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# FIELD TEST DEVICE

## sigfox Europe

Mode d'emploi  
V1.1.0



### ADEUNIS RF

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# ENGLISH

## INFORMATIONS

| Document Information |                   |
|----------------------|-------------------|
| <b>Title</b>         | FIELD TEST DEVICE |
| <b>Subtitle</b>      | sigfox Europe     |
| <b>Document type</b> | User Guide        |
| <b>Version</b>       | V1.1.0            |

This document applies to the following products:

| Nom                                      | Référence          | Version Firmware                               |
|--|--------------------|--|
| <b>FIELD TEST DEVICE - sigfox Europe</b> | Up to : ARF8121AAB | APP Up to : V01.00.09<br>RTU Up to : V01.00.01 |

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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 by e-mail. Use our dedicated e-mail address ([arf@adeunis-rf.com](mailto:arf@adeunis-rf.com)) rather than any personal e-mail address of our staff. 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 (for example Field Test Device)
- 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**

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

Apparatus model/Product: FIELD TEST DEVICE SIGFOX 868  
Type: ARF8121AA

**Object of the declaration:**



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

**Directive 2014/53/UE (RED)**

**The following harmonised standards and technical specifications have been applied:**

| Title:              | Date of standard/specification             |
|---------------------|--|
| EN 300 220-1 V2.4.1 | 2012/05                                    |
| EN 300 220-2 V2.4.1 | 2012/05                                    |
| EN 60950-1          | 2006 +A11:2009 +A1:2010 +A12:2011 +A2:2013 |
| EN 301 489-1 v1.9.2 | 2011-09                                    |
| EN 301 489-3 V1.6.1 | 2013-08                                    |
| EN 62311            | 2008                                       |

October, 13<sup>th</sup>, 2016

Monnet Emmanuel, Certification Manager



## INTRODUCTION

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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

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Valid for Fiel Test Device sigfox Europe: ARF8121AA



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.

**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).

The product must be equipped with a switching mechanism so that the power can be cut. This must be close to the equipment. Any electrical connection of the product must be equipped with a protection device against voltage spikes and short-circuits.

## 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



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.



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



## 1. INTRODUCING THE DEVICE

### 1.1. Description

The Field Test Device (FTD) from Adeunis-RF is a Class 0 sigfox compatible device. This is not a point to point device and may not be used in this manner. This indicates that it must be used on sigfox operate network.

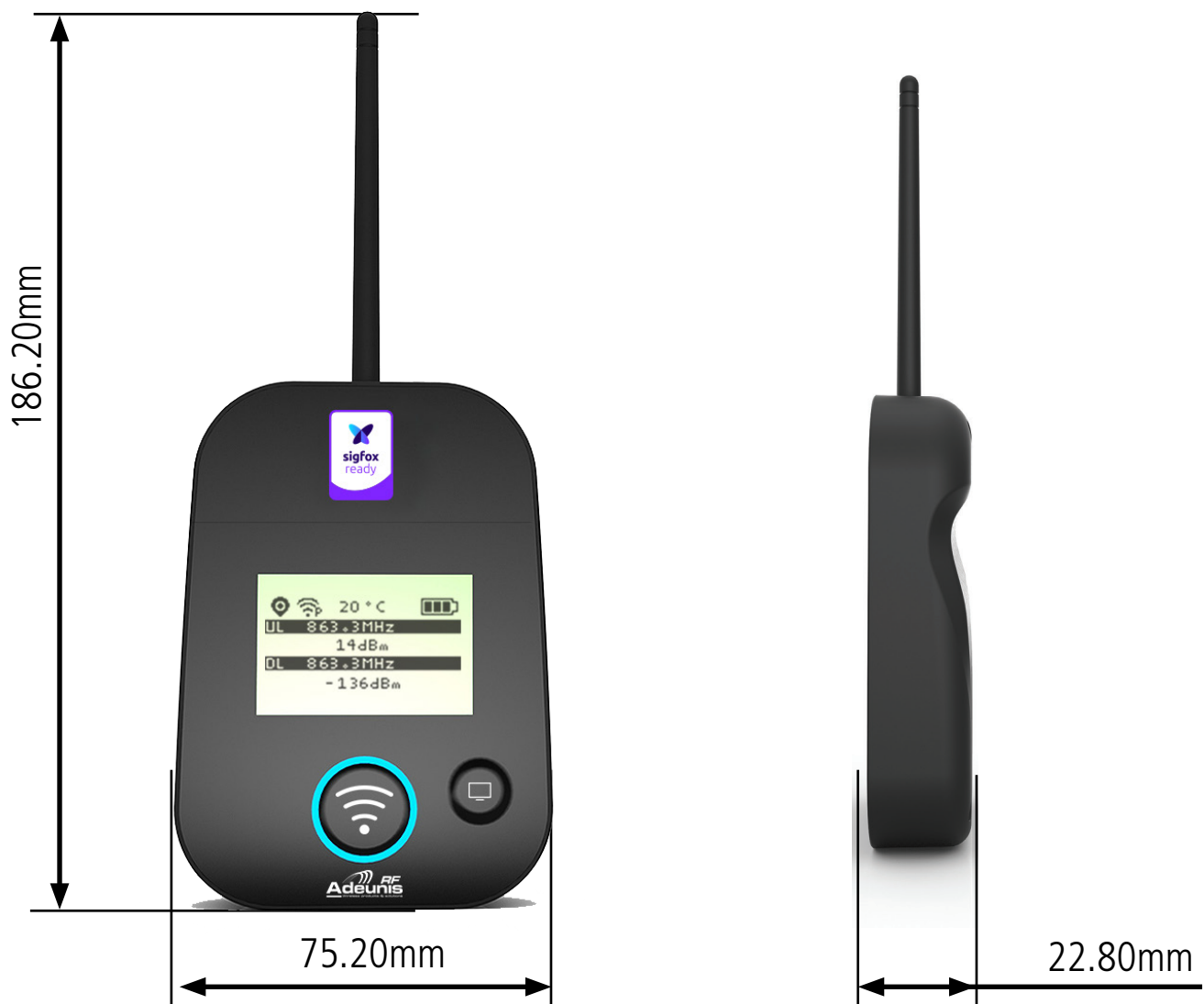
The sigfox Field Test Device from Adeunis-RF is a ready-to-use device, which makes it possible to communicate with all network using the sigfox protocol. The system makes it possible to transmit and receive radio frames and to instantly view the results.

