User Guide - COMFORT - LoRaWAN EU863-870

Document version V1.1.2

Product/Service COMFORT EU868 / RC1

4 weitere Eigenschaften

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PRODUCTS AND REGULATORY INFORMATION

This User Guide applies to the following product:

LoRaWAN COMFORT
Reference: ARF8275A
Firmware version:

RTU version: V02.00.01
APP version: V02.01.00

DOCUMENT INFORMATION	
Title	LoRaWAN COMFORT - User guide
Type	User guide
Version	2.1.1

Déclaration UE de Conformité

Nous

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Déclarons que la DoC est délivrée sous notre seule responsabilité et fait partie du produit suivant :

Modèle produit :	SB1 TEMPERATURE+ HUMIDITY LoRaWAN
Références :	ARF8275A

Objet de la déclaration :

L'objet de la déclaration décrit ci-dessus est conforme à la législation d'harmonisation de l'Union applicable :
Directive 2014/53/UE (RED)

Les normes harmonisées et les spécifications techniques suivantes ont été appliquées :

Titre :	Date du standard/spécification
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

24 Juillet 2018

Monnet Emmanuel, Responsable Certification

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1. DEVICE OVERVIEW

Description :

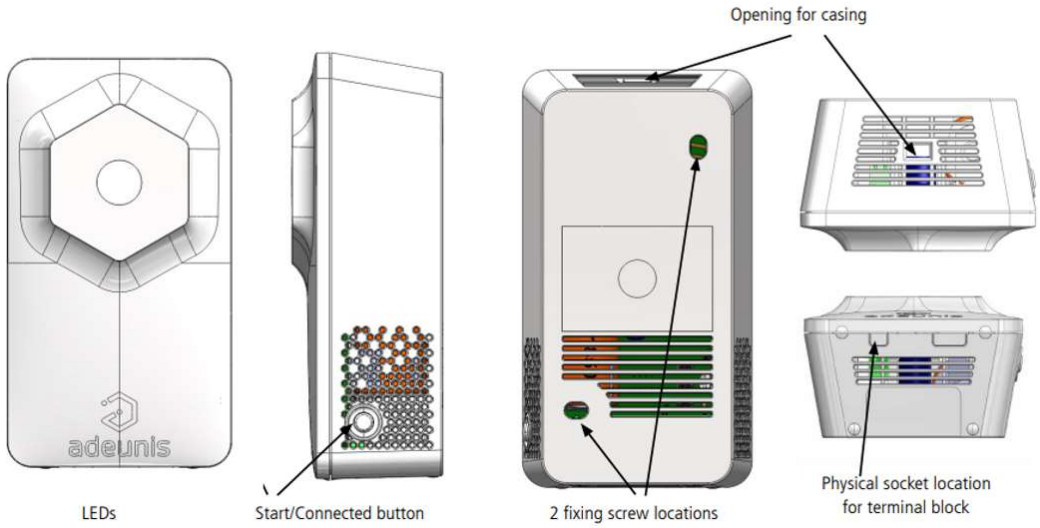
Le LoRaWAN Smart Building COMFORT from Adeunis is a ready-to-use radio transmitter for measuring ambient temperature and humidity.
• This device meets the needs of users to monitor the temperature and humidity of their buildings via an LPWAN network.
• The device issues data periodically or when thresholds are high or low.
• The user can access the transmitter configuration locally via a micro-USB port or remotely via the LoRaWAN network, letting you configure, in particular, periodicity, sending modes and alarm thresholds.
• The LoRaWAN Smart Building COMFORT is powered by a changeable internal battery.
• It also has a button that send frames when pressed.
• The device is compatible with the adeunis® KARE Device Management platform and the KARE+ service.

IMPORTANT NOTE: The LoRaWAN Smart Building COMFORT is delivered by default with an OTAA configuration, so the user can declare the device to a LoRaWAN operator.

To start the LoRaWAN Smart Building COMFORT, use the button on the side of the case

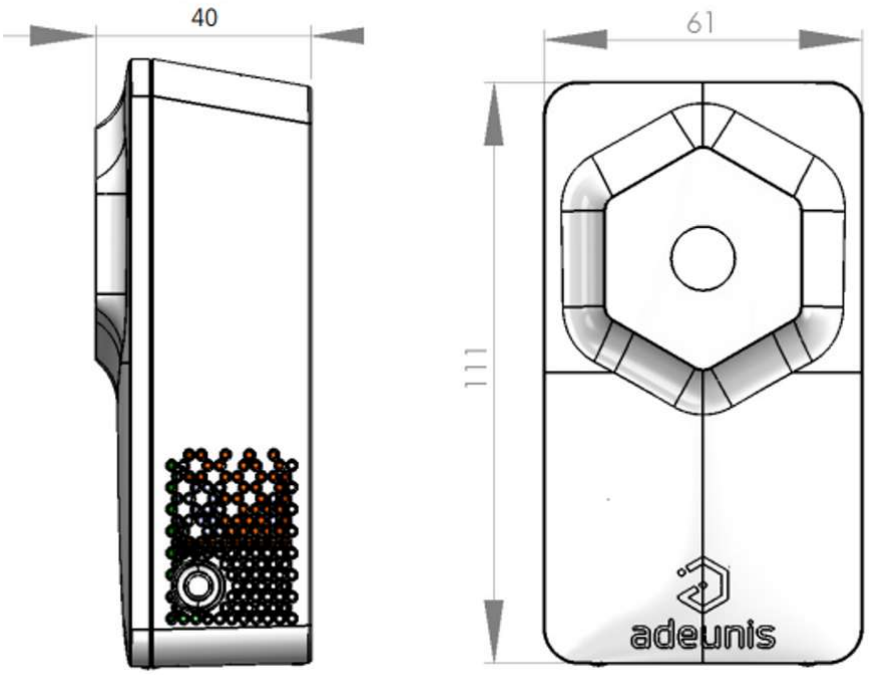
Package contents:
The device is delivered in a carton package containing the following: Front panel, rear panel and electronic card, Removable LiSOCl2 FANSO (battery-pack ER18505H+W36+51021), 2 x CBLZ 3.5x 19mm screws, 2 x SX5 Fischer plugs

