Wireless 2-Gang Reed Switch Open/Close Detection Sensor

R718F2
User Manual

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1. Introduction

R718F2 is a long-distance door Sensor based on the LoRaWAN open protocol (Class A). The device is equipped with 2-gang reed sensors, The reed switch is on (conducting) within the magnetic range, and is off (nonconducting) when it's out of the magnetic range. The module can detect the closing and opening signals so that the state of the door window status can be detected.

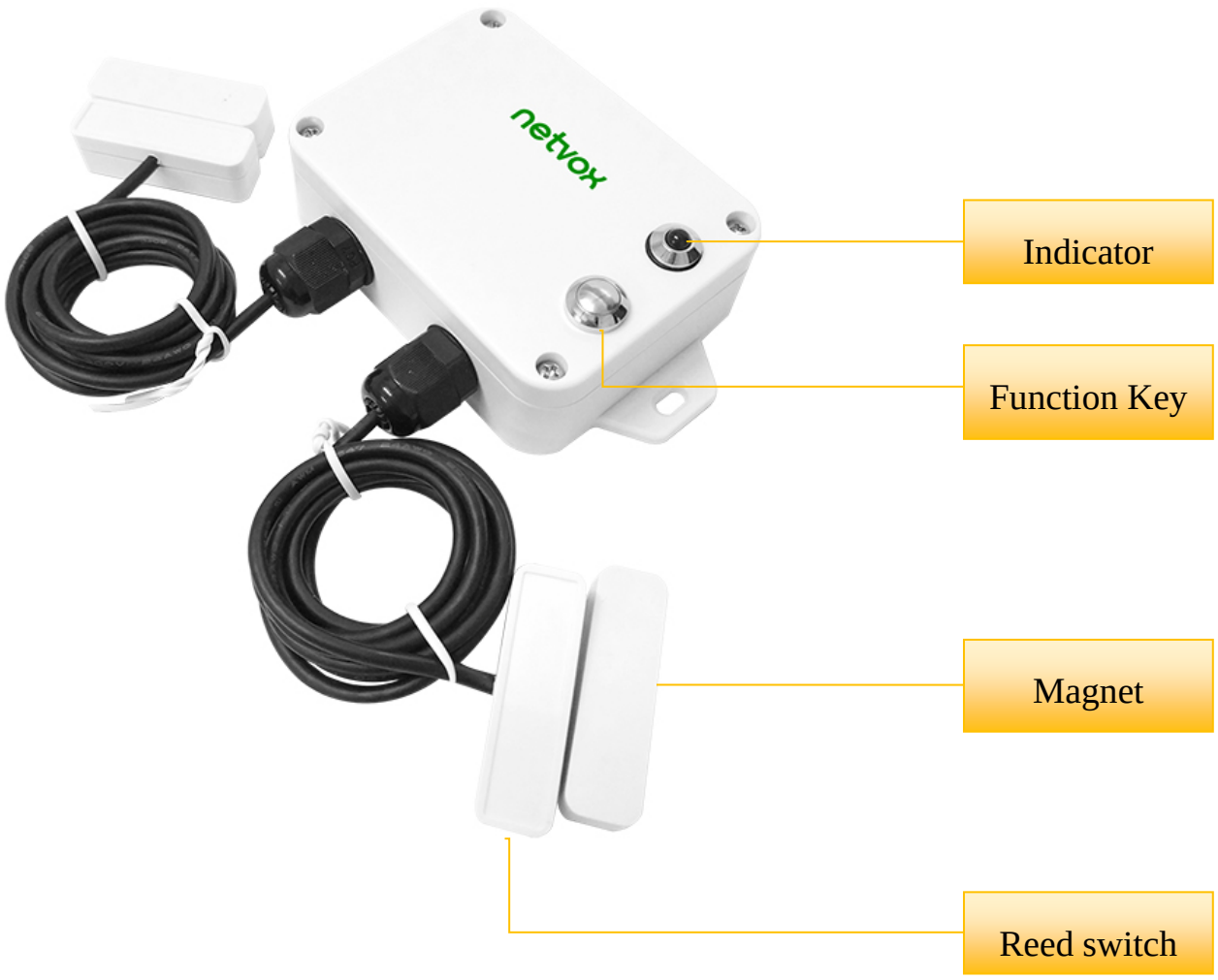
LoRa Wireless Technology:

LoRa is a wireless communication technology famous for its long-distance transmission and low power consumption. Compared with other communication methods, LoRa spread spectrum modulation technique greatly extend the communication distance. It can be widely used in any use case that requires long-distance and low-data wireless communications. For example, automatic meter reading, building automation equipment, wireless security systems, industrial monitoring. It has features like small size, low power consumption, long transmission distance, strong 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

