Wireless Outdoor Temperature and Humidity Sensor

R712

User Manual

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1. Introduction

R712 is a long-range wireless outdoor temperature and humidity device based on the LoRaWAN open protocol (Class A).

The R712 is mainly used to detect the temperature and humidity in outdoor air, and also carrying a waterproof housing. It collects data over LoRa network and sends it to devices to be shown, fully compatible with LoRaWAN protocol.

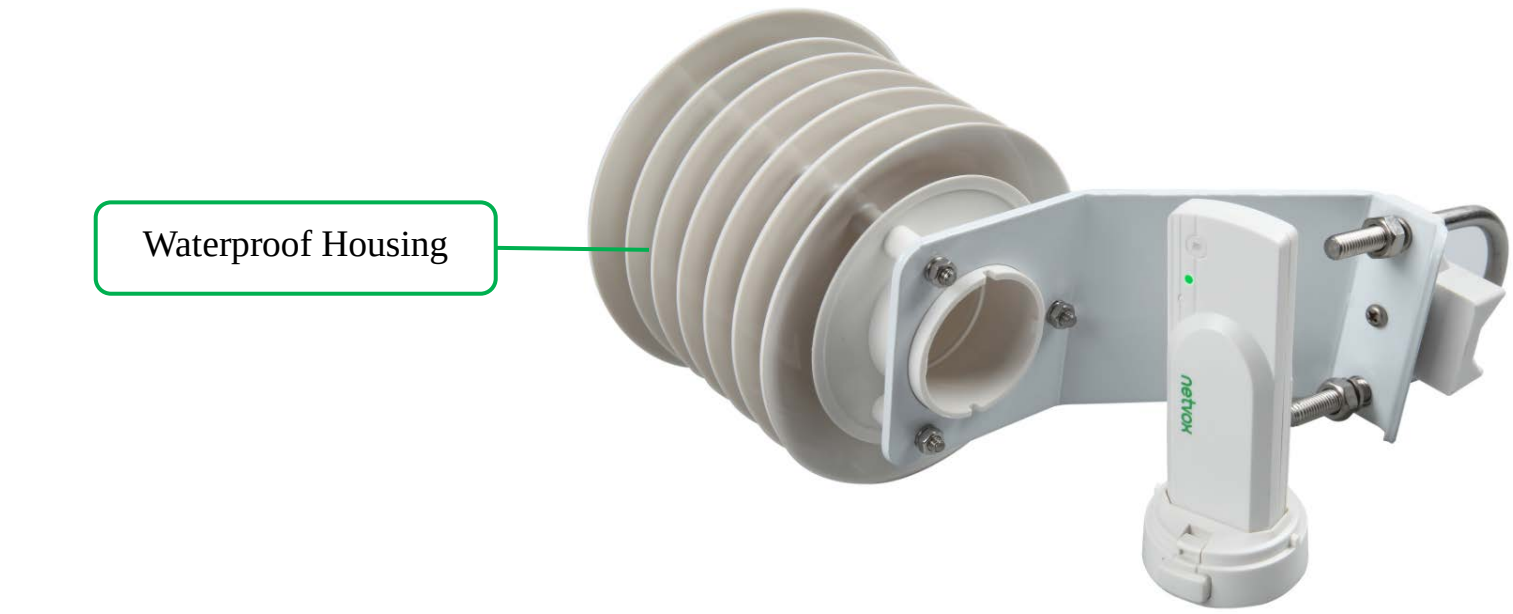
LoRa Wireless Technology:

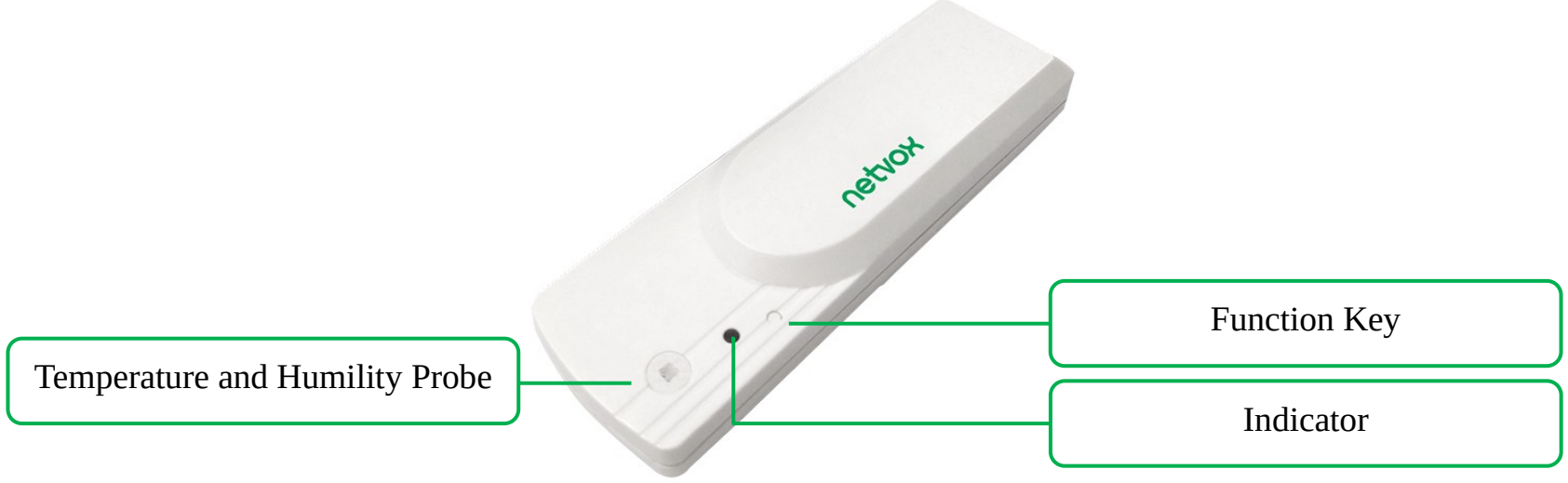
LoRa is a wireless communication technology dedicated to long distance and low power consumption. Compared with other communication methods, LoRa spread spectrum modulation method greatly increases to expand the communication distance. Widely used in long-distance, low-data wireless communications. For 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

- Compatible with LoRaWAN™ Class A
- 2 section 1.5V AA Alkaline battery
- Temperature and humidity detection
- IP rating IP54
- Frequency hopping spread spectrum
- Applicable to third-party platforms: Actility/ThingPark, TTN, MyDevices/Cayenne
- Improved power management for longer battery life
- Battery Life:
  - 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.

4.Set up Instruction

On/Off

Power on	Insert 2 section AA 1.5V batteries
Turn on	Press the function key 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. Hold the function key and insert batteries, the device will be into 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

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.

Low Voltage Warning

Low Voltage	2.4V

5. Data Report

The device will immediately send a version packet report along with an uplink packet including temperature, humidity and battery voltage.

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

Default setting:

MaxTime: 0x0E10 (3600s)

MinTime: 0x0E10 (3600s)

BatteryChange: 0x01 (0.1V)

TemperatureChange: 0x0064 (1℃)

HumidityChange: 0x0064 (1%)

Note:

1. The device report interval will be programmed based on the default firmware which may vary.
2. The interval between two reports must be the minimum time.
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

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)

Tips

1. **Battery Voltage:**

   The voltage value is bit 0 ~ bit 6, bit 7=0 is normal voltage, and bit 7=1 is low voltage.

   Battery=0x98, binary=1001 1000, if bit 7= 1, it means low voltage.

   The actual voltage is 0001 1000 = 0x18 = 24, 24*0.1v =2.4v

2. **Version Packet:**

   When Report Type=0x00 is the version packet, such as 0101000A0B202005200000, the firmware version is 2020.05.20

3. **Data Packet:**

   When Report Type=0x01 is data packet.

4. **Signed Value:**

   When the temperature is negative, 2's complement should be calculated.

Device	Device Type	Report Type	NetvoxPayLoadData				
R712	0x01	0x00	SoftwareVersion (1Byte) Eg.0x0A—V1.0	HardwareVersion (1Byte)	DateCode (4Bytes) eg 0x20170503	Reserved (2Bytes) fixed 0x00)	
		0x01	Battery (1Byte) unit:0.1V	Temperature (Signed2Bytes) unit:0.01℃	Humidity (2Bytes) unit:0.01%	ThresholdAlarm (1Byte) Bit0_LowTemperatureAlarm Bit1_HighTemperatureAlarm Bit2_LowHumidityAlarm Bit3_HighHumidityAlarm Bit4-7:Reserved	Reserved (2Bytes) fixed 0x00

Example 1 of Uplink: 0101012406701A9E000000

1st byte (01): Version

2nd byte (01): DeviceType 0x01 — R712

3rd byte (01): ReportType

4th byte (24): Battery — 3.6V, 24(Hex) = 36(Dec), 36x0.1v=3.6v

5th 6th byte (0670): Temperature — 16.48 °C , 0670(Hex)=1648(Dec), 1648x0.01=16.48°C

7th 8th byte (1A9E): Humidity — 68.14%, 1A9E(Hex)=6814(Dec), 6814x0.01=68.14%

9th byte (00): Threshold Alarm — No alarm

10th -11th byte (0000): Reserved

Example 2 of Uplink: 0101019FFF391A9E010000

1st byte (01): Version

2nd byte (01): DeviceType 0x01 — R712

3rd byte (01): ReportType

4th byte (9F): Battery — 3.1V, 1F(Hex) = 31(Dec), 31x0.1v=3.1v // Low battery

5th 6th byte (FF39): Temperature — -1.99°C, 0xFF39 (Hex) = -199(Dec) , -199x0.01=-1.99°C

7th 8th byte (1A9E): Humidity — 68.14%, 1A9E(Hex)=6814(Dec), 6814x0.01=68.14%

9th byte (01): Threshold Alarm — LowTemperatureAlarm, 01(Hex) = 0000 0001 (Bin), bit0=1

10th -11th byte (0000): Reserved

5.2 Example of Report Configuration

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	Cmd ID	Device Type	NetvoxPayLoadData				
Config ReportReq	R712	0x01	0x01	MinTime (2bytes Unit:s)	MaxTime (2bytesUnit:s)	BatteryChange (1byte Unit:0.1v)	Temperature Change (2byte Unit:0.01℃)	Humidity Change (2byte Unit:0.01%)
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)	Temperature Change (2byte Unit:0.01℃)	Humidity Change (2byte Unit:0.01%)

(1) Command Configuration:

MinTime = 60s MaxTime = 60s, BatteryChange = 0.1v, TemperatureChange = 1℃, HumidityChange = 1%

Downlink: 0101003C003C0100640064 003C($H_{ex)}$ = 60($D_{ec)}$,0064($H_{ex)}$ = 100($D_{ec)}$

Response: 8101<u>00</u>00000000000000000 (Configuration success)

8101<u>01</u>00000000000000000 (Configuration failure)

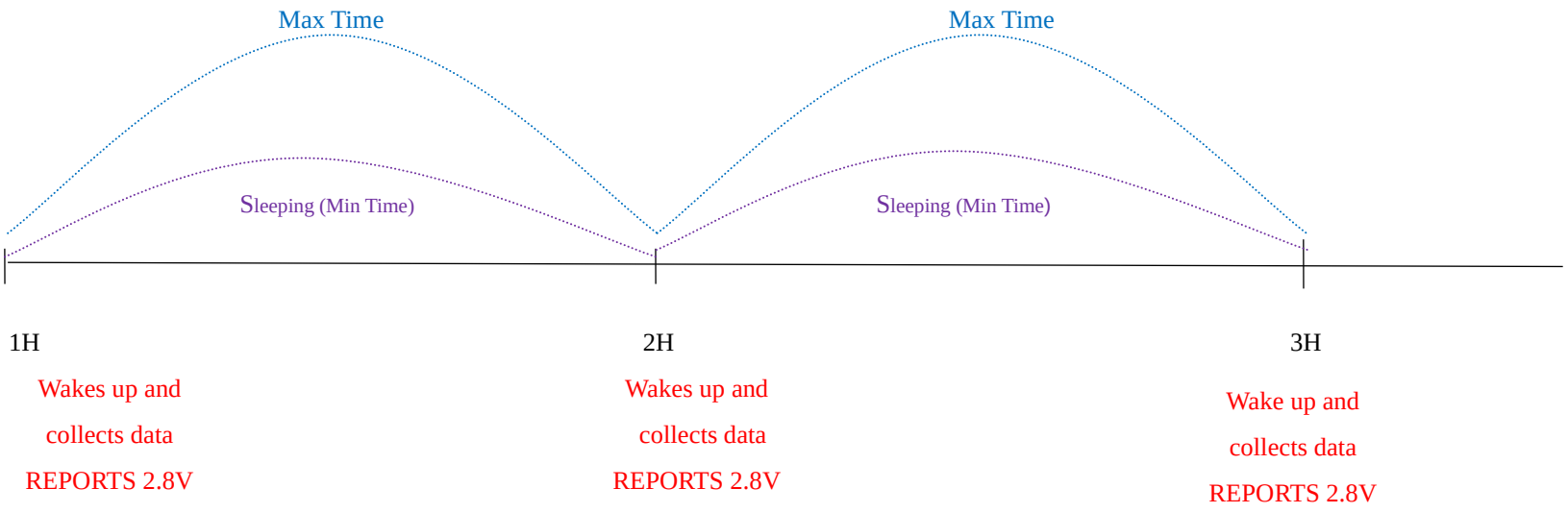
(2) Read Configuration:

Downlink： 0201000000000000000000

Response： 8201003C003C0100640064 (Current configuration)

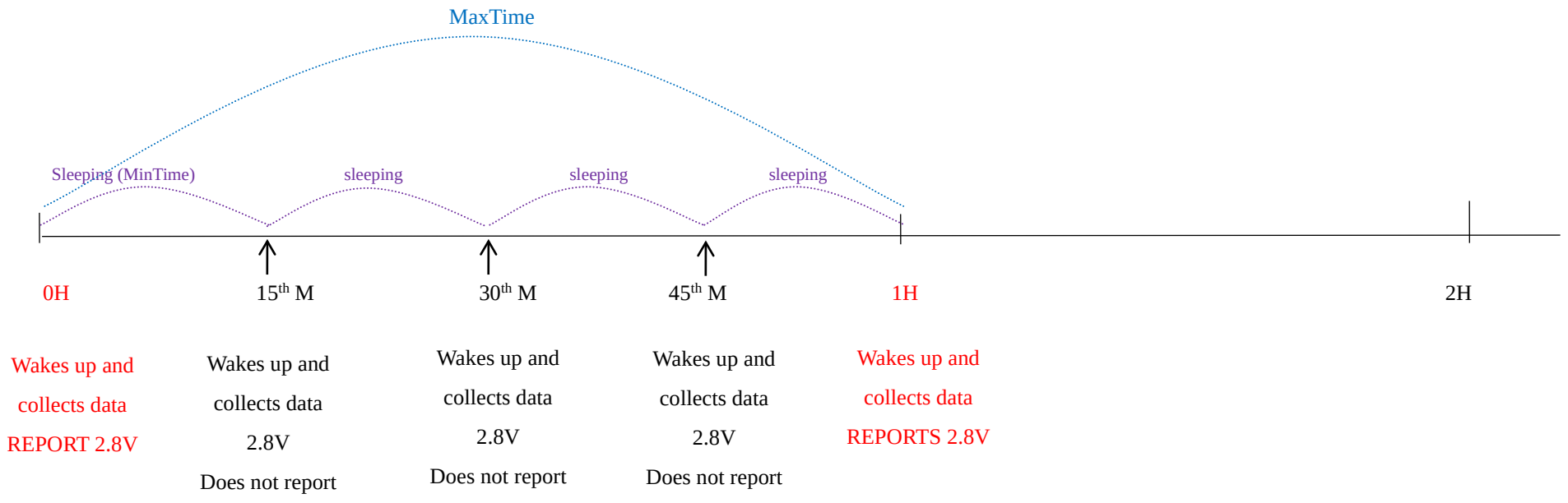
5.3 Example for MinTime/MaxTime logic

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

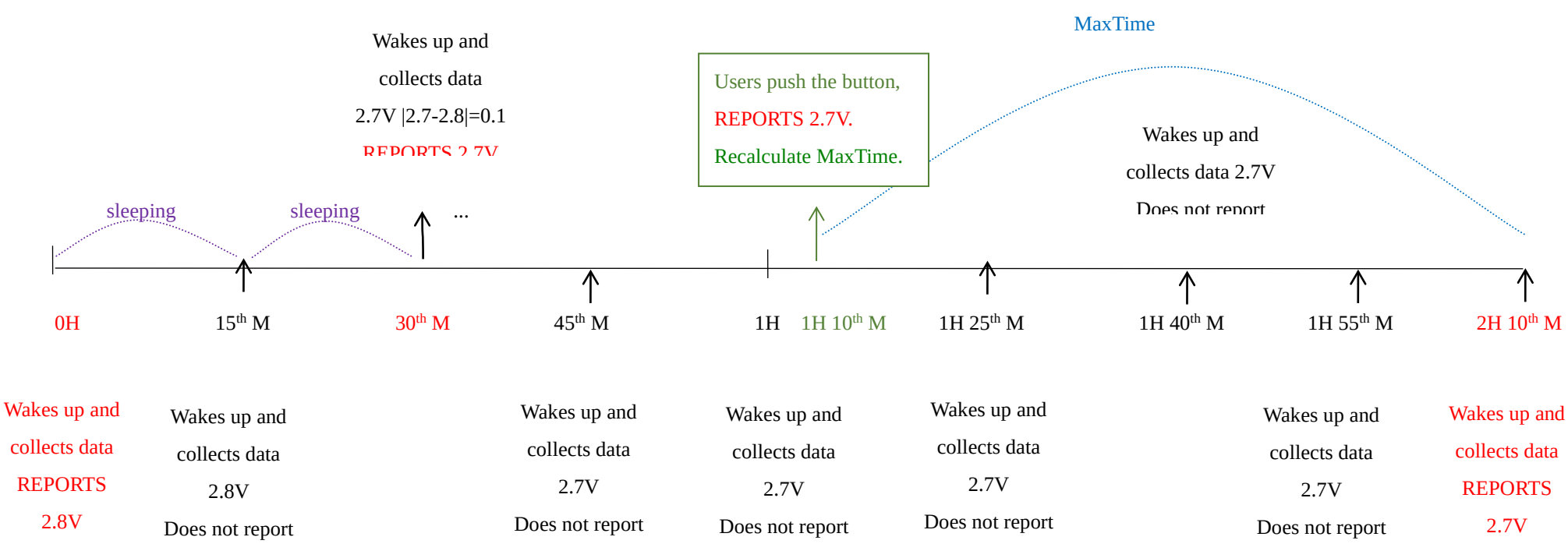


Note:
MaxTime=MinTime. Data will only be report according to MaxTime (MinTime) duration regardless BatteryVoltageChange value.

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 change value 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 and Precaution

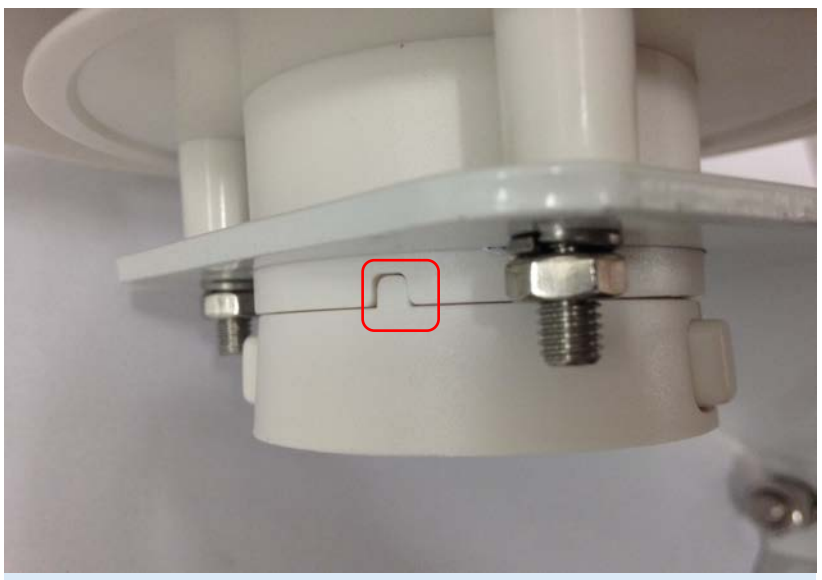
1. Take out the temperature and humidity sensor and the base of it from the housing.

Press the buttons on both sides of the base, then gently take out the sensor inside the housing.

Note:

Please keep the device from metal or other electrical equipment to avoid affecting the wireless transmission of the device.

2. Insert the battery into the sensor, then replace the sensor and base into the housing.



Note that the protruding part of the base should be aligned with the concave part of the housing.

3. Unscrew the nut of the red circle below and lock the device to the tube as shown below.

4. When the temperature and humidity detected by R712 is compared with the last reported values, when the temperature change is exceeded 1°C (default) or the humidity change is exceeded 1%(default),it will report current values.

5.Installation height recommendation: 1-1.5m

6.Installation ambient temperature: -20C°~55°C

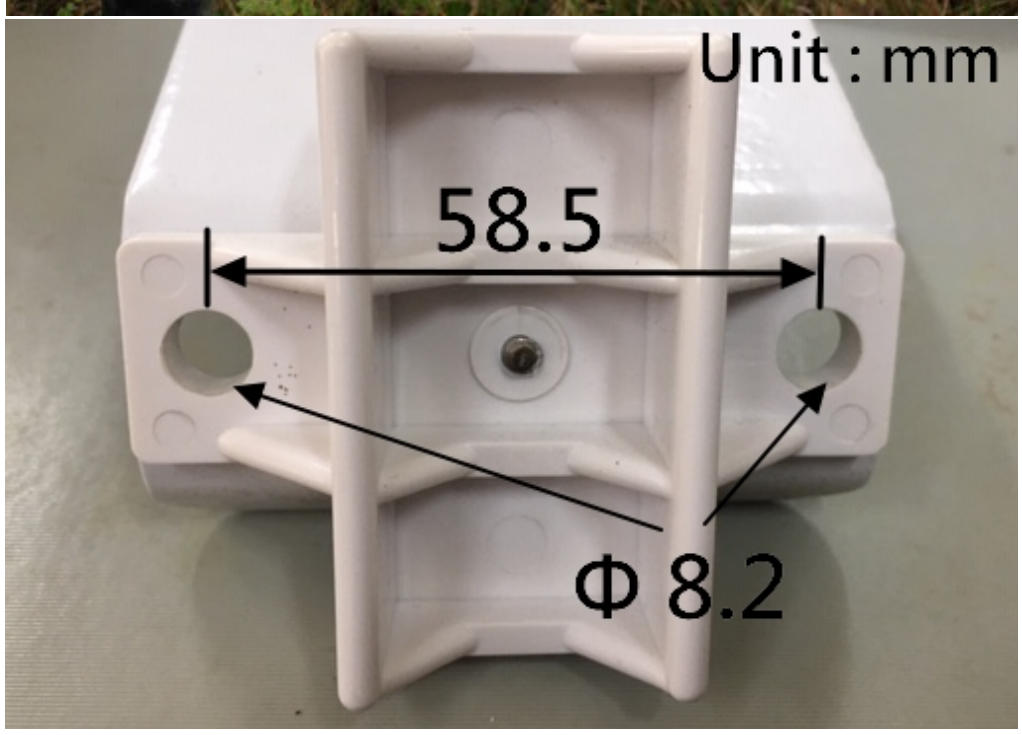
7.The outdoor temperature and humidity sensor (R712) is suitable for the following scenarios:

- Smart agriculture
- Environmental monitoring

When it is necessary to detect temperature or humidity Outdoors.

Range of diameter of post for mounting

Ø25~ Ø 50(mm)

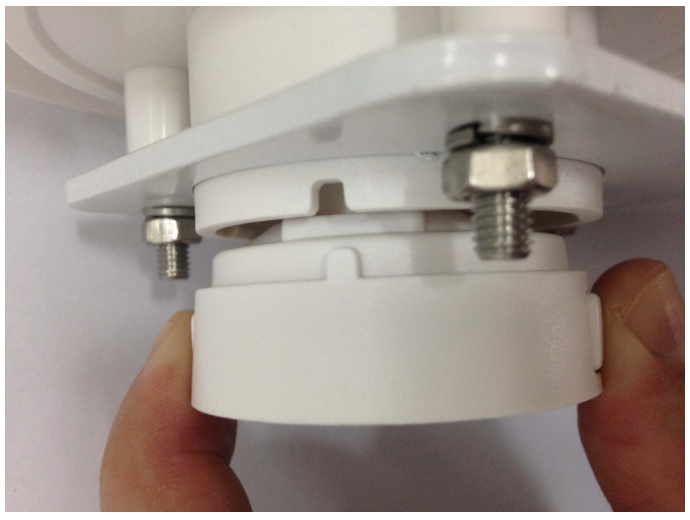


6.1 Battery installation steps

The device must use 2 sections of AA 1.5V Alkaline batteries.

Step 1

Press the buttons on both sides of the base (as shown in the below picture), then gently take out the sensor inside the housing.



Step 2

On the back of the device, press and hold the battery cover, and then slide down to open the battery bay. Put the batteries into the battery bay of the device. Please note the positive and negative poles of the battery.

Please do not insert the battery reversely.

Step 3

After inserting the batteries, like the following picture, and put the lid back on.

7. Important Maintenance Instruction

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

- Keep the equipment dry. Rain, moisture and various liquids or water 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 way can damage its detachable parts and electronic components.
- Do not store in excessive heat place. 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. Treating equipment roughly can destroy internal circuit boards and delicate structures.
- Do not wash with strong chemicals, detergents or strong detergents.
- Do not paint the device. Smudges can make debris block detachable parts up and affect normal operation.
- Do not throw the battery into the fire to prevent the battery from exploding. Damaged batteries may also explode.

All the above suggestions apply equally to your device, batteries and accessories.

If any device is not operating properly.

Please take it to the nearest authorized service facility for repairing.