Wireless Seat Occupy Sensor

R313WA
User Manual

Table of Content

1. Introduction

R313WA is a Class A wireless 2-gang seat occupancy device based on standard LoRaWAN protocol. The R313WA will report to the gateway whenever one of the 2-gang seat occupancy sensor detects external pressure. It will also report to the gateway when the external pressure is gone.

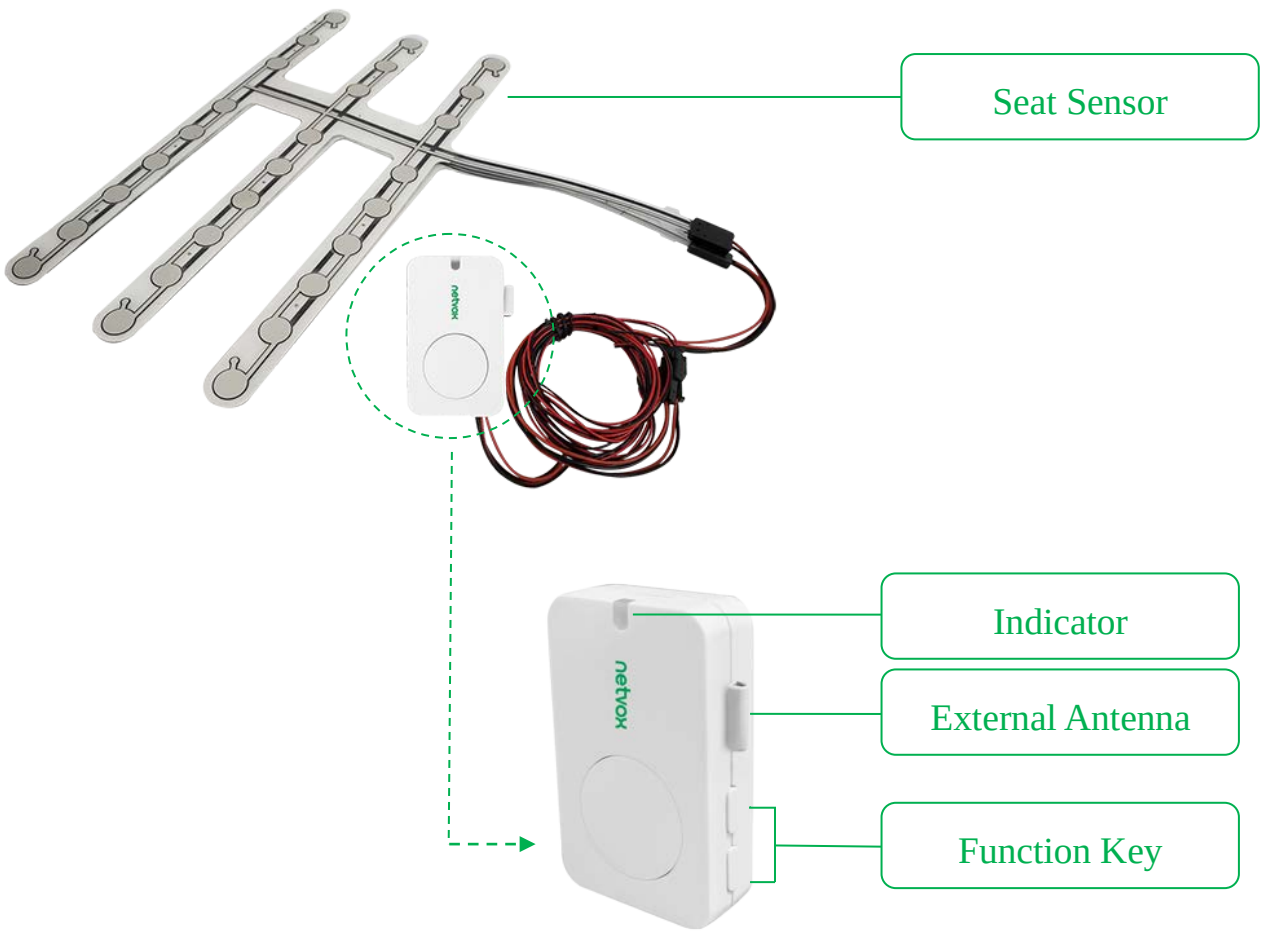
LoRa Wireless Technology:

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, 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

- Compatible with LoRaWAN
- 2 sections of 3V CR2450 button battery power supply
- Detectable voltage and seat occupancy status
- Simple operation and setting
- Protection level IP30
- Compatible with LoRaWAN Class A
- Frequency hopping spread spectrum technology
- Available third-party platform: Actility / ThingPark, TTN, MyDevices/Cayenne
- Low power consumption and long battery life

4. Set up Instruction

On/Off

Power on	Insert batteries. Note: 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 factory setting)	Press and hold both function keys for 5 seconds till green indicator flashes for 20 times.
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 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	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 to check the device verification information on the gateway with your platform server provider.

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	2.4V

5. Data Report

When the device is turned on, it will immediately send a version package and attribute data.

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

Default Setting:

Maximum time: 0x0E10 (3600s)

Minimum time: 0x0E10 (3600s)

BatteryChange: 0x01 (0.1V)

DisableTime: 0x001E (30s) // Value must be greater than DisableTime≧5s

DetectionTime: 0x0078 (120s) // Value must be greater than DetectionTime≧DisableTime

Pressure Detecting:

When the R313WA detects changes in pressure, it will report the status.

When the seat is occupied, the status is 1.

When the seat is unoccupied, the status is 0.

Note:

The reported data is decoded by the Netvox LoRaWAN Application Command document and

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

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=0x98, binary=1001 1000, if bit 7= 1, it means low voltage.

   The actual voltage is 0001 1000 = 0x18 = 24, 24*0.1v =2.4v

2. **Version Packet:**

   When Report Type=0x00 is the version packet, such as 015A000A0B202005200000, the firmware version is 2020.05.20

3. **Data Packet:**

   When Report Type=0x01 is data packet.

Device	**Device Type**	**Report Type**	**NetvoxPayLoadData**			
R313WA	0x5A	0x00	SoftwareVersion (1Byte) Eg.0x0A—V1.0	HardwareVersion (1Byte)	DateCode (4Bytes,eg 0x20170503)	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 1 of Uplink: 015A011D01000000000000

1st byte (01): Version

2nd byte (5A): DeviceType 0x5A－R313WA

3rd byte (01): ReportType

4th byte (1D): Battery－2.9V, 1D(Hex) = 29(Dec), 29x0.1v=2.9v

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				
ConfigReport Req	R313WA	0x01	0x5A	MinTime (2bytes Unit:s)	MaxTime (2bytes Unit:s)	BatteryChange (1byte Unit:0.1v)	Sensor DisableTime (2bytes Unit:s)	Sensor DectionTime (2bytes Unit:s)
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)	Sensor DisableTime (2bytes Unit:s)	Sensor DectionTime (2bytes Unit:s)

(1) Configure device parameters

MinTime = 60s, MaxTime = 60s, BatteryChange = 0.1, SensorDisableTime = 30s, SensorDectionTime = 60s

Downlink: 015A003C003C01001E003C 001E(Hex) = 30(Dec), 003C(Hex) = 60(Dec)

Response:

815A00000000000000000 (Configuration success)

815A01000000000000000 (Configuration failure)

(2) Read Configuration:

Downlink: 025A000000000000000

Response:

825A003C003C01001E003C (Current configuration)

Note:

Disable time must≧5s

Detection time≧ Disable time

5.3 Example of Resendtime

FPort：0x07

Resend the occupancy status of the seat sensor.

