

**Wireless Water Turbidity Sensor**

---

# **Wireless Water Turbidity Sensor**

## **RA0710\_R72610\_RA0710Y**

### **User Manual**

**Copyright©Netvox Technology Co., Ltd.**

This document contains proprietary technical information which is the property of NETVOX Technology. It shall be maintained in strict confidence and shall not be disclosed to other parties, in whole or in part, without written permission of NETVOX Technology. The specifications are subject to change without prior notice.

# Table of Content

|                                            |    |
|--------------------------------------------|----|
| 1. Introduction.....                       | 2  |
| 2. Appearance.....                         | 2  |
| 3. Main Feature .....                      | 3  |
| 4. Set up Instruction.....                 | 4  |
| 5. Data Report.....                        | 5  |
| 6. Installation .....                      | 8  |
| 6.1 RA0710.....                            | 8  |
| 6.2 R72610.....                            | 8  |
| 6.3 RA0710Y .....                          | 9  |
| 6.4 Maintenance Method .....               | 10 |
| 7. Important Maintenance Instruction ..... | 10 |

## 1. Introduction

RA0710\_R72610\_RA0710Y is a Water Turbidity Sensor for Netvox ClassA type devices based on the LoRaWAN open protocol and is compatible with the LoRaWAN protocol.

It connects an external turbidity sensor to detect water turbidity and temperature.

### 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.

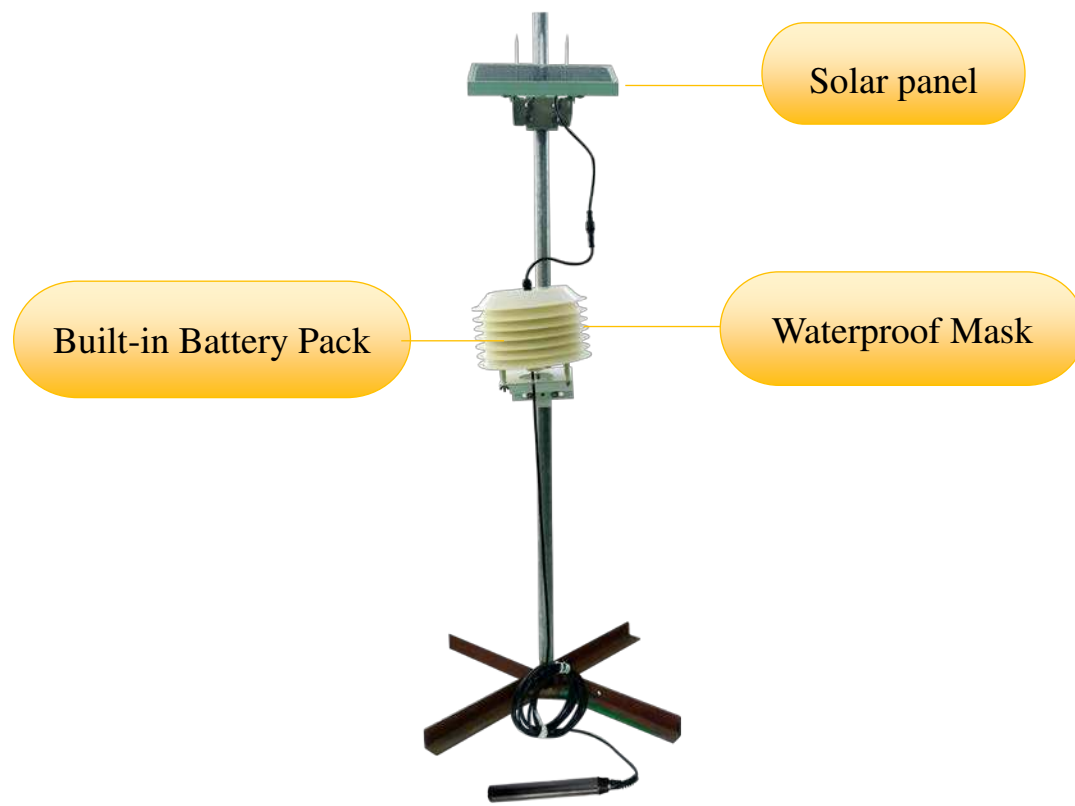
### LoRaWAN:

LoRaWAN uses LoRa technology to define end-to-end standard specifications to ensure interoperability between devices and gateways from different manufacturers.

