Wireless pH Sensor

R718PA8
User Manual

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1. Introduction

R718PA8 is a Class A device based on the LoRaWAN^{TM} protocol of Netvox and is compatible with LoRaWAN protocol.

R718PA8 can be connected with a pH sensor (RS485) and report the pH value and temperature of the solution collected by the device to the corresponding gateway.

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

Indicator

PH Sensor

Adapter

Function Key
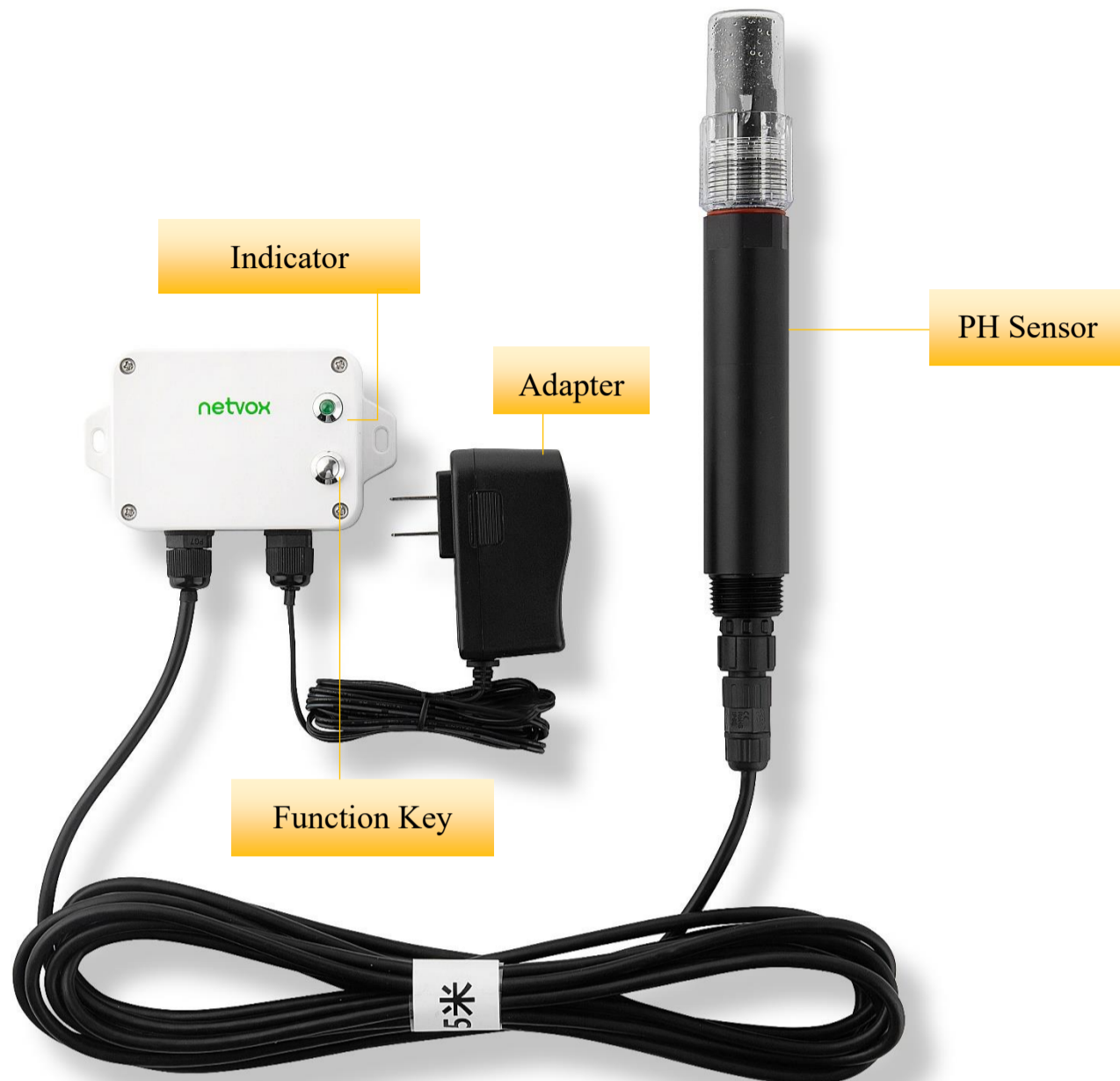
3. Main Feature

- Adopt SX1276 wireless communication module

- RS485 communication

- 12V DC power supply

- pH value of solution and temperature detection

- The base is equipped with a magnet that can be attached to the iron object

- Main body protection level IP65/IP67 (optional)

