netvox R718B2 Series Wireless 2-Gang Temperature Sensor User Manual

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Product Information

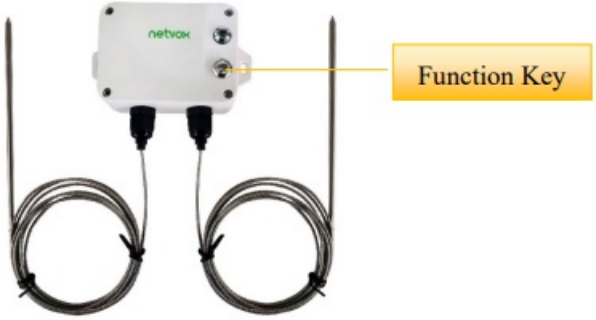
The Wireless 2-Gang Temperature Sensor R718B2 Series is a device designed to monitor and report temperature readings wirelessly. It has a 2-gang design which enables it to fit into standard electrical boxes. The sensor has a long battery life and can transmit data to other devices within a range of up to 200 meters. It is compatible with other products from the manufacturer and has various reporting configurations that can be set up to suit specific requirements.

Appearance

R718B220
Round head probe

R718B221
Needle probe

R718B240
Round head probe



R718B241
Needle probe

R718B250
Round head probe

R718B251
Needle probe

R718B222
Absorption probe

The Wireless 2-Gang Temperature Sensor R718B2 Series has a white, rectangular design and fits into a standard 2-gang electrical box. It has two temperature sensors on the front panel and an LED indicator light.

Main Features

- Wireless transmission of temperature data
- Long battery life
- Compatible with other products from the manufacturer
- Configurable reporting options
- Fits into standard 2-gang electrical boxes
- Adopt SX1276 LoRa wireless communication module.
- 2 x ER14505 lithium batteries in parallel.
- PT1000 Platinum resistance temperature sensor detection.
- The base is attached with a magnet that can be attached to a ferromagnetic material object.
- Main body IP rating: IP65/IP67 (optional)
- R718B220, R718B221 temperature range: -70°C to 200°C, Sensor IP rating: IP67
- R718B222 temperature range: -50°C to 180°C, Sensor IP rating: IP67
- R718B240, R718B241 temperature range: -40°C to 375°C, Sensor IP rating: IP50
- R718B250, R718B251 temperature range: -40°C to 500°C, Sensor IP rating: IP50
- 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 the web: **http://www.netvox.com.tw/electric/electric_calc.html**
    - At this website, users can find battery lifetime for various models at different configurations.

Product Usage Instructions

- **Step 1:** Install the Wireless 2-Gang Temperature Sensor R718B2 Series into a standard 2-gang electrical box.
- **Step 2:** Activate the battery if required. To determine if battery activation is necessary, refer to section 7.1 of the user manual. Follow the instructions in section 7.2 to activate the battery if necessary.
- **Step 3:** Set up the reporting configuration. Refer to section 5.2 of the user manual for an example of report configuration. The reporting options can be configured to suit specific requirements.
- **Step 4:** Monitor the temperature data transmitted by the sensor. The device can transmit data wirelessly to other devices within a range of up to 200 meters.
- **Step 5:** Perform maintenance as necessary. Refer to section 9 of the user manual for important maintenance instructions.

  Note: The Wireless 2-Gang Temperature Sensor R718B2 Series is compatible with other products from the manufacturer. Refer to section 8 of the user manual for relevant products.

Introduction

R718B2 series is a Wireless 2-Gang Resistance Temperature Detector for Netvox ClassA type devices based on the LoRaWAN open protocol and is compatible with the LoRaWAN protocol.
R718B2 connects two external resistance temperature detectors (PT1000) to measure the temperature.

LoRa Wireless Technology:
LoRa is a wireless communication technology dedicated to long distances 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, and industrial monitoring. The main features include small size, low power consumption, transmission distance, anti-interference ability, and so on.

