User Guide - FIELD TEST DEVICE - LoRaWAN EU863-870

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PRODUCT AND REGULATORY INFORMATION

This User Guide applies to the following product:

FIELD TEST DEVICE LoraWAN 863-870

Reference: From ARF8123AA

Firmware versions:

RTU: from V02.00.02
APP: from V02.00.01

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1. PRODUCT PRESENTATION

1.1. Description

The Field Test Device (FTD) from Adeunis is a Class A LoRaWAN 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 a private or public operated network.

The LoRaWAN Field Test Device from Adeunis is a ready-to-use device, which makes it possible to communicate with all network operators using the LoRaWAN V1.0 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, SF, PER, etc.) in addition to information from sensors (GPS coordinates, 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

Casing 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

1.3. Technical specifications

Communication	LoRaWAN protocol & LoRa Modulation
LoRaWan Specification compliant	V1.0.2
Radio rate	Variable (SF12/125kHz (~183 bps) to FSK (~50kbps)
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
Network area	EU863-870
Frequency	ISM band 865-870MHz

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

Operational	IoT Configurator ou commandes AT
Serial rate	115.2 kbps
Parity	None
Amount of data	8
Stop bit	1
Temperature of operation	-20°C/+40°C en décharge et -20°C/ +36°C en charge
Device configuration	Via IoT Configurator or AT commands

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.

Device charging

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

2.2 Description of the buttons

Operation interface**:**

Push button 1		This button allows you to carry out radio transmissions in manual mode. On the PER menu, a long press reset the counters to zero. A long press on the push button 1 and 2 simultaneously will lock the button 1 and force the periodical mode.
Push button 2		This button allows you to manage the LCD screen: • When the LCD back-light is switched off, pressing this button will switch on the back-light. • When the LCD back-light is switched on, each press will allow you to scroll through the different screens available on this device. A long press on this push button enables to see the Configuration screen.
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 or configure it.
Charge indicator		The charge LED shows you the device’s charge status.

3. DESCRIPTION OF THE SCREENS

The product's LCD screen is divided into several screens:

- The START screen (Firmware version display) - Only when the product is turned on
- The JOIN screen - Only when the product is turned on or when exiting command mode
- The UPLINK/DOWNLINK simplified screen - network bars indicating the quality of the radio link

- Advanced UPLINK/DOWNLINK screen - network indicators such as RSSI, SNR, etc.
- The GPS screen
- The PER (Packet Error Rate) screen
- CONFIGURATION screen - accessible via a long press on the screen button

The following icons are present on each screen of the product:

GPS status (First on the left)

No icon GPS has been deactivated

 GPS has not been synchronized

 GPS has been synchronized

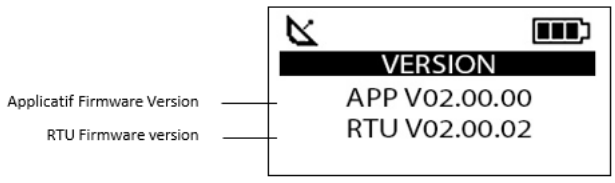
Battery (Last on the left)

 Battery level

 Product in charge

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.

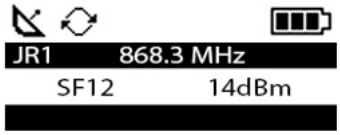


Firmware Version

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. Join Screen

When the device is configure in OTAA mode (Over the Air Activation) default mode, the product start a join request session (JRx) and show the frequency, SF and power used during this session. When the product receive a Join Accept (JA) from the network, the information is displayed on
the "expert" screen. On the simplified screen only the icon on the status bar is visible.



Join request phase

Join accept phase

The request are identify «JR» following with a number showing the number of request done. The frequency used for the request is showing after this information.

Note: If there is no network available, the «Join Request» will be send indefinitely.

