netvox™

R720FLD / R720FLO / R720FU : Wireless Liquid Hand Soap Sensor
R720FW : Wireless Water Leak Detector

Wireless Liquid Hand Soap Sensor/ Wireless Water Leak Detector

R720F Series
User Manual

Table of Content

1. Introduction

R720F series is a Class A device based on LoRaWAN™ protocol of NETVOX and is compatible with LoRaWAN protocol. It is a wireless communication device that can detect the level of hand wash or the water leakage. The detected data will be transmitted to other device for display via wireless network.

The hand wash detection devices are R720FLO,R720FLD,R720FU. The devices are connected with two electrode rods. The shape and orientation of electrode rod of can be selected according to the needs, and the electrode rode can be trimmed to the required length by self according to the demand.

The water leakage detection device is R720FW.

Hand Wash Detection

1. Regularly check the current voltage and state of hand wash according to the configured time.

2. When the device detects the change in the current state of the hand wash, it will report a data packet of the current voltage and state of the hand wash.

3. Press the function key to immediately detect the current voltage and state of the hand wash, and a currently detected data packet will be reported.

Water Leakage Detection

1. Regularly check the current voltage and state of water leakage according to the configured time

2. When the device detects the change in the current water leakage state, it will report a data packet with the current voltage and state of water leakage.

3. Press the function key to immediately detect the current voltage and state of water leakage, and a currently detected data packet will be reported.

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

Hand Wash Detection:

Electrode Rod

Indicator

Function Key
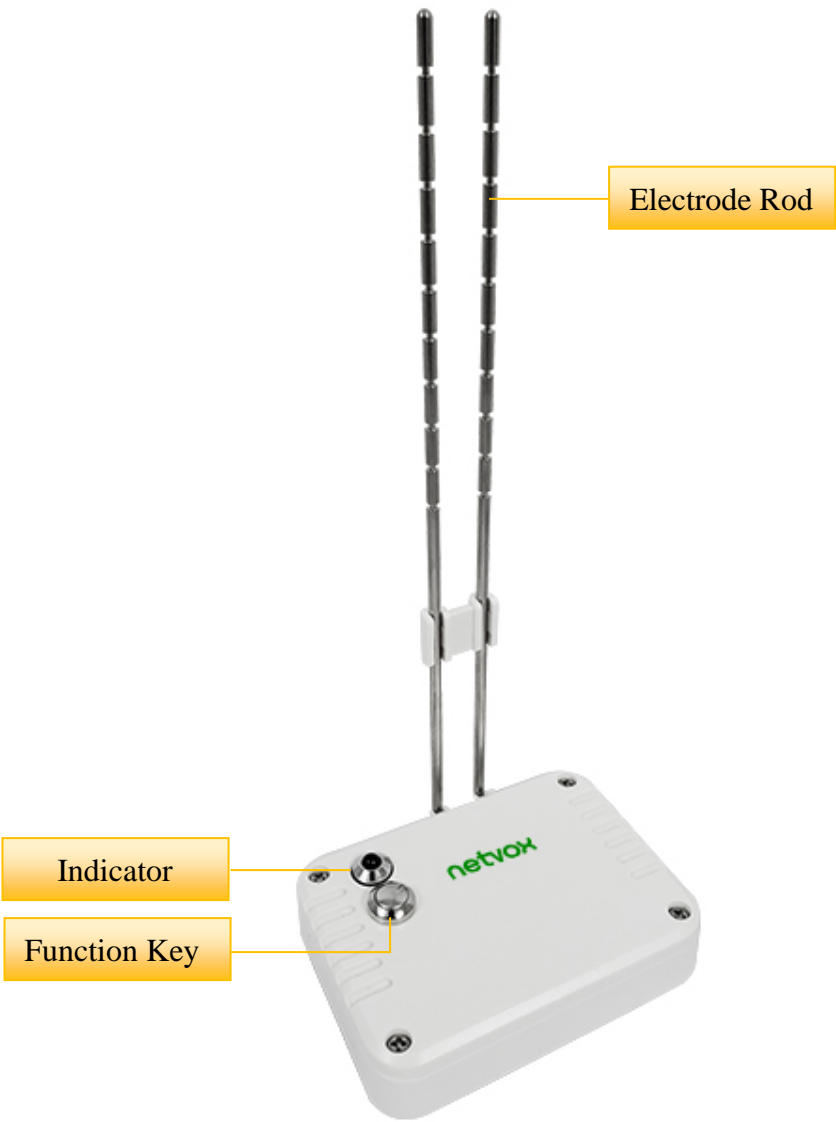
R720FLO   L-type Probe- Electrode rods Upward

