Wireless Water pH / Turbidity / Residual Chlorine Sensor

with 1 x Digital Output

R900PD01O1 User Manual

Contents

1. Introduction

R900PD01O1 is a wireless water pH, turbidity, and residual chlorine sensor with a digital output. It transmits digital signals to a third-party device when a value exceeds the threshold. With up to 7 flexible installation options, R900PD01O1 integrates easily into various environments. In addition, with support for Netvox NFC app, users can easily configure settings, update firmware, and access data simply by tapping their smartphone to the device.

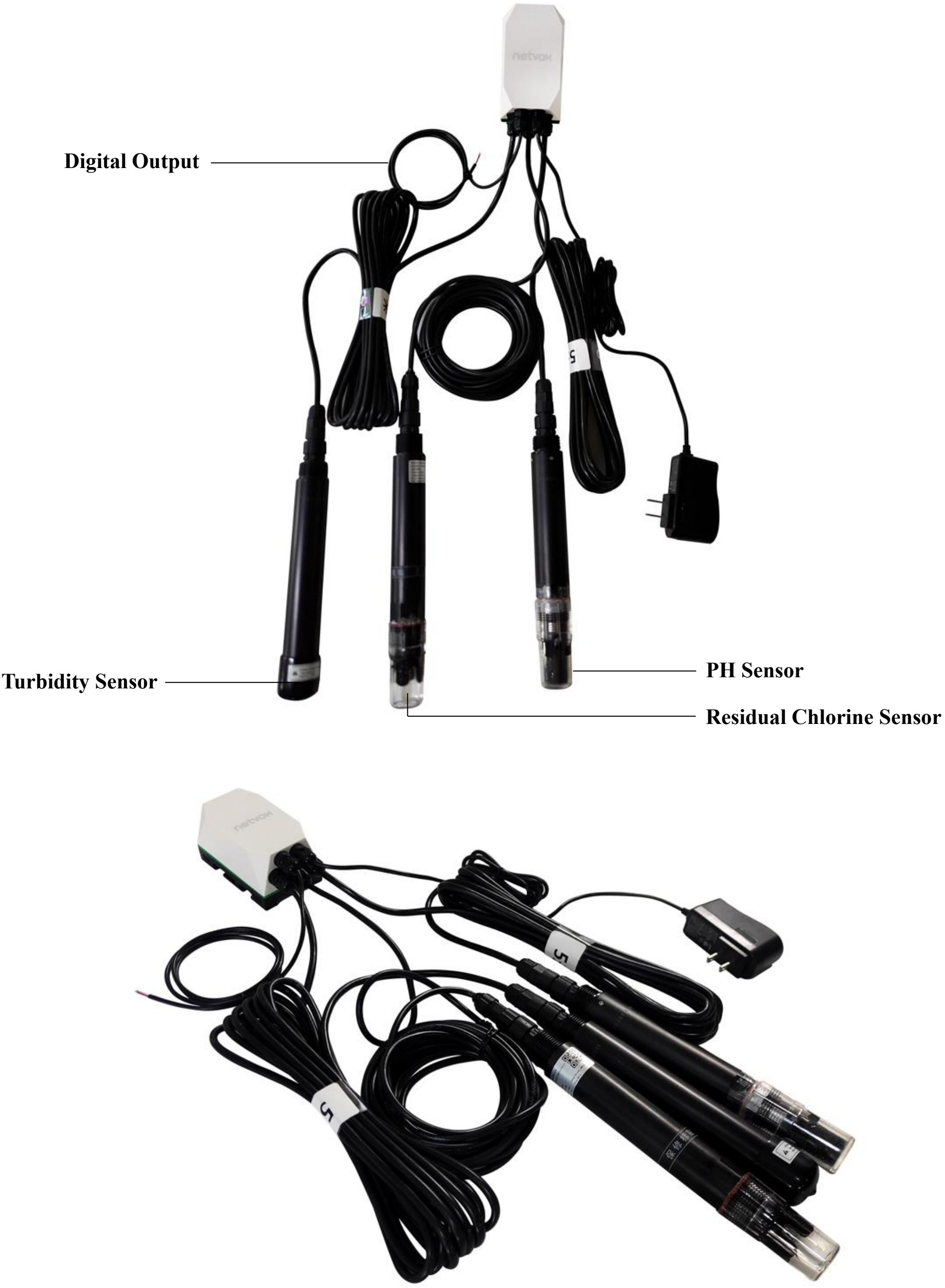
LoRa Wireless Technology

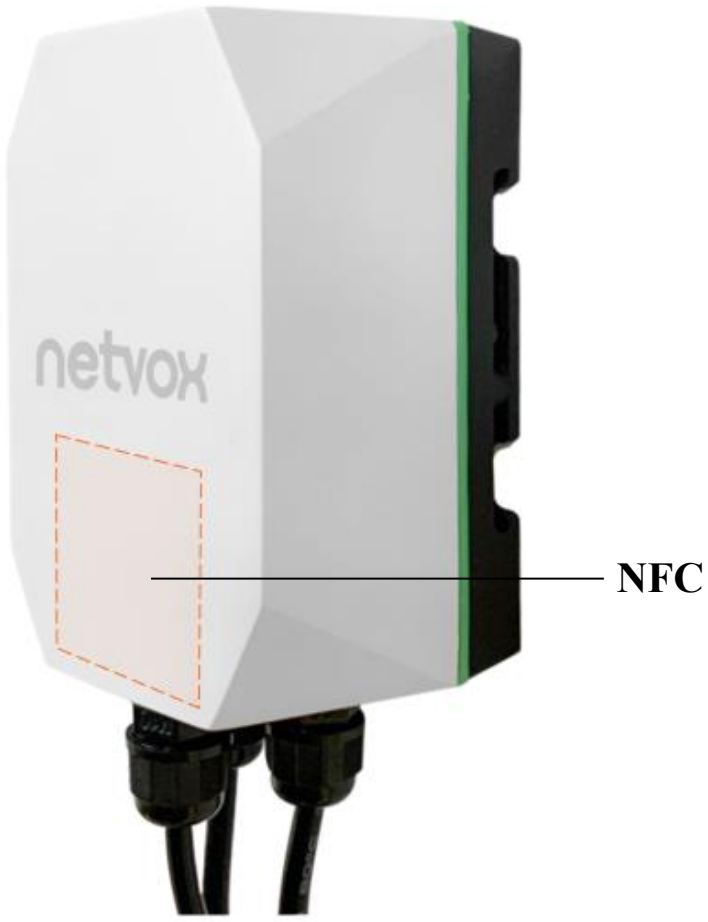
LoRa is a wireless communication technology famous for its long-distance transmission and low power consumption. Compared with other communication methods, LoRa spread spectrum modulation technique greatly extends the communication distance. It can be widely used in any case that requires long-distance and low-data wireless communications. For example, automatic meter reading, building automation equipment, wireless security systems, and industrial monitoring. It has features like small size, low power consumption, long transmission distance, strong anti-interference ability, and so on.

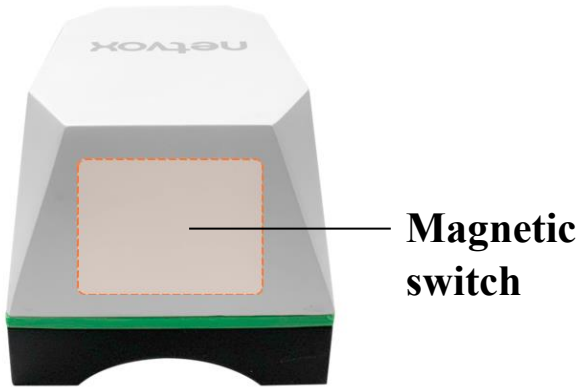
LoRaWAN

LoRaWAN uses LoRa technology to define end-to-end standard specifications to ensure interoperability between devices and gateways from different manufacturers.

2. Appearance







Top

Bottom

Left Side

Back

3. Features

- Main unit: IP65
- Detect water temperature, turbidity, pH, and residual chlorine
- Built-in vibration sensor for tamper alarm
- Output digital signals when a value exceeds the threshold
- Up to 7 installation methods for different kinds of scenarios
- Support NFC. Configure and upgrade firmware on Netvox NFC app
- Store up to 10000 data
- LoRaWAN™ Class C compatible
- Frequency hopping spread spectrum
- Configuration parameters can be configured through third-party software platforms, data can be read, and alarms can be set via SMS text and email (optional)
- Applicable to the third-party platforms: Actility/ThingPark, TTN, MyDevices/Cayenne

4. Setup Instructions

On / Off

Turn on	Plug in the DC12V power adapter. The green indicator flashes one time.
Turn off	Unplug the power adapter.

Function key

Reboot	Step 1. Press and hold the function key for 5 seconds. The green indicator flashes once. Step 2. Release the function key and short press it in 5 seconds. Step 3. The green indicator flashes 5 times.
Factory reset	Step 1. Press and hold the function key for 10 seconds. The green indicator flashes once every 5 seconds. Step 2. Release the function key and short press it in 5 seconds. Step 3. The green indicator flashes 20 times. R900 is factory reset and off.

Magnetic switch

Reboot	Step 1. Hold a magnet close to R900 for 5 seconds. The green indicator flashes once. Step 2. Remove the magnet and get close to R900 in 5 seconds. Step 3. The green indicator flashes 5 times.
Factory reset	Step 1. Hold a magnet close to R900 for 10 seconds. The green indicator flashes once every 5 seconds. Step 2. Remove the magnet and get close to R900 in 5 seconds. Step 3. The green indicator flashes 20 times. R900 is factory reset and reboot.

Note: 5 seconds after powering on, the device will be in engineering test mode.

Join a Network

First time joining the network	Turn on the device to search the network. The green indicator stays on: Success The green indicator remains off: Fail
Had joined the network before (Device is not factory reset.)	Turn on the device to search the network. The green indicator stays on: Success The green indicator remains off: Fail
Fail to join the network	Please check the device verification information on the gateway or consult your platform server provider.

Function key

Short press	Device is in the network The green indicator flashes once. After sampling is completed, the device reports a data packet. Device is not in the network The green indicator remains off.

Magnetic switch

Move magnet close to the switch and remove it	Device is in the network The green indicator flashes once. After sampling is completed, the device reports a data packet. Device is not in the network The green indicator remains off.

5. Data Report

35 seconds after the device is powered on, it will send a version packet and data including water pH, turbidity, residual chlorine, and temperature.

Default setting:

Min Interval = 0x0384 (900s)

Max Interval = 0x0384 (900s) // should not be less than 30 seconds

pH = 0x0064 (1)

NTU = 0x0064 (10 NTU)

Residual Chlorine = 0x0064 (1 mg/L)

Temperature = 0x01F4 (5˚C)

Note: a. If no configuration is done, the device sends data based on the default settings.

b. Please refer to Netvox LoRaWAN Application Command document and Netvox Lora Command Resolver http://www.netvox.com.cn:8888/cmddoc to resolve uplink data.

