Wireless Water Leak Detector (Rope Sensor) with Temperature and Humidity Sensor

R718WBA
User Manual

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1. Introduction

R718WBA is a detection device that is a ClassA type device based on LoRaWAN open protocol of Netvox. The device is applied to detecting water leakage and surrounding ambient temperature and humidity. R718WBA is 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
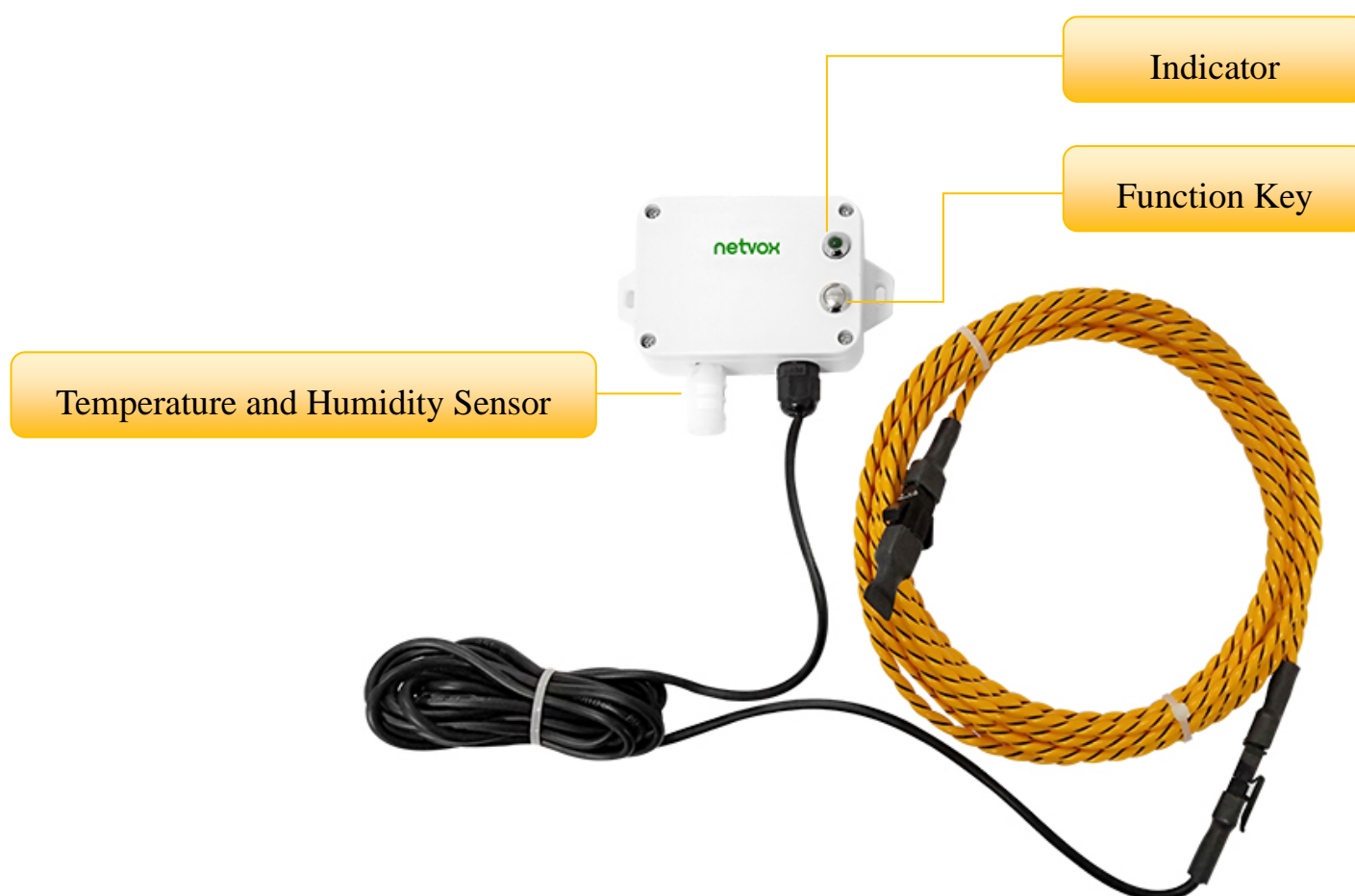
3. Main Features

