Wireless 3-Phase Current Meter

R718N3 User Manual

Table of Content

1. Introduction

The R718N3 series is 3-Phase Current Meter device for Netvox Class A type devices based on the LoRaWAN open protocol and is compatible with the LoRaWAN protocol. R718N3 series have different measuring range for different variety of CT.

It is divided into:

R718N3 Wireless 3-Phase Current Meter with 3 x 50A Solid Core CT (Range:1A-50A ±1%)

R718N37 Wireless 3-Phase Current Meter with 3 x 75A Clamp-On CT (Range:1A-75A ±1%)

R718N315 Wireless 3-Phase Current Meter with 3 x 150A Clamp-On CT (Range:1A-150A ±1%)

R718N325 Wireless 3-Phase Current Meter with 3 x 250A Clamp-On CT (Range:1A-250A ±1%)

R718N363 Wireless 3-Phase Current Meter with 3 x630A Clamp-On CT (Range:10A-630A ±1%)

*The current is lower than the current measurement range, it will report 0 A

LoRa Wireless Technology:

LoRa is a wireless communication technology famous for its long-distance transmission and low power consumption. Compared with other communication methods, LoRa spread spectrum modulation technique greatly extend the communication distance. It can be widely used in any use case that requires long-distance and low-data wireless communications. For example, automatic meter reading, building automation equipment, wireless security systems, industrial monitoring. It has features like small size, low power consumption, long transmission distance, strong 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.

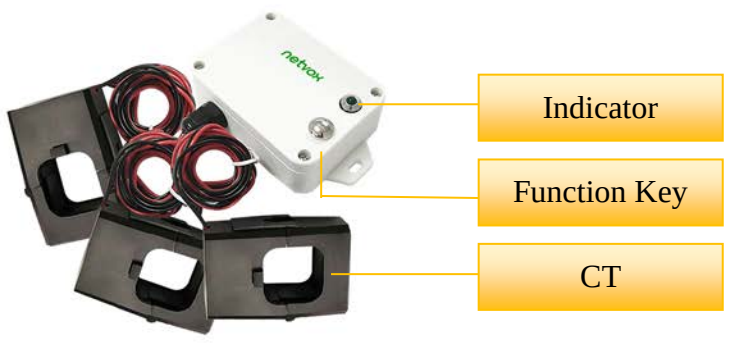
2. Appearance

R718N3

R718N37

R718N315

R718N325



R718N363

3. Main Features

- The SX1276 wireless communication module is used
- Powered by 2 x ER14505 3.6V Lithium battery
- 3-phase current meter detection
- The base is attached with a magnet that can be attached to a ferromagnetic material object
- IP rating: main body - IP53, CT - IP30
- LoRaWAN™ Class A compatible
- Frequency Hopping Spread Spectrum (FHSS)
- Third-Party online wireless sensor monitoring and notification system to configure sensors, view data and set alerts via SMS text and email (optional)
- Available third-party platform: Actility/ThingPark, TTN, MyDevices/Cayenne
- Low power consumption and long battery life

Battery Life*2:

- 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.

*1. Actual range may vary depending on environment.

*2. Battery life is determined by sensor reporting frequency and other variables.

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.The device will be off after removing the battery and insert it again. 2.It is suggested to wait for at least 10 seconds between turning the device on and off. 3.At 1st -5th second after power on, the device will be in engineering test mode.

Network Joining

If the device has never joined the network	Turn on the device, and it will search for the network to join. The green indicator light stays on for 5 seconds: joins the network successfully The green indicator light remains off: fail to join the network
If the device has joined the network and it is not set to default	Turn on the device, and it will search for the previous network to join. The green indicator light stays on for 5 seconds: joins the network successfully The green indicator light remains off: fail to join the network

Function Key

Press the function key and hold the pressing for 5 seconds	The device will be set to default and turned off The green indicator light flashes for 20 times: success The green indicator light remains off: fail
Press the function key once	The device is in the network: green indicator light flashes once and sends a report The device is not in the network: green indicator light remains off

Sleeping Mode

The device is turned on and in the network	Sleep 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

The device will immediately send a version packet report along with two uplink packets including 3 current, 3 multiplier and battery voltage.