RF status (second on the left)

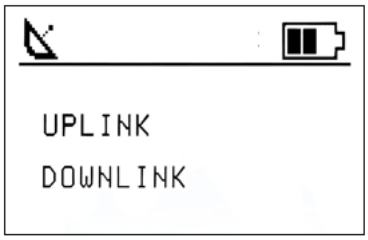
No icon The JOIN phase is completed and the device is operational on the network

The device is in JOIN phase, and is trying to connect to the network

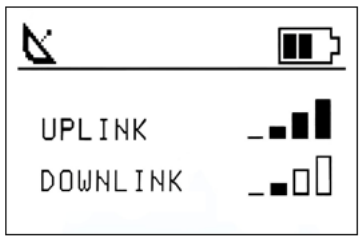
3.3 Uplink/Downlink screen - “simplified” view

This screen is the first screen displayed after the “Start screen”.

On this screen, only 2 indicators are available in the form of network bars to give the radio link quality (uplink and downlink). When the device is sending a message or when no frame has been received by the FTD, there is no indicator on the screen. After reception of a downlink the FTD shows the 2 indicators of the link radio quality from 1 bar to 4 bars.



Before reception of the network feedback



After reception of the network feedback

No network or very weak signal, installation not possible.

Bad network, frame loss rate higher than 10%, installation is not recommended by adeunis.

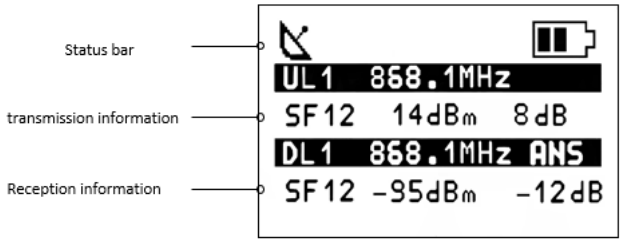
Good network, frame loss rate lower than 10%, installation possible but autonomy of the transmitter not optimized

Very good network, no frame lost or very low frame loss rate, installation possible and optimized autonomy of the transmitter.

3.4. Uplink/Downlink screen - “advanced” view

This screen is displayed after pushing the screen button (pushbutton 2).

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.
• The second line show the SF, the power used and the SNR of the uplink (given by the gateway).
• The third line show the Downlink information «DLx» with x for the number and frequency of the reception window
• The last line show the SF, RSSI and SNR of the frame received



Advanced screen

Transmission status (Second on the left)

No icon There is currently no radio transmission

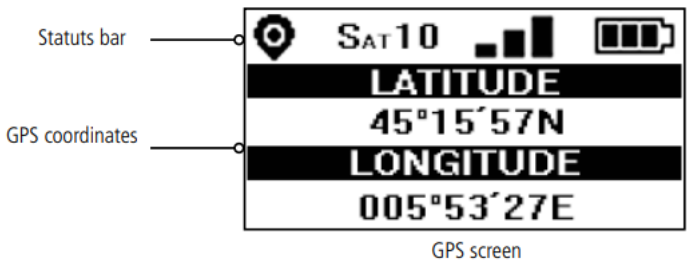
Manual transmission has been triggered (transmission cycle in progress)

Periodic transmission has been triggered (transmission cycle in progress)

The Downlink information displayed on the device relates to a Downlink frame sent from a LoRaWAN network. If no information is visble in this section, the product is still sending or waiting for the downlink. However if there are dashes where it should be figures, it signifies that the
downlink has not been received by the FTD.

3.5. GPS screen

This screen can be accessed by briefly pressing 2 times on pushbutton 2 after the home screen (if GPS is activated). It allows you to view the functioning information of the GPS module, as well as the device’s GPS positioning.



GPS screen

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

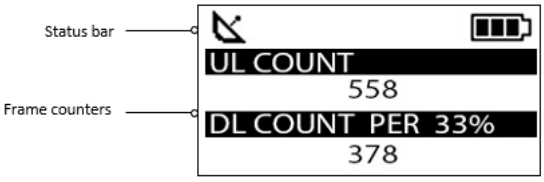
When GPS has not yet been “fixed”, no information on latitude or longitude will be displayed on the screen and the information icon will indicate that GPS has not been synchronized.

GPS screen (No synchronisation)

If the product loses synchronisation with the GPS, the information in this screen will no longer be available. There is no storage of the last received position.

