netvox™

Wireless Soil Moisture Sensor

Wireless Soil Moisture Sensor

User Manual

Firmware:V1.3
Hardware:V0.4

Table of Content

1. Introduction

RA0713_R72613_RA0713Y is a ClassA type device based on the LoRaWAN open protocol.
The RA0713_R72613_RA0713Y can be connected to the EC_5 sensor, and the value collected by the sensor is reported to the corresponding 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.
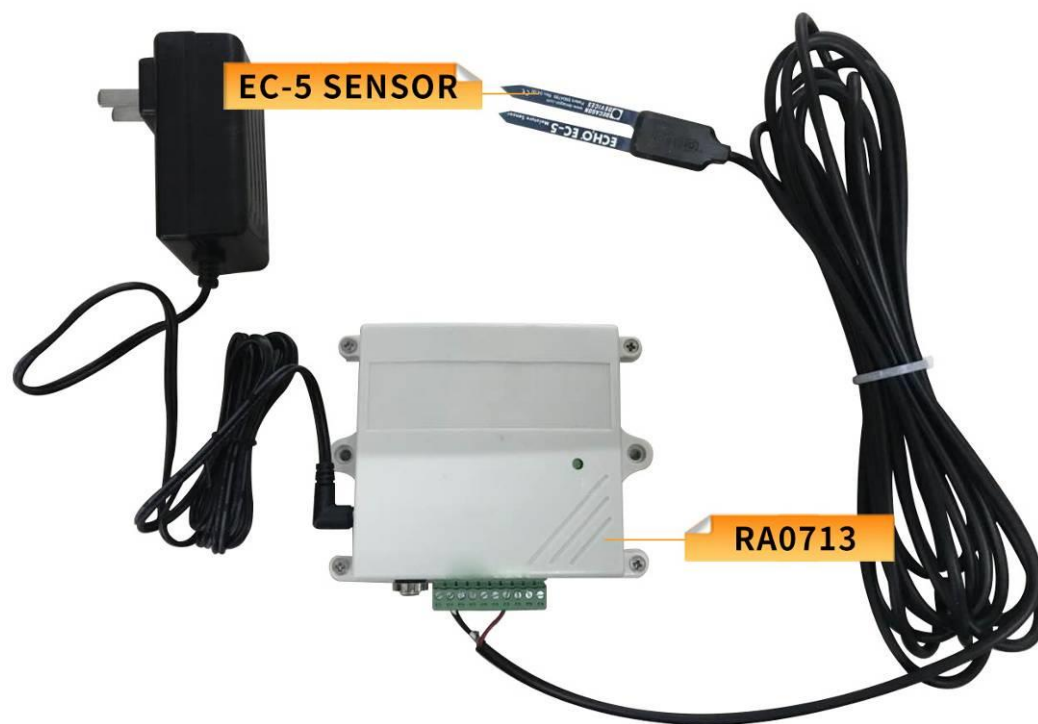
2. Appearance

Figure 1. RA0713 External soil moisture sensor (subject to the actual object)

3. Main Features

- Compatible with LoRaWAN
- RA0713 和 RA0713Y apply DC 12V adapter
- R72613 applies solar and rechargeable lithium batteries
- Simple operation and setting
- Only mineral-containing soil testing is supported

- Adopt SX1276 wireless communication module

4.Set up Instruction

On/Off

Power on	RA0713 and RA0713Y are connected to the DC 12V adapter for power-on; R72613 applies solar and rechargeable lithium batteries.
Turn on	Power on to turn on.
Restore to factory setting	Press and hold the function key for 5 seconds till green indicator flashes for 20 times.
Power off	Remove power
Note:	1. Engineering test modes require the burning engineering test software. 2. On/off interval is suggested to be about 10 seconds to avoid the interference of capacitor inductance and other energy storage components.

Network Joining

Never joined the network (Or at factory setting)	Turn on the device to search the network. 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. 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: the green indicator flashes once and the device sends a data report The device is not in the network: green indicator remains off

Low Voltage Threshold

Low Voltage Threshold	10.5 V

Restore to Factory Setting

Instruction	RA0713_R72613_RA0713Y has a network information memory function saving function when power-down. This function is turned off by default, that is, it will be re-joined every time it is powered back on. This function can be turned on by the ResumeNetOnOff command. At this time, each time the power is rewritten, the last network joining information will be recorded (including saving the network address information assigned to it, etc., if you want to join a new network, you need to perform a factory resetting operation first.) It will not be re-joined the previous network.
Operation	1. Press and hold the button for 5 seconds and release (the binding button is released when the LED flashes), and the LED flashes for 20 times. 2. The device will automatically restart to re-joining.

5. Data Report

The device will immediately send a version package Report and a report data with temperature and humidity and voltage Values. The device sends data in the default configuration before any configuration is done.

ReportMaxTime: RA0713_ RA0713Y is 180s and RA72613 is 900s; (subject to factory settings)
ReportMinTime: 30s;
ReportChange: 0;

Note: The device send data cycle has been programmed to be correct.
The interval between two reports must be the maximum time
The RA0713_R72613_RA0713Y device does not support the ReportChange function, that is, the function is invalid.
The sent report data string is always sent according to the ReportMaxTime period
(starting to the end of the first data as a period).
The data of the device Report is: soil moisture value, ReportType count = 1;

Note: 1. The value of ReportMaxTime is greater than (ReportType count *ReportMinTime + 10 units: seconds);
     2. The device also supports Cayenne's TxPeriod cycle configuration instructions. Therefore, the device can also perform a report according to the cycle time of the TxPeriod value; and at a certain time, the report period is ReportMaxTime or TxPeriod, depending on which cycle time is configured last time;
    3. After pressing the button, the device needs 35 seconds to process the sensor information, please be patient.

Please refer Netvox LoRaWAN Application Command document and Netvox Lora Command Resolver
http://cmddoc.netvoxcloud.com/cmddoc to resolve uplink data.

Report Configuration Example:

Description	Device	CmdID	DeviceType	NetvoxPayLoadData		
ConfigReportReq	RA07 Series/ R726 Series/ R727 Series	0x01	0x05/0x09/0x0D	MinTime(2 bytes Unit:s)	MaxTime(2bytes Unit:s)	Reserved (5Bytes,Fixed 0x00)
ConfigReportRsp		0x81		Status(0x00_success)	Reserved (8Bytes,Fixed 0x00)	
ReadConfigReportReq		0x02		Reserved (9Bytes,Fixed 0x00)		
ReadConfigReportRsp		0x82		MinTime(2 bytes Unit:s)	MaxTime(2bytes Unit:s)	Reserved

(1) Configure RA0713 device parameters MinTime = 30s, MaxTime = 120s (120>30*1+10)
    Downlink: 0105001E00780000000000
    Device returns:
        8105000000000000000000 (configuration is successful)
        8105010000000000000000 (configuration failed)

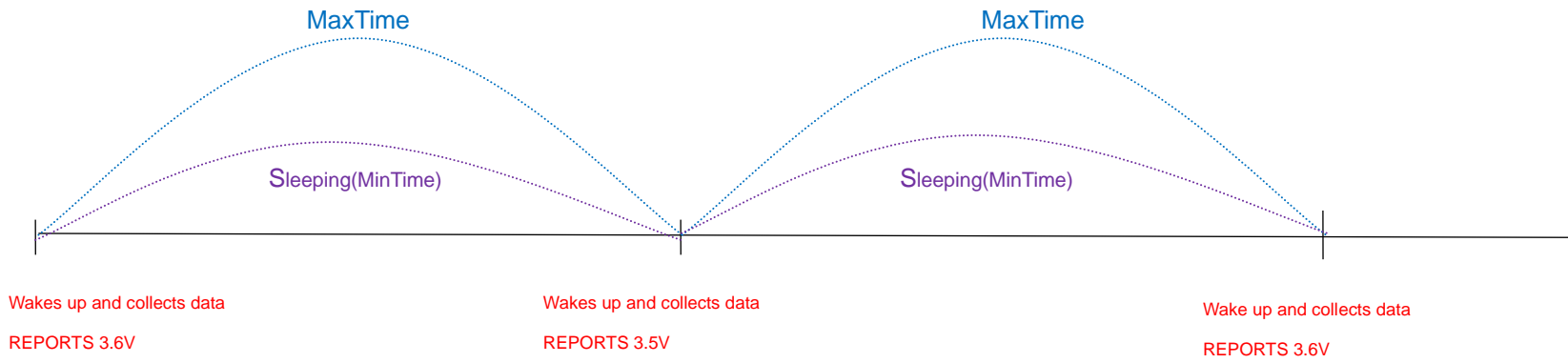(2) Read RA0713 device parameters
    Downlink: 0205000000000000000000
    Device returns:
        8205001E00780000000000 (device current parameter)

