# Wireless Ultrasonic Distance Sensor with Temperature Sensor

# R718X
# User Manual

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# 1. Introduction

The R718X is a LoRaWAN Class a device and it is compatible with LoRaWAN protocol. R718X has a built-in ultrasonic ranging sensor that can detect the distance from the sensor to the detected object (for example: detect the height of garbage in the waste bin). R718X also has the temperature detection function, it can detect the temperature of the waste bin. R718X would send out the detected data through wireless network.

**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



Indicator

Function Key

Ultrasonic Ranging Sensor
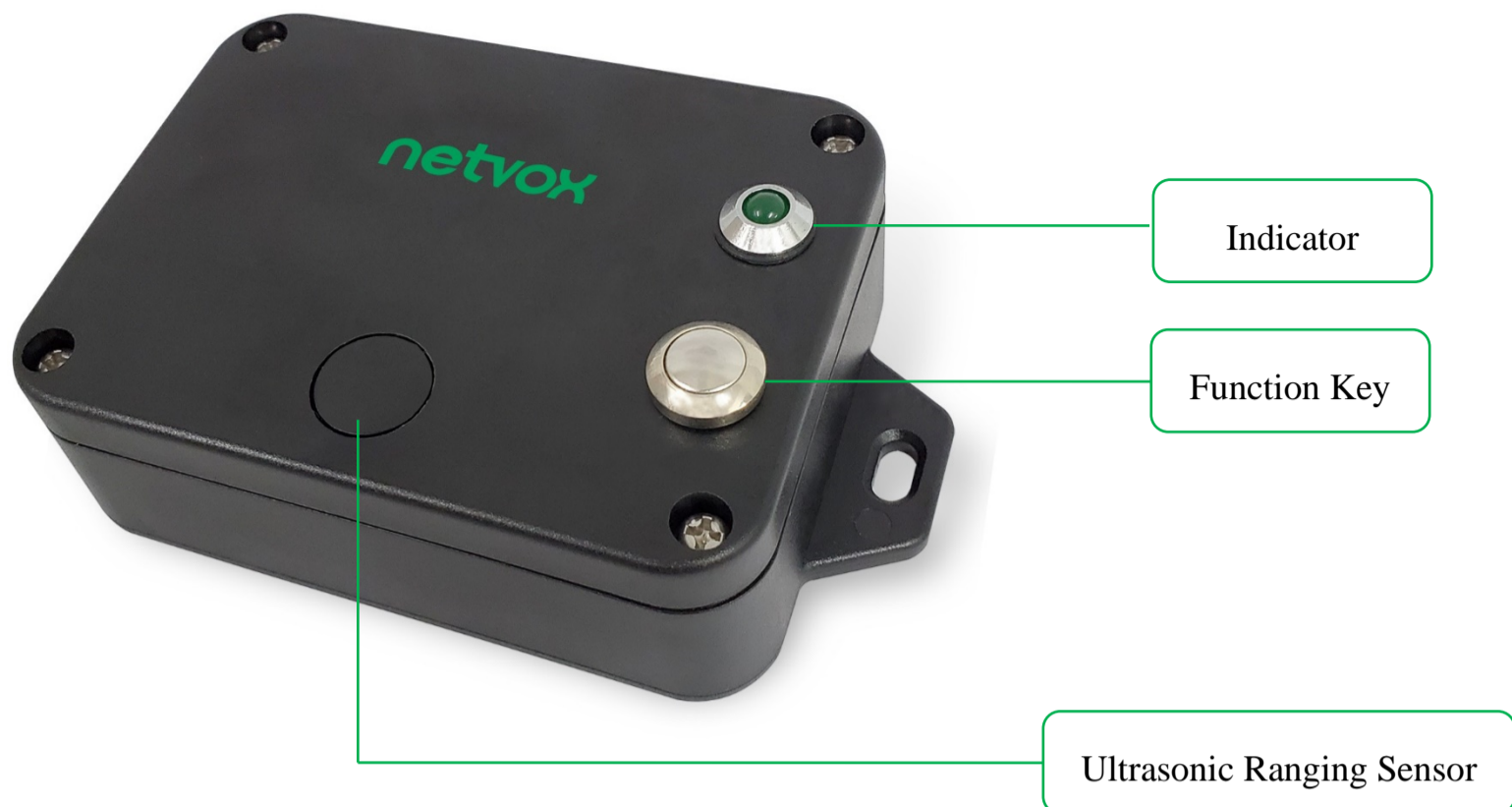
# 3. Main Features

- Apply SX1276 wireless communication module

- 2 sections ER14505 3.6V Lithium AA size battery

- Temperature detection

- Distance detection

- The base is attached with a magnet that can be attached to a ferromagnetic material object

- Protection level: Main body IP65

- Compatible with LoRaWAN$^{TM}$ Class A

- Frequency hopping spread spectrum technology

- Available third-party platform: Actility / ThingPark, TTN, MyDevices/Cayenne

- Low power consumption and long battery life

  Battery Life:

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

  ⁻ At this website, users can find battery lifetime for variety models at different configurations.

# 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. Five seconds 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. 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 |

## 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 status, distance, temperature, fill level of percentage.

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

**Default Setting:**

    MaxTime: 0x0384 (900s)

    MinTime: 0x0384 (900s)

    BatteryChange: 0x01 (0.1v)

    DistanceChange: 0x012C (300mm)

    TemperatureChange: 0x0A (1°C)

    OnDistanceThreshold: 0x01F4 (500mm)

    FillMaxDistance: 0x07D0 (2000mm)

**Data packet:**

    (1) When used in waste bin detection: Distance, Temperature, FillLevel; Status=0 (Invalid)

    (2) When used in parking detection: Status, Distance, Temperature; FillLevel=0 (Invalid)

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.

