Wireless Water Turbidity Sensor

RA0710_R72610_RA0710Y

User Manual

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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.

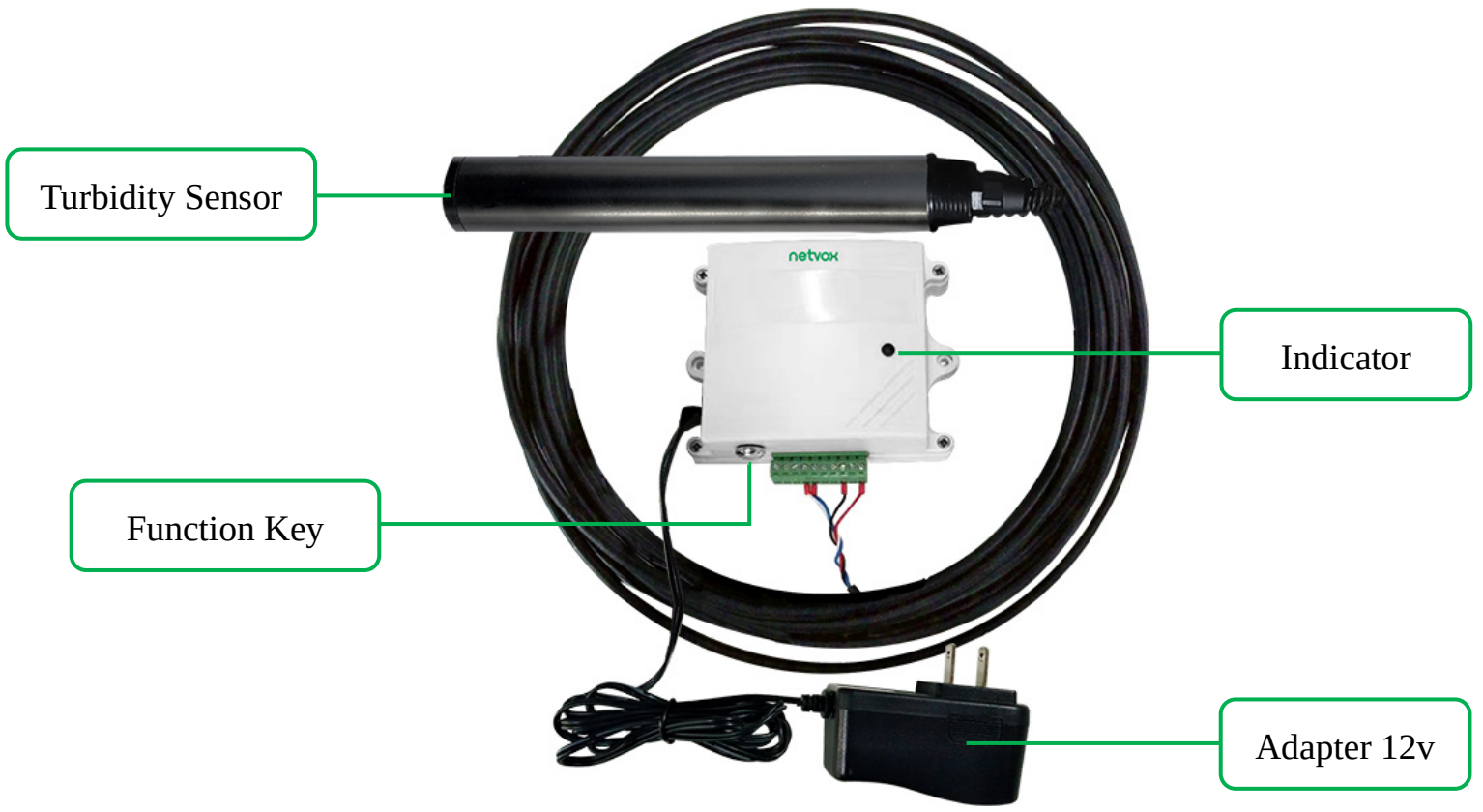
LoRa Wireless Technology:

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.