<table>
<tr><th>Description</th><th>Device</th><th>Cmd ID</th><th>Device Type</th><th colspan="2">NetvoxPayLoadData</th></tr>
<tr><td>SetLastMessage ResendtimeReq</td><td rowspan="5">Suitable for use with contact switch devices.</td><td>0x1F</td><td rowspan="5">0xFF</td><td>Resendtime
(1Byte,Unit:1s)</td><td>Reserved
(8Bytes,Fixed 0x00)</td></tr>
<tr><td>SetLastMessage ResendtimeRsp</td><td>0x9F</td><td>Status
(0x00_success)</td><td>Reserved
(8Bytes,Fixed 0x00)</td></tr>
<tr><td>GetLastMessage ResendtimeReq</td><td>0x1E</td><td colspan="2">Reserved
(9Bytes,Fixed 0x00)</td></tr>
<tr><td>GetLastMessage ResendtimeRsp</td><td>0x9E</td><td>Resendtime
(1Byte,Unit:1s)</td><td>Reserved
(8Bytes,Fixed 0x00)</td></tr>
<tr><td colspan="6">Resend time range: 0x00 to 0xFF
Resend time = 0x00 or 0xFF, means no additional data will be sent
Resend time = 0x03 to 0xFE, the device will send data after triggering, and then supplement the last status data after 3-254s.</td></tr>
</table>

(1) Configure device parameters: resend time = 5s

Downlink: 1FFF050000000000000000

Response:

9FFF000000000000000000 (Configuration success)

9FFF010000000000000000 (Configuration failure)

(2) Read Configuration

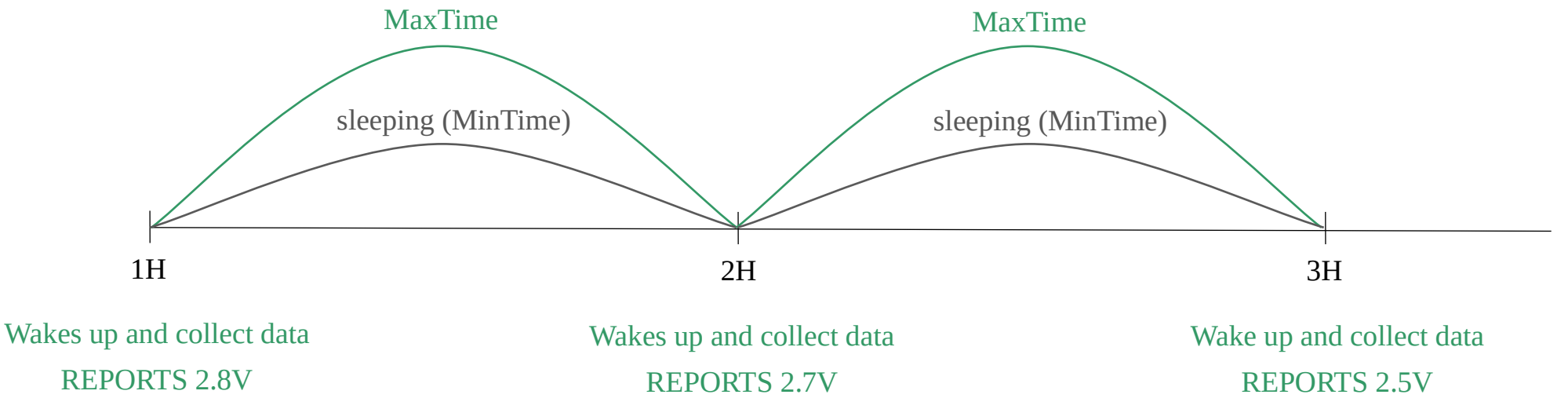
Downlink: 1EFF000000000000000000

Response:

9EFF050000000000000000 (Current configuration)

