Wireless Differential Pressure and Temperature sensor

R718Y
User Manual

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1. Introduction

R718Y is the Class A device based on the LoRaWAN™ protocol of Netvox. The device detects the pressure difference and the temperature. It is compatible with the LoRaWAN protocol.

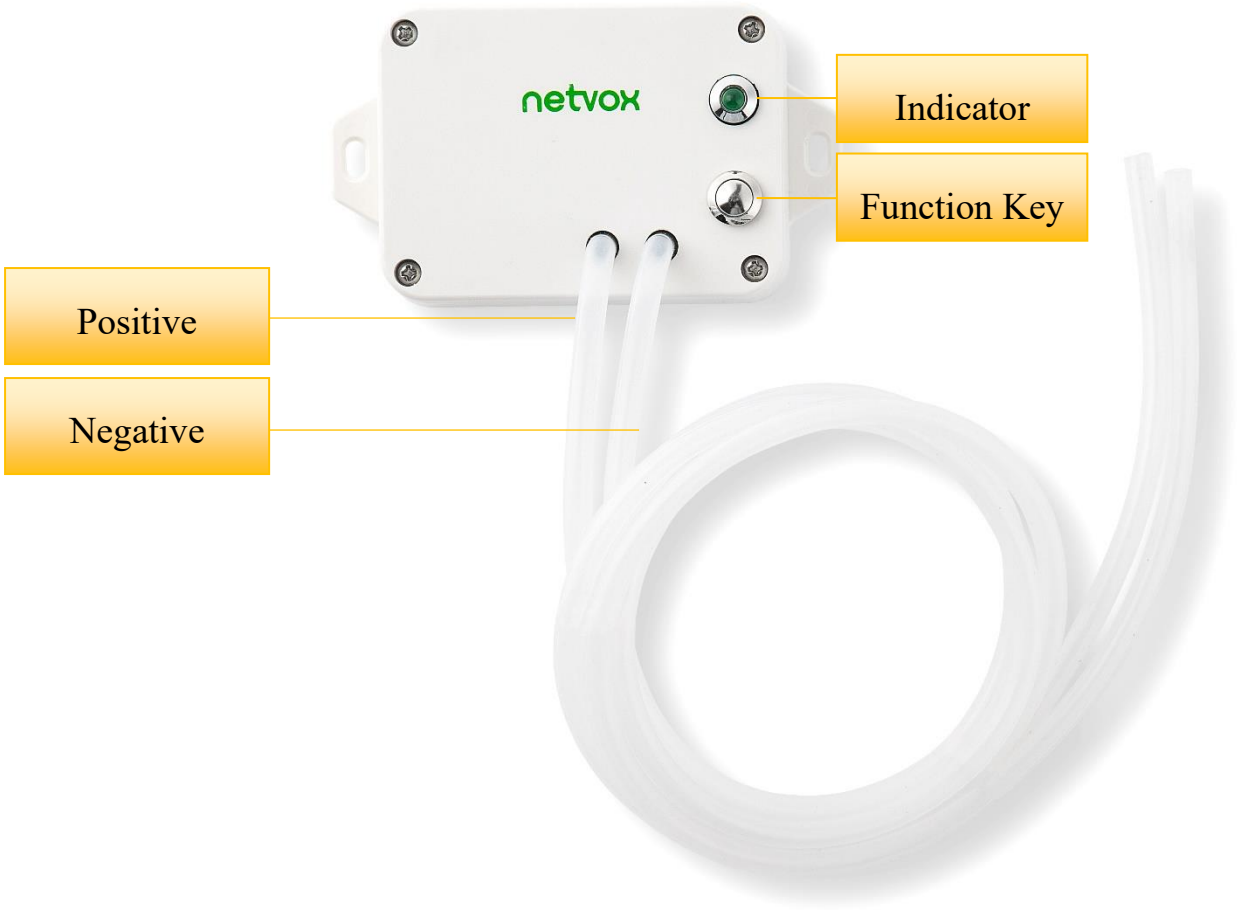
LoRa Wireless Technology:

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



3. Main Features

- Apply SX1276 wireless communication module
- 2 ER14505 batteries AA size (3.6V / section) in parallel
- Differential pressure sensor
- Protection class IP40
- The base is attached with a magnet that can be attached to a ferrous object
- Compatible with LoRaWAN™ Class A
- Frequency hopping spread spectrum technology
- Configuration parameters can be configured through third-party software platforms, data can be read and alarms can be set via SMS text and email (optional)
- Available third-party platform: Actility / ThingPark, TTN, MyDevices/Cayenne
- Low power consumption and long battery life

  Battery Life:

  - Please refer to web: http://www.netvox.com.tw/electric/electric_calc.html
  - At this website, users can find battery life time for variety models at different configurations.

    1. Actual range may vary depending on environment.

    2. Battery life is determined by sensor reporting frequency and other variables.

4. Set up Instruction

On/Off

Power on	Insert batteries. (The users may need a 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 second, and the green indicator flashes 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. The first 5 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

Function Key

Press and hold for 5 seconds	Restore to 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: 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.

Low Voltage Warning

Low Voltage	3.2V

5. Data Report

When the device is powered on, it will immediately send a version package Report and the report data with the device battery voltage, the differential pressure, and the temperature.

The device sends data in the default configuration before any configuration is done.

Default setting:

MaxTime: Max Interval = 15 min = 900s

MinTime: Max Interval = 15 min = 900s

BatteryChange = 0x01 (Unit: 0.1v)

Different Pressure Change = 0x0A (1 Pa) (Unit: 0.1Pa)

Temperature Change = 0x0A (1°C) (Unit: 0.1°C)

Measurement Range:

Different pressure Measuring Range: -500 to 500 Pa

Temperature Measuring Range: -20℃ to 50℃

Pressure Difference And Temperature Detection:

When the function key is pressed, the device immediately sends a report with the current voltage value, differential pressure value and temperature value. Or when the configure time is up, it will also detect and send the report with Battery, Different Pressure, and Temperature.

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 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 the devicetype

NetvoxPayLoadData– Fixed bytes (Fixed =8bytes)

Device	CmdID	Device Type	NetvoxPayLoadData			
R718Y	0xAC	0x01	Battery (1byte, Unit: 0.1v)	Different Pressure (Signed2Bytes, Unit: 0.1Pa)	Temperature (Signed2Bytes,Unit:0.1°C)	Reserved (3Bytes, Fixed 0x00)

Uplink: 01AC0124001E0116000000

1st byte (01): Version

2nd byte(AC): DeviceType 0xAC ― R718Y

3rd byte (01): ReportType

4th byte (24): Battery, 24 H_{ex}=36 D_{ec} 36*0.1v=3.6v

5th 6th byte (001E): Different Pressure, 1E H_{ex} =30 D_{ec} 30*0.1Pa=3 Pa

7th 8th byte (0116): Temperature, 116 H_{ex} =278 D_{ec} 278*0.1°C=27.8°C

9th ~11th byte (000000): 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	R718Y	0x01	0xAC	MinTime (2bytes, Unit: s)	MaxTime (2bytes, Unit: s)	BatteryChange (1byte, Unit: 0.1v)	DifferentPressure Change (2bytes Unit:0.1Pa)	TemperatureChange (2byte Unit:0.1°C)
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)	BatteryChange (1byte, Unit: 0.1v)	DifferentPressure Change (2bytes, Unit: 0.1Pa)	TemperatureChange (2byte Unit:0.1°C)

(1) Configure device parameters MinTime = 1min, MaxTime = 1min, BatteryChange = 0.1v, DifferentPressureChange=10Pa, TemperatureChange = 10℃

Downlink: 01AC003C003C0100640064 003C($H_{ex)}$ = 60($D_{ec)}$

Device returns:

81AC00000000000000000 (configuration successful)

81AC010000000000000000 (configuration failed)

