# Wireless Current Sensor
## with 6 x Clamp-On CT, 4 x NTC Temperature Sensor and 1 x Digital Output

## R900NAB Series User Manual

# Contents

# 1. Introduction

R900NAB series is a wireless current sensor that has 6 clamp-on current transformers (CT), 4 point-contact NTC thermistors, 1 digital output, 1 light sensor, and a built-in vibration sensor. In addition to these powerful functions, the R900NAB series supports configuration and firmware upgrade through Netvox NFC App. Just hold your phone near the device. Data reading, device settings, everything you need can all be done on the app.

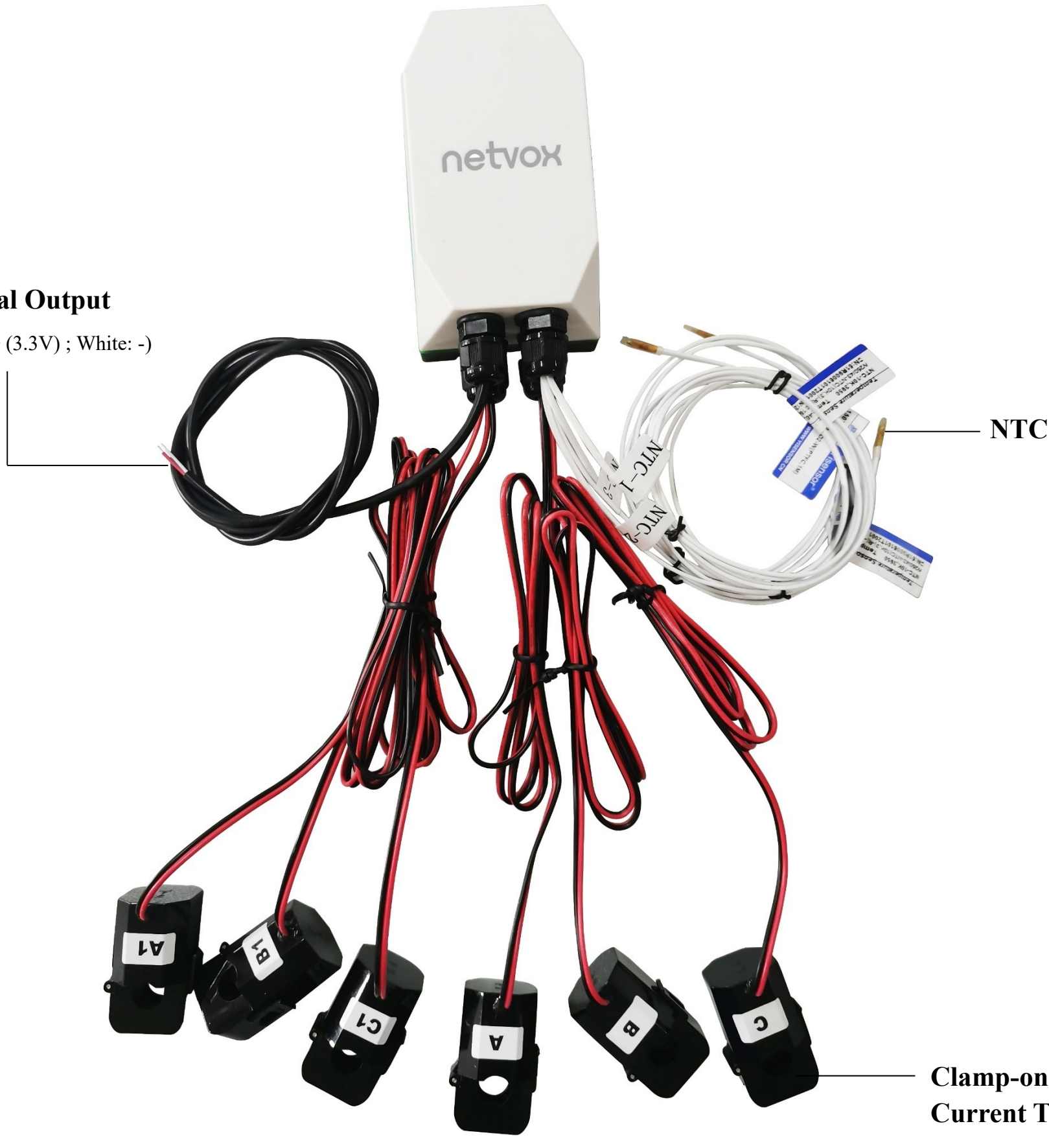
**LoRa Wireless Technology**

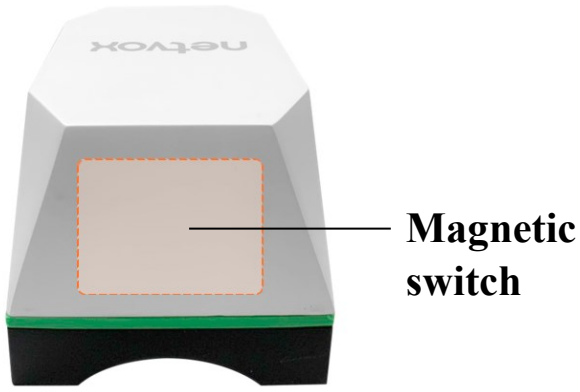
LoRa is a wireless communication technology famous for its long-distance transmission and low power consumption. Compared with other communication methods, LoRa spread spectrum modulation technique greatly extends the communication distance. It can be widely used in any case that requires long-distance 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



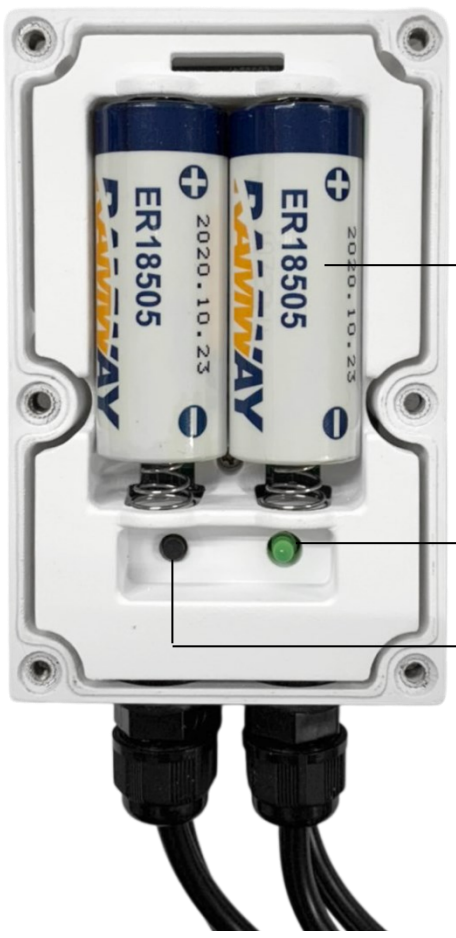




Top


Bottom

Left Side

Back




**Battery**

★ also support ER14505 battery with battery converter case

## 3. Features

- Equipped with multiple kinds of sensors
  (Up to 6* clamp-on CTs + up to 4* NTC thermistor + 1* digital output + 1* light sensor +1* built-in vibration sensor)
- CT cable (detachable/undetachable), measurement range (75/150/250A…), phase (single / 3-phase) can be personalized based on user's need
- Only for AC detection