Equipped with a large LCD screen, you can view various information relating to how the network being used is functioning (Uplink, Downlink, PER, etc.) in addition to information from sensors (GPS coordinates, temperature, battery level, etc.). This device is specifically adapted for application validation, such as communicating sensors, tracking, smart building, metering, security and M2M.

Thanks to its rechargeable battery, the FTD allows several hours of functioning and can be recharged using a standard mobile phone micro-usb.

### 1.2. Mechanical features

| Unit specifications |  |
|---------------------|--|
| Dimensions          | H186.20 x L75.20 x P22.80                      |
| Weight              | 140g   |
| Materials           | Unit: ABS GP22 + Black Colouring (HB à 1.6mm)  |
|                     | Lexan: Autotex Polycarbonate                   |
|                     | Antenna: Thermolast K TC7AA (d) (a) UL#E214855 |



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### 1.3. Technical specifications

| Radio         |   |
|---------------|---|
| Communication | sigfox protocol and DBPSK sigfox                  |
| Radio Rate    | Variable (SF12/125kHz (~183 bps) to FSK (~50kbps) |
| Frequency     | ISM band 863-870MHz                               |
| RF Power      | 14dBm (25mW)                                      |
| Sensitivity   | down to -140 dBm in SF12/CR4                      |
| Range (Open)  | Up to 15km  |
| Standards met | EN 300-220, EN 301-489, EN 60950                  |

| Supply    |                                    |
|-----------|------------------------------------|
| Connector | Micro-USB - 5V - 500mA             |
| Battery   | Lithium-Ion Polymer 3.7V 2Ah 7.4Wh |

| Opérationnel            |  |
|-------------------------|--|
| Device configuration    | Via AT commands<br>(see relevant chapter to find a full list of available AT commands) |
| Serial rate             | 115.2 kbps   |
| Parity                  | None   |
| Amount of data          | 8  |
| Stop bit                | 1  |
| Functioning temperature | -30°C / +70°C  |

### 1.4. Charging the FTD

The device is equipped with a rechargeable battery. Once the device has been connected to a USB charger or the USB socket of a computer, it will start to charge automatically; even if the ON/OFF communicator is set to OFF (this functions in exactly the same way as a mobile phone). The device can be used while it is charging. During charging, the charge indicator will be red. When the device is fully charged, the indicator will turn green.



Figure 1 : Device charging



Figure 2 : Device is fully charged

If the battery is completely empty, it will be necessary to recharge the device for 6 hours in order for it to be fully charged.

## 2. DEVICE DESCRIPTION

### 2.1. User interface

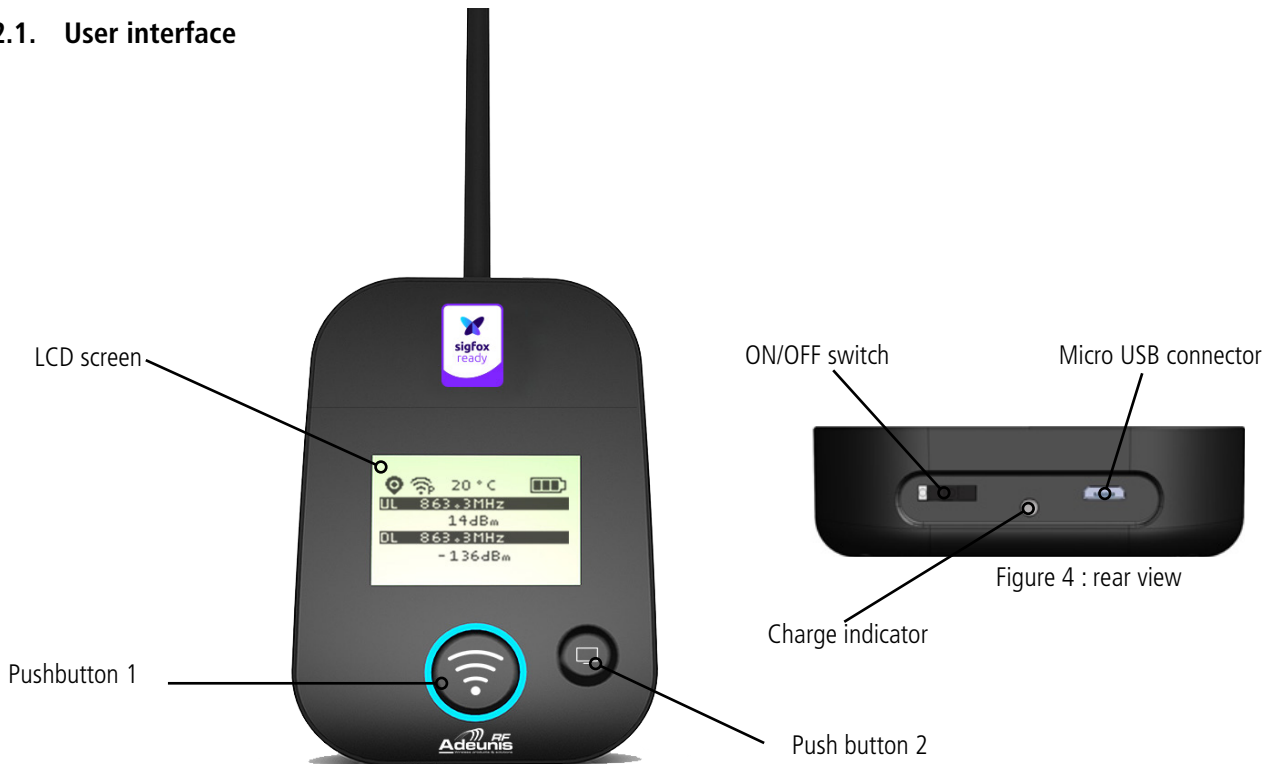
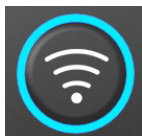


Figure 3 : Front view

### 2.2. Button description

#### Interface operation



Pushbutton 1

This button allows you to carry out radio transmissions in manual mode. In the PER menu, a long press will allow you to reset the counters to zero.