- Compatible with LoRaWAN™ Class A

- Frequency hopping spread spectrum technology

- Configuring parameters and reading data via the third-party software platforms, and set alarms via SMS text and email (optional)

- Applicable to the third-party platforms: Actility/ ThingPark/ TTN/ MyDevices/ Cayenn

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	DC12V adapter
Turn On	DC12V power supply, the green indicator flashing once means turn on successfully.
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 DC12V adapter
Note	1. On/off interval is suggested to be about 10 seconds to avoid the interference of capacitor inductance and other energy storage components. 2. In the first 5 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 restore to the factory 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 to check the device registration information on the gateway or consulting your platform server provider

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 the device sends a data report The device is not in the network: the green indicator remains off

5. Data Report

After power on, the device will immediately send a version packet report. Then, it will send another report with the data of pH value and temperature of the solution **after it is powered on for 20s.**

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

Default setting:

MaxTime: Max Interval = 3min = 180s

MinTime: The MinTime configuration is not available.

*But the software has restriction, MinTime must be configured a number greater than 0.

Note:

Report interval is based on the factory default.

R718PA8 reports the pH value and temperature of the solution.

The device reported data parsing please refer to Netvox LoraWAN Application Command document and Netvox Lora Command Resolver http://www.netvox.com.cn:8888/cmddoc

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				
R718PA Series (R718PA8)	0x57	0x08	Battery (1Byte, unit:0.1V)	PH (2Bytes ,0.01pH)	TemperaturewithPH (Signed 2Bytes,unit:0.01°C)	ORP (Signed 2Bytes ,1mv)	Reserved (1Byte,fixed 0x00)

Uplink: 015708000226092EFFFF00

1st byte (01): Version

2nd byte (57): Device Type 0x57 － R718PA Series

3rd byte (08): ReportType

4th byte (00): DC power supply

5th 6th byte (0226): PH   226 H_{ex} = 550 D_{ec} , 550*0.01ph =5.50 pH

7th 8th byte (092E): Temperature   92E H_{ex} = 2350 D_{ec} , 2350*0.01°C = 23.50°C

9th 10th byte (FFFF): ORP

11th byte (00): 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	R718PA Series (R718PA8)	0x01	0x57	MinTime (2bytes Unit: s)	MaxTime (2bytes Unit: s)	Reserved (5Bytes,Fixed 0x00)
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)	Reserved (5Bytes,Fixed 0x00)

(1) Configure R718PA8 device parameter MaxTime = 60s

(The MinTime configuration is useless,but it needs to be set greater than 0 because of the software limitation.)

Downlink: 0157000A003C0000000000

Device return:

8157000000000000000000000 (configuration success)

8157010000000000000000000 (configuration failure)

