Wireless Window Sensor with Glass Break Detector

R313CB
User Manual

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1. Introduction

R313CB is a switch detection device which is the Class A device of Netvox based on LoRaWAN™ protocol.

It is compatible with the LoRaWAN protocol. When the doors and windows are abnormally opened or the glass of the doors and windows are broken, R313CB will send a message to the gateway.

It can be installed on the door or window with two glass sliding sashes. The reed switch and the magnet of the main body are respectively installed on both sides of the window sashes. The external reed switch and the magnet can be installed on both sides of another window sashes, and the glass sensor can be pasted on the glass.

When the window or door is opened, R313CB will send an alarm message to the gateway. When the door or window is closed, it will send a message that the state is normal. When the glass is broken, R313CB will send an alarm message to the gateway, and then the data which is sent after breakage is based on the current state. If it is open, the data is an alarm state. If it is closed, the data is a normal state.

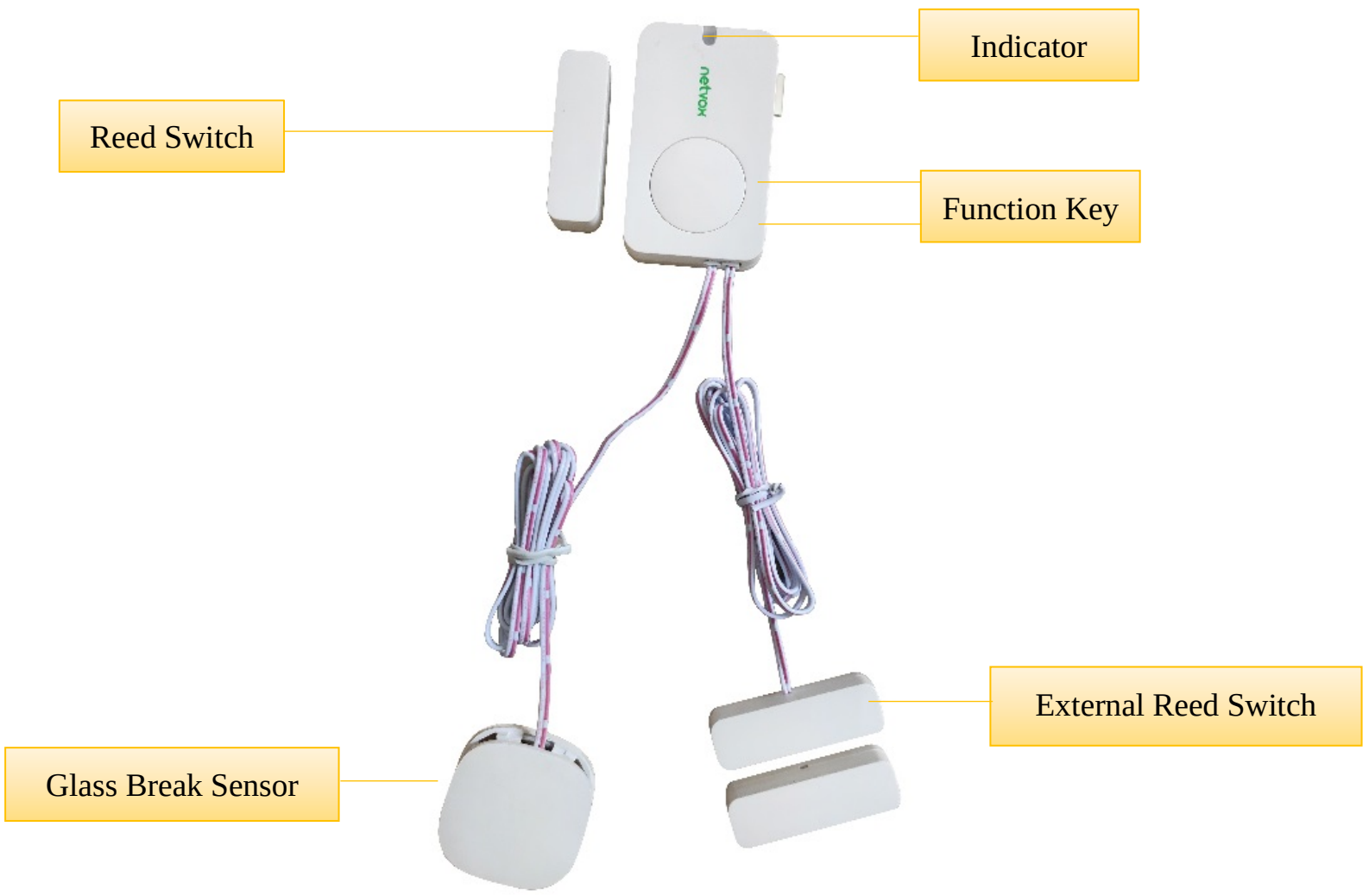
LoRa Wireless Technology:

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



3. Main Features

- 2 sections of 3V CR2450 button batteries
- Compatible with LoRaWAN Class A
- Adopt SX1276 wireless communication module
- Frequency hopping spread spectrum technology
- Configuring parameters and reading data via the third-party software platforms, and set alarms via SMS text and email (optional)
- Applicable to the third-party platforms: Actility/ ThingPark/ TTN/ MyDevices/ Cayenne
- Low power consumption, supports longer battery life

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 may need a flat blade screwdriver to open); Insert two sections of 3V CR2450 button batteries and close the battery cover.)
Turn on	Press any function key till green and red indicator flashes once.
Turn off (Restore to original setting)	Press simultaneously and hold two function keys for 5 seconds, and then the green indicator will flash continuously. After release function keys, the green indicator flashes 20 times and the device will turn off automatically.
Power off	Remove Batteries
Note:	1. Remove and insert the battery; the device memorizes previous on/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. Press any function key and insert batteries at the same time; it will enter engineer testing mode.

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 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 gateway or consulting your platform server provider if the device fails to join the network.

Function Key

Press and hold 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 turned on and join in the network	Sleeping period: Min Interval. When the reportchange exceeds the default or the state of the device changes: send a data report according to Min Interval.

Low Voltage Warning

Low Voltage	2.4V

5. Data Report

After power on, the device will immediately send a version packet report and a data report including reed switch status, glass break status and voltage.

The device sends data according to the default configuration before any other configuring.

Default setting:

Report MaxTime: 0x0E10 (3600s)

Report MinTime: 0x0E10 (3600s)

BatteryVoltageChange: 0x01 (0.1V)

Last Message Resend time:0x00 (no resend)

Triggering the reed switch:

When the reed switch detects the state changing, the report will be sent immediately.

The status1: Close: 0 (off) Open: 1(on)

* The main body and the external sensor share an I/O status1;

therefore, when either the main body or the external sensor is in the open state, the report status will be 1.

The report status will be 0 only when both the main body and the external sensor are closed.

Triggering the glass sensor:

When the glass break sensor detects the state changing, the report will be sent immediately.

The status2: No trigger: 0 Trigger: 1

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 document* and *Netvox Lora Command Resolver* http://cmddoc.netvoxcloud.com/cmddoc

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)

Device	**Device Type**	**Report Type**	**NetvoxPayLoadData**			
R313CB	0x56	0x01	Battery (1Byte, unit:0.1V)	Status1 (1Byte 0:off 1:on)	Status2 (1Byte 0:off 1:on)	Reserved (5Bytes,fixed 0x00)

