Wireless Short-Range Occupancy Sensor

R718PQ

User Manual

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1. Introduction

R718PQ is a long-range Wireless Short-Range Occupancy Sensor for Netvox Class A type devices based on LoRaWAN open protocol.

If there is to be a person or animal movement detected by the R718PQ within the monitoring area, the device reports the detected status to gateway.

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
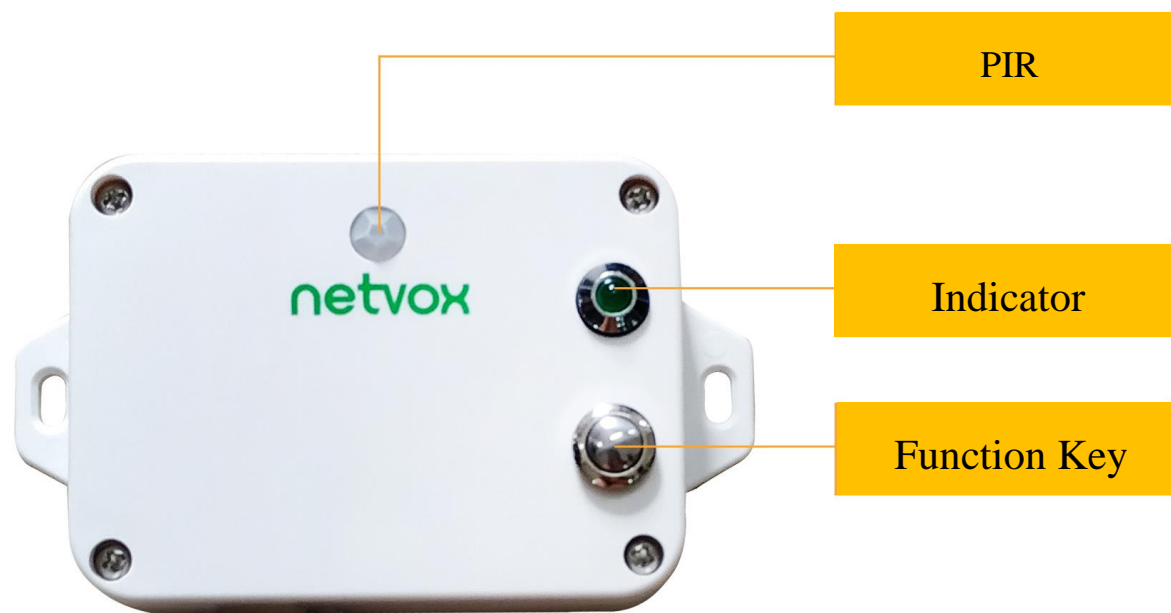
R718PQ

3. Main Features

- Compatible with LoRaWAN protocol
- 2 sections ER14505 3.6V Lithium AA battery
- Detect occupancy status
- Protection level IP65 / IP67 (optional)
- Compatible with LoRaWAN™ 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 sensor reporting frequency and other variables, please refer to

    http://www.netvox.com.tw/electric/electric_calc.html. On this website, users can find battery life time for varied models at different

    configurations.

4. Set up Instruction

On/Off

Power on	Insert batteries. (users may need a flat blade 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
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 or consult 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	3.2V

5. Data Report

The device will immediately send a version packet report along with an uplink packet including occupied status and battery voltage.

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

Default Report Time

　　　　Maximum time: Max Interval = 1 hour

　　　　Minimum time: Min Interval = 1 hour

　　　　　　*The current voltage and occupied are detected every Min Interval

　　　　　　*if there is special custom shipment, the setting is changed according to customer requirements

Default Report Change:

　　　　Battery --- 0x01 (0.1V)

Default Occupancy Status:

　　　　Occupy status = 1   (Green indicator flashes once and sends a report)

　　　　Vacant status = 0

Default Delay setting:

　　　　IRDisableTime = 30s   (Value must be greater than IRDisableTime $\geqq$ 5 ,units: seconds)

　　　　IRDetectionTime = 5 min   (Value must be greater than IRDetectionTime $\geqq$ IRDisableTime)

　　Note:

　　　　1. The data transmission period of the device is subject to the programming configuration before shipment.

　　　　2. The interval between two reports must be the MinTime

　　　　3. 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

Report Configuration Example:

Description	Device	CmdID	DeviceType	NetvoxPayLoadData			
Config Report Req		0x01		MinTime (2bytes Unit: s)	MaxTime (2bytes Unit: s)	BatteryChange (1byte Unit:0.1v)	Reserved (4Bytes,Fixed 0x00)
Config Report Rsp	R718PQ	0x81	0x5B	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 = 1min, MaxTime = 1min, BatteryChange = 0.1v

Downlink: 015B003C003C0100000000

Device returns:

815B000000000000000000 (configuration succeeded)

815B010000000000000000 (configuration failed)

(2) Read device parameters

Downlink: 025B000000000000000000

Device returns:

825B003C003C0100000000 (device current configuration parameter)

Description	Device	CmdID	DeviceType	NetvoxPayLoadData		
SetIRDisableTimeReq		0x03		IRDisableTime (2bytes Unit:s)	IRDetectionTime (2bytes Unit:s)	Reserved (5Bytes,Fixed 0x00)
SetIRDisableTimeRsp	R718PQ	0x83	0x5B	Status (0x00_success)		Reserved (8Bytes,Fixed 0x00)
GetIRDisableTimeReq		0x04		Reserved (9Bytes,Fixed 0x00)		
GetIRDisableTimeRsp		0x84		IRDisableTime (2bytes Unit:s)	IRDetectionTime (2bytes Unit:s)	Reserved (5Bytes,Fixed 0x00)

(1) Set IRDisableTime = 30s, IRDetectionTime = 90s

Downlink: 035B001E005A0000000000

Device returns:

835B000000000000000000 (configuration succeeded)

835B010000000000000000 (configuration failed)

(2) Get IRDisableTime, IRDetectionTime parameters

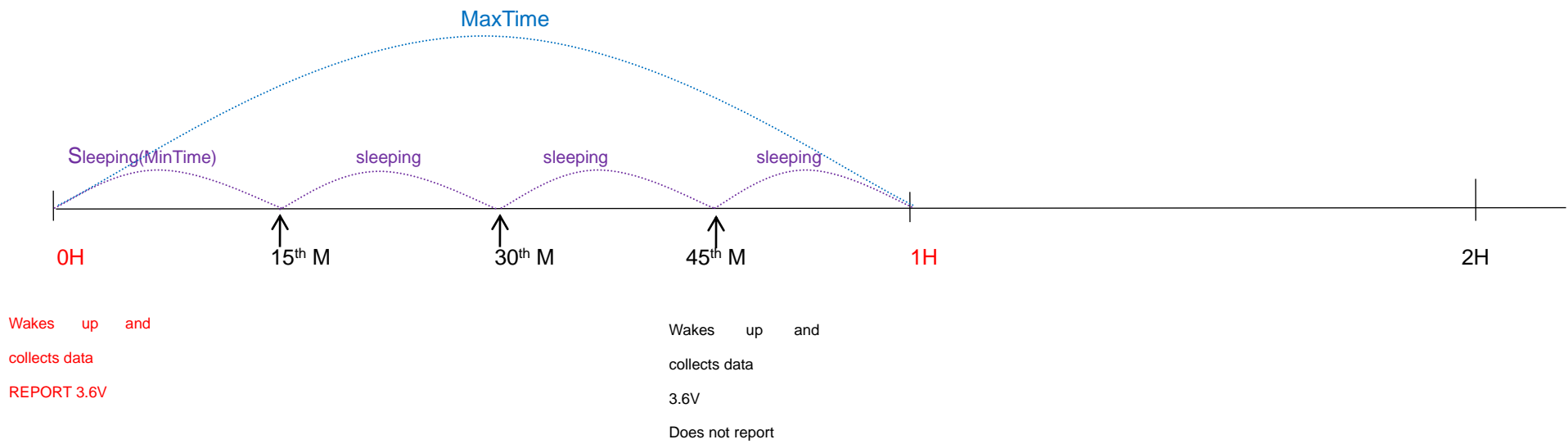Downlink: 045B000000000000000000

Device returns:

845B001E005A0000000000(device current configuration parameter)

