

Three-Axis Digital Accelerometer & NTC Thermistor

R718E

User Manual

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1. Introduction

The R718E series equipment is a device that detects the three-axis acceleration of the ClassA type device of the Netvox LoRaWAN open protocol. When the device moves or vibrates over threshold value, it immediately reports the acceleration and speed of the X, Y, and Z axes. The device 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



Fig.1 R718E Appearance

3. Main Features

- Compatible with LoRaWAN protocol
- Powered by 2 x ER14505 3.6V Lithium AA battery
- Detect battery value and the acceleration and speed of the X, Y, and Z axes
- Simple operation and installation

4. Application

In the case of detecting whether the motor is working normally, it is necessary to install the device in the state where the device is powered off and the motor is stationary. It is recommended to install it horizontally. After the fixing is completed, power on the device. The device performs offset calibration of the device after one minute of network-joining. (The device offset cannot be moved after calibration. If it needs to be moved, it needs to be powered off for 1 minute and then re-offset calibration). The equipment needs to collect the triaxial acceleration and temperature of the target motor for a period of time, and it is used as a reference for the setting of the static threshold, the motion threshold and whether the motor is abnormal. Assume that the acquired Z-axis acceleration is stable at 100m/s^2 with an error of $\pm 2\text{m/s}^2$, and the active threshold can be set to 110m/s^2 , and the static threshold is 104m/s^2 . The specific configuration needs to be based on actual conditions. The configuration of the active threshold and the static threshold can be found in the Netvox LoRaWAN Application Command V1.8.6 document.

5. Set up Instruction

5.1 Power on and Turn on / off

- (1) **Power on:** Insert batteries: open the battery cover; insert two sections of 3.6V ER14505 AA batteries and close the battery cover.
- (2) **Turn on:** if the device had never joined in any network or at factory setting mode, after powering on, the device is at off mode by default setting. Press and hold function key for 3 seconds till the green indicator flashes once and release.
- (3) **Turn off:** Press and hold function key for 5 seconds till the green indicator flashes quickly and release. The green indicator will flash 20 times to show that the device is turned off.

Note:

1. The interval between shutting down twice or power off/on is suggested to be about 10 seconds to avoid the interference of capacitor inductance and other energy storage components.
2. When the battery is removed, it will be off mode by default setting, and users need to restart it.
3. Turn off operation is same with “Restore to Factory Setting” operation.

5.2 Join Into LoRa Network

To join the device into LoRa network to communicate with LoRa gateway.

The network operation is as following:

- (1) If the device had never joined any network, turn on the device; it will search an available LoRa network to join. The green indicator will stay on for 5 seconds to show it joins into the network, otherwise, the green indicator will be off.
- (2) If R718E had been joined into a LoRa network, remove and insert the batteries; it will repeat step (1).

5.3 Function Key

- (1) Press and hold function key for 5 seconds to reset to factory setting. After restoring to factory setting successfully, the green indicator will flashes quickly 20 times.
- (2) Press function key to turn on the device which is in the network and the green indicator will flash once and the device will send two data report.

5.4 Offset Calibration

The accelerometer is a mechanical structure that contains components that can move freely. These moving parts are very sensitive to mechanical stress, far beyond solid-state electronics. The 0g offset or offset is an important accelerometer indicator because it defines the baseline used to measure acceleration. After the device is installed, it will be turned on. After 1 minute of network joining, the device will automatically offset the calibration. If the device installation position moves, you need to power off the device for one minute and power on to offset the calibration.

5.5 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.

Maximum time: 3600s

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

Default reportchange:

Batteryvoltagechange ---- 0x01(0.1V)

Acceleratedspeedchange ---- 0x03(m/s²)

• R718E to report three-axis acceleration and speed

The device's three-axis acceleration exceeds the set active threshold and a report is issued immediately. After reporting the three-axis acceleration and speed, the three-axis acceleration of the device needs to be lower than the set static threshold and the duration is longer than 5 seconds (not modifiable) before the next detection can be started. If vibration continues to occur during this process. The timing starts again.

The device sends two packets of data, one for three-axis acceleration, one for three-axis speed and temperature, and interval between two packets are 10 seconds.

• Send commands to change the active vibration threshold and Inactive threshold through the gateway.

Active vibration threshold range is 0x0003-0x00FF (0x0003 by default)

Inactive static threshold range is 0x0002-0xFF (0x0002 by default)

Remark: The scale factor of the threshold is 62.5mg, and g is the gravitational acceleration at standard atmospheric pressure.