3.6. PER (Packet Error Rate) screen

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



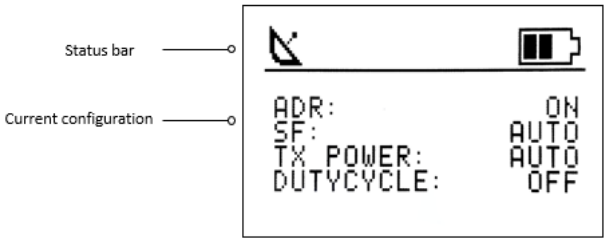
PER screen

- 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 (%) = 100 - ((DL_COUNT / UL_COUNT) * 100)

3.7. CONFIGURATION SCREEN

This screen is reachable by pressing the pushbutton 2 (screen button) during 2 seconds. It allows to show the current configuration of the Field Test Device regarding the following parameters: ADR, SF, Power and Duty Cycle. If ADR is deactivated, the product will show the current configuration
of the SF and TX power instead of AUTO.



Configuration screen

To exit this screen press again on the pushbutton.

4. “INTEGRATED ANTENNA” MODE

When activated by the user, the FTD switch to a mode called «integrated antenna».
In this mode, the Field Test Device emulates the operation and the performances of a device with a PCB antenna and having the ADR ON.

This mode enables the user to be aware of the behavior of an integrated product on the field.

NOTE: when this mode is activated, the information related to downlink is not provided because considered as non relevant (on screen and even in the logs, except SF and power transmission).

5. 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: BF9D4515969000534500272020OFC95207
This example will be used in order to explain how the payload is decoded.

Byte	1	2	3 to 6	7 to 10	11	12	13
Description	Status	Reserved	GPS Latitude	GPS Longitude	GPS Quality	UL counter	DL count
Example	**BF**	**9D**	**45 | 15 | 96 | 90**	**00 | 53 | 45 | 00**	**27**	**20**	**20**

5.1 Status

Byte	Bit	Commentaires	Valeur	Exemple hexadécimal	Exemple décimal
1	7	Reserved	0 ou 1	BF	1
	6	Reserved	0 ou 1		0
	5	Transmission triggered by pressing pushbutto	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		1
	0	Presence of RSSI and SNR information	0 ou 1		1

0: Data missing from the payload
1: Data present in the payload

5.2 Temperature

Temperature measurement is no longer supported for Field Test Device with App firmware from V02.00.01

Temperature value is setted to -99°C (invalid measurement) to ensure compatibility with existing decoders.

5.3 Latitude

Byte	Bit N°	Comments	Value	Hex	
3 to 6	7..4	BCD coding of the entire degree section (tenth of a degree)	45°15,9690	45	
	3..0	BCD coding of the entire degree section (whole degrees)	45°15,9690		
	7..4	BCD coding of the entire minute section (tenth of a minute)	45°15,9690	15	
	3..0	BCD coding of the entire minute section (whole minutes)	45°15,9690		
	7..4	BCD coding of the decimal section (tenth)	45°15,9690	96	
	3..0	BCD coding of the decimal section (one hundredth)	45°15,9690		
	7..4	BCD coding of the decimal section (one thousandth)	45°15,9690	90	
	3...1	Not used			
	0	Hemispheric coding	0 : North 1 : South		

Note: the value expressed in the payload will be in degrees and decimal minutes. 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.

5.4 Longitude

Byte	Bit N°	Comments	Value	Hex	
7 to 10	7..4	BCD coding of the entire degree section (one hundredth of a degree)	005°34,500	00	
	3..0	BCD coding of the entire degree section (one tenth of a degree)	005°34,500		
	7..4	BCD coding of the entire degree section (whole degrees)	005°34,500	53	
	3..0	BCD coding of the entire minute section (one tenth of a minute)	005°34,500		
	7..4	BCD coding of the entire minute section (whole minutes)	005°34,500	45	
	3..0	BCD coding of the decimal section (tenth)	005°34,500		
	7..4	BCD coding of the decimal section (one hundredth)	005°34,500	00	
	3...1	Not used			
	0	Hemispheric coding	0 : East 1 : West		

Note: the value expressed in the payload will be in degrees and decimal minutes. 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.

5.5 GPS quality (Not available in Legacy mode)

Byte 11 :

Bit N°	Comments	Value	Hex	Value
7…4	Reception scale	1: Good 2: Average 3: Poor	27	2
3…0	Number of satellites	1…. 16	27	7

The byte's MSB allows you to find out the quality of the GPS signal and the LSB gives you the number of satellites viewed by the device.

5.6 UL counter

Byte	Comments	Value	Hex	Decimal
12	Uplink frame counter	0 ... 255	20	32

Please note: This counter is not the LoRaWAN 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.

5.7 DL counter

Byte	Comments	Value	Hex	Decimal
13	Downlink frame counter	0 ... 255	20	32

Attention : Ce compteur n'est pas le compteur de trame de la stack LoRaWAN, mais un compteur de trame interne. Il n'y a donc pas de corrélation entre ce compteur et celui que vous pouvez visualiser sur le réseau.

5.8 Battery level

Byte	Comments	Value	Hex
14	MSB value of the battery level (in mV)	4041	**0F C9**
15	LSB value of the battery level (in mV)		**0F C9**

5.9 RSSI

Byte	Comments	Value	Hex	Decimal
16	RSSI Value in dBm (Absolute value)	0 ... 255	52	82

In the example the RSSI value is -82dBm

5.10 SNR

Byte	Comments	Value	Hex	Decimal
17	SNR Value in dB (Two's complement)	-125 ... 125	7	7

In the example the SNR value is 7 dB

6. 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.

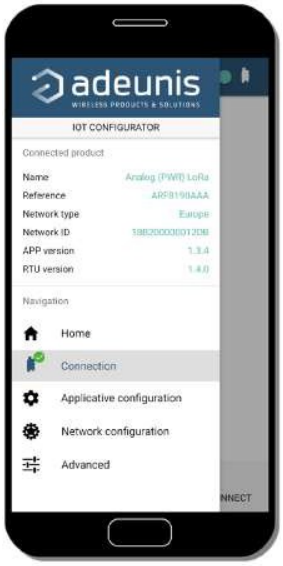
6.1 Connecting the device to a computer

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 recognized by the computer as a Virtual Com Port (VCP) device.

Using Windows: Verification that the device has been recognized 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:
https://www.adeunis.com/en/produit/ftd-network-tester/
Select:
• DRIVER - stsw-stm32102_vcpdriver

6.2 IoT Configurator



IoT Configurator is an Adeunis application developed to facilitate the configuration of devices through a user-friendly interface The IoT Configurator can be used directly on a mobile or tablet on Android or via a Windows PC.
Compatible with Windows 10 only and Android 5.0.0 Minimum
Connect via the micro-USB interface present on the device, the PC or the mobile.
The application automatically recognizes the device, downloads these configuration parameters and makes it possible to configure the device quickly and intuitively using the forms (drop-down
menus, checkboxes, text fields, etc.). The application also lets you export an application configuration in order to duplicate it on other devices in a few clicks.
The IoT Configurator is continuously enriched with new features.

For mobile or tablet: Download application for free on Google Play
https://play.google.com/store/apps/details?id=com.adeunis.IoTConfiguratorApp

For computer: directly on the Adeunis website
https://www.adeunis.com/download/

6.3 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).

6.3.1 Function register

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

Range	Content	Default value	Comments
S370	Payload format	1	0 : Format Legacy (Demonstrator) 1 : Format Field Test Device
S371	GPS configuration	11	0: GPS deactivated 1: GPS activated/Continuous Mode 11 : GPS activated/Continuous Mode + GPS Reset (Cold Start)
S380	Frame transmission period	600	0: No periodic transmission 1 to 86400 (expressed in seconds) : Periodic transmission
S382	ACK and Class mode	0	0: Class A Unconfirmed 1: Class A Confirmed All other values will be retained.
S383	Uplink Port	1	1-223
S385	Personalized Payload Size	0	0 : Deactivated 1 to 16 : Size of the payload
S386	Personalized Payload Size - Bloc 1	0	Each bloc allow to define 4 bytes of the payload
S387	Personalized Payload Size - Bloc 2	0	Each bloc allow to define 4 bytes of the payload
S388	Personalized Payload Size - Bloc 3	0	Each bloc allow to define 4 bytes of the payload
S389	Personalized Payload Size - Bloc 4	0	Each bloc allow to define 4 bytes of the payload

S370 : Payload format
The Field Test Device (FTD) is compatible with the previous version of the device (the LoRaWAN Demonstrator). In order to modify the format of the payload and to make it compatible with the previous device, it will be necessary to modify this range.