    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

| 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 to 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 0134000A01202404010000, the firmware version is 2024.04.01.

**3. Data Packet:**

When Report Type=0x01 is the data packet.

---

| Device | Device Type | Report Type | NetvoxPayLoadData | | | | | |
|--------|-------------|-------------|-------------------|---|---|---|---|---|
| R718X | 0x34 | 0x00 | SoftwareVersion (1 Byte) e.g.0x0A—V1.0 | HardwareVersion (1 Byte) | | DateCode (4 Bytes, e.g. 0x20170503) | Reserved (2 Bytes, fixed 0x00) | |
| | | 0x01 | Battery (1Byte, unit:0.1V) | Status (1Byte) 0x01_On 0x00_Off | Distance (2Bytes,Unit:1mm) | Temperature (Signed 2Bytes) unit:0.1℃ | FillLevel (1Byte,Unit:1%) | Angle of Inclination (1Byte) Signed Value,Unit:1° *DONT SUPPORT FROM 2021.10.01 |

| | | | | ThresholdAlarm(1Byte)<br><br>Bit0_Low Distance Alarm,<br><br>Bit1_High Distance Alarm,<br><br>Bit2_ Low Temperature Alarm,<br><br>Bit3_ High Temperature Alarm,<br><br>Bit4_ Low FillLevel Alarm,<br><br>Bit5_ High FillLevel Alarm,<br><br>Bit6-7_Reserved | |
|---|---|---|---|---|---|
| R718X | 0x34 | 0x02 | Battery<br><br>(1Byte, unit:0.1V) | | Reserved<br><br>(6Bytes,fixed 0x00) |

**Example of Uplink**

**Packet 1: 0134019F0000C801275A00**

1st byte (01): Version

2nd (34): DeviceType — R718X

3rd (01): ReportType

4th (9F): Battery — 3.1V

5th (00): Status — Off

6th – 7th (00C8): Distance — 200mm, C8 (HEX) = 200(DEC)

8th – 9th (0127): Temperature — 29.5°C, 127 (HEX) = 295(DEC), 295* 0.1°C = 29.5°C

10th (5A): Fill Level — 90%, 5A (HEX) = 90(DEC), 90* 1% = 90%

11th (00): Reserved


**Packet 2: 0134029F01000000000000**          // When the *ThresholdAlarm* is enabled will the packet be sent.

1st byte (01): Version

2nd byte (34): DeviceType — R718X

3rd byte (02): ReportType

4th byte (9F): Battery — 3.1V

5th byte (01): Threshold Alarm — Low Distance Alarm

6th – 11th (000000000000): Reserved

> **Threshold Alarm**
>
> Low Distance Alarm = 0x01 (bit0=1)
>
> High Distance Alarm = 0x02 (bit1=1)
>
> Low Temperature Alarm = 0x04 (bit2=1)
>
> High Temperature Alarm = 0x08 (bit3=1)
>
> Low FillLevel Alarm = 0x10 (bit4=1)
>
> High FillLevel Alarm = 0x20 (bit5=1)
>
> Low Distance & Low Temperature Alarm = 0x05 (bit0=1&bit2=1)
>
> ...etc.

## 5.2 Example of data configuration

| 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 | R718X | 0x01 | 0x34 | MinTime (2bytes Unit:s) | MaxTime (2bytes Unit:s) | BatteryChange (1byte Unit:0.1v) | DistanceChange (2byte Unit:1mm) | Temperature Change (2byte Unit:0.1℃) |
| 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) | DistanceChange (2byte Unit:1mm) | Temperature Change (2byte Unit:0.1℃) |
| SetOnDistance ThresholdRreq | | 0x03 | | OnDistanceThreshold (2byte Unit:1mm) | | | Reserved (7Bytes,Fixed 0x00) | |
| SetOnDistance ThresholdRrsp | | 0x83 | | Status (0x00_success) | | | Reserved (8Bytes,Fixed 0x00) | |
| GetOnDistance ThresholdRreq | | 0x04 | | Reserved (9Bytes,Fixed 0x00) | | | | |
| GetOnDistance ThresholdRrsp | | 0x84 | | OnDistanceThreshold (2byte Unit:1mm) | | | Reserved (7Bytes,Fixed 0x00) | |
| SetFillMax DistanceReq | | 0x05 | | FillMaxDistance (2byte Unit:1mm) | | | Reserved (7Bytes,Fixed 0x00) | |

| | | | | | |
|---|---|---|---|---|---|
| SetFillMax DistanceRsp | | 0x85 | | Status (0x00_success) | Reserved (8Bytes,Fixed 0x00) |
| GetFillMax DistanceReq | | 0x06 | | Reserved (9Bytes,Fixed 0x00) | |
| GetFillMax DistanceRsp | | 0x86 | | FillMaxDistance (2byte Unit:1mm) | Reserved (7Bytes,Fixed 0x00) |
| SetDeadZone DistanceReq ( Keep the last set value when restoring the factory setting) | | 0x0B | | DeadZoneDistance (2byte Unit:1mm) | Reserved (7Bytes,Fixed 0x00) |
| SetDeadZone DistanceRsp | | 0x8B | | Status (0x00_success) | Reserved (8Bytes,Fixed 0x00) |
| GetDeadZone DistanceReq | | 0x0C | | Reserved (9Bytes,Fixed 0x00) | |
| GetDeadZone DistanceReq | | 0x8C | | DeadZoneDistance (2byte Unit:1mm) | Reserved (7Bytes,Fixed 0x00) |

## Set Report Time

(1) Configure device parameters MinTime = 1min, MaxTime = 1min, BatteryChange = 0.1v, DistanceChange = 500mm、