Set up Instruction

On/Off

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 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 an off state by default. Press and hold the function key for 3 seconds till the green indicator flashes once to turn on the device. 2. On/off interval is suggested to be about 10 seconds to avoid the interference of capacitor inductance and other energy storage components. 3. 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. The green indicator stays on for 5 seconds: success The green indicator remains off: fail
Had joined the network (not at factory setting mode)	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)	Suggest checking the device verification information on the gateway or consulting your platform service provider.
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: the green indicator remains off
Sleeping Mode	
The device is on and in the network	Sleeping period: Min Interval. When the report change exceeds the setting value or the state changes: send a data report according to Min Interval.

Low Voltage Warning

Low Voltage	3.2V

Data Report

The device will immediately send a version packet report along with an uplink packet including temperature1, temperature2 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 follows

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 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 device type is listed in Netvox LoRaWAN Application Devicetype doc ReportType – 1 byte –the presentation of the

- NetvoxPayLoadData according to the device type NetvoxPayLoadData– Fixed bytes (Fixed =8bytes)

Tips

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 0114000A0B202005200000, the firmware version is 2020.05.20
3. **Data Packet:**
   When Report Type=0x01 is a data packet.

Signed Value:
When the temperature is negative, 2's complement should be calculated.

Device	**Device Type**	**Report Type**	**NetvoxPayLoadData**			
R718B2 series	0x14	0x00	SoftwareVersion (1Byte) Eg.0x0A—V1.0	HardwareVersion (1Byte)	DateCode (4Bytes,eg 0x20170503)	Reserved (2Bytes,fixed 0x00)
		0x01	Battery (1Byte, unit:0.1V)	Temperature 1 (Signed2Bytes,unit:0.1°C)	Temperature 2 (Signed2Bytes,unit:0.1°C)	Reserved (5Bytes,fixed 0x00)

Example 1 of Uplink: 0114012401090102000000

- 1st byte (01): Version
- 2nd byte (14): DeviceType 0x14 R718B2 series
- 3rd byte (01): ReportType
- 4th byte (24): Battery 3.6V, 24(HEX)=36(DEC),36*0.1v=3.6v
- 5th6th byte (0109): Temperature 26.5 °C , 0109(HEX)=265(DEC),265*0.1°C =26.5°C 7th8th byte (0102): Temperature 25.8 °C ,
- 0102(HEX)=258(DEC),258*0.1°C =25.8°C 9th-11th byte (0000000): Reserved

Example 2 of Uplink: 011401A0FF39FF36000000

- 1st byte (01): Version
- 2ndbyte (14): DeviceType 0x14 R718B2 series
- 3rd byte (01): ReportType
- 4th byte (A0): Battery 3.2V (Low battery), A0(HEX)=32(DEC),32*0.1v=3.2v //The bit7 is 1,represent low battery 5th6th byte (FF39): Temperature -19.9oC ,
- 0x10000-0xFF39=0xC7 (HEX), 0xC7 (HEX)=199(DEC) , -199×0.1°C= -19.9°C 7th8th byte (FF36): Temperature -20.2 °C ,0x10000-0xFF36=0xCA (HEX), 0Xca (HEX)= 202(DEC),-202*0.1°C = -20.2°C 9th-11th byte (0000000): Reserved

Example of Report configuration

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

ConfigReport Req		0x01		MinTime (2 bytes Unit:s)	MaxTime (2bytes Unit :s)	BatteryChange(1byteUnit:0.1v)	TemperatureChange (2byte Unit:0.1 ℃)	Reserved (2Bytes,Fixed 0x00)
ConfigReport Rsp		0x81		Status (0x00_success)		Reserved (8Bytes,Fixed 0x00)		
ReadConfig ReportReq		0x02		Reserved (9Bytes,Fixed 0x00)				
	R718B2		0x14					

