netvox™

Wireless Temperature and Humidity Sensor For Low Temperature Environment

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R720A
User Manual

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1. Introduction

R720A is a long-distance wireless temperature and humidity device for Netvox Class A type equipment based on LoRaWAN open protocol, compatible with LoRaWAN protocol.

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.
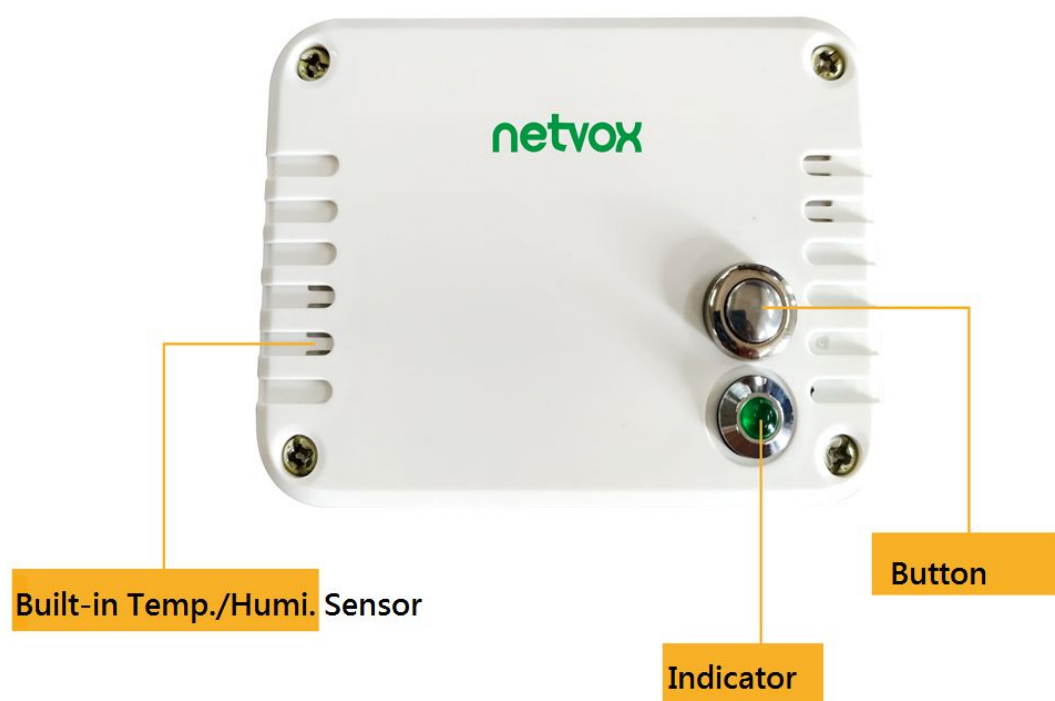
2. Appearance

Fig.1   R720A   Appearance

3. Main Features

- Compatible with LoRaWAN
- 2 ER14505 lithium batteries (3.6V / section) parallel power supply
- Detectable air temperature and humidity
- Simple operation and setting
- The base is attached with a magnet that can be attached to a ferrous object
- Protection class IP65
- Compatible with LoRaWANTM Class A
- Frequency hopping spread spectrum
- Configuration parameters can be configured via a third-party software platform, data can be read and alerts can be set via SMS text and email (optional)
- Applicable to third-party platforms: Actility/ThingPark, TTN, MyDevices/Cayenne
- Low power consumption and long battery life

Note:

Battery life is determined by the sensor reporting frequency and other variables, please refer to http://www.netvox.com.tw/electric/electric_calc.html

On this website, users can find battery life time for varied models at different configurations.

4.Set up Instruction

On/Off

Power on	Insert batteries. (users may need a flat blade screwdriver to open)
Turn on	Press and hold the function key for 3 seconds till the green indicator flashes once.
Turn off (Restore to factory setting)	Press and hold the function key for 5 seconds till the green indicator flashes for 20 times.
Power off	Remove Batteries.
Note:	1. Remove and insert the battery; the device is at off state by default. 2. On/off interval is suggested to be about 10 seconds to avoid the interference of capacitor inductance and other energy storage components. 3. Five seconds after power on, the device will be in engineering test mode.

Network Joining

Never joined the network	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	Turn on the device to search the previous network. The green indicator stays on for 5 seconds: success The green indicator remains off: fail

Fail to join the network
(when the device is on)
	First two mins: wake up every 15 seconds to send request.
	After two mins: enter sleeping mode and wake up every 15 minutes to send request.
	Note: Suggest to remove batteries if the device is not used to save power.
	    Suggest to check the device verification information on the gateway
	    or consult your platform server provider.

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: green indicator flashes once and sends a report The device is not in the network: green indicator remains off

Sleeping Mode

The device is on and in the network	Sleeping period: Min Interval. When the reportchange exceeds setting value or the state changes: send a data report according to Min. Interval.

The device is on but not in the network	First two mins: wake up every 15 seconds to send request.
	After two mins: enter sleeping mode and wake up every 15 minutes to send request.
	Note: Suggest to remove batteries if the device is not used.
	    Suggest to check the device verification information on the gateway
	    or consult your platform server provider.

Low Voltage Warning

Low Voltage	3.2V

5. Data Report

Data Report

The device will immediately send a report of the version package and a report data with temperature and humidity and voltage values.
The device sends data in the default configuration before any configuration is done.

Maximum time: Max Interval
Minimum time: Min Interval (by default, the current voltage value is detected every Min Interval)

Default reportchange:
Battery --- 0x01 (0.1V)
Air temperature default reportchange: 1 ° C
Air humidity default reportchange: 1%

Note: The device data reporting cycle is configured before shipment .
The interval between two reports must be the minimum time
R720A default Max Interval = 15min, Min Interval = 15min (if there is special custom shipment, the setting is changed according to customer requirements)

The data parsing reported by the device is referenced by the Netvox LoraWAN Application Command document and
http://www.netvox.com.cn:8888/page/index

Data report configuration and sending period are as following:

Min Interval (Unit:second)	Max Interval (Unit:second)	Reportable Change	Current Change≥ Reportable Change	Current Change < Reportable Change
Any number between 1~65535	Any number between 1~65535	Can not be 0.	Report per Min Interval	Report per Max Interval

6. Control Command

FPort：0x07

Bytes	1	1	Var(Fix =9 Bytes)
	CmdID	DeviceType	NetvoxPayLoadData

CmdID– 1 bytes
DeviceType– 1 byte – Device Type of Device
NetvoxPayLoadData– var bytes (Max=9bytes)

| Description	Device	CmdID	Device Type	NetvoxPayLoadData				
Config ReportReq		0x01		MinTime (2bytes Unit:s)	MaxTime (2bytes Unit:s)	BatteryChange (1byte Unit:0.1v)	TemperatureChange (2byte Unit:0.01℃)	HumidityChange （2byte Unit:0.01%）
Config ReportRsp	R720A	0x81	0x6E	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)	BatteryChange (1byte Unit:0.1v)	TemperatureChange (2byte Unit:0.01℃)	HumidityChange （2byte Unit:0.01%）

（1）**Command Configuration:**

MinTime = 1min、MaxTime = 1min、BatteryChange = 0.1v、TemperatureChange = 1℃、HumidityChange = 1％

Downlink：016E003C003C0100640064　　　　003C(H$_{ex}$) = 60(D$_{ec}$)
Response：

816E000000000000000000（Configuration success）
816E010000000000000000（Configuration failure）

（2）**Read Configuration:**

Downlink：026E000000000000000000
Response：

826E003C003C0100640064（Current configuration）

Example#1 based on
**MinTime = 1 Hour, MaxTime= 1 Hour, Reportable Change i.e. BatteryVoltageChange=0.1V**
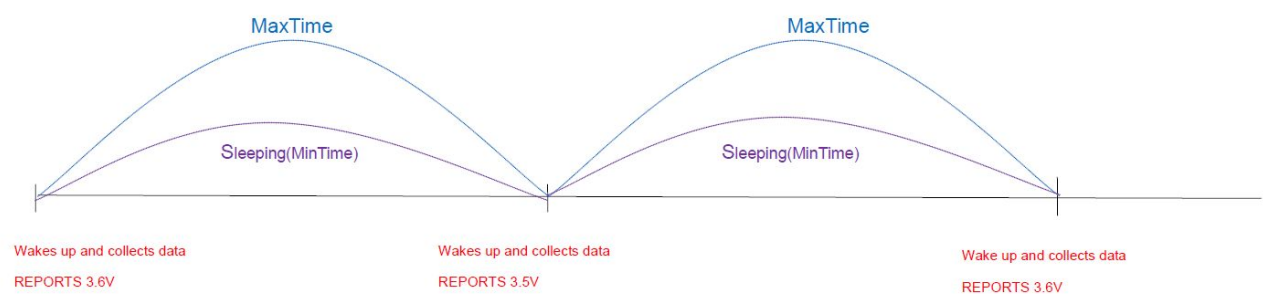
Note: MaxTime=MinTime. Data will only be report according to MaxTime (MinTime) duration regardless BtteryVoltageChange value.

