Wireless Activity Event Counter R718MBB
User Manual

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1. Introduction

The R718MBB series equipment is a vibration alarm device for Netvox ClassA type equipment based on the LoRaWAN open protocol. It can count the number of movements or vibrations of the device and is compatible with the 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

Indicator

Function Key

3. Main Features

- Compatible with LoRaWAN

- 2 ER14505 lithium batteries in parallel power supply (3.6V / section)

- IP Rating: IP65/IP67 (Optional)

- Compatible with LoRaWAN™ Class A

- The base is attached with a magnet that can be attached to a ferromagnetic material object

- Frequency hopping spread spectrum

- Configuration parameters can be configured via a third-party software platform, data can be read and alerts can be set via SMS text and email (optional)

- Applicable to third-party platforms: Actility/ThingPark, TTN, MyDevices/Cayenne

- Low power consumption and long battery life

Battery Life:

- Please refer to web: http://www.netvox.com.tw/electric/electric_calc.html

- At this website, users can find battery life time for variety models at different configurations.

4. Set up Instruction

On/Off

Power on	Insert batteries. (Users may need a screwdriver to open)
Turn on	Press and hold the function key for 3 seconds till the green indicator flashes once.
Turn off (Restore to factory setting)	Press and hold the function key for 5 seconds till green indicator flashes for 20 times.
Power off	Remove Batteries.
Note	1. Remove and insert the battery; the device is at 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. At 1st -5th second after power on, the device will be in engineering test 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

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.

Low Voltage Warning

Low Voltage	3.2V

5. Data Report

When the device is turned on, it will immediately send a version package and a cluster report data.

Data will be reported once per hour by default setting.

Default Setting:

Maximum time: 0x0E10 (3600s)

Minimum time: 0x0E10 (3600s)   // Detect the current voltage value every 3600s by default setting

Battery Change: 0x01 (0.1V)

R718MBB Vibration:

The device detects sudden movement or vibration, and after waiting for 5s to enter the static state, the counting times will be accumulated by one, the report of vibration times will be issued, and a new round of detection will be started.

If the vibration continues to occur during this process, the 5s timing will be restarted until entering the static state.

Counting data will not be saved when power is off.

Active Threshold:

Active threshold range is 0x0003-0x00FF (default is 0x0003, the most sensitive)

Active Threshold = Critical value $\div$ 9.8 $\div$ 0.0625

* The gravitational acceleration at standard atmospheric pressure is 9.8 m/s^2

* The scale factor of the threshold is 62.5 mg

R718MB DeviceType:

0x01_R718MBA

0x02_R718MBB

0x03_R718MBC

The default value is the programming value.

Note:

1. The device report interval will be programmed based on the default firmware which may vary.

2. The interval between two reports must be the minimum time.

Please refer Netvox LoRaWAN Application Command document and Netvox Lora Command Resolver

http://cmddoc.netvoxcloud.com/cmddoc to resolve uplink data.

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

5.1 Example of Report Data

Bytes	1	1	1	Var(Fix=8 Bytes)
	Version	DeviceType	ReportType	NetvoxPayLoadData

Version– 1 byte –0x01――the Version of NetvoxLoRaWAN Application Command Version

DeviceType– 1 byte – Device Type of Device

        The devicetype is listed in Netvox LoRaWAN Application Devicetype doc

ReportType – 1 byte –the presentation of the NetvoxPayLoadData，according the devicetype

NetvoxPayLoadData– Fixed bytes (Fixed =8bytes)

Device	Device Type	Report Type	NetvoxPayLoadData		
			Battery (1Byte,unit:0.1V)	WorkCount (4Bytes)	Reserved (3Bytes,fixed 0x00)
R718MBB	0x2B	0x01			

Example 1 of Uplink: 012B0124000000A5000000

    1st byte (01): Version

    2nd byte (2B): DeviceType－R718MBB

    3rd byte (01): ReportType

    4th byte (24): Battery－3.6v , 24 Hex=3.6Dec   36*0.1v=3.6v

    5th ~8th byte (000000A5): Work Count－165, A5 Hex=165 Dec

    9th ~ 11th byte (000000): Reserved

Example 2 of Uplink: 012B019F00000111000000

    1st byte (01): Version

    2nd byte (2B): DeviceType－R718MBB

    3rd byte (01): ReportType

    4th byte (9F): Battery－3.1v , 1F Hex=31Dec   31*0.1v=3.1v   // Low battery

    5th ~8th byte (00000111): Work Count－273, 111 Hex=273 Dec

    9th ~ 11th byte (000000): Reserved

Note:

When the battery is low voltage, the highest bit of the voltage is 1, and bit0-bit6 represents the voltage value.

