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**Wireless Pulse Counter Interface**

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# **Wireless Pulse Counter Interface R718H User Manual**

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## 1. Introduction

R718H is the Wireless Pulse Counter Interface of Netvox ClassA type device based on LoRaWAN open protocol, compatible with LoRaWAN protocol.

### 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
- Pulse counter
- Simple operation and setting
- External equipment of pulse voltage range is 2.4v~3.0v
- 2 ER14505 lithium batteries in parallel power supply (3.6V / section)
- Protection class IP65
- Compatible with LoRaWAN™ Class A
- Frequency hopping spread spectrum
- Configuration parameters can be configured via a third-party software platform, data can be read and alerts can be set via SMS text and email (optional)
- Applicable to third-party platforms: 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](http://www.netvox.com.tw/electric/electric_calc.html)
- At this website, users can find battery life time for variety models at different configurations.
  1. Actual range may vary depending on environment.
  2. Battery life is determined by sensor reporting frequency and other variables.

## 4.Set up Instruction

### On/Off

Power on	Insert batteries. (users may need a flat blade 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:	<ol style="list-style-type: none"> <li>1. Remove and insert the battery; the device is at off state by default.</li> <li>2. On/off interval is suggested to be about 10 seconds to avoid the interference of capacitor inductance and other energy storage components.</li> <li>3. At 1<sup>st</sup> to 5<sup>th</sup> second after power on, the device is in engineering test mode.</li> </ol>

### Network Joining

Never joined the network	<p>Turn on the device to search the network.</p> <p>The green indicator stays on for 5 seconds: success</p> <p>The green indicator remains off: fail</p>
Had joined the network (Not at factory setting state)	<p>Turn on the device to search the previous network.</p> <p>The green indicator stays on for 5 seconds: success</p> <p>The green indicator remains off: fail</p>

### Function Key

Press and hold for 5 seconds	<p>Restore to factory setting / Turn off</p> <p>The green indicator flashes for 20 times: success</p> <p>The green indicator remains off: fail</p>
Press once	<p>The device is in the network: green indicator flashes once and sends a report</p> <p>The device is not in the network: green indicator remains off</p>

### Sleeping Mode

The device is on and in the network	<p>Sleeping period: Min Interval.</p> <p>When the reportchange exceeds setting value or the state changes: send a data report according to Min Interval.</p>
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### Low Voltage Warning

Low Voltage	3.2V If the battery voltage is lower than 3.2V, the device will send a low-power warning
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## 5. Data Report

The device will immediately send a version packet report along with an uplink packet including battery voltage and pulse count.

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

### Default Setting:

MaxTime: Max Interval = 60 min = 3600s

MinTime: Max Interval = 60min = 3600s

BatteryChange = 0x01 (0.1v)

FilterTime = 0x02 (10ms)

### Pulse Counter Clear Mode:

Pulse Counter has two mode to option

- a. Clear When SEND:0x00 (default)

Clear the pulse count after reporting data packet

- b. Clear When Roll-Over:0x01 (Enable the mode by command ConfigureCmd)

Accumulate each pulse count, it will clear pulse count reach 0xFFFF then report an uplink packet (0xFFFF), and restart count. (When device reset or reboot, it will clear pulse count data, too)

Note:

- (1) The input pulse width is greater than 100ms to accurately count
- (2) The device report interval will be programmed based on the default firmware which may vary.
- (3) The interval between two reports must be the minimum time

Please refer Netvox *LoRaWAN Application Command document* and *Netvox Lora Command Resolver*

<http://www.netvox.com.cn:8888/page/index> 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

### Example of ReportDataCmd

FPort: 0x06

Bytes	1	1	1	Var(Fix=8 Bytes)
	Version	DeviceType	ReportType	NetvoxPayloadData

**Version**– 1 bytes –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	DeviceType	ReportType	NetvoxPayloadData		
R718H	0x1F	0x01	Battery (1Byte, unit:0.1V)	PulseCount (2byte)	Reserved(5Bytes, fixed 0x00)

Uplink: 011F012400C80000000000      Pulse count = 200 ; C8 (Hex)=200 (Dec)

### Example of ConfigureCmd

FPort: 0x07

Bytes	1	1	Var(Fix =9 Bytes)
	CmdID	DeviceType	NetvoxPayloadData

**CmdID**– 1 bytes

**DeviceType**– 1 byte – Device Type of Device

**NetvoxPayloadData**– var bytes (Max=9bytes)

Description	Device	Cmd ID	DeviceType	NetvoxPayloadData			
Config ReportReq	R718H	0x01	0x1F	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)	
ReadConfigRepo rtReq		0x02		Reserved (9Bytes,Fixed 0x00)			
ReadConfigRepo rtRsp		0x82		MinTime (2bytes Unit:s)	MaxTime (2bytes Unit:s)	BatteryChange (1byte Unit:0.1v)	Reserved (4Bytes,Fixed 0x00)