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

Wakes up and collects data
REPORTS 3.6V

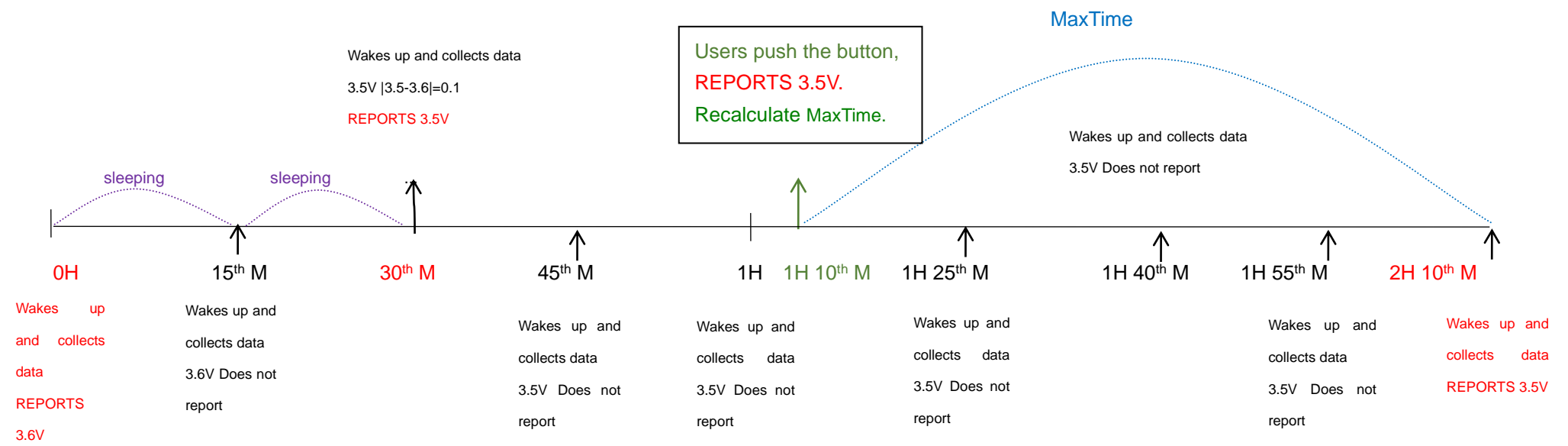Wakes up and collects data
REPORTS 3.5V

5
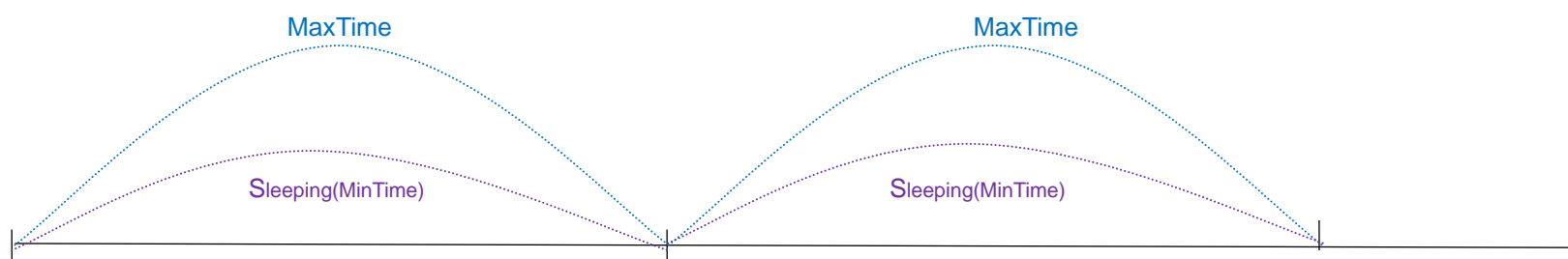
Note: MaxTime=MinTime. Data will only be report according to MaxTime (MinTime) duration regardless BtteryVoltageChange value.

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
REPORT 3.6V

Wakes up and collects data
3.6V
Does not report

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

MaxTime

Wakes up and collects data
3.5V |3.5-3.6|=0.1
REPORTS 3.5V

Users push the button,
REPORTS 3.5V.
Recalculate MaxTime.

Wakes up and collects data
3.5V 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
REPORTS 3.6V

Wakes up and collects data
3.6V Does not report

Wakes up and collects data
3.5V Does not report

Wakes up and collects data
3.5V Does not report

Wakes up and collects data
3.5V Does not report

Wakes up and collects data
3.5V Does not report

Wakes up and collects data
REPORTS 3.5V

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 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. PIR Detection

If there is to be a person or animal movement detected by the R718PQ within the monitoring area, the device reports the detected Occupy status = 1 along with other sensor status value.

If there were no movement detected within the monitoring area within the following 5 minutes IRDetectionTime (Default 5 minutes, configurable), then the device reports Vacant status = 0 along with other sensor status value.

To save the power, when R718PQ detects the infrared signal, it will enter IRDetectionTime period.

When there is no infrared signal detected in IRDetectionTime period, then it reports Vacant status = 0.

IRDisableTime is the sampling period during IRDetectionTime

(Default IRDisableTime being 30 seconds; first 70% of the period = 21s being off and for rest 30% of the period would be on) and no movement will be detected during IRDisableTime.

The detection will be resumed after the 21s IRDisableTime, and the IRDisableTime along with IRDetectionTime will be extended for another 21s if there is to be any movement detected again.

The above described cycle continues until there is no longer any movement detected and the device reports Vacant status = 0.

Example1:

While IRDetectionTime is 60 secs and IRDisableTime is 30 secs, no living creature is detected after triggered.
R718PQ will report un-occupied after 60 secs(IRDetectTime).
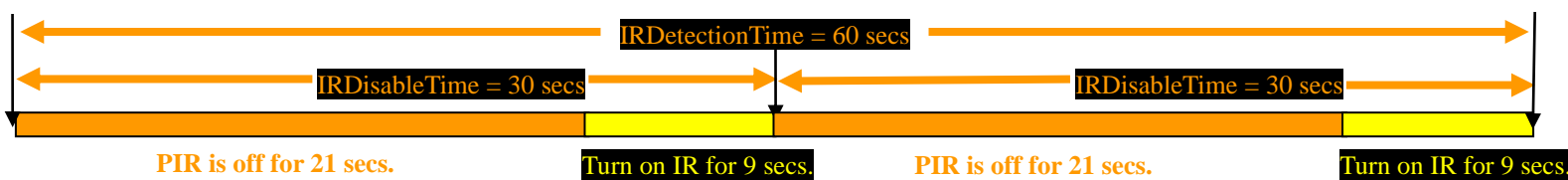
Example2:

While IRDetectionTime is 60 secs and IRDisableTime is 30 secs, living creature is detected during 25th sec.
R718PQ will restart IR detect procedure(IRDetectionTime).
No living creature is detected during next IRDetectionTime and R718PQ therefore report un-occupy.
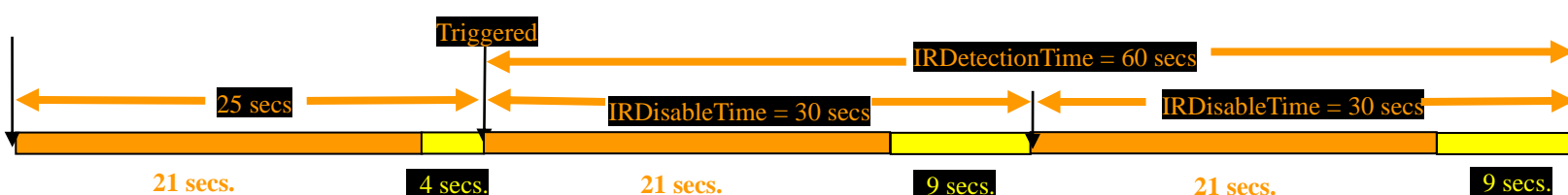
7. Installation

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.

Note on battery use:

Because the passivation of the ER battery electrode surface is an inherent characteristic of lithium thionyl chloride batteries, before using the ER14505M 3.6V 2200mAh lithium thionyl chloride battery, the user can use a 33 ohm resistor to activate the battery for 1 minute to actively eliminate the battery hysteresis.

8. 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:

8.1 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.

8.2 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.

9. 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.