Example#2 based on
MinTime = 15 Minutes, MaxTime= 1 Hour, Reportable Change i.e. BatteryVoltageChange= 0.1V.
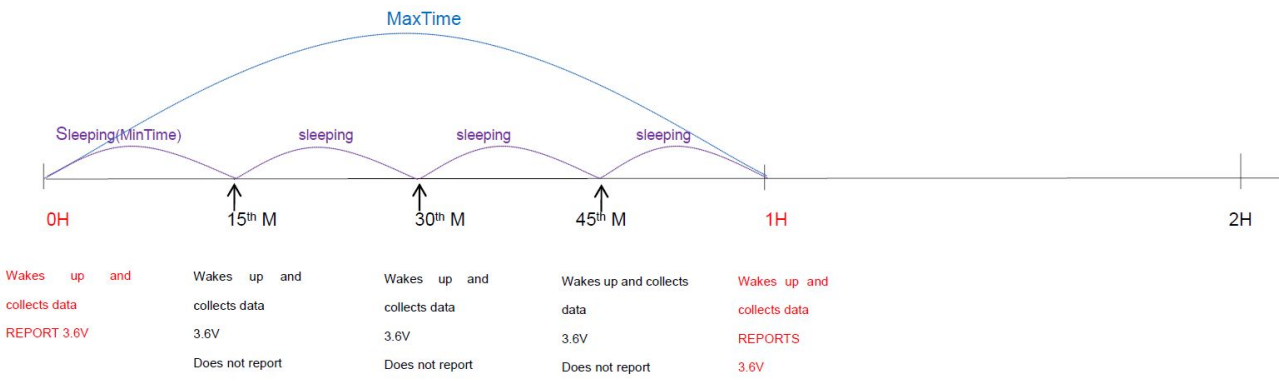
Example#3 based on
MinTime = 15 Minutes, MaxTime= 1 Hour, Reportable Change i.e. BatteryVoltageChange= 0.1V.
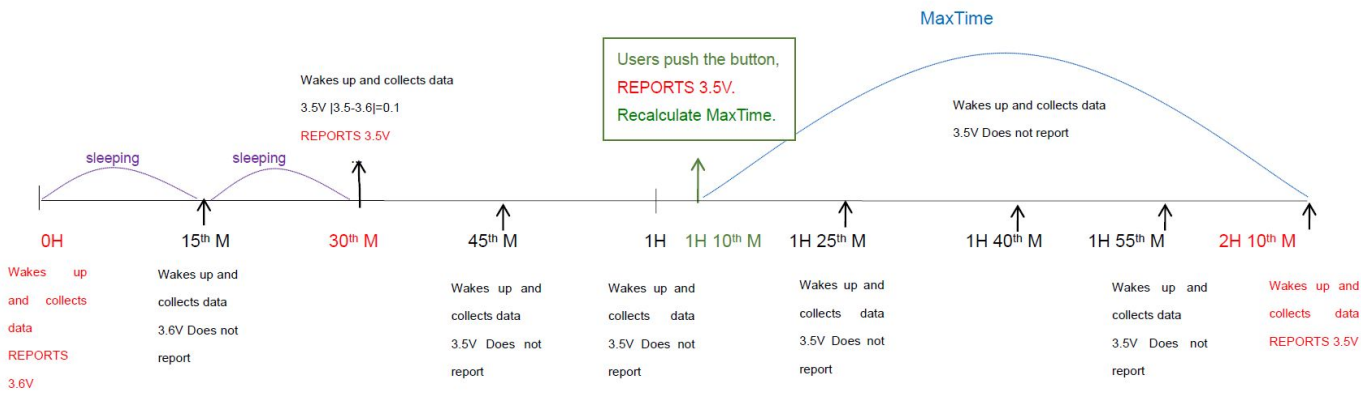
Notes:
1) The device only wakes up and performs data sampling according to MinTime Interval.
   When it is sleeping, it does not collect data.
2) The data collected is compared with the last data reported. If the data change value is greater than the ReportableChange value, the device reports according to MinTime interval.
   If the data variation is not greater than the last data reported, the device reports according to MaxTime interval.