SetFilter timeReq	R718H	0x03	0x1F	FilterTime (1byte,Unit:5ms)	Reserved (8Bytes,Fixed 0x00)
SetFilter timeRsp		0x83		Status (0x00_success)	Reserved (8Bytes,Fixed 0x00)
GetFilter timeReq		0x04		Reserved (9Bytes,Fixed 0x00)	
GetFilter timeRsp		0x84		FilterTime (1byte,Unit:5ms)	Reserved (8Bytes,Fixed 0x00)
SetPulseCounter ClearModeReq		0x05		PulseCounterClearMode (1Byte,0x00_Clear When SEND, 0x01_Clear When Roll-Over)	
SetPulseCounter ClearModeRsp		0x85		Status (0x00_success)	Reserved (8Bytes,Fixed 0x00)
GetPulseCounter ClearModeReq		0x06		Reserved (9Bytes,Fixed 0x00)	
GetPulseCounter ClearModeRsp		0x86		PulseCounterClearMode (1Byte,0x00_Clear When SEND, 0x01_Clear When Roll-Over)	Reserved (8Bytes,Fixed 0x00)

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

Downlink: 011F003C003C0100000000 003C(H<sub>ex</sub>) = 60(D<sub>ec</sub>)

Response:

811F00000000000000000000 (Configuration success)

811F01000000000000000000 (Configuration failure)

(2) Read Device Parameters Configuration:

Downlink: 021F00000000000000000000

Response: 821F003C003C0100000000 (Current device parameter)

(3) Setting the FilterTime =100ms

Downlink: 031F14000000000000000000 14(Hex) = 20(Dec), 20\*5ms=100ms

Response:

831F00000000000000000000 (Configuration success)

831F01000000000000000000 (Configuration failure)

(4) Read the FilterTime Configuration:

Downlink: 041F00000000000000000000



Response: 841F140000000000000000 (Current device parameter)

(5) Setting the Pulse Counter Clear Mode = 0x01\_Clear When Roll-Over

Downlink: 051F010000000000000000

Response:

851F000000000000000000 (Configuration success)

851F010000000000000000 (Configuration failure)

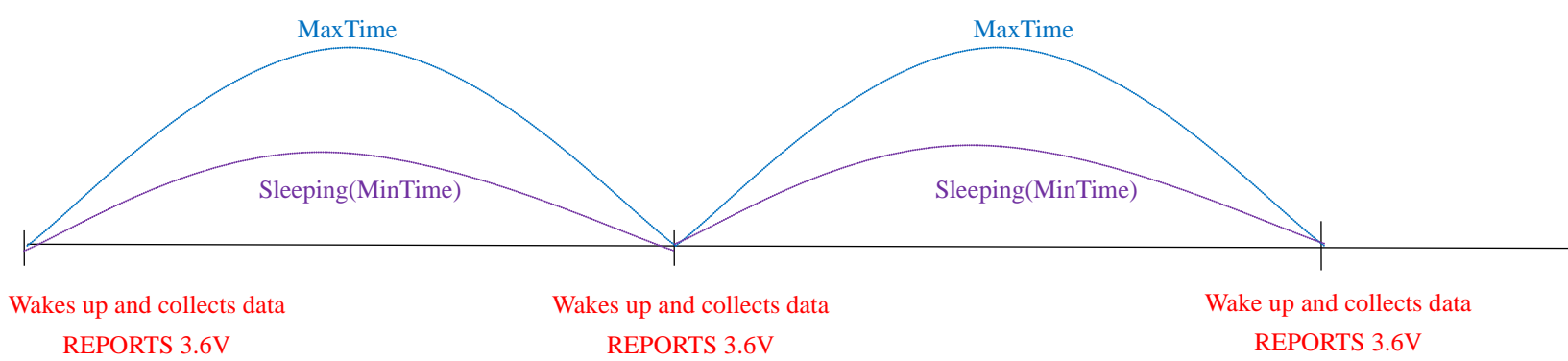
(6) Read the Pulse Counter Clear Mode Configuration:

Downlink: 061F000000000000000000

Response: 861F010000000000000000 (Current device parameter)