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

Default setting:

Maximum time: Max Interval =15 min (900 s)

Minimum time: Min Interval =15 min (900 s)

CurrentChange:0x0064 (100 mA)

*The interval between min time and max time must be the greater than 20 seconds.

Note:

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

(2) If MinTime configuration less than 20 seconds, it will configure 20 seconds.

(3) R718N3 series would take about 3 seconds for the CT to sample and process the collected value, If the current changes frequently, the sampling result might be wrong.

Please refer Netvox *LoRaWAN Application Command document* and *Netvox Lora Command Resolver* http://www.netvox.com.cn:8888/page/index 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 30~65535	Any number between Min.~65535	Can not be 0.	Report per Min. Interval	Report per Max. Interval

Example of ConfigureCmd

FPort：0x07

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

CmdID– 1 bytes

DeviceType– 1 byte – Device Type of Device

NetvoxPayLoadData– var bytes (Max=9bytes)

Description	Device	CmdID	Device Type	NetvoxPayLoadData			
Config ReportReq	R718N3	0x01	0x4A	MinTime (2bytes Unit:s)	MaxTime (2bytes Unit:s)	CurrentChange (2byte Unit:1mA)	Reserved (3Bytes,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)	CurrentChange (2byte Unit:1mA)	Reserved (3Bytes,Fixed 0x00)

(1) Configure device parameters MinTime = 1min, MaxTime = 1min, CurrentChange = 100mA

Downlink: 014A003C003C0064000000

The device returns:

814A000000000000000000 (Configuration succeeded)

814A010000000000000000 (Configuration failed)

(2) Read device configuration parameters

Downlink: 024A000000000000000000

The device returns:

824A003C003C0064000000 (current device configuration parameters)

Example of ReportDataCmd

FPort：0x06

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

Version– 1 bytes –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)

R718N3	0x4A	0x01	Battery (1Byte, unit:0.1V)	Current1 (2Bytes,Unit:1mA)	Current2 (2Bytes,Unit:1mA)	Current3 (2Bytes,Unit:1mA)	Mulitplier1(1Byte), the real current1 should convert with Current* Multiplier
		0x02	Battery (1Byte, unit:0.1V)	Mulitplier2 (1Byte),the real current2 should convert with Current* Multiplier	Mulitplier3 (1Byte),the real current3 should convert with Current* Multiplier	Reserved(5Bytes,fixed 0x00)	

Ex1

Uplink data#1: 014A0124006400C81B5801

Uplink data#2: 014A0224010A0000000000

Current = Current * Multiplier

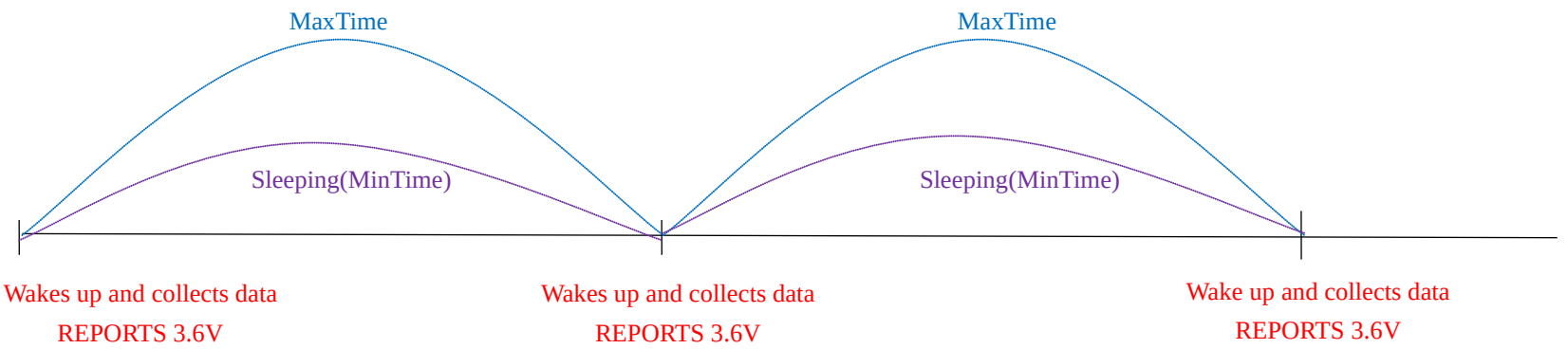
Current 1 = Current1 * Multiplier 1, 100*1=100 mA