## 2. Appearance



RA0710



R72610



RA0710Y

### 3. Main Feature

- Compatible with LoRaWAN
- RA0710 and RA0710Y use DC 12V adapter power supply
- R72610 uses solar panel and rechargeable lithium batteries
- Simple operation and setting
- Water turbidity and temperature detection
- Adopt SX1276 wireless communication module

## 4. Set up Instruction

### On/Off

|                            |                                                                                                                                                                                                                                                                                   |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Power on                   | RA0710 and RA0710Y are connected to the DC 12V adapter for power-on;<br>R72610 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:                      | <ol style="list-style-type: none"> <li>1. Engineering test modes require the burning engineering test software.</li> <li>2. On/off interval is suggested to be about 10 seconds to avoid the interference of capacitor inductance and other energy storage components.</li> </ol> |

### Network Joining

|                                                      |                                                                                                                                                                   |
|------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Never joined the network<br>(Or at factory setting ) | <p>Turn on the device to search the network.</p> <p>The green indicator stays on for 5 seconds: success</p> <p>The green indicator remains off: fail</p>          |
| Had joined the network<br>(Not at factory setting.)  | <p>Turn on the device to search the previous network.</p> <p>The green indicator stays on for 5 seconds: success</p> <p>The green indicator remains off: fail</p> |

### Function Key

|                              |                                                                                                                                                                               |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Press and hold for 5 seconds | <p>Restore to factory setting / Turn off</p> <p>The green indicator flashes for 20 times: success</p> <p>The green indicator remains off: fail</p>                            |
| Press once                   | <p>The device is in the network: the green indicator flashes once and the device sends a data report</p> <p>The device is not in the network: green indicator remains off</p> |

### Restore to Factory Setting

|             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Instruction | <p>RA0710_R72610_RA0710Y has a network information memory function saving function when power-down.</p> <p>This function is turned off by default, that is, it will be re-joined every time it is powered back on.</p> <p>This function can be turned on by the ResumeNetOnOff command.</p> <p>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.)</p> <p>It will not be re-joined the previous network.</p> |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|           |                                                                                                                                                                                                                                                                    |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operation | <ol style="list-style-type: none"> <li>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.</li> <li>2. The device will automatically restart to re-joining.</li> </ol> |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 5. Data Report

The device will immediately send a version packet report along with an uplink packet including turbidity and temperature.

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

### Default setting

ReportMaxTime:

**RA0710/RA0710Y** is 180s

**R72610** is 900s

Value must be greater than  $ReportMinTime \geq ReportType\ count * ReportMinTime + 10$ , units: seconds

ReportMinTime: 30s;

ReportChange: 0;

ReportType count = 1;

Note:

- (1) The device report interval will be programmed base on the default firmware which may vary.
- (2) The interval between two reports must be the Maxtime
- (3) ReportChange is not supported by RA0710\_R72610\_RA0710Y (Invalid configuration)
- (4) Report cycle will be based on ReportMaxTime period when sending data packet (beginning to the end of the first data as a period).
- (5) Data packet: turbidity and temperature value.
- (6) It would take a period of time for the turbidity sensor to sample and process the collected turbidity value if you were to manually trigger the device by pressing the button, please be patient.

The device reported data parsing please refer to

*Netvox LoraWAN Application Command document and Netvox Lora Command Resolver*

<http://loraresolver.netvoxcloud.com:8888/page/index>

## 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)

| Device         | Device Type | Report Type | NetvoxPayLoadData             |                        |                                                   |                                         |                                  |
|----------------|-------------|-------------|-------------------------------|------------------------|---------------------------------------------------|-----------------------------------------|----------------------------------|
| RA07 series    | 0x05        |             |                               |                        |                                                   |                                         |                                  |
| R726series     | 0x09        | 0x09        | Battery<br>(1Byte, unit:0.1V) | NTU<br>(2Byte ,0.1ntu) | TemperaturewithNTU<br>(Signed 2Bytes,unit:0.01°C) | EC5SoildHumidtiy<br>(2Bytes,unit:0.01%) | Reserved<br>(1Bytes, fixed 0x00) |
| RA07**Y series | 0x0D        |             |                               |                        |                                                   |                                         |                                  |