TemperatureChange=2°C

Downlink: 0134003C003C0101F40014          $003C(H_{ex}) = 60(D_{ec}),\ 01F4(H_{ex}) = 500(D_{ec}),\ 14(H_{ex}) = 20(D_{ec})$

Device returns:

813400000000000000000000 (Configuration is successful)

813401000000000000000000 (Configuration failed)

(2) Read device parameters

Downlink: 023400000000000000000000

Device returns:

8234003C003C0101F40014 (current device parameters)

## Set Total Height of The Container

(3) Setting the total height of the container, FillMaxDistance = 5000mm

Downlink: 0534138800000000000000          $1388(H_{ex}) = 5000(D_{ec}),$

Device returns:

853400000000000000000000 (Configuration is successful)

853401000000000000000 (Configuration failed)

(4) Read the total height of the container (FillMaxDistance)

Downlink:0634000000000000000000

Device returns:

8634138800000000000000 (Device current parameter)


## Switch the Mode

If the mode of the device is waste bin detection, switch it to parking detection.

(5) Set FillMaxDistance to 0

Downlink：  0534000000000000000000

Device returns：

8534000000000000000000

(6) Read FillMaxDistance, and check whether it is set successfully.

Downlink：  0634000000000000000000

Device returns：

8634000000000000000000


## Set Distance Threshold

(7) Set OnDistanceThreshold to the appropriate value

Downlink：  033401F400000000000000        // 01F4 ($H_{ex}$) = 500 ($D_{ec}$)

Device returns：

8334000000000000000000

(8) Read OnDistanceThreshold, and check whether it is set successfully.

Downlink：  0434000000000000000000

Device returns：

833401F400000000000000


* The mode switches via setting the value of FillMaxDistance and OnDistanceThreshold.

   If the current mode of the device is waste bin detection, it can be switched to the parking detection by setting FillMaxDistance

   to 0 first, and then setting OnDistanceThreshold.

   Conversely, the current mode of the device is parking detection, it can be switched to the waste bin detection by setting

   OnDistanceThreshold to 0 first, and then setting FillMaxDistance.

**Set Dead Zone Distance**　　---　Support after data code 20211220 (include)

(9) SetDeadZoneDistance

      Downlink：　0B3400C800000000000000　　// set the device detection dead band to 200mm, 00C8 ($H_{ex}$) = 200 ($D_{ec}$)

      Device returns：

            8B34000000000000000000

(10)　GetDeadZoneDistance, and check whether it is set successfully.

      Downlink：　0C340000000000000000000　　// Obtain the device detection dead zone distance of 200mm

      Device returns：

            8C3400C800000000000000

## 5.3 Example of GlobalCalibrateCmd

Port:0x0E (port = 14, Dec)

| Description | Cmd ID | Sensor Type | PayLoad(Fix =9 Bytes) | | | | |
|---|---|---|---|---|---|---|---|
| SetGlobal CalibrateReq | 0x01 | 0x01 0x36 | Channel(1Byte) 0_Channel1, 1_Channel2,etc | Multiplier (2bytes,Unsigned) | Divisor (2bytes,Unsigned) | DeltValue (2bytes,Signed) | Reserved (2Bytes,Fixed 0x00) |
| SetGlobal CalibrateRsp | 0x81 | | Channel(1Byte) 0_Channel1, 1_Channel2,etc | | Status (1Byte,0x00_success) | Reserved (7Bytes,Fixed 0x00) | |
| GetGlobal CalibrateReq | 0x02 | | Channel (1Byte,0_Channel1,1_Channel2,etc) | | | Reserved (8Bytes,Fixed 0x00) | |
| GetGlobal CalibrateRsp | 0x82 | | Channel(1Byte) 0_Channel1, 1_Channel2,etc | Multiplier (2bytes,Unsigned) | Divisor (2bytes,Unsigned) | DeltValue (2bytes,Signed) | Reserved (2Bytes,Fixed 0x00) |
| ClearGlobal CalibrateReq | 0x03 | Reserved (10Bytes,Fixed 0x00) | | | | | |
| ClearGlobal CalibrateRsp | 0x83 | Status (1Byte,0x00_success) | | | Reserved (9Bytes,Fixed 0x00) | | |
| Note: (1) Distance sensor type = 0x36, Channel = 0x00 (2) Temperature sensor type = 0x01, Channel = 0x01 (3) Set SensorHighThreshold or SensorLowThreshold as 0xFFFFFFFF to disable the threshold. (4) The last configuration will be kept after the device is factory reset. | | | | | | | |

(5) When Multiplier is not 1, Calibration value = DeltValue*Multiplier.

(6) When Divisor is not 1, Calibration value = DeltValue/Divisor.

(7) With different sensor type, it is forbidden to use that same Channel number.

(8) This universal calibration supports calibration of positive and negative numbers.

(1) Set the **distance** calibration:

If the distance between the device and detected object the R718X detects is 490mm and the actual distance is 500mm, it means the calibration we want to make is +10mm.

SensorType =0x36, Channel 1= 0x00, Multiplier = 000A, Divisor = 0000, DeltValue=0001

Downlink：013600000A000000010000

Response：

81360000000000000000000（Configuration success）

(2) Check whether the setting in (1) calibration

Downlink：0236000000000000000000

Response：

823600000A000000010000 (Current configuration)

(3) Set the **temperature** calibration:

If the temperature the R718X detects is 26° and the actual temperature is 27°, it means the calibration we want to make is +1°.