- Support NFC. Configure and upgrade firmware on Netvox NFC app
- Store up to 10000 data
- Report when device disconnects from the network
- Output digital signal based on the threshold of current and temperature
- Support magnetic switch to turn on/off and factory reset device
- Powered by 2* 3.6V ER18505 batteries (also support ER14505 batteries with battery converter case)
- Up to 7 installation methods for different kinds of scenarios
- Main unit: IP53; Sensor: IP30
- LoRaWAN™ Class A 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
- Low power consumption and longer battery life

Note: Battery life is determined by the sensor reporting frequency and other variables, please visit http://www.netvox.com.tw/electric/electric_calc.html for battery life and calculation.

# 4. Setup Instructions

## On / Off

| | |
|---|---|
| Power on | Insert 2* 3.6V ER18505 batteries. |
| Power off | Remove the batteries. |

Function key

| | |
|---|---|
| Turn on | Press and hold the function key for 3 seconds until the green indicator flashes once. |
| Turn off | Step 1. Press and hold the function key for 5 seconds until the green indicator flashes once.<br>Step 2. Release the function key and short press it in 5 seconds.<br>Step 3. The green indicator flashes 5 times. R900 turns off. |
| Factory reset | Step 1. Press and hold the function key for 10 seconds. The green indicator flashes once every 5 seconds.<br>Step 2. Release the function key and short press it in 5 seconds.<br>Step 3. The green indicator flashes 20 times. R900 is factory reset and off. |