Example 1 of Uplink: 0156011E01000000000000

1st byte (01): Version

2nd byte (56): DeviceType 0x56 － R313CB

3rd byte (01): ReportType

4th byte (1E): Battery－3v ,1E Hex=30 Dec 30*0.1v=3.0v

5th byte (01): Status1－on

6th byte (00): Status2－off

7th -11th byte (0000000000): Reserved

Example 2 of Uplink: 0156019700010000000000

1st byte (01): Version

2nd byte (56): DeviceType 0x56 － R313CB

3rd byte (01): ReportType

4th byte (97): Battery－2.3v ,17 Hex=23 Dec 23*0.1v=2.3v

// The bit7 is 1 represent low battery, bit6-bit0 represent battery voltage

5th byte (00): Status1－off

6th byte (01): Status2－on

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**	**Cmd ID**	**Device Type**	**NetvoxPayLoadData**			
Config ReportReq	R313CB	0x01	0x56	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 R313CB device parameter MinTime = 1min, MaxTime = 1min, BatteryChange = 0.1v

Downlink： 0156003C003C0100000000

Device return：

81560000000000000000 (configuration success)

81560100000000000000 (configuration failure)

(2) Read R313CB device parameter

Downlink： 02560000000000000000

Device return：

8256003C003C0100000000 (device current parameter)

Description	**Device**	**Cmd ID**	**Device Type**	**NetvoxPayLoadData**	
SetLastMessage ResendtimeReq	ALL (0xFF) only used in	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	contactswitch devicetype	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)

Resendtime = 0x00 or 0xFF, No additional data will be sent

Resendtime = 0x03 to 0xFE, The device will send data after triggering, and then supplement the last status data after 3-254s.

When the device is triggered quickly, additional data can be sent

Resendtime=0, When the reed switch is closed immediately after magnetic opening, it will only receive reed switch status =1

Resendtime=3, Close the reed switch as soon as it is opened, and you will receive reed switch status =1, it will be received after 3 seconds reed switch status =0

(3) Configure the device to resend data within 5s after sending the packet

Downlink: 1FFF050000000000000000

Device return：

9FFF000000000000000000 (configuration success)

9FFF010000000000000000 (configuration failure)

(4) Read R313CB device parameter

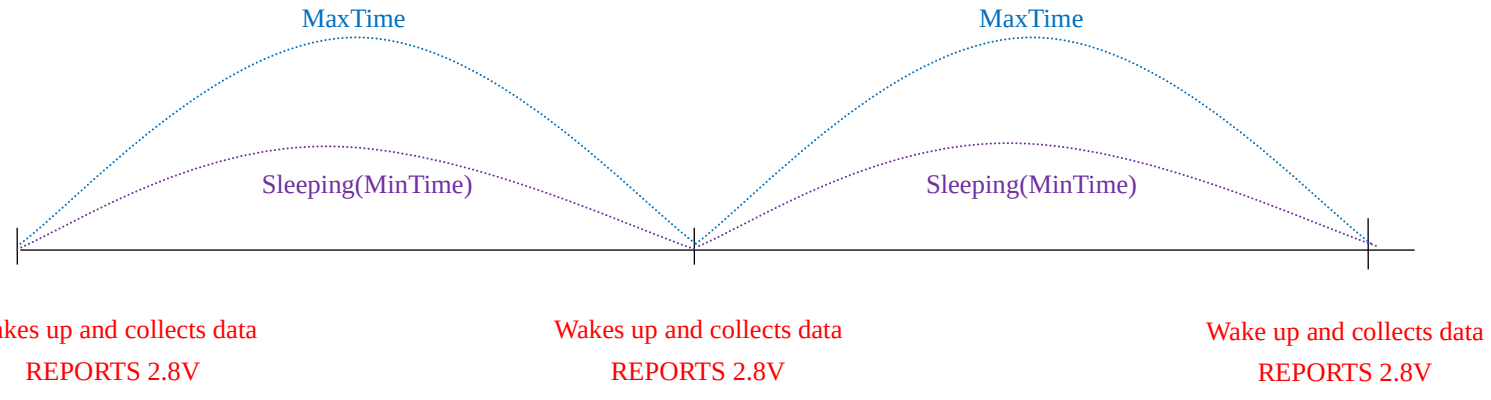
Downlink： 1EFF000000000000000000

Device return：

9EFF050000000000000000 (device current parameter)