SensorType =0x01 ,Channel 2= 0x01, Multiplier = 000A, Divisor = 0000, DeltValue=0001

Downlink：010101000A000000010000

Response：

81010100000000000000000（Configuration success）

(4) Check whether the setting in (3) calibration

Downlink：0201010000000000000000

Response：

820101000A000000010000（Current configuration）

## 5.4 Example of AlarmThresholdCmd

| CmdDescriptor | CmdID (1Byte) | Payload(10Bytes) | | | |
|---|---|---|---|---|---|
| SetSensorAlarm ThresholdReq | 0x01 | Channel (1Byte) 0x00_Channel 1 | SensorType(1Byte) 0x00_ Disable ALL SensorthresholdSet 0x01_Temperature 0x2F_ Distance 0x30_ FillLevel | SensorHighThreshold (4Bytes) Temperature, Unit:0.1°C Distance, Unit:1mm FillLevel, Unit:1% | SensorLowThreshold (4Bytes) Temperature, Unit:0.1°C Distance, Unit:1mm FillLevel, Unit:1% |
| SetSensorAlarm ThresholdRsp | 0x81 | Status (0x00_success) | | Reserved (9Bytes,Fixed 0x00) | |
| GetSensorAlarm ThresholdReq | 0x02 | Channel(1Byte) 0x00_Channel1 | SensorType(1Byte) 0x00_ Disable ALL SensorthresholdSet 0x01_Temperature 0x2F_ Distance 0x30_ FillLevel | Reserved (8Bytes,Fixed 0x00) | |
| GetSensorAlarm ThresholdRsp | 0x82 | Channel (1Byte) 0x00_Channel 1 | SensorType(1Byte) 0x00_ Disable ALL SensorthresholdSet 0x01_Temperature 0x2F_ Distance 0x30_ FillLevel | SensorHighThreshold (4Bytes) Temperature, Unit:0.1°C Distance, Unit:1mm FillLevel, Unit:1% | SensorLowThreshold (4Bytes) Temperature, Unit:0.1°C Distance, Unit:1mm FillLevel, Unit:1% |

Note:

(1) Distance: Channel = 0x00, sensor type = 0x2F

(2) Temperature: Channel = 0x01, sensor type = 0x01

(3) Fill Level: Channel = 0x02, sensor type = 0x30

(4) Set SensorHighThreshold or SensorLowThreshold as 0xFFFFFFFF to disable the threshold.

(5) The last configuration will be kept after the device is factory reset.

(1) Configure distance high alarm = 5000mm, low alarm =4000mm

    Downlink: 01002F0000138800000FA0    // 1388(Hex)=5000(DEC)

                                                // FA0(Hex)=4000(DEC)

    Response: 8100000000000000000000 (Configuration success)


(2) GetSensorAlarmThresholdReq

    Downlink: 02002F0000000000000000

    Response: 82002F0000138800000FA0 (Configuration success)


(3) Clear all SensorThreshold (Sensor type=0x00)

    Downlink: 0100000000000000000000

    Response: 8100000000000000000000

## 5.5 LoRaWANRejoin

Check if the device is still in the network. If the device is disconnected, it will automatically rejoin back to the network.

FPort: 0x20 (port = 32, Dec)

| CmdDescriptor | CmdID (1Byte) | Payload(5Bytes) | |
|---|---|---|---|
| SetNetvoxLoRaWAN RejoinReq | 0x01 | RejoinCheckPeriod (4Bytes,Unit:1s) | RejoinThreshold (1Byte) |
| SetNetvoxLoRaWAN RejoinRsp | 0x81 | Status (1Byte,0x00_success) | Reserved (4Bytes,Fixed 0x00) |
| GetNetvoxLoRaWAN RejoinReq | 0x02 | Reserved (5Bytes,Fixed 0x00) | |
| GetNetvoxLoRaWAN RejoinRsp | 0x82 | RejoinCheckPeriod (4Bytes,Unit:1s) | RejoinThreshold (1Byte) |
| Note: (1) Set RejoinCheckThreshold as 0xFFFFFFFF to stop the device from rejoining the network. (2) The last configuration would be kept as user reset the device back to the factory setting (3) Default setting: RejoinCheckPeriod = 2 (hr) and RejoinThreshold = 3 (times) | | | |

**(1) Command Configuration**

Set RejoinCheckPeriod = 3600s (0x00000E10), RejoinThreshold = 3 times

Downlink: 0100000E1003

Response: 810000000000 (Configuration success)
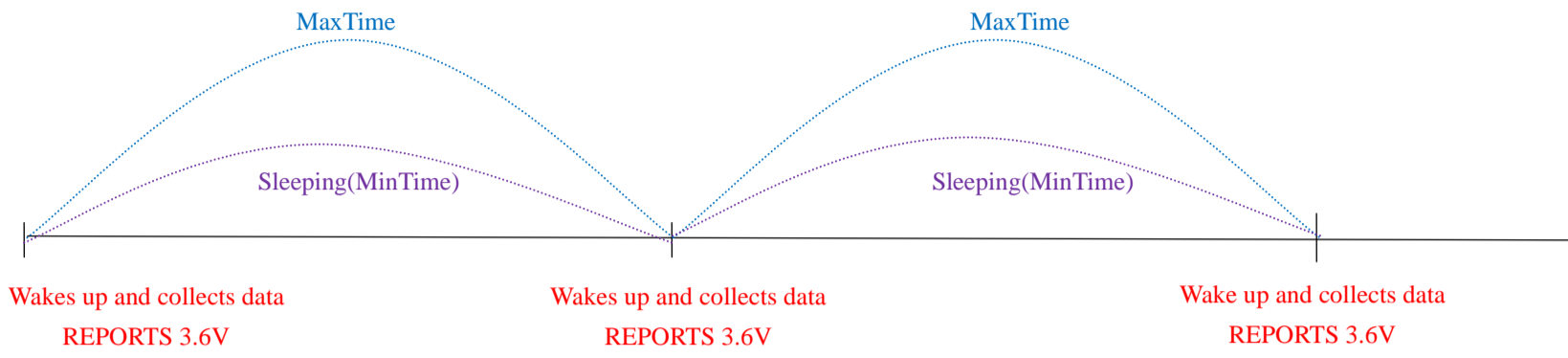
810100000000 (Configuration failure)