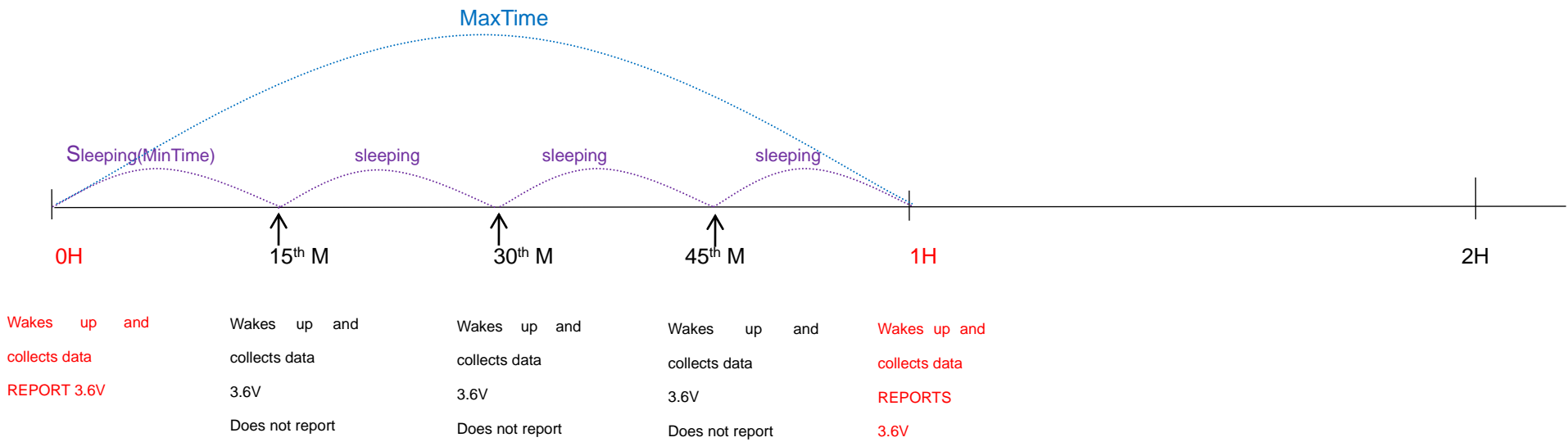Data report configuration and sending period are as following:

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 = 1 Hour, MaxTime= 1 Hour, Reportable Change i.e. BatteryVoltageChange=0.1V

MaxTime   MaxTime

Sleeping(MinTime)   Sleeping(MinTime)

Wakes up and collects data

REPORTS 3.6V

Wakes up and collects data

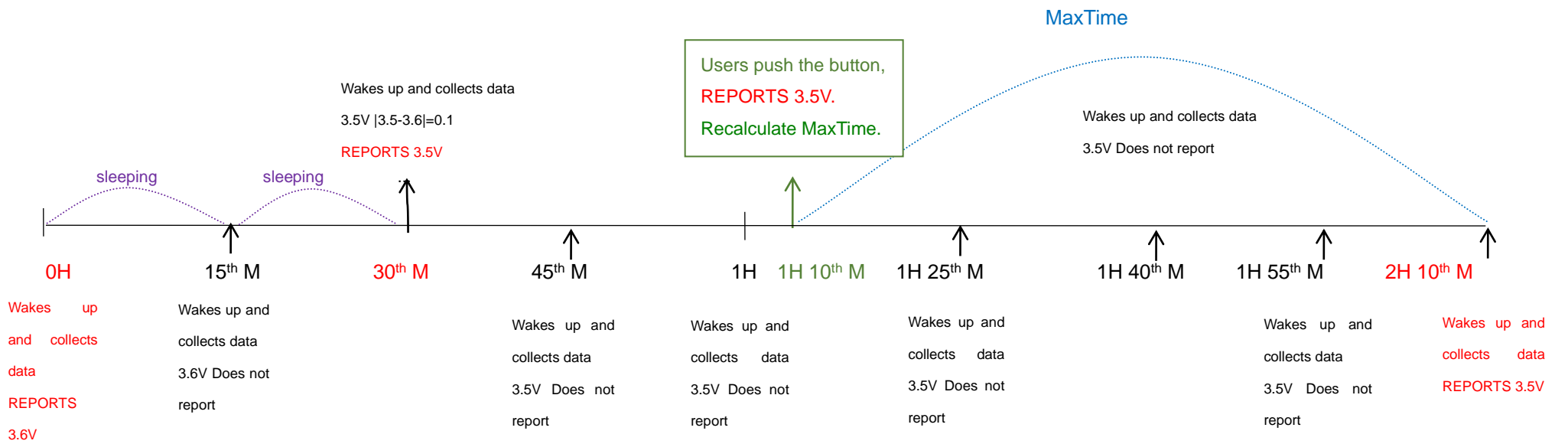REPORTS 3.5V

Wake up and collects data

REPORTS 3.6V

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

Wakes up and collects data
3.6V
Does not report

Wakes up and collects data
3.6V
Does not report

Wakes up and collects data
REPORTS
3.6V

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
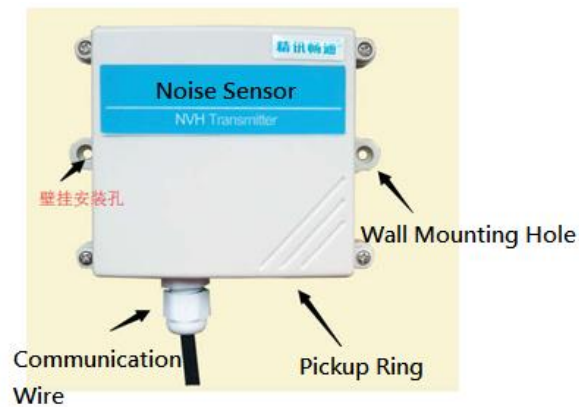
Notes :

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 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.
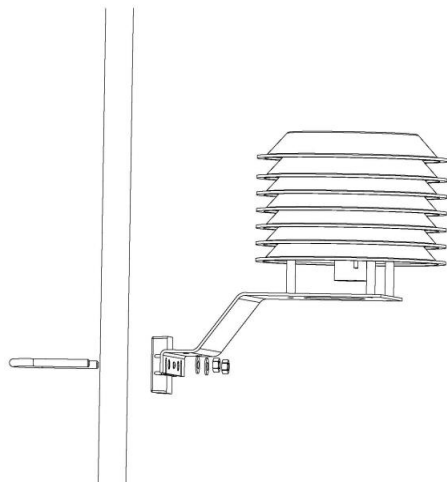
6. Installation

1. RA0713 does not have a waterproof function. After the network joining is completed, please place it indoor. Please pay attention to the direction when installing the sensor, keep the pickup ring facing down.

2. The R72613 product is waterproof. After the network-joining is completed, please leave it outdoors.
(1) In the position to be installed, loosen the U-shaped screw of the bottom of the R72613 and the mating washer nut, and fix the U-shaped screw through the appropriate size cylinder on the R72613 fixed strut piece. Install the washer nut in order, lock the nut till R72613 body is stable and does not shake.
(2) At the upper side of the fixed position of R72613, loosen the two U-shaped screws on the side of the solar panel and the mating washer nut. Fix the U-shaped screw through the appropriate size cylinder on the main bracket of the solar panel, and install the gasket in sequence. Lock nut till the solar panel is stable and does not shake.
(3) Adjust the angle of the solar panel. After the adjustment is completed, lock the nut.
(4) Connect the R72613 top waterproof cable to the solar panel wiring and lock it tight.

(5) R726X has a battery compartment inside, users can buy and install rechargeable 18650 lithium battery, a total of 3 sections, a single rechargeable lithium battery voltage 3.7V, capacity recommended 5000mah, the installation of rechargeable lithium battery steps are as follows:
1: Remove the four battery box screws and install three rechargeable lithium batteries.
2: Press the activation button on the battery box for the first time.
3: After activation, close the cover and lock the 4 box screws.

Fig. 1
Fig. 2
Activation Button
Fig. 3
Fig.4

1. User removes the four screws of the battery holder. (Fig.1)
2. Insert the battery according to positive and negative poles. (Fig.2)

3. Press activation button after loading batteries. (Fig. 3)
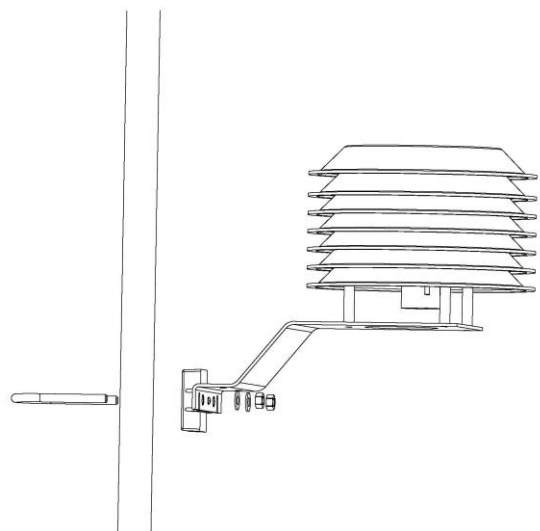4. After activation, close the holder with 4 screws.(Fig. 4)

Rechargeable lithium battery installation instructions.

3. The RA0713Y product is waterproof and can be placed outdoors after the network-joining is completed.

(1) In the position to be installed, loosen the bottom U-shaped screw of the RA0713Y and the mating washer nut, and fix the U-shaped screw through the appropriate size cylinder on the RA0713Y fixed strut piece. Install the washer nut in order, lock the nut till RA0713Y body is stable and does not shake.
(2) Loosen the M5 nut at the bottom of the 727 matte and take the matte together with the screw.
(3) Insert the power DC plug from the center through hole of the RA0713Y bottom cover, insert it into the RA0713Y DC socket, and then return the mating screw to the original position and lock the N5 nut tight.

7. 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 excessive 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.