Wireless Dry Contact Sensor

R311CA
User Manual

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1. Introduction

The R311CA is a dry contact detection device for Netvox ClassA type devices based on the LoRaWAN open protocol and is compatible with LoRaWAN protocol. When any dry contact of R311CA detects a change, R311CA will send a message to the gateway.

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 and 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

Indicator

Function Key

3. Main Features

- 2 x 3V CR2450 button batteries

- Compatible with LoRaWAN

- Adopt SX1276 wireless communication module.

- Dry contact detection

- Frequency hopping spread spectrum technology.

- Applicable to the third-party platforms: Actility/ ThingPark/ TTN/ MyDevices/ Cayenne

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

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

In this website, users can find battery lifetime for various models at different configurations.

4. Set up Instruction

On/Off

Power on	Insert batteries (users need a flat blade screwdriver to open)
Turn on	Press any function key till green and red indicator flashes once.
Turn off (Restore to original setting)	Press and hold the function key for 5 seconds till the green indicator flashes 20 times.
Power off	Remove Batteries
Note:	1. Remove and insert the battery; the device memorizes previous on/off state by default. 2. Press any function key and insert batteries at the same time; it will enter engineer testing mode. 3. 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 join 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 in the original setting)	Turn on the device to search for the previous network to join. The green indicator stays on for 5 seconds: Success The green indicator remains off: Fail
Fail to join the network	Suggest checking device verification on the gateway or consulting your platform service provider if the device fails to join the network.

Function Key

Press two function keys for 5 seconds	Restore to the original setting / Turn off The green indicator flashes 20 times: Success The green indicator remains off: Fail
Press once	The device is in the network: the 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 turn on and join in the network	Sleeping period: Min Interval. When reportchange exceeds the set value: send data packets according to Min Interval.

Low Voltage Warning

Low Voltage	2.4V

5. Data Report

When the device is powered on, it will immediately send a version package report and a report data with voltage value and dry contact status.

Before any configuration is performed, the device sends data according to the default configuration.

Default setting:

MaxTime: 0x0E10 (3600s)

MinTime: 0x0E10 (3600s)

Batterychange: 0x01 (0.1V)

Triggering the dry contact:

When the state of R311CA dry contact changes, the Report will be sent immediately.

Disconnect : 0

Connect : 1

Command - LastMessageResendtime:

When the state of R311CA dry contact changes, the Report will be sent immediately, and the current dry contact state will be resent after 5 seconds.

*The resending time can be modified through commands.

*The time range is from 3s to 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.

The device reported data parsing please refer to *Netvox LoraWAN Application Command* documents and URL:

http://www.netvox.com.cn:8888/cmddoc

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

5.1 Example of ConfigureCmd

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=0x97, binary=1001 0111, if bit 7= 1, it means low voltage.

   The actual voltage is 0001 0111 = 0x17 = 23, 23*0.1v =2.3v

2. **Version Packet:**

   When Report Type=0x00 is the version packet, such as 014C000A0B202005200000, the firmware version is 2020.05.20

3. **Data Packet:**

   When Report Type=0x01 is data packet.

Device	Device Type	Report Type	NetvoxPayLoadData			
R311CA	0x4C	0x00	SoftwareVersion (1Byte)Eg.0x0A—V1.0	HardwareVersion (1Byte)	DateCode (4Bytes,eg0x20170503)	Reserved (2Bytes,fixed 0x00)
		0x01	Battery (1Byte, unit:0.1V)	Status1 (1Byte 0:off 1:on)	Status2 (1Byte 0:off 1:on)	Reserved (5Bytes,fixed 0x00)

Example of Uplink: 014C011E01000000000000

　　1st byte (01): Version

　　2nd byte (4C): DeviceType 0x4C－ R311CA

　　3rd byte (01): ReportType

　　4th byte (1E): Battery－3.0V, 1E(HEX)=30(DEC),30*0.1v=3.0v

　　5th byte (01): Status1－On

　　6th byte (00): Status2－Off

　　7th ~ 11th byte (0000000000): 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	R311CA	0x01	0x4C	MinTime (2bytes Unit:s)	MaxTime (2bytes Unit:s)	BatteryChange (1byte Unit:0.1v)	Reserved (4Bytes,Fixed 0x00)
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)	Reserved (4Bytes,Fixed 0x00)

(1) Configure R311CA device parameter MinTime = 1min、MaxTime = 1min、BatteryChange = 0.1v

    Downlink： 014C003C003C0100000000

    Device return：

        814C000000000000000000 (configuration success)

        814C010000000000000000 (configuration failure)

(2) Read R311CA device parameter.

