netvox R718B1 Series Wireless Temperature Sensor User Manual

Contents

netvox R718B1 Series Wireless Temperature Sensor

Product Introduction

- The R718B1 series is a Wireless Resistance Temperature Detector for Netvox ClassA type devices based on the LoRaWAN open protocol and is compatible with the LoRaWAN protocol. R718B connects an external resistance temperature detector (PT1000) to measures the temperature.
- LoRaWAN: LoRaWAN uses LoRa technology to define end-to-end standard specifications to ensure interoperability between devices and gateways from different manufacturers.

Product Appearance

- R718B120 Round head probe
- R718B121 Needle probe
- R718B140 Round head probe
- R718B141 Needle probe
- R718B250 Round head probe
- R718B251 Needle probe
- R718B122 Absorption probe

Product Main Features

For battery life time for variety models at different configurations, please refer to the following website:
http://www.netvox.com.tw/electric/electric_calc.html

Product Set up Instruction

- **Power on:**
    1. Insert batteries. (Users may need a screwdriver to open)
    2. Turn on: Press and hold the function key for 3 seconds till the green indicator flashes once.
- **Power off:**
    1. Remove Batteries.

Note:

- Remove and insert the battery; the device is at off state by default.
- On/off interval is suggested to be about 10 seconds to avoid the interference of capacitor inductance and other energy storage components.
- At 1st -5th second 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 to join. The green indicator stays on for 5 seconds: success. The green indicator remains off: fail.
- **Had joined the network (not at factory setting):** Turn on the device to search the previous network to join. The green indicator stays on for 5 seconds: success. The green indicator remains off: fail.

Function Key

- **Restore to factory setting / Turn off:** Press and hold for 5 seconds. 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

Sleeping period: Min Interval.
The device is on and in the network 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. Suggest to remove batteries if the device is not used.

Data Report

- The device will immediately send a version packet report along with an uplink packet including temperature and battery voltage.
- The device sends data in the default configuration before any configuration is done. Default setting:
- Please refer Netvox LoRaWAN Application Command document and Netvox Lora Command Resolver http://cmddoc.netvoxcloud.com/cmddoc to resolve uplink data.
- Data report configuration and sending period are as following:
    - Min Interval: Any number between
    - Max Interval: Any number between (Unit:second)

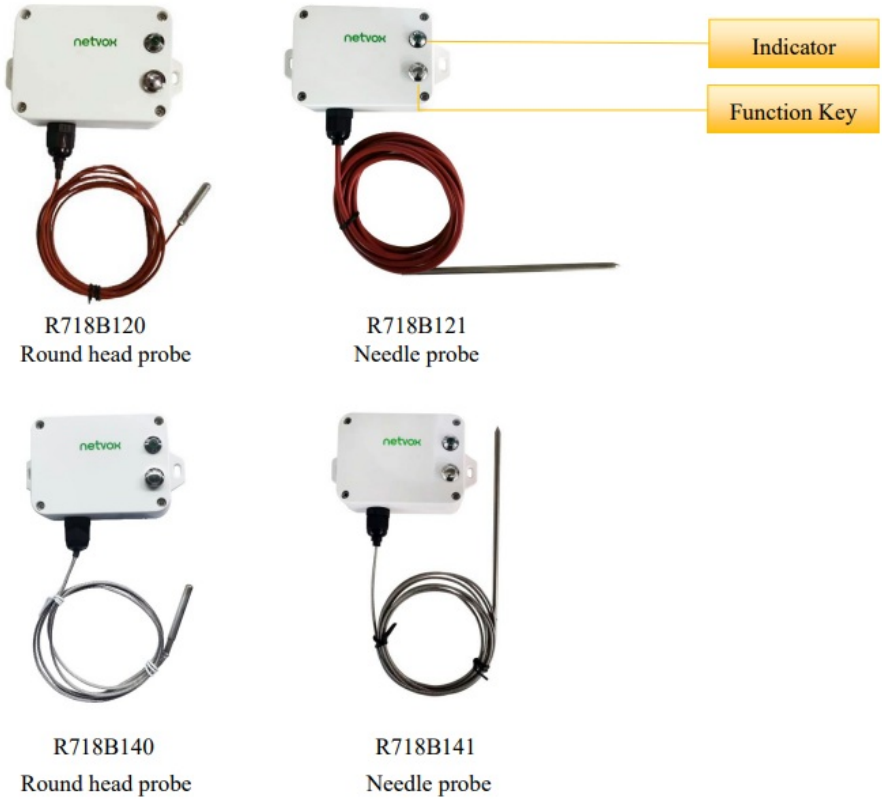
Introduction

- The R718B1 series is a Wireless Resistance Temperature Detector for Netvox ClassA type devices based on the LoRaWAN open protocol and is compatible with the LoRaWAN protocol.
- R718B connects an external resistance temperature detector (PT1000) to measures the temperature.

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.

Appearance



R718B250
Round head probe

R718B251
Needle probe

R718B122
Absorption probe

Main Features

- Adopt SX1276 LoRa wireless communication module.
- PT1000 Platinum resistance temperature sensor detection
- Main body IP rating: IP65/IP67 (optional)
- R718B120, R718B121 temperature range: -70°C to 200°C, Sensor IP rating: IP67
- R718B122 temperature range: -50°C to 180°C, Sensor IP rating: IP67
- R718B140, R718B141 temperature range: -40°C to 375°C, Sensor IP rating: IP50
- R718B150, R718B151 temperature range: -40°C to 500°C, Sensor IP rating: IP50
- 2 x ER14505 lithium batteries in parallel.
- The base is attached with a magnet that can be attached to a ferromagnetic material object
- Compatible with LoRaWANTM Class A
- Frequency hopping spread spectrum
- Applicable to third-party platforms: 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.

Set up Instruction

On/Off	
Power on	Insert batteries. (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 settin g)	Press and hold the function key for 5 seconds till 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 interf erence of capacitor inductance and other energy storage components. 3. At 1st -5th second after power on, the device will be in engineering test mode.
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Low Voltage Warning

Low Voltage	3.2V

Data Report

- The device will immediately send a version packet report along with an uplink packet including temperature and battery voltage.
- The device sends data in the default configuration before any configuration is done.

Default setting:

- Max Interval: 0x0384 (900s)
- Min Interval: 0x0384 (900s)
- BatteryChange: 0x01 (0.1V)
- TemperatureChange:0x0064 (10°C)

Note:

- The device report interval will be programmed based on the default firmware which may vary.
- The interval between two reports must be the minimum time.
- Please refer Netvox LoRaWAN Application Command document and Netvox Lora Command Resolver **http://cmddoc.netvoxcloud.com/cmddoc** to resolve uplink data.

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

Example of Report Data Cmd

Bytes	1	1	1	Var(Fix=8 Bytes)
	Version	DeviceType	ReportType	NetvoxPayLoadData

- **Version– 1 byte –0x01——**the Version of NetvoxLoRaWAN Application Command Version
- **Device Type– 1 byte –** Device Type of Device The devicetype is listed in Netvox LoRaWAN Application Devicetype doc
- **Report Type – 1 byte –**the presentation of the NetvoxPayLoadData according the devicetype
- **Netvox Pay Load Data–** Fixed bytes (Fixed =8bytes)

Tip s

1. **Battery Voltage:**
   - The voltage value is bit 0 ~ bit 6, bit 7=0 is normal voltage, and bit 7=1 is low voltage.
   - Battery=0xA0, binary=1010 0000, if bit 7= 1, it means low voltage.
   - The actual voltage is 0010 0000 = 0x20 = 32, 32*0.1v =3.2v
2. **Version Packet:**
   When Report Type=0x00 is the version packet, such as 0195000A0B202005200000, the firmware version is 2020.05.20
3. **Data Packet:**
   When Report Type=0x01 is data packet.
4. **Signed Value:**
   When the temperature is negative, 2's complement should be calculated.