Current 2 = Current2 * Multiplier 2, 200*1=200 mA

Current 3 = Current3 * Multiplier 3, 7000*10=70000 mA=70A

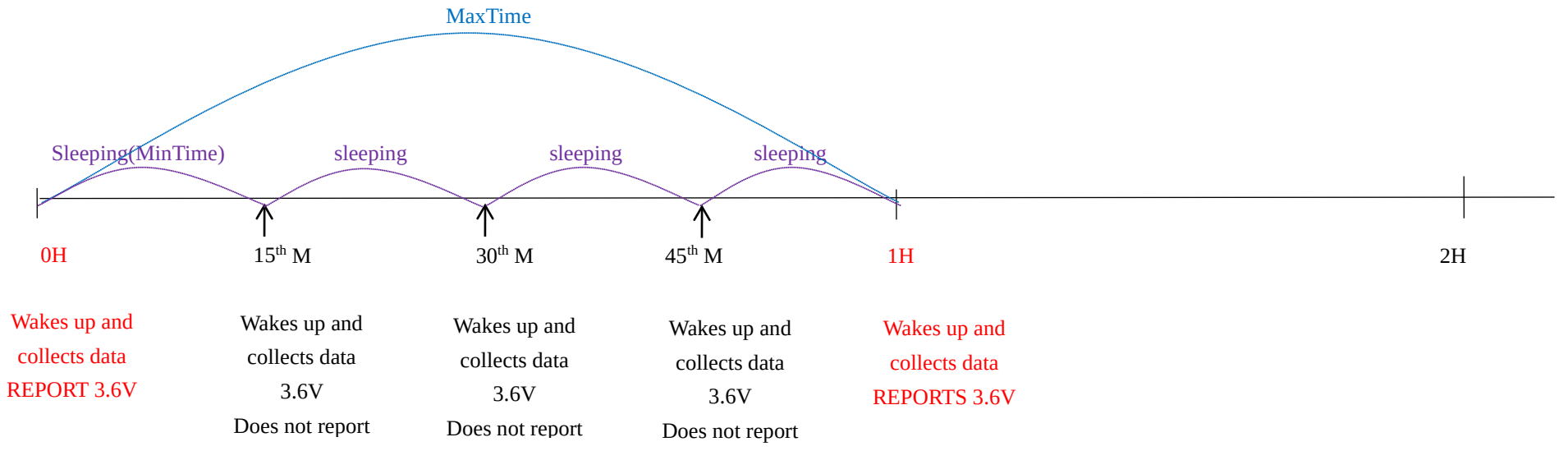
Example for MinTime/MaxTime logic:

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

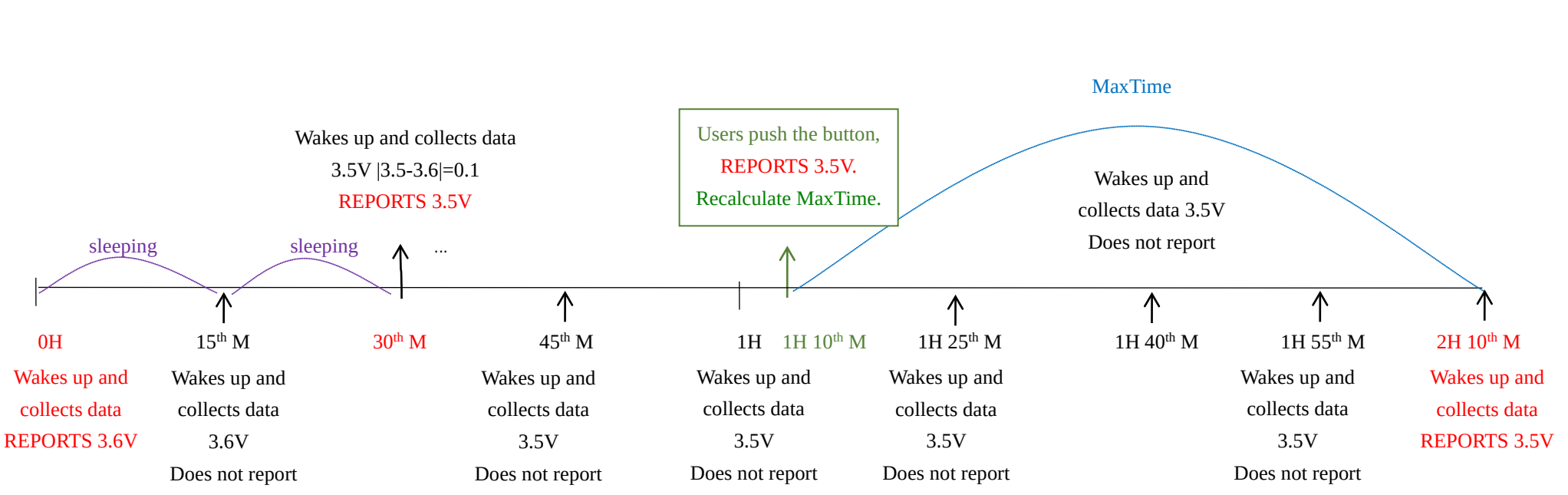


Note: MaxTime=MinTime. Data will only be report according to MaxTime (MinTime) duration regardless BatteryVoltageChange value.

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.



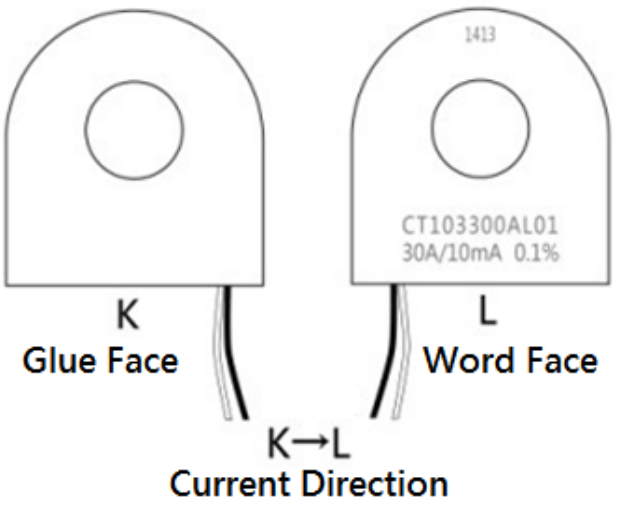
Notes :

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.