    Downlink: 024C000000000000000000

    Device return：

        824C003C003C0100000000 (device current parameter)

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)

(3) Set Last Message Resend time, resend time =5s

    Downlink：　1FFF050000000000000000

    Device return：

        9FFF000000000000000000 (configuration success)

        9FFF010000000000000000 (configuration failure)
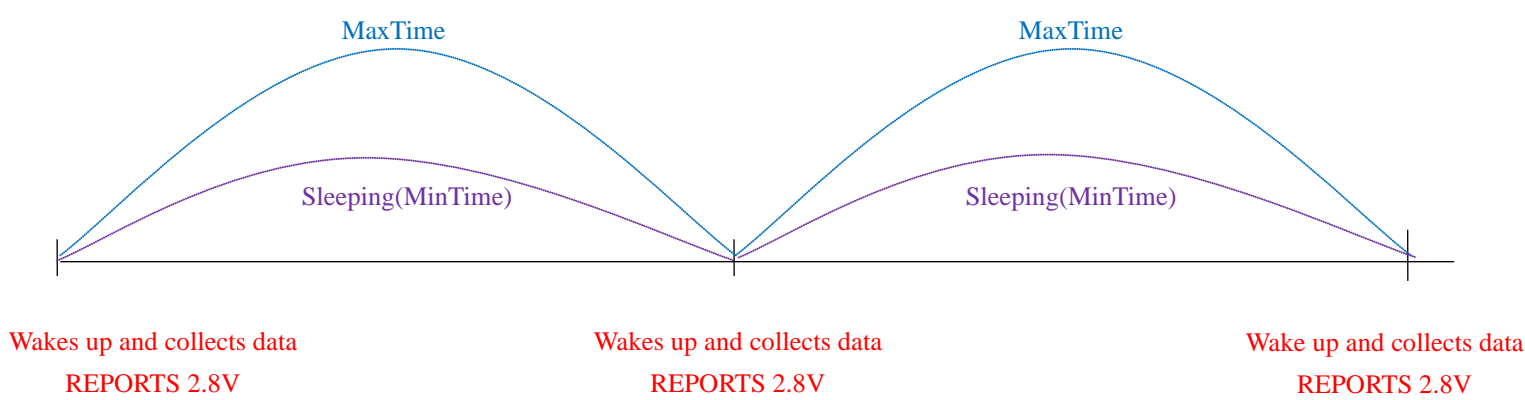
(4) Get Last Message Resend time

    Downlink：　1EFF000000000000000000

    Device return：

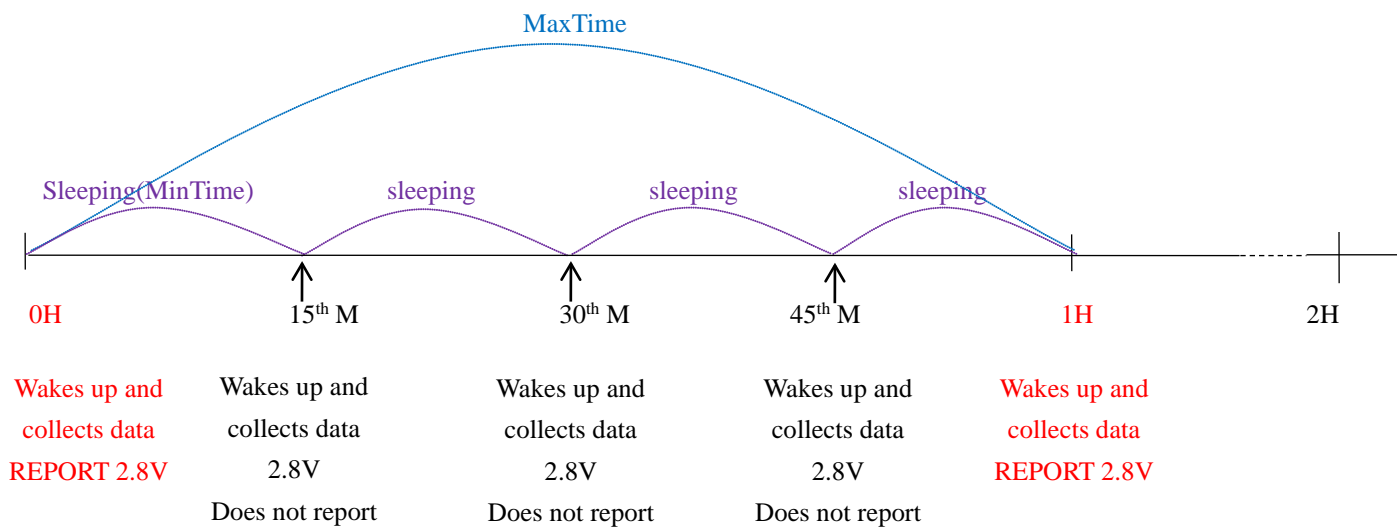   9EFF050000000000000000 (device current parameter)