Data report configuration and sending period are as follows:

Min Interval (unit: second)	Max Interval (unit: second)	Reportable Change	Current Change ≥ Reportable Change	Current Change＜ Reportable Change
Any number between 30 to 65535	Any number between Min time to 65535	Cannot be 0	Report per Min Interval	Report per Max Interval

5.1 Example of ReportDataCmd

FPort: 0x16

Bytes	1	2	1	Var (length based on the payload)
	Version	DeviceType	ReportType	NetvoxPayLoadData

Version – 1 bytes – 0x03——the Version of NetvoxLoRaWAN Application Command Version

DeviceType – 2 bytes – Device Type of Device

The devicetype is listed in Netvox LoRaWAN Application Devicetype V3.0.doc

ReportType – 1 byte – the presention of the NetvoxPayLoadData, according to the devicetype

NetvoxPayLoadData – Var bytes (length based on the payload)

Tips

1. Battery Voltage

If the battery is equal to 0x00, it means that the device is powered by a DC power supply.

2. Version Packet

When Report Type = 0x00 is the version packet, such as 03010E000A0120250319, the firmware version is 2025.03.19.

3. Data Packet

When Report Type=0x01 is the data packet.

4. Signed Value

When the temperature is negative, 2's complement should be calculated.

Device	Device Type	Report Type	NetvoxPayLoadData						
R900PD01O1	0x010E	0x01	PH (2 Bytes) 0.01pH	Temperature withPH (Signed 2 Bytes, unit: 0.01°C)	NTU (2 Bytes) unit: 0.1ntu	Temperature withNTU (Signed 2 Bytes) unit: 0.01°C	Residual Chlorine (2 Bytes) unit: 0.01mg/L	ThresholdAlarm (2 Bytes) Bit0_LowPHAlarm Bit1_High PHAlarm Bit2_LowNTUAlarm Bit3_HighNTUAlarm Bit4_Low Residual Chlorine Alarm Bit5_High Residual Chlorine Alarm Bit6_LowTempWithPH Alarm Bit7_HighTempWithPH Alarm Bit8_LowTempWithNTU Alarm Bit9_HighTempWithNTU_Alarm Bit10-15: Reserved	ShockTamperAlarm (1 Byte) 0x00_NoAlarm 0x01_Alarm

Example of Uplink: **03010E0102A107E43DB008CA0000000000**

1st Byte (03): Version

2nd 3rd Byte (010E): DeviceType— R900PD01O1

4th (01): ReportType

5th – 6th Byte (02A1): pH – 8.73 02A1 (Hex) = 873 (Dec), 873* 0.01 = 8.73

7th – 8th Byte (07E4): TemperaturewithPH – 20.20°C 07E4 (Hex) = 2020 (Dec), 2020* 0.01* °C = 20.20°C

9th – 10th Byte (3DB0): NTU – 1579.2 NTU 3DB0 (Hex) = 15792 (Dec), 15792* 0. 1 NTU = 1579.2 NTU

11th – 12th Byte (08CA): TemperaturewithNTU – 22.50°C 08CA (Hex) = 2250 (Dec), 2250* 0.01°C = 22.50°C

13th – 14th Byte (0000): Residual Chlorine – 0 mg/L

15th – 16th Byte (0000): ThresholdAlarm –no alarm

17th Byte (00): ShockTamperAlarm –no alarm

5.2 Example of ConfigureCmd

FPort: 0x17

Bytes	1	2	Var (length based on the payload)
	CmdID	DeviceType	NetvoxPayLoadData

CmdID – 1 byte

DeviceType – 2 bytes – Device Type of Device

The devicetype is listed in Netvox LoRaWAN Application Devicetype3.0.doc

NetvoxPayLoadData – Var bytes (length based on the payload)

Description	Device	Cmd ID	Device Type	NetvoxPayLoadData					
ConfigReport Req	R900P D01O1	0x01	0x010E	MinTime (2 Bytes, unit: s)	MaxTime (2 Bytes, unit: s)	PHChange (2 Byte) unit: 0.01pH	NTUChange (2Byte) unit: 0.1NTU	Residual Chlorine Change (2 Bytes) unit: 0.01mg/L)	Temperature Change (2 Bytes, unit: 0.01°C)
ConfigReport Rsp		0x81		Status (0x00_success)					
ReadConfigReportReq		0x02							
ReadConfigReportRsp		0x82		MinTime (2 Bytes, unit: s)	MaxTime (2 Bytes, unit: s)	PHChange (2 Byte) unit: 0.01pH	NTUChange (2Byte) unit: 0.1NTU	Residual Chlorine Change (2 Bytes) unit: 0.01mg/L)	Temperature Change (2 Bytes, unit: 0.01°C)
SetShockSensorSensitivityReq		0x03		ShockSensorSensitivity (1 Byte)					
SetShockSensorSensitivityRsp		0x83		Status (0x00_success)					
GetShockSensorSensitivityReq		0x04							
GetShockSensorSensitivityRsp		0x84		ShockSensorSensitivity (1 Byte)					

ConfigDigital OutPutReq		0x05		DigitalOutPut Type (1 Byte) 0x00_NormallyLowLevel 0x01_NormallyHighLevel	OutPulseTime (1 Byte, unit: s)	BindAlarmSource (2 Bytes) Bit0_LowPHAlarm Bit1_High PHAlarm Bit2_LowNTUAlarm Bit3_HighNTUAlarm Bit4_Low Residual Chlorine Alarm Bit5_High Residual Chlorine Alarm Bit6_LowTempWithPH Alarm Bit7_HighTempWithPH Alarm Bit8_LowTempWithNTU Alarm Bit9_HighTempWithNTU_Alarm Bit10-15: Reserved	Channel (1 Byte) 0x00_Channel1 0x01_Channle2
ConfigDigital OutPutRsp		0x85		Status (0x00_success)			
Read ConfigDigital OutPutReq		0x06		Channel (1Byte) 0x00_Channel1 0x01_Channle2			
Read ConfigDigital OutPutRsp		0x86		DigitalOutPut Type (1 Byte) 0x00_Normally LowLevel 0x01_Normally HighLevel	OutPulseTime (1 Byte, unit: s)	BindAlarmSource (2 Bytes) Bit0_LowPHAlarm Bit1_High PHAlarm Bit2_LowNTUAlarm Bit3_HighNTUAlarm Bit4_Low Residual Chlorine Alarm Bit5_High Residual Chlorine Alarm Bit6_LowTempWithPH Alarm Bit7_HighTempWithPH Alarm Bit8_LowTempWithNTU Alarm Bit9_HighTempWithNTU_Alarm Bit10-15: Reserved	Channel (1 Byte) 0x00_Channel1 0x01_Channle2
TriggerDigital OutPutReq		0x07		OutPulseTime (1 Byte, unit: s)		Channel (1Byte) 0x00_Channel1 0x01_Channle2	
TriggerDigital OutPutRsp		0x87		Status (0x00_success)			

(1) Configure device parameters

MinTime = 0x003C (60s), MaxTime = 0x003C (60s),

PHChange = 0x0064 (1), NTUChange = 0x0064 (10 NTU), Residual Chlorine Change = 0x0064 (1mg/L)

TemperatureChange = 0x0064 (1°C)

Downlink: 01010E003C003C0064006400640064

Response: 81010E00 (configuration success)

81010E01 (configuration fail)

Read device parameters

Downlink: 02010E

Response: 82010E003C003C0064006400640064

(2) Configure ShockSensorSensitivity = 0x14 (20)

Downlink: 03010E14

Response: 83010E00 (configuration success)

83010E01 (configuration fail)

Note: ShockSensorSensitivity range = 0x01 to 0x14

0xFF (disables vibration sensor)

Read ShockSensorSensitivity

Downlink: 04010E

Response: 84010E14 (device's current parameters)

(3) Configure DigitalOutPutType = 0x00 (NormallyLowLevel),

OutPulseTime = 0xFF (disable pulse duration),

BindAlarmSource = 0x0200= 0010 0000 0000 (BIN) Bit9_HighTempWithNTU_Alarm =1

(when Bit9_HighTempWithNTU_Alarm is triggered, DO outputs signals)

Channel = 0x00_Channel1

Downlink: 05010E00FF020000

Response: 85010E00 (configuration success)

85010E01 (configuration fail)

Read DO parameters

Downlink: 06010E00

Response: 86010E00FF020000

Configure OutPulseTime = 0x0A (10 seconds)

Downlink: 07010E0A00

Response: 87010E00 (configuration success)

5.3 Example of SetSensorAlarmThresholdCmd

FPort: 0x10

CmdDescriptor	CmdID (1 Byte)	Payload (10 Bytes)			
SetSensorAlarmThresholdReq	0x01	Channel (1 Byte) 0x00_Channel1, 0x01_Chanel2, 0x02_Channel3, etc.	SensorType (1Byte) 0x00_Disable ALL, 0x01_Temperature, 0x1A_ PH, 0x1C_ NTU, 0x36_ Residual Chlorine	SensorHighThreshold (4 Bytes) unit: Temperature – 0.01°C pH – 0.01pH Turbidity – 0.1 NTU Residual Chlorine –0.01mg/L	SensorLowThreshold (4 Bytes) unit: Temperature – 0.01°C pH – 0.01pH Turbidity – 0.1 NTU Residual Chlorine –0.01mg/L
SetSensorAlarmThresholdRsp	0x81	Status (0x00_success)	Reserved (9 Bytes, Fixed 0x00)		
GetSensorAlarmThresholdReq	0x02	Channel (1 Byte) 0x00_Channel1, 0x01_Chanel2, 0x02_Channel3, etc.	SensorType (1Byte) 0x00_Disable ALL, 0x01_Temperature, 0x1A_ PH, 0x1C_ NTU, 0x36_ Residual Chlorine	Reserved (8 Bytes, Fixed 0x00)	
GetSensorAlarmThresholdRsp	0x82	Channel (1 Byte) 0x00_Channel1, 0x01_Chanel2, 0x02_Channel3, etc.	SensorType (1Byte) 0x00_Disable ALL, 0x01_Temperature, 0x1A_ PH, 0x1C_ NTU, 0x36_ Residual Chlorine	SensorHighThreshold (4 Bytes) unit: Temperature – 0.01°C pH – 0.01pH Turbidity – 0.1 NTU Residual Chlorine –0.01mg/L	SensorLowThreshold (4 Bytes) unit: Temperature – 0.01°C pH – 0.01pH Turbidity – 0.1 NTU Residual Chlorine –0.01mg/L

Note: a. Set SensorHigh/LowThreshold as 0xFFFFFFFF to disable threshold.

b. The last configuration will be saved when the device is reset to factory setting.

(1) Configure parameters

Channel = 0x00, SensorType = 0x36 (Residual Chlorine),

SensorHighThreshold = 0x000001F4 (5mg/L), SensorLowThreshold = 0x00000064 (1mg/L)

Downlink: 0100360000001F400000064

Response: 810000000000000000000000

(2) GetSensorAlarmThresholdReq

Downlink: 0200360000000000000000

Response: 820036000001F400000064

(3) Clear all thresholds (SensorType = 0x00)

Downlink: 0100000000000000000000

Response: 810000000000000000000

5.4 Example of GlobalCalibrateCmd

FPort: 0x0E

Description	Cmd ID	SensorType	PayLoad (Fix = 9 Bytes)				
SetGlobalCalibrateReq	0x01	0x01_Temperature Sensor 0x13_PH Sensor 0x3B_ ZSTurbidity 0x41_ Residual Chlorine Sensor	Channel (1 Byte) 0_Channel1 1_Channel2, etc.	Multiplier (2 Bytes, Unsigned)	Divisor (2 Bytes, Unsigned)	DeltValue (2 Bytes, Signed)	Reserved (2 Bytes, Fixed 0x00)
SetGlobalCalibrateRsp	0x81		Channel (1 Byte) 0_Channel1 1_Channel2, etc.	Status (1 Byte) 0x00_success)	Reserved (7 Bytes, Fixed 0x00)		
GetGlobalCalibrateReq	0x02		Channel (1 Byte) 0_Channel1 1_Channel2, etc.	Reserved (8 Bytes, Fixed 0x00)			
GetGlobalCalibrateRsp	0x82		Channel (1 Byte) 0_Channel1 1_Channel2, etc.	Multiplier (2 Bytes, Unsigned)	Divisor (2 Bytes, Unsigned)	DeltValue (2 Bytes, Signed)	Reserved (2 Bytes, Fixed 0x00)
ClearGlobalCalibrateReq	0x03	Reserved (10 Bytes, Fixed 0x00)					
ClearGlobalCalibrateRsp	0x83	Status (1 Byte, 0x00_success)	Reserved (9 Bytes, Fixed 0x00)				

0x01_Temperature Sensor; channel = 0x03 (PHtemperature) / 0x04 (ZTUtemperature)

0x13_PH Sensor; channel = 0x00

0x3B_ ZSTurbidity; channel = 0x01

0x41_ Residual Chlorine Sensor; channel = 0x02

(1) SetGlobalCalibrateReq

Calibrate residual chlorine sensor by increasing 1mg/L

Channel: 0x02 (channel3); Multiplier: 0x0001 (1); Divisor: 0x0001 (1); DeltValue: 0x0064 (100)

Downlink: 0141020001000100640000

Response: 8141020000000000000000 (configuration success)

8141020100000000000000 (configuration fail)

(2) Read parameters

Downlink: 0241020000000000000000

Response: 8241020001000100640000 (configuration success)

(3) ClearGlobalCalibrateReq

Downlink: 0300000000000000000000

Response: 8300000000000000000000

5.5 Example of NetvoxLoRaWANRejoin

Fport:0x20

Check if the device is connected to the network during RejoinCheckPeriod. If the device does not respond within the RejoinThreshold, it will be rejoied back to the network automatically.

CmdDescriptor	CmdID (1 Byte)	Payload (Var Bytes)						
SetNetvoxLoRaWANRejoinReq	0x01	RejoinCheckPeriod (4 Bytes, unit: 1s) 0x FFFFFFFF_DisableNetvoxRejoinFunction					RejoinThreshold (1 Byte)	
SetNetvoxLoRaWANRejoinRsp	0x81	Status (1 Byte) 0x00_success	Reserved (4 Bytes, Fixed 0x00)					
GetNetvoxLoRaWANRejoinReq	0x02	Reserved (5 Bytes, Fixed 0x00)						
GetNetvoxLoRaWANRejoinRsp	0x82	RejoinCheckPeriod (4 Bytes, unit: 1s) 0x FFFFFFFF_DisableNetvoxRejoinFunction					RejoinThreshold (1 Byte)	
SetNetvoxLoRaWANRejoinTimeReq	0x03	1st Rejoin Time (2 Bytes, unit:1 min)	2nd Rejoin Time (2 Bytes, unit: 1 min)	3rd Rejoin Time (2 Bytes, unit: 1 min)	4th Rejoin Time (2 Bytes, unit: 1 min)	5th Rejoin Time (2 Bytes, unit: 1 min)	6th Rejoin Time (2 Bytes, unit: 1 min)	7th Rejoin Time (2 Bytes, unit: 1 min)
SetNetvoxLoRaWANRejoinTimeRsp	0x83	Status (1 Byte) 0x00_success	Reserved (13 Bytes, Fixed 0x00)					
GetNetvoxLoRaWANRejoinTimeReq	0x04	Reserved (15 Bytes, Fixed 0x00)						
GetNetvoxLoRaWANRejoinTimeRsp	0x84	1st Rejoin Time (2 Bytes, unit:1 min)	2nd Rejoin Time (2 Bytes, unit: 1 min)	3rd Rejoin Time (2 Bytes, unit: 1 min)	4th Rejoin Time (2 Bytes, unit: 1 min)	5th Rejoin Time (2 Bytes, unit: 1 min)	6th Rejoin Time (2 Bytes, unit: 1 min)	7th Rejoin Time (2 Bytes, unit: 1 min)

Note:

a. Set RejoinCheckThreshold as 0xFFFFFFFF to stop the device from rejoining the network.

b. The last configuration would be kept when the device is factory reset.

c. Default setting:

RejoinCheckPeriod = 2 (hr) and RejoinThreshold = 3 (times)

1st Rejoin Time = 0x0001 (1 min), 2nd Rejoin Time = 0x0002 (2 mins), 3rd Rejoin Time = 0x0003 (3 mins),

4th Rejoin Time = 0x0004 (4 mins), 5th Rejoin Time = 0x003C (60 mins), 6th Rejoin Time = 0x0168 (360 mins),

7th Rejoin Time = 0x05A0 (1440 mins)

d. If device loses connection from network before data are reported, the data will be saved and reported every 30 seconds after the device is reconnected. Data will be reported based on the format of Payload + Unix timestamp. After all data are reported, the report time will be back to the normal setting.

(1) Command Configuration

Set RejoinCheckPeriod = 0x00000E10 (3600s), RejoinThreshold = 0x03 (3 times)

Downlink: 0100000E1003

Response: 810000000000 (Configuration success)

810100000000 (Configuration failure)

(2) Read RejoinCheckPeriod and RejoinThreshold

Downlink: 020000000000

Response: 8200000E1003

(3) Configure Rejoin Time

1st Rejoin Time = 0x0001 (1 min), 2nd Rejoin Time = 0x0002 (2 mins), 3rd Rejoin Time = 0x0003 (3 mins),

4th Rejoin Time = 0x0004 (4 mins), 5th Rejoin Time = 0x0005 (5 mins), 6th Rejoin Time = 0x0006 (6 mins),

7th Rejoin Time = 0x0007 (7 mins)

Downlink: 0300010002000300040005000600 07

Response: 830000000000000000000000000000 (Configuration success)

830100000000000000000000000000 (Configuration failure)

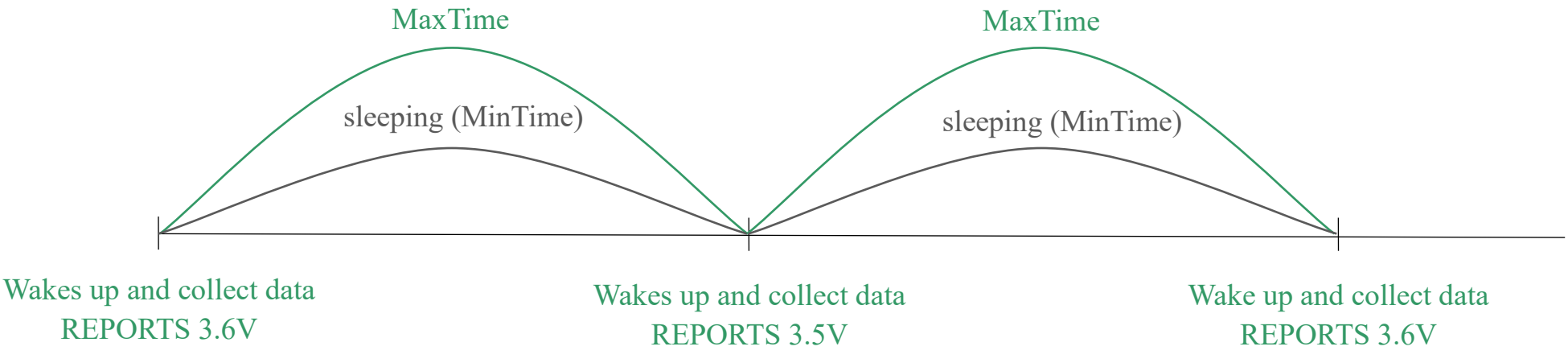
(4) Read Rejoin Time parameter

Downlink: 040000000000000000000000000000

Response: 840001000200030004000500060007

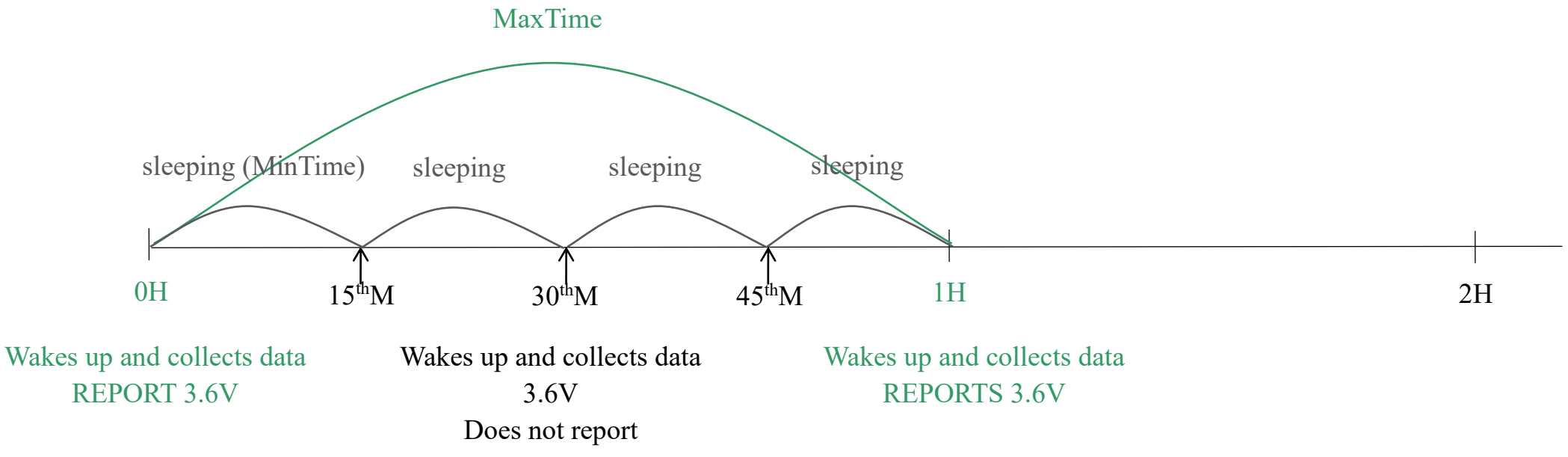
5.6 Example for MinTime/MaxTime logic

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

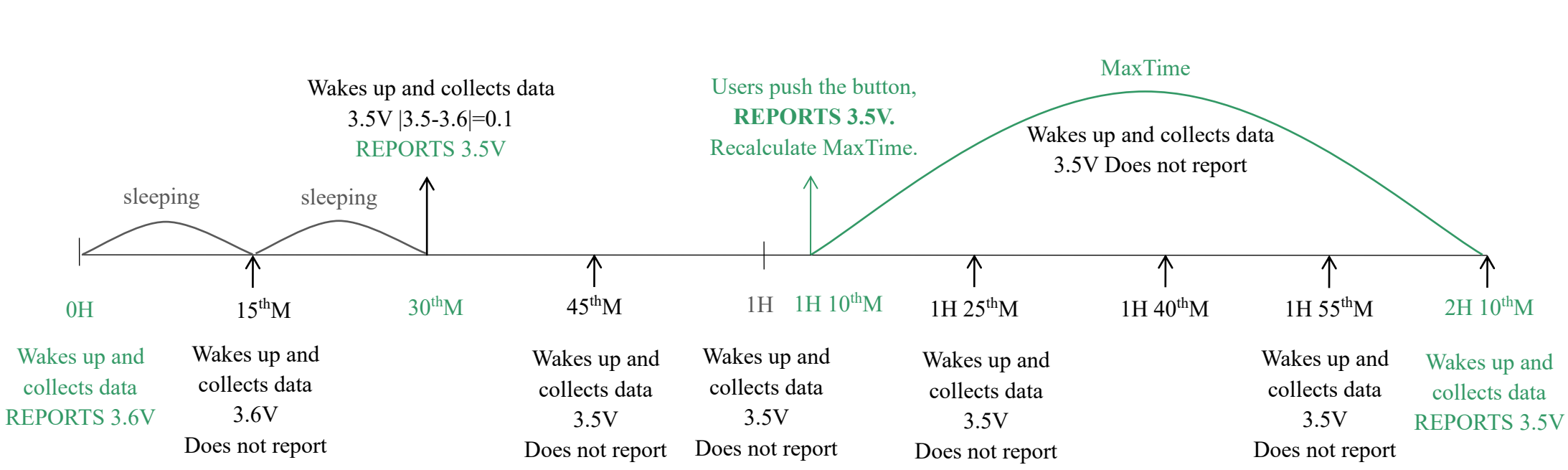


Note: MaxTime = MinTime. Data will only be reported according to MaxTime (MinTime) duration regardless BatteryVoltageChange value.

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:

a. The device only wakes up and performs data sampling according to MinTime Interval. When it is sleeping, it does not collect data.

b. 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.

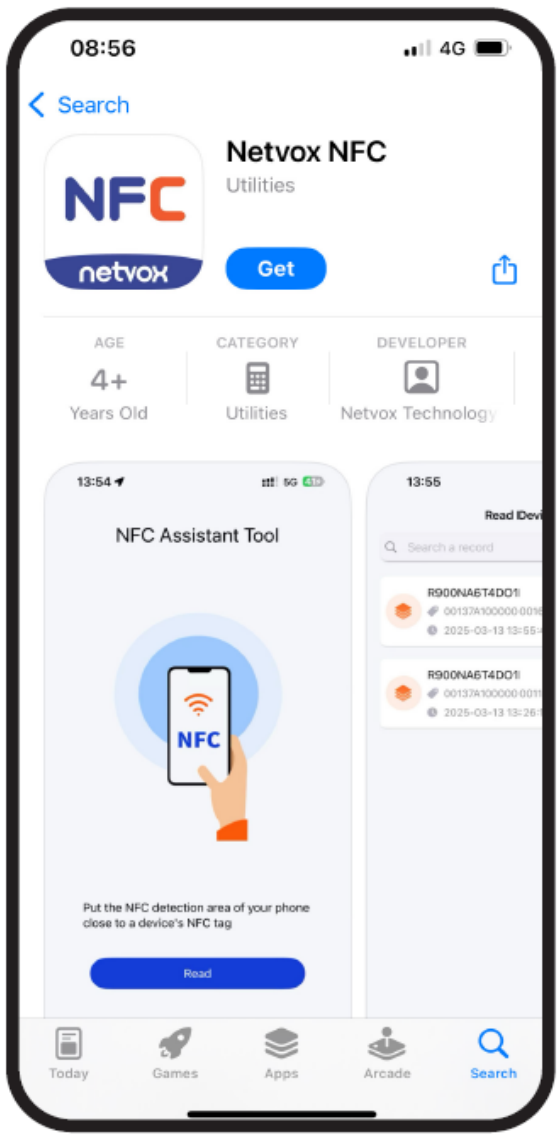
c. We do not recommend setting the MinTime Interval value too low. If the MinTime Interval is too low, the device wakes up frequently and the battery will be drained soon.

d. 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. Read R900 Data on NFC App

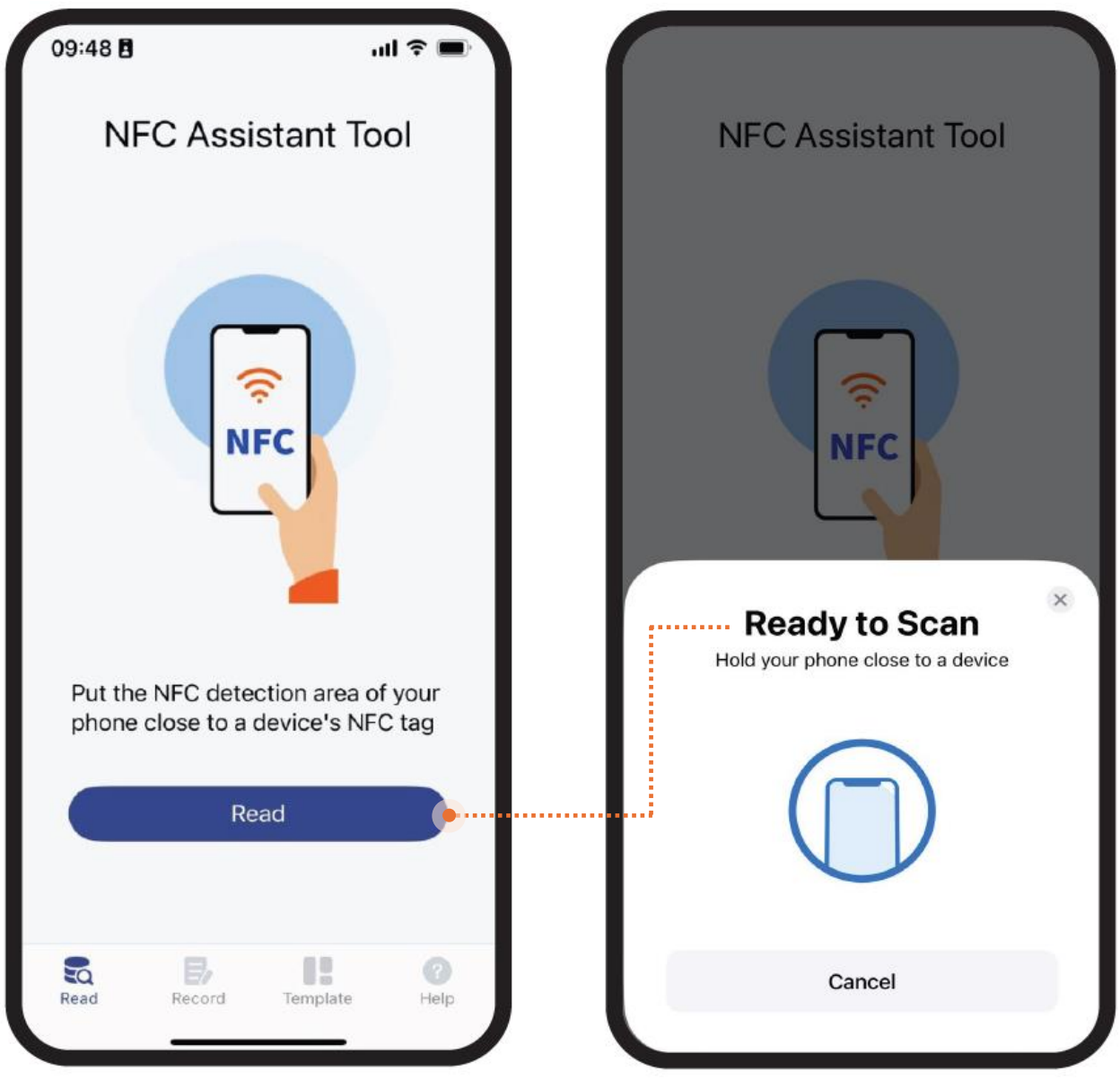
(1) Download Netvox NFC app.

Please make sure your phone supports NFC.

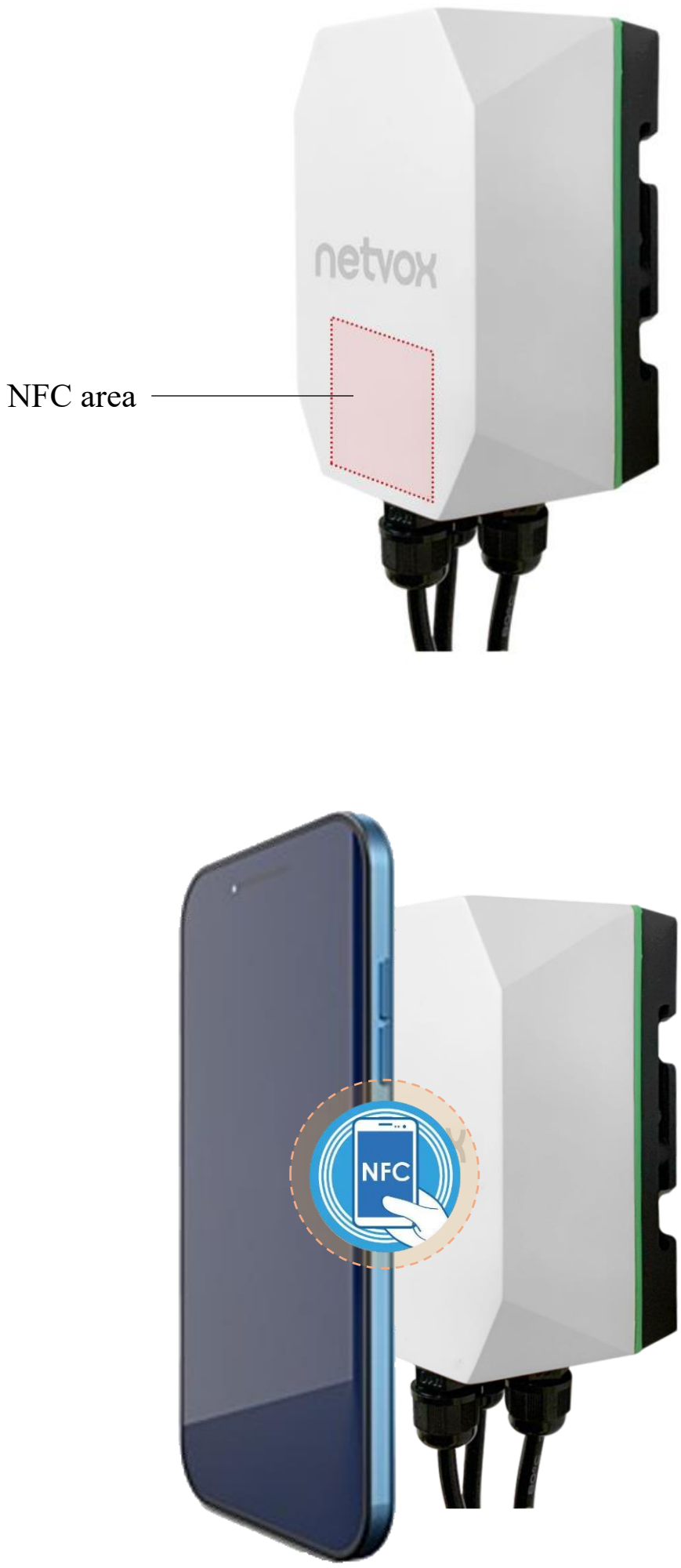


(2) Enable NFC in Settings and find your phone’s NFC area.

