Wireless Water Leak Sensor

R313W

User Manual

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1. Introduction

Netvox water leak sensor R313W is a LoRaWAN device compatible with LoRaWAN protocol (ClassA). When the R313W sensor detects a leak, it will send an alarm message to the gateway. When the sensor detects no leaks, it will send a message that shows no leak to the 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, and industrial monitoring. The 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

Water Leak Sensor ——

Indicator

Function Key

netvox
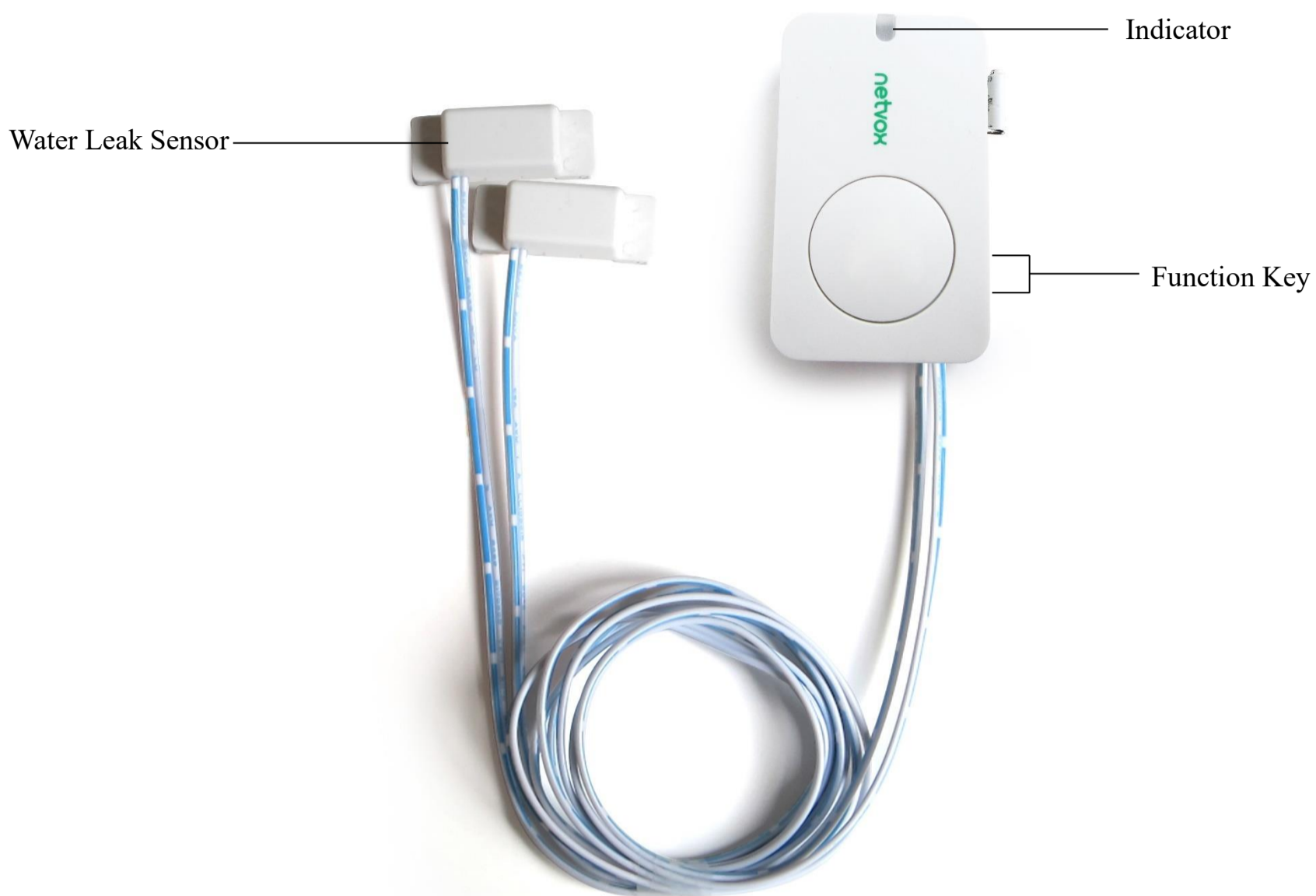
3. Features

- Compatible with LoRaWAN
- Powered by 2* 3V CR2450 button battery
- Detectable voltage and water leak status
- Simple operation and setting
- IP30
- Compatible with LoRaWANTM 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 platforms: Actility / ThingPark, TTN, MyDevices/Cayenne
- Low power consumption and long battery life

Please visit http://www.netvox.com.tw/electric/electric_calc.html for more detailed information about battery life.