5.3 Example for MinTime/MaxTime logic

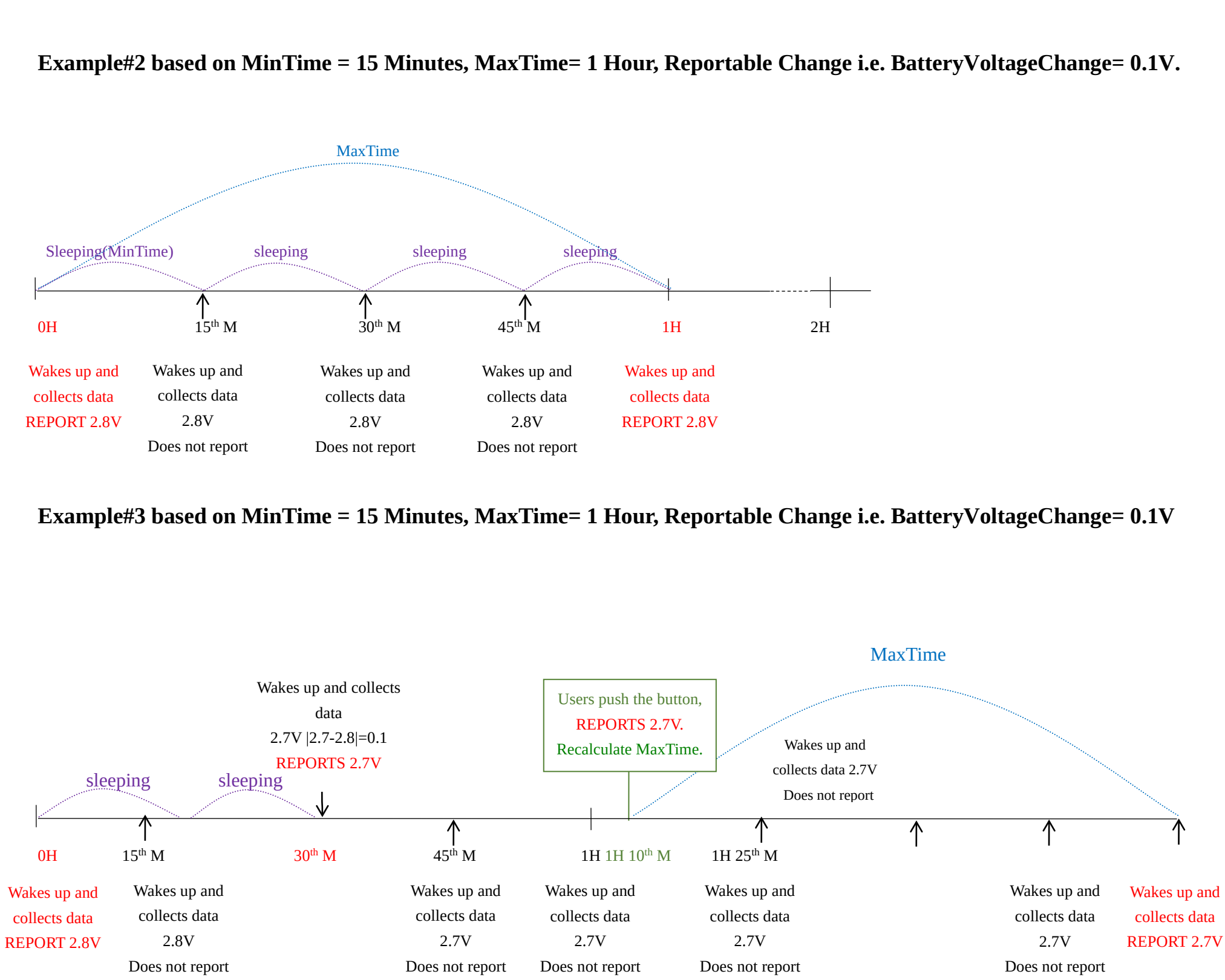
Example#1 based on MinTime = 1 Hour, MaxTime= 1 Hour, Reportable Change i.e. BatteryVoltageChange=0.1V



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.

