

Wireless 2-Gang Vibration Sensor, Rolling Ball Type

R718DA2 User Manual

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1. Introduction

R718DA2 is a ball-type two-way vibration sensors of Netvox ClassA type equipment based on LoRaWAN open protocol. The sensor is attached to the detected device with magnet. When the device vibrates, the sensor is triggered. R718DA2 immediately sends the trigger information to the gateway. R718DA2 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

- Adopt SX1276 wireless communication module
- 2 x 3.6V ER14505 AA size lithium batteries
- Trigger the vibration sensor, the device will send trigger information
- The base is equipped with a magnet that can be attached to the magnetic substance
- IP Ratings: Main part- IP65/IP67 (Optional), Sensor-/IP67
- Compatible with LoRaWAN™ Class A
- Frequency hopping spread spectrum technology
- Configuration parameters can be configured through third-party software platforms
- Applicable to third-party platforms: Actility / ThingPark, TTN, MyDevices / Cayenne
- Low power consumption and long battery life

Note:

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

On this website, users can find various types of battery life time in 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 and the green indicator flash once.
Turn off (Restore to factory setting)	Press and hold the function key for 5 seconds and the green indicator flashes 20 times.
Power off	Remove Batteries.
Note:	<ol style="list-style-type: none"> 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. For the first 5 second after powering on, the device will be in engineering test mode.

Network Joining

Never joined the network	<p>Turn on the device to search the network to join.</p> <p>The green indicator stays on for 5 seconds: success</p> <p>The green indicator remains off: fail</p>
Had joined the network	<p>Turn on the device to search the previous network to join.</p> <p>The green indicator stays on for 5 seconds: success</p> <p>The green indicator remains off: fail</p>
Fail to join the network (when the device is on)	Suggest to check the device verification information on the gateway or consult your platform server provider.

Function Key

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

Sleeping Mode

The device is on and in the network	<p>Sleeping period: Min Interval.</p> <p>When the reportchange exceeds setting value or the state changes: send a data report according to Min Interval.</p>
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Low Voltage Warning

Low Voltage	3.2V
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5. Data Report

The device will immediately send a version packet report and the vibration report data

The device sends data in the default configuration before any configuration is done.

Default setting:

Max Interval: 0x0E10 (3600s)

Min Interval: 0x0E10 (3600s)

BatteryVoltageChange: 0x01 (0.1V)

R718DA2 Trigger:

When the device senses vibration and the ball is shaken, an alarm message will be reported.

The shaking alarm bit is “1”.

The static and non-shaking alarm bit is “0”.

Note:

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

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 ReportDataCmd

FPort: 0x06

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			
R718DA2	0x2F	0x00	SoftwareVersion (1Byte) Eg.0x0A—V1.0	Hardware Version (1Byte)	DateCode (4Bytes, eg 0x20170503)	Reserved (2Bytes, fixed 0x00)
		0x01	Battery (1Byte, unit:0.1V)	Status 1 (1Byte 0:off 1:on)	Status 2 (1Byte 0:off 1:on)	Reserved (5Bytes, fixed 0x00)

Example 1 of Uplink: 012F012401000000000000

- 1st byte (01): Version
- 2nd byte (2F): DeviceType 0x2F — R718DA2
- 3rd byte (01): ReportType
- 4th byte (24): Battery — 3.6V, 24(Hex) = 36(Dec), 36x0.1v=3.6v
- 5th byte (01): Status — on
- 6th byte (00): Status — off
- 7th -11th byte (0000000000): Reserved

Example 2 of Uplink: 012F01A000010000000000

- 1st byte (01): Version
- 2nd byte (2F): DeviceType 0x2F — R718DA2
- 3rd byte (01): ReportType
- 4th byte (A0): Battery — 3.2V, 20(HEX)=32(DEC), 32*0.1v=3.2v // Low battery
- 5th byte (00): Status — off
- 6th byte (01): Status — on
- 7th -11th byte (0000000000): Reserved

5.2 Example of ConfigureCmd

FPort: 0x07

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	CmdID	Device Type	NetvoxPayLoadData			
Config ReportReq	R718DA2	0x01	0x2F	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 = 1 min, MaxTime = 1 min, BatteryChange = 0.1v