Magnetic switch

| | |
|---|---|
| Turn on | Hold a magnet near R900 for 3 seconds until the green indicator flashes once. |
| Turn off | Step 1. Hold a magnet close to R900 for 5 seconds. The green indicator flashes once.<br>Step 2. Remove the magnet and get close to R900 in 5 seconds.<br>Step 3. The green indicator flashes 5 times. R900 turns off. |
| Factory reset | Step 1. Hold a magnet close to R900 for 10 seconds. The green indicator flashes once every 5 seconds.<br>Step 2. Remove the magnet and get close to R900 in 5 seconds.<br>Step 3. The green indicator flashes 20 times. R900 is factory reset and off. |

Note:
a. Remove and insert the battery; the device is off by default.
b. 5 seconds after powering on, the device will be in engineering test mode.
c. The on/off interval should be about 10 seconds to avoid the interference of capacitor inductance and other energy storage components.
d. After the batteries are removed, the device can still operate for a while until the power supported by the supercapacitor runs out.

## Join a Network

| | |
|---|---|
| First time joining the network | Turn on the device to search the network.<br>The green indicator stays on for 5 seconds: Success<br>The green indicator remains off: Fail |
| Had joined the network before<br>(Device is not factory reset.) | Turn on the device to search the network.<br>The green indicator stays on for 5 seconds: Success<br>The green indicator remains off: Fail |
| Fail to join the network | (1) Please turn off the device and remove the batteries to save power.<br>(2) Please check the device verification information on the gateway or consult your platform server provider. |

Function key

| | |
|---|---|
| Short press | Device is in the network<br>The green indicator flashes once. 6 seconds after sampling is completed, the device reports a data packet.<br><br>Device is not in the network<br>The green indicator remains off. |

Note: The function key does not work during sampling.

Magnetic switch

| | |
|---|---|
| Move magnet close to the switch and remove it | Device is in the network<br>The green indicator flashes once. 6 seconds after sampling is completed, the device reports a data packet.<br><br>Device is not in the network<br>The green indicator remains off. |

## Sleep Mode

| | |
|---|---|
| The device is on<br>and in the network. | Sleeping period: Min Interval.<br>When the reportchange exceeds the setting value or the state changes: send a data report based on the Min Interval. |

## Low Voltage Alarm

| | |
|---|---|
| Low voltage | 3.3V |

# 5. Data Report

30 seconds after the device is powered on, it will send a version packet and data including CT's current value and NTC's temperature.

**Default setting:**

Min Interval = 0x0E10 (3600s)

Max Interval = 0x0E10 (3600s) // should not be less than 30 seconds

CurrentChange= 0x0064 (100 mA)

TemperatureChange = 0x001E (3°C)

**Current Transformer Measurement Range and Accuracy:**

| | **75A** | **150A** | **250A** | **630A** | **1000A** | **3000A** |
|---|---|---|---|---|---|---|
| Measurement Range | 100mA – 75A | 1A – 150A | 1A – 250A | 5A – 630A | 10A – 1000A | 150A – 3000A |
| Accuracy | ±1% (300mA–75A) | ±1% | | | | |

Note: a. Current transformer reports 0A when the current < 1A.

b. If no configuration is done, the device sends data based on the default settings.

c. 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 (The above is in hexadecimal. To use decimal, please convert it to port 22.)

| Bytes | 1 | 2 | 1 | Var (length according to the payload) |
|---|---|---|---|---|
| | Version | DeviceType | ReportType | NetvoxPayLoadData |

**Version** – 1 byte – 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 the devicetype

**NetvoxPayLoadData** – Var bytes (length according to the payload)

**Tips**

**1. Battery Voltage**

The voltage value is bit 0 – bit 6, bit 7=0 is normal voltage, and bit 7=1 is low voltage.

Battery=0xA1, binary= 1010 0001, if bit 7= 1, it means low voltage.

The actual voltage is 0010 0001 = 0x21 = 33, 33*0.1v =3.3v.

**2. Version Packet**

When Report Type = 0x00 is the version packet, such as 030105000A0320250115, the firmware version is 2025.01.15.