- Apply SX1276 wireless communication module

- 2 ER14505 battery AA Size (3.6V / section) in parallel power supply

- Water leakage status, temperature, and humidity detection

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

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

- Low power consumption and long battery life

  Note:

  Battery life is determined by the sensor reporting frequency and other variables, please refer to

  http://www.netvox.com.tw/electric/electric_calc.html

  In this website, users can find battery life of various models in different configurations

4. Set up Instruction

On/Off

Power on	Insert batteries. (Users 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 original setting)	Press and hold the function key for 5 seconds till green indicator flashes 20 times.
Power off	Remove Batteries.
Note:	1. Remove and insert the battery and the device is in the turn-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 join the network	Turn on the device to search the network. The green indicator keeps 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. The green indicator keeps on for 5 seconds: success. The green indicator remains off: fail.
Fail to join the network	Suggest checking the device registration information on the 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 on and in the network	Sleeping period: Min Interval. When the reportchange exceeds the setting value or the state changes, a data report will be sent according to Min Interval.

Low Voltage Warning

Low Voltage	3.2V

*Suggest removing batteries if the device is not used to save the power.

5. Data Report

After power on, the device will immediately send a version packet report and a data report including the attribute.

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

Default setting:

MaxTime: 0x0E10 (3600s)

MinTime: 0x0E10 (3600s)

Battery Change = 0x01 (0.1v)

Temperature Change = 0x0064 (1°C)

Humidity Change = 0x0064 (1%)

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

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				
			Battery (1Byte) unit:0.1V	Temperature (Signed 2Bytes) unit:0.01°C	Humidity (2Bytes) unit:0.01%)	Status (1Byte) 0:off 1:on	Reserved (2Bytes) fixed 0x00
R718WBA	0x6B	0x01					

Example of Uplink: 016B012406701A9E000000

1st byte (01): Version

2nd byte (6B): DeviceType 0x6B － R718WBA

3rd byte (01): ReportType

4th byte (24): Battery－3.6v , 24Hex=36 Dec   36*0.1v=3.6v

5th 6th byte (0670): Temperature － 16.48°C , 0670(Hex)=1648(Dec), 1648x0.01=16.48°C

7th 8th byte (1A9E): Humidity － 68.14%, 1A9E(Hex)=6814(Dec), 6814x0.01=68.14%

9th byte (00): Status－No leaking

10th 11th byte (0000): 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	R718WBA	0x01	0x6B	MinTime (2bytes Unit: s)	MaxTime (2bytes Unit: s)	Battery Change (1byte) Unit:0.1v	Temperature Change (2bytes) Unit:0.01°C	Humidity Change (2bytes) Unit:0.01%
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)	Battery Change (1byte) Unit:0.1v	Temperature Change (2bytes) Unit:0.01℃	Humidity Change (2bytes) Unit:0.01%

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

HumidityChange =1%

Downlink: 016B003C003C0100640064

The device returns:

816B000000000000000000 (configuration success)

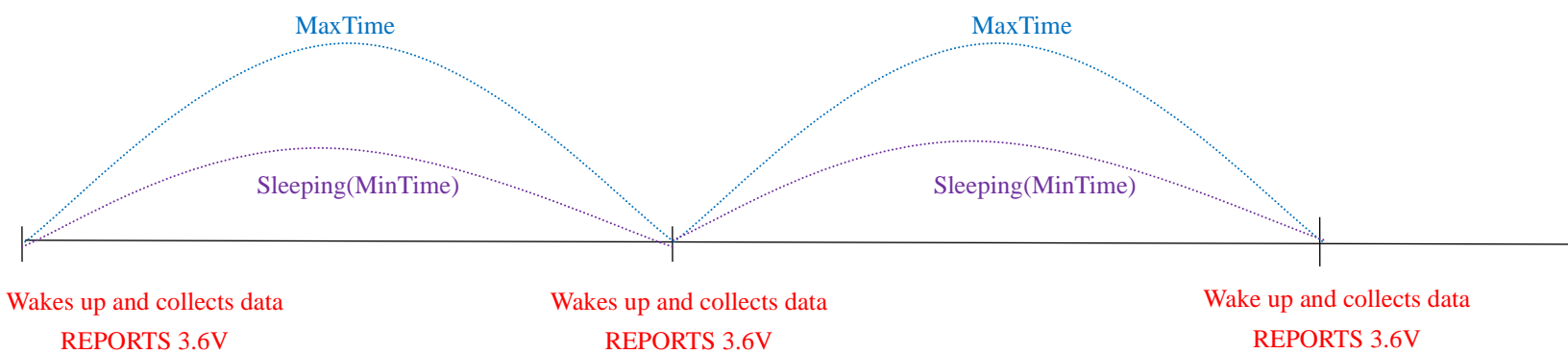816B010000000000000000 (configuration failure)