5.4 Example for MinTime/MaxTime logic

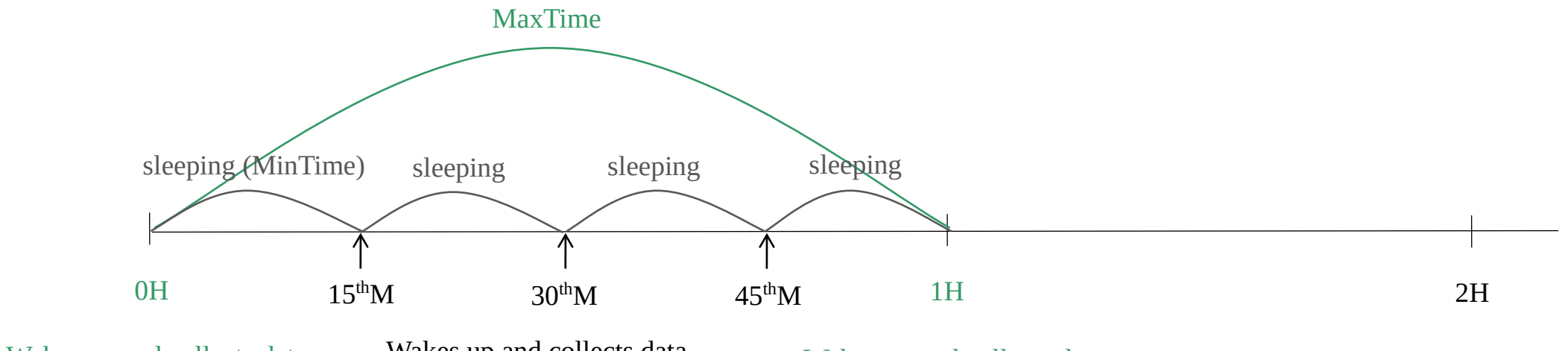
Example#1 based on MinTime = 1 Hour, MaxTime= 1 Hour, Reportable Change i.e. BatteryVoltageChange=0.1V



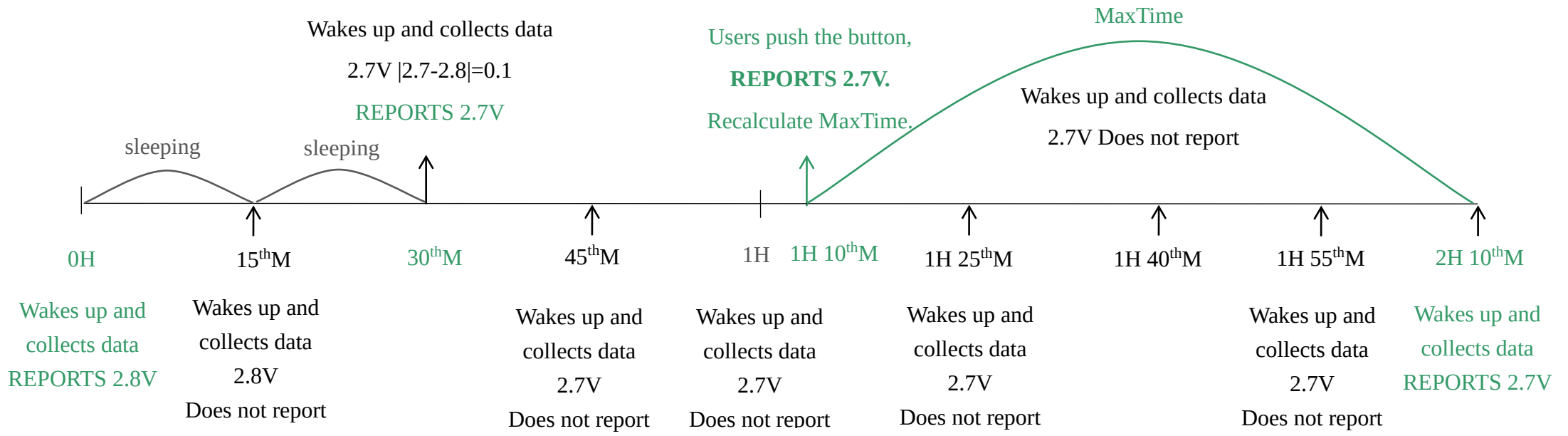
Note:

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



Note:

(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 change value 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. Seat Occupancy Delay Configuration

There is a delay configuration specially designed for battery saving. The delay configuration logic includes DetectionTime and DisableTime.

DisableTime is the sampling period;

DetectionTime is the detecting period. (Please find further info regarding DisableTime and DetectionTime below.)

(1) When R313WA detects pressure caused by the occupancy of the seat, it will report 1 (indicating the seat is taken) and other status (battery for example).

(2) The delay configuration will be triggered after the occupancy is detected.