(2) Read R718PA8 device parameter
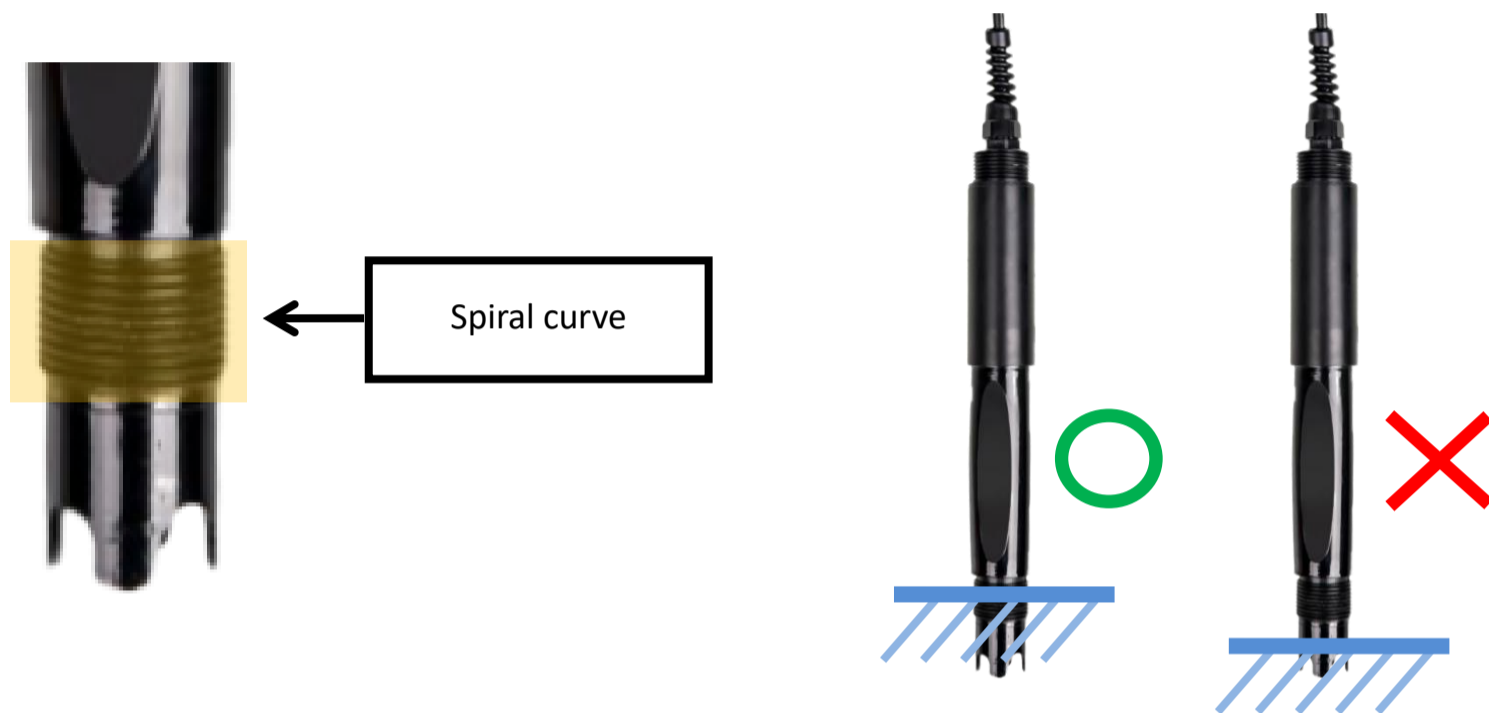
Downlink: 025700000000000000000000

Device return:

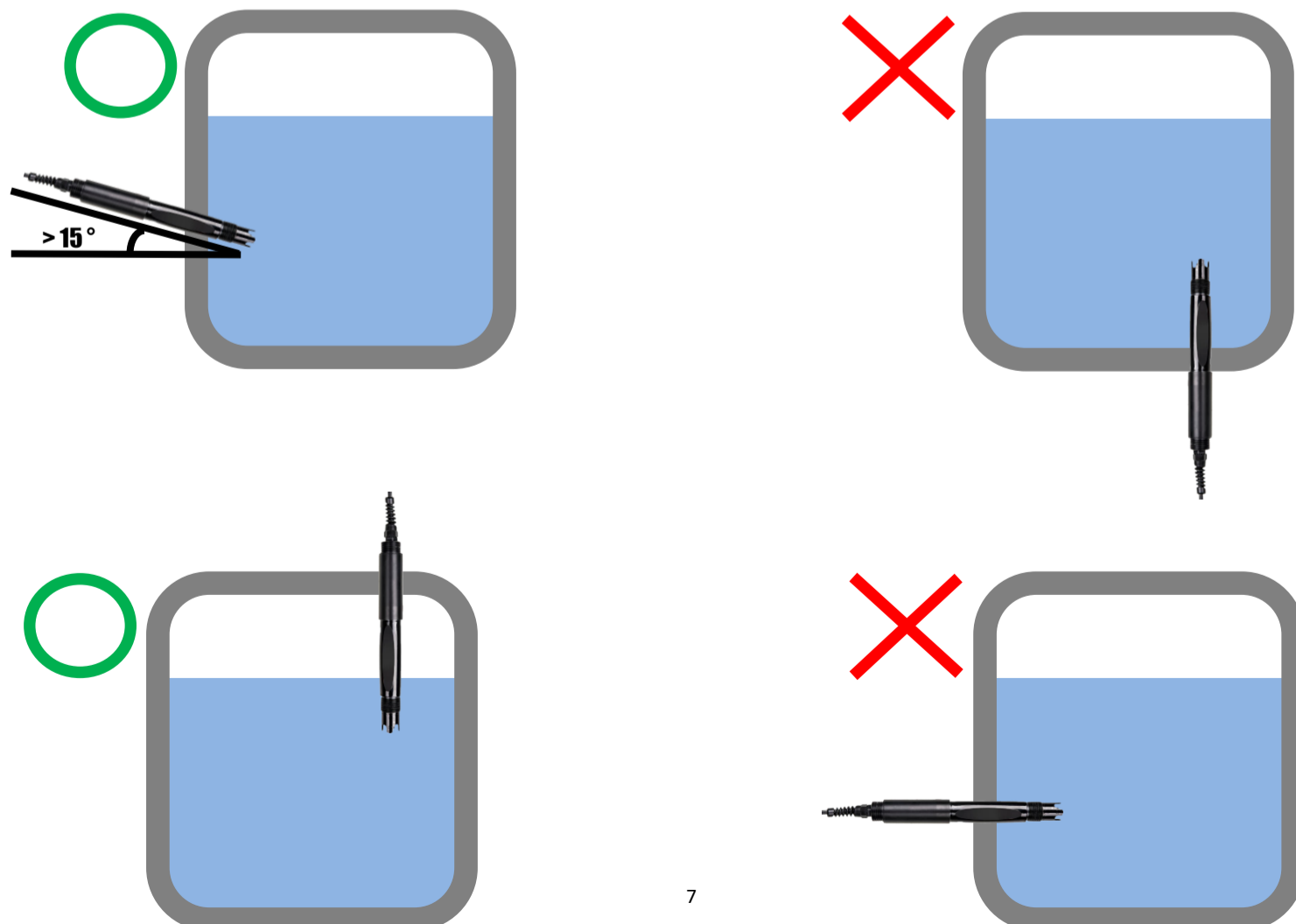8257000A003C0000000000 (device current parameter)