(2) Read device parameters

Downlink: 026B000000000000000000

The device returns:
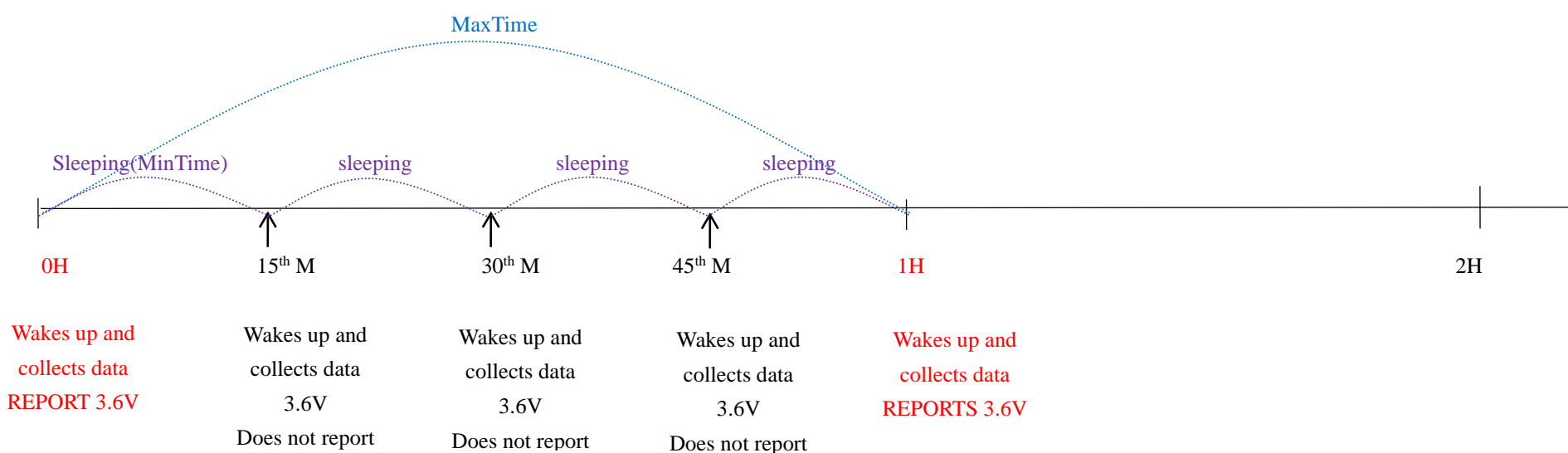
826B003C003C0100640064 (device current parameter)

5.3 Example for MinTime/MaxTime logic

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

MaxTime   MaxTime

Sleeping(MinTime)   Sleeping(MinTime)

Wakes up and collects data   Wakes up and collects data   Wake up and collects data
REPORTS 3.6V   REPORTS 3.6V   REPORTS 3.6V

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.

MaxTime

Sleeping(MinTime)   sleeping   sleeping   sleeping

0H   15th M   30th M   45th M   1H   2H

Wakes up and collects data REPORT 3.6V   Wakes up and collects data 3.6V Does not report   Wakes up and collects data 3.6V Does not report   Wakes up and collects data 3.6V Does not report   Wakes up and collects data REPORTS 3.6V

