after 3 seconds of magnet detection
In Class C, when the external supply is missing at the start up of the device	10 seconds ON	OFF



LEDs scenario for a sensor configured in Class A OTAA:

3. REGISTERS AND FRAME DESCRIPTION

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 TEMP product, available on the adeunis website: <https://www.adeunis.com/en/produit/temp/>

4. CONFIGURATION AND INSTALLATION

4.1. Configuration and installation of the transmitter

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>

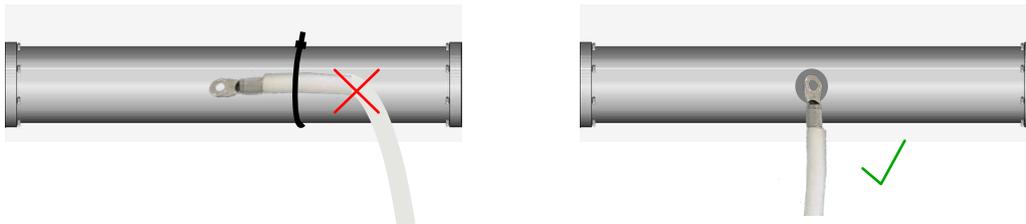
- Windows 10: <https://www.adeunis.com/telechargements/>

To install the product, please refers to the INSTALLATION GUIDE adeunis® available on the website.

4.2. Installation of the remote probe

To ensure an optimal performance of the remote probe, please, follow the installation recommendations here-after:

- Install the contact probe on the surface to monitor
- Place the probe to be sure that it is the reinforced section that is in contact with hot surfaces and not the wire (cf illustration hereunder)



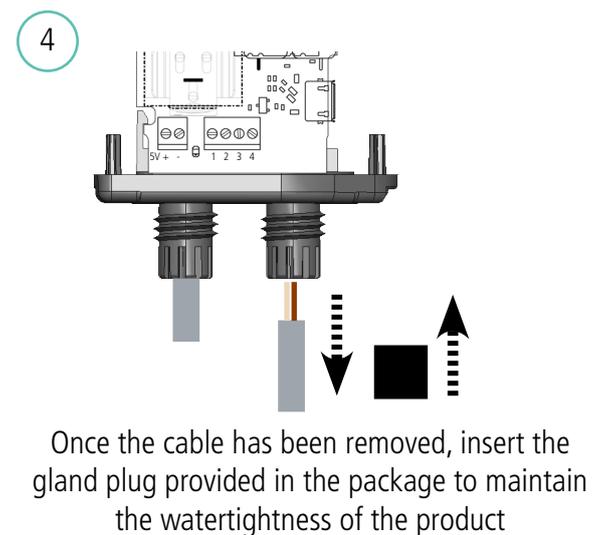
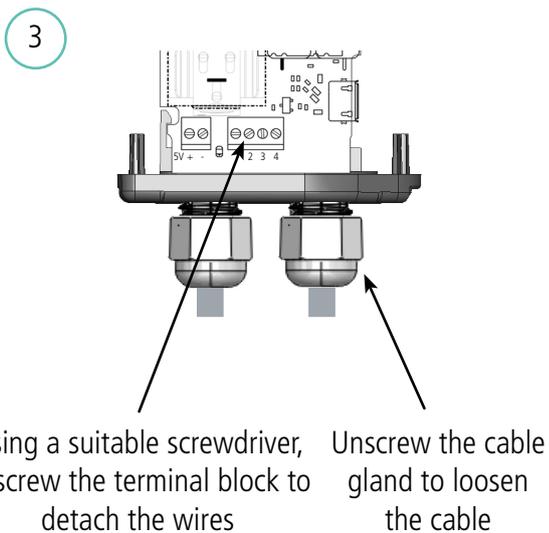
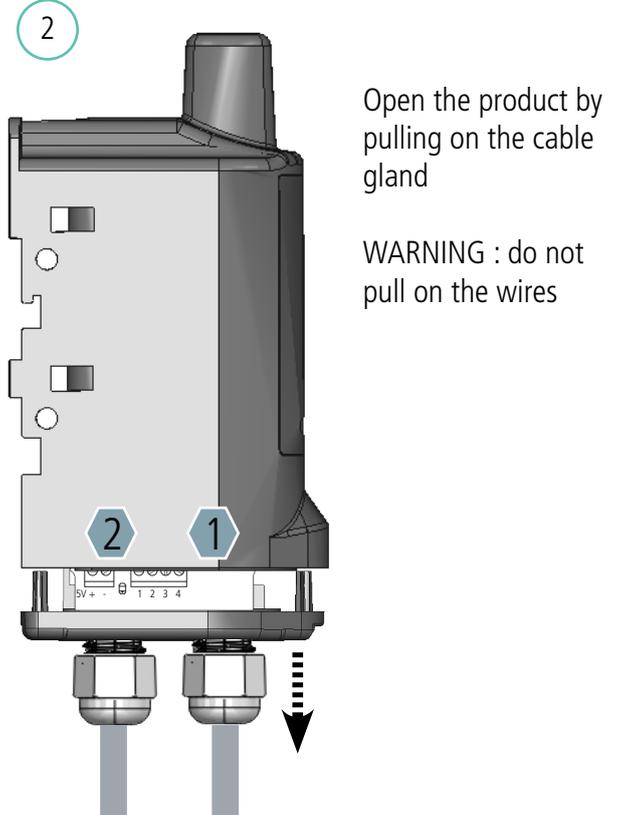
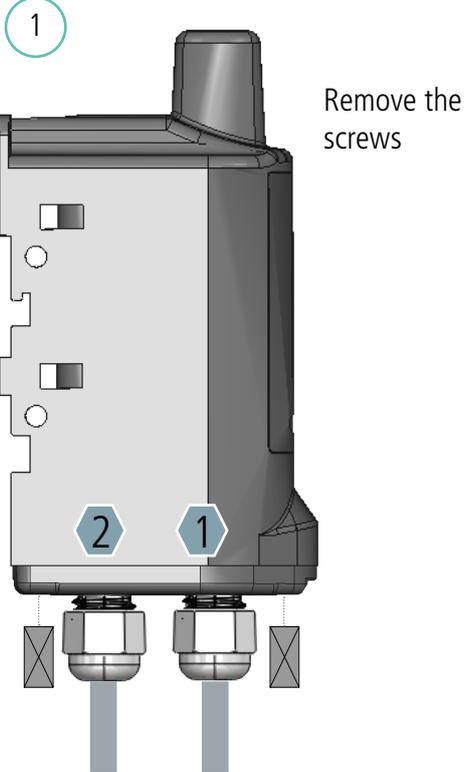
- Use the appropriate fixation for the monitored surface (thermal paste, heat resistant collars etc.)