- Compatible with LoRaWAN
- 2 ER14505 lithium batteries in parallel (3.6V / cell).
- 2-gang reed switch detection
- The base is attached with a magnet that can be attached to a ferromagnetic material object.
- Protection level: Main body-IP65 / IP67 (optional), Sensor-IP67
- Compatible with LoRaWAN™ Class A
- Using frequency hopping spread spectrum technology
- Available for third-party platforms: Actility / ThingPark, / TTN / MyDevices / Cayenne
- Improved power management for longer battery life

  Battery Life:

  - Please refer to web: http://www.netvox.com.tw/electric/electric_calc.html

4. 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 setting)	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 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 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

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.

Low Voltage Warning

Low Voltage	3.2V

5. Data Report

The device will immediately send a version packet report along with an uplink packet including reed switch status and battery voltage.

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

Default Setting

MaxTime: 0x0E10 (3600s)

MinTime: 0x0E10 (3600s)

BatteryChange: 0x01 (0.1V)

LastMessageResendtime: 0x00 (No resend)

Reed Switch Trigger Status

When the magnet closes to the reed switch, it will report the status “0”

*The distance between the magnet and the reed switch is less than 2 cm

When the magnet removes the reed switch, it will report the status “1”

*The distance between the magnet and the reed switch is greater than 2 cm

Last Message Resend Time Function

Resendtime = 0x00 or 0xFF, send the reed switch status

Resendtime = 0x03 to 0xFE, send the reed switch status, and resend the reed switch status after 3-254s

Note:

1. The cycle of the device sending the data report is according to the default.
2. The interval between two reports must be the Mintime.
3. 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

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)

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 013E000A0B202005200000, the firmware version is 2020.05.20

3. **Data Packet:**

   When Report Type=0x01 is data packet.

Device	**Device Type**	**Report Type**	**NetvoxPayLoadData**			
R718F2	0x3E	0x00	SoftwareVersion(1Byte) Eg.0x0A—V1.0	HardwareVersion (1Byte)	DateCode (4Bytes,eg0x20170503)	Reserved (2Bytes,fixed 0x00)
		0x01	Battery (1Byte, unit:0.1V)	Status 1 (1Byte 0:off 1:on)	Status 2 (1Byte 0:off 1:on)	Reserved (5Bytes,fixed 0x00)

Example of uplink: 013E012401000000000000

1st byte (01): Version

2nd byte (3E): DeviceType 0x3E － R718F2

3rd byte (01): ReportType

4th byte (24): Battery－3.6v , 24 Hex=36 Dec 36*0.1v=3.6v

5th byte (01): Status 1－On

6th byte (00): Status 2－Off

7th -11th byte (000000000000): 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			
ConfigReport Req	R718F2	0x01	0x3E	MinTime (2bytes Unit: s)	MaxTime (2bytes Unit: s)	BatteryChange (1byte Unit: 0.1v)	Reserved (4Bytes, Fixed 0x00)
ConfigReport Rsp		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)	Reserved (4Bytes, Fixed 0x00)

1. Configure device parameters MinTime = 1min, MaxTime = 1min, BatteryChange = 0.1v

   Downlink: 013E003C003C0100000000 // 003C Hex = 60 Dec

   Device returns:

   813E000000000000000000 (configuration successful)

   813E010000000000000000 (configuration failed)

2. Read device parameters

   Downlink: 023E000000000000000000

   Device returns:

   823E003C003C0100000000 (current configuration parameters)

5.3 Example of LastMessageResendtime

SetLastMessage ResendtimeReq	ALL(0xFF) only used in contact switch device type	0x1F	0xFF	Resendtime(1Byte)Unit:1s , Range:3-254s when 0 or 255 no resend, default is no resend	Reserved (8Bytes,Fixed 0x00)
SetLastMessage ResendtimeRsp		0x9F		Status (0x00_success)	Reserved (8Bytes,Fixed 0x00)
GetLastMessage ResendtimeReq		0x1E		Reserved (9Bytes,Fixed 0x00)	
GetLastMessage ResendtimeRsp		0x9E		Resendtime(1Byte)Unit:1s , Range:3-254s when 0 or 255 no resend,default is no resend	Reserved (8Bytes,Fixed 0x00)