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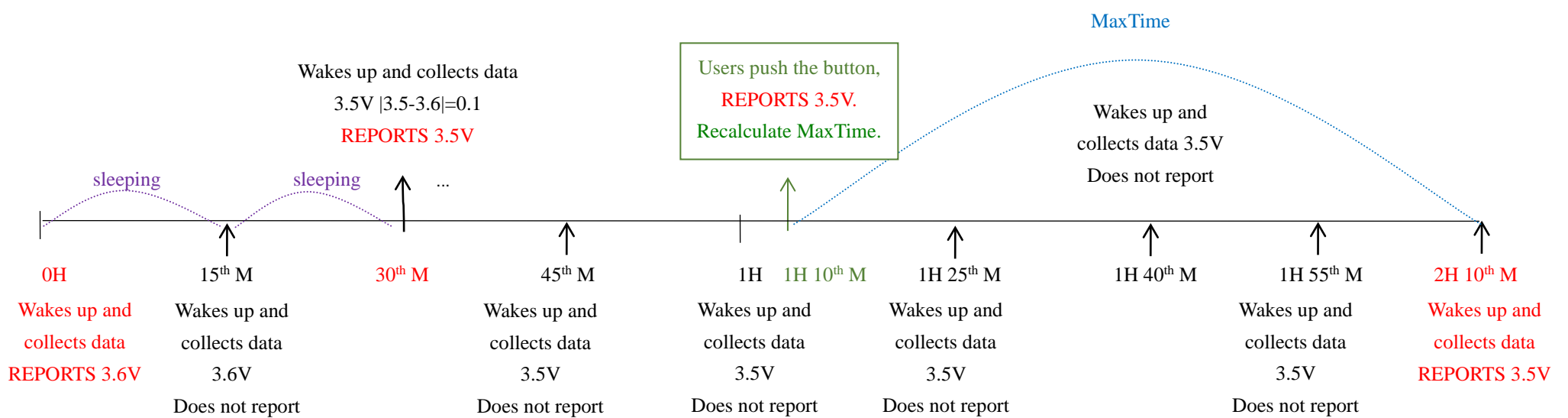
Note:

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 collected data is compared with the last reported data. If the variation of the data is greater than the ReportableChange value, 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, regardless of the resulting from data variation, button pushed or MaxTime interval, another cycle of MinTime/MaxTime calculation will start.
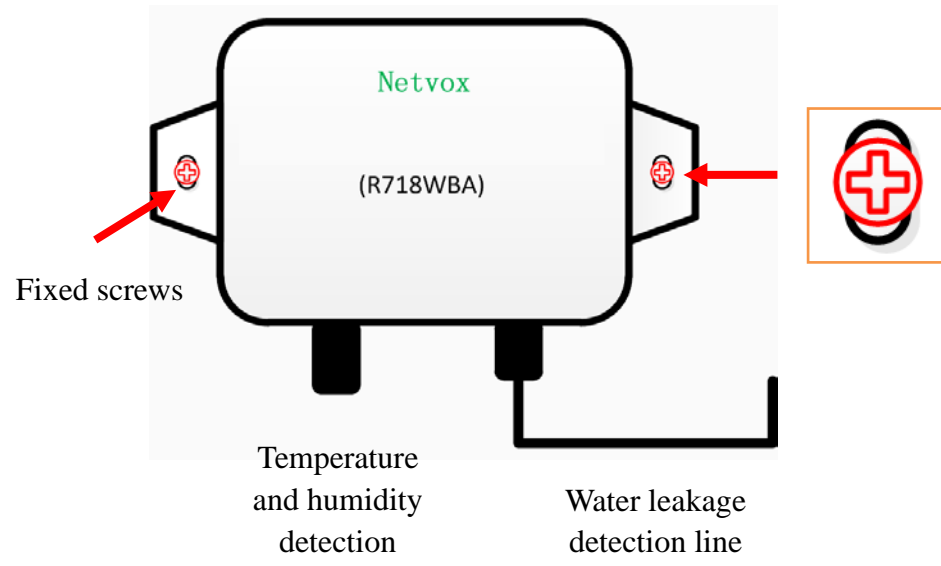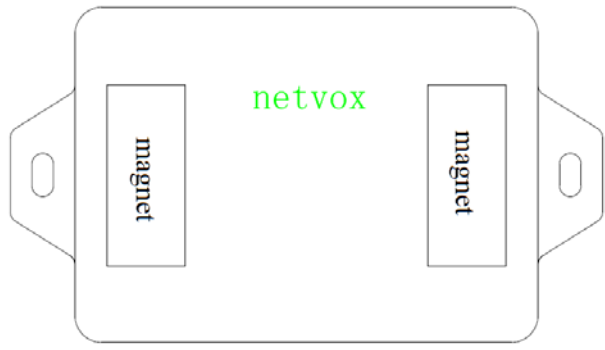
6. Installation

