

netvox™
R718CK
Wireless
Thermocouple
Sensor



netvox R718CK Wireless Thermocouple Sensor User Manual

[Home](#) » [netvox](#) » netvox R718CK Wireless Thermocouple Sensor User Manual 

Contents

- 1 netvox R718CK Wireless Thermocouple Sensor
- 2 FAQs
- 3 Introduction
- 4 Appearance
- 5 Features
- 6 Set up Instruction
- 7 Data Report
- 8 Installation
- 9 Information about Battery Passivation
- 10 Important Maintenance Instruction
- 11 Precautions for Outdoor Installation
- 12 Documents / Resources
 - 12.1 References
- 13 Related Posts

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netvox R718CK Wireless Thermocouple Sensor



FAQs

1. How do I check the battery lifespan?

You can visit http://www.netvox.com.tw/electric/electric_calc.html for information on battery lifespan.

2. What is the default reporting interval for data?

The default reporting interval may vary based on firmware, but it is recommended to configure it to the minimum time interval.

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Introduction

- R718CK (Ni-Cr / Ni-Si): The detecting range of R718CK is -40°C to +375°C.
- R718CK has the characteristics of good linearity, bigger thermal electromotive force, high sensitivity, and stability.
- R718CT (Cu / Cu-Ni): The detecting range of R718CT is -40°C to +125°C.
- R718CT is more stable when detecting the temperature range of -40°C to 0°C.
- R718CN (Ni-Cro-Sil / Ni-Si-Mg): The detecting range of R718CN is -40°C to +800°C.
- The N-type thermocouple has good linearity, large-term electromotive force, high sensitivity, and good stability and uniformity. It has strong oxidation resistance and is not affected by short-range ordering.

- R718CR (noble metal thermocouple): The detecting range of R718CR is 0°C to +1400°C.
- The R-type thermocouple gets accurate results, operates stably, and has a long lifespan. With good chemical and physical performance, it can be used in oxidizing and inert gas.

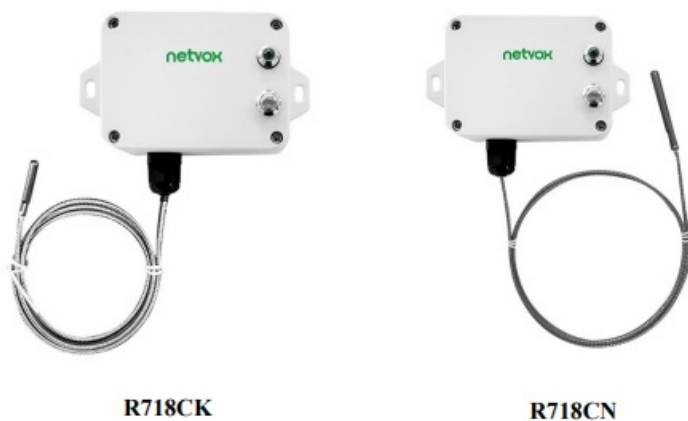
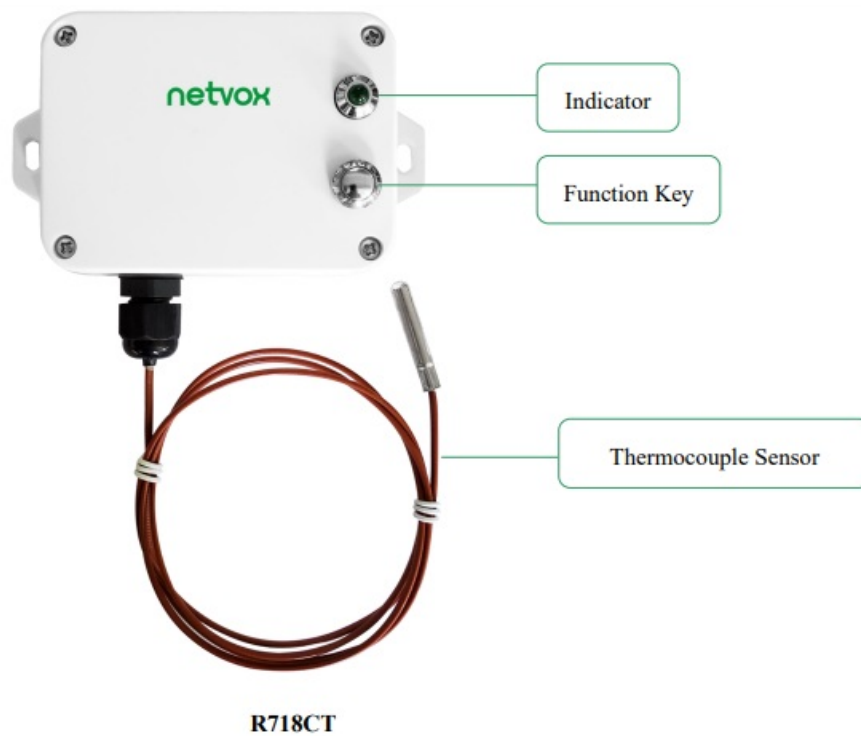
LoRa Wireless Technology

