Wireless CO2 / Temperature / Humidity Sensor User Manual

Table of Content

1. Introduction

RA0715_R72615_RA0715Y is a Class A device based on the LoRaWAN™ protocol of Netvox and is compatible with the LoRaWAN protocol.

RA0715_R72615_RA0715Y can be connected with the sensor of the temperature and humidity, and CO2.

The values collected by the sensor are 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 RA0715

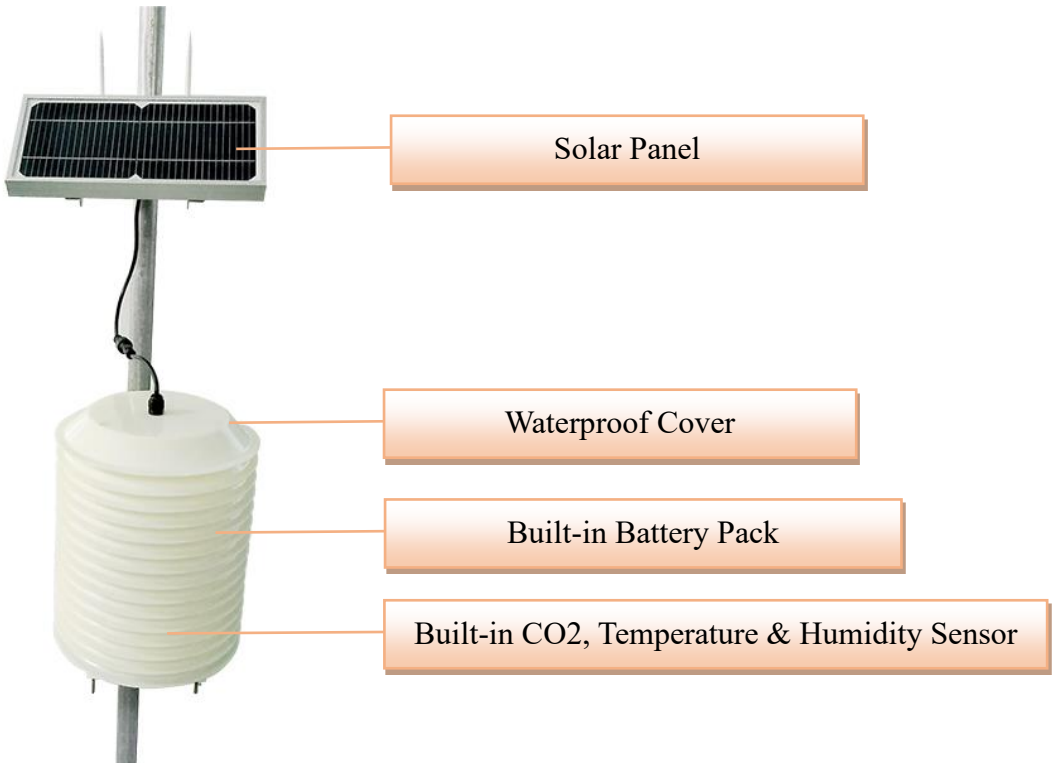


Figure 2 R72615

Figure 3 RA0715Y

3. Main Feature

- Compatible with LoRaWAN
- RA0715 and RA0715Y applies DC 12V adapters
- R72615 applies solar and rechargeable lithium batteries
- Simple operation and setting
- CO2, temperature and humidity detection
- Adopt SX1276 wireless communication module

4. Set up Instruction

On/Off

Power On	RA0715 and RA0715Y are connected to DC 12V adapter for power on. R72615 applies solar power and rechargeable lithium batteries.
Turn On	Connect with power on to turn on
Restore to Factory Setting	Press and hold the function key for 5 seconds, and the green indicator flashes 20 times.
Power Off	Disconnect from the power supply
Note	1. The engineering test requires to write the engineering testing software separately. 2. The interval between on and off is suggested to be about 10 seconds to avoid the interference of capacitor inductance and other energy storage components.

Network Joining

Never Join the Network	Turn on the device to search the network. The green indicator keeps on for 5 seconds: success. The green indicator remains off: fail
Had joined the network (Not in the original setting)	Turn on the device to search the previous network. The green indicator keeps on for 5 seconds: success. The green indicator remains off: fail.
Fail to Join the Network	Suggest checking the device registration information on the gateway or consulting your platform server provider if the device fails to join the network.

Function Key

Press and Hold for 5 Seconds	Restore to the original setting / 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 the device sends a data report The device is not in the network: the green indicator remains off

Low Voltage Threshold

Low Voltage Threshold	10.5 V

Threshold Restore to Factory Setting

Description	RA0715_R72615_RA0715Y has the function of the power-down saving the memory of network-joining information. This function acquiesces in turn off, that is, it will rejoin every time when it is power on. If the device is turned on by the ResumeNetOnOff command, the last network-joining information will be recorded when every time it is power on. (including saving the network address information that it is assigned, etc.) If users want to join a new network, the device needs to perform the original setting, and it will not rejoin the last network.
Operation Method	1. Press and hold the binding button for 5 seconds and then release (release the binding button when the LED flashes), and the LED flashes 20 times. 2. The device automatically restarts to rejoin the network.

5. Data Report

After power on, the device will immediately send a version packet report and two data reports including CO2, temperature, humidity and voltage.

The device sends data according to the default configuration before any other configuring.

ReportMaxTime:

RA0715 and RA0715Y is 900s,

R72615 is 1800s (subject to original setting)

* MaxTime **cannot** be set less than 15 min

* The value of the ReportMaxTime should be **greater than ReportType count *ReportMinTime+10**

ReportMinTime:

30s (US915, AU915, KR920, AS923, IN865)

120s (EU868)

*Data packets should be sent at MinTime intervals.

Report Type count: 2

Note:

(1) The cycle of the device sending the data report is according to the default.

(2) The interval between two reports must be the MaxTime.

(3) ReportChange is not supported by RA0715_R72615_RA0715Y (Invalid configuration).

The data report is sent according to ReportMaxTime as a cycle (the first data report is the start to the end of a cycle).

(4) Data packet: CO2, temperature, and humidity.

(5) The CO2 sensor operates stably. It takes about 180 seconds after power-on to send the data report.

(6) The device also supports the TxPeriod cycle configuration instructions of Cayenne. Therefore, the device can perform the report according to the TxPeriod cycle. The particular report cycle is ReportMaxTime or TxPeriod depending on which report cycle was configured last time.

(7) It would take 180 seconds for the sensor to sample and process the collected value after 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://www.netvox.com.cn:8888/cmddoc

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=0x01 is data packet; If the device data exceeds 11 bytes or there are shared data packets, the Report Type will have different values.

   (b) When Report Type=0xFFFF, it means that RA0715/ R72615/RA0715Y does not support the connected device or sensor malfunction.

4. **Signed Value:**

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

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 to the devicetype

NetvoxPayLoadData– Fixed bytes (Fixed =8bytes)

Device	**Device Type**	**Report Type**	**NetvoxPayLoadData**				
RA07 R726 RA07xxY	0x05 0x09 0x0D	0x00	SoftwareVersion (1Byte) Eg.0x0A—V1.0	HardwareVersion (1Byte)	DateCode (4Bytes,eg 0x20170503)	Reserved (2Bytes,fixed 0x00)	
		0x07	Battery (1Byte, unit:0.1V)	CO2 (2Byte ,0.1ppm)	NH3 (2Byte ,0.1ppm)	Noise (2Byte ,0.1db)	Reserved (1Byte,fixed 0x00)
		0x0C	Battery (1Byte, unit:0.1V)	Temperature (Signed2Bytes,unit:0.01°C)	Humidity (2Bytes,unit:0.01%)	WindSpeed (2Bytes,unit:0.01m/s)	Reserved (1Byte,fixed 0x00)

Example of RA0715 Uplink:

Packet #1: 010507002134FFFFFFFF00

1st byte (01): Version

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

3rd byte (07): ReportType

4th byte (00): DC power supply

5th 6th byte (2134): CO2—850ppm , 2134 Hex=8500 Dec 8500*0.1ppm=850 ppm

7th 8th byte (FFFF): NH3—N/A

9th 10th byte(FFFF): Noise—N/A

11th byte (00): Reserved

Packet #2: 01050C0009C42328FFFF00

1st byte (01): Version

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

3rd byte (0C): ReportType

4th byte (00): DC power supply

5th 6th byte (09C4): Temperature—25° ,9C4 Hex=2500 Dec 2500*0.01°C =25°C

7th 8th byte (2328): Humidity—90% ,2328 Hex=9000 Dec 9000*0.01%=90%

9th 10th byte (FFFF): Wind Speed—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	DeviceType	NetvoxPayLoadData		
Config ReportReq	RA0715 R72615 RA0715Y	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 RA0715 device parameter MinTime = 30s, MaxTime = 900s