**(2) Read current configuration** (RejoinCheckPeriod and RejoinThreshold)

Downlink: 020000000000

Response: 8200000E1003

## 5.6 Example for MinTime/MaxTime logic

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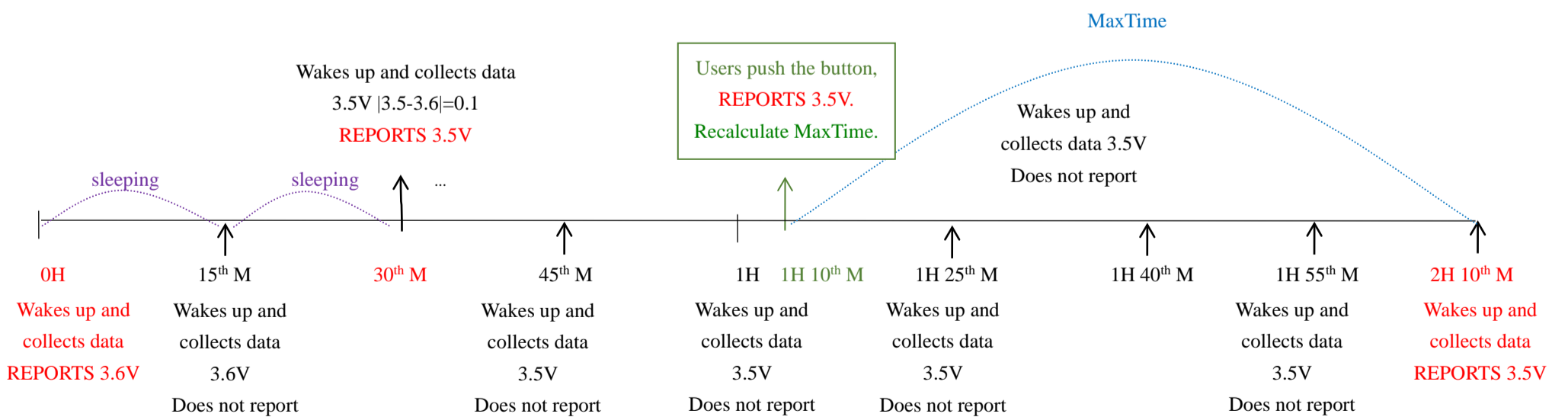


Note: MaxTime=MinTime. Data will only be report according to MaxTime (MinTime) duration regardless BatteryVoltageChange value.

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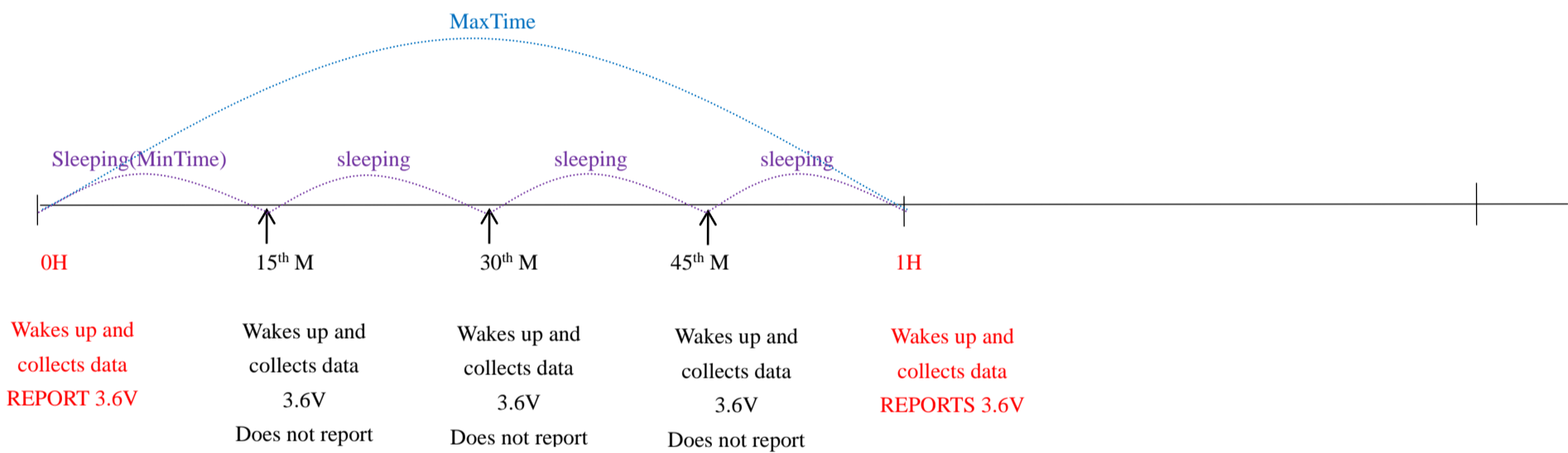


**Example#3** based on MinTime = 15 Minutes, MaxTime= 1 Hour, Reportable Change i.e. BatteryVoltageChange= 0.1V.



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 setting 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. Application scenario

In the use case of detecting the garbage in waste bin, the device should be installed on the top of the waste bin.

After the device is installed and powered, turn on the device and it will detect the distance between the device and the garbage as well as the percentage of the garbage in the waste bin.

**H** means the height of the waste bin (this value can be set with the payload command; the "fillmaxdistance" in payload means H)

**D** means the distance between the device and the garbage (this value is "distance" in uplinks)

**L** means the garbage (this value can be calculated by the "distance" in uplink and "fillmaxdistance" in payload)

    Calculation: L = fillmaxdistacnce - distance

**d** represents the DeadZoneDeistance set by the equipment (the distance that cannot be detected by the actual equipment)

**FillLevel** means the percentage of the garbage in the waste bin.

The value of the total depth of the water tank / trash can can be set according to the specific scene through instructions;

DeadZoneDeistance can be set according to the actual use scenario.