5.3 Example for MinTime/MaxTime logic

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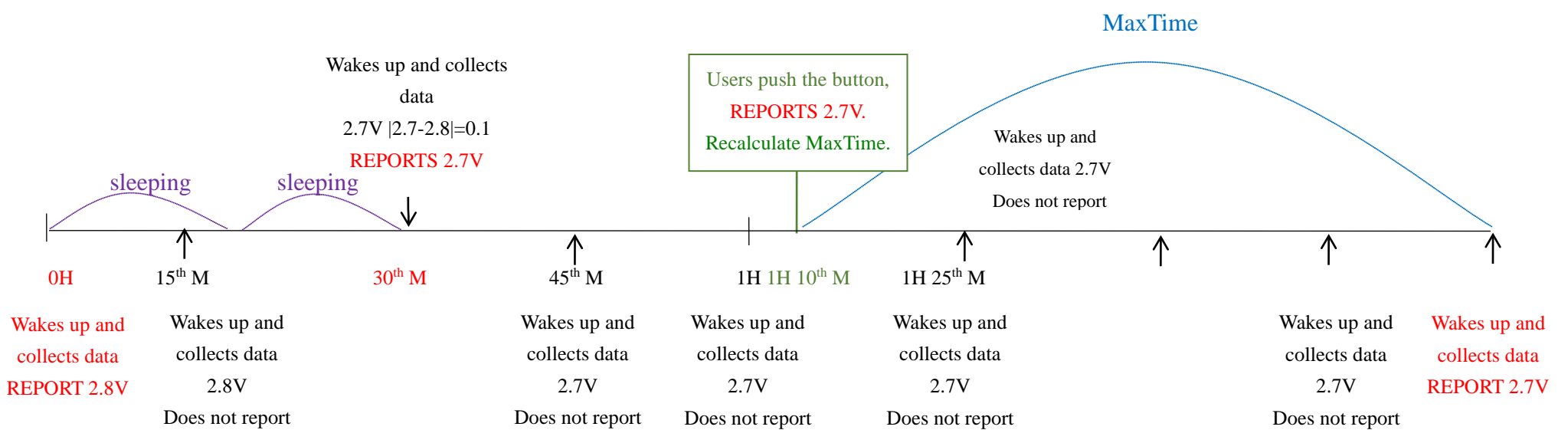

Note: MaxTime=MinTime. Data will only be report according to MaxTime (MinTime) duration regardless BtteryVoltageChange value.

Example#2 based on MinTime = 15 Minutes, MaxTime= 1 Hour, Reportable Change i.e. BatteryVoltageChange= 0.1V.

0H	15th M	30th M	45th M	1H	2H
Wakes up and collects data REPORT 2.8V	Wakes up and collects data 2.8V Does not report	Wakes up and collects data 2.8V Does not report	Wakes up and collects data 2.8V Does not report	Wakes up and collects data REPORT 2.8V	

Example#3 based on MinTime = 15 Minutes, MaxTime= 1 Hour, Reportable Change i.e. BatteryVoltageChange= 0.1V.

Wakes up and collects data
2.7V |2.7-2.8|=0.1
REPORTS 2.7V

Users push the button, REPORTS 2.7V. Recalculate MaxTime.

Wakes up and collects data 2.7V Does not report

0H	15th M	30th M	45th M	1H 1H 10th M	1H 25th M		
Wakes up and collects data REPORT 2.8V	Wakes up and collects data 2.8V Does not report		Wakes up and collects data 2.7V Does not report	Wakes up and collects data 2.7V Does not report	Wakes up and collects data 2.7V Does not report	Wakes up and collects data 2.7V Does not report	Wakes up and collects data REPORT 2.7V

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 collected data is compared with the last reported data. If the variation of the data is greater than the value of ReportableChange, the device will report according to MinTime interval. If the data variation is not greater than the last reported data, the device will report according to MaxTime interval.

(3) We do not recommend setting the MinTime Interval value too low. If the MinTime Interval is too low, the device will wake up frequently and the battery will be drained soon.

(4) When the device sends a report, no matter the data changes, button is pushed or MaxTime interval comes, another cycle of MinTime / MaxTime calculation starts.

6. Installation

1. Remove the 3M release paper on the back of the device and attach the device to the smooth wall (please do not stick it to the rough wall to avoid falling off after a longtime usage).