This product comes with waterproof function. When using it, the back of it can be adsorbed on the iron surface, or the two ends can be fixed to the wall with screws.
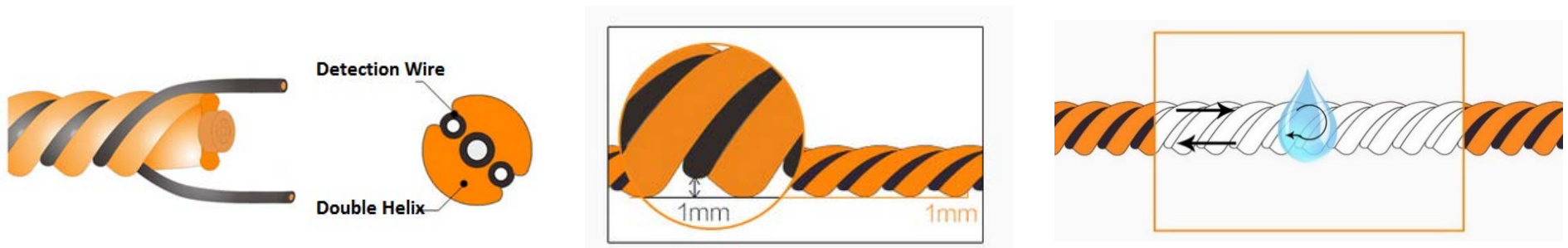
R718WBA has built-in magnet (as the figure on the left below). When installed, the device can attach to the surface of the ferrous object easily. In order to installing the device firmly, users can secure it to the wall or other surface by using screws (need to purchase by oneself) (as the figure on the right below).

Note:

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.

Fixed screws

Temperature and humidity detection

Water leakage detection line

Waterline Structure:

Detection Wire

Double Helix

1mm   1mm

Water line: Up to 300m*

Water contact alarm: Recommended at least 3cm line length and at least 2mm depth of water (as the installation example diagram)

Alert: Instant report (within 10 seconds)

Installation Suggestions and Examples

Dedicated line card fix
(Standard)

Tape fix
(Standard)