6. Installation

6.1 PH Sensor Use

The water level of the water you plan to measure the pH value of is recommended to be higher than the spiral curve on the pH sensor.
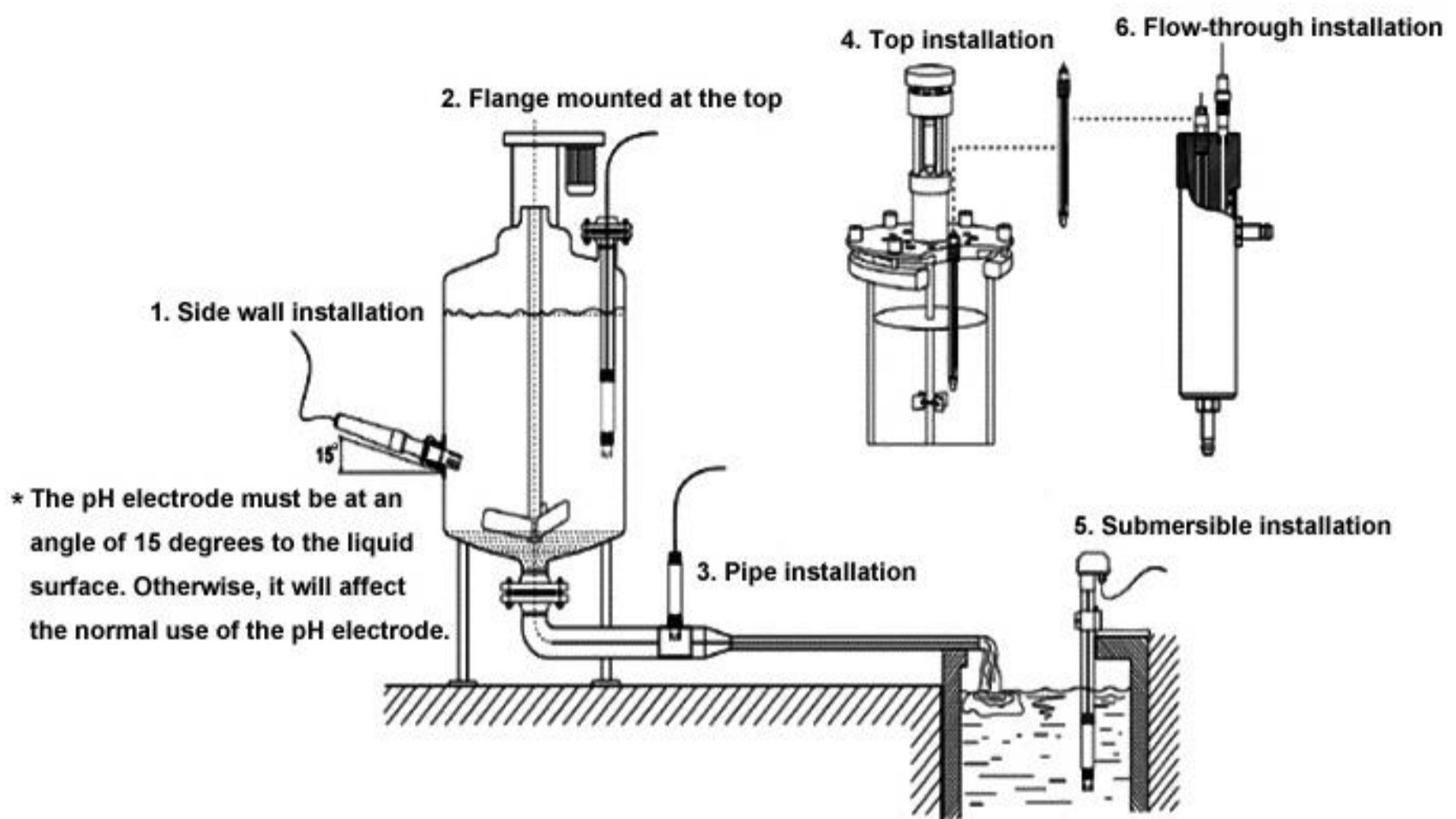