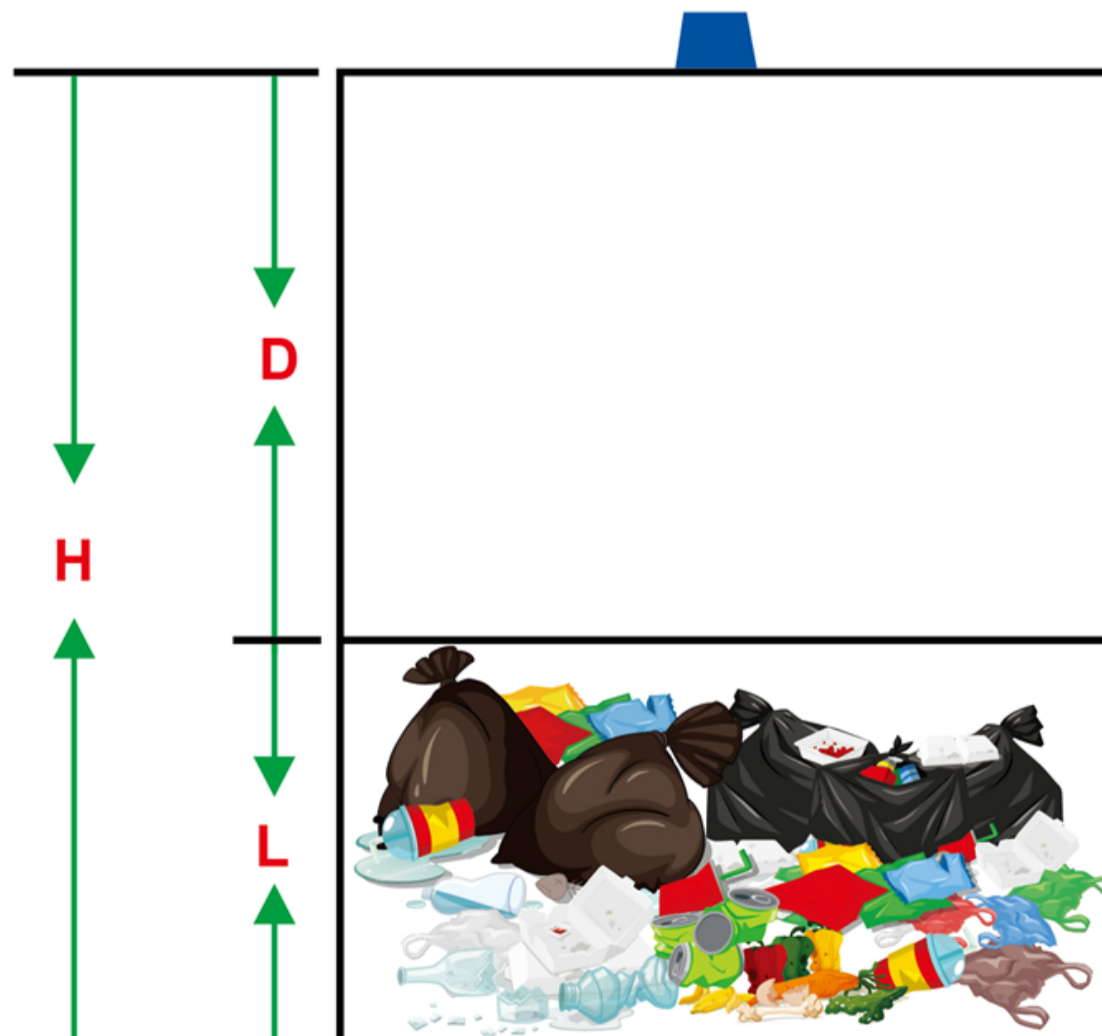Illustration 1.

    **FillLevel = ((H - D) / H) \* 100%**

Illustration 2.