Downlink: 012F003C003C0100000000 003C(Hex) = 60(Dec)

Response:

812F00000000000000000000 (Configuration success)

812F01000000000000000000 (Configuration failure)

(2) Read device configuration parameters

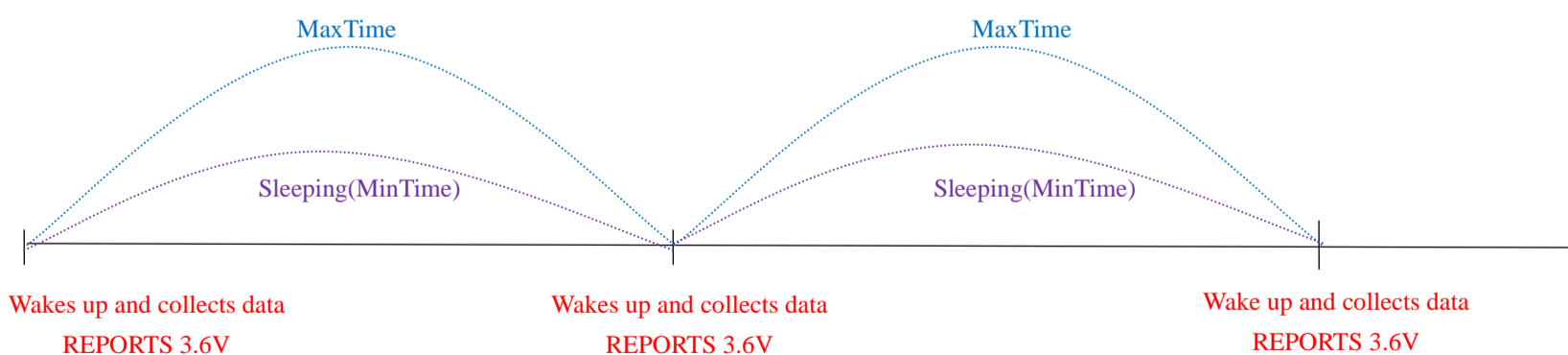
Downlink: 022F00000000000000000000

Response:

822F003C003C0100000000 (Current configuration)

