netvox RA0723 Wireless PM2.5/Noise/Temperature/Humidity Sensor User Manual

Contents

netvox RA0723 Wireless PM2.5/Noise/Temperature/Humidity Sensor

Introduction

RA0723_R72623_RA0723Y is a ClassA type device based on the LoRaWAN open protocol of Netvox and is compatible with the LoRaWAN protocol. RA0723_R72623_RA0723Y can be connected to the detector of PM2.5, temperature and humidity, and noise. The values collected by the sensor are reported to the corresponding gateway.

LoRa Wireless Technology:
LoRa is a wireless communication technology famous for its long-distance transmission and low power consumption. Compared with other communication methods, LoRa spread spectrum modulation technique greatly extend the communication distance. It can be widely used in any use case that requires long-distance and low-data wireless communications. For example, automatic meter reading, building automation equipment, wireless security systems, industrial monitoring. It has features like small size, low power consumption, long transmission distance, strong 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.

Appearance

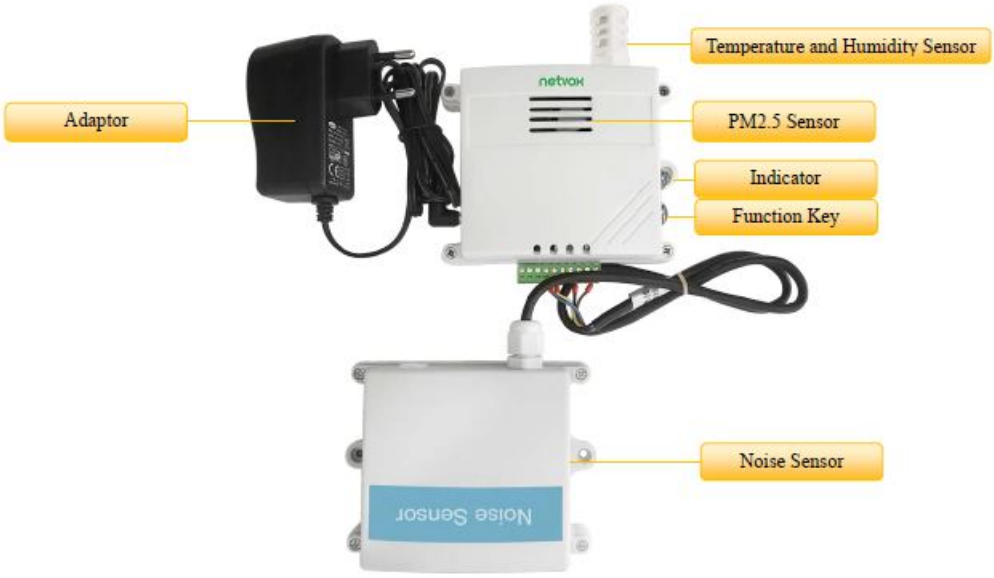


Fig. 1. RA0723 internal PM2.5 and temperature and humidity sensor, external noise Sensor

Fig. 2. R72623 shield is equipped with PM2.5, temperature and humidity sensor and noise sensor

Fig. 3. RA0723Y shield is equipped with PM2.5, temperature and humidity sensor and noise sensor

Main Feature

- Compatible with LoRaWAN
- RA0723 and RA0723Y applies DC 12V adapters
- R72623 applies solar and rechargeable lithium batteries
- Simple operation and setting
- PM2.5, noise, temperature and humidity detection
- Adopt SX1276 wireless communication module
- Frequency-hopping spread spectrum
- Configuring parameters and reading data via the third-party software platforms, and set alarms via SMS text and email (optional)
- Applicable to the third-party platforms: Actility/ThingPark, TTN, MyDevices/Cayenne

Set Up Instruction

On/Off

Power ON	RA0723 and RA0723Y are connected to DC 12V adapter for power on. R72623 applies solar 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 till green indicator flashes for 20 tim es.
Power Off	Disconnect from the power supply.
*The engineering test requires to write the engineering testing software separately.	

Note: 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 remain s off: fail
Had Joined the Network (N ot in the factory setting)	Turn on the device to search the previous network. The green indicator keeps on f or 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 factory 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.

Restore to Factory Setting

Description	RA0723_R72623_RA0723Y 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 factory 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.

Low Voltage Threshold

Low Voltage Threshold	10.5 V

Data Report
After power is on, the device will immediately send a version packet report and a data report including the noise value, PM2.5, temperature and humidity, and voltage. The device sends data according to the default configuration before any other configuring.