Open the app and click Read.

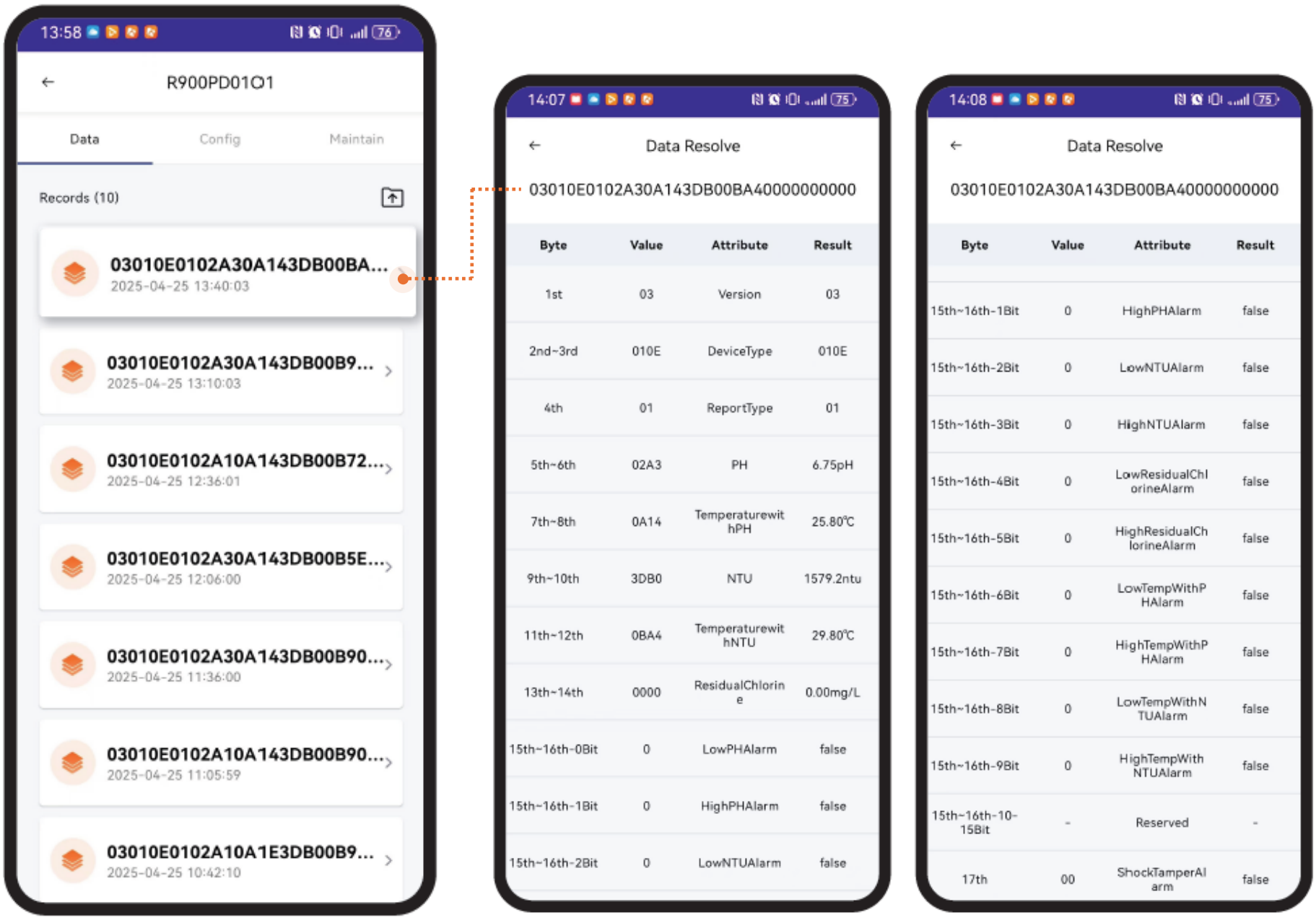


(3) Hold your phone near R900’s NFC tag.



(4) After R900 is successfully read, the latest 10 data will be displayed.

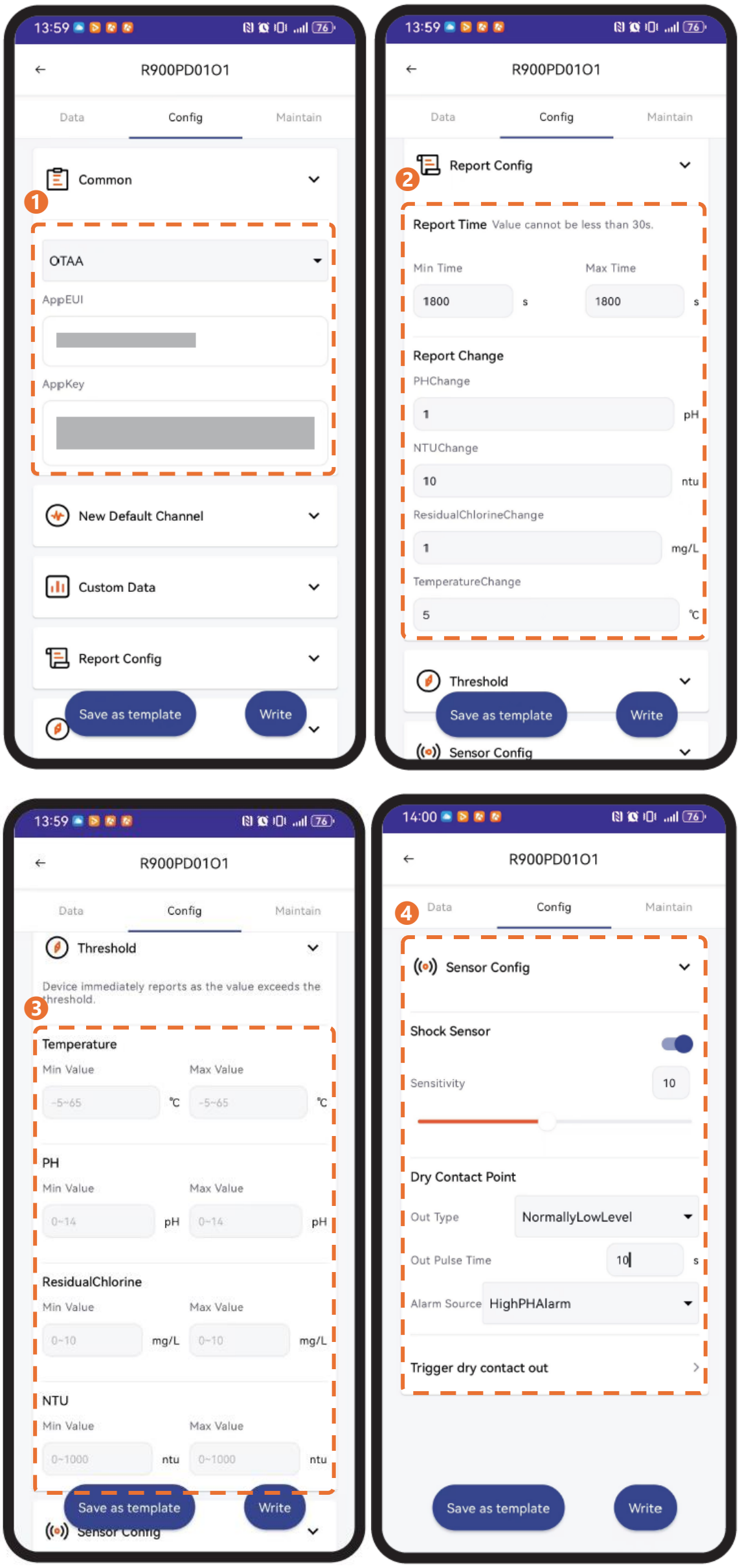
Select a data and go to the Data processing.



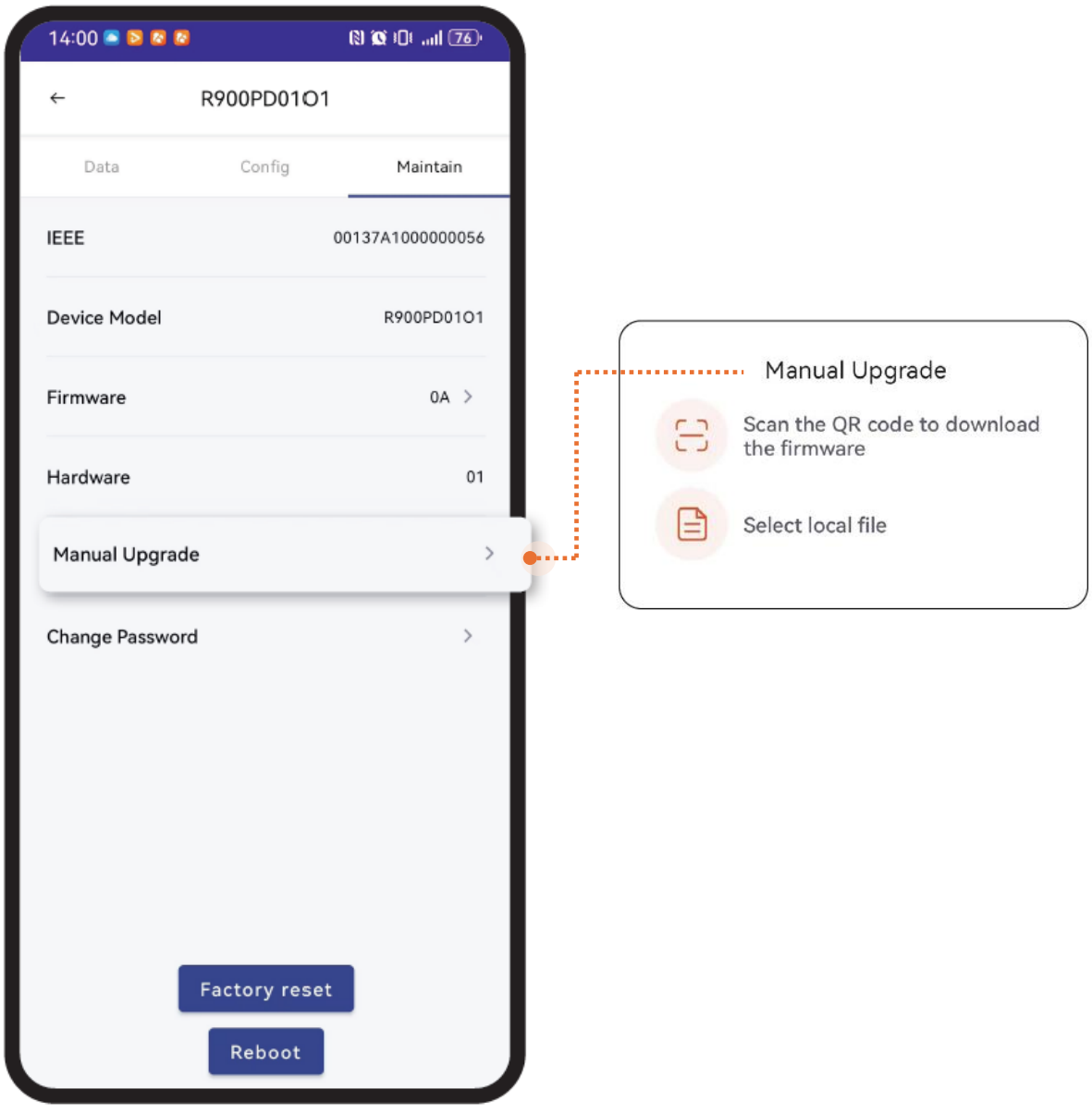
(5) Click Config to edit R900's settings, including network connection, report configuration, threshold, and sensor parameters.

Note: a. To configure device parameters, users need to enter password: 12345678 (default).

b. Password can be changed on the app and reset to default when R900 is factory reset.



(6) Click Maintain to check R900PD01O1’s info and available upgrade.

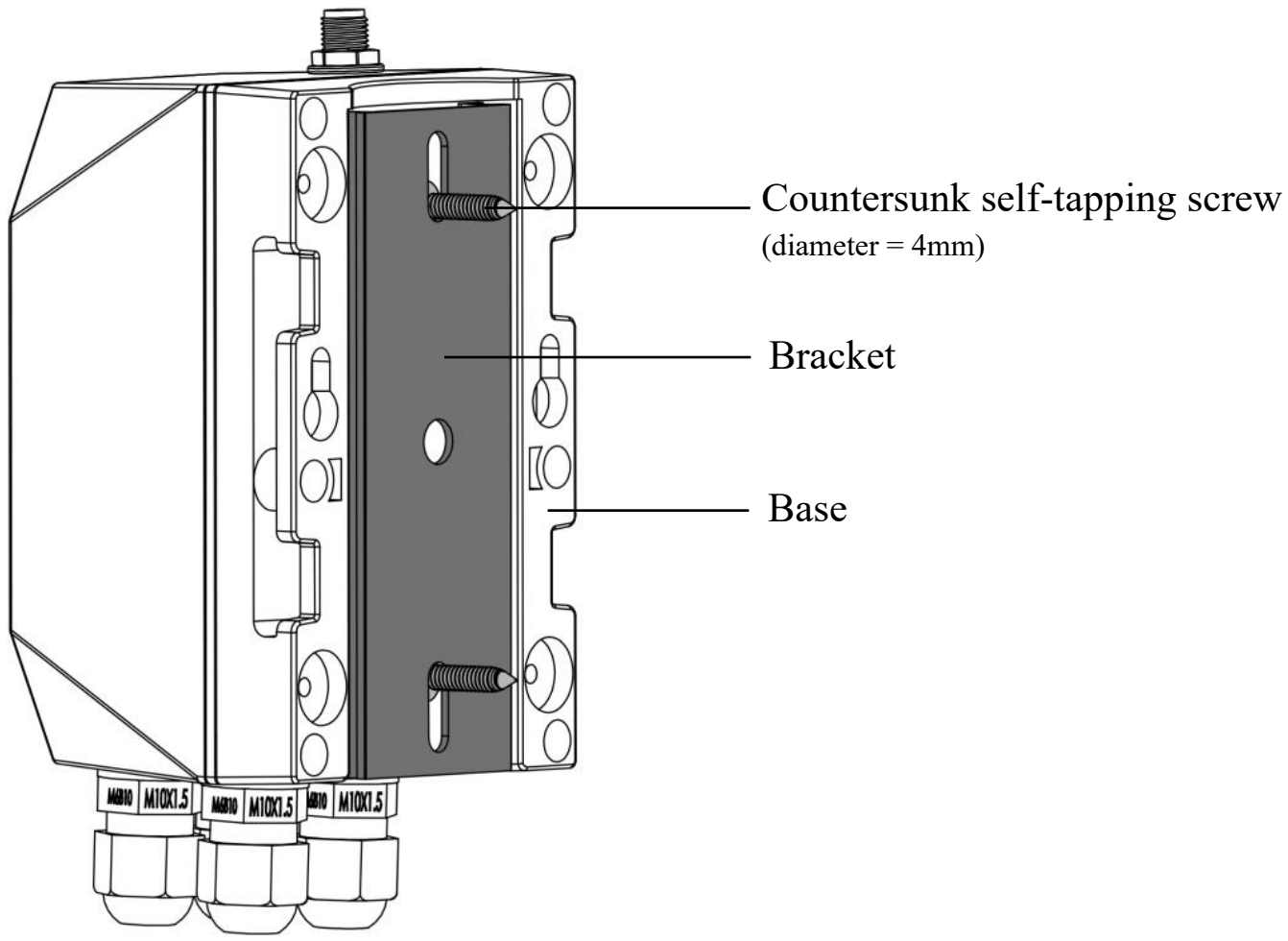


7. Installation

R900

- Standard

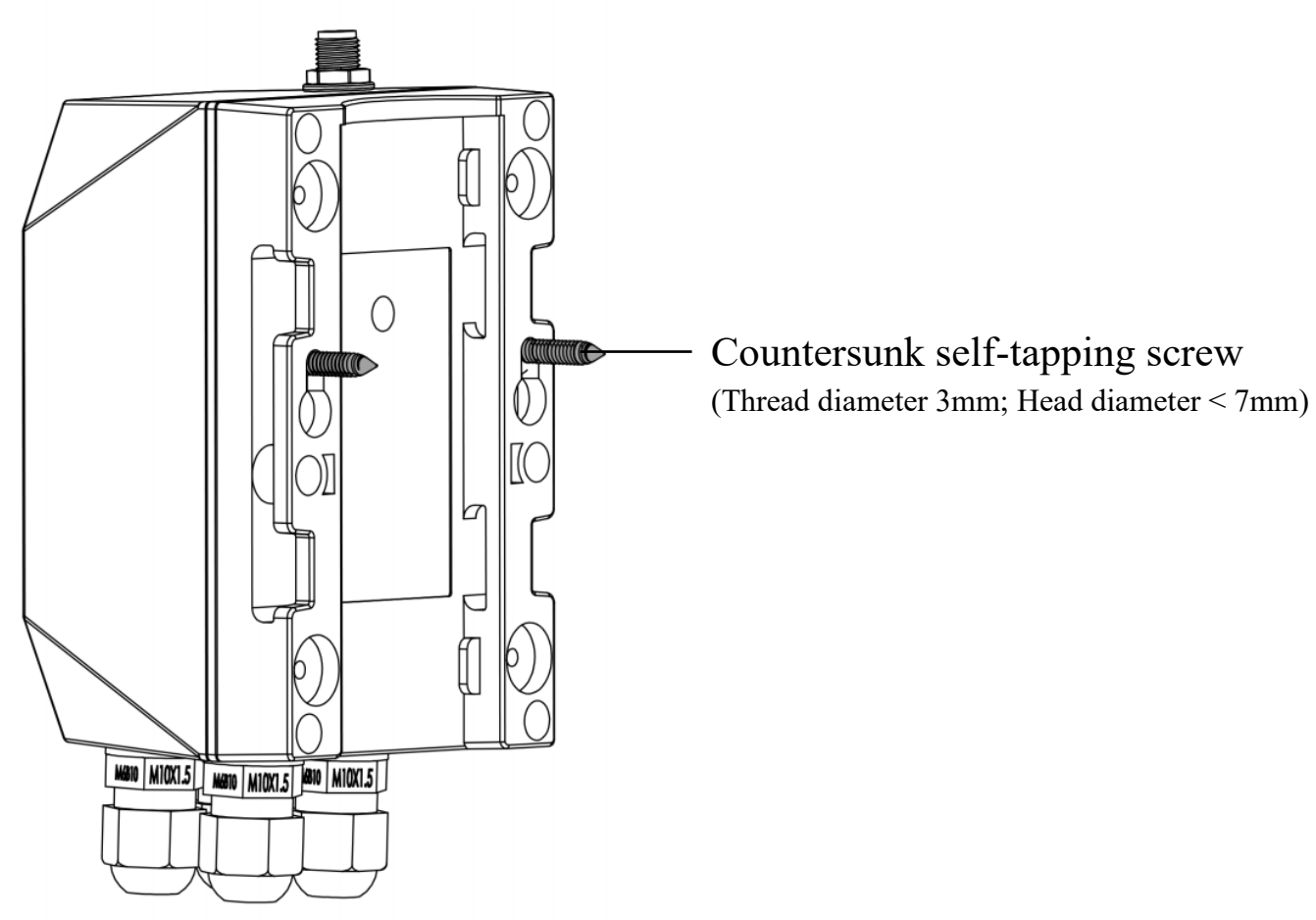
(1) Screws + Bracket



❶ Mount the bracket on a surface with 2 counter self-tapping screws.

❷ Hold R900 and slide down to connect the base and bracket.

(2) Screws



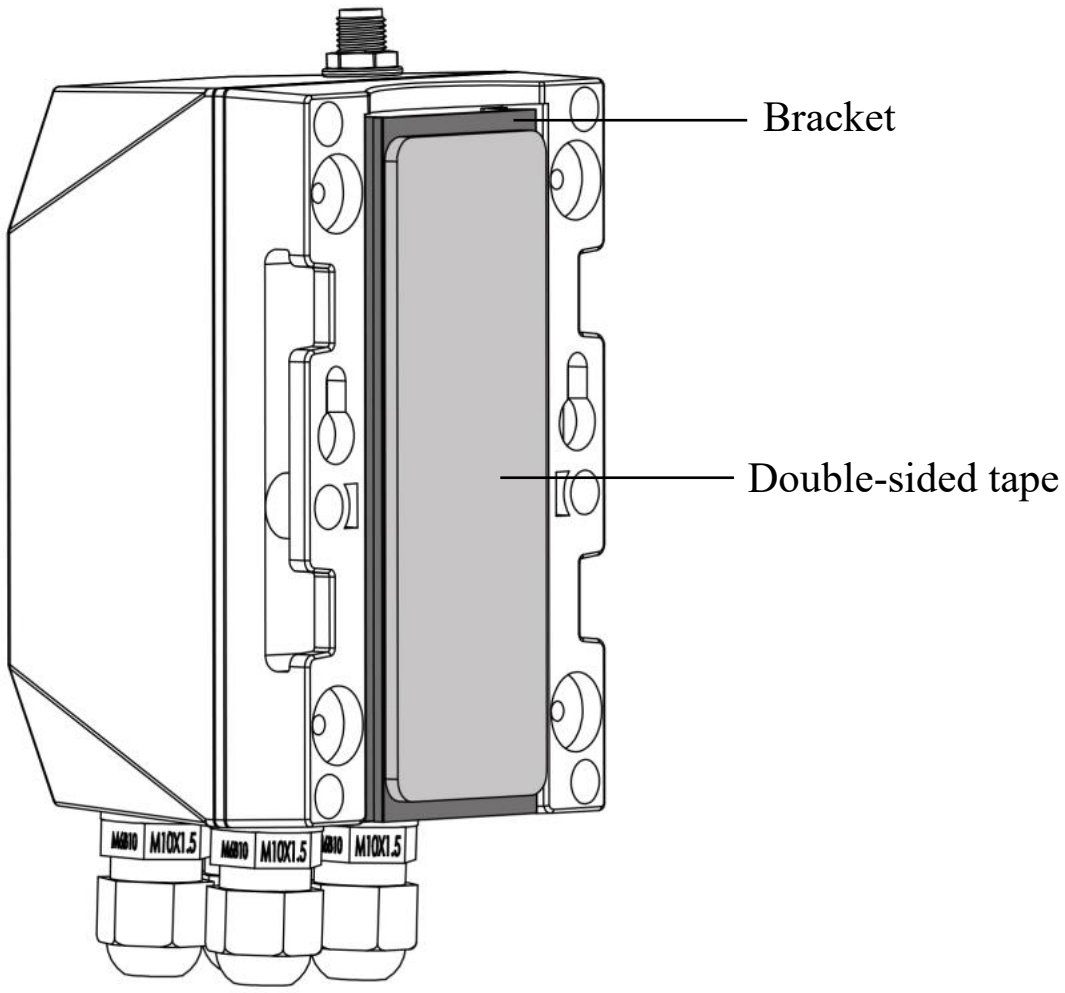
❶ Mount 2 countersunk self-tapping screws or expansion bolts on the wall.