LoRa is a wireless communication technology dedicated to long-distance and low power consumption. Compared with other communication methods, the 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.

LoRaWAN

- LoRaWAN uses LoRa technology to define end-to-end standard specifications to ensure interoperability between devices and gateways from different manufacturers.

Appearance



Features

- SX1276 wireless communication module
- 2 x ER14505 battery in parallel (AA size 3.6V / section)
- IP rating:
 - R718CT main body IP65/IP67; T-type thermocouple sensor IP67
 - R718CK and R718CN IP50 (whole device)
 - R718CR R-type thermocouple sensor IP60
- Magnet base
- Thermocouple Detection
- Compatible with LoRaWAN™ Class A
- Frequency hopping spread spectrum
- Applicable to third-party platforms: Actility/ThingPark, TTN, MyDevices/Cayenne
- Improved power management for longer battery life

- Note: Please visit http://www.netvox.com.tw/electric/electric_calc.html for more information about battery lifespan.

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 until the green indicator flashes once.
Turn off (Reset to factory setting)	Press and hold the function key for 5 seconds until the green indicator flashes 20 times.
Power off	Remove Batteries.
Note	<ol style="list-style-type: none"> 1. Remove and insert the battery; the device is an 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.
Network Joining	
Never joined the network	<u>Turn on the device to search the network to join.</u> The green indicator stays on for 5 seconds: success The green indicator remains off: fail
Had joined the network (not in the factory setting)	<u>Turn on the device to search for the previous network to join.</u> The green indicator stays on for 5 seconds: success The green indicator remains off: fail
Fail to join the network	Please check the device verification information on the gateway or consult your platform server provider.

On/Off	
Power on	Insert batteries. (Users may need a screwdriver to open)
Turn on	Press and hold the function key for 3 seconds until the green indicator flashes once.
Turn off (Reset to factory setting)	Press and hold the function key for 5 seconds until the green indicator flashes 20 times.
Power off	Remove Batteries.
Note	<ol style="list-style-type: none"> 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.
Network Joining	
Never joined the network	<u>Turn on the device to search the network to join.</u> The green indicator stays on for 5 seconds: success The green indicator remains off: fail
Had joined the network (not in the factory setting)	<u>Turn on the device to search for the previous network to join.</u> The green indicator stays on for 5 seconds: success The green indicator remains off: fail
Fail to join the network	Please check the device verification information on the gateway or consult your platform server provider.

Low Voltage Warning

Low Voltage	3.2V
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Data Report

Data report configuration and sending period are as follows

- 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:

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

Min Interval (Unit: second)	Max Interval (Unit: second)	Reportable Change	Current Change≥ Reportable Change	Current Change Reportable Change
Any number between n 1–65535	Any number between n 1–65535	Cannot 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 the 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 0192000A02202108160000, the firmware version is 2021.08.16.
3. Data Packet: When Report Type=0x01 is the data packet.

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

Device	Device Type	Report Type	NetvoxPayLoadData		
R718CK R718CT	0x91				Reserved
R718CN / R718CR	0x92	0x01	Battery (1Byte, unit: 0.1V)	Temperature (Signed 2 Bytes, unit: 0.1°C)	(5 Bytes, fixed 0x00)
	0x93				

Example 1 of R718CT uplink: 0192019F01220000000000

- 1st byte (01): Version
- 2nd byte (92): DeviceType 0x92 R718CT
- 3rd byte (01): ReportType
- 4th byte (9F): Battery 3.1v (Low voltage), 9F Hex = 31 Dec 31*0.1v=3.1v
- 5th 6th byte (0122): Temperature 29.0°C , 0122 Hex = 290 Dec 290*0.1°C =29.0°C
- 7th – 11th byte (0000000000): Reserved

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	Cmd ID	Device Type	NetvoxPayloadData				
ConfigReport Req	R718CK R718CT R718CN / R718CR	0x01		MinTime (2 bytes Unit: s)	Maxime (2 bytes Unit: s)	Battery Change (1 byte Unit : 0 . 1 v)	Temperature Change (2 bytes Unit: 0.1°C)	Reserved (2 bytes, Fixed 0x00)
ConfigReport Rsp		0x81		Status (0x00_success)		Reserved (8 bytes, Fixed 0x00)		
ReadConfigReporter		0x02		Reserved (9 bytes, Fixed 0x00)				

ReadConfigR sports		0x82		MinTime (2 bytes Unit: s)	Maxime (2 bytes Unit: s)	Battery Change (1 byte Unit: 0.1v)	Temperature Change (2 bytes Unit: 0.1°C)	Reserved (2 bytes, Fixed 0x00)
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1. Configure R718CK report parameters:

- MinTime = 1min, MaxTime = 1min, BatteryChange = 0.1v, TemperatureChange = 0.1°C
- Downlink: 0191003C003C0100010000 3C(Hex) =60(Dec)
- Response: 8191000000000000000000 (Configuration success)
- 819101000000000000000000 (Configuration failure)

2. Read Configuration:

- Downlink: 0291000000000000000000
- Response: 8291003C003C0100010000 (Current configuration)

Example of Temperature Calibration

Port:0x0E

Description	CmdID	SensorType	Payload (Fix =9 Bytes)					
SetGlobal CalibrateReq	0x01	0x01	Channel (1 byte) 0_Channel1, 1_Channel2, etc	Multiplier (2 bytes, Unsigned)	Divisor (2 bytes, Unsigned)	DeltValue (2 bytes, Signed)	Reserved (2 bytes, Fixed 0x00)	
SetGlobal CalibrateResp	0x81		Channel (1 byte) 0_Channel1, 1_Channel2, etc	Status (1 byte, 0x00_success)	Reserved (7 bytes, Fixed 0x00)			
GetGlobal CalibrateReq	0x02		Channel (1 byte) 0_Channel1, 1_Channel2, etc	Reserved (8 bytes, Fixed 0x00)				
GetGlobal CalibrateResp	0x82		Channel (1 byte) 0_Channel1, 1_Channel2, etc	Multiplier (2 bytes, Unsigned)	Divisor (2 bytes, Unsigned)	DeltValue (2 bytes, Signed)	Reserved (2 bytes, Fixed 0x00)	
ClearGlobal CalibrateReq	0x03	Reserved (10 bytes, Fixed 0x00)						
ClearGlobal CalibrateResp	0x83	Status (1 byte,0x00_success)		Reserved (9 bytes, Fixed 0x00)				

SensorType: Temperature 0x01

Temperature calibration:

- If the temperature the R718Cx detects is 16°C and the actual temperature is 17°C, the calibration needs to increase by 1°C.
- SensorType =0x01, Channel 1= 0x00, Multiplier = 0x0001, Divisor =0x0001, DeltValue= 0x0064
- Downlink: 0101000001000100640000

Response:

- 81010000000000000000 (Configuration success)
- 8101000100000000000000 (Configuration failure)

Check whether the temperature calibration

- Downlink: 02010000000000000000
- Response: 8201000001000100640000 (Current configuration)

Example of NetvoxLoRaWANRejoin

- Fport:0x20

CmdDescriptor	CmdID (1 byte)	Payload (5 bytes)	
SetNetvoxLoRaWANRejoin Req	0x01	RejoinCheckPeriod (4 bytes, Unit: 1s 0xFFFFFFFF Disable NetvoxLoRaWANRejoinFunction)	SetNetvoxLoRaWANRejoinReq
SetNetvoxLoRaWANRejoin Rsp	0x81	Status (1 byte, 0x00_success)	SetNetvoxLoRaWANRejoinRsp
GetNetvoxLoRaWANRejoin Req	0x02	Reserved (5 bytes, Fixed 0x00)	
GetNetvoxLoRaWANRejoin Rsp	0x82	RejoinCheckPeriod (4 bytes, Unit: 1s)	GetNetvoxLoRaWANRejoinRsp