4. Setup Instructions

On/Off

Power on	Insert 2* 3V CR2450 button batteries and close the cover.
Turn on	Press any function key until the green and red indicator flashes once.
Turn off (Restore to factory setting)	Press and hold both function keys for 5 seconds until the green indicator flashes 20 times.
Power off	Remove Batteries.
Note	1. Remove and insert the battery. The device memorizes the previous on/off state by default. 2. On and off interval should be 10 seconds long to avoid the interference of capacitor inductance and other energy storage components. 3. Device will be in engineering testing mode when one function key is pressed, and batteries are inserted at the same time.

Network Joining

Never joined the network	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
(without factory resetting device)
	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	Please check the device verification information on the gateway with your platform server provider.

Function Key

Press and hold for 5 seconds	factory resetting / Turn off
	  The green indicator flashes 20 times: Success
	  The green indicator remains off: Fail

Press once	The device is in the network: the green indicator flashes once and sends a report The device is not in the network: the green indicator remains off

Sleeping Mode

The device is on and in the network	Sleeping period: Min Interval When the reportchange exceeds the setting value or the state changes: send a data report according to Min Interval.

Low Voltage Warning

Low Voltage	2.4V

5. Data Report

When the device is on, it will immediately send a version package and an attribute report.

Data will be sent based on the default setting before any configuration is done.

Default setting:

Maximum time: 0x0E10 (3600s)

Minimum time: 0x0E10 (3600s)

Battery: 0x01 (0.1V)

R313W sensor is triggered:

When the R313W status changes, it will send a warning report.

No water leak:0; Water leak:1

Note: The reported data is decoded by the Netvox LoRaWAN Application Command document and

http://www.netvox.com.cn:8888/cmddoc

Data report configuration and sending period are as follows:

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	Cannot be 0	Report per Min Interval	Report per Max Interval

5.1 Example of ReportDataCmd

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 to the devicetype

NetvoxPayLoadData– Fixed bytes (Fixed = 8 Bytes)

Version	DeviceType	ReportType	NetvoxPayloadData			
0x01	0x0B	0x00	SoftwareVersion (1 Byte) e.g. 0x0A-V1.0	HardwareVersion (1 Byte)	DateCode (4 Byte) e.g. 0x20170503	Reserved (2 Bytes)
0x01	0x0B	0x01	Battery (1 Byte, unit: 0.1v)	Water1Leak (1 Byte) 0: noleak; 1: leak	Water2Leak (1 Byte) 0: noleak; 1: leak	Reserved (5 Bytes)

Example of Uplink: **0106011E00000000000000**

1st Byte (01): Version

2nd Byte (06): DeviceType — R313W

3rd Byte (01): ReportType

4th Byte (1E): Battery — 3V 1E (H_{ex}) = 30 (D_{ec}), 30* 0.1V = 3.0V

5th Byte (00): Water1Leak — noleak

6th Byte (00): Water2Leak — noleak

7th–11th Byte (0000000000): Reserved

5.2 Example of Report Configuration

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

CmdID– 1 Byte

DeviceType– 1 Byte – Device Type of Device

NetvoxPayLoadData– var bytes (Max = 9 Bytes)

Description	Device	CmdID	DeviceType	NetvoxPayLoadData			
Config ReportReq	R313W	0x01	0x06	MinTime (2 Bytes, unit: s)	MaxTime (2 Bytes, unit: s)	BatteryChange (1 Byte, unit: 0.1v)	Reserved (4 Bytes, Fixed 0x00)
Config ReportRsp		0x81		Status (0x00_success)		Reserved (8 Bytes, Fixed 0x00)	
ReadConfig ReportReq		0x02		Reserved (9 Bytes, Fixed 0x00)			
ReadConfig ReportRsp		0x82		MinTime (2 Bytes, unit: s)	MaxTime (2 Bytes, unit: s)	BatteryChange (1 Byte, unit:0.1v)	Reserved (4 Bytes, Fixed 0x00)

(1) Configure parameters

MinTime = 0x003C (1 min), MaxTime = (0x003C) (1 min), BatteryChange = 0x01 (0.1V)

Downlink: 0106003C003C0100000000

Response: 8106000000000000000000 (Configuration success)

8106010000000000000000 (Configuration fail)

(2) Read parameters

Downlink: 0206000000000000000000

Response: 8206003C003C0100000000 (Current configuration)

5.3 Example of Resendtime

Description	Device	CmdID	DeviceType	NetvoxPayLoadData	
SetLastMessage ResendtimeReq	R313W	0x1F	0xFF	Resendtime (1 Byte, Unit: 1s, range: 3-254s), when 0 or 255 no resend, default is no resend	Reserved (8 Bytes, Fixed 0x00)
SetLastMessage ResendtimeRsp		0x9F		Status (0x00_success)	Reserved (8 Bytes, Fixed 0x00)
GetLastMessage ResendtimeReq		0x1E		Reserved (9 Bytes, Fixed 0x00)	
GetLastMessage ResendtimeRsp		0x9E		Resendtime (1 Byte, Unit: 1s, range: 3-254s), when 0 or 255 no resend, default is no resend	Reserved (8 Bytes, Fixed 0x00)