Once the delay configuration is triggered, the device will enter the detecting and sampling period

(i.e. the DetectionTime and DisableTime.)

Note: How long you set the DetectionTime and DisableTime will determine the number of the periods of DisableTime

R313WA will only report 0 (indicating the seat is unoccupied) when the following is both fulfilled:

(1) A DetectionTime is finished

(2) No pressure is detected during the DisableTime (the default setting is 30 seconds, and it can be changed)

Note: If DetectionTime and DisableTime are not set to the same, there will be multiple DisableTime periods, and all of them should detect no pressure to fulfill this prerequisite.)

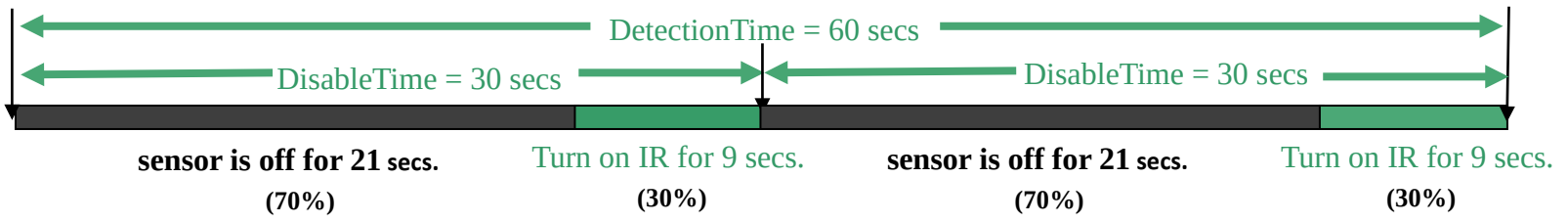
Disabletime and Detectiontime

Once the device enters the DisableTime, it will stop detecting for the first 70% period of the DisableTime, and it will be back to detection for the remaining 30% of the DisableTime. If pressure/occupancy is detected during the remaining 30% of the DisableTime, R313WA will enter the next period of DisableTime.

Example 1:

While DetectionTime is 60 secs and DisableTime is 30 secs, **nopressure** is detected after triggered.

R313WA will report un-pressure after 60 secs (DetectTime).

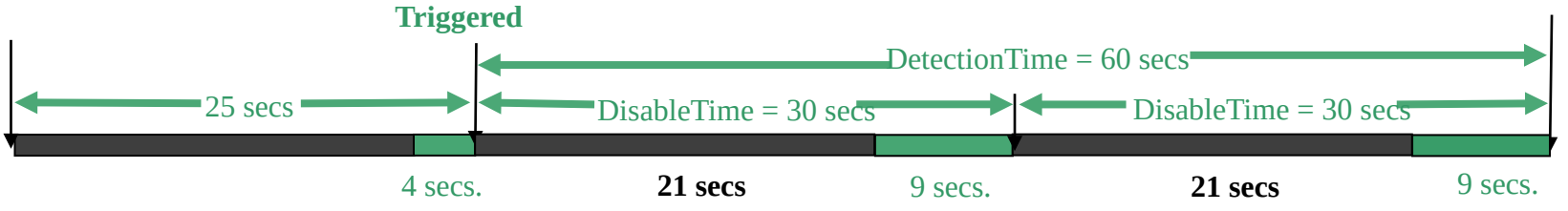


Example 2:

While DetectionTime is 60 secs and DisableTime is 30 secs, pressure is detected during 25th sec.

R313WA will restart pressure detect procedure (DetectionTime).

No pressure is detected during next DetectionTime and R313WA therefore report un-pressure



7. Installation

1. Remove the 3M adhesive on the back of the Wireless Seat Occupy Sensor and attach the body to the surface of a smooth object (please do not stick it to a rough surface to prevent the device from falling off after a long time use)

Note:

1. Wipe the surface clean before installation to avoid dust on
   the surface to affect the adhesion of the device.
2. 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. Tear off the 3M adhesive on the back of the sensor and stick the sensor to the seat.
3. one of the 2-gang seat occupancy sensor detects external pressure (not less than 200g).It will also report to the gateway.
4. When no pressure is detected during DisableTime (occupancy delay configuration, default:30s, can modify) ,R313WA will report un-pressure