Downlink: 0105001E03840000000000

Device Return:

810500000000000000000 (configuration success)

810501000000000000000 (configuration failure)

（2）Read RA0715 device parameter

Downlink: 020500000000000000000

Device Return:

8205001E03840000000000 (device current parameter)

*Note:

The value of MinTime should be ≥ 30s (US915, AU915, KR920, AS923, IN865)

The value of MinTime should be ≥ 120s (EU868)

The value of MaxTime should be ≥ 900s

6. Installation

1. **RA0715** does not have the waterproof function. After the device completes joining the network, please place it indoor.

2. **R72615** has a waterproof function. After the device completes joining the network, please place it outdoors.

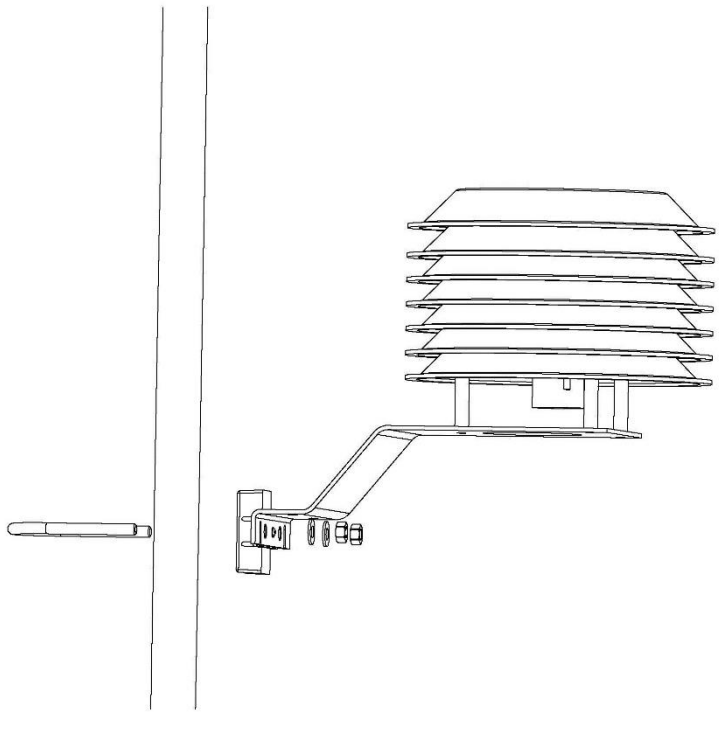
(1) In the installed position, loosen the U-shaped screw, the mating washer and the nut at the bottom of R72617, and then make the U-shaped screw pass through the appropriate size cylinder and fix it on the fixing strut flap of R72615. Install the washer and the nut in order and lock the nut till R72615 body is stable and does not shake.

(2) At the upper side of the fixed position of R72615, loosen the two U-shaped screws, the mating washer and nut on the side of the solar panel. Make the U-shaped screw pass through the appropriate size cylinder and fix them on the main bracket

of the solar panel and install the washer and the nut in sequence. Lock nut till the solar panel is stable and does not shake.

(3) After adjusting the angle of the solar panel completely, lock the nut.

(4) Connect the top waterproof cable of R72617 with the wiring of the solar panel and lock it tight.



（5）Rechargeable lithium battery

R72615 has a battery pack inside. Users can buy and install rechargeable 18650 lithium battery, a total of 3 sections, voltage 3.7V/ every single rechargeable lithium battery, recommended capacity 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 positive and negative level of the battery)

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.