(2) Read device parameters

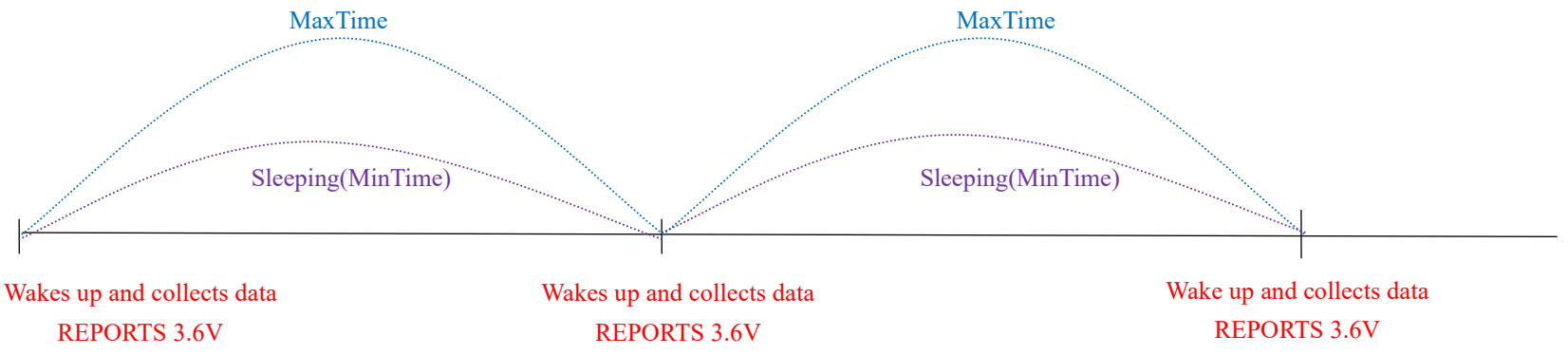
Downlink: 02AC000000000000000000

Device returns:

82AC003C003C0100640064 (current device parameters)

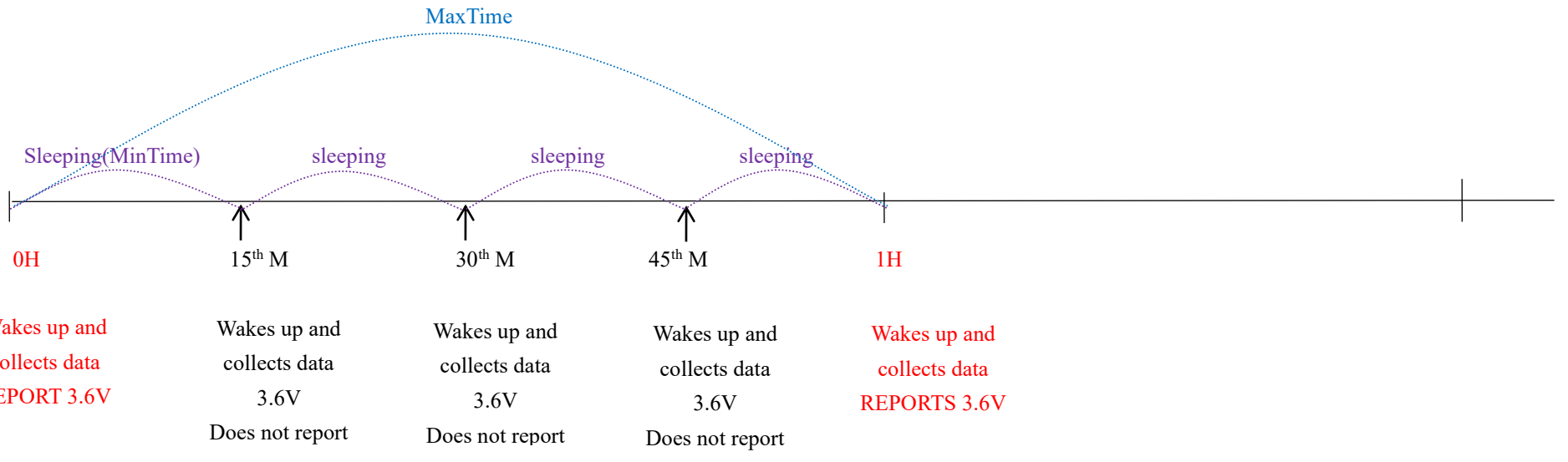
5.3 Example for MinTime/MaxTime logic

Example#1 based on MinTime = 1 Hour, MaxTime= 1 Hour, Reportable Change i.e. BatteryVoltageChange=0.1V