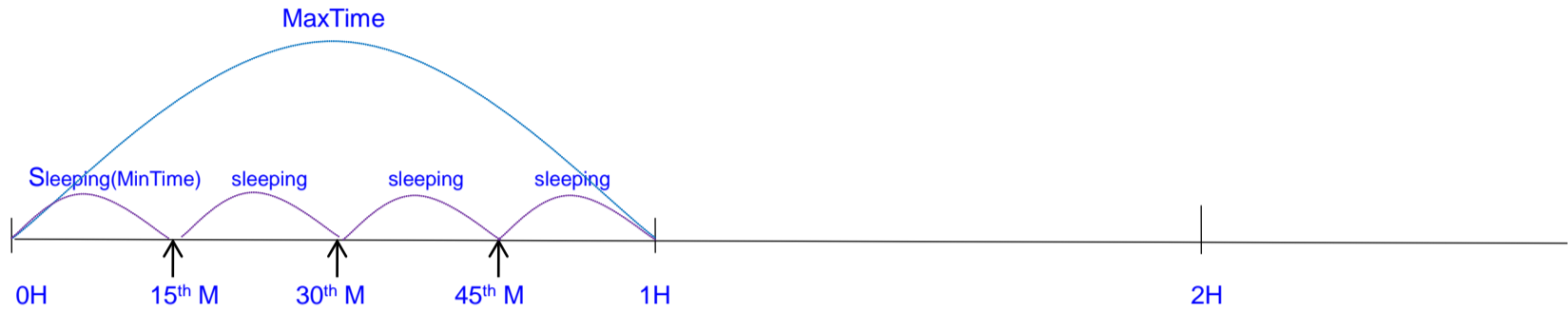
For example: If you need to set the active threshold to 10m/s², you need to set the value to $10/9.8/0.0625=16.32$. The last value obtained is an integer and is configured as 16.

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

Example#1

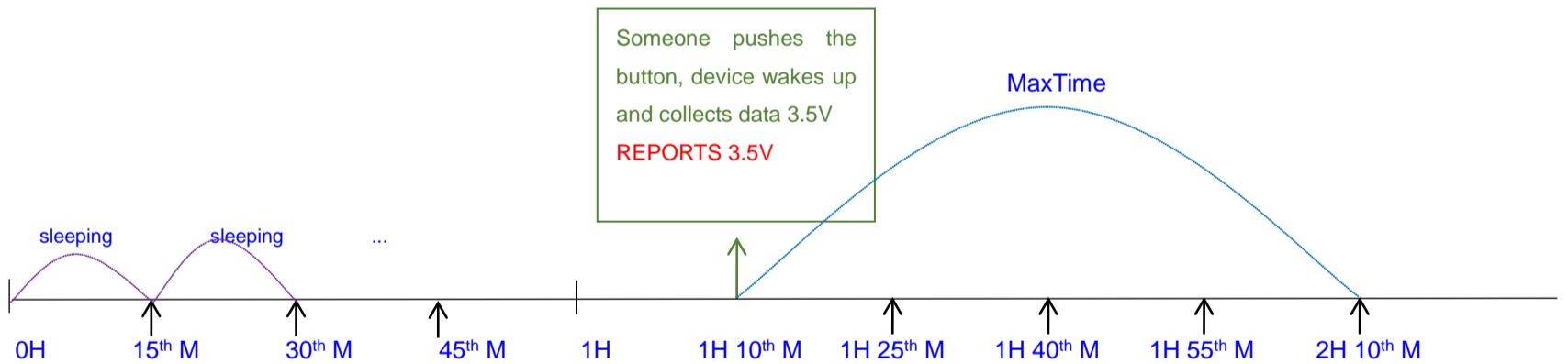
based on MinTime = 15 Minutes, MaxTime= 1 Hour, battery voltage Reportable Change = 0.1V



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
3.6V	3.6	3.6	3.6	3.6
$ 3.6-3.6 =0<0.1$	$ 3.6-3.6 =0<0.1$	$ 3.6-3.6 =0<0.1$	$ 3.6-3.6 =0<0.1$	$ 3.6-3.6 =0<0.1$
Does not report	Does not report	Does not report	Does not report	REPORTS
3.6				3.6

Example#2

based on MinTime = 15 Minutes, MaxTime= 1 Hour, battery voltage Reportable Change = 0.1V



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	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
3.6	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
$ 3.6-3.6 =0<0.1$	$ 3.6-3.5 =0.1=0.1$	$ 3.5-3.5 =0<0.1$	$ 3.5-3.5 =0<0.1$	$ 3.5-3.5 =0<0.1$	$ 3.5-3.5 =0<0.1$	$ 3.5-3.5 =0<0.1$	$ 3.5-3.5 =0<0.1$	$ 3.5-3.5 =0<0.1$	$ 3.5-3.5 =0<0.1$
Does not report	REPORTS	Does not report	Does not report	Does not report	Does not report	Does not report	Does not report	Does not report	REPORTS
3.6	3.5								3.5

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. Restore to Factory Setting

R718E saves data including network key information, configuration information, etc. To restore to factory setting, users need to execute below operations.

1. Press and hold function key for 5 seconds till the green indicator flashes and then release; LED flashes quickly 20 times.
2. R718E is at off mode by default setting after restoring to factory setting.

Note: The device operation of turning off is the same as the “Restore Factory Settings” operation.

7. Sleeping Mode

R718E is designed to enter sleeping mode for power-saving in some situations:

- (A) While the device is in the network → the sleeping period is Min Interval. (During this period, if the report change is larger than setting value, it will wake up and send a data report).
- (B) When it is not in the network → R718E will enter sleeping mode and wake up every 15 seconds to search a network to join in the first two minutes. After two minutes, it will wake up every 15 minutes to request to join the network.

If it's at (B) status, to prevent this unwanted power consumption, we recommend that users remove the batteries to power off the device.

8. Low Voltage Alarming

The operating voltage threshold is 3.2V. If the battery voltage is lower than 3.2V, R718E will send a low-power warning to the LoRa network.

9. Installation

This product comes with waterproof function. When using it, the back of it can be adsorbed on the iron surface, or the two ends can be fixed to the wall with screws.

Note: To install the battery, use a screwdriver or similar tool to assist in opening the battery cover.

10. 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.