WARNING : the probe must be manipulated at room temperature, risk of damage if handled in negative temperatures or above 90°C.

5. WIRING

5.1. Disconnect a probe

To disconnect a probe, please follow these instructions:

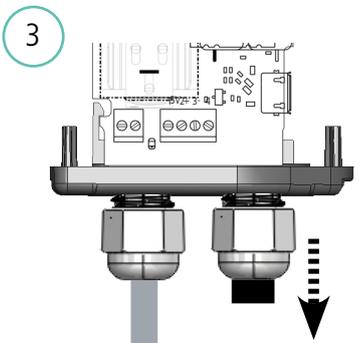
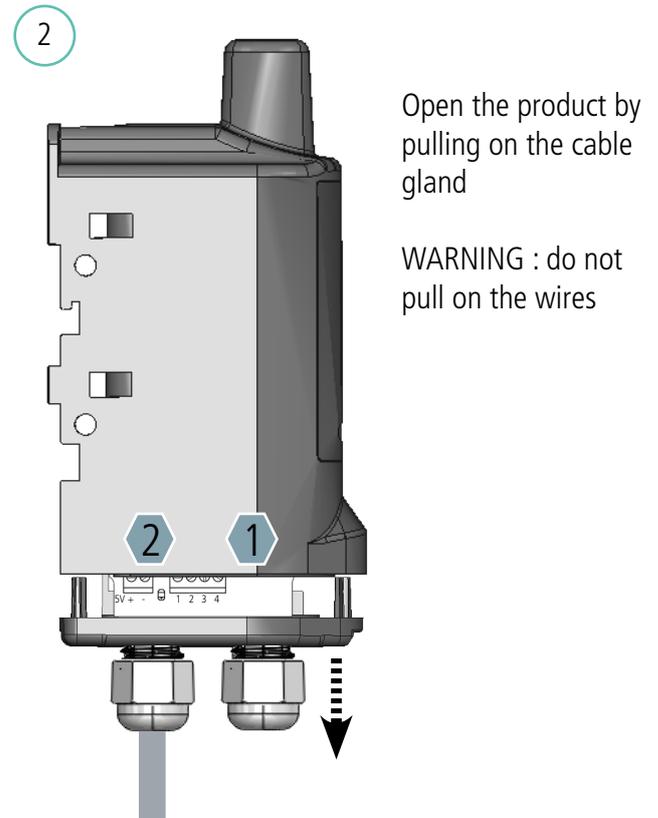
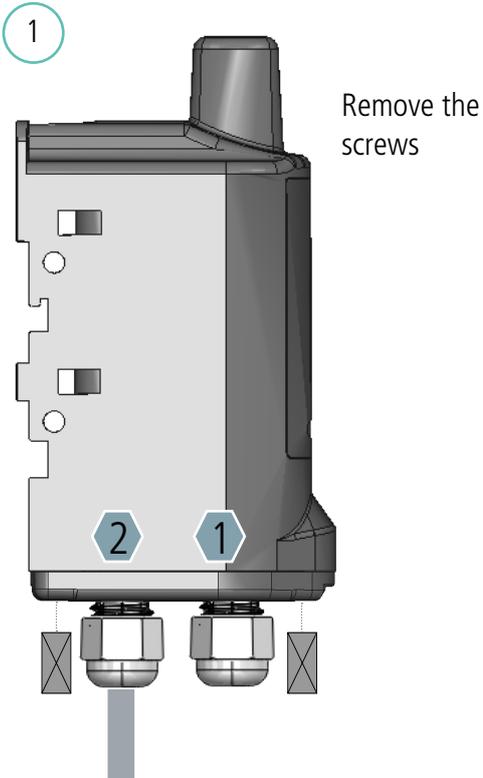