1.1. General description

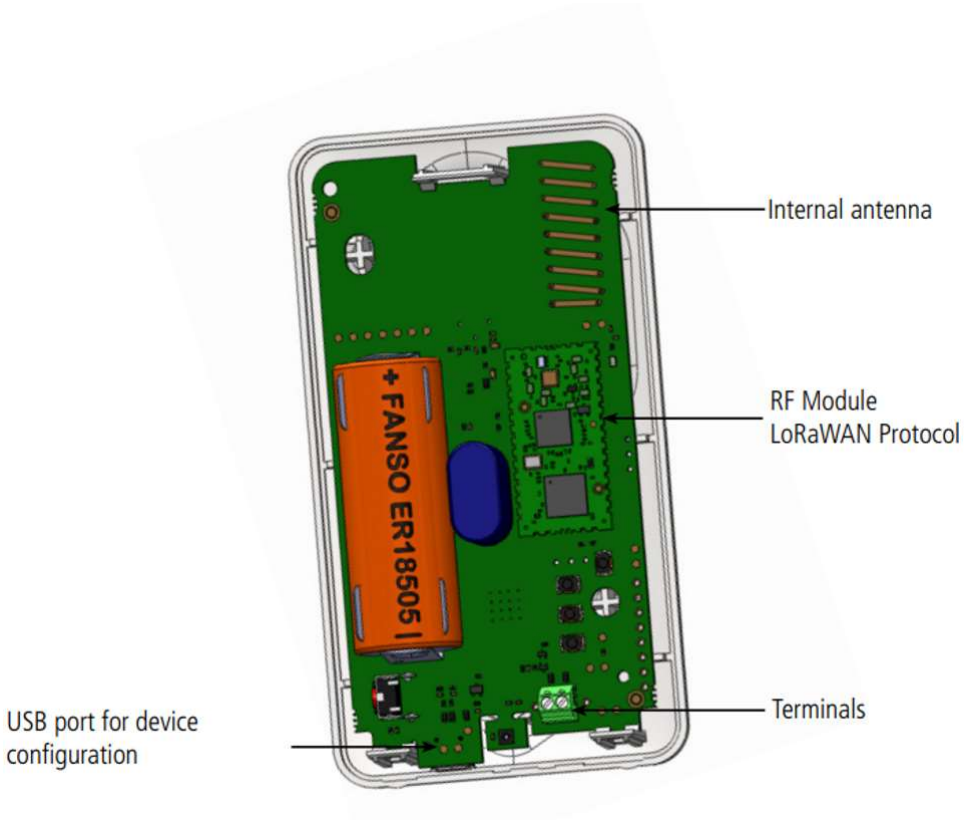


1.2. Dimensions

Values are in millimeters.



1.3. Circuit board



1.4. Technical specifications

1.4.1 General characteristics

Parameters	Value
Supply voltage	Nominal 3.6V
Power supply	Removable LiSOCl2 FANSO (battery-pack ER18505H+W36+51021)
Operating temperature	-20°C / +60°C
Dimensions	111 x 61 x 40 mm
Weight	102 g
Casing	IP20
LoRaWAN zone	EU 863-870 MHz
LoRaWAN specification	1.0.2
Max power transmission	14 dBm
Application port (downlink)	1
Daily clock drift between AT 25°C	< 3 seconds per day5 TO 7 SECONDS

1.4.2 Autonomy

Usage conditions :

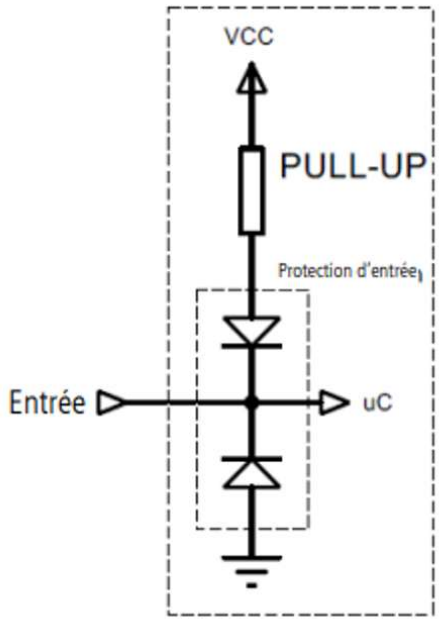
Product storage before use : 1 year maximum.
Calculation done with a temperature of 25°C with a sampling every 600 seconds (10 minutes) with
the button activated and the digital input deactivated.