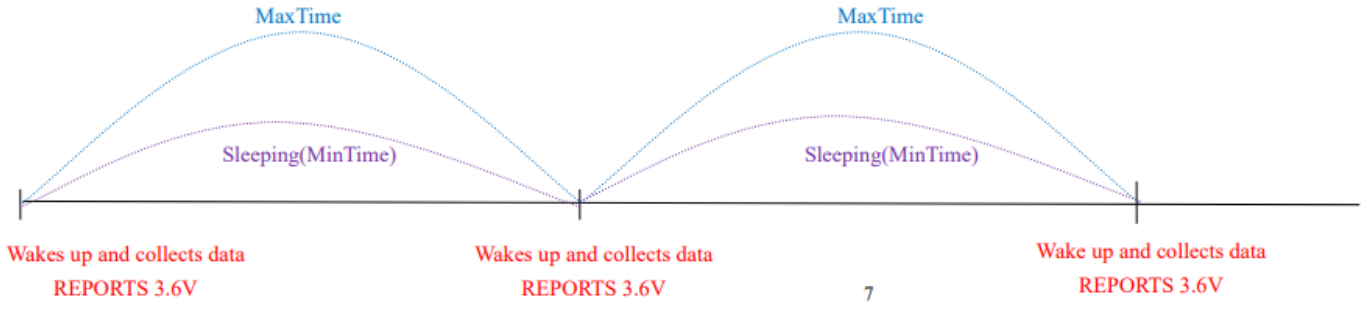
ReadConfig ReportRsp		0x82		MinTime (2 bytes Unit:s)	MaxTime (2bytes Unit :s)	BatteryChange (1byte Unit: 0.1v)	TemperatureChange (2byte Unit:0.1 ℃)	Reserved (2Bytes,Fixed 0x00)

1. Configure device parameters MinTime = 1min, MaxTime = 1min, BatteryChange = 0.1v, Temperaturechange = 10°CDownlink: 0114003C003C0100640000

   Device returns:

   - 811400000000000000000 (configuration successful)
   - 81140100000000000000 (configuration failed)
2. Read device parameters
   - Downlink: 0214000000000000000000
   - Device returns: 8214003C003C0100640000 (current device configuration parameters)

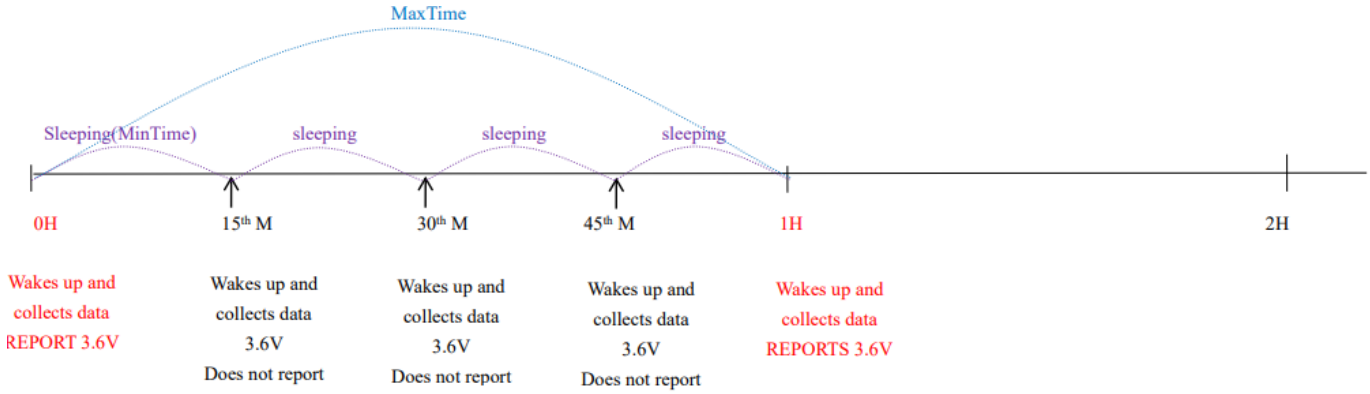
Example for MinTime/MaxTime logic
Example#1 based on MinTime = 1 Hour, MaxTime= 1 Hour, Reportable Change i.e. BatteryVoltageChange=0.1V