3) We do not recommend to set the MinTime Interval value too low. If the MinTime Interval is too low, the device wakes up frequently and the battery will be drained soon.
4) Whenever the device sends a report, no matter resulting from data variation, button pushed or MaxTime interval, another cycle of MinTime/MaxTime calculation is started.

7. Example Application

In the case of detecting whether the motor is working normally, it is necessary to install the device in the state where the device is powered off and the motor is stationary. It is recommended to install it horizontally. After the fixing is completed, power on the device. The device performs offset calibration of the device after one minute of network-joining. (The device offset cannot be moved after calibration. If it needs to be moved, it needs to be powered off for 1 minute and then re-offset calibration). The equipment needs to collect the triaxial acceleration and temperature of the target motor for a period of time, and it is used as a reference for the setting of the static threshold, the motion threshold and whether the motor is abnormal. Assume that the acquired Z-axis acceleration is stable at $100m/s^2$ with an error of $\pm 2m/s^2$, and the active threshold can be set to $110m/s^2$, and the static threshold is $104m/s^2$. The specific configuration needs to be based on actual conditions. The configuration of the active threshold and the static threshold can be found in the Netvox LoRaWAN Application Command V1.8.6 document.

8. Installation

This product comes with waterproof function. When using it, the back of it can be adsorbed on the iron surface, or the two ends can be fixed to the wall with screws.
Note: To install the battery, use a screwdriver or similar tool to assist in opening the battery cover.

1. The temperature and humidity sensor (R720A) has a built-in magnet (as shown by the dotted line in the figure below). It can be attached to the surface with iron material during installation, which is convenient and quick.

Comment
Do not install the device in a metal shielded box or in an environment surrounded by other electrical equipment to avoid affecting the wireless transmission of the device.
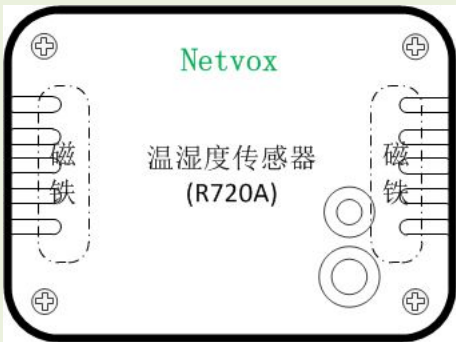
2. The temperature and humidity sensor detects the temperature (or humidity) according to Min Time. When the detected temperature value (or humidity value) is compared with the last report, it exceeds the set value (temperature default 1 ℃; humidity default 1%), that is, temperature. If the change exceeds 1 ° C (or humidity exceeds 1%), the currently detected value is sent.

3. If the change value of temperature or humidity does not exceed the set value, the data is reported regularly according to the Max Time.

This figure shows the application of the temperature and humidity sensor (R720A) in a refrigerator.
It can also be applied to the following scenarios:
● Restaurant (refrigerator or freezer)
● Supermarket (freezer)
● Engine room
● Environmental monitoring
● Smart cities and buildings
● Storage and transportation of food and medicine
● Flowers and other perishable foods
● Wall or logistics refrigerator
where temperature or humidity needs to be detected

9.Important Maintenance Instruction

Your device is a product of 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 moisture 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 can damage its detachable parts and electronic components.

• Do not store in excessive heat. High temperatures can shorten the life of electronic devices, destroy batteries, and deform or melt some plastic parts.

• Do not store in a 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. Rough handling of equipment can destroy internal circuit boards and delicate structures.

• Do not wash with strong chemicals, detergents or strong detergents.

• Do not apply with paint. Smudges can block debris in detachable parts and affect normal operation.

• Do not throw the battery into a fire to prevent the battery from exploding. Damaged batteries may also explode.

All of the above suggestions apply equally to your device, battery and accessories. If any device is not working properly.

Please take it to the nearest authorized service facility for repair.