The distance between the two screws should be 48.5mm. The gap between the bottom of the screw head and the wall should be 3mm.

❷ After the screws are mounted, align the holes of the base with the screws.

❸ Move R900 down to clamp it.

(3) Double-Sided Tape



❶ Stick the double-sided tape on the bracket.

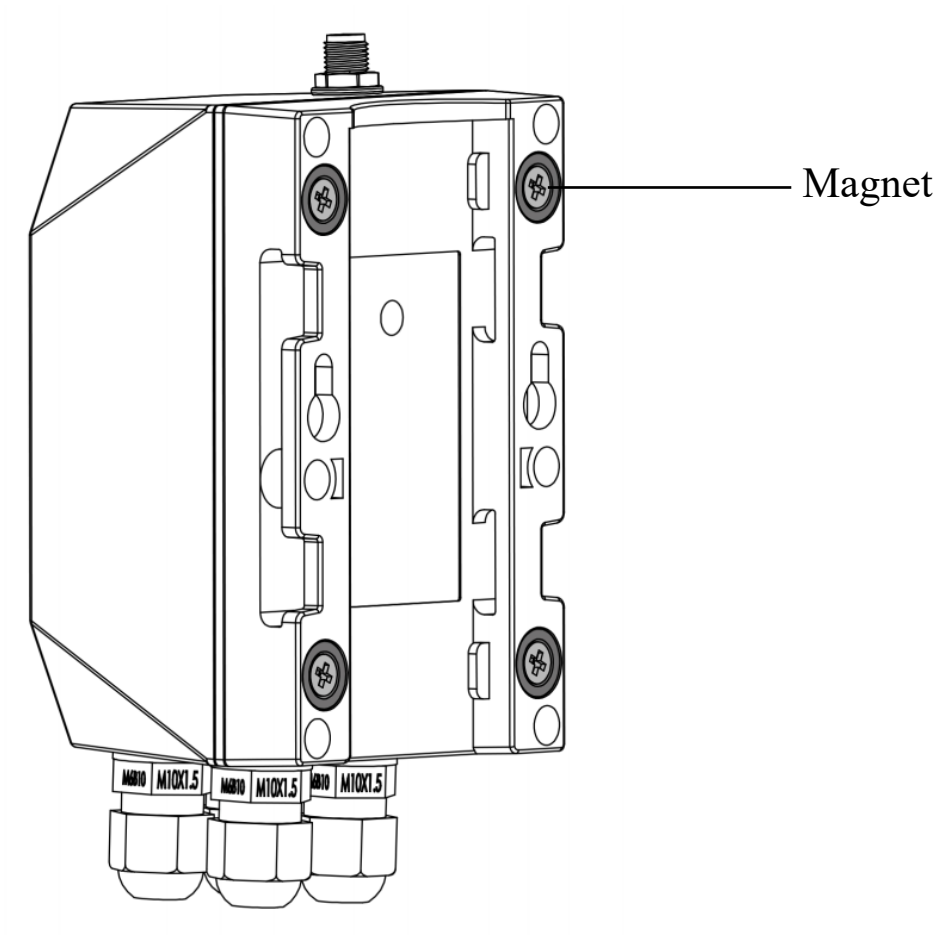
❷ Peel the liner and fix R900 on the surface.

❸ Press to ensure R900 is firmly installed.

Note: Please make sure the surface is clean and dry before applying double-sided tape.

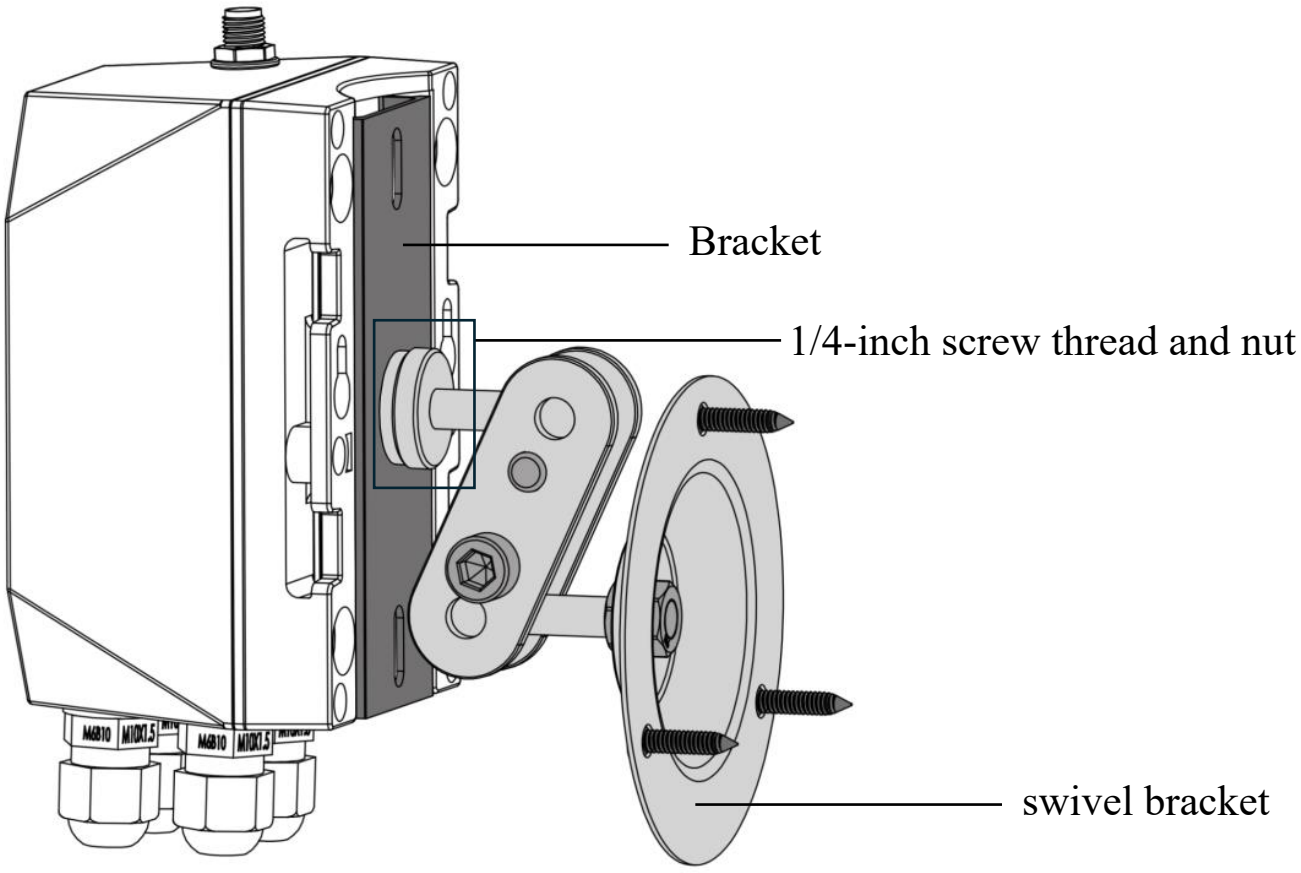
- Optional

(1) Magnet



❶ Fix the R900 on a metal surface.

(2) Swivel Bracket



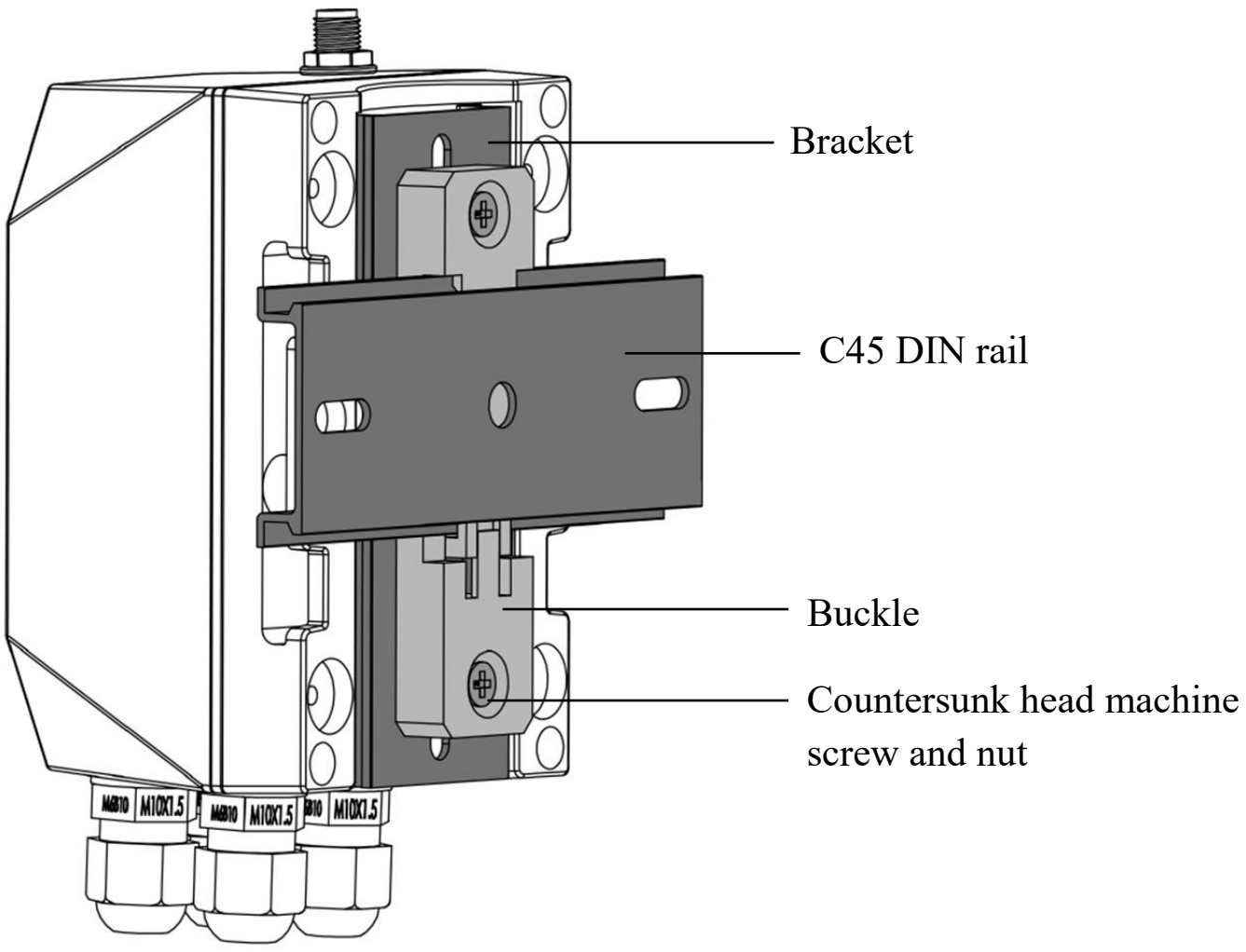
❶ Insert a 1/4-inch screw thread into the hole of the bracket.