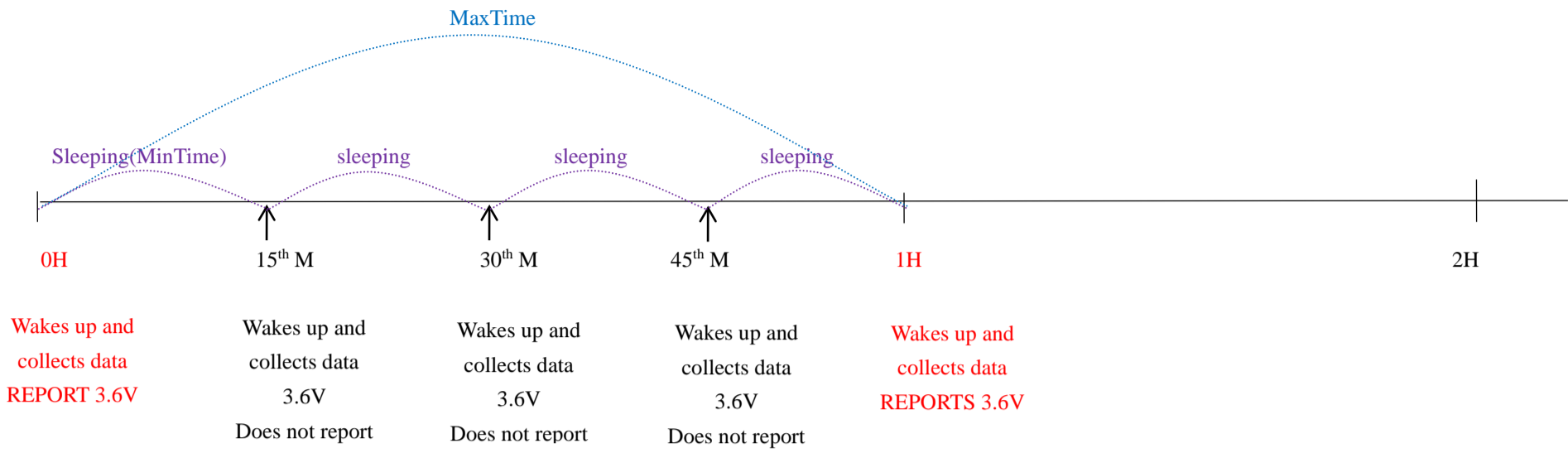
5.3 Example for MinTime/MaxTime logic

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

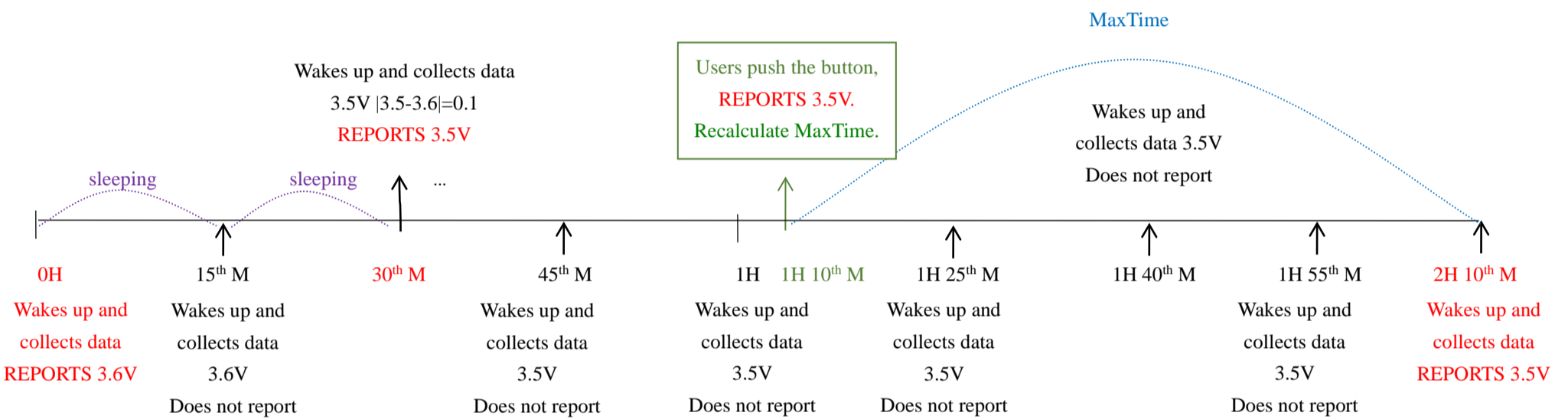


Note: MaxTime=MinTime. Data will only be report according to MaxTime (MinTime) duration regardless BatteryVoltageChange value.

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



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

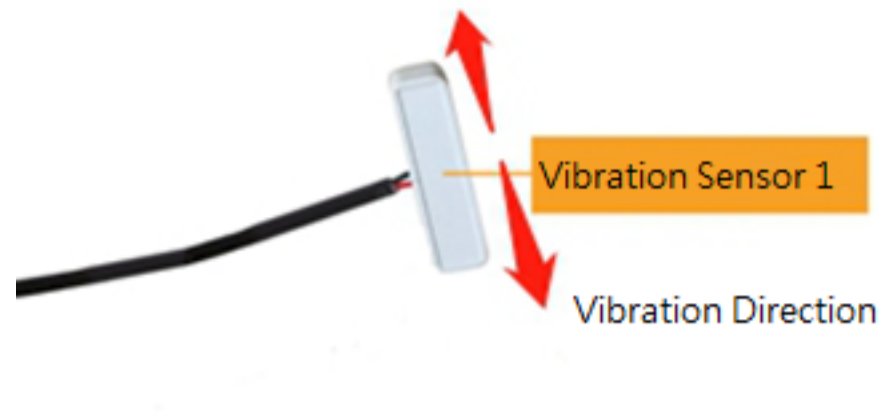


Notes :

- 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 reported. If the data variation 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

When installing the vibration sensor, pay attention to the fact that the direction of the vibration and the long side of the sensor on the same as below figure.



7. 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:

7.1 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.

7.2 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.

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.