Device	**Device Type**	**Report Type**	**NetvoxPayLoadData**			
R718B1 series	0x95	0x00	SoftwareVersion (1Byte) Eg.0x0A—V1.0	Hardware Version (1Byte)	DateCode (4Bytes,eg0x20170503)	Reserved (2Bytes,fixed 0x00)
		0x01	Battery (1Byte, unit:0.1V)	Temperature (Signed2Bytes,unit:0.1°C)	Reserved (5Bytes,fixed 0x00)	

Example 1 of Uplink: 0195012401090000000000

- **1st byte (01):** Version
- **2nd byte (95):** DeviceType 0x95 R718B1 series
- **3rd byte (01):** ReportType
- **4th byte (24):** Battery 3.6V, 24(Hex) = 36(Dec), 36×0.1v=3.6v
- **5th 6th byte (0109):** Temperature 26.5 oC , 109(Hex)=265(Dec), 265×0.1°C=26.5°C 7th-11th byte (00000000000): Reserved

Example 2 of Uplink: 019501A0FF390000000000

- **1st byte (01):** Version

- **2nd byte (95):** DeviceT ype 0x95 R718B1 series
- **3rd byte (01)**: ReportType
- **4th byte (A0):** Battery 3.2V (Low battery), 20(Hex) = 32(Dec), 32×0.1v=3.2v //The bit7 is 1,represent low battery
- **5th 6th byte (FF39):** Temperature -19.9oC , 0x10000-0xFF39=0xC7 (Hex), 0xC7 (Hex)=199(Dec) , -199×0.1°C= -19.9°C
- **7th-11th byte (0000000000):** Reserved

Example of Report configuration

Bytes	1	1	Var(Fix =9 Bytes)
	CmdID	DeviceTyp e	NetvoxPayLoadData

- **CmdID–** 1 byte
- **Device Type–** 1 byte – Device Type of Device
- **Netvox Pay Load Data–** var bytes (Max=9bytes)

Description	Device	Cmd ID	Device Type	NetvoxPayLoadData

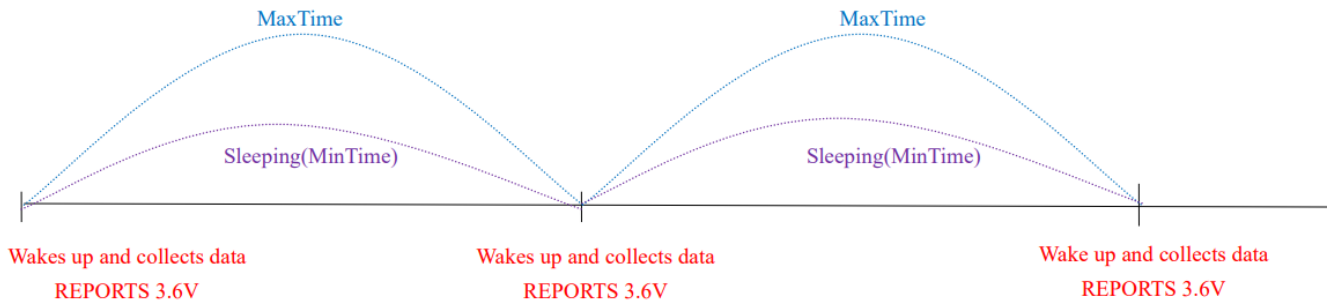
Config ReportReq		0x01		MinTime (2bytes Unit: s)	MaxTime (2bytes Unit: s)	BatteryChange (1byteUnit:0.1v)	Temperaturechange (2byte Unit:0.1°C)	Reserved (2Bytes,Fixed 0x00)
Config ReportRsp		0x81		Status (0x00_success)			Reserved (8Bytes,Fixed 0x00)	
ReadConfig ReportReq		0x02		Reserved (9Bytes,Fixed 0x00)				
	R718B1 series		0x95					

ReadConfig ReportRsp		0x82		MinTime (2bytes Unit: s)	MaxTime (2bytes Unit: s)	BatteryChange (1byteUnit:0.1v)	Temperaturechange (2byte Unit:0.1°C)	Reserved (2Bytes,Fixed 0x00)