❷ Tighten the thread with a nut.

❸ Mount the swivel bracket with self-tapping screws and expansion bolts.

❹ Hold R900 and slide down to connect the base and bracket.

(3) DIN Rail



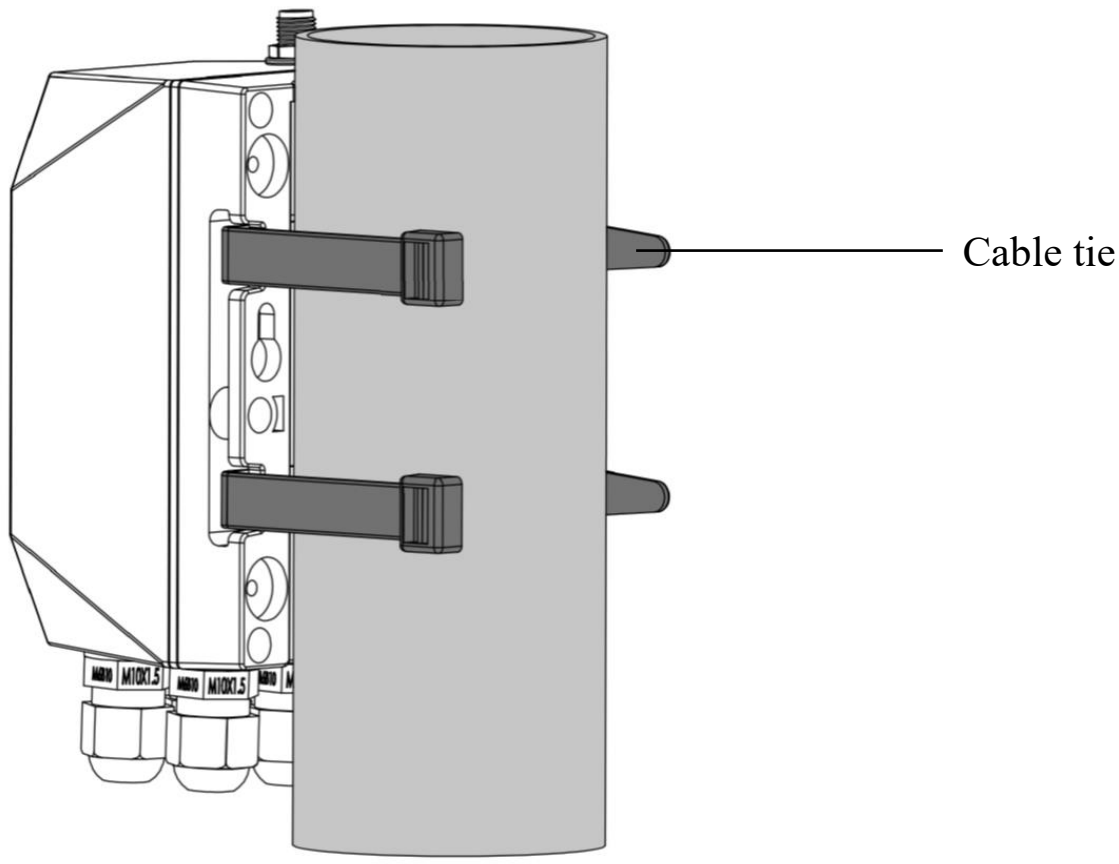
❶ Mount the rail buckle onto R900’s bracket with countersunk head machine screws and nuts.

❷ Snap the buckle onto the DIN rail.

❸ Hold R900 and slide down to connect the base and bracket.

- Prepared by customers

(1) Cable Tie



❶ Insert cable ties through the holes of the base.

❷ Insert the pointed end through the slot.

❸ Tighten the cable ties and make sure R900 is fixed firmly around a column.

pH / Turbidity / Residual Chlorine Sensor Installation

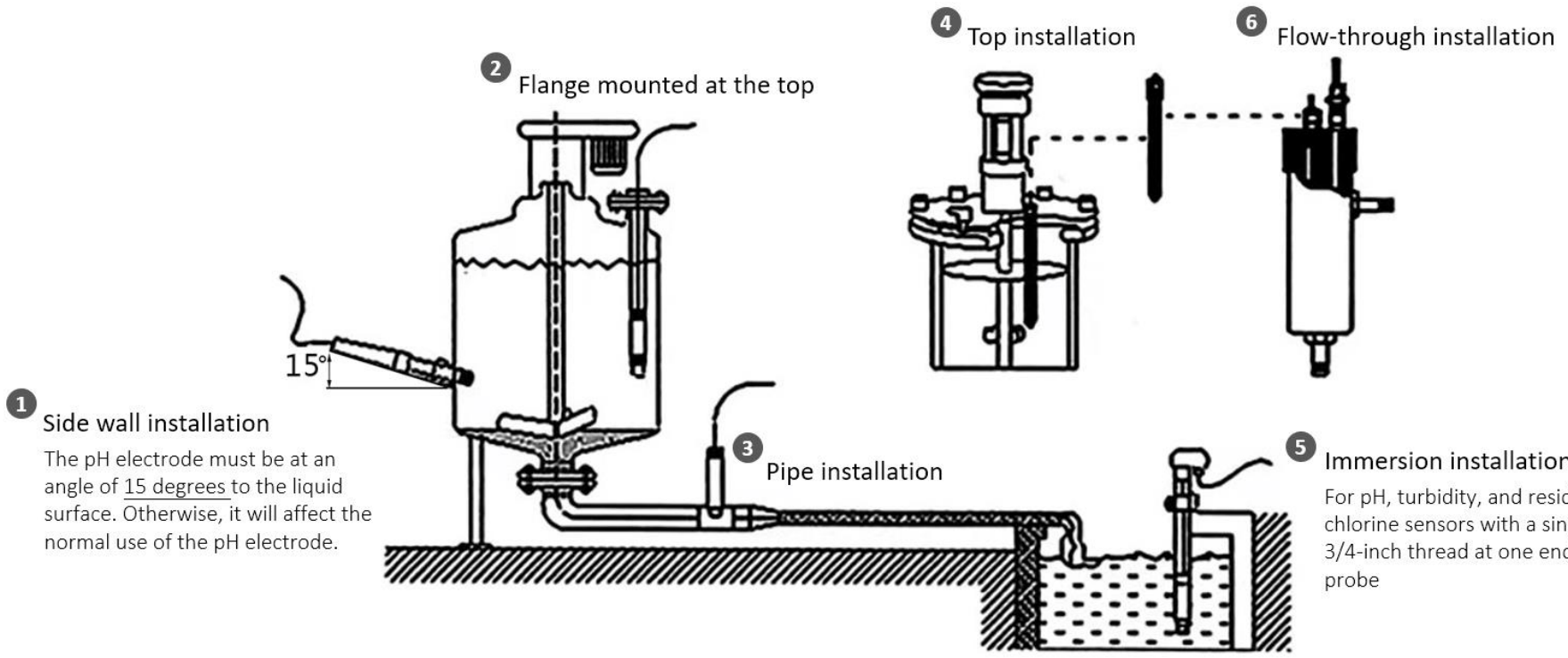
- Remove the protective cap from the front end of the device before use.

▼ pH sensor

▼ Turbidity sensor

▼ Residual chlorine sensor

- Except for the turbidity sensor, both pH and residual chlorine sensors have NPT 3/4 threads on both ends of the probe. They support the installation method shown in the picture below.
- Immersion Installation: The residual chlorine sensor's cable should pass through the waterproof bracket. The 3/4 thread on the top of the sensor should be connected to the 3/4 thread on the waterproof bracket using thread seal tape.
- Pipeline Installation: Connect the 3/4 thread at the bottom of the residual chlorine transmitter to the pipeline.



Cautions:

1. The transmitter should be installed in an area with steady water flow and no bubbles and debris, to avoid significant measurement errors and potential damage to the device.
2. If the device malfunctions, do not try to open or repair it yourself. Contact the manufacturer as soon as possible.
3. Please do not use this device in corrosive liquids or liquids containing organic solvents.
4. During installation and use, make sure the cables are not pulled or placed under tension.

Maintenance

pH sensor

- Before using the pH sensor, please clean it with distilled water (or deionized water), and dry it with filter paper to prevent impurities from entering the liquid to be tested. After cleaning, dip 1/3 of the sensor into a liquid.
- Please clean the sensor when it's not in use. Insert it in a protective case or a container with 3.5 mol/L potassium chloride solution.
- Please 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 oil.
- For an aging sensor, its glass membrane may become translucent or have sediments, which can be washed with dilute hydrochloric acid and rinsed with water.

When the calibration and measurement cannot be performed after the sensor is maintained based on the instructions, please replace the electrode.

Turbidity Sensor

- External Surface of The Sensor:

  Use tap water to clean the external surface of the sensor. If there are still debris remaining, wipe it with a soft moistened cloth. For some stubborn dirt, users can add some household detergent to the tap water to clean it.
- Check the Cable of The Sensor:

  The cable should not be taut during normal operation; otherwise, the internal wires of the cable may break, and the sensor cannot work normally.
- Check whether the measuring part of the sensor is dirty and whether the cleaning brush is normal.

Note: a. The probe contains sensitive optical components and electronic components. Make sure that the probe is not subject to severe impact. The components inside the probe do not need to be maintained by the user.

b. The black plastic cap of the turbidity sensor must be removed before testing as the figure below; otherwise, it will affect the measurement.

c. Install the turbidity sensor 5cm away from the wall and 10cm away from the bottom. Please disregard the readings when the sensor is not immersed in water.

Residual Chlorine Sensor

The sensor generally does not require daily maintenance. In there is a noticeable malfunction, do not attempt to disassemble or repair it yourself. Please contact us as soon as possible.

- After using the sensor, please rinse the head thoroughly with clean water and cover it with the protective cap.
- If dirt or mineral deposits accumulate on the electrode membrane, it may reduce sensitivity and affect measurement results. Please ensure the platinum ring area remains clean.
- If the platinum ring appears rough or covered with contaminants after measurement, please clean it using the following methods (for reference):

  A. Inorganic contamination: Soak the electrode in 0.1 mol/L dilute hydrochloric acid for 15 minutes. Gently wipe the platinum ring with a cotton swab, then rinse with tap water.

  B. Organic or oil-based contamination: Soak the electrode in tap water containing a small amount of detergent (e.g., dishwashing liquid). Thoroughly clean the sensor's sensing surface. Gently wipe the platinum ring with a cotton swab, then rinse with tap water.
- If an oxide film has formed on the platinum ring, polish the sensing surface gently using toothpaste or 1000-grit fine sandpaper, then rinse with tap water. The platinum ring is connected to glass, so please handle it carefully during polishing.
- The electrode typically has a service life of about one year. Please replace it if it's ageing.

8. Important Maintenance Instructions

Kindly pay attention to the following 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 a dusty or dirty environment. It might damage its detachable parts and electronic components.
- Do not store the device under extremely hot conditions. High temperatures 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, moisture that forms inside the device will damage 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 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 operating properly, please take it to the nearest authorized service facility for repair