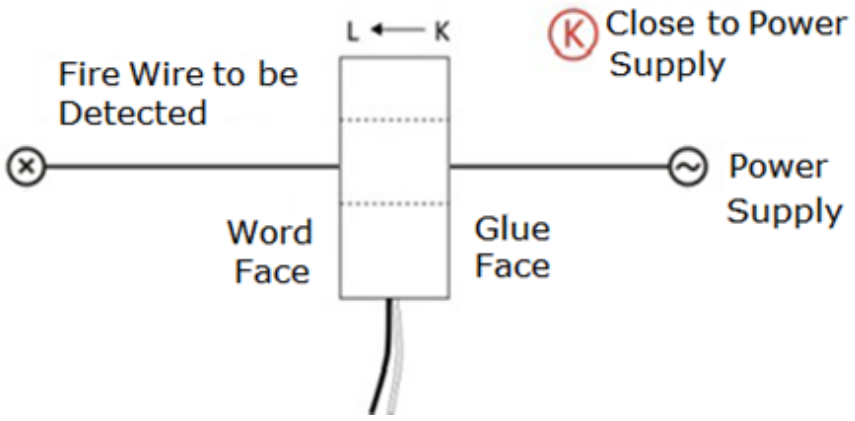
6. Installation

1. 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.
2. When installing the R718N3 series current transformer, please separate the fire and neutral wires of the wire to be detected, and only take the fire wire through current transformer and start the measurement according to the wiring below:

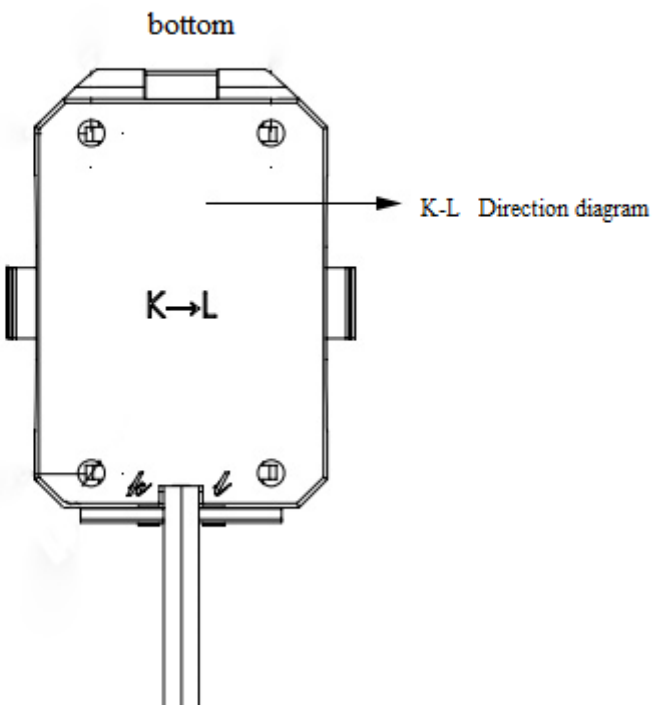
(Current direction, K-->L)



Solid Core CT



Split Core CT



Note:

Please do not disassemble the device unless it is required to replace the batteries.

Do not touch the waterproof gasket, LED indicator light, function keys when replacing the batteries. Please use suitable screwdriver to tighten the screws (if using an electric screwdriver, it is recommended to set the torque as 4kgf) to ensure the device is impermeable.

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 the batteries should be produced within the last three months.

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

7.1 To determine whether a battery requires activation

Connect a new ER14505 battery to a 68ohm 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 68ohm resistor in parallel

b. Keep the connection for 6~8 minutes

c. The voltage of the circuit should be ≧3.3V

8. Important Maintenance Instruction

Kindly pay attention to the following in order to achieve the best maintenance of the product:

• Keep the device dry. Rain, moisture, or any liquid, might contain minerals and thus corrode electronic circuits. If the device gets wet, please dry it completely.

• Do not use or store the device in dusty or dirty environment. It might damage its detachable parts and electronic components.

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

• Do not store the device in places that are too cold. 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 clean the device with strong chemicals, detergents or strong detergents.

• Do not apply the device with paint. Smudges might block in the device and affect the operation.

• Do not throw the battery into the fire, or the battery will explode. Damaged batteries may also explode.

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