Pushbutton 2

This button allows you to manage the LCD screen. When the LCD backlight is switched off, pressing this button will switch on the backlight. When the LCD backlight is switched on, each press will allow you to scroll through the different screens available on this device.



ON/OFF Switch

The ON/OFF switch allows you to switch the device on or off. Moving the switch to the right will turn the device on.



Micro-USB connector

The micro-USB connector allows you to charge the device (see paragraph 1.4) or configure it (see paragraph 3).



Charge indicator





The charge LED shows you the device's charge status (see paragraph 1.4).

### 3. SCREEN DESCRIPTION

The LCD screen of the product is split on few part :

- The START screen (Showing the firmware version) - Only on the powering up
- The SIGFOX CYCLE screen
- The GPS screen
- The PER screen (Packet Error Rate)
- The DOWNLINK FRAME screen

The following icon are present on each screen of the product

| Item                               | Icon  | Description                   |
|------------------------------------|---|-------------------------------|
| GPS status<br>(First on the left)  | No icon   | GPS has been deactivated      |
|                                    |  | GPS has not been synchronised |
|                                    |  | GPS has been synchronised     |
| Temperature<br>(Third on the left) | 20 °C   | Temperature in °C             |
| Battery<br>(Last on the left)      |  | Battery level                 |
|                                    |  | Product in charge             |

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#### 3.1. Start Screen

The device is switched on using the ON/OFF switch located on the underside of the device. Once it has been switched on, the device's LCD screen will light up and the start menu will be displayed. This screen show the 2 firmware versions during few seconds.

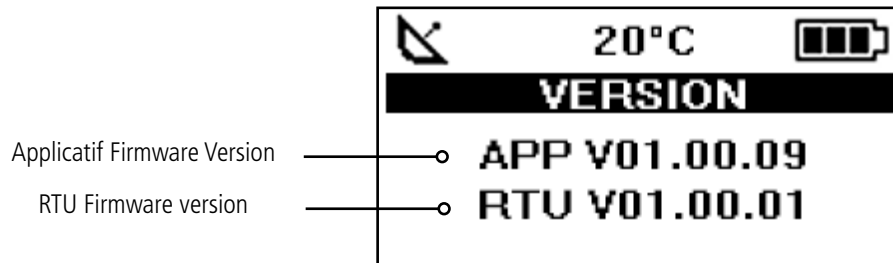


Figure 5 : Firmware version

**NOTE :** If the device does not switch on, this could mean that there is insufficient battery charge. You would then need to connect the device to a USB charger. When the battery is completely empty, it is possible that the device will not switch on, even when connected. Please wait a few minutes before the device can be used.

#### 3.2. Ecran Cycle sigfox

This screen is displayed after the start screen.

All the frame transmit or receive on the network can be see on the screen. If the product is correctly set, frames are directly sending on the sigfox network as soon as the product is power on. The periodic transmission icon and 3 sending frames sigfox cycle information (UL1 to UL3) must appear, join the emission frequency.

Uplink and Downlink transmission information will be displayed on the LCD screen.

The first line show the Uplink information «ULx» with x for the number and frequency of repetition. She also show the Out Of Band «OOB» information. The second line show the power used

The third line show the Downlink information «DL» and frequency of the reception window

The last line show the RSSI received

The sigfox cycle can be split in several stages :

- 3 emissions on a variable frequency (Figure 6, 7 et 8)
- 1 reception windows after a 20 secondes times break (Figure 9)
- 1 OOB emission, if the product received a downlink (Figure 10)

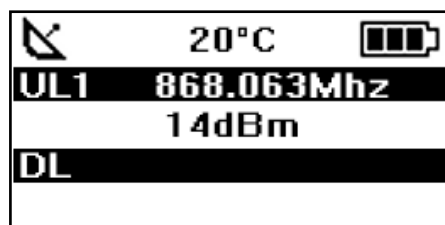
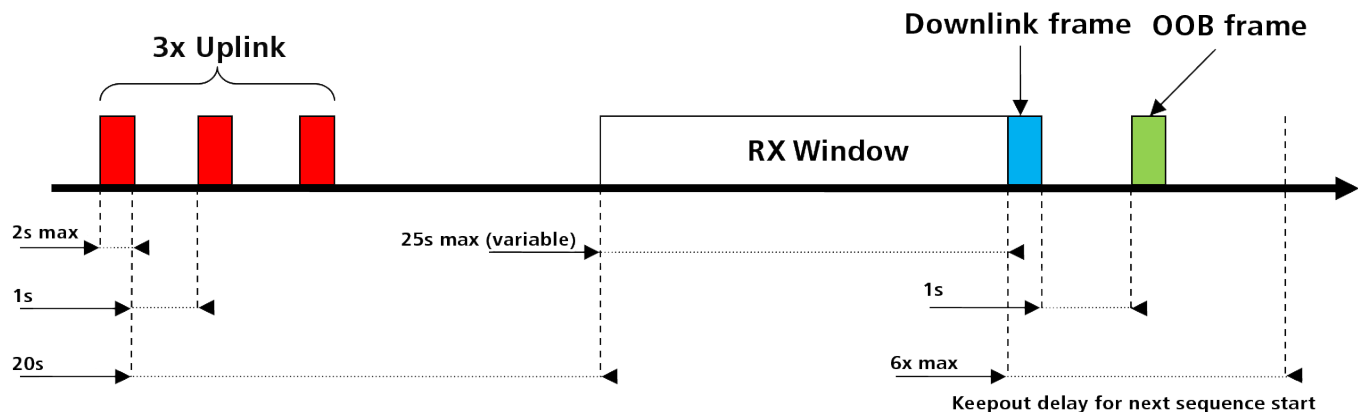


Figure 6 : Uplink 1

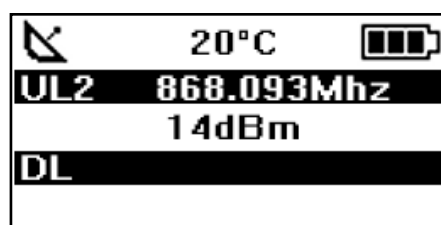


Figure 7 : Uplink 2

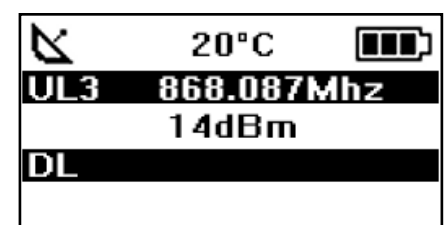


Figure 8 : Uplink 3

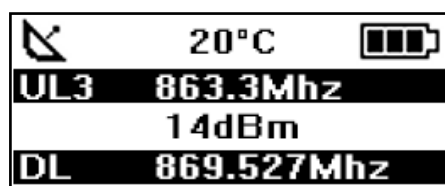


Figure 9 : Downlink

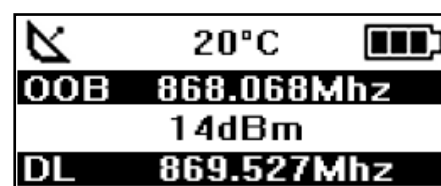




Figure 10 : OOB

| Item  | Icon  | Description   |
|---|---|---|
| Transmission Status<br>(Second on the left) | No icon   | There is currently no radio transmission  |
|   |  | Manual transmission has been triggered (transmission cycle in progress)   |
|   |  | Periodic transmission has been triggered (transmission cycle in progress)   |
| Uplink information<br>(Black Line)          |   | Display showing the number of Uplink (UL1 to UL3) frame repetitions as well as the transmission frequency of the frame or the OOB frame, accurate to three decimal place. |
| Uplink Information<br>(White Line)          |   | Display showing the SF used as well as the transmission power of the frame.   |
| Downlink Information<br>(Black Line)        |   | Display showing the listening window of the device (DL) as well as the reception frequency of the frame, accurate to three decimal place.                                 |
| Downlink Information<br>(White Line)        |   | Display showing the RSSI of the most recent frame received.   |

The Downlink information displayed on the device relates to a Downlink frame sent from a sigfox network. If no information can be found in this section, this does not indicate that the device will not function on the network but only that it has not received any information from the network. To validate the upload link (sending a frame from the device to the network) it is necessary to use an interface that will allow you to read frames from the network (example: back-end or application).

3.3. GPS screen

This screen can be accessed by briefly pressing on pushbutton 2 after the home screen. It will allow you to view the functioning information of the GPS module, as well as the device’s GPS positioning.

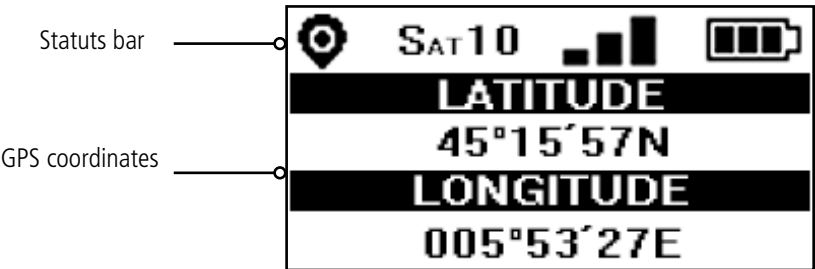



Figure 11 : GPS screen

| Item   | Icon  | Description   |
|--|---|---|
| Number of Satellites<br>(Second on the left) | SAT xx  | Indicates the number of satellites received by the device   |
| GPS signal<br>(Third on the left)            |  | Indicator showing the quality of the GPS signal<br>1 bar: weak reception<br>2 bars: average reception<br>3 bars: good reception |
| LATITUDE                                     |   | Display showing latitude coordinates in degrees, minutes and seconds  |
| LONGITUDE                                    |   | Display showing longitude coordinates in degrees, minutes and seconds   |

When GPS has not yet been “fixed”, no information on latitude or longitude will be displayed on the screen and the information icon will indicate that GPS has not been synchronised.

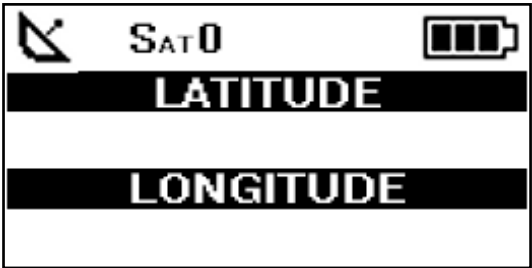


Figure 12 : GPS screen (No synchronisation)

If the device falls out of synchronisation with GPS, the information on this screen will no longer be available. There will be no memory of the last received position.

3.4. PER (Packet Error Rate) screen

This menu can be accessed by briefly pressing on pushbutton 2 after the GPS menu. It will allow you to evaluate the quality of the radio connection between the device and the network.