(1) Configure parameter

Resendtime = 0x05 (5s)

Downlink: 1FFF050000000000000000

Response: 9FFF000000000000000000 (configuration success)

9FFF010000000000000000 (configuration fail)

(2) Read parameter

Downlink: 1EFF000000000000000000

Response: 9EFF050000000000000000 (current parameter)

5.4 Example of NetvoxLoRaWANRejoin

Check if the device is still in the network. If the device is disconnected, it will automatically rejoin back to the network.

Fport: 0x20

CmdDescriptor	CmdID (1 Byte)	Payload						
SetNetvoxLoRaWAN RejoinReq	0x01	RejoinCheckPeriod (4 Bytes, unit: 1s)					RejoinThreshold (1 Byte)	
SetNetvoxLoRaWAN RejoinRsp	0x81	Status (1 Byte, 0x00_success)			Reserved (4 Bytes, Fixed 0x00)			
GetNetvoxLoRaWAN RejoinReq	0x02	Reserved (5 Bytes, Fixed 0x00)						
GetNetvoxLoRaWAN RejoinRsp	0x82	RejoinCheckPeriod (4 Bytes, Unit: 1s)					RejoinThreshold (1 Byte)	
SetNetvoxLoRaWAN RejoinTimeReq	0x03	1st Rejoin Time (2 Bytes, unit: 1min)	2nd Rejoin Time (2 Bytes, unit: 1min)	3rd Rejoin Time (2 Bytes, unit: min)	4th Rejoin Time (2 Bytes, unit: min)	5th Rejoin Time (2 Bytes, unit: min)	6th Rejoin Time (2 Bytes, unit: min)	7th Rejoin Time (2 Bytes, unit: min)
SetNetvoxLoRaWAN RejoinTimeRsp	0x83	Status (1 Byte, 0x00_success)			Reserved (13 Bytes, Fixed 0x00)			
GetNetvoxLoRaWAN RejoinTimeReq	0x04	Reserved (15 Bytes, Fixed 0x00)						
GetNetvoxLoRaWAN RejoinTimeRsp	0x84	1st Rejoin Time (2 Bytes, unit: 1min)	2nd Rejoin Time (2 Bytes, unit: 1min)	3rd Rejoin Time (2 Bytes, unit: min)	4th Rejoin Time (2 Bytes, unit: min)	5th Rejoin Time (2 Bytes, unit: min)	6th Rejoin Time (2 Bytes, unit: min)	7th Rejoin Time (2 Bytes, unit: min)

Note:
a. Set RejoinCheckThreshold as 0xFFFFFFFF to stop the device from rejoining the network.

b. The last configuration would be kept as user reset the device back to the factory setting.

c. Default setting: RejoinCheckPeriod = 2 (hr) and RejoinThreshold = 3 (times)
1st Rejoin Time = 0x0001 (1 min), 2nd Rejoin Time = 0x0002 (2 mins), 3rd Rejoin Time = 0x0003 (3 mins), 4th Rejoin Time = 0x0004 (4 mins), 5th Rejoin Time = 0x003C (60 mins), 6th Rejoin Time = 0x0168 (360 mins), 7th Rejoin Time = 0x05A0 (1440 mins)

(1) Command Configuration

Set RejoinCheckPeriod = 3600s (0x00000E10), RejoinThreshold = 3 times

Downlink: 0100000E1003

Response: 81<u>00</u>000000000 (Configuration success)

81<u>01</u>00000000 (Configuration failure)

(2) Read current configuration (RejoinCheckPeriod and RejoinThreshold)

 Downlink: 020000000000

 Response: 8200000E1003

(3) Configure Rejoin Time

 1st Rejoin Time = 0x0001 (1 min), 2nd Rejoin Time = 0x0002 (2 mins), 3rd Rejoin Time = 0x0003 (3 mins),

 4th Rejoin Time = 0x0004 (4 mins), 5th Rejoin Time = 0x0005 (5 mins), 6th Rejoin Time = 0x0006 (6 mins),

 7th Rejoin Time = 0x0007 (7 mins)

 Downlink: 0300010002000300040005000600 07

 Response: 8300000000000000000000000000 0000 (Configuration success)

    8301000000000000000000000000 0000 (Configuration failure)

(4) Read RejoinTime parameter

 Downlink: 040000000000000000000000000000 0000

 Response: 8400010002000300040005000600 07

5.5 Example for MinTime/MaxTime logic

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

MaxTime   MaxTime

sleeping (MinTime)   sleeping (MinTime)

1H   2H   3H

Wakes up and collect data   Wakes up and collect data   Wake up and collect data

REPORTS 2.8V   REPORTS 2.7V   REPORTS 2.5V

Note: MaxTime = MinTime. Data will only be reported 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.