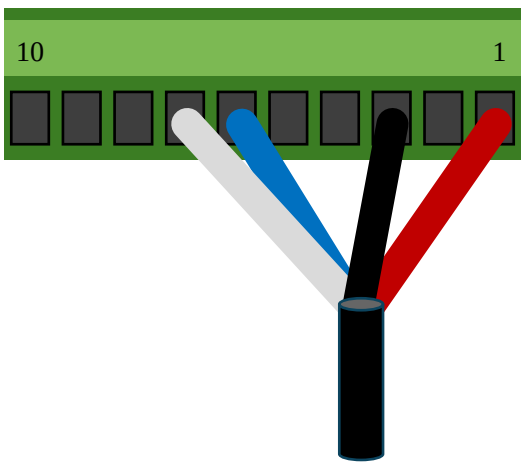
LoRaWAN:

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

2. Appearance

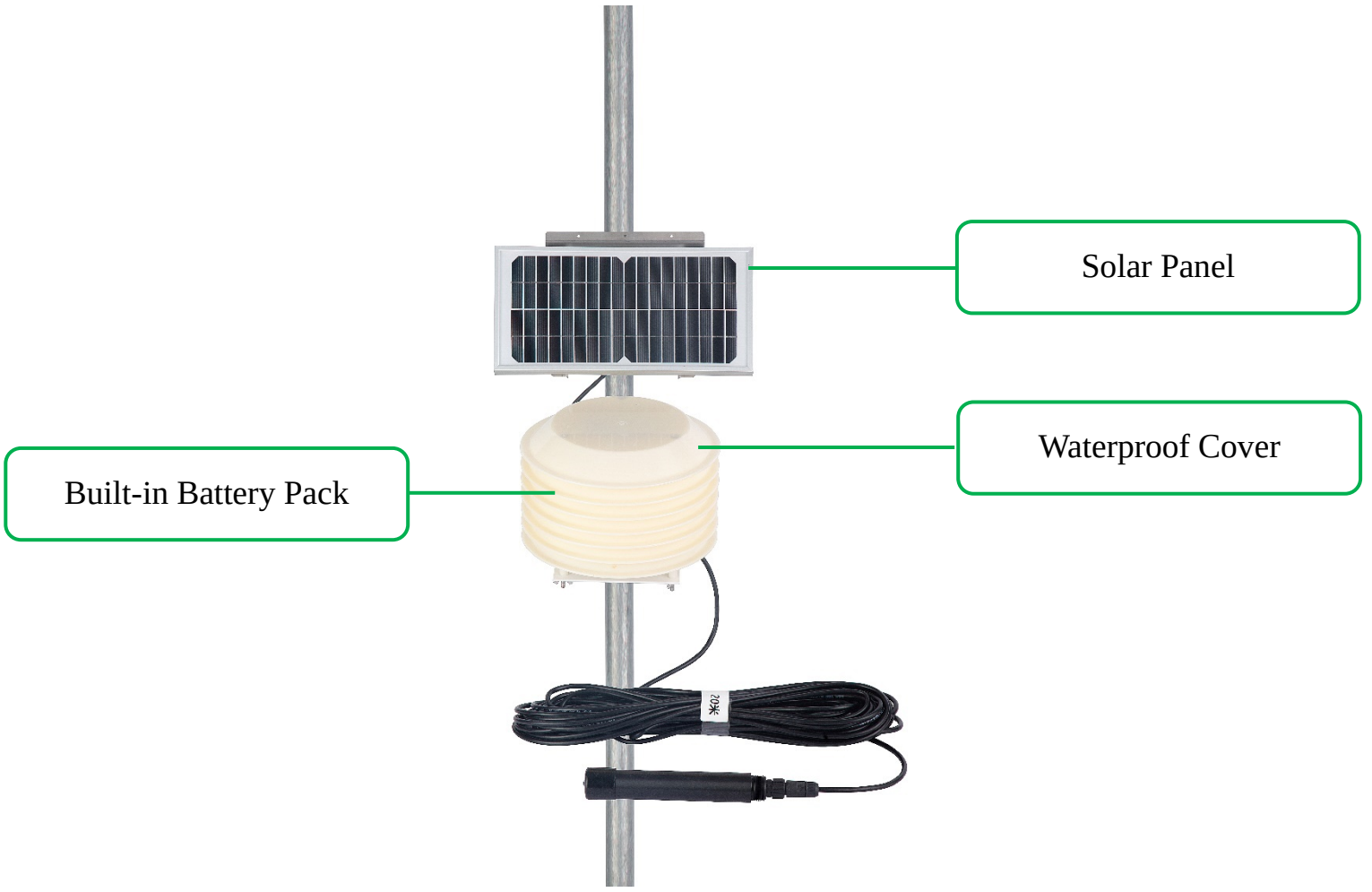


RA0710

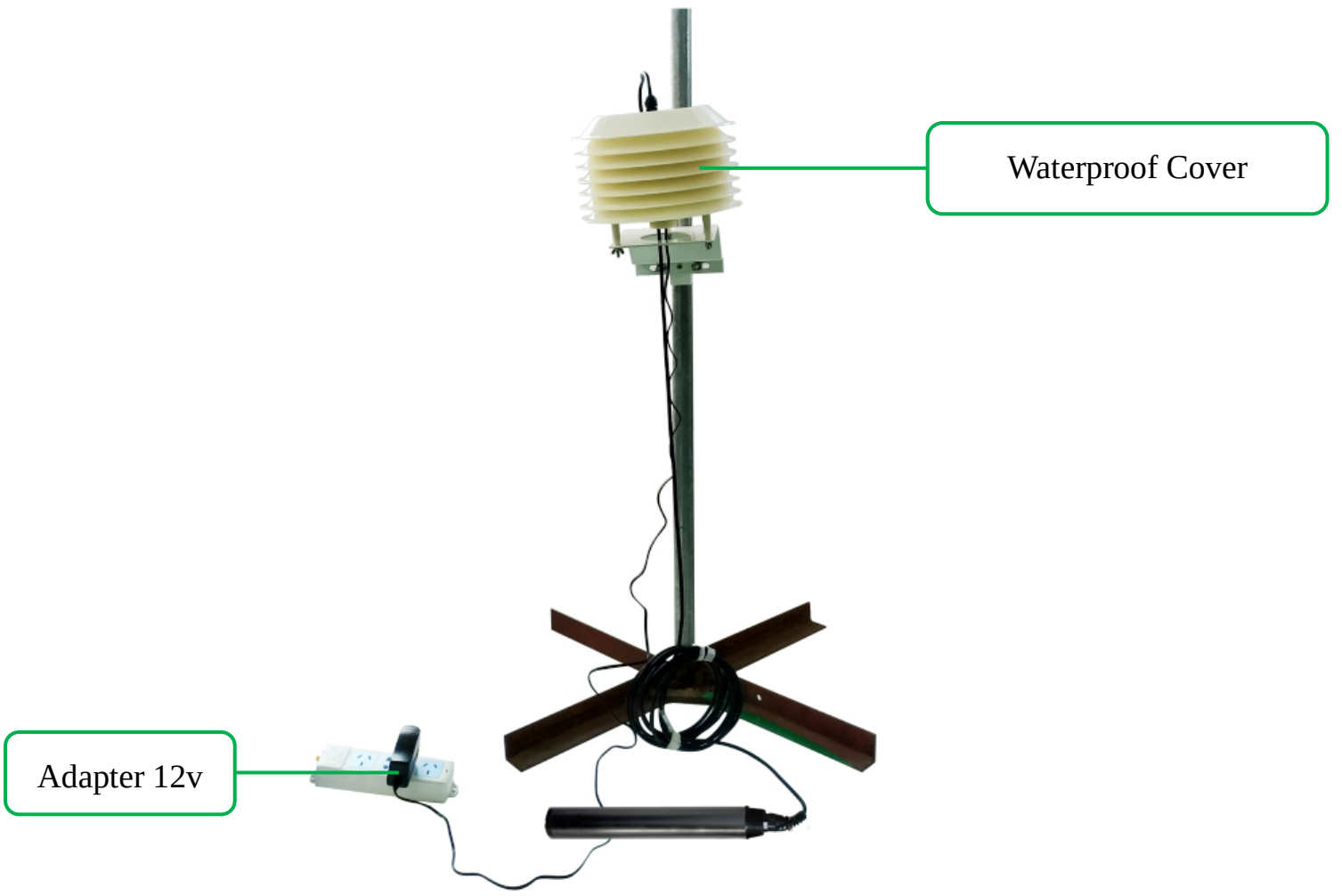


PIN	Color	Description
PIN 1	Red	VCC
PIN 3	Black	GND
PIN 6	Blue	RS485-A
PIN 7	White	RS485-B

Turbidity Sensor Wiring



R72610



RA0710Y

3. Main Feature

- Compatible with LoRaWAN
- RA0710 and RA0710Y applies DC 12V adapter
- R72610 uses solar panel and rechargeable lithium batteries
- Water turbidity and temperature detection
- Adopt SX1276 wireless communication module
- Frequency Hopping Spread Spectrum (FHSS)
- Available third-party platform: Actility/ThingPark, TTN, MyDevices/Cayenne

4. Set up Instruction

On/Off

Power on	RA0710 and RA0710Y are connected to the DC 12V adapter for power-on ; 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:	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

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 (R72610)

Low Voltage Threshold	10.5v

Restore to Factory Setting