Default setting:
Report Maxime & Minime

Model		US915, AU915, KR920, AS923, IN865	EU868
RA0723	MaxTime	180s	370s
	MinTime	30s	120s
R72623	MaxTime	1800s	1800s
	MinTime	30s	120s
RA0723Y	MaxTime	180s	370s
	MinTime	30s	120s

Report Type count = 3

Report Change: 0

*** Report Max Time should be greater than ReportType count *ReportMinTime+10 and should not be less than 300 seconds.**

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 RA0723_R72623_RA0723Y (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 pocket: PM2.5, noise, temperature, and humidity
5. 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.
6. It would take 35 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://loraresolver.netvoxcloud.com:8888/page/index**

Example of ReportDataCmd

FPort 0x06

Bytes	1	1	1	Var (Fix=8 Bytes)
	Version	DeviceType	Report Type	NetvoxPayLoadData

Version– 1 byte –0x01——the Version of Netvox LoRaWAN Application Command Version
DeviceType– 1 byte – Device Type of Device The device type is listed in Netvox LoRaWAN Application Device

type.doc
Report Type – 1 byte –the presentation of the NetvoxPayLoadData according to the device type
NetvoxPayLoadData– Fixed bytes (Fixed =8bytes)

Device	**Device Type**	**Report Type**	**NetvoxPayLoadData**				
RA0723 R72623 RA0723Y	0x05 0x09 0x0D	0x02	Battery (1Byte, unit: 0.1V)	PM1.0 (2Byte 1ug/m3)	PM2.5 (2Byte 1ug/m3)	PM10 (2Byte 1ug/m3)	Reserved (1Byte,fixed 0x00)
		0x07	Battery (1Byte, unit: 0.1V)	CO 2(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 R72623 Uplink:

Packet #1: 01090278FFFF000EFFFF00

- 1st byte (01): Version
- 2nd byte(09): DeviceType 0x09 R726 Series
- 3rd byte (02): ReportType
- 4th byte (78): Battery 12v , 78 Hex=120 Dec 120*0.1v=12v
- 5th6th byte (FFFF): PM1.0
- 7th 8th byte (000E): PM2.5 14 ug/m3
- 9th10th byte (FFFF): PM10
- 11th byte (00): Reserved

Packet #2: 01090778FFFFFFFF025800

- 1st byte (01): Version
- 2nd byte (09): DeviceType 0x09 R726 Series
- 3rd byte (07): ReportType
- 4th byte (78): Battery 12v , 78 Hex=120 Dec 120*0.1v=12v
- 5th6th byte (FFFF): CO2
- 7th 8th byte (FFFF): NH3
- 9th10th byte (0258): Noise 60db , 258 Hex=600 Dec 600*0.1v=60 db

- 11th byte (00): Reserved

Packet #3: 01090C7809C41B58FFFF00

- 1st byte (01): Version
- 2nd byte (09): DeviceType 0x09 R726 Series
- 3rd byte (0C): ReportType
- 4th byte (78): Battery 12v , 78 Hex=120 Dec 120*0.1v=12v
- 5th6th byte (09C4): Temperature 25° , 09C4 Hex=2500 Dec 2500*0.01°=25°
- 7th 8th byte(1B58): Humidity 70% , 1B58 Hex=7000 Dec 7000*0.01%=70%
- 9th10th byte (FFFF): Wind Speed
- 11th byte (00): Reserved

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	RA0723 R72623 RA0723Y	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 R72623 device parameter MinTime = 30s, MaxTime = 3600s
   Downlink 0109001E0E100000000000
   Device returns
   810900000000000000000 (Configuration success)
   810901000000000000000 (Configuration failure)
2. Read R72623 device parameter
   Downlink 020900000000000000000
   Device return
   8209001E0E100000000000 (device current parameter)

PM2.5 Sensor Dust Removal

PM2.5 sensor dust removal needs to be disassemble. There are currently two ways to clean the dust of PM2.5 sensor:

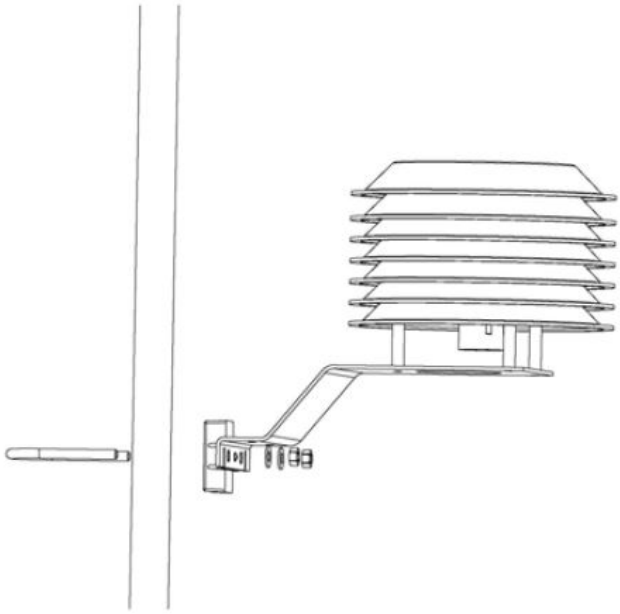
1. If it is ordinary dry dust, it can use a hair dryer to clean it up. Be careful not to get too hot and too strong wind. Please use a hair dryer to clean the air inlet and outlet when the PM2.5 sensor stops operating. (Among them, the fan of PM2.5 sensor is the air outlet; therefore, please fix the fan blade when cleaning the air outlet, and fixing fan blade can be clamped with tweezers or caught by something.)
2. When the PM2.5 sensor stops operating, the sticky dust inside the sensor cannot be cleaned. The user can

use a brush to clean the dust that can be seen inside the air inlet and outlet.

3. The average time that PM2.5 Dust Sensor is without any failures is 3 years. If the concentration is more than 300ug/m3 for more than 50% of a year, or the concentration exceeds 500ug/m3 for more than 20% of a year, the consistency of the sensor will decrease. The data may be high because of the internal dust accumulation.

Installation

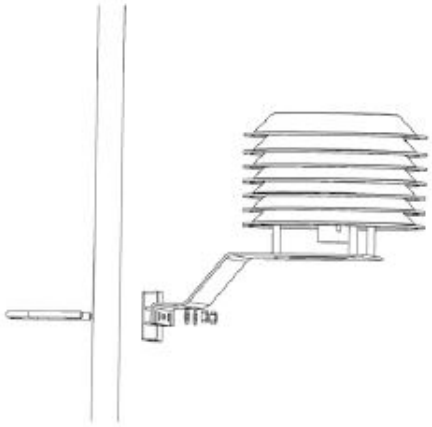
1. **RA0723** does not have the waterproof function. After the device completes joining the network, please place it indoor. Please pay attention to the direction when installing the Sensor and keep the pickup facing down
2. **R72623** has a waterproof function. After the device completes joining the 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 R72623, and then make the U-shaped screw pass through the appropriate size cylinder and fix it on the fixing strut flap of R72623. Install the washer and the nut in order and lock the nut till R72623 body is stable and does not shake.
    2. At the upper side of the fixed position of R72623, 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 R72623 with the wiring of the solar panel and lock it tight



    5. Rechargeable lithium battery R72623 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. **RA0723Y** 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 RA0723Y, and then make the U-shaped screw pass through the appropriate size cylinder and fix it on the fixing strut flap of RA0723Y. Install the washer and the nut in order and lock the nut till RA0723Y body is stable and does not shake.
    2. Loosen the M5 nut at the bottom of the RA0723Y matte and take the matte together with the screw.
    3. Make the DC adaptor pass through the central hole of the bottom cover of RA0723Y and insert it into the RA0723Y DC socket, and then put the mating screw to the original position and lock the M5 nut tight.



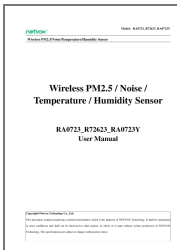
Important Maintenance Instruction

Kindly pay attention to the following in order 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 dusty or dirty environment. It might damage its detachable parts and electronic components.
- Do not store the device under excessive heat condition. High temperature 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 to normal temperature, moisture will form inside, which will destroy 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 in 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 working properly, please take it to the nearest authorized service facility for repair.

Documents / Resources

 Wireless PM2.5 / Noise / Temperature / Humidity Sensor RA0723_R72623_RA0723Y User Manual	**netvox RA0723 Wireless PM2.5/Noise/Temperature/Humidity Sensor** [pdf] User Manual RA0723, R72623, RA0723Y, Wireless PM2.5 Sensor, Wireless Noise Sensor, Wireless Temperature Sensor, Wireless Humidity Sensor