Spiral curve

Note:

(1) The sensor is recommended to be installed with angles higher than 15 degrees.

(2) Horizontal or upside-down position is not allowed.

> 15°

1. Side wall installation

* The pH electrode must be at an angle of 15 degrees to the liquid surface. Otherwise, it will affect the normal use of the pH electrode.

2. Flange mounted at the top

3. Pipe installation

4. Top installation

5. Submersible installation

6. Flow-through installation

6.2 PH Sensor Maintenance

When measuring the pH sensor, it should be cleaned in distilled water (or deionized water), and the filter paper should be used to absorb moisture to prevent impurities from being introduced into the liquid to be tested. 1/3 of the sensor should be inserted into the solution to be tested.

The sensor should be washed when not in use, inserted into a protective sleeve with a 3.5 mol/L potassium chloride solution, or the sensor inserted into a container with a 3.5 mol/L potassium chloride solution.

If the liquid in the cover of the pH sensor dries out, you could replace the liquid with potassium chloride liquid or tap water. Please do not use purified water or deionized water.

Check if the terminal is dry. If it is stained, wipe it with absolute alcohol and dry it. Avoid long-term immersion in distilled water or protein solution and prevent contact with silicone grease. With a longer sensor, its glass film may become translucent or with deposits, which can be washed with dilute hydrochloric acid and rinsed with water. The sensor is used for a long time. When a measurement error occurs, it must be calibrated with the meter for calibration.

When the calibration and measurement cannot be performed while the sensor is being maintained and maintained in the above manner, the sensor has failed. Please replace the sensor.
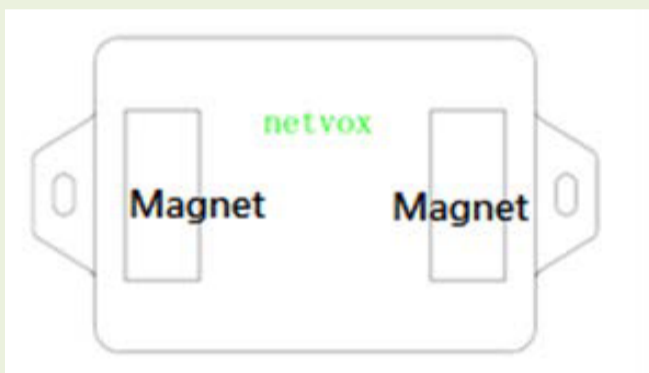
Note:

PH sensor can be placed in water for a long time. If PH sensor is not applicable, please add some water to the sponge in the protective shell of the probe, and then install the protective shell to the probe position. PH senor can not be exposed to the sun, and should be placed in a humid environment. If PH sensor is put in the water for a long time, it will consume the electrode. When the electrode is consumed to a certain extent, the electrode needs to be replaced, and the life span is about half a year.

1. R718PA8 has the built-in magnet (as the figure below) which can be attached to the surface of an iron object during installation, which is convenient and quick.

In order to make the installation firmer, please use screws (purchased separately) to fix the device to the wall or other surface (as Figure below).

Note: Do not install the device in a metal shielded box or in an environment surrounded by other electrical equipment to avoid affecting the wireless transmission of the device.