### Uplink: 01050900006409C4FFFF00

1<sup>st</sup> byte (01): Version

2<sup>nd</sup> byte (05): DeviceType 0x01 — RA07 Series

3<sup>rd</sup> byte (09): ReportType

4<sup>th</sup> byte (00): Battery; When Battery data is 0x00, it means DC/AC power source.

5<sup>th</sup>6<sup>th</sup> byte (0064): NTU— 10 ntu ,  $0064_{\text{hex}}=100_{\text{dec}}$ ,  $100 \times 0.1=10$  ntu

7<sup>th</sup>8<sup>th</sup> byte (09C4): Temperature with NTU— 25°C,  $09C4_{\text{hex}}=2500_{\text{dec}}$ ,  $2500 \times 0.01^\circ\text{C}=25^\circ\text{C}$

9<sup>th</sup>10<sup>th</sup> byte (FFFF): The model does not support the data

11<sup>th</sup> byte (00): Reserved

Note:

If 5<sup>th</sup>6<sup>th</sup> byte-NTU reports “FFFF”, please check if the wiring is loose or wrong.

## Example of ConfigureCmd

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)

### Report Configuration Example:

| Description          | Device                                    | CmdID | Device Type | NetvoxPayLoadData               |                                 |                                 |
|----------------------|-------------------------------------------|-------|-------------|---------------------------------|---------------------------------|---------------------------------|
| Config ReportReq     | RA07 Series<br>R726 Series<br>R727 Series | 0x01  | 0x05        | MinTime<br>(2bytes Unit:s)      | MaxTime<br>(2bytes Unit:s)      | Reserved<br>(5Bytes,Fixed 0x00) |
| Config ReportRsp     |                                           | 0x81  |             | Status<br>(0x00_success)        | Reserved<br>(8Bytes,Fixed 0x00) |                                 |
| ReadConfig ReportReq |                                           | 0x02  | 0x09        | Reserved<br>(9Bytes,Fixed 0x00) |                                 |                                 |
| ReadConfig ReportRsp |                                           | 0x82  | 0x0D        | MinTime<br>(2bytes Unit:s)      | MaxTime<br>(2bytes Unit:s)      | Reserved<br>(5Bytes,Fixed 0x00) |

(1) Configure RA0710 device parameters MinTime = 30s, MaxTime = 120s (120>30\*1+10)

Downlink: 0105001E00780000000000

Device returns:

8105000000000000000000 (configuration is successful)

8105010000000000000000 (configuration failed)

(2) Read RA0710 device parameters

Downlink: 0205000000000000000000

Device returns:

8205001E00780000000000 (device current parameter)



## 6. Installation

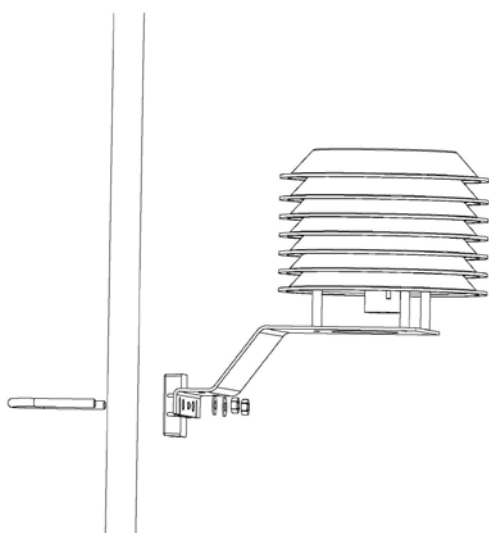
### 6.1 RA0710

RA0710 does not have a waterproof function. After the network joining is completed, please place it indoor.