Note:

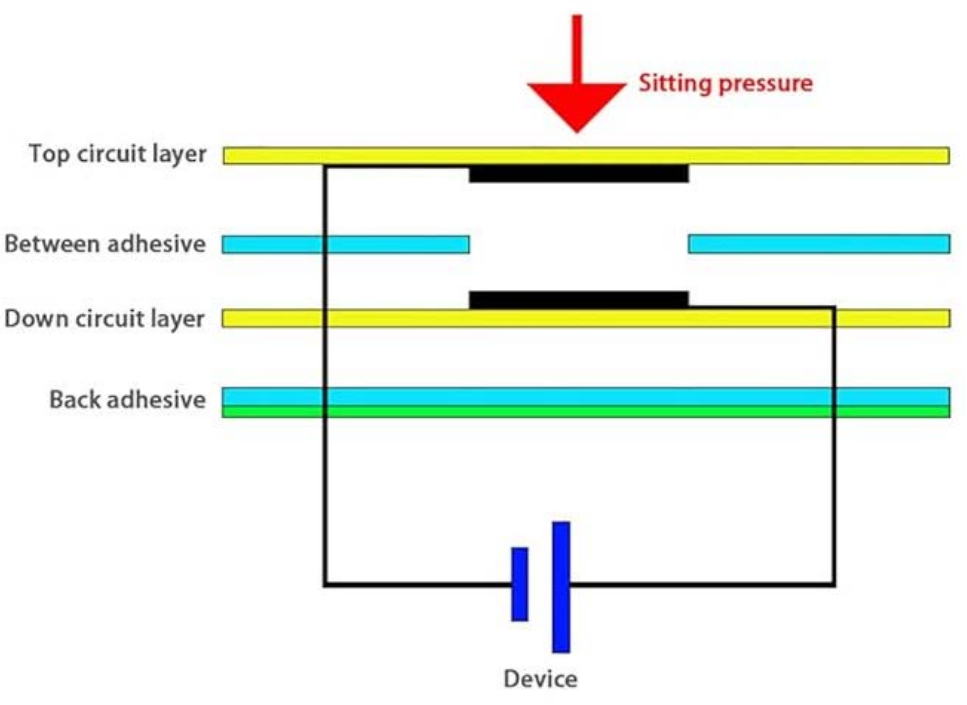
When the seat is occupied, the status is 1.

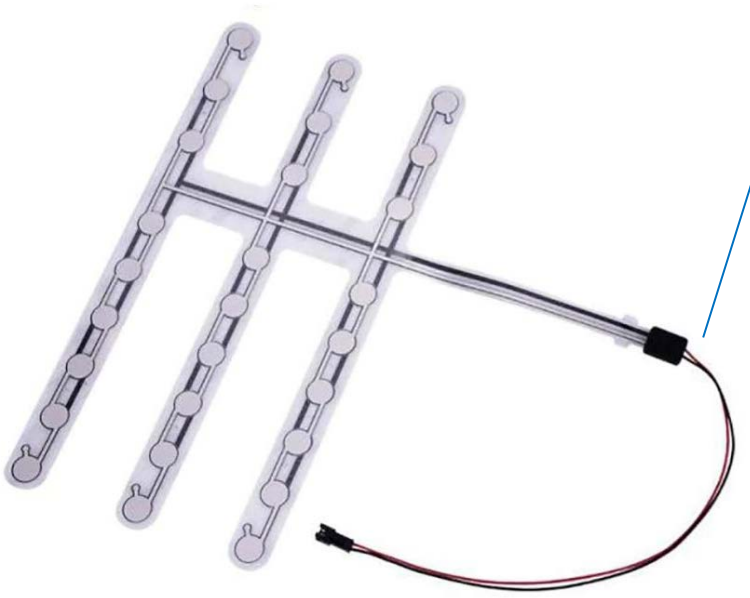
When the seat is unoccupied, the status is 0.