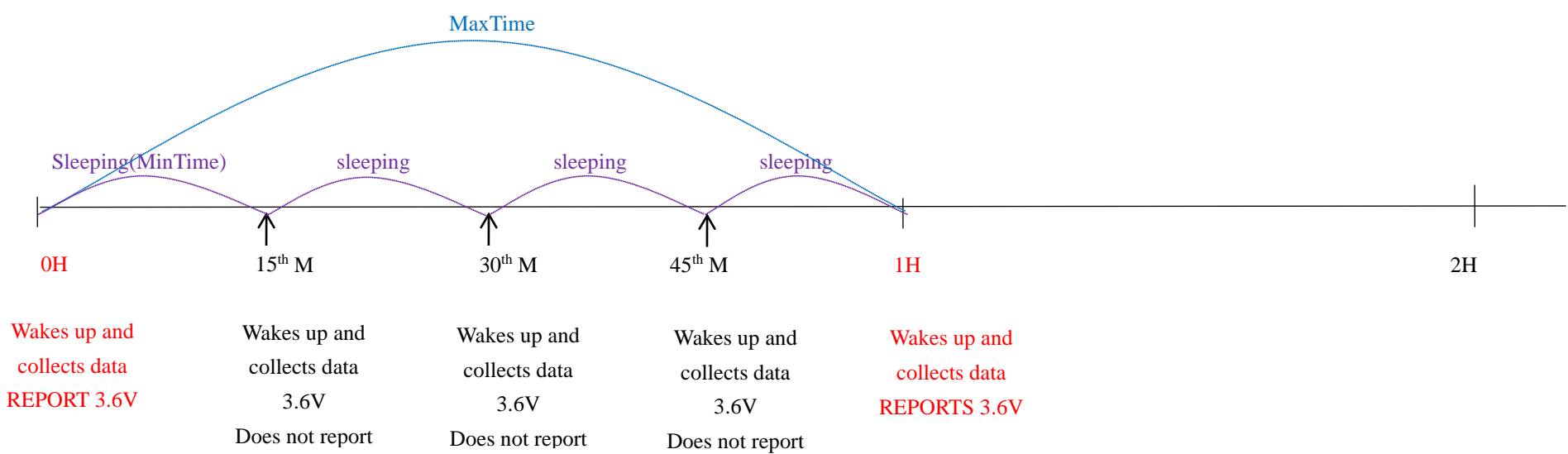
**Example for MinTime/MaxTime logic:**

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

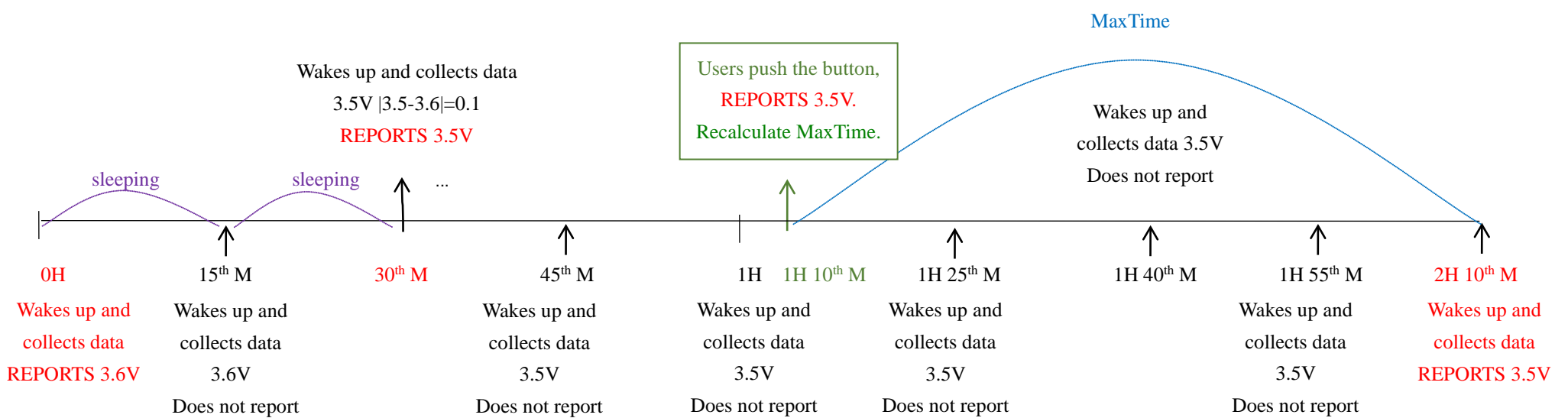


Note: MaxTime=MinTime. Data will only be report according to MaxTime (MinTime) duration regardless BatteryVoltageChange value.