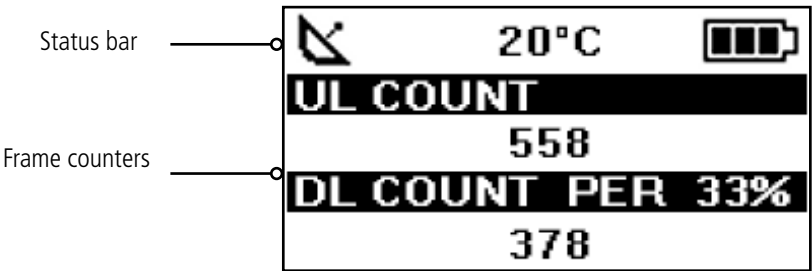


Figure 13 : PER screen

The screen will display:

- The number of frames sent (UL COUNT), including repetitions
- The number of frames received (DL COUNT)
- The Packet Error Rate (PER) as a percentage

The PER measurement is calculated by comparing the number of frames transmitted to the number of frames received:

- $PER (\%) = (DL\_COUNT / UL\_COUNT) * 100$

### 3.5. Downlink screen

This menu can be accessed by briefly pressing on pushbutton 2 after the PER menu. It will allow you to view a downlink frame sending by the network. This frame is displayed in ASCII characters. The non printable characters are replaced by a point.

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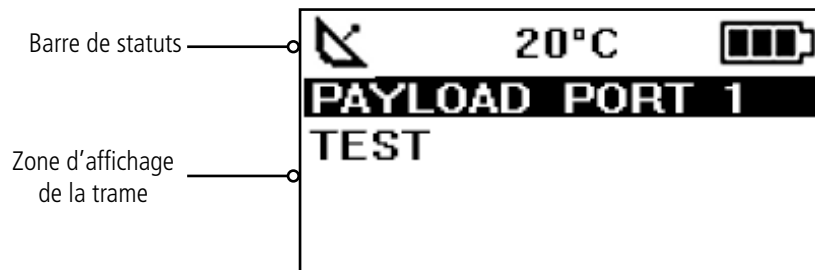


Figure 14 : Ecran Downlink

The screen allows a viewing of 51 characters (17 characters per line). If the size of the payload is upper than 51 bytes, the product will not display the extra bytes.

## 4. DECODING THE PAYLOAD

The size of the Field Test Device's payload can vary depending on the information transmitted. The first byte will enable you to identify the presence of information contained in the payload. Information will always be shown in the order indicated in the following table.

Example of a payload received: 9C1B4515969000553450272020

This example will be used in order to explain how the payload is decoded.

| Order           | 1      | 2           | 3            | 4             | 5           | 6          | 7          | 8             |
|-----------------|--------|-------------|--------------|---------------|-------------|------------|------------|---------------|
| Number of bytes | 1      | 1           | 4            | 4             | 1           | 1          | 1          | 2             |
| Description     | Status | Temperature | GPS Latitude | GPS Longitude | GPS Quality | UL Counter | DL Counter | Battery level |
| Example         | 9C     | 1B          | 45 15 96 90  | 00 55 34 50   | 27          | 20         | 20         | 0F C9         |

### 4.1. Status

| Hex | Décimal | N° | Bit N° | Commentaires                                    | Valeur |
|-----|---------|----|--------|---|--------|
| 9C  | 1       | 1  | 7      | Presence of temperature information             | 0 ou 1 |
|     | 0       |    | 6      | Transmission triggered by the accelerometer     | 0 ou 1 |
|     | 0       |    | 5      | Transmission triggered by pressing pushbutton 1 | 0 ou 1 |
|     | 1       |    | 4      | Presence of GPS information                     | 0 ou 1 |
|     | 1       |    | 3      | Presence of Uplink frame counter                | 0 ou 1 |
|     | 1       |    | 2      | Presence of Downlink frame counter              | 0 ou 1 |
|     | 1       |    | 1      | Presence of battery level information           | 0 ou 1 |
|     | 0       |    | 0      | No used   | 0      |

0: Data missing from the payload

1: Data present in the payload

## 4.2. Température

| Hex | Binaire      | N° | Bit N° | Commentaires                        | Valeur        |
|-----|--------------|----|--------|-------------------------------------|---------------|
| 1B  | 0001<br>1011 | 2  | 1      | Temperature in °C (Additional to 2) | -128 ... +127 |

Aid for decoding temperature

| Hex   | Sign Bit | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 | Value T°C |
|-------|----------|-------|-------|-------|-------|-------|-------|-------|-----------|
| Value |          | 64    | 32    | 16    | 8     | 4     | 2     | 1     |           |
| 1B    | 0        | 0     | 0     | 1     | 1     | 0     | 1     | 1     | +27°C     |
| F4    | 1        | 1     | 1     | 1     | 0     | 1     | 0     | 0     | -12°C     |

- For a positive temperature (sign bit = 0) : Value T°C = 16 + 8 + 2 + 1 = +27°C
- For a negative temperature (sign bit = 1) : Value T°C = (64+32+16+4)-128 = -12°C

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## 4.3. Latitude

| Hex | N° | Bit N° | Commentaires  | Valeur                 |
|-----|----|--------|---|------------------------|
| 45  | 3  | 7..4   | BCD coding of the entire degree section (tenth of a degree) | 45°15,9820             |
|     |    | 3..0   | BCD coding of the entire degree section (whole degrees)     | 45°15,9820             |
| 15  |    | 7..4   | BCD coding of the entire minute section (tenth of a minute) | 45°15,9820             |
|     |    | 3..0   | BCD coding of the entire minute section (whole minutes)     | 45°15,9820             |
| 96  |    | 7..4   | BCD coding of the decimal section (tenth)                   | 45°15,9820             |
|     |    | 3..0   | BCD coding of the decimal section (one hundredth)           | 45°15,9820             |
| 90  |    | 7..4   | BCD coding of the decimal section (one thousandth)          | 45°15,9890             |
|     |    | 3...1  | Not used  |                        |
|     |    | 0      | Hemispheric coding  | 0 : North<br>1 : South |

**Note:** the value expressed in the payload will be in degrees, minutes and fractions of a second. A conversion to degrees, minutes and seconds must be carried out in order to make a comparison with the coordinates displayed on the device's LCD screen.