CAUTION: To maintain the IP 68 it is important to screw the cable glands fully and screw the screws with a PZ.1 head and a tightening torque of 0.9 N.m.

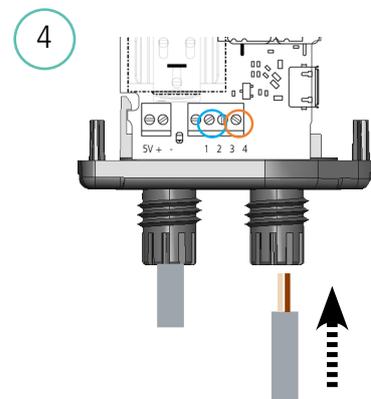
As a reminder the probe 1 is on the rounded side of the housing, the probe 2 is on the flat side of the housing.

5.2. Wiring a probe

In order to wire a probe, please follow these instructions:



Remove the gland plug



Insert the cable of the probe supplied with the product and connect the wires to the terminal blocks:

- for **probe 1*** terminals 3 and 4
- for **probe 2*** terminals 1 and 2

CAUTION: To maintain the IP 68 it is important to screw the cable glands fully and screw the screws with a PZ.1 head and a tightening torque of 0.9 N.m.

As a reminder the probe 1 is on the rounded side of the housing, the probe 2 is on the flat side of the housing.

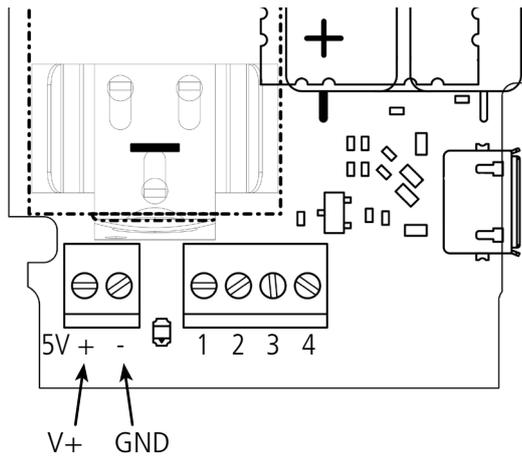
*The wiring of the probes at the right place is important to match the associated registers and for the interpretation of the results (cf. Technical Reference Manual, Registers).

5.3. Wiring external supply

A terminal is present in the product to connect an external supply in order to:

- Use the Class C LoRaWAN (mandatory for this mode)
- Improve the autonomy of the product
- Send more frames more regularly.

Connect the power cable to the "+" terminal block (V +) with a power supply between 4.5 V and 6.5 V and connect the earth to the "-" terminal block (GND).



N.B.: To power the product via an external power supply it is necessary to disconnect a probe in order to pass the cable of the power supply in the cable gland.

N.B.: It is not necessary to disconnect the battery when the external power supply is connected. For the Class C it is even advisable to keep it to benefit from the "back-up" mode in case of power failures.

6. DOCUMENT HISTORY

Version	Contents
V1.0.0	Creation
V1.0.1	Update Declaration of Conformity
V1.2.0	Update Part 3
V2.0.0	Changes after update RTU & APP
V2.0.1	Two external probes product and changes after APP updates
V3.0.0	Add of applicative functionalities (historisation, redundancy, alarm repetition)
V3.0.1	Hardware changes: IP68 casing, external supply and new FANSO battery
V3.0.2	Change in electrical standard part
V3.1.0	Add of applicative functionalities :Timestamp, Network Quality test, and JOIN process configuration
V3.1.1	More information about the battery