Instruction	RA0710_R72610_RA0710Y 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 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:

MaxTime:

RA0710 and RA0710Y: US915, AU915, KR920, AS923, IN865: 180s

EU868: 370s

R72610: 1800s (All frequency bands)

*Value must be greater than *ReportMinTime*≧*ReportType count* **ReportMinTime* + *10* ,units: seconds

MinTime:

US915, AU915, KR920, AS923, IN865: 30s

EU868: 120s

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.

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

5.1 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)

Tips

1. **Battery Voltage:**

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

Battery=0xE9, binary=1110 1001, if bit 7= 1, it means low voltage.

The actual voltage is 0110 1001 = 0x69 = 105, 105*0.1v =10.5v.

(b) If the battery is equal to 0x00, it means that the device is powered by a DC power supply.

2. **Version Packet:**

When Report Type=0x00 is the version packet, such as 0105000A0B202005200000, the firmware version is 2020.05.20

3. **Data Packet:**

(a) When Report Type=0x09 is data packet.

(b) When NetvoxPayLoadData field=0xFFFF, it means that RA0710/R72610/RA0710Y does not support the connected device or sensor malfunction.

4. **Signed Value:**

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

Device	Device Type	Report Type	NetvoxPayLoadData				
RA07 series R726 series RA07xxY series	0x05 0x09 0x0D	0x00	SoftwareVersion (1Byte) Eg.0x0A—V1.0	HardwareVersion (1Byte)	DateCode (4Bytes,eg0x20170503)	Reserved (2Bytes,fixed 0x00)	
		0x09	Battery (1Byte, unit:0.1V)	NTU (2Bytes ,0.1ntu)	Temperature with NTU (Signed 2Bytes, unit:0.01°C)	EC5SoilHumidity (2Bytes,unit:0.01%)	Reserved (1Byte,fixed 0x00)

(1) Example of RA0710 Uplink: 01050900006409C4FFFF00

1st byte (01): Version

2nd byte (05): DeviceType 0x05 — RA07 Series

3rd byte (09): ReportType

4th byte (00): Battery—DC power supply

5th6th byte (0064): NTU—10 ntu, 0064(Hex)=100(Dec), 100x0.1ntu=10 ntu

7th8th byte (09C4): Temperature with NTU—25°C, 09C4(Hex)=2500(Dec), 2500x0.01°C=25°C