5.2 Example of Config Report Time

Bytes	1	1	Var (Fix =9 Bytes)
	CmdID	DeviceType	NetvoxPayLoadData

CmdID– 1 byte

DeviceType– 1 byte – Device Type of Device

NetvoxPayLoadData– var bytes (Max=9bytes)

Description	Device	Cmd ID	Device Type	NetvoxPayLoadData			
Config ReportReq	R718MBB	0x01	0x2B	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)

(1) Configure device parameters MinTime = 5 min, MaxTime = 5min, Battery Change = 0.1v

    Downlink: 012B012C012C0100000000   // 012C (Hex) = 300(Dec)

    The device returns:

        812B00000000000000000000   // Configuration is successful

        812B01000000000000000000   // Configuration failed

(2) Read device parameters

    Downlink: 022B00000000000000000000

    The device returns: 822B012C012C0100000000   // Current device parameters

5.3 Example of Config R718MBType

Description	Device	Cmd ID	Device Type	NetvoxPayLoadData	
SetR718MB TypeReq	R718MBB	0x03	0x2B	R718MBType(1Byte) 0x01_R718MBA 0x02_R718MBB	Reserved (8Bytes,Fixed 0x00)

				0x03_R718MBC	
SetR718MB TypeRsp		0x83		Status (0x00_success)	Reserved (8Bytes,Fixed 0x00)
GetR718MB TypeReq		0x04		Reserved (9Bytes,Fixed 0x00)	
GetR718MB TypeRsp		0x84		R718MBType(1Byte) 0x01_R718MBA 0x02_R718MBB 0x03_R718MBC	Reserved (8Bytes,Fixed 0x00)

(3) Change the device type to R718MBC

Downlink: 032B030000000000000000

The device returns:

832B000000000000000000   // Configuration succeeded

832B010000000000000000   // Configuration failed

(4) Check the current device type

Downlink: 042B000000000000000000

The device returns: 842B030000000000000000 // Current device type is R718MBC

5.4 Example of Config Active Threshold

Description	Device	Cmd ID	Device Type	NetvoxPayLoadData		
SetActive ThresholdReq		0x05		Threshold (2Bytes)	Deactivetime (1Byte,Unit:1s)	Reserved (6Bytes,Fixed 0x00)
SetActive ThresholdRsp	R718MBB	0x85	0x2B	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)

(5) Assuming the threshold is 10m/s², the value that needs to be set is 10/9.8/0.0625=16.32, the last value is 16.32 which needs

to be taken an integer, and the configuration is 16.

Configure device parameters Threshold= 16, Deactivetime=10s

Downlink: 052B00100A000000000000   // 10 (Hex) = 16(Dec), 0A (Hex) = 10(Dec)

The device returns: 852B000000000000000000   // Configuration succeeded

852B010000000000000000   // Configuration failed

(6) Read device configuration parameters

Downlink: 062B000000000000000000

The device returns: 862B00100A000000000000 (current device configuration parameters)

6. Information about Battery Passivation

Many of Netvox devices are powered by 3.6V ER14505 Li-SOCl2 (lithium-thionyl chloride) batteries that offer many advantages including low self-discharge rate and high energy density.

However, primary lithium batteries like Li-SOCl2 batteries will form a passivation layer as a reaction between the lithium anode and thionyl chloride if they are in storage for a long time or if the storage temperature is too high. This lithium chloride layer prevents rapid self-discharge caused by continuous reaction between lithium and thionyl chloride, but battery passivation may also lead to voltage delay when the batteries are put into operation, and our devices may not work correctly in this situation.

As a result, please make sure to source batteries from reliable vendors, and it is suggested that if the storage period is more than one month from the date of battery production, all the batteries should be activated.

If encountering the situation of battery passivation, users can activate the battery to eliminate the battery hysteresis.

ER14505 Battery Passivation:

6.1 To determine whether a battery requires activation

Connect a new ER14505 battery to a resistor in parallel, and check the voltage of the circuit.

If the voltage is below 3.3V, it means the battery requires activation.

6.2 How to activate the battery

a. Connect a battery to a resistor in parallel

b. Keep the connection for 5~8 minutes

c. The voltage of the circuit should be ≧3.3, indicating successful activation.

Brand	Load Resistance	Activation Time	Activation Current
NHTONE	165 Ω	5 minutes	20mA
RAMWAY	67 Ω	8 minutes	50mA
EVE	67 Ω	8 minutes	50mA
SAFT	67 Ω	8 minutes	50mA

Note:

If you buy batteries from other than the above four manufacturers, then the battery activation time, activation current, and required load resistance shall be mainly subject to the announcement of each manufacturer.

7. Relevant Products

Model	Function	Appearance
R718MBA	Detect the movement or vibration of the device and triggers an alarm.	
R718MBB	Counts the number of movements or vibrations of the device.	
R718MBC	Counts the movement or vibration duration of the device.	

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 a 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.