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 in sleeping mode, it does not collect data.

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.

(2) 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.

(3) 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:

- The distance between the magnet and the reed switch must be less than 2cm.
- 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.

Main Body

Magnet

2. If R313CB with the glass sensor detects that the window is opened (the magnet is separated from the main body) or closed (the magnet and the main body are closed), the data will be sent immediately.
3. If the glass breaking vibration triggers the glass sensor, the data will be sent immediately.
4. If it detects the battery voltage exceeding the variation value at MinTime, the data will be sent immediately.
5. Even if the window status does not change or the no broken glass is detected, the data will be sent regularly according to the Max Time.

Note:

- When either the main body or the external sensor is in the open state, the report status1 will be 1.

  The report status1 will be 0 only when both of the main body and the external sensor are closed.

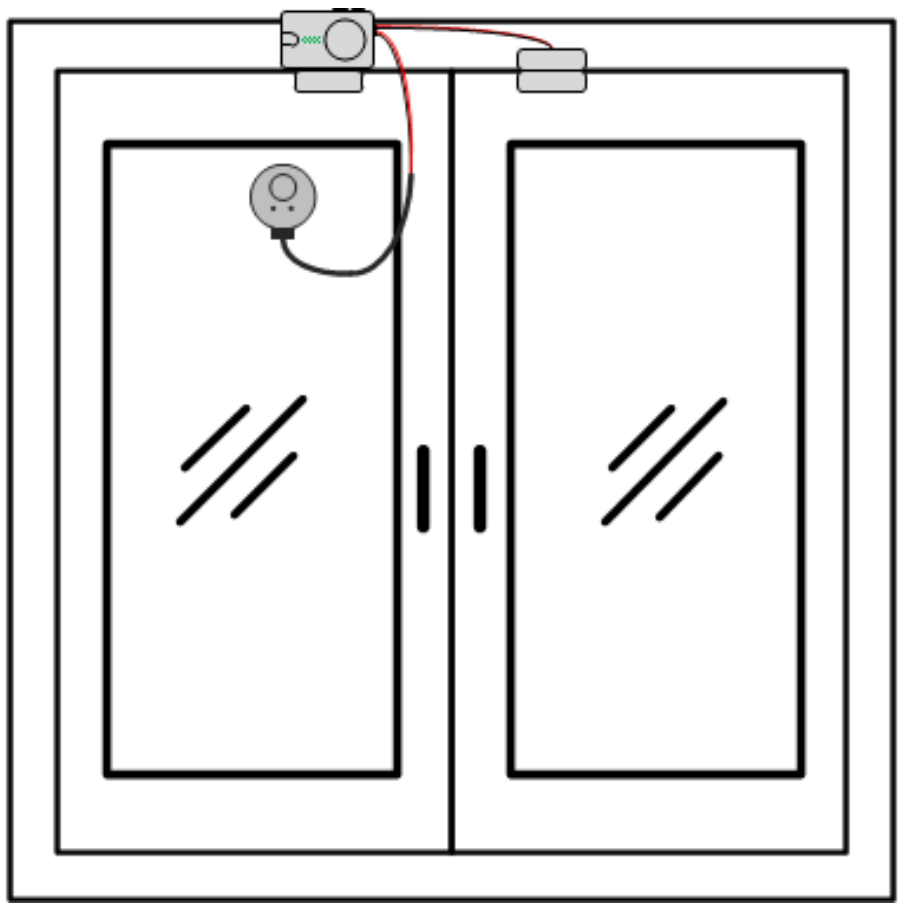
- When the glass break detector is triggered,

  the report status2 will be 1.

The sensor (R313CB) can be applied to the following scenes:

- Office building
- School
- Shopping mall
- Villa

The occasions with glass windows or glass doors.



Installation Diagram

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.