The calculation method of water level percentage of <u>deadzonedeistance</u> can be set
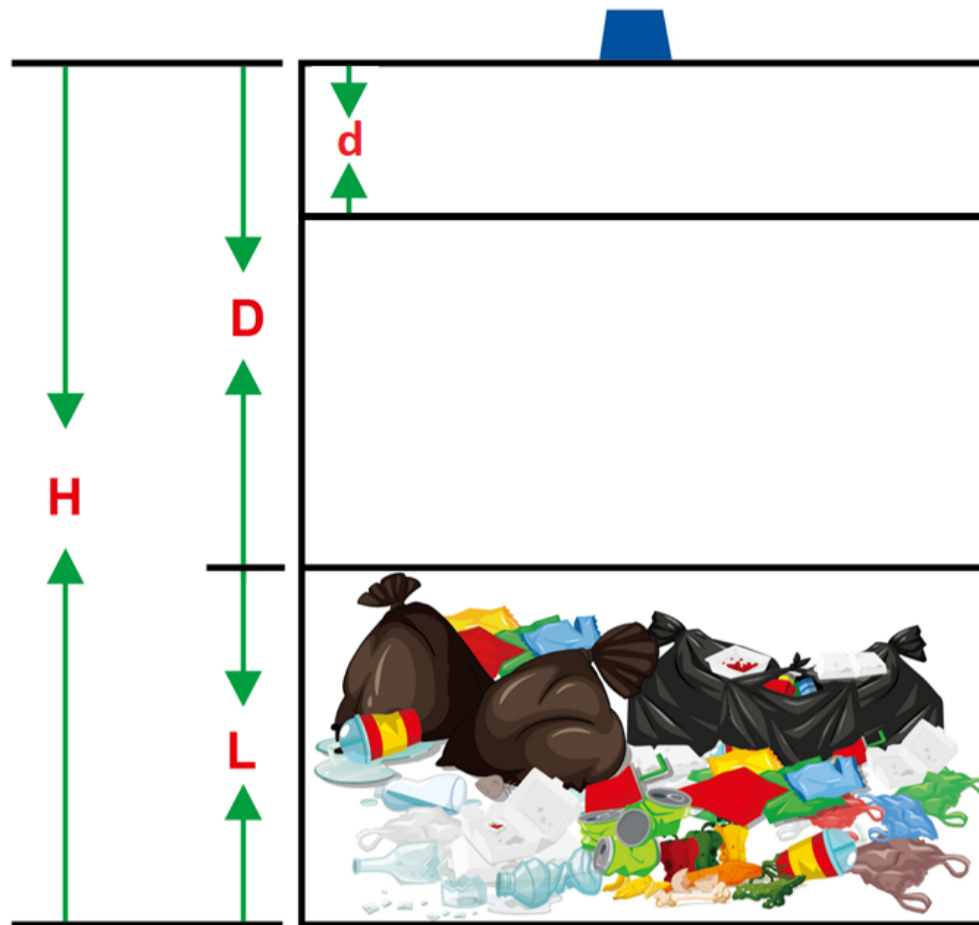
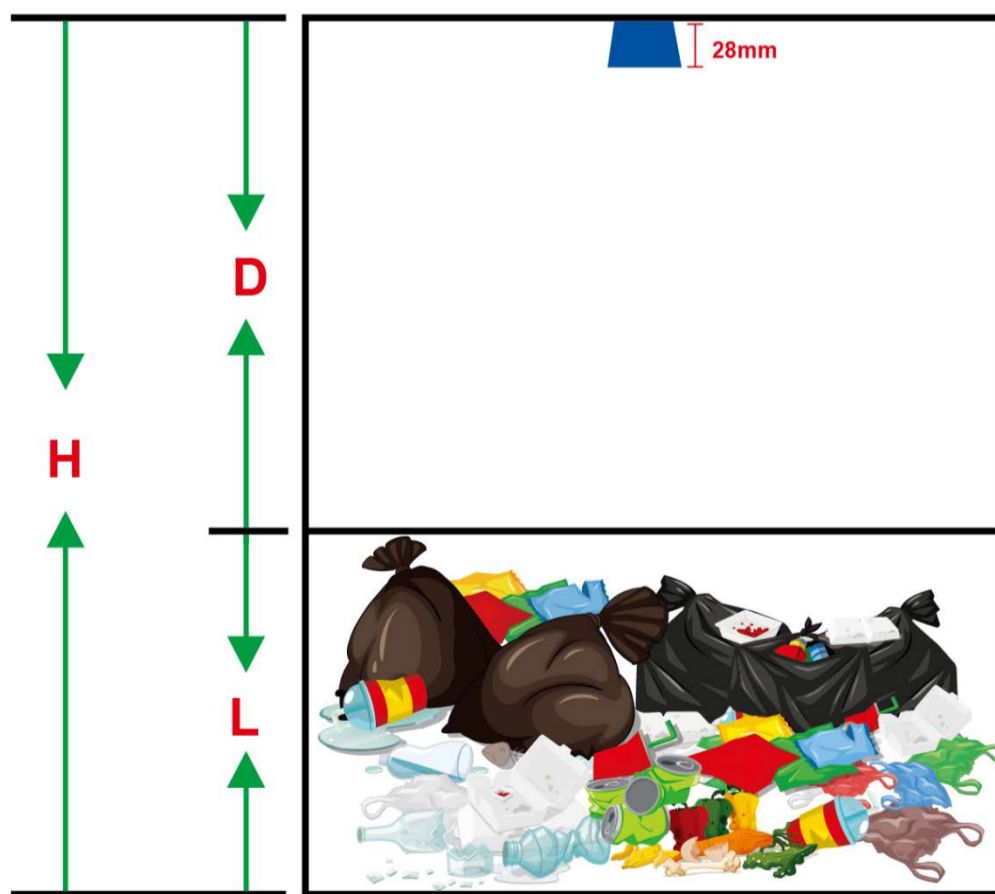**FillLevel = ((H - D) / H-d) * 100%**



Illustration 3.

If the R718X is installed as the following way, then the measured distance needs to add the height of the device itself which is
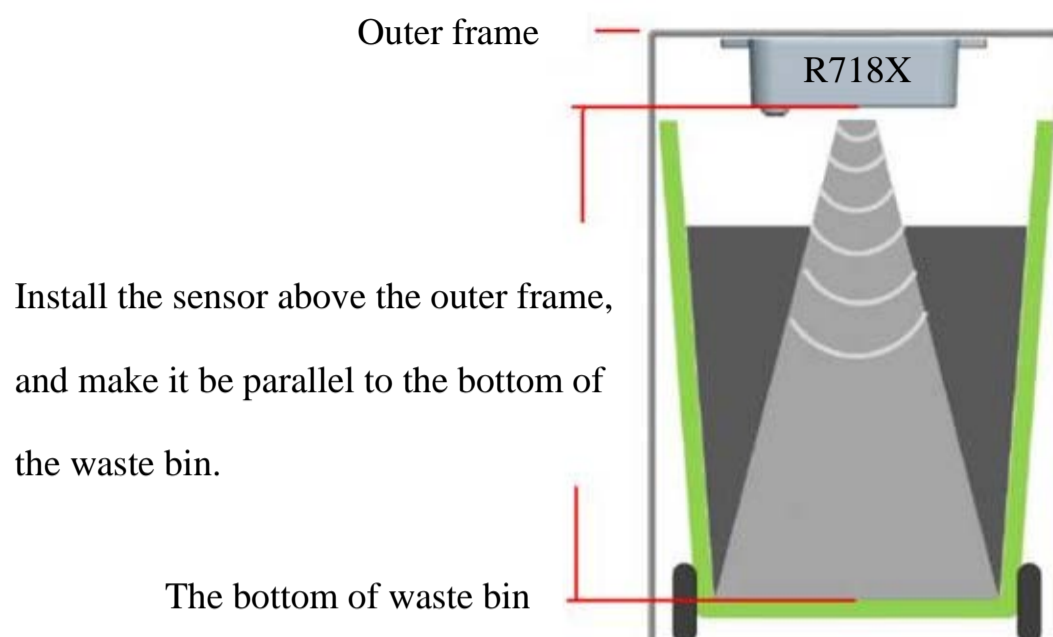
28mm.