Number of frames per day	Autonomy (years) SF7	Autonomy (years) SF12
140	>10	1.6
110	>10	2
100	>10	2.2
70	>10	3
50	>10	4.1
48	>10	4.3
24	>10	7.5
20	>10	8.6
18	>10	9.3
15	>10	>10
10	>10	>10
2	>10	>10

The above values are estimates made under certain conditions of use and environment (25°C and 1 year of storage). They do not under any circumstances represent a commitment on the part of Adeunis.

1.4.3 Digital inputs interfaces

The schematic diagram of the digital input interfaces is as follows:



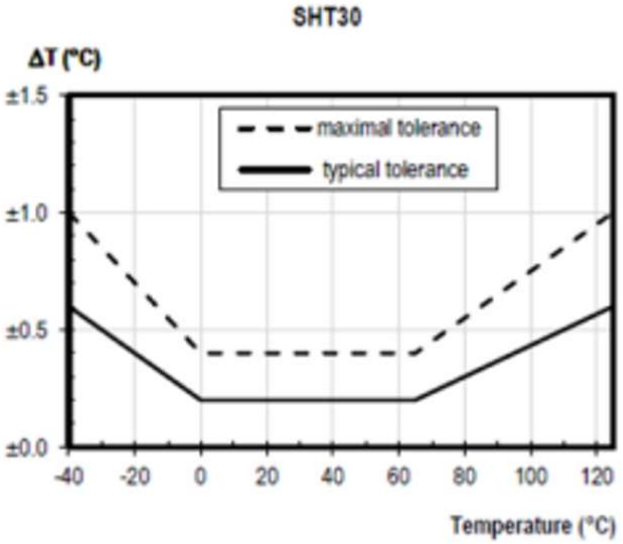
Maximum absolute values	
Minimum input voltage	- 0,7 V
Maximum input voltage	+50 V

Electrical Characteristics		Unit
Minimum input voltage	0	V
Maximum input voltage	24	V
Equivalent input resistance	500	kΩ
Input frequency	10	Hz
Current consumption input level HIGH	0	µA
Current consumption input level LOW	6	µA

A prolonged state above min/max absolute values will damage the device.

1.4.4 Characteristics of integrated sensors

Characteristics			Unit
Temperature:	-Range	-20/+60	°C
	-Typical accuracy	+/- 0.2 entre [0-60°C] +/- 0.6 entre [-20-0°C]	°C
	-Resolution	+/- 0.015 à 25°C	°C
Humidity:	-Range	10 - 90	% RH (relative humidity in the air, applicable between [0- 60]°C
	-Precision	+/- 2 to 25°C	% RH (relative humidity in the air, applicable between [0- 60]°C
	-Resolution	0.01 to 25°C	% RH (relative humidity in the air, applicable between [0- 60]°C

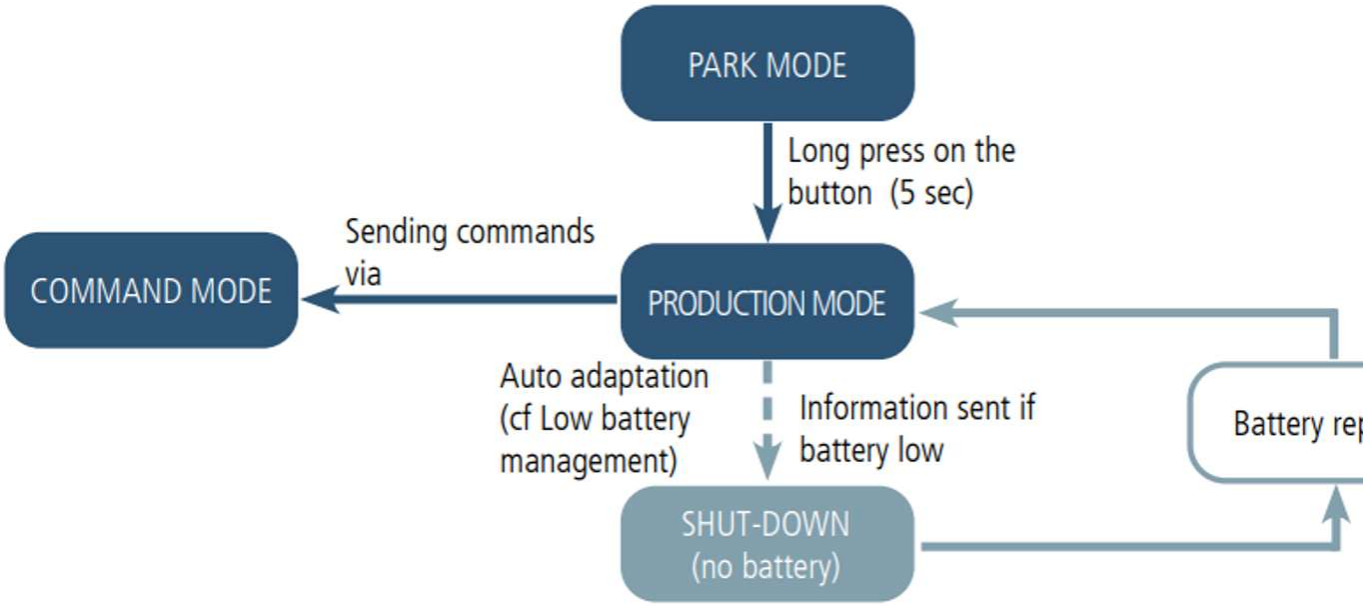


2. DEVICE OPERATION

2.1. Operating modes

IMPORTANT NOTE: Adeunis uses the Big-Endian data format

The device has several operating modes :