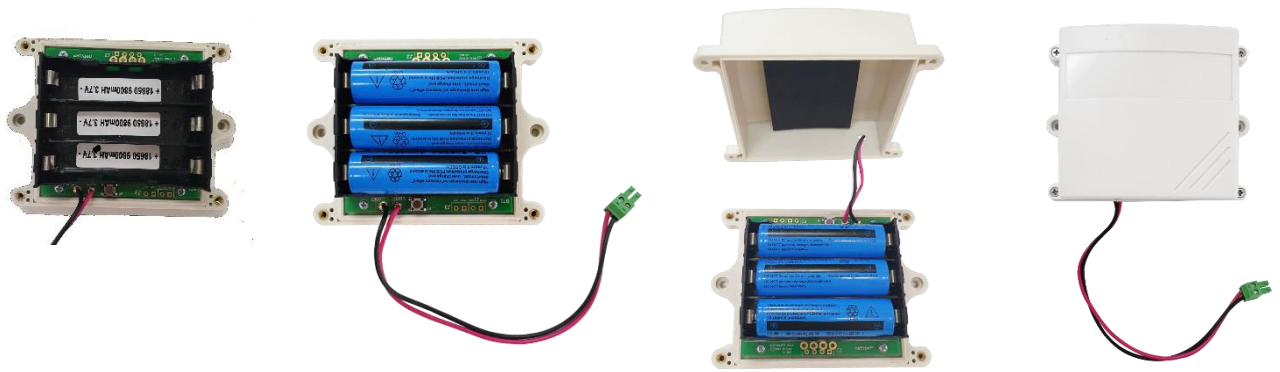


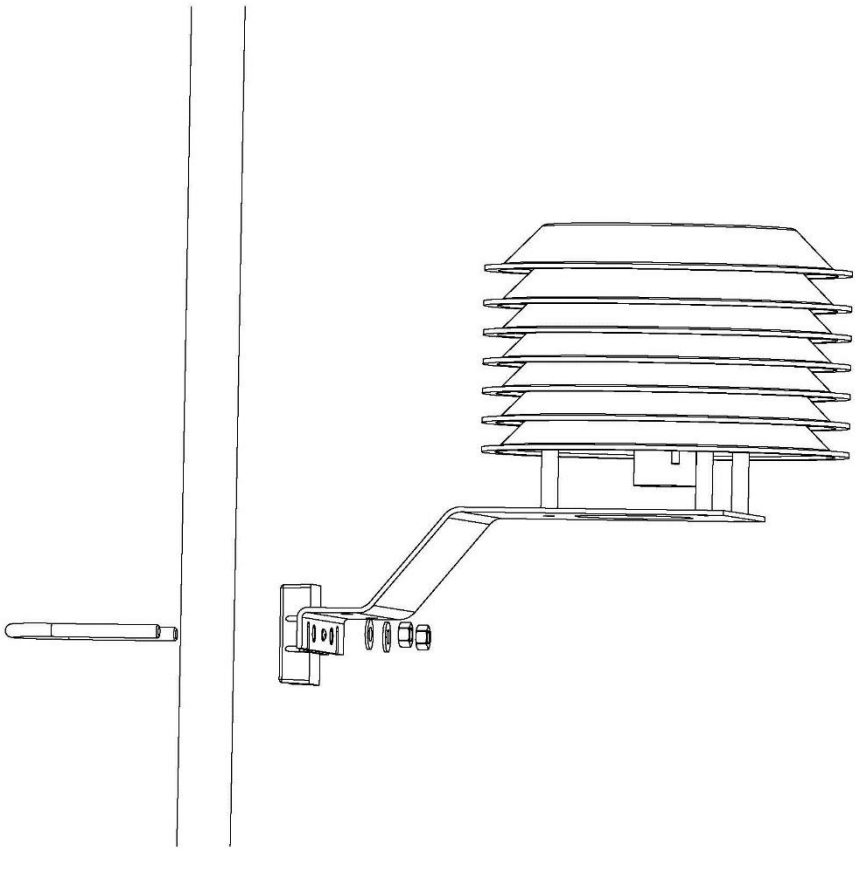
Fig. Rechargeable Lithium Battery

3．**RA0715Y** is waterproof and can be placed outdoors after the device completes joining the network..

(1) In the installed position, loosen the U-shaped screw, the mating washer and the nut at the bottom of RA0715Y, and then make the U-shaped screw pass through the appropriate size cylinder and fix it on the fixing strut flap of RA0715Y. Install the washer and the nut in order and lock the nut till RA0715Y body is stable and does not shake.

(2) Loosen the M5 nut at the bottom of the RA0715Y matte and take the matte together with the screw.

(3) Make the DC adaptor pass through the central hole of the bottom cover of RA0715Y and insert it into the RA0715Y DC socket, and then put the mating screw to the original position and lock the M5 nut tight.



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.