MaxTime

sleeping (MinTime)   sleeping   sleeping   sleeping

0H   15thM   30thM   45thM   1H   2H

Wakes up and collects data   Wakes up and collects data   Wakes up and collects data

REPORT 2.8V   2.8V   REPORTS 2.8V

Does not report

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

Wakes up and collects data   Users push the button,   MaxTime

2.7V |2.7-2.8|=0.1   **REPORTS 2.7V.**   Wakes up and collects data

REPORTS 2.7V   Recalculate MaxTime.   2.7V Does not report

sleeping   sleeping

0H   15thM   30thM   45thM   1H   1H 10thM   1H 25thM   1H 40thM   1H 55thM   2H 10thM

Wakes up and   Wakes up and   Wakes up and   Wakes up and   Wakes up and   Wakes up and   Wakes up and

collects data   collects data   collects data   collects data   collects data   collects data   collects data

REPORTS 2.8V   2.8V   2.7V   2.7V   2.7V   2.7V   REPORTS 2.7V

Does not report   Does not report   Does not report   Does not report   Does not report

Notes:

a. The device only wakes up and performs data sampling according to MinTime Interval. When it is sleeping, it does not collect data.

b. The data collected is compared with the last data <u>reported</u>. 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.

c. 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.

d. 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

This product does not have a waterproof function. After the screening is completed, please place it indoors.

1. Remove the backing of the double-sided tapes and fix the body to a door frame.

Note: a. Please wipe the door before installation in case dust affects the adhesion of double-sided tape.

b. Please do not fix the device on a rough surface in case it falls off.

c. Please do not install the device in a metal-shielded box or around other electrical equipment in case it affects the wireless transmission of the device.

2. Remove the backing from the bottom of the sensor probe and attach it to a flat ground where water leakage may occur.
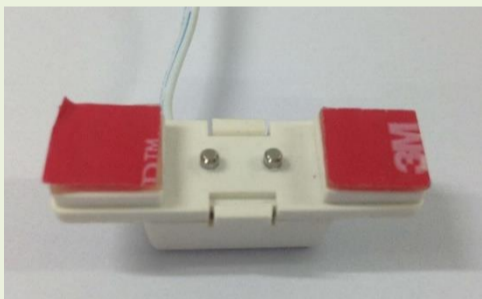

3. When the sensor detects a leak, it sends an "alarm" message. Remove the probe and dry the remaining water inside the sensor. When the device is back to a "normal" state, it sends a "normal" status message.

In addition to a bathroom (as the picture shown below), R313W can also be used in these applications:

- Data center and computer room
- Document storage center
- Basement leak monitoring
- Water pipe leak detection
- Bilge monitoring

R313W is for water leakage detection only. Chemicals, solvents, oils, fuels, strong acids, or corrosive liquids are not suitable for R313W.
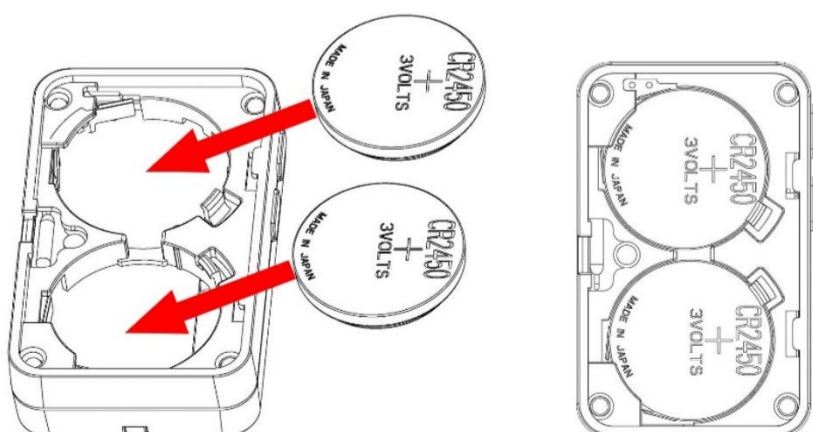
Please face the positive (+) upward when inserting batteries.

Note: To install the battery, please use a screwdriver or similar tool to open the battery cover.

7. Important Maintenance Instructions

Kindly pay attention to the following 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 a dusty or dirty environment. It might damage its detachable parts and electronic components.

• Do not store the device under extremely hot conditions. High temperatures 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, moisture that forms inside the device will damage 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 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 operating properly, please take it to the nearest authorized service facility for repair.