2.1.1 PARK mode

Le produit est livré en mode PARC, il est alors en veille et sa consommation est minimale. La sortie du mode PARC s'effectue par l'appui sur le bouton latérale du capteur pendant une durée supérieur à 5 secondes. La LED verte s'allume pour signifier la détection de l'appui bouton et clignote ensuite rapidement pendant la phase de démarrage du produit.

Le dispositif effectue sa calibration au démarrage et envoie ensuite ses trames de configuration et de données.

2.1.2 COMMAND mode

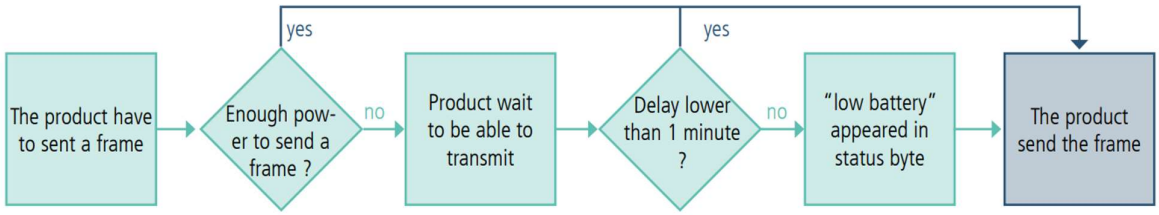
This mode allows the user to configure the registers of the product.
To enter in this mode, plug the micro-USB cable and use the IoT Configurator or AT command. Exit from command mode is done when USB is disconnected, using the "disconnect" button in the IoT Configurator or with an ATO command. The product 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.



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 phase

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 attempt

ENRegisters 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.

2.3.1 Three modes of sending possible

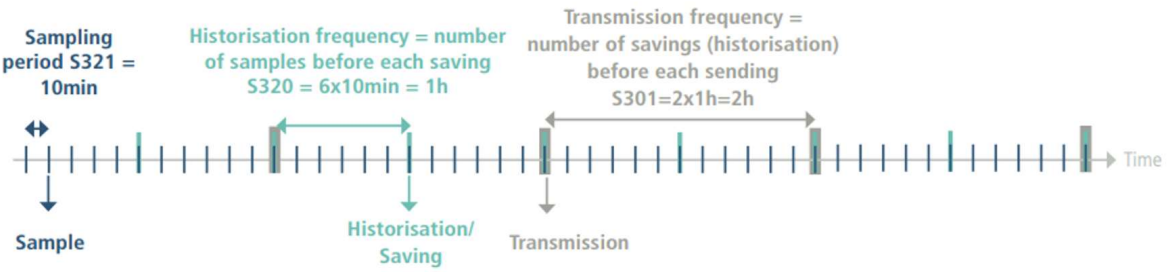
The device can measure the temperature and humidity in a room, save this information and send it in three transmission modes.

	Periodic transmission	Transmission over threshold	Peri thre
Definition	Periodic sending allows data to be collected in a specified period of time, to be saved and sent on a regular basis for analysis over time.	The sending of a frame on exceeding a threshold makes it possible to read data according to a given period and to send an alarm only if one of the thresholds is exceeded	Mix be a rece exc info ana
Practical exam- ple of use	I want my device to read the tempera- ture and humidity every 3 hours, this in- formation is saved and all my backups are sent to me once a day.	I want my device to send me an alarm when 24°C in my room is exceeded with a reading every 10 minutes. I do not want an alarm for humidity.	I wa min eve sen If th war war
Associated configuration	• **Period of acquisition** (S321) = 5400 (5400 seconds = 3 hours) • **Backup frequency** (S320) = 1 (1 backup every 3 hours) • **Frequency of transmission** (S301) = 8 (8 X 3 hours = 24 hours) • Type of alarm T° (S330) = 0 (alarm disabled) • Type of humidity alarm (S340) = 0 (alarm disabled)	• **Period of acquisition** (S321) = 300 (300x2 = 10 minutes) • **Frequency of transmission** (S301) = 0 (no periodic sending) • High threshold definition (S331) = 240 (+24°C) • Type of alarm T° (S330) = 1 (high threshold) • high threshold hysteresis (S330) = 20 (2°C) My room will have returned to the “normal” temperature below 22°C. • Type of humidity alarm (S340) = 0 (alarm disabled)	• P = 3 • B = 1 • F (S3 = 8 • H = 2 • Ty = 1 • h = 2 retu tem • Ty = 0