Wireless Seat Occupy Sensor is suitable for the following scenarios:

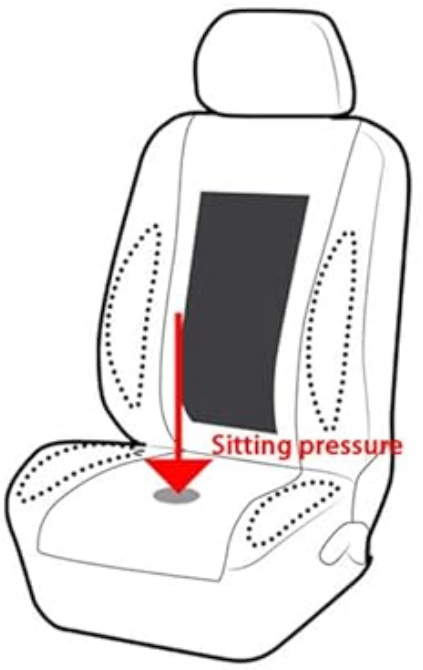
- Theater seat detection
- Conference hall seat detection
- Large classroom seating detection
- Performance of the stadium seating status

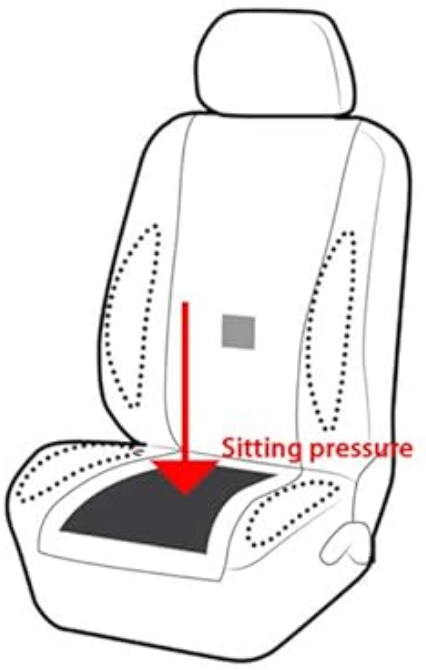
Working structure and principle:

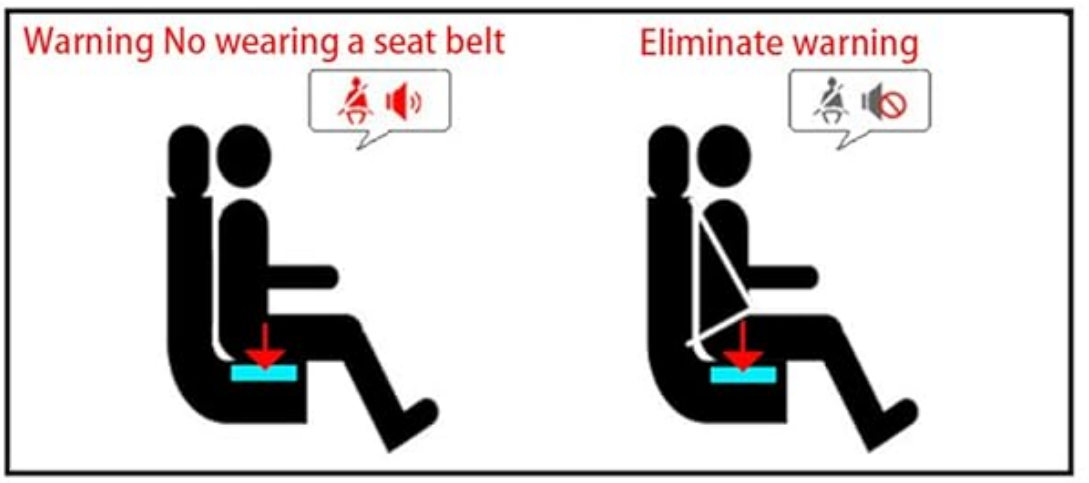




Assembled between the sponge and the steel base.







8. 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 excessively 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 to normal temperature, moisture will form inside, which will destroy the board.
- Do not throw, knock, or shake the device. Rough handling of the device 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 working properly, please take it to the nearest authorized service facility for repair.