1. Configure device parameters MinTime = 1min, MaxTime = 1min, BatteryChange = 0.1v, Temperaturechange = 10°C
   - **Downlink:** 0195003C003C0100640000
   - **Devices return:**
     - 819500000000000000000 (configuration is successful)
     - 819501000000000000000 (configuration is failed)
2. Read device parameters
   - **Downlink:** 029500000000000000000
   - **Devices return:**
     8295003C003C0100640000 (current device configuration parameters)

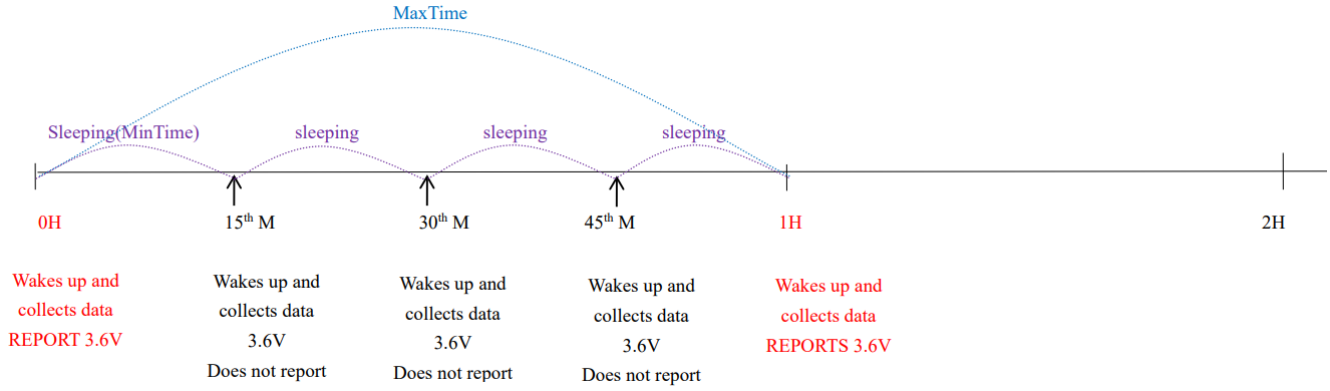
Example for MinTime/MaxTime logic

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

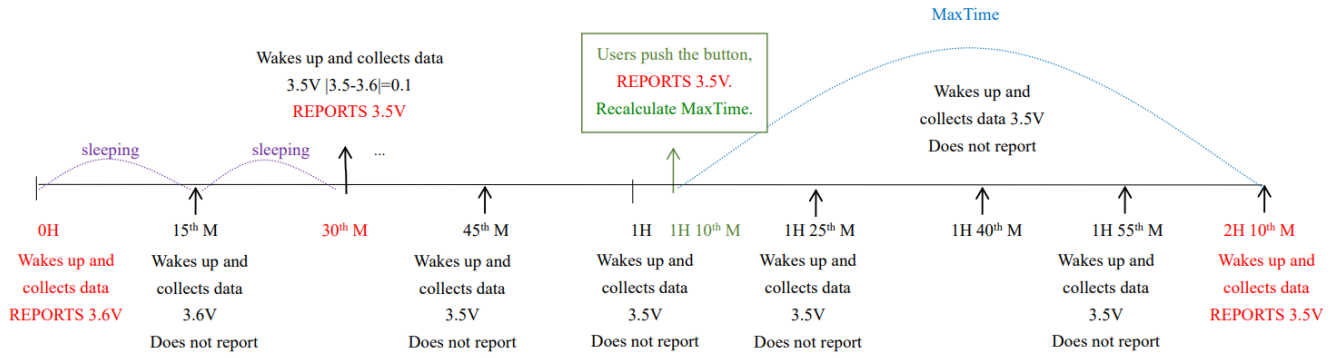


Note: MaxTime=MinTime. Data will only be report according to MaxTime (MinTime) duration regardless BatteryVoltageChange value.