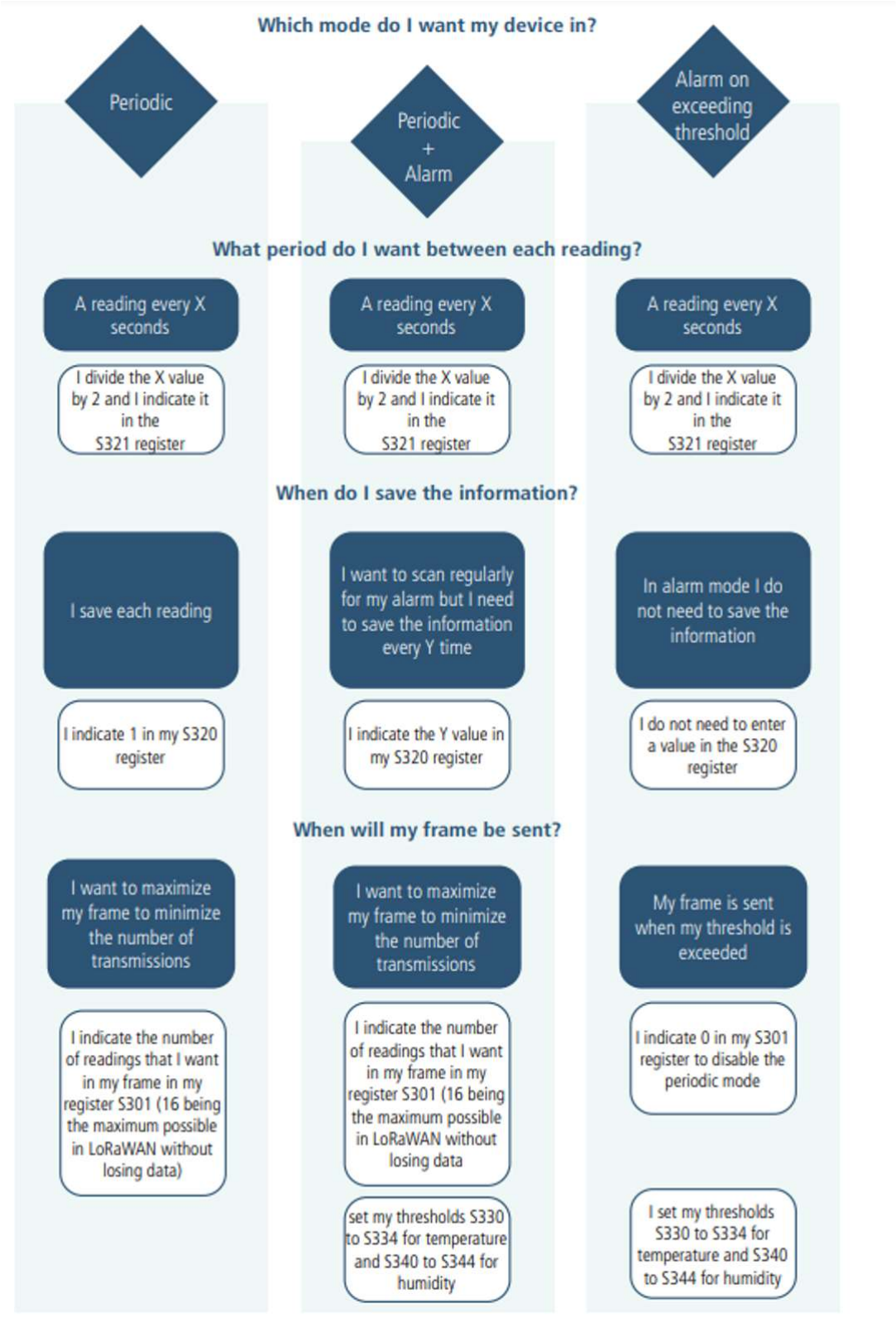
CAUTION: The information sending capacity will depend on the network used. Here the case considered works with a technology LoRaWAN.

PAY ATTENTION: the frame capacity depends of the network used.

Illustration of the mixed mode, with periodical data and sampling for alarm:



Procedure to follow to program its registers according to the chosen mode :



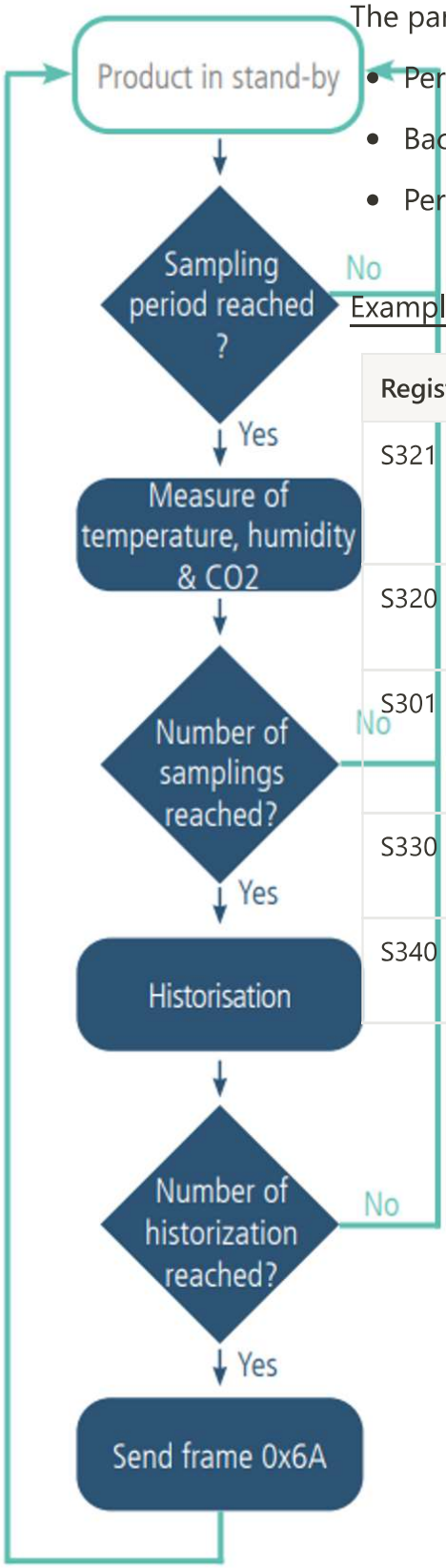
Example of possible configurations:

Desired case (except 100% event)	Associated con- figuration	Theoretical number of periodic frames sent per day
• Reading: 10 minutes • Backup: every hour (every 6 readings) • Sending: every half day (every 12 backups)	• 321 = 300 • 320 = 6 • 301 = 12	2 frames
• Reading: 10 minutes • Backup: at each reading • Sending: maximum tolerated by my frame (here, LoRaWAN)	• 321 = 300 • 320 = 1 • 301 = 15	9 or 10 frame
• Reading: 5 minutes • Backup: every 15 minutes (every 3 readings) • Sending: every hour (i.e., every 4 backups)	• 321 = 150 • 320 = 3 • 301 = 4	24 frame
• Reading: every hour • Backup: at each reading • Sending: at each backup	• 321 = 1800 • 320 = 1 • 301 = 1	24 frame
• Reading: every hour • Backup: at each reading • Sending: every 4 hours (every 4 backups)	• 321 = 1800 • 320 = 1 • 301 = 4	6 frame
• Reading: every 10 seconds • Backup: every minute (every 6 readings) • Sending: every quarter hour (every 15 backups)	• 321 = 5 • 320 = 6 • 301 = 15	96 frame
• Reading: every hour • Backup: at each reading • Sending: every 10 minutes (every 10 backups)	• 321 = 30 • 320 = 1 • 301 = 10	144 frame

2.3.1.01 Periodic sending with or without history logs

The device allows the measurement and the periodic sending of the sensor values according to the following diagram:

The device makes it possible to record the temperature and the humidity at a certain frequency, to store this information and then to send it periodically.



The parameters associated with this operating mode are:

- Period of acquisition (S321)
- Backup period (S320)
- Period of transmission(S301)

Example:

Register	Value encoding	Value	Result
S321	Decimal	5400	1 reading every 3 hours 5400 * 2sec = 10800 sec = 3 hours
S320	Decimal	1	1 backup at each reading
S301	Decimal	8	Periodic mode with a period of 8 * 3 hours = 24 hours
S330	Decimal	0	Temperature alarm off
S340	Decimal	0	Humidity alarm off

In this example:

- The device takes temperature and humidity every 3 hours and saves the information
- The device will make 8 backups and send them once a day
- The device is in pure periodic sending mode since the alarms have been

ADVICE FROM ADEUNIS: By default, the device is set to read every hour (S321 = 1800). For pure periodic sending it is advisable to set the acquisition period to the desired back- up period in order to gain autonomy (here 5400 corresponding to 3 hours).