Note:

    (1) The default value of OnDistanceThreshold is 500mm, and the default value of FillMaxDistance is 2000mm.

    (2) The detecting range of the device is 200mm~3500mm.

# 7. Installation

## 7.1 The waste bin with frame

Outer frame

R718X

Install the sensor above the outer frame, and make it be parallel to the bottom of the waste bin.

The bottom of waste bin

## 7.2 The waste bin without the frame but an upper cover

The waste bin without the frame but an upper cover needs to be drilled out the required mounting holes in the cover, and then install the sensor on the cover. User should find and make sure the installation location that is parallel to the bottom of the waste bin. Namely, the detecting direction is perpendicular to the bottom of the waste bin.

Horizontal Plane

## 7.3 Plastic Bucket Test of R718X

Probe position

| The probe offset center point 7cm | The probe offset center point 5 cm | The probe is offset to the right 5.5 cm |

## 7.4 Installation

Use screws and locking nuts to fix the device, as the figure for reference.



M4 Locking Nut
M4 Gasket
M4*20 Machine Screw

1. After finding the installation position, use the tool to drill 2 holes in the upper cover.

   M4 screws can be inserted into the hole.
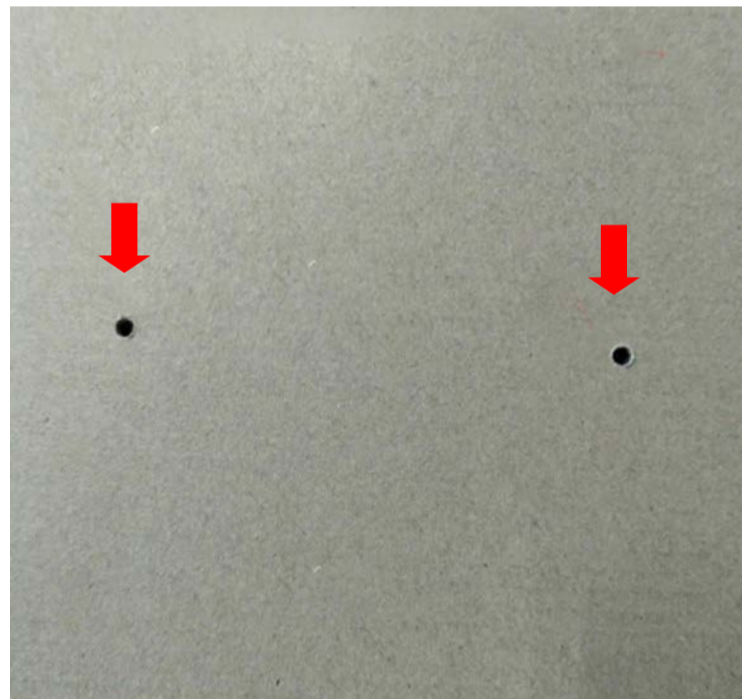


2. Insert the screw with the gasket into the hole to install the device.
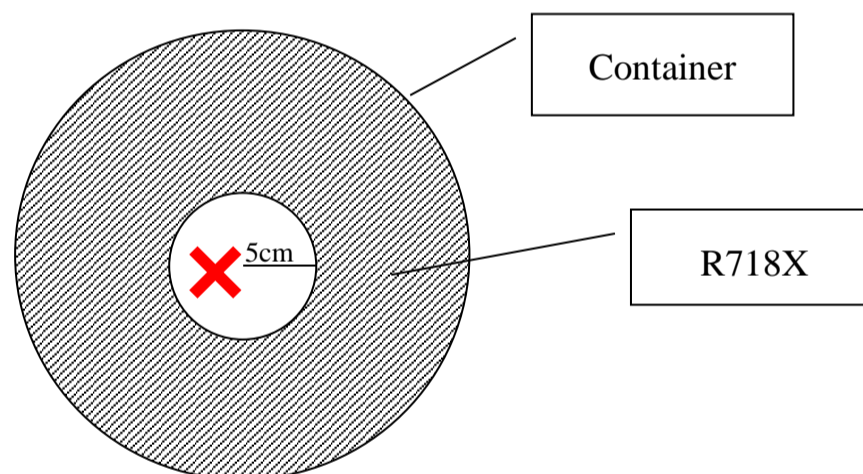
3. Use a tool to tighten the locking nut.



Note:

  1.The installation location **can not** be at the center of the cover.

  Suggest that installing the sensor should be outside the area of the circle with radius 5cm from the center of the cover.

  If the ultrasonic sensor is installed in the center, the ultrasonic signal will generate gain which will affect the

  measurement result



  2.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.

When disassembling and assembling the equipment, it is recommended to understand the internal structure of the equipment

first to avoid equipment damage.

# 8. 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:**

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.

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.

# 9. 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 dusty or dirty environment. It might damage its detachable parts and electronic components.

• Do not store the device under excessive heat condition. High temperature 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 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 in 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.