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



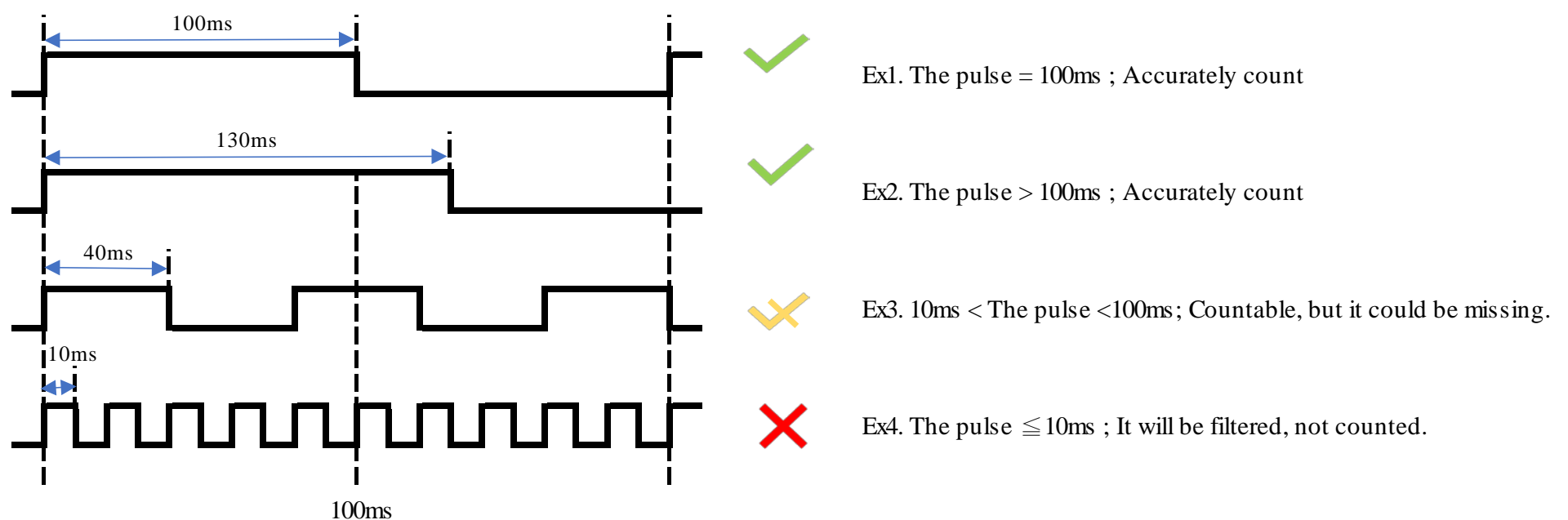
**Example#3** based on MinTime = 15 Minutes, MaxTime= 1 Hour, Reportable Change i.e. BatteryVoltageChange= 0.1V.



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. Filtering time



\*Pulse filtering time must be multiple of 5ms (can be set)

