

# Wireless PM2.5 / Temperature / Humidity Sensor User Manual

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# 1. Introduction

RA0716 is a Class A device based on the LoRaWAN<sup>TM</sup> protocol of Netvox and is compatible with the LoRaWAN protocol.

RA0716 can be connected with the sensor of the temperature and humidity and PM2.5. 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. RA0716

## 3. Main Feature

- Compatible with LoRaWAN
- RA0716 applies DC 12V adapters
- Simple operation and setting
- PM2.5 temperature and humidity detection
- Adopt SX1276 wireless communication module

## 4. Set up Instruction

### On/Off

Power On	RA0716 is connected to DC 12V adapter for power on.
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	<ol style="list-style-type: none"><li>1. The engineering test requires to write the engineering testing software separately.</li><li>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.</li></ol>

## 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
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## Threshold Restore to Factory Setting

Description	RA0716 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 the data report including the temperature, humidity, PM2.5 and voltage.

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

ReportMaxTime: 900s

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

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

ReportMinTime: 30s

120s (EU868)

( The MinTime configuration is not available. But the software has restriction, MinTime must be configured a number greater than 0. )

ReportType count = 1

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 RA0716 (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, voltage, 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>

## Report Configuration

Description	Device	CmdID	DeviceType	NetvoxPayloadData		
ConfigReportReq	RA0716	0x01	0x35	MinTime (2bytes Unit:s)	MaxTime (2bytes Unit: s)	Reserved (5Bytes, Fixed 0x00)
ConfigReportRsp		0x81		Status (0x00_success)	Reserved (8Bytes, Fixed 0x00)	
ReadConfigReportReq		0x02		Reserved (9Bytes, Fixed 0x00)		
ReadConfigReportRsp		0x82		MinTime (2bytes Unit: s)	MaxTime (2bytes Unit: s)	Reserved (5Bytes, Fixed 0x00)

(1) Configure RA0716 device parameter MinTime = 30s, MaxTime = 900s

Downlink: 0135001E03840000000000

Device Return:

8135000000000000000000 (configuration success)

8135010000000000000000 (configuration failure)

\*Note:

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

The value of MinTime should be  $\geq 120s$  (EU868)

The value of MaxTime should be  $\geq 900s$

(2) Read RA0716 device parameter

Downlink: 0235000000000000000000

Device Return:

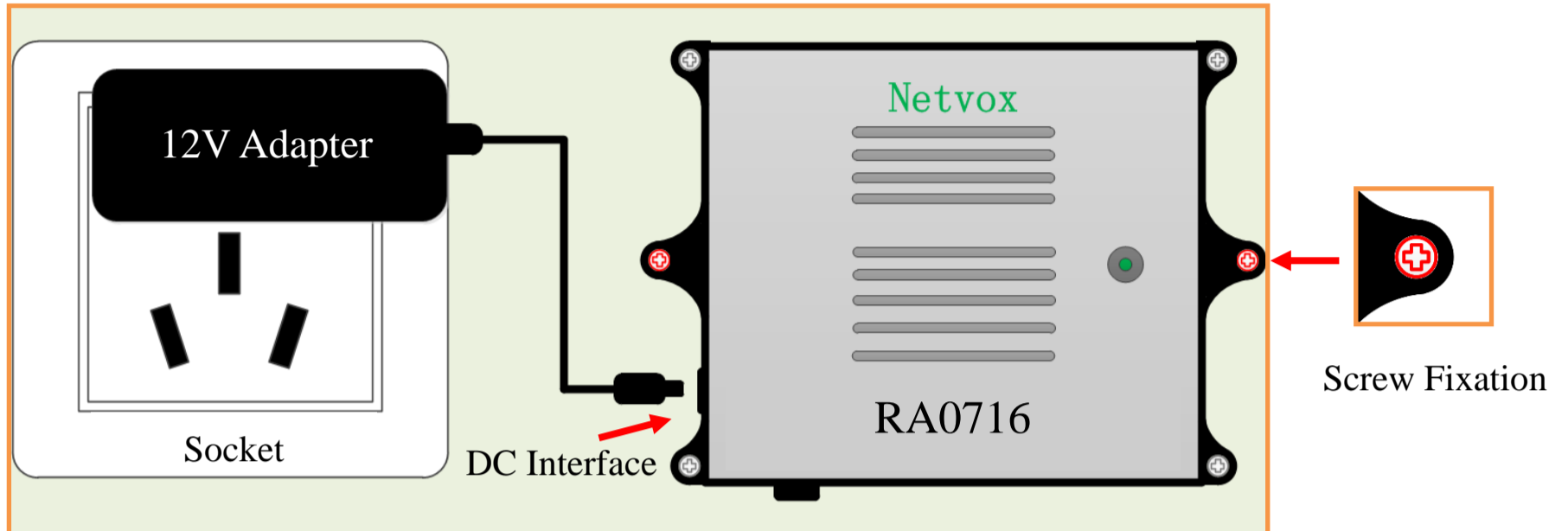
8235001E03840000000000 (device current parameter)

## 6. Installation

1. RA0716 adopts screws to secure the unit to a wall or other surface (as the figure below).

Note:

Do not install the device in a metal shielded box or in an environment with other electrical equipment around it to avoid affecting the wireless transmission of the device.



2. RA0716 periodically reports the data including the temperature, humidity, and PM2.5 according to ReportMaxTime.

The default MaxTime is 900 seconds.

Note:

MaxTime can be modified through the downlink command, but it is recommended not to set the time too short to avoid excessive battery consumption.

3. RA0716 is suitable for the following scenarios:

- Factory
- Construction site
- School
- Airport
- Station
- Dust Environmental Protection Supervision



## 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.