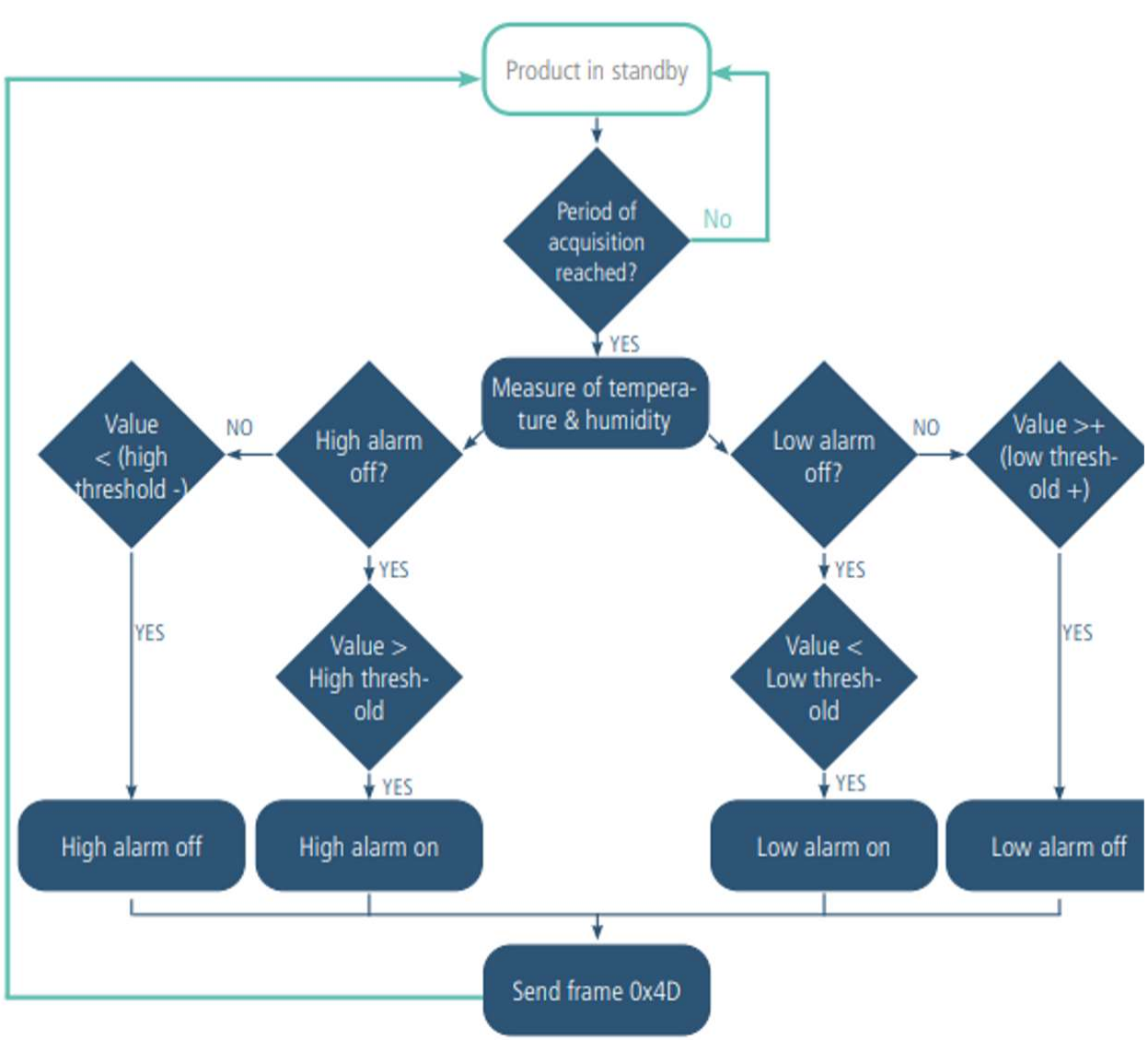
Be careful about backup and sending values that will also depend on the network used and its bandwidth.

Note: for a transmission without history, it is sufficient to set the register 301 (transmis- sion period) to 1 so the device will send a frame to each backup.

2.3.1.02 Sending on exceeding threshold

The device allows detection of exceeding threshold (high and low) for each sensor according to the following schema: The device sends a data frame when a threshold is exceeded but also when returning to normal.

E.g.:

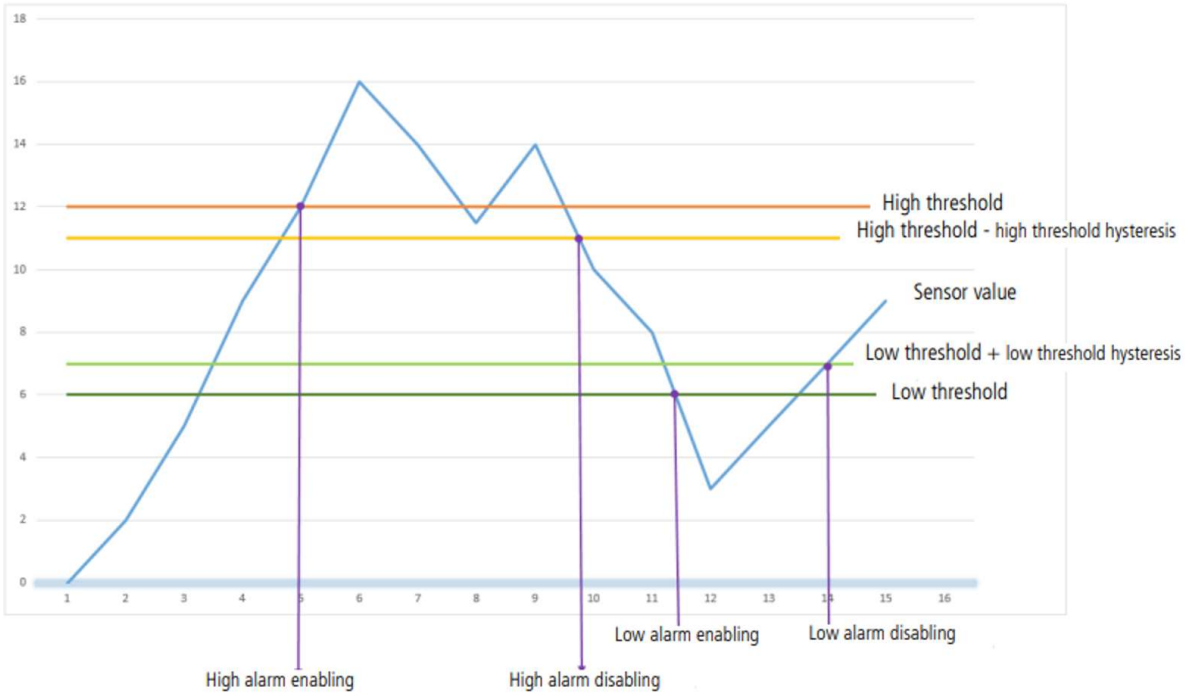


Register	Value encoding	Value	Result
S301	Decimal	0	Event mode (no periodicity)
S321	Decimal	300	One reading every 10 minutes (300/60 sec x 2)
S330	Decimal	2	Alarm type for high threshold temperature
S331	Decimal	240	Temperature at + 24°C (240/10)
S332	Decimal	20	Hysteresis at 2°C (20/10) below the high threshold o 22°C
S340	Decimal	0	Humidity alarm off

In this example:
• The device takes temperature and humidity every 10 minutes
• The device will trigger an alarm if the temperature is above 24°C, no alarm indicated for humidity
• The alarm will be disabled if the temperature drops below 22°C

NOTE: As described, it is possible to combine the periodic mode and the alarm mode.