## 4.4. Longitude

| Hex | N° | Bit N° | Commentaires  | Valeur               |
|-----|----|--------|---|----------------------|
| 00  | 4  | 7..4   | BCD coding of the entire degree section (one hundredth of a degree) | 005°34,500           |
|     |    | 3..0   | BCD coding of the entire degree section (one tenth of a degree)     | 005°34,500           |
| 55  |    | 7..4   | BCD coding of the entire degree section (whole degrees)             | 005°34,500           |
|     |    | 3..0   | BCD coding of the entire minute section (one tenth of a minute)     | 005°34,500           |
| 34  |    | 7..4   | BCD coding of the entire minute section (whole minutes)             | 005°34,500           |
|     |    | 3..0   | BCD coding of the decimal section (tenth)                           | 005°34,500           |
| 50  |    | 7..4   | BCD coding of the decimal section (one hundredth)                   | 005°34,500           |
|     |    | 3...1  | Not used  |                      |
|     |    | 0      | Hemispheric coding  | 0 : Est<br>1 : Ouest |

**Note:** the value expressed in the payload will be in degrees, minutes and fractions of a second. A conversion to degrees, minutes and seconds must be carried out in order to make a comparison with the coordinates displayed on the device's LCD screen.



#### 4.5. UL counter

| Hex | Decimal | N° | Bit N° | Commentaires         | Valeur    |
|-----|---------|----|--------|----------------------|-----------|
| 20  | 32      | 5  | 1      | Uplink frame counter | 0 ... 255 |

**Please note:** This counter is not the sigfox stack frame counter, but an internal frame counter. Therefore, there is no correlation between this counter and the one that you can view on the network.

#### 4.6. DL counter

| Hex | Decimal | N° | Bit N° | Commentaires           | Valeur    |
|-----|---------|----|--------|------------------------|-----------|
| 20  | 32      | 6  | 1      | Downlink frame counter | 0 ... 255 |

**Please note:** This counter is not the sigfox stack frame counter, but an internal frame counter. Therefore, there is no correlation between this counter and the one that you can view on the network.

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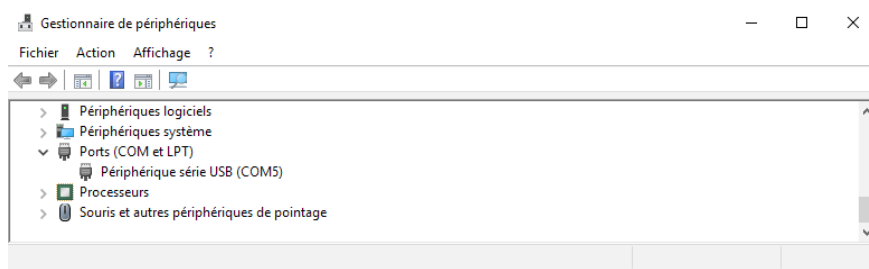
## 5. DEVICE CONFIGURATION

The device can be configured using the USB connector. This connection allows you to communicate with the device via a virtual com port and to transmit AT commands in order to modify the parameters of the device.

### 5.1. Connecting the device to a computer

Connect the Field Test Device (FTD) to the USB input of a computer. The FTD device has a Type B micro USB connector. During connection, the device must be recognised by the computer as a Virtual Com Port (VCP) device.

Using Windows: Verification that the device has been recognised to be functioning properly can be obtained by consulting the device manager. You should see the USB series device with a corresponding COM port number appear during connection.



If you are not able to see a device of this type, you must install the USB driver for this device, available to download from our website: <http://www.adeunis-rf.com/fr/produits/produits-sigfox-ready/field-test-device-sigfox-868>



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# FIELD TEST DEVICE SIGFOX 868

## Network Coverage & Tracking

**SIGFOX ready**

**Support**

- [Datasheet](#)
- [Catalogue](#)
- [Drivers](#)
  - [Driver USB-STIM32\\_x64](#)
  - [Driver USB-STIM32](#)

**Specifications**

**Performances**

- Range : up to 15km
- Power : 25mW
- Radiated RF power : 14dBm
- Sensitivity : -126dBm
- Frequencies : 868.xMHz
- Modulation : SIGFOX

**Hardware**

- High-precision GPS
- Micro-USB : batt charging & configuration
- Button : frame transmission

**Consumption & needs**

- Select:
- Driver USB-STIM32\_x64, si votre ordinateur est un système 64 bits
- Driver USB-STIM32, si votre ordinateur est un système 32 bits

## 5.2. Command mode

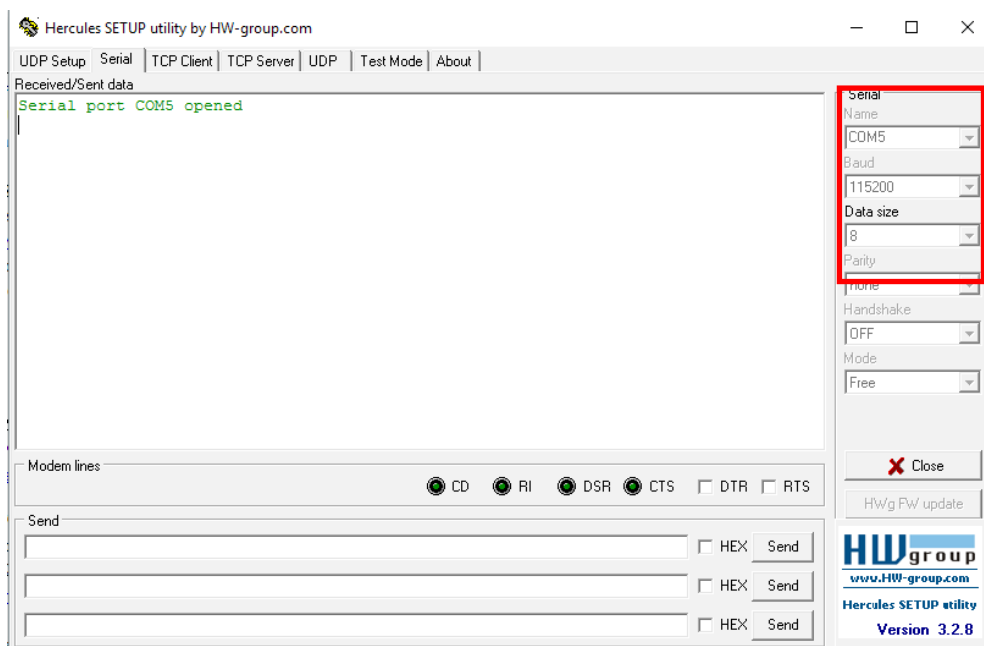
Use a COM port terminal in order to communicate with the device. We use the HERCULES COM port soft terminal available to download for free by clicking on the following link: [http://www.hw-group.com/devices/hercules/index\\_en.html](http://www.hw-group.com/devices/hercules/index_en.html)