Set resend time =5s

Downlink:1FFF050000000000000000

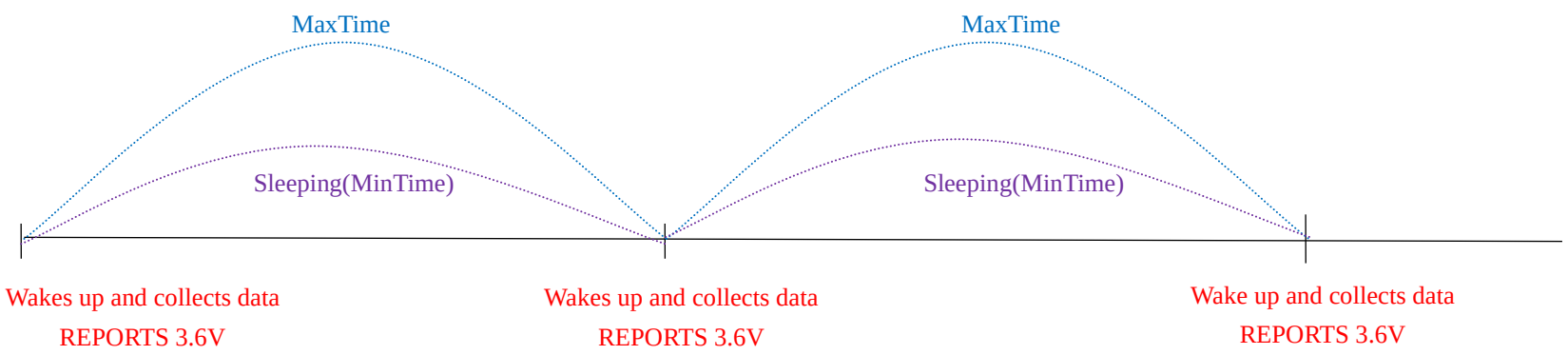
Response:

9FFF000000000000000000 (Configuration success)

9FFF010000000000000000 (Configuration failure)

5.4 Example for MinTime/MaxTime logic

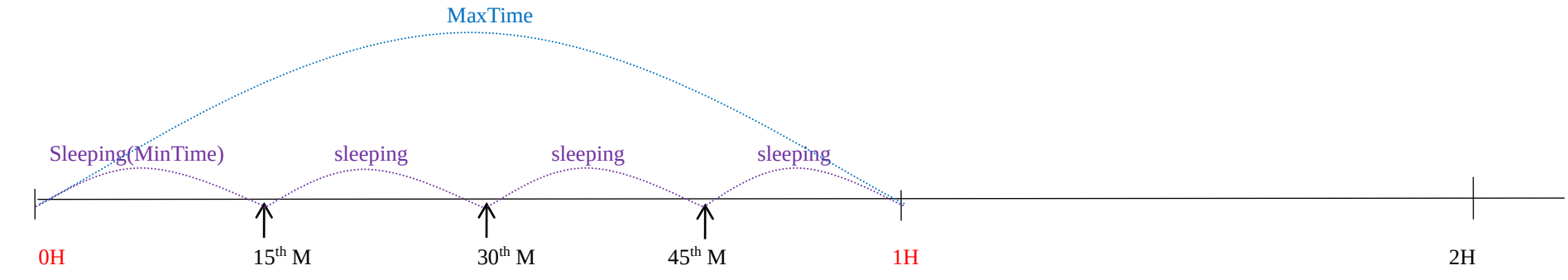
Example#1 based on MinTime = 1 Hour, MaxTime= 1 Hour, Reportable Change i.e. BatteryVoltageChange=0.1V



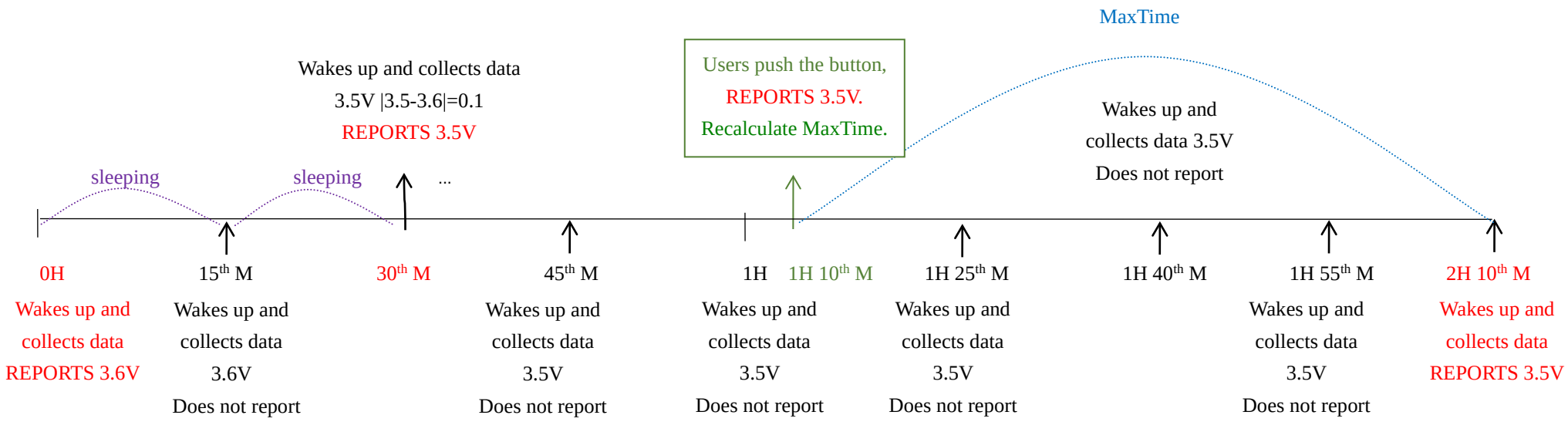
Note:

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.

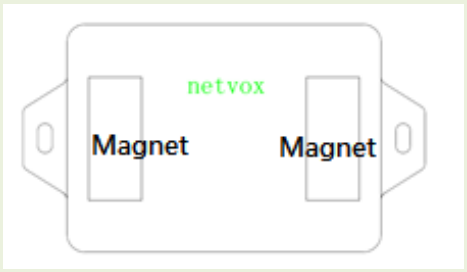
6. Installation

1. R718F2 has a built-in magnet (as the figure 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 separately) to secure the unit to a wall or other surface (as the figure 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.



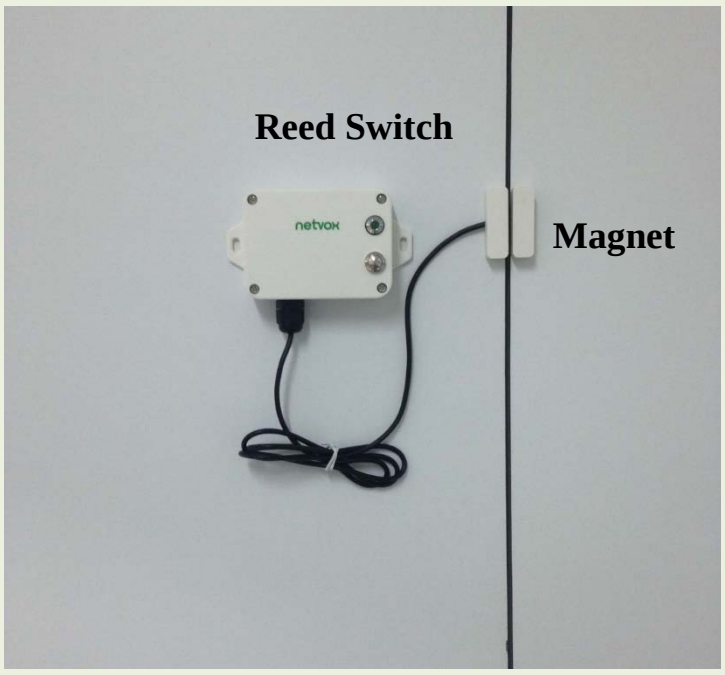
2. Tear off the 3M glue at the bottom of the reed switch probe and the magnet (as the red frame in the figure above). Then, stick the reed switch probe to the door and is parallel to the magnet (as the figure on the right).

Note:

The installation distance between the reed switch probe and the magnet should be less than 2cm.

3. When the door or window is opened, the reed switch probe is separated from the magnet, and the device sends an alarm message about the opening.

When the door or window is closed, the reed switch probe and the magnet get closer, and the device restores to the normal state and sends a state message about the closing.

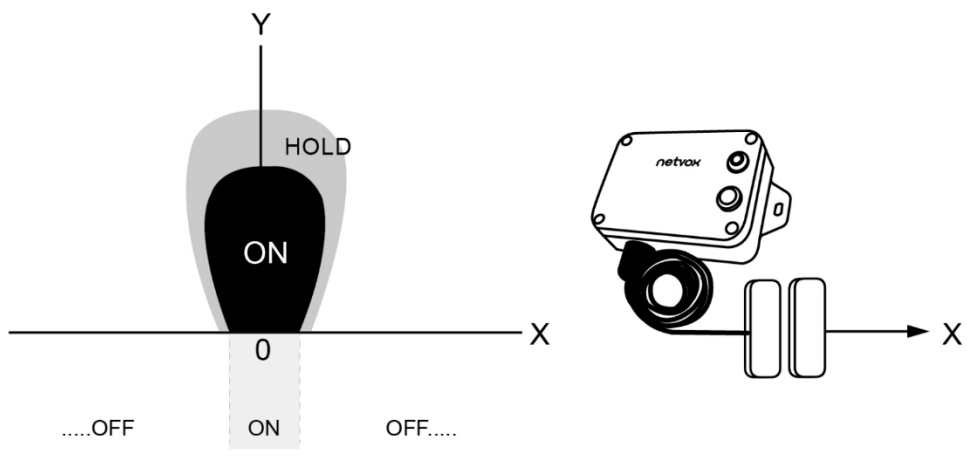


R718F2 is suitable below scenarios:

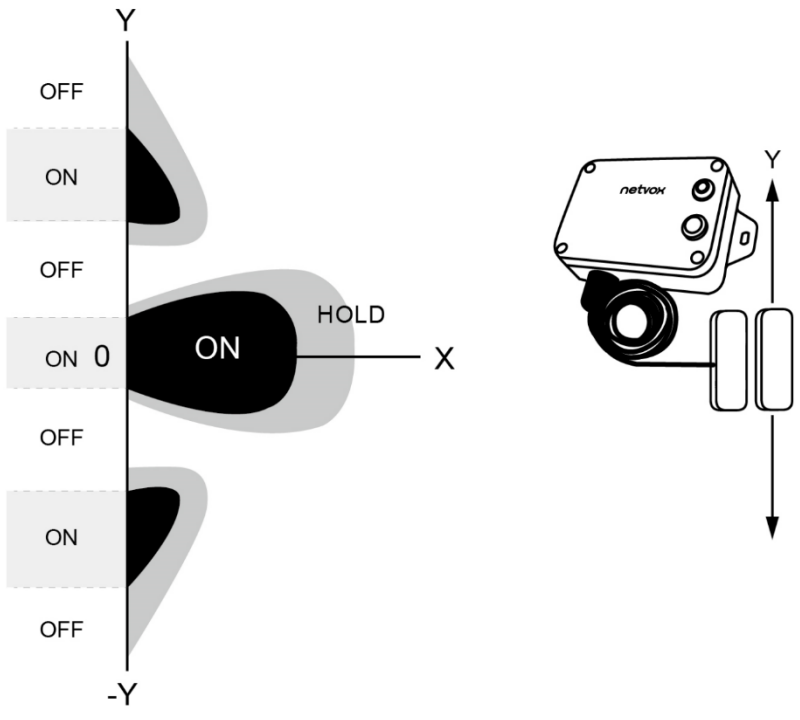
- Door, window
- Machine room door
- Archives
- Closet
- Refrigerators and freezers
- Cargo ship hatch
- Garage door
- Public toilet door

The place needs to detect the opening and closing status.

When installing the device, the magnet **must move along the X axis** relative to the sensor.



If the magnet moves along the Y axis relative to the sensor, it will cause repeated reports due to the magnetic field.



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.

7. 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:

7.1 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.

7.2 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.

8. Important Maintenance Instruction

The device is a product with 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 water 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 way can damage its detachable parts and electronic components.
- Do not store in excessive heat place. High temperatures can shorten the life of electronic devices, destroy batteries, and deform or melt some plastic parts.
- Do not store in excessive 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. Treating equipment roughly can destroy internal circuit boards and delicate structures.
- Do not wash with strong chemicals, detergents, or strong detergents.
- Do not paint the device. Smudges can make debris block detachable parts up and affect normal operation.
- Do not throw the battery into the fire to prevent the battery from exploding. Damaged batteries may also explode.

All the above suggestions apply equally to your device, batteries, and accessories.

If any device is not operating properly, please take it to the nearest authorized service facility for repairing.

9. Description of Waterproof Grade

1: According to Enclosure Protection Class

This standard is equivalent to IEC 60529:2001 Degrees of Protection Provided by Enclosures (IP Code) (English version)

2: The test method of IP65 waterproof grade is: spray the device in all directions under 12.5L/min water flow for 3min, and the internal electronic function is normal.

The test method of IP67 waterproof grade is: the device is immersed in 1m deep water for 30min, and the internal electronic function is normal.

IP65, dust-proof and to prevent damage caused by water from nozzles in all directions from invading electrical appliances. It can be used in general indoor environment and sheltered outdoor environment. It is not suitable for use in environments with high water pressure, high temperature and high humidity, such as long time direct sunlight outdoors and possible direct exposure to rainstorm. If it is really necessary to install in harsh environments, it is recommended to add sunscreen and rainproof shields when installing.

Case I (face down with LED and buttons)

Case II (installed under the rain shield)