Explanation of thresholds and hysteresis



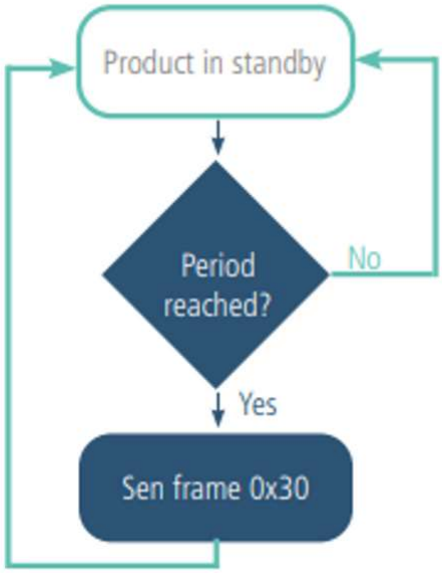
The parameters associated with this operating mode are:

- The transmission period (equal to zero in this use case) (register 301).
- The acquisition period (register 321).
- The high alarm threshold for the temperature sensor (register 331).
- The high alarm hysteresis for the temperature sensor (register 332)
- The low alarm threshold for the temperature sensor (register 333).
- The low alarm hysteresis for the temperature sensor (register 334).
- The high alarm threshold for the humidity sensor (register 341).
- The high alarm hysteresis for the humidity sensor (register 342).
- The low alarm threshold for the humidity sensor (register 343).
- The low alarm threshold for the humidity sensor (register 344).

2.3.2 Transmitting the Keep Alive frame

If the device does not have periodic data configured, and no threshold is exceeded, it may not transmit data for a long time. So, to be sure that the device is working properly, it transmits a Keep Alive frame (0x30) according to a determined frequency (S300)

The parameters associated with this operating mode is the setting of the transmission period of the Keep Alive frame (register 300).

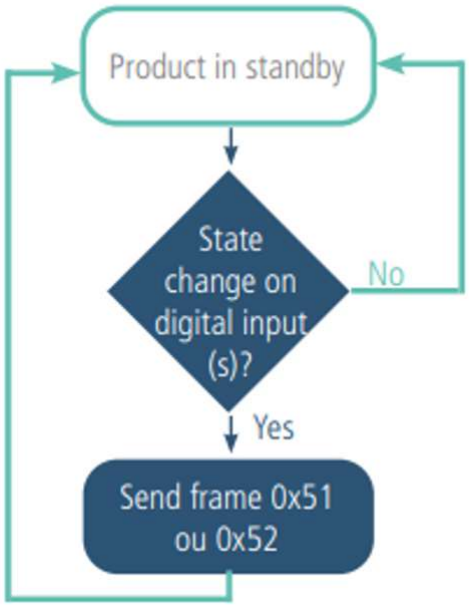


E.g.: I want a Keep Alive frame sent to me every 24 hours

Register	Value encoding	Value	Result
S301	Decimal	0	Disabling periodic sending
S300	Decimal	8640	8640x10 = 86 400 seconds or 1440 minutes or 24 hours

2.3.3 Alarm on the digital input

The device incorporates two digital inputs, one through the connected button and one via the terminal block, both for detecting a change in up
and down state.
The device allows the sending of a frame following a change of state on one of its inputs according to the following diagram:



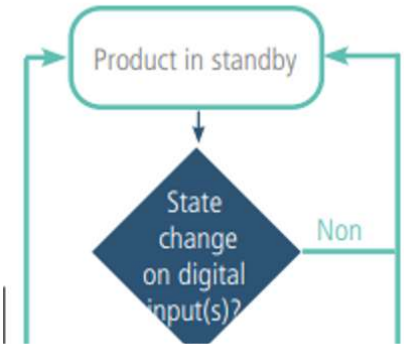
Example :

Register	Value encod- ing	Value	Result
S380	Hexadecimal	0x41	Configuration of the Digital Input 1 (button): • Detection of high edges • Debounce time* 100ms
S381	Decimal	1	The device sends a frame every time the button is enabled
S382	Hexadecimal	0x0	Configuration of the Digital Input 2 input (terminal block): • Disabled • No debounce time

*Debounce time: minimum time to take account of a change of state. For example, if this period is
10 ms all pulses (high or low level) whose duration is less than 10 ms will not be considered. This
technique avoids potential rebounds during a change of state.

In this example the device:
• The device has a debounce time of 100ms and the button press alarm is enabled (register 380).
• The device sends a frame for each button press (register 381)
• The alarm via the terminal block is disabled (register 382)

NOTE: It is possible to program the sending of a frame only after a certain number of edge detections (S381/S383).



Register	Value code	Value	Result
S382	Hexadecimal	0x41	Configuration of the Digital Input 2 input (terminal block): • Detection of high edges • Debounce time* 100ms