**3. Data Packet**

When Report Type=0x01 is the data packet.

| Device | Device Type | Report Type | NeyvoxPayLoadData | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| R900NAB6T4<br>R900NAB6T4DO<br>R900NAB6T1O<br>R900NAB3T1O | 0x0104<br>0x0105<br>0x010C<br>0x010D | 0x01 | Battery (1 Byte, unit: 0.1v) | Current1 (3 Bytes, unit: mA) | Current2 (3 Bytes, unit: mA) | Current3 (3 Bytes, unit: mA) | Current4 (3 Bytes, unit: mA) | Current5 (3 Bytes, unit: mA) | Current6 (3 Bytes, unit: mA) | Temperature 1 (2 Bytes, unit: 0.1℃) | Temperature 2 (2 Bytes, unit: 0.1℃) | Temperature 3 (2 Bytes, unit: 0.1℃) | Temperature 4 (2 Bytes, unit: 0.1℃) | ThresholdAlarm (3 Byte)<br>Bit0:LowCurrent1Alarm<br>Bit1:HighCurrent1Alarm<br>Bit2:LowCurrent2Alarm<br>Bit3:HighCurrent2Alarm<br>Bit4:LowCurrent3Alarm<br>Bit5:HighCurrent3Alarm<br>Bit6:LowCurrent4Alarm<br>Bit7:HighCurrent4Alarm<br>Bit8:LowCurrent5Alarm<br>Bit9:HighCurrent5Alarm<br>Bit10:LowCurrent6Alarm<br>Bit11:HighCurrent6Alarm<br>Bit12:LowTemp1Alarm<br>Bit13:HightTemp1Alarm<br>Bit14:LowTemp2Alarm<br>Bit15:HightTemp2Alarm<br>Bit16:LowTemp3Alarm<br>Bit17:HightTemp3Alarm<br>Bit18:LowTemp4Alarm<br>Bit19:HightTemp4Alarm<br>Bit20_23: Reserved | ShockTamper Alarm (1 Byte, 0x00_NoAlarm, 0x01_Alarm) |

Example of Uplink: **0301050122000000000000000000000000000000000000DC00DC00DD00DF00000000**

1st Byte (03): Version

2nd 3rd Byte (0105): DeviceType－ R900NAB6T4DO

4th (01): ReportType

5th Byte (22): Battery－3.4V　22 (Hex) = 34 (Dec), 34* 0.1v = 3.4V

6th – 8th Byte (0000000): Current1－0mA　000000 (Hex) = 0 (Dec), 0* 1mA = 0mA

9th – 11th Byte (0000000): Current2－0mA　000000 (Hex) = 0 (Dec), 0* 1mA = 0mA

12th – 14th Byte (0000000): Current3－0mA　000000 (Hex) = 0 (Dec), 0* 1mA = 0mA

15th – 17th Byte (0000000): Current4－0mA　000000 (Hex) = 0 (Dec), 0* 1mA = 0mA

18th – 20th Byte (0000000): Current5－0mA　000000 (Hex) = 0 (Dec), 0* 1mA = 0mA

21th – 23th Byte (0000000): Current6－0mA　000000 (Hex) = 0 (Dec), 0* 1mA = 0mA

24th – 25th Byte (00DC): Temperature1－22.0°C　00DC (Hex) = 220 (Dec), 220* 0.1°C = 22.0°C

26th – 27th Byte (00DC): Temperature2－22.0°C　00DC (Hex) = 220 (Dec), 220* 0.1°C = 22.0°C

28th – 29th Byte (00DD): Temperature3－22.1°C　00DD (Hex) = 221 (Dec), 221* 0.1°C = 22.1°C

30th – 31th Byte (00DF): Temperature4－22.3°C　00DF (Hex) = 223 (Dec), 223* 0.1°C = 22.3°C

32th – 34th Byte (000000): ThresholdAlarm－no alarm

35th Byte (00): ShockTamperAlarm －no alarm

Note: Current and Temperature reports 0xFFFFFF or 0xFFFF when no sensor is connected. For example, Current4, 5, and 6 report 0xFFFFFF when R900 only has 3 CTs connected.

## 5.2 Example of ConfigureCmd

FPort: 0x17 (The above is in hexadecimal. To use decimal, please convert it to port 23.)

| Bytes | 1 | 2 | Var (length according to 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 Var bytes (length according to the payload)

| Description | Device | CmdID | Device Type | NetvoxPayLoadData | | | |
|---|---|---|---|---|---|---|---|
| ConfigReport Req | R900NAB 6T4<br>R900NAB 6T4DO<br>R900NAB 6T1O<br>R900NAB 3T1O | 0x01 | 0x0104<br>0x0105<br>0x010C<br>0x010D | MinTime (2 Bytes, unit: s) | MaxTime (2 Bytes, unit: s) | CurrentChange (2 Bytes, unit: 1mA) | TemperatureChange (2 Bytes, unit: 0.1°C) |
| ConfigReport Rsp | | 0x81 | | Status (0x00_success) | | | |
| ReadConfig ReportReq | | 0x02 | | | | | |
| ReadConfig ReportRsