Wireless Activity Event Counter
User Manual

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1. Introduction

R311FB is a vibration alarm device for Netvox ClassA type equipment based on LoRaWAN open protocol. It can count the number of movements or vibrations of the device and is compatible with LoRaWAN protocol.

LoRa Wireless Technology:
LoRa is a wireless communication technology dedicated to long distance and low power consumption. Compared with other communication methods, LoRa spread spectrum modulation method greatly increases to expand the communication distance. Widely used in long-distance, low-data wireless communications. For example, automatic meter reading, building automation equipment, wireless security systems, industrial monitoring. Main features include small size, low power consumption, transmission distance, anti-interference ability and so on.

LoRaWAN:
LoRaWAN uses LoRa technology to define end-to-end standard specifications to ensure interoperability between devices and gateways from different manufacturers.

2. Appearance

3. Main Features

- Compatible with LoRaWAN
- 2 section 3V CR2450 button battery powered
- Detect battery voltage and the device motion status
- Compatible with LoRaWANTM Class A
- Frequency hopping spread spectrum technology
- Configuration parameters can be configured through third-party software platforms, data can be read and alarms can be set via SMS text and email (optional)
- Available third-party platform: Actility / ThingPark, TTN, MyDevices/Cayenne
- Low power consumption and long battery life

Note *:

Battery life is determined by the frequency and other variables reported by the sensor, please refer to
http://www.netvox.com.tw/electric/electric_calc.html

On this website, users can find the battery life of various models in different configurations

4. Set up Instruction

On/Off

Power on	Insert batteries. (users may need a flat blade screwdriver to open); insert two sections of 3V CR2450 button batteries and close the battery cover.)
Turn on	Press any function key till green and red indicator flashes once.
Turn off (Restore to factory setting)	Press and hold both function keys for 5 seconds till green indicator flashes for 20 times.
Power off	Remove Batteries.
Note:	1. Remove and insert the battery; the device will memorize previous on/off state by default. 2. On/off interval is suggested to be about 10 seconds to avoid the interference of capacitor inductance and other energy storage components. 3. Press any function key and insert batteries at the same time; it will enter engineer testing mode.

Network Joining

Never joined the network	Turn on the device to search the network to join. The green indicator stays on for 5 seconds: success The green indicator remains off: fail
Had joined the network (not at factory setting)	Turn on the device to search the previous network to join. The green indicator stays on for 5 seconds: success The green indicator remains off: fail
Fail to join the network (when the device is on)	First two mins:wake up every 15 seconds to send request. After two mins: enter sleeping mode and wake up every 15 minutes to send request. Note: Suggest to remove batteries if the device is not used to save power. Suggest to check the device verification information on the gateway with your platform server provider.

Function Key

Press and hold for 5 seconds	Restore to factory setting / Turn off The green indicator flashes for 20 times: success The green indicator remains off: fail
Press once	The device is in the network: green indicator flashes once and sends a report The device is not in the network: green indicator remains off

Sleeping Mode

The device is on and in the network	Sleeping period: Min Interval. When the reportchange exceeds setting value or the state changes: send a data report according to Min Interval.
The device is on but not in the network	First two mins: wake up every 15 seconds to send request. After two mins: enter sleeping mode and wake up every 15 minutes to send request. Note: Suggest to remove batteries if the device is not used. 　　　Suggest to check device verification on gateway.

Low Voltage Warning

Low Voltage	2.4 V

5. Data Report

When the device is turned on, it will immediately send a version package.
Data will be reported once per hour by default setting.

Maximum time: Max Interval
Minimum time: Min Interval (Detect the current voltage value every Min Interval by default setting)
Default reportchange:
batteryvoltagechange ---- 0x01 (0.1V)

Remarks:
1. The device periodically sends data according to the maximum time. The data content is:
   R311FB current device status.
2. R311FB device will only report according to the minimum time when the battery voltage changes.
3. The actual data sending cycle depends on real program before shipment.

R311FB vibration alarm:
The device detects sudden movement or vibration, and the quiescent state changes. The device waits for a certain period of time (DeactiveTime) to enter the quiescent state and counts 1 time for the cumulative number, sends a report of the cumulative number of vibrations, and restarts the preparation for the next detection. If the vibration continues to occur, the timing of DeactiveTime restarts until it reaches a standstill to count 1 time for the cumulative number. The count data is not saved when it is powered off.

Can be changed by the gateway to change the device type, active vibration threshold and DeactiveTime.
The Active vibration threshold range is 0x0003-0x00FF (default is 0x0003);
DeactiveTime is 0x01-0xFF (default is 0x05);

R311F DeviceType(1Bytes,0x01_ **R311FA**,0x02_ **R311FB**,0x03_ **R311FC**), the default value is the programming value.

For the analysis of the data reported by the device, refer to the Netvox LoraWAN Application Command document and the
http://www.netvox.com.cn:8888/page/index

Data report configuration and sending period are as following:

Min Interval (Unit:second)	Max Interval (Unit:second)	Reportable Change	Current Change≥ Reportable Change	Current Change ＜ Reportable Change
Any number between 1~65535	Any number between 1~65535	Can not be 0.	Report per Min Interval	Report per Max Interval

Report Configuration

Config ReportReq	R311FB	0x01	0x50	MinTime (2bytes Unit:s)	MaxTime (2bytes Unit:s)	BatteryChange (1byte Unit:0.1v)	Reserved (4Bytes,Fixed 0x00)
Config ReportRsp		0x81		Status (0x00_success)	Reserved (8Bytes,Fixed 0x00)		
ReadConfig ReportReq		0x02		Reserved (9Bytes,Fixed 0x00)			
ReadConfig ReportRsp		0x82		MinTime (2bytes Unit:s)	MaxTime (2bytes Unit:s)	BatteryChange (1byte Unit:0.1v)	Reserved (4Bytes,Fixed 0x00)
SetR311F TypeReq	R311FB	0x03	0x50	R311FType (1Bytes,0x01_R311FA,0x02_R311FB,0x03_R311FC)			Reserved (8Bytes,Fixed 0x00)
SetR311F TypeRsp		0x83		Status (0x00_success)	Reserved (8Bytes,Fixed 0x00)		
GetR311F TypeReq		0x04		Reserved (9Bytes,Fixed 0x00)			
GetR311 FTypeRsp		0x84		R311FType (1Bytes,0x01_R311FA,0x02_R311FB,0x03_R311FC)			Reserved (8Bytes,Fixed 0x00)
SetActive ThresholdReq		0x05		Threshold (2Bytes)	Deactivetime (1Byte,Unit:1s)	Reserved (6Bytes,Fixed 0x00)	
SetActive ThresholdRsp		0x85		Status (0x00_success)	Reserved (8Bytes,Fixed 0x00)		
GetActive ThresholdReq		0x06		Reserved (9Bytes,Fixed 0x00)			
GetActive ThresholdRsp		0x86		Threshold (2Bytes)	Deactivetime (1Byte,Unit:1s)	Reserved (6Bytes,Fixed 0x00)	

(1) Configure device parameters MinTime = 1min, MaxTime = 1min, BatteryChange = 0.1v

Downlink: 0150003C003C0100000000

The device returns:

81500000000000000000000 (configuration succeeded)

81500010000000000000000 (configuration failed)

(2) Read device configuration parameters

Downlink: 025000000000000000000000

The device returns:

8250003C003C0100000000 (current device configuration parameters)

(3) Configure device type 0x01 = R311FA, 0x02 = R311FB, 0x03 = R311FC

Downlink: 0350010000000000000000

The device returns:

83500000000000000000000 (configuration succeeded)

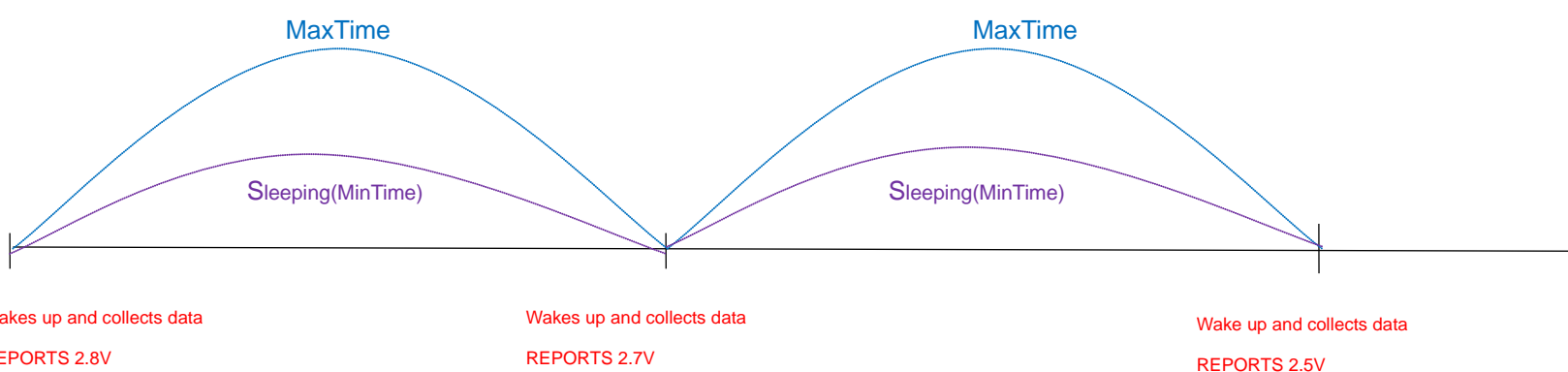83500010000000000000000 (configuration failed)