- With Hercules, select the "Serial" tab, then configure the serial port with the following serial parameters:

| Parameters | Value       |
|------------|-------------|
| Rate       | 115 200 bps |
| Parity     | None        |
| Data       | 8           |
| Stop Bit   | 1           |

- Select the serial port on which the device has been created with Windows (Name).
- Click on the "Open" button to open the serial port.

**PLEASE NOTE:** If the com port has been opened correctly, Hercules will display the message "Serial COM3 port opened". Alternatively, "Serial port com opening error" will be displayed, meaning either that the com port is already open for another application, or it does not exist.



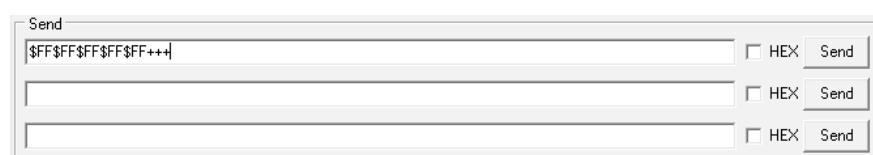
Switch ON/OFF



Bottom view

- To supply power to the device, move the switch to the right.

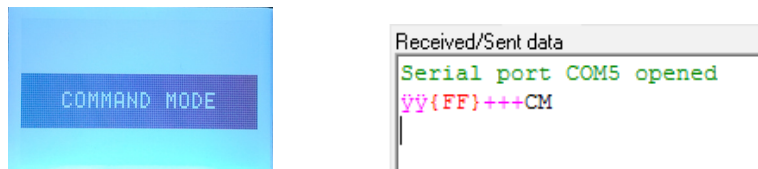
You must send a specific frame in order to move the device to configuration mode.  
 Frame expressed in hexadecimals: 0xFF 0xFF 0xFF 0xFF 0x2B 0x2B 0x2B



For Hercules, this frame must be entered in one of the 3 lines available at the bottom. The hexadecimal format must be expressed using a "\$" in this program, which gives us the following frame: \$FF\$FF\$FF\$FF\$2B\$2B\$2B



- Send the transition frame in command mode in order to switch the device to configuration mode by clicking on the SEND button. After a few seconds, you should see the COMMAND MODE screen appear on the device's LCD. This may take some time due to the fact that transition to command mode can only happen during a transmission cycle.



On the com port terminal, you should also have "CM" feedback for Command Mode. Sending a character on Hercules is displayed in magenta and receiving a character is displayed in black. If you do not see sending characters, this is probably because ECHO is not active on this program. To activate the option in the accessible menu, right click in the viewing window.

### 5.3. AT command

A command starts with 2 ASCII characters: "AT", followed by one or more characters and data (see the list below for the syntax of AT commands available on the modem).

Each command must finish with a "CR" or "CR" "LF" – both are acceptable.

(CR indicates: Carriage Return, LF indicates: Line Feed)

Once the command has been received, the modem will feedback:

<cr><lf> "Data" for ATS type playback control <n> ?, AT/S or AT/V

"O" <cr><lf>, for any other command when this has been accepted.

"E" <cr><lf>, if it refuses the command due to a syntax error, unknown command, unknown range, invalid parameter, etc.

"CM" <cr><lf>, if it accepts the input in command mode

**Table of AT commands:**

| Commande       | Description  | Réponse  |
|----------------|--|--|
| ATS<n> ?       | Feeds back the content of the <b>n</b> range                             | Sn=y where y represents the content of the n range   |
| ATS<n>=<m>     | Transfers the <b>m</b> value to the <b>n</b> range                       | "O" if the operation has been accepted<br>"E" if the operation has been refused<br>"W" if the operation has encountered a problem during configuration |
| AT/S           | Edits the content of all of the user ranges in the form of a list.       | Sxxx=y for each range  |
| AT/V           | Feeds back the version of the software                                   | Example:<br>8123AAA_PRG_1601_V01.00.00:8134AAA_PRG_1601_V01.00.00<br>(chapter 6)   |
| ATR            | Restores the value of all non-volatile memory ranges to volatile memory. | "O" if the operation has been accepted.<br>"E" if the operation has been refused.  |
| AT&W           | Saves the current configuration to non-volatile memory.                  | "O" if the operation has been accepted.<br>"E" if the operation has been refused.  |
| AT&RST         | Restart the device   | "O" if the operation has been accepted.<br>"E" if the operation has been refused.  |
| AT0            | Exit command mode  | "O" if the operation has been accepted.<br>"E" if the operation has been refused.  |
| ATT63 PROVIDER | Unblock the operating range  | "O" if the operation has been accepted.<br>"E" if the operation has been refused.  |

Example of a set of commands and corresponding responses that can be seen on the terminal:

| Syntaxe de la Commande | Description                            | Syntaxe de la réponse à la ligne suivante                           |
|------------------------|--|---|
| \FF\FF\FF\FF++         | Input request in command mode          | <b>CM</b>   |
| ATS202=3               | The number of repetition change        | <b>E -&gt;</b> This command is not validated (register no unlocked) |
| ATT63 PROVIDER         | Unblock the operating range            | <b>O</b>  |
| ATS202=3               | The number of repetition change        | <b>O</b>  |
| ATS230?                | Feeds back the value of the S230 range | <b>S230=868130000</b>   |
| AT&W                   | Memory request for the state range     | <b>O</b>  |
| ATO                    | Output request in command mode         | <b>O</b>  |

Interpreting the previous example: the user wanted to modify the number of repetition after having made an unauthorised command (answer **E**), and the ranges were unblocked in order to modify the range. The range 230 was verified and the parameters were saved before exiting. When exiting command mode, the device will start a new transmission cycle.