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 min 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 synchronize 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 traveled a great distance (for example, if it has traveled 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 LoRa 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.
If the button is locked, the periodical mode is used with the period indicated in this register.

S382 : Class and ACK Mode
The range will allow you to select the method of functioning for the device:
• Unconfirmed Mode
• Confirmed Mode

S383 : Uplink Port
The communication port for the Uplink frame can be configured in this frame. You can select a value between 1 and 223

S385 : Personalize Payload Size
This option allow to send a define payload instead of the standard define inside the product
The user can set the size of the payload and the text to send.
When the value of the register is set to , the function is deactivated and the product use the standard payload.
When the value get a number, the product send the characters of the registers S386 to S389.

S386 to S389 : Personalize Payload Text
The 4 registers allow to set a specific payload:
• The register S386 allow to define the bytes 1 to 4 of the frame
• The register S386 allow to define the bytes 5 to 8 of the frame
• The register S386 allow to define the bytes 9 to 11 of the frame
• The register S386 allow to define the bytes 12to 16 of the frame
The value must be set in hexadecimal code : example for the «TEST» word --> 54455354

WARNING: The register need to be completed with zero to send a byte, or the product will completed by himself the register and you will not have the result you would like to have.

Example with: S385=1.
• S386=AB000000 --> The system understand the frame AB000000 and send the first byte --> You will receive AB
• S386=AB --> The system understand the frame 000000AB and send the first byte --> You will receive 00

6.3.2 Network register

Registre	Content	default value	Comments
S201	Spreading Factor value	12	7: SF7 8: SF8 9: SF9 10: SF10 11: SF11 12: SF12
S204	RESERVED	-	Read only
S205	Transmission power	14	Unit: dBm Possible values: 2,4,6,8,10,12,14
S214	LORA APP_EUI (First section)	0018B244	Parameter coded with 16 characters. Each range contains a section of the key.
S215	LORA APP_EUI (Second section)	41524632	Parameter coded with 16 characters. Each range contains a section of the key.
S216	LORA APP_KEY (First section)	(voir note)	Parameter coded with 16 bytes. Each of the 4 ranges will contain 4 bytes.
S217	LORA APP_KEY (Second section)	(voir note)	Parameter coded with 16 bytes. Each of the 4 ranges will contain 4 bytes.

Registre	Content	default value	Comments
S218	LORA APP_KEY (Third section)	(voir note)	Parameter coded with 16 bytes. Each of the 4 ranges will contain 4 bytes.
S219	LORA APP_KEY (Fourth section)	(voir note)	Parameter coded with 16 bytes. Each of the 4 ranges will contain 4 bytes.
S220	Activation ADR	1	0: Inactive 1: Active
S221	Activation mode	1	0 : ABP 1 :OTAA
S222	LORA NWK_sKEY (First section)	0	Parameter coded with 16 bytes. Each of the 4 ranges contains 4 bytes
S223	LORA NWK_sKEY (Second section)	0	Parameter coded with 16 bytes. Each of the 4 ranges contains 4 bytes
S224	LORA NWK_sKEY (Third section)	0	Parameter coded with 16 bytes. Each of the 4 ranges contains 4 bytes
S225	LORA NWK_sKEY (Fourth section)	0	Parameter coded with 16 bytes. Each of the 4 ranges contains 4 bytes
S226	LORA APP_sKEY (First section)	0	Parameter with 16 bytes. Each of the 4 ranges contains 4 bytes.
S227	LORA APP_sKEY (Second section)	0	Parameter with 16 bytes. Each of the 4 ranges contains 4 bytes.
S228	LORA APP_sKEY (Third section)	0	Parameter with 16 bytes. Each of the 4 ranges contains 4 bytes.
S229	LORA APP_sKEY (Fourth section)	0	Parameter with 16 bytes. Each of the 4 ranges contains 4 bytes.
S231	“Integrated antenna” mode	0	0: deactivated 1: activated
S280	NETWORK ID	0	Read-only
S281	DEVICE ADDRESS		

S201: SF value
The range allows you to set a “Spreading Factor” (SF) value to use when the device has not been configured with “Adaptive Data Rate” (ADR).
This value will then be used to transmit the frame on the LoRaWAN network. When the ADR is active, the SF will automatically be managed by the network.

S205: Power value
The range allows you to set a “Transmission power” (dBm) value to use when the device has not been configured with “Adaptive Data Rate” (ADR). This value will then be used to transmit the frame on the LoRaWAN network. When the ADR is active, the power will automatically be managed by the network.

S214 and S215: LORA APP_EUI
The S214 and S215 ranges determine the APP_EUI key used during the JOIN phase in OTAA mode. The key is made up of 16 characters spread across these 2 ranges, which can each contain 8 characters. The S214 range contains the start of the key, while the S215 range contains the end
of the key.

Example: 0018B244 41524632
S214 = 0018B244
S215 = 41524632

S216 to S219: LORA APP_KEY
The ranges from S216 to S219 determine the APP_KEY used during the JOIN phase in OTAA mode. The key is made up of 32 characters spread across these 4 ranges, which can each contain 8 characters. The S216 range contains the first 8, the S217 range contains the next 8, the S218
range contains the next 8 and the S219 range contains the last 8.

Example : 0018B244 41524632 0018B200 00000912
S216 = 0018B244
S217= 41524632
S218 = 0018B200
S219 = 00000912

S220: ADR activation
If the ADR mode has been activated, the device will have no control over the SF and the Power because the parameter can only be modified by the network. If the ADR has been deactivated, the SF value and power value used are that contained in the S201 and S205 registers.

S221: Activation mode
This range will allow you to configure the device's activation mode:
• The "Over The Air Activation" (OTAA) mode uses a JOIN phase before it can transmit on the network. This mode uses the code APP_EUI (S214 and S215) and the code APP_KEY (S216 to S219) during this phase in order to create the network communication keys. Once this phase has
finished, the APP_sKEY, NWK_sKEY and DEVICE ADDRESS codes will be present in the corresponding ranges. A new JOIN phase will start each time the device exits command mode, is reset or is supplied with power.

Code	Description
APP_EUI	Global application identifier
APP_KEY	Device application key

The "Activation By Personalization" (ABP) mode does not have a JOIN phase, but transmits directly on the network by directly using the codes NWK_sKEY (S222 to S225), APP_sKEY (S226 to S229) and DEVICE ADDRESS (S281) in order to communicate.

Data Rate (DR) value	**Description**
NWK_sKEY	Network session key
APP_sKEY	Application session key
DEVICE ADDRESS	Network device address

S222 to S225: LORA NWK_sKEY
The ranges from S222 to S225 determine the NWK_sKEY used during network exchanges. The key is made up of 32 characters spread across these 4 ranges, which can each contain 8 characters. The range S222 contains the first 8, the S223 range contains the next 8, the S224 register contains the next 8 and the S225 range contains the last 8.

Example: 0018B244 41524632 0018B200 00000912
S216 = 0018B244
S217= 41524632
S218 = 0018B200
S219 = 00000912

S226 to S229: LORA APP_sKEY
The ranges from S226 to S229 determine the APP_sKEY used during network exchanges. The key is made up of 32 characters spread across these 4 ranges, which can each contain 8 characters. The S226 range contains the first 8, the S227 range contains the next 8, the S228 range contains the next 8 and the S229 range contains the next 8.

Example: 0018B244 41524632 0018B200 00000912
S216 = 0018B244
S217= 41524632
S218 = 0018B200
S219 = 00000912

S231: "Integrated antenna" mode
The S231 register switch the FTD in a mode called "integrated antenna". In this mode the FTD emulates the behavior of a device with a PCB antenna. See corresponding paragraph.

S281: DEVICE ADDRESS
This range will allow you to determine the address of the device on the network when using the ABP mode. In the OTAA mode, this parameter is automatically input during the JOIN phase.

7. DOWNLOAD THE MEASUREMENT HISTORY

7. DOWNLOAD THE MEASUREMENT HISTORY

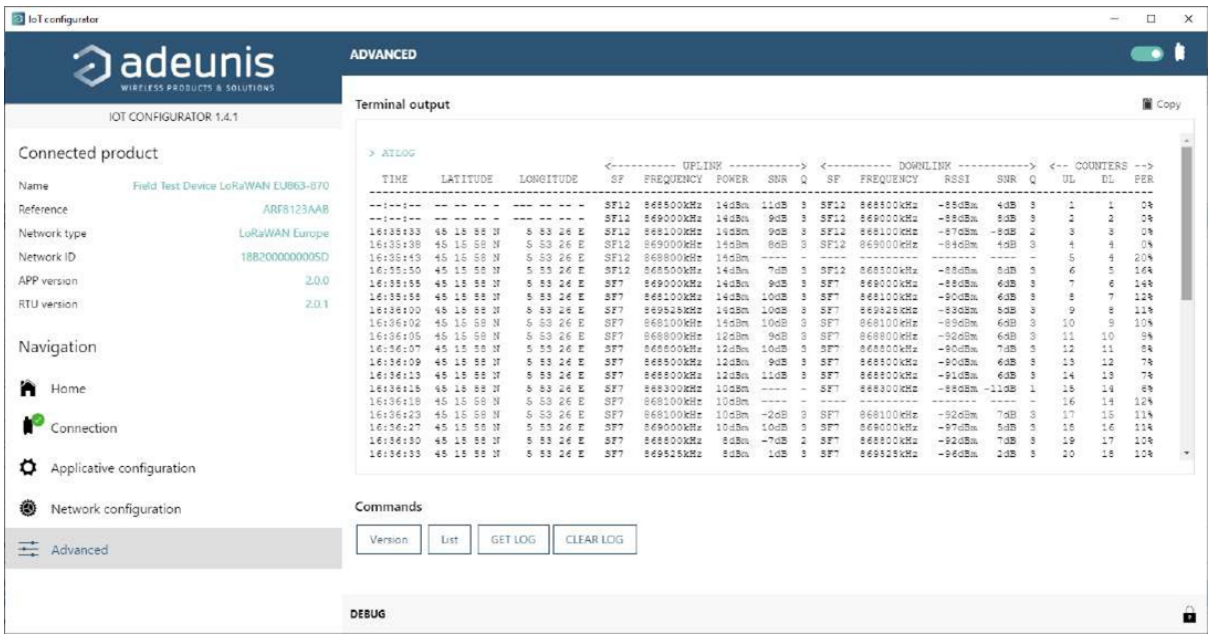
From APP 2.0.0, it is possible to download up to the last 100 logs done by the FTD. It allows to make an entire network campaign on site and to download all the logs after directly on the computer.

Through IoT Configurator: go to the Advanced menu once the product is recognized and then click on:
• GET LOG: to obtain all the logs saved
• CLEAR LOG: to clear history

Once downloaded in the Advanced menu, you can copy/paste it in an text file or an excel file thanks to the “copy” button at the top of the page.

Through AT Command you can use the following commands: ATLOG to get the logs and ATCLRLOG to clear history.

The logs are given with the following format:



*These data depend on GPS connection, if the GPS is deactivated or out of reach these data will be missing in the logs.
** Q signifies «Simplified indicator», it represents from 0 to 3 the bars of the simplified screen (0= 1 bar >> 3= 4 bars, please refer to the corresponding paragraph to know the meaning)

NOTE 1: each data non received is replaced by dashes and blanks are data not supplied.
NOTE 2: in the “integrated antenna” mode, only the SF and Poser transmission is given for Downlinks, other data from DL are empty because considered irrelevant.

8. DEVICE FIRMWARES

The device has 2 firmwares:
• RTU firmware
• APPLICATIVE firmware

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

Example :
APP_8123AAB_PRG_2001_V02.00.00:RTU_ 8134CAA_PRG_2001_V02.00.02
The APP firmware version is: V02.00.00
The RTU firmware version is: V02.00.02

DOCUMENT HISTORY

Version	Contenu
V2.1.0	Removal of accelerometer, temperature measurement and temperature display. Removal of frame transmission when triggering of the accelerometer
V2.0.0	New screens and new features added. New APP and RTU firmware.
V1.2.3	Minor corrections
V1.2.2	Minor corrections
V1.2.1	New template
V1.2.0	Modification of frequencies
V1.1.2	DoC removed
V1.1.0	Add new functionality RSSI-SNR management in the payload SF setting when ADR is disabled Downlink frame screen Customized payload JOIN screen Firmware version display at startup
V1.0.0	Document creation