### 6.2 R72610

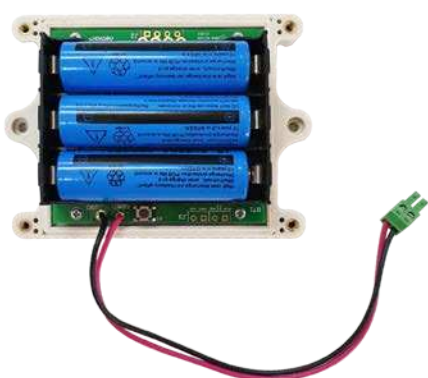
R72610 product is waterproof. After the network-joining is completed, please leave it outdoors.

- (1) In the position to be installed, loosen the U-shaped screw of the bottom of the R72610 and the mating washer nut, and fix the U-shaped screw through the appropriate size cylinder on the R72610 fixed strut piece. Install the washer nut in order, lock the nut till R72610 body is stable and does not shake.
- (2) At the upper side of the fixed position of R72610, 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 R72610 top waterproof cable to the solar panel wiring and lock it tight.



(5) R72610 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:

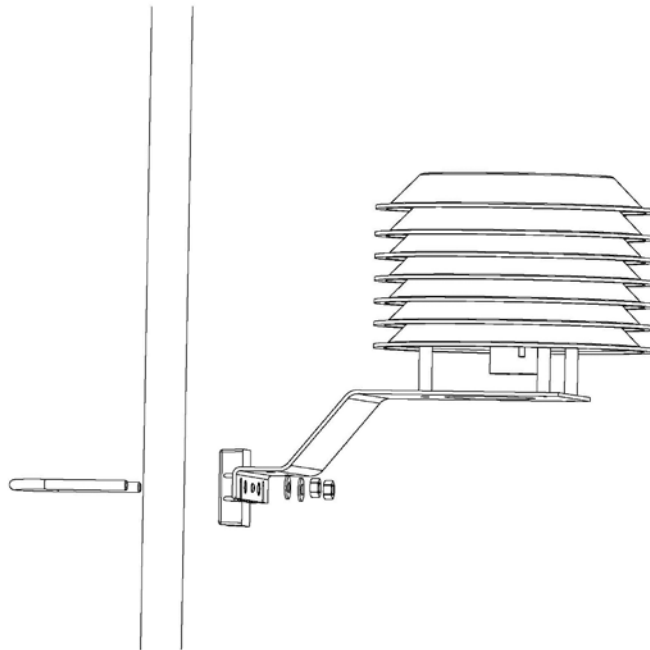
- 1: Remove the four screws around battery cover
- 2: Insert three 18650 lithium batteries. (Please make sure the battery positive and negative)
- 3: Press the activation button on the battery pack for the first time.
- 4: After activation, close the battery cover and lock the screws around battery cover.



### 6.3 RA0710Y

RA0710Y 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 RA0710Y and the mating washer nut, and fix the U-shaped screw through the appropriate size cylinder on the RA0710Y fixed strut piece. Install the washer nut in order, lock the nut till RA0710Y body is stable and does not shake.
- (2) Loosen the M5 nut at the bottom of the RA0710Y matte and take the matte together with the screw.
- (3) Insert the power DC plug from the center through hole of the RA0710Y bottom cover, insert it into the RA0710Y DC socket, and then return the mating screw to the original position and lock the M5 nut tight.



Note:

1. The probe contains sensitive optical and electronic components. Make sure that the probe is not subject to severe mechanical shocks. There are no parts inside the probe that need users' maintenance.
2. The black plastic cap on the head of the turbidity sensor should be removed during the test; otherwise, it will affect the measurement.



## 6.4 Maintenance Method

### 1. External Surface of The Sensor:

Use tap water to clean the external surface of the sensor. If there are still debris remaining, wipe it with a moistened soft cloth.

For some stubborn dirt, users can add some household detergent to the tap water to clean it.

### 2. Check the Cable of The Sensor:

The cable should not be taut during normal operation; otherwise, the internal wires of the cable may break and the sensor cannot work normally.

### 3. Check whether the measuring part of the sensor is dirty, and whether the cleaning brush is normal.

## 7. Important Maintenance Instruction

The device is a product with 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 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.