- **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 :

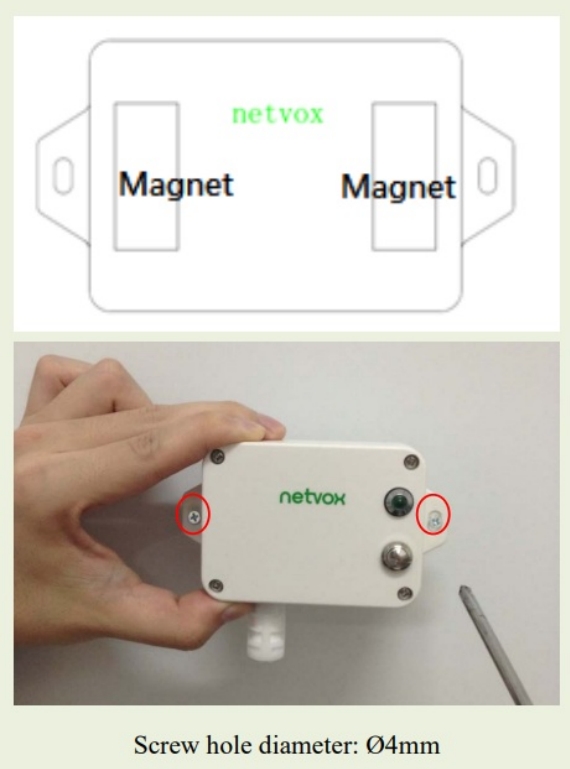
1. The device only wakes up and performs data sampling according to MinTime Interval. When it is sleeping, it does not collect data.
2. The data collected is compared with the last data reported. If the data variation is greater than the ReportableChange value, the device reports according to MinTime 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.

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.

1. 1. The Wireless Resistance Temperature Detector (R718B) has a built-in magnet (see Figure 1 below). When installed, it can be attached to the surface of an object with iron which is convenient and quick.
   To make the installation more secure, use screws (purchased) to secure the unit to a wall or other surface (see 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. When R718B is compared with the last reported values, the temperature change is exceeded 0.1°C (default),it will report values at the MinTime interval;
   If does not exceeded 0.1°C (default) ,it will report values at the MaxTime interval;
   R718B is suitable below scenarios:
   - Oven
   - Industrial control equipment
   - Semiconductor industry

Note:

- Please do not disassemble the device unless it is required to replace the batteries.
- Do not touch the waterproof gasket, LED indicator light, function keys when replacing the batteries. Please use suitable screwdriver to tighten the screws (if using an electric screwdriver, it is recommended to set the torque as 4kgf) to ensure the device is impermeable.

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.

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.

How to activate the battery

- Connect a battery to a resistor in parallel
- Keep the connection for 5~8 minutes
- 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.

Relevant Products

Model		Temperature Range	Wire Material	Wire Length	Probe Type	Probe Material	Probe Dimension	Probe IP Rating
R718B120	One-gang	-70° to 200°C	PTFE + silicone	2m	Round head	316 stainless steel	Ø5mm*30mm	IP67
R718B220	Two-gang							
R718B121	One-gang				Needle		Ø5mm*150mm	
R718B221	Two-gang							
R718B122	One-gang	-50° to 180°C			Absorption	NdFeB magnet + stainless steel spring	Ø15mm	
R718B222	Two-gang							
R718B140	One-gang	-40° to 375°C	Braided Fiberglass		Round head	316 stainless steel	Ø5mm*30mm	IP50
R718B240	Two-gang							
R718B141	One-gang				Needle		Ø5mm*150mm	
R718B241	Two-gang							
R718B150	One-gang	-40° to 500°C			Round head		Ø5mm*30mm	
R718B250	Two-gang							
R718B151	One-gang				Needle		Ø5mm*150mm	
R718B251	Two-gang							

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 ne11a rest authorized service facility for repair.

Documents / Resources

 Wireless Temperature Sensor R718B1 Series User Manual	netvox R718B1 Series Wireless Temperature Sensor [pdf] User Manual R718B1 Series Wireless Temperature Sensor, R718B1 Series, Wireless Temperature Sensor, Temperature Sensor, Sensor

References

- Netvox LoRaWAN Application Command
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