(4) Read device type

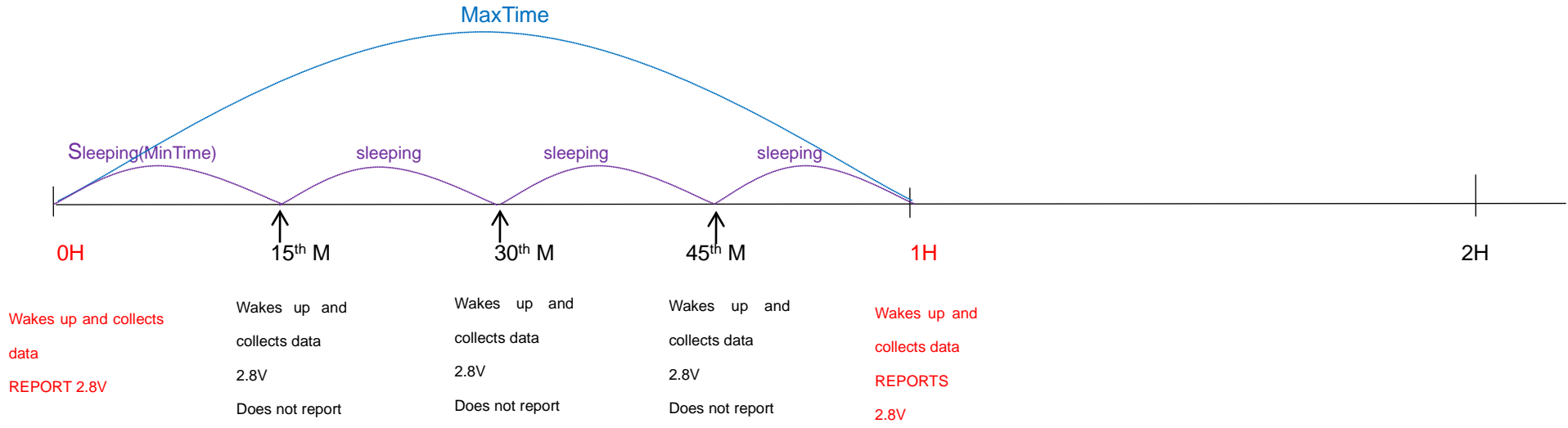Downlink: 045000000000000000000000

The device returns:

84500100000000000000000 (current device type R311FA)

Example#1   based on MinTime = 1 Hour, MaxTime= 1 Hour, Reportable Change   i.e. BatteryVoltageChange=0.1V
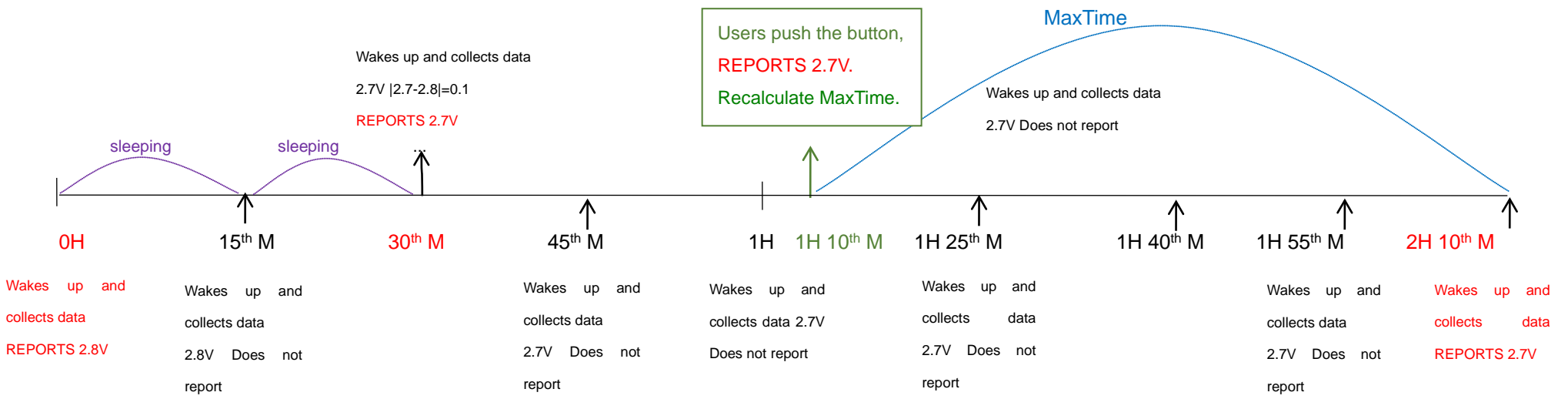

Note: MaxTime=MinTime. Data will only be report according to MaxTime (MinTime) duration regardless BatteryVoltageChange value.

Example#2   based on MinTime = 15 Minutes, MaxTime= 1 Hour, Reportable Change i.e. BatteryVoltageChange= 0.1V.

MaxTime

Sleeping(MinTime)   sleeping   sleeping   sleeping

0H	15th M	30th M	45th M	1H		2H
Wakes up and collects data	Wakes up and collects data	Wakes up and collects data	Wakes up and collects data	Wakes up and collects data		
REPORT 2.8V	2.8V	2.8V	2.8V	REPORTS		
	Does not report	Does not report	Does not report	2.8V		

Example#3   based on MinTime = 15 Minutes, MaxTime= 1 Hour, Reportable Change i.e. BatteryVoltageChange= 0.1V.

Wakes up and collects data
2.7V |2.7-2.8|=0.1
REPORTS 2.7V

Users push the button,
REPORTS 2.7V.
Recalculate MaxTime.

MaxTime

Wakes up and collects data
2.7V Does not report

sleeping   sleeping

0H	15th M	30th M	45th M	1H	1H 10th M	1H 25th M	1H 40th M	1H 55th M	2H 10th M
Wakes up and collects data	Wakes up and collects data		Wakes up and collects data	Wakes up and collects data 2.7V		Wakes up and collects data		Wakes up and collects data	Wakes up and collects data
REPORTS 2.8V	2.8V Does not report		2.7V Does not report	Does not report		2.7V Does not report		2.7V Does not report	REPORTS 2.7V

Notes:

1) The device only wakes up and performs data sampling according to MinTime Interval. When it is sleeping, it does not collect data.

2) The data collected is compared with the last data <u>reported</u>. If the data change value is greater than the ReportableChange value, the device reports according to MinTime interval. If the data variation is not greater than the last data reported, the device reports according to MaxTime interval.

3) We do not recommend to set the MinTime Interval value too low. If the MinTime Interval is too low, the device wakes up frequently and the battery will be drained soon.

4) Whenever the device sends a report, no matter resulting from data variation, button pushed or MaxTime interval, another cycle of MinTime / MaxTime calculation is started.

6. Installation

1. Tear off the 3M adhesive on the back of the motion detection counter, and stick the body to the surface of the smooth object (or motor) (please do not stick to the rough surface to prevent the device from falling off after a long time)

Notes:
- Wipe the surface of the object clean before installation to avoid dust on the surface of the object and affect the paste effect of the device.
- Do not install the body in a metal shield box or in an environment surrounded by other electrical equipment to avoid affecting the wireless transmission of the equipment.

The motion detection counter (R311FB) is suitable for the following scenarios:
- Industrial equipment
- Industrial instrument
- Medical instruments

Where it is necessary to detect the number of motor runs

2. When the device detects the sudden movement or vibration of the item (or the motor), the device status changes; wait for a period of time (Deactive Time-default 5 seconds, can be modified) after entering the static state, it is counted to be vibration once, the count is increased by 1. In the mean time, it will send the number of simultaneous vibrations.

Notes:
(1) After the device vibrates and before it enters the stationary state, if it continues to vibrate, it is postponed for 5 seconds until the device enters the stationary state before counting to 1.
(2) After the device is powered off, the count data is cleared.

7. Relative Devices

Model	Function	Appearance
R718MBA	Send an alarm when detecting vibration or movement	
R718MBB	Count the number of vibration or movement	
R718MBC	Count the time interval of vibration or movement	

8. Important Maintenance Instruction

Your device is a product of superior design and craftsmanship and should be used with care. The following suggestions will help you use the warranty service effectively.

• Keep the equipment dry. Rain, moisture, and various liquids or moisture may contain minerals that can corrode electronic circuits. In case the device is wet, please dry it completely.

• Do not use or store in dusty or dirty areas. This can damage its detachable parts and electronic components.

• Do not store in excessive heat. High temperatures can shorten the life of electronic devices,destroy batteries, and deform or melt some plastic parts.

• Do not store in excessive cold place. Otherwise, when the temperature rises to normal temperature,moisture will form inside, which will destroy the board.

• Do not throw, knock or shake the device. Rough handling of equipment can destroy internal circuit boards and delicate structures.

• Do not wash with strong chemicals, detergents or strong detergents.

• Do not apply with paint. Smudges can block debris in detachable parts and affect normal operation.

• Do not throw the battery into a fire to prevent the battery from exploding. Damaged batteries may also explode.

All of the above suggestions apply equally to your device, battery and accessories. If any device is not working properly.
Please take it to the nearest authorized service facility for repair.