2. R718PA8 regularly reports data that is pH value and the solution temperature according to MaxTime. The default Max Time is 3 minutes.

Note:

MaxTime can be modified by the downlink command, but it is recommended not to set the interval too short.

R718PA8 can be applied to detecting the pH value and the solution temperature Example:

- Water Quality Monitor
- Industrial Sewage Disposal
- Agricultural Irrigation/Aquaculture
- Swimming Pool/Hot Spring
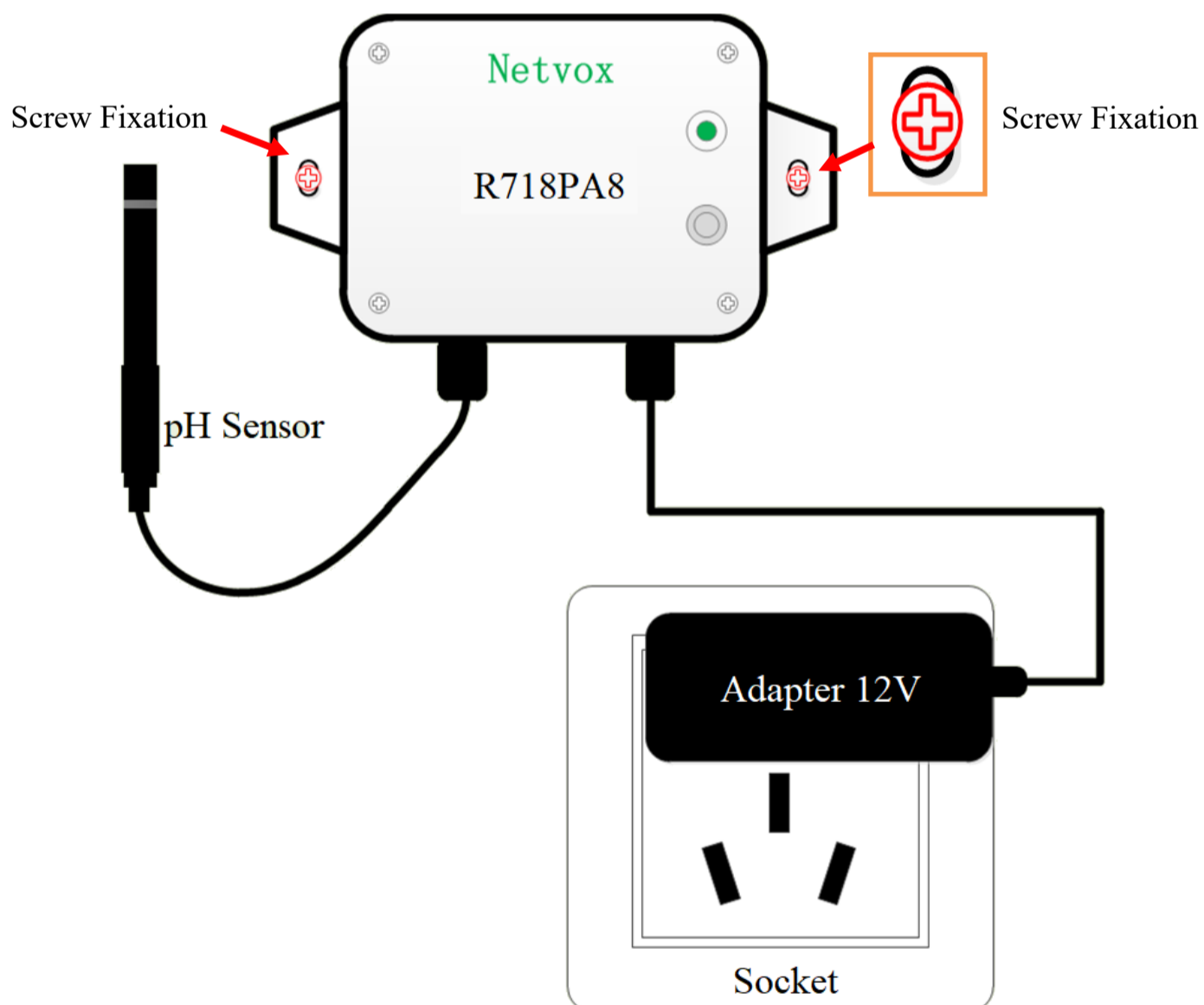
7. Important Maintenance Instruction

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 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.