1. Configure parameters

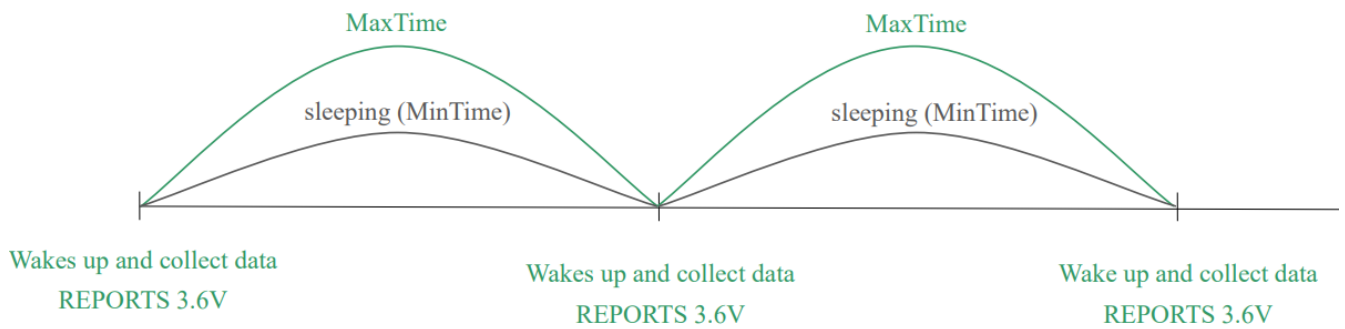
1. RejoinCheckPeriod = 60min (0x00000E10); RejoinThreshold = 3 times (0x03)
2. Downlink: 0100000E1003
3. Response: 810000000000 (configuration succeed)
4. 810100000000 (configuration fail)

2. Read configuration

- Downlink: 020000000000
- Response: 8200000E1003
- **Note:** a. Set RejoinCheckThreshold as 0xFFFFFFFF to stop the device from rejoining the network.
 - b. The last configuration would be kept as user factory resets the device.
 - c. Default setting: RejoinCheckPeriod = 2 (hr) and RejoinThreshold = 3 (times)