9th10th byte (FFFF): EC5SoilHumidity—N/A/

11th byte (00): Reserved

(2) Example of R72610 Uplink: 010909780064FF83FFFF00

1st byte (01): Version

2nd byte (09): DeviceType 0x09 — R726 Series

3rd byte (09): ReportType

4th byte (78): Battery—12v , 78 H_{ex}=120 D_{ec} 120*0.1v=12v

5th6th byte (0064): NTU—10 ntu, 0064(Hex)=100(Dec), 100x0.1ntu=10 ntu

7th8th byte (FF83): Temperature with NTU—-1.25°C, FF83(Hex)=-125(Dec), -125x0.01°C=-1.25°C

9th10th byte (FFFF): EC5SoilHumidity—N/A/

11th byte (00): Reserved

(3) Example of RA0710Y Uplink: 010D0900006409C4FFFF00

1st byte (01): Version

2nd byte (0D): DeviceType 0x0D — RA07xxY Series

3rd byte (09): ReportType

4th byte (00): Battery—DC power supply

5th6th byte (0064): NTU—10 ntu, 0064(Hex)=100(Dec), 100x0.1ntu=10 ntu

7th8th byte (09C4): Temperature with NTU—25°C, 09C4(Hex)=2500(Dec), 2500x0.01°C=25°C

9th10th byte (FFFF): EC5SoilHumidity—N/A/

11th byte (00): Reserved

5.2 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)

Description	**Device**	**CmdID**	**Device Type**	**NetvoxPayLoadData**		
Config ReportReq	RA07 Series R726 Series R727 Series	0x01	0x05 0x09 0x0D	MinTime (2bytes Unit:s)	MaxTime (2bytes Unit:s)	Reserved (5Bytes,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)	Reserved (5Bytes,Fixed 0x00)

(1) Configure RA0710 device parameters MinTime = 30s, MaxTime = 3600s (3600>30*1+10)

Downlink: 0105001E0E100000000000

Device returns:

8105000000000000000000 (configuration is successful)

8105010000000000000000 (configuration failed)

(2) Read RA0710 device parameters

Downlink: 0205000000000000000000

Device returns:

8205001E0E100000000000 (device current parameter)

Note:

The value of ReportMaxTime should be greater than (ReportType count *ReportMinTime+10) (Unit: second)

ReportType Count = 1 (The MinTime of EU868 cannot be less than 120s.)

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

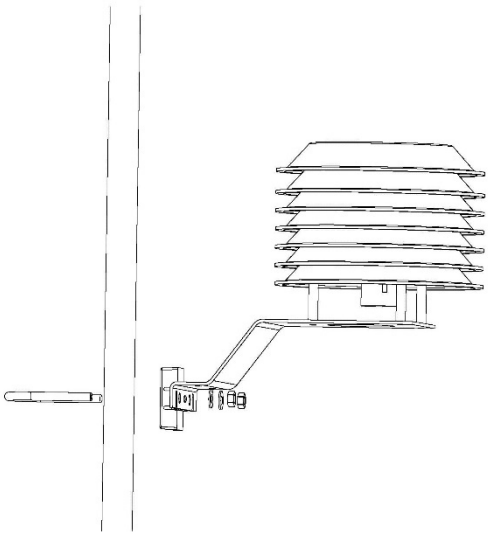
R72610 product is waterproof. After the network-joining is completed, please leave it outdoors.

(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.