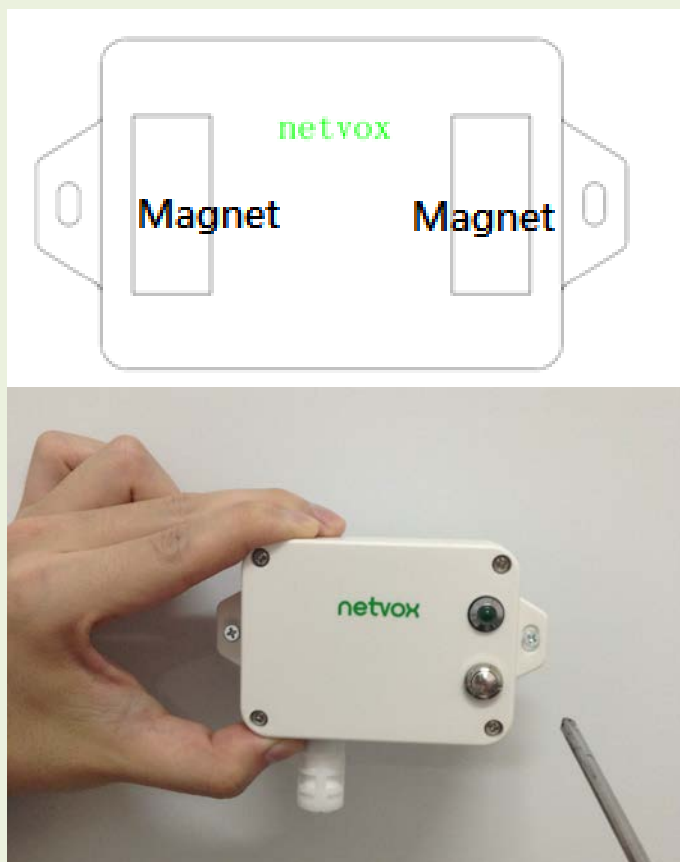
## 7. Installation

1. Wireless Pulse Counter Interface(R718H) has a built-in magnet (see Figure 1 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) to secure the unit to a wall or other surface (see Figure 2 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. Wireless Pulse Counter Interface(R718H) is sent according to the maximum and minimum interval, and the count is automatically cleared after transmission

3. When the count reaches 65535 (0XFF), a report is automatically sent (sending value is 65535), and the report loop is restarted.

Note:

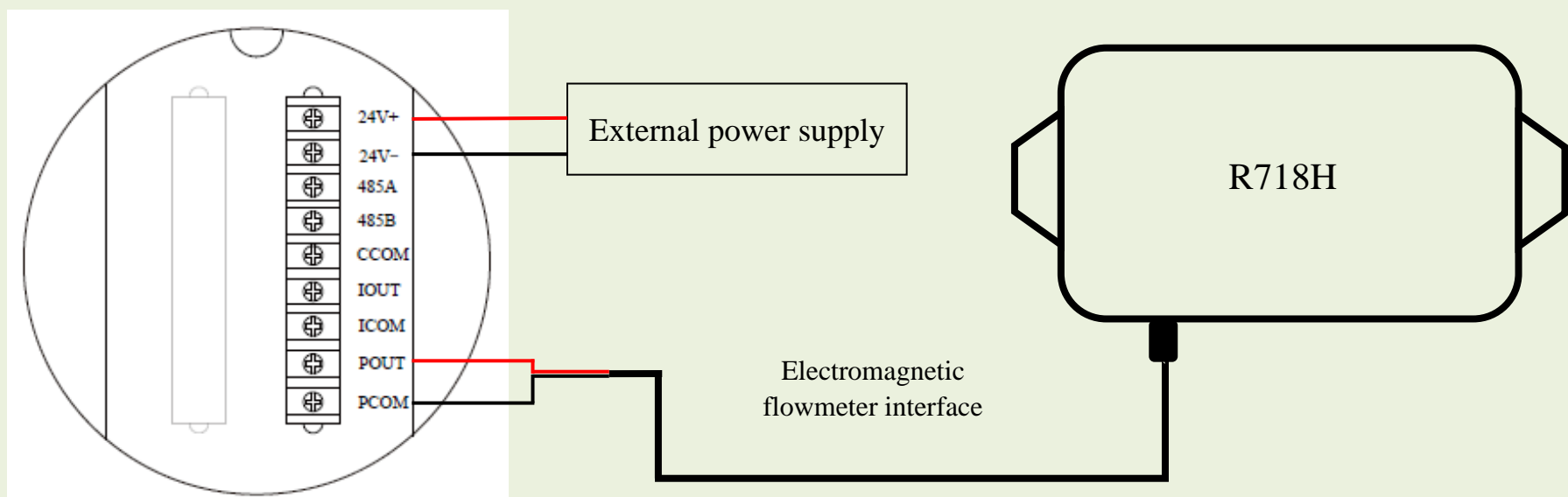
- Input pulse width greater than 100ms can be accurately counted
- External pulse input level is not higher than 3.3V

Wireless Pulse Counter Interface (R718H)

It can also be applied to the following scenarios:

- Electric meter
- Water meter
- Gas Meter
- Flow meter

When it is necessary to instrumentation equipment with pulse signal output



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.

## 8. Information about Battery Passivation

Many of Netvox devices are powered by 3.6V ER14505 Li-SOCl<sub>2</sub> (lithium-thionyl chloride) batteries that offer many advantages including low self-discharge rate and high energy density.

However, primary lithium batteries like Li-SOCl<sub>2</sub> 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 the batteries should be produced within the last three months.

If encountering the situation of battery passivation, users can activate the battery to eliminate the battery hysteresis.

### 8.1 To determine whether a battery requires activation

Connect a new ER14505 battery to a 68ohm resistor in parallel, and check the voltage of the circuit.

If the voltage is below 3.3V, it means the battery requires activation.

### 8.2 How to activate the battery

- a. Connect a battery to a 68ohm resistor in parallel
- b. Keep the connection for 6~8 minutes
- c. The voltage of the circuit should be  $\geq 3.3V$

## 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.