R720FLD   L-type Probe- Electrode rods Downward

R718FU   U-type Probe

Water Leakage Detection:

R720W

3. Main Features

- Apply SX1276 wireless communication module

- 2 ER14505 lithium batteries (3.6V / section) in parallel

- Detect the usage status of the hand wash / Detect the water leakage

- Protection Class IP65

- Compatible with LoRaWAN^{TM} 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

  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

    On this website, users can find battery lifetime for varied 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 and the green indicator flashes 20 times.
Power Off	Remove Batteries
Note	1. Remove and insert the battery: the device is in the turn-off state by default. 2. After 5 seconds of powering on, the device is in engineering testing mode. 3. Every time, after remove and reinsert the battery, the device is in a turn-off state and need to turn on again. 4. On/off interval is suggested to be about 10 seconds to avoid the interference of capacitor inductance and other energy storage components.

Network Joining

Never Join 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	Suggest to check the device verification information on the gateway or consult your platform server provider.

Function Key

Press and hold for 5 seconds	Restore to factory setting / Turn off The green indicator flashes 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 turns on and joins 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 Threshold Alarm

Low Voltage	3.2 V

5. Data Report

Hand Wash Detection:

After power on, the device will immediately send a version packet report and a data report including the voltage of the battery and the current state of the hand wash.

Water Leakage Detection:

After power on, the device will immediately send a version packet report and a data report including the voltage of the battery and the current state of the water leakage.

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

Default setting:

Report MaxTime：Max Interval =3600s (1 hour)

Report MinTime：Min Interval =3600s (1 hour) (Every Min Interval will detect the current voltage one time)

Reportchange：BatteryChange : 0x01(0.1v)

* If there is a special customized order, the setting of the device will change according to customer's requirements

R720F trigger:

1. It can be used to detect the current voltage and the current state of hand wash according to the default.
2. As soon as the device detects the change in the current state of the hand wash, it will report a data packet including the current voltage value and the current state of the hand wash.
3. Press the button, and it will immediately detect the current voltage and the current state of the hand wash, and then report a currently detected data packet.

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://loraresolver.netvoxcloud.com:8888/page/index

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 ConfigureCmd

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			
ConfigReport Req	R720F	0x01	0xB7	MinTime (2bytes Unit: s)	MaxTime (2bytes Unit: s)	BatteryChange (1byte Unit: 0.1v)	Reserved (4Bytes, Fixed 0x00)
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)	Reserved (4Bytes,Fixed 0x00)

（1）Configure R720F device parameter MinTime = 1min、MaxTime = 1min、BatteryChange = 0.1v

Downlink: 01B7003C003C0100000000

Device return：

81B7000000000000000000 (configuration success)

81B7010000000000000000 (configuration failure)

（2）Read R720F device parameter

Downlink: 02B7000000000000000000

Device return：

82B7003C003C0100000000 (device current parameter)

Example of ReportDataCmd

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		
R720F	0xB7	0x01	Battery (1Byte, unit:0.1V)	Status (1Byte 0:off 1:on)	Reserved (6Bytes,fixed 0x00)

Hand Wash Detection

Uplink: 01B70124<u>01</u>000000000000   // The report of the status is 1 meaning it has hand wash.

Uplink: 01B70124<u>00</u>000000000000   // The report of the status is 0 meaning it has no hand wash.

Water Leakage Detection

Uplink: 01B7012401000000000000   // The report of the status is 1 meaning it has water leakage.

Uplink: 01B7012400000000000000   // The report of the status is 0 meaning it has no water leakage.

Example for MinTime/MaxTime logic:

Example#1 based on MinTime = 1 Hour, MaxTime= 1 Hour, Reportable Change i.e. BatteryVoltageChange=0.1V
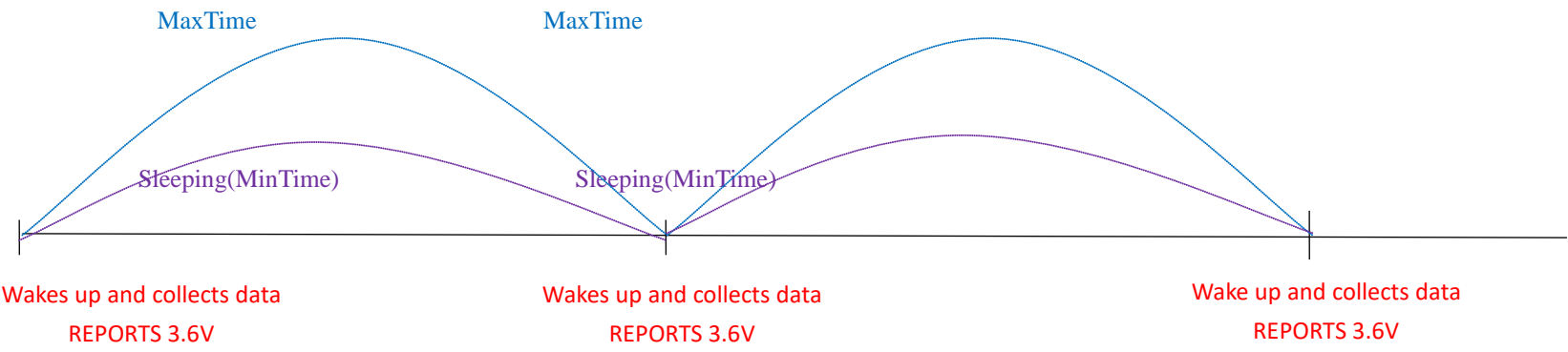
Note: MaxTime=MinTime. Data will only be report according to MaxTime (MinTime) duration regardless BatteryVoltageChange value.

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

MaxTime

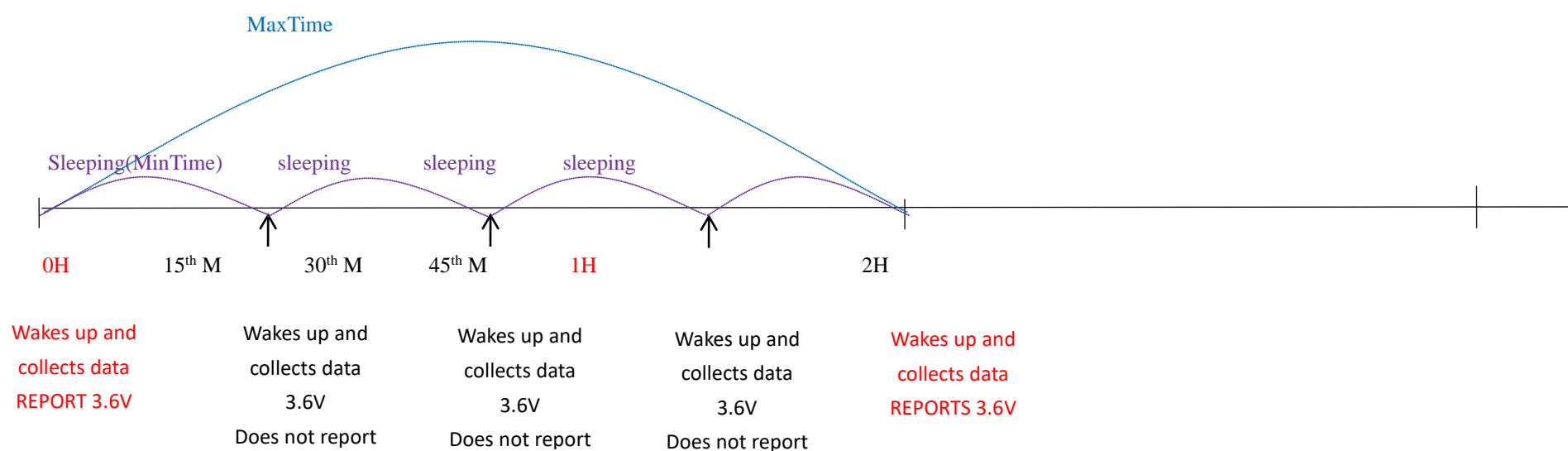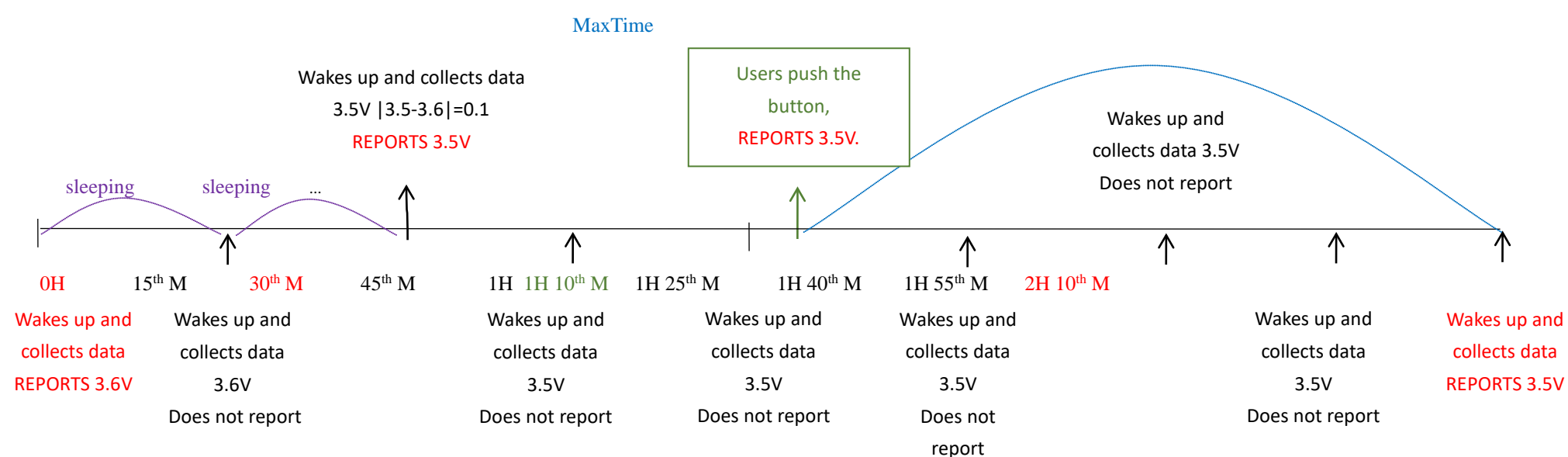Sleeping(MinTime)   sleeping   sleeping   sleeping