#### 5.4. Register description

Once supplied with power, the Field Test Device will function according to the last saved configuration (factory settings if this is the first time the device has been switched on, or if this configuration has not been changed).

ATS<n>=<m> or ATR type modification commands allow you to modify the content of these ranges.

It is essential to save the parameters using the AT&W command before exiting the command mode, otherwise all of your changes will be lost.

##### 5.4.1 Fonction register

Below is a list of the ranges accessible on the device (by default). These ranges make it possible to modify the device's behaviour. Details on how each range functions can be found elsewhere in the table.

| Range | Content                    | Default value | Comments   |
|-------|----------------------------|---------------|--|
| S370  | RESERVE                    | 0             |  |
| S371  | GPS configuration          | 11            | 0: GPS deactivated<br>1: GPS activated/Continuous Mode<br>0x00000101: GPS activated/Continuous Mode + GPS Reset (Cold Start) |
| S380  | Frame transmission period  | 600           | 0: No periodic transmission<br>1 to 86400 (expressed in seconds) : Periodic transmission                                     |
| S832  | Communication mode         | 1             | 0: monodirectional<br>1: bidirectional   |
| S383  | RESERVE                    | 1             |  |
| S385  | Personnalized Payload Size | 0             | 0 : Deactivated<br>1 to 16 : Size of the payload   |

| Range | Content                           | Default value | Comments   |
|-------|-----------------------------------|---------------|--|
| S386  | Personalize Payload Text - Bloc 1 | 0             | Each bloc allow to define 4 bytes of the payload<br><br>The data enter in the last bloc will be not take in charge |
| S387  | Personalize Payload Text - Bloc 2 | 0             |  |
| S388  | Personalize Payload Text - Bloc 3 | 0             |  |
| S389  | Personalize Payload Text - Unused | 0             |  |

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### S371 : GPS configuration

The way in which the GPS module is configured is completely independent from the main firmware. Two functioning modes are available:

- Permanent Mode
- Periodic Mode

In **permanent mode**, the GPS is always active and will operate at maximum power (like the GPS in a car). This is the most efficient mode and we would recommend using it when it is necessary to move the Field Test Device (example: if the device will be in a car), or if satellite visibility is poor.

In **periodic mode**, the GPS will start for a period of 5 mins at maximum power before switching to periodic power. In this mode, the GPS will become active for 30-40 seconds every 10 minutes. The rest of the time, it will be in rest mode, which will aid the device's independence. This mode should be used for static use (fixed position, or very slow movement), or where satellite visibility is very good.

The user can also choose to reset the GPS once it is switched on. This operation will allow you to delete the GPS memory as well as all previously acquired information. This can be useful when the GPS is not able to synchronise itself while it is starting up. Essentially, the GPS will use its internal memory to set a position and to locate satellites, but when the GPS has not been used for a long period of time or has travelled a great distance (for example, if it has travelled on-board an aircraft to another country), the information will be inaccurate and must be deleted.

If the GPS coordinates are available during transmission of a sigfox frame, these coordinates will be included in the payload. Otherwise the corresponding bytes will be deleted, rendering the payload shorter.

### S380 : Frame transmission period

The device is capable of automatically making periodic transmissions. The transmission period is defined in seconds and can be anywhere between 0 and 86400 (24 hours).

If the value for the period is equal to 0, the function will then be deactivated.

### S382 : Communication Mode

The communication mode allows to modify the device comportement in front of the network.

- Monodirectional mode: the device transmit a frame to the network and can't receive a downlink frame.
- Bidirectional mode: the device transmit a frame to the network and open a reception window which allows the network to transmit a frame to the device, but also to transmit acknowledgment frames.

## 5.4.2 Network range

| Range | Content                | Default value | Comments                                   |
|-------|------------------------|---------------|--|
| S200  | Transmission frequency | 868130000     | From 862000000 to 870000000 (Test mode)    |
| S201  | Reception frequency    | 869525000     | From 862000000 to 870000000 (Test mode)    |
| S202  | Number of repetitions  | 2             | From 0 to 2 (only available in BIDIR mode) |
| S230  | RESERVE                |               |  |
| S260  | RESERVE                |               |  |
| S261  | RESERVE                |               |  |

**S200: Transmission frequency**

The central transmission frame of the device can be change for the test. This parameter have to be change only for operator test.

**S201: Reception frequency**

The central reception frame of the device can be change for the test. This parameter have to be change only for operator test.

**S202: Number of repetitions**

Usually a sigfox message is reapeted twice time. The number of repetition stay unchanged in monodirectional communication mode, but it can be change in bidirectional mode.

## 6. DEVICE UPDATES

The firmware versions of the device can be updated. The device has 2 firmwares that can be updated individually:

RTU firmware

APPLICATIVE firmware

It is possible to find out the references for versions loaded onto the device using the command AT/S

Example :

8121AAB\_PRG\_1701\_**V01.00.09**:8120AAB\_PRG\_1701\_**V01.00.01**

The RTU firmware version is: V01.00.09

The APPLICATIVE firmware version is: V01.02.01

The full procedure is available on the device page of our website: [www.adeunis-rf.com](http://www.adeunis-rf.com)

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## 7. DOCUMENT HISTORY

| Version | Content  |
|---------|--|
| V1.0.0  | Creation   |
| V1.1.0  | New function <ul style="list-style-type: none"> <li>• Downlink frame screen</li> <li>• Personnalize payload</li> <li>• Firmware version screen on start</li> </ul> |



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