Note:

- Wipe the wall surface before installation to avoid dust on the wall surface that affect the effect of the paste.
- Do not install the device in a metal shielded box or other electrical equipment around it to avoid affecting the wireless transmission of the device.

2.When the device detects the state of dry contact changing, the data report will be sent immediately.

3.If detect the battery voltage exceeding the value of the variation at MinTime, the report will be sent immediately.

4.No matter the state of the dry contact changes, the data report must be sent at MaxTime.

Note:

- When the dry contact is connected, the state is "1".
- When the dry contact is disconnect, the state is "0"

The dry contact sensor (R311CA) can be applied to the following scenes:

- Various switches and buttons
- The output of the dry contact of the sensor
- The operating state of the device
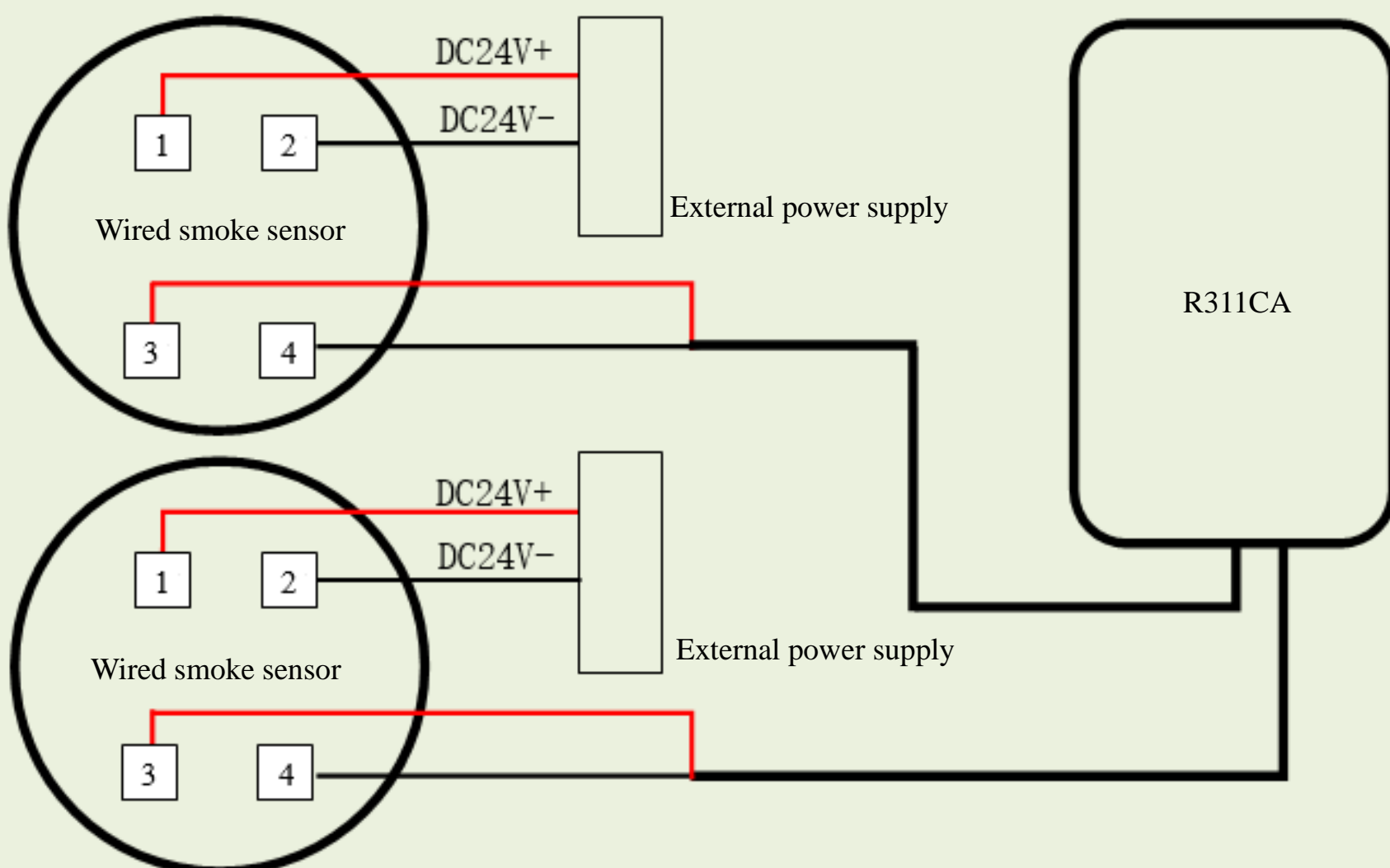- Monitoring the condition of doors and windows in home or in business

Fig. Diagram of connecting with the wired smoke sensor

7. 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.