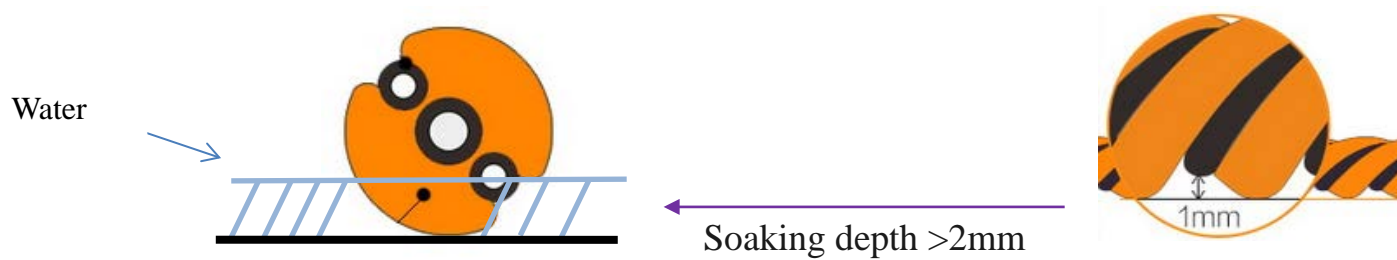**Fix along the pipeline**
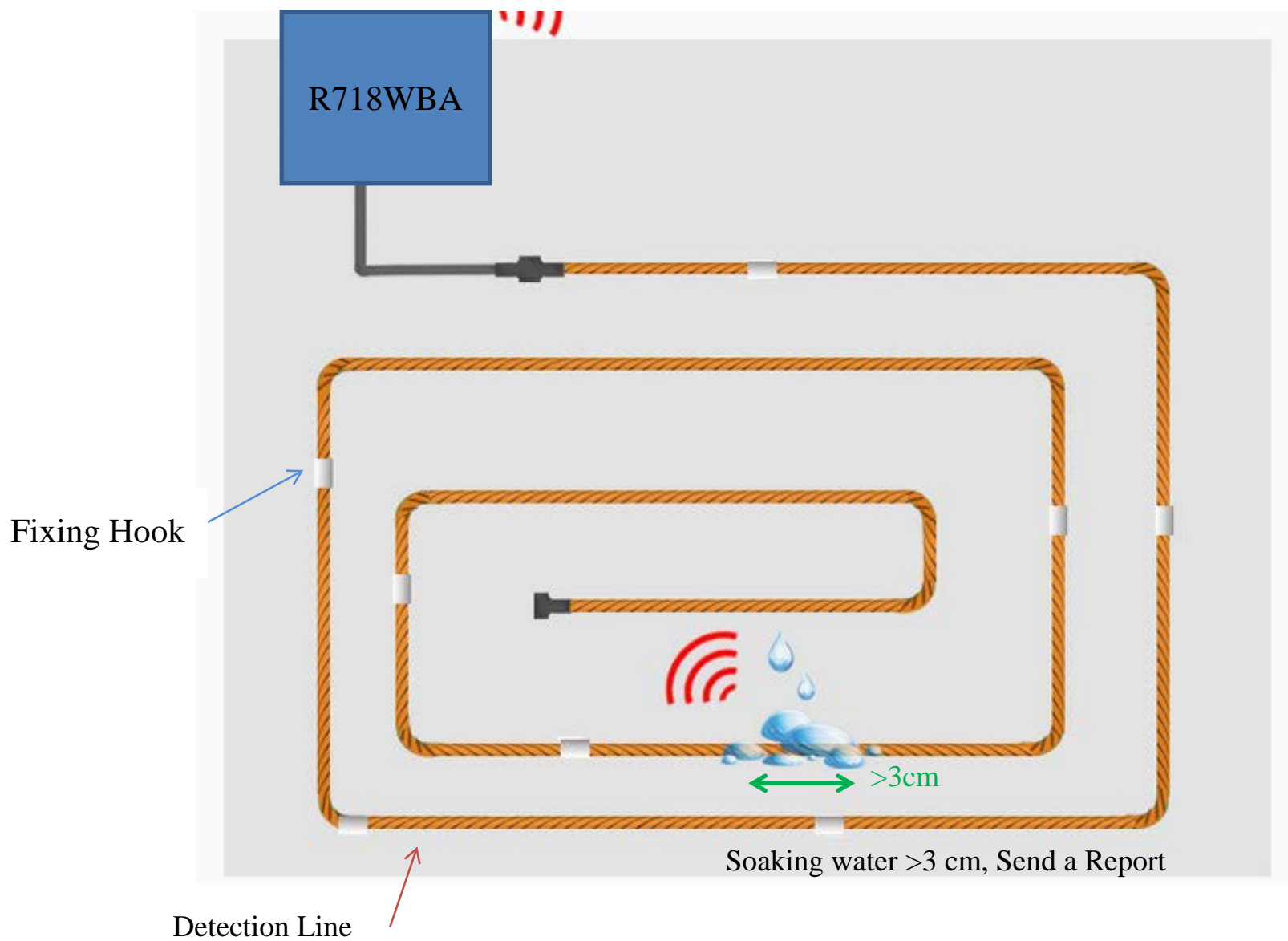(Standard)

Glue fix
(Damage the cable)

Metal bind fix
(Interference)

Face to air-con outlet (False alarm due to humidity)

Report Time: Real-time (Within 10 seconds)

Soaking water >3 cm, Send a Report

Soaking depth >2mm

The device can be applied to the following scenes:

- The data center and generator room
- Basement leakage monitoring
- The bottom of the cabin monitoring
- Archives
- Warehouse

Any place is necessary to detect if there is a leakage or is sensitive to the leakage.

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.

7. 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:

7.1 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.

7.2 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.

8. Important Maintenance Instruction

Kindly pay attention to the following in order to achieve the best maintenance of the product:

• 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 applies to your device, battery, and accessories.

If any device is not working properly, please take it to the nearest authorized service facility for repairing.