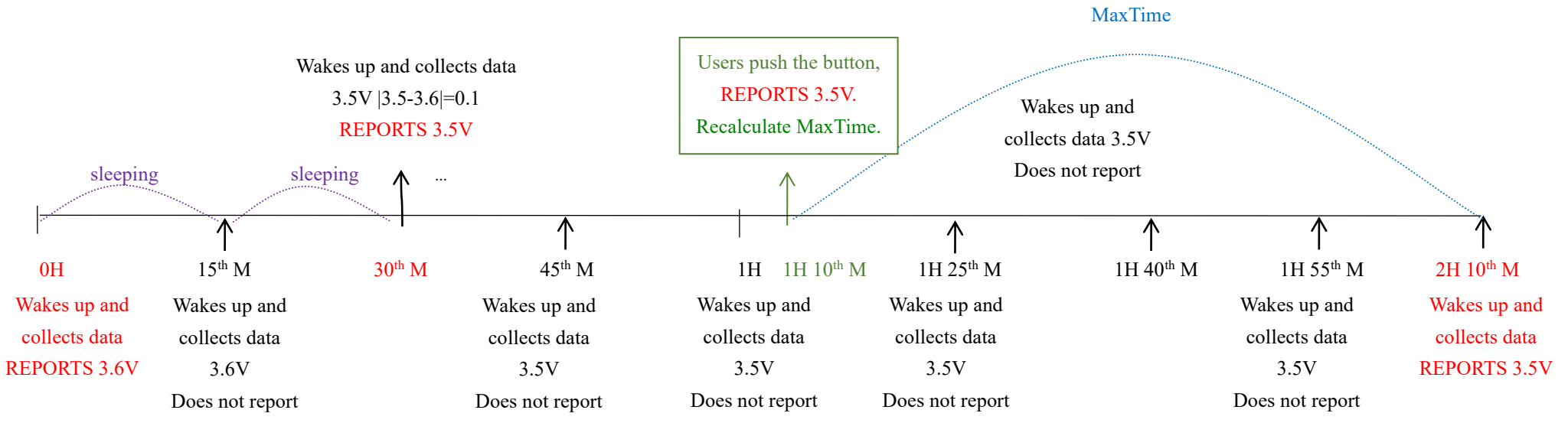


Note: MaxTime=MinTime. Data will only be report according to MaxTime (MinTime) duration regardless BatteryVoltageChange value.

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 variation 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.

6. Information about Battery Passivation

Many of Netvox devices are powered by 3.6V ER14505 Li-SOCl2 (lithium-thionyl chloride) batteries that offer many advantages including low self-discharge rate and high energy density.

However, primary lithium batteries like Li-SOCl2 batteries will form a passivation layer as a reaction between the lithium anode and thionyl chloride if they are in storage for a long time or if the storage temperature is too high. This lithium chloride layer prevents rapid self-discharge caused by continuous reaction between lithium and thionyl chloride, but battery passivation may also lead to voltage delay when the batteries are put into operation, and our devices may not work correctly in this situation.

As a result, please make sure to source batteries from reliable vendors, and it is suggested that if the storage period is more than one month from the date of battery production, all the batteries should be activated.

If encountering the situation of battery passivation, users can activate the battery to eliminate the battery hysteresis.

ER14505 Battery Passivation:

6.1 To determine whether a battery requires activation

Connect a new ER14505 battery to a resistor in parallel, and check the voltage of the circuit.

If the voltage is below 3.3V, it means the battery requires activation.

6.2 How to activate the battery

a. Connect a battery to a resistor in parallel

b. Keep the connection for 5~8 minutes

c. The voltage of the circuit should be ≧3.3, indicating successful activation.

Brand	Load Resistance	Activation Time	Activation Current
NHTONE	165 Ω	5 minutes	20mA
RAMWAY	67 Ω	8 minutes	50mA
EVE	67 Ω	8 minutes	50mA
SAFT	67 Ω	8 minutes	50mA

Note:

If you buy batteries from other than the above four manufacturers, then the battery activation time, activation current, and required load resistance shall be mainly subject to the announcement of each manufacturer.

7. 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.