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

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

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

MaxTime

Wakes up and collects data
3.5V |3.5-3.6|=0.1
REPORTS 3.5V

Users push the
button,
REPORTS 3.5V.

Wakes up and
collects data 3.5V
Does not report

sleeping   sleeping   ...

0H   15th M   30th M   45th M   1H 1H 10th M   1H 25th M   1H 40th M   1H 55th M   2H 10th M

Wakes up and   Wakes up and   Wakes up and   Wakes up and   Wakes up and   Wakes up and   Wakes up and
collects data   collects data   collects data   collects data   collects data   collects data   collects data
REPORTS 3.6V   3.6V   3.5V   3.5V   3.5V   3.5V   REPORTS 3.5V
                  Does not report   Does not report   Does not report   Does not   Does not report
                                                                                          report

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 <u>reported</u>. 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.
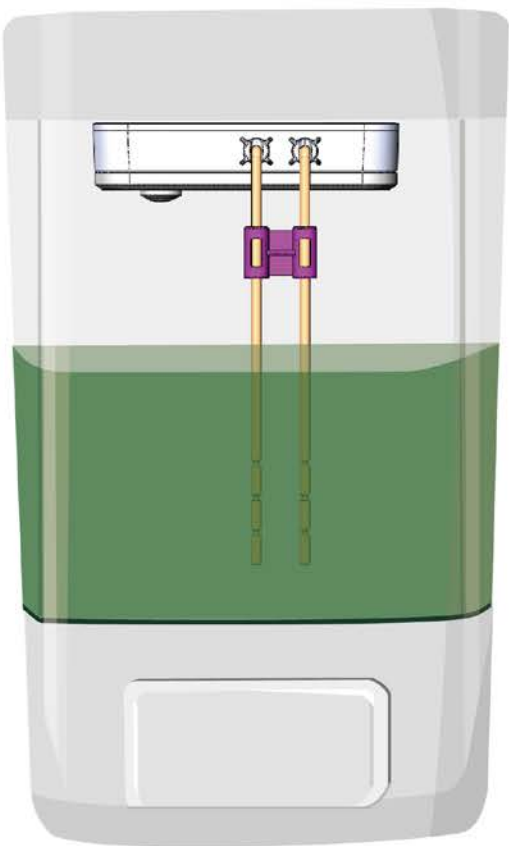
6. Installation

The device is waterproof.

The installation instruction is as the figure below.

1.The device can be fixed on the cover by the force rubber, or make the hole in the cover and bundle the device with cable ties.

2. The length of the probe can be trimmed according to personal requirements.

3. When the level of the hand wash is lower than electrode rods, the device will issue a warning.

R720FLD	R720FLO	R720FU
L-type Probe- Electrode rods Downward	L-type Probe- Electrode rods Upward	U-type Probe

Installation method of water leakage detection device:

Place the device on the location where water leakage needs to be detected. If users need to detect water leakage on the ground, please refer to the following figure.

R720FW

Note:

Please use the screwdriver to open the cover to install the battery.

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 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.

*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.

*How to activate the battery

1) Connect a battery to a 68ohm resistor in parallel

2) Keep the connection for 6~8 minutes

3) The voltage of the circuit should be ≧3.3V

8. 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.