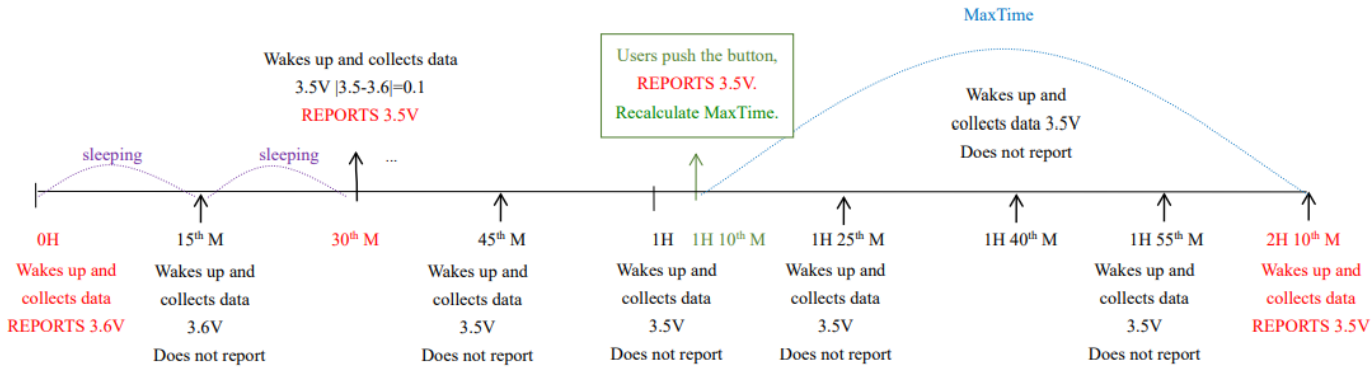
Note: MaxTime=MinTime. Data will only be report according to MaxTime (MinTime) duration regardless

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 of data variation, button push or MaxTime interval, another cycle of MinTime/MaxTime calculation is started.

Installation

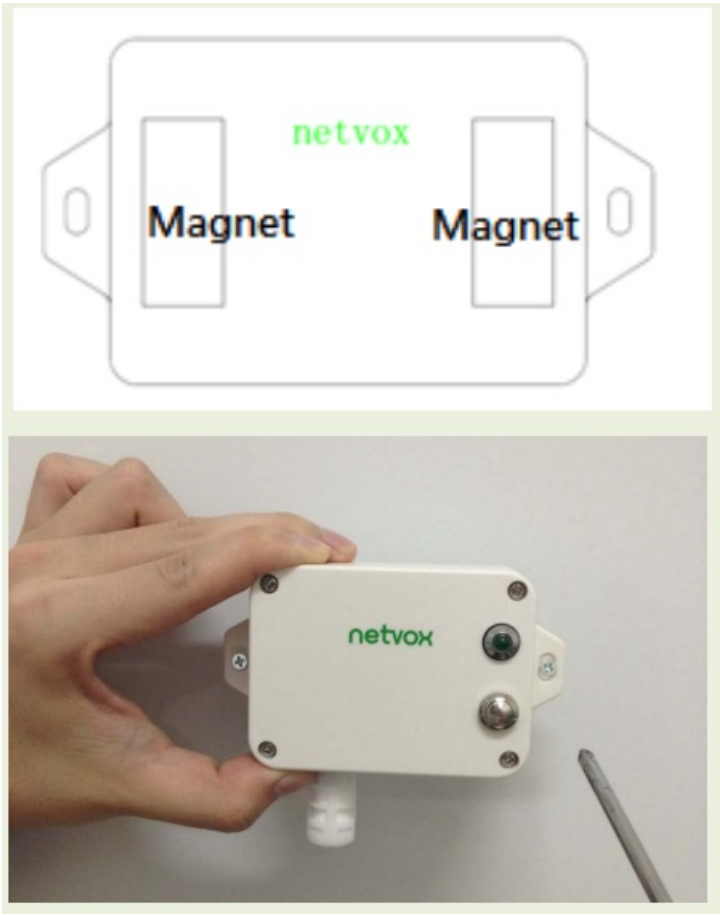
This product comes with a waterproof function.
When using it, the back of it can be adsorbed on the iron surface, or the two ends can be fixed to the wall with screws.

1. The Wireless 2-Gang Temperature Sensor (R718B2) 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 Figure 2 below).

Note:

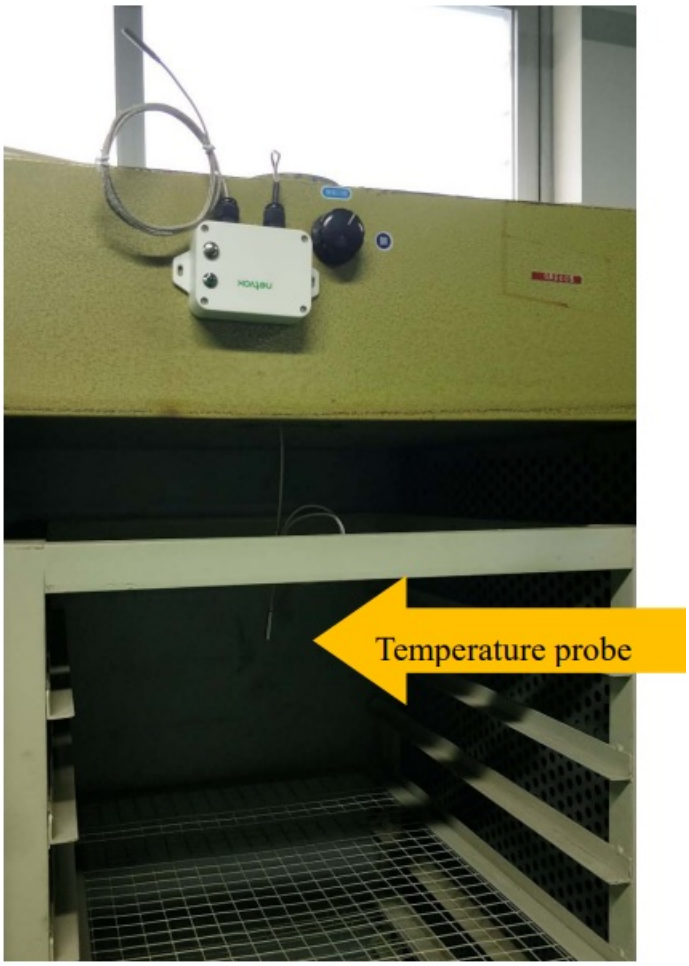
Do not install the device in a metal shielded box or in an environment with other electrical equipment around it to avoid affecting the wireless transmission of the device.



2. When R718B2 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 exceed 0.1°C (default) ,it will report values at the MaxTime interval;

   R718B2 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, or function keys when replacing the batteries.

Please use a 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 a continuous reactions 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:

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 a dusty or dirty environment. It might damage its detachable parts and

electronic components.

- Do not store the device under excessive heat conditions. High temperatures 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 its 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 2-Gang Temperature Sensor R718B2 Series User Manual	netvox R718B2 Series Wireless 2-Gang Temperature Sensor [pdf] User Manual R718B2 Series Wireless 2-Gang Temperature Sensor, R718B2 Series, Wireless 2-Gang Temperature Sensor, 2-Gang Temperature Sensor, Temperature Sensor, Sensor

References

- Netvox LoRaWAN Application Command
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