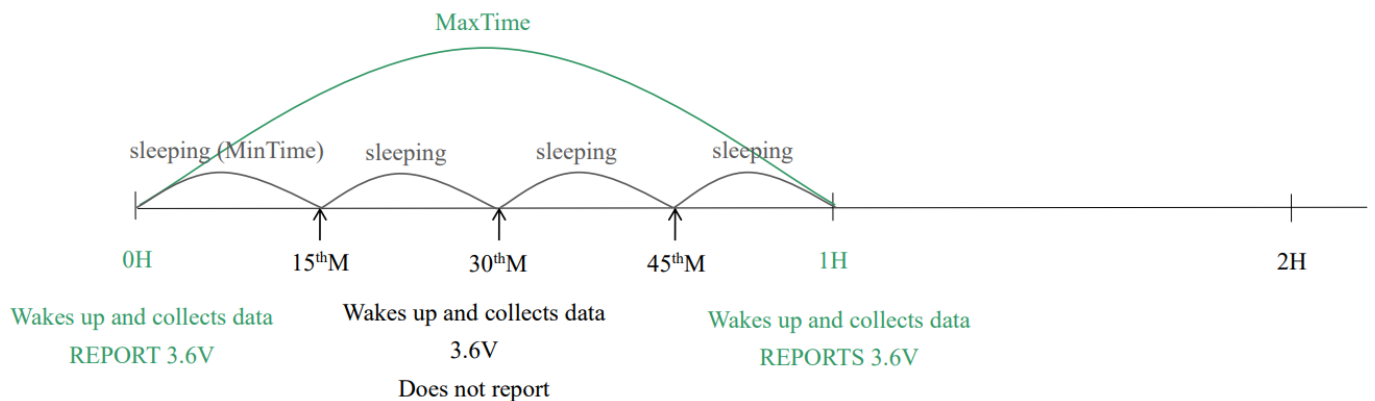
Example for MinTime/MaxTime logic

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

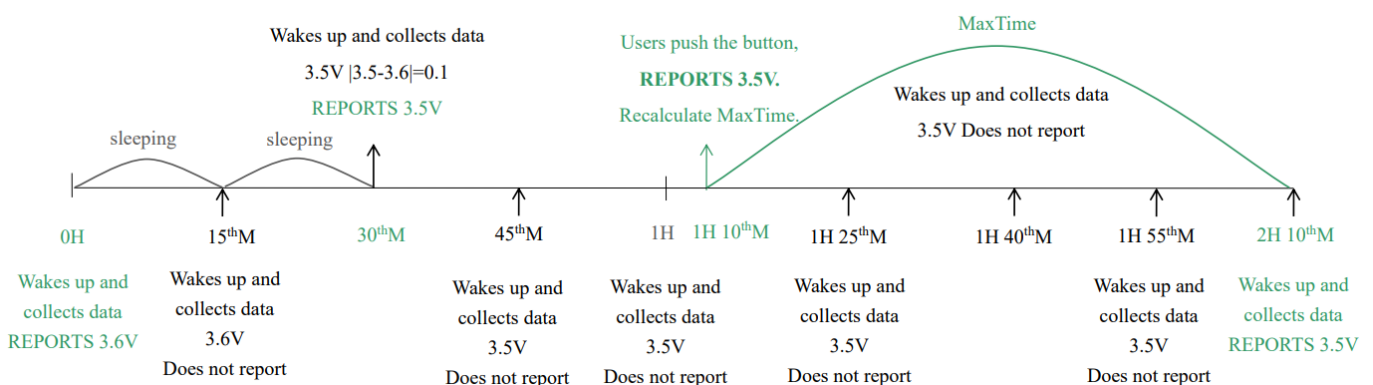


Note: MaxTime=MinTime. Data will only be report according to MaxTime (MinTime) duration regardless of BatteryVoltageChange value.

- 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.



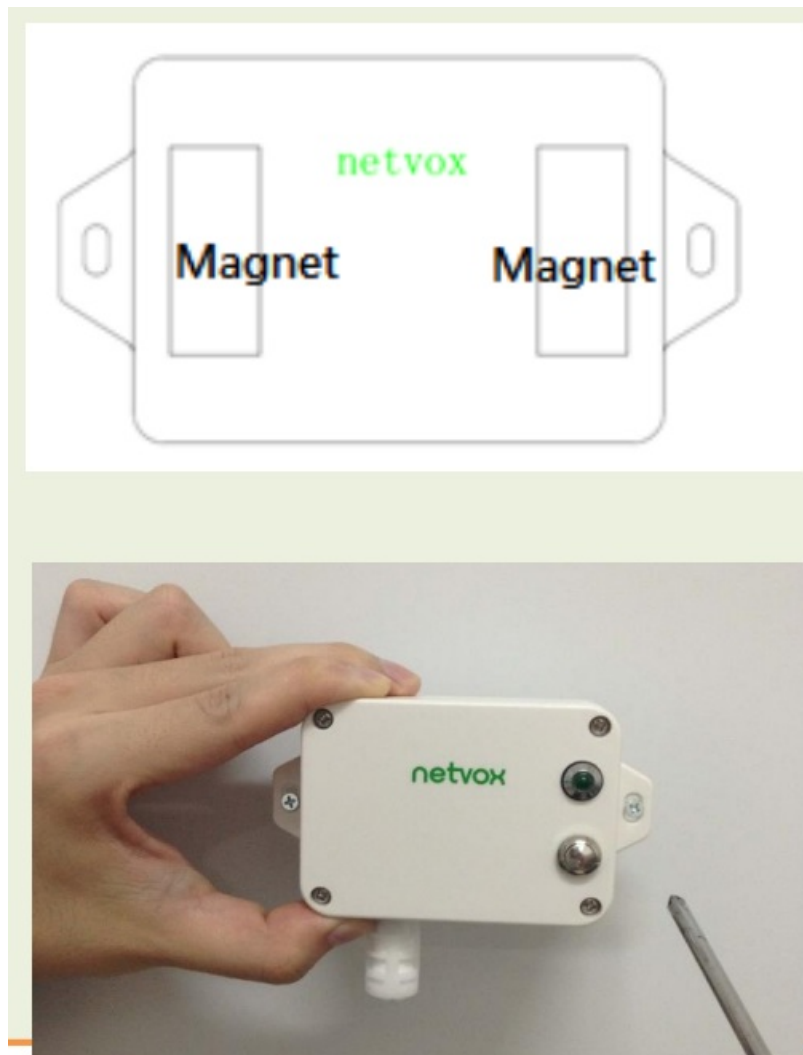
Notes:

- The device only wakes up and performs data sampling according to MinTime Interval. When it is sleeping, it does not collect data.
- 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 the 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

1. The Wireless Thermocouple Sensor (R718CK/T/N/R) 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

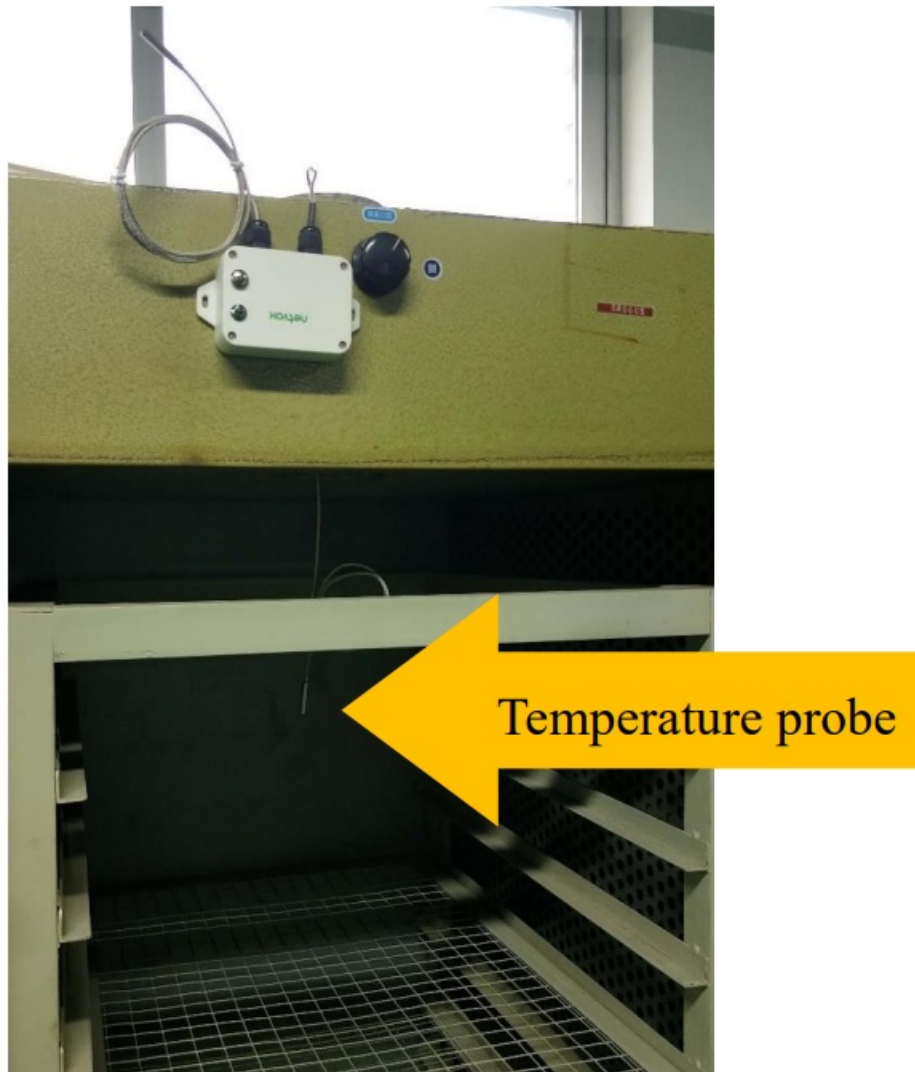


2. When R718CK/T/N/R is compared with the last reported values, the temperature change exceeds 10°C (default), and it will report values at the MinTime interval. If does not exceed 10°C (default), it will report values at the MaxTime interval.

R718CK/T/N/R 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 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

- 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.

Important Maintenance Instruction

Kindly pay attention to the following 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 extremely hot 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, moisture that forms inside the device will damage 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 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 operating properly, please take it to the nearest authorized service facility for repair.

Precautions for Outdoor Installation

According to the Enclosure Protection Class (IP code), the device is compliant to GB 4208-2008 standard, which is equivalent to IEC 60529:2001 degrees of protection provided by enclosures (IP Code). IP Standard Test Method: IP65: spray the device in all directions under 12.5L/min water flow for 3min, and the internal electronic

function is normal. IP65 is dustproof and able to prevent damage caused by water from nozzles in all directions from invading electrical appliances. It can be used in general indoor and sheltered outdoor environments. Installation in extreme weather conditions or direct exposure to sunlight and rain could damage the components of the device. Users may need to install the device under an awning (fig. 1) or face the side with an LED and function key downwards (fig. 2) to prevent malfunction. IP67: the device is immersed in 1m deep water for 30 minutes, and the internal electronic function is normal.




Fig 1. Install under an awning



Fig 2. Install with LED and function key faced downwards

Documents / Resources

	netvox R718CK Wireless Thermocouple Sensor [pdf] User Manual R718CK, R718CT, R718CN, R718CR, R718CK Wireless Thermocouple Sensor, R718CK, Wireless Thermocouple Sensor, Thermocouple Sensor, Sensor
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References

- [Netvox LoRaWAN Application Command](#)
- [ÉÔ°ö;£¡£¡£](#)
- [User Manual](#)

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