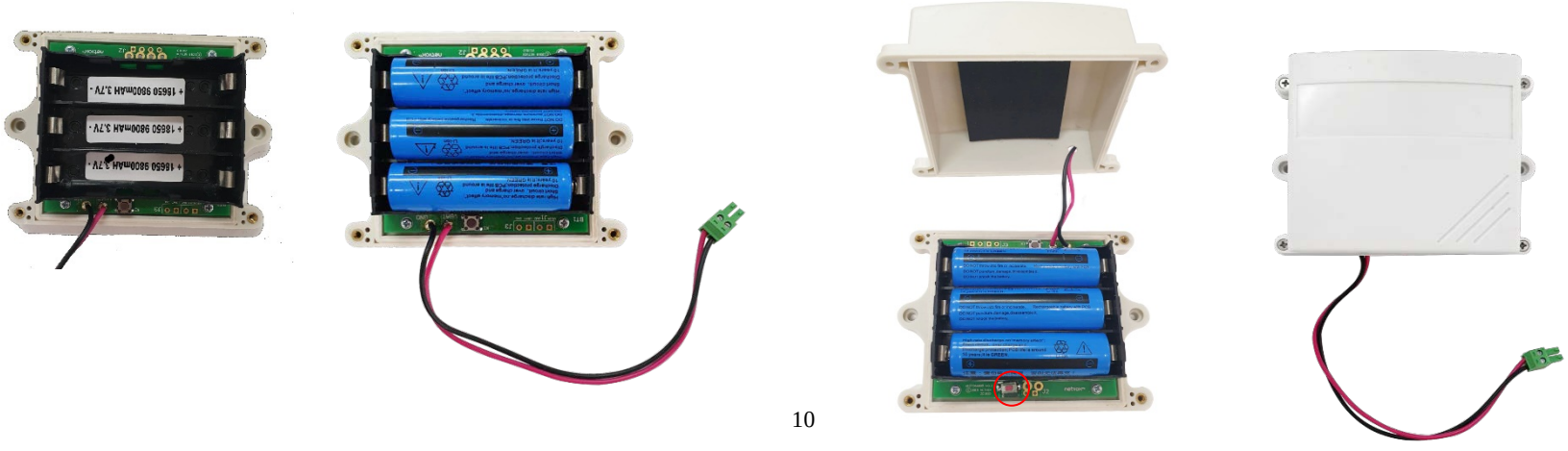
(5) R72610 has a battery compartment inside, users can buy and install rechargeable 18650 lithium battery, a total of 3 sections, a single rechargeable lithium battery voltage 3.7V, capacity recommended 5000mah, the installation of rechargeable lithium battery steps are as follows:

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.



activation button

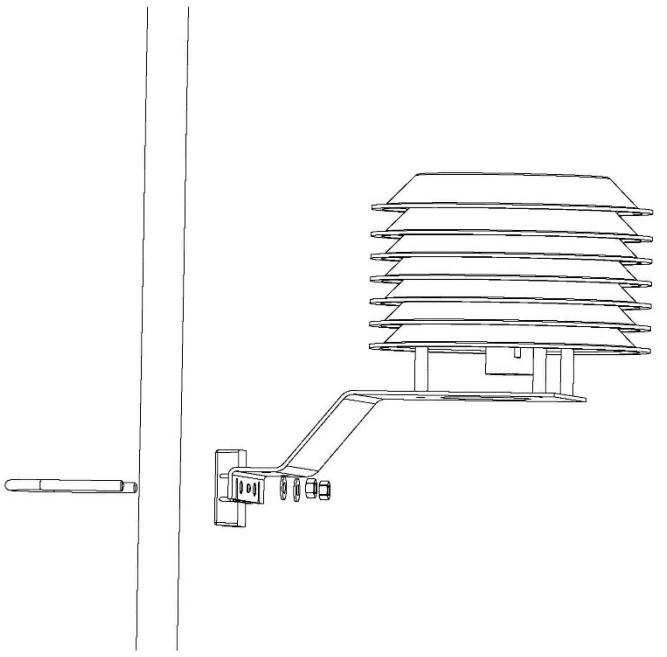
6.3RA0710Y

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.

6.4Maintenance 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.

4. Maintenance Period

   The maintenance period is dependent on the usage scenario. If the concentration of suspended solids is high, or there are many microorganisms, the sensor needs to be cleaned every 3-5 days.

Note

(1) The probe contains sensitive optical components and electronic components. Make sure that the probe is not subject to severe impact. The components inside the probe do not need to be maintained by the user.

(2) The black plastic cap of the turbidity sensor must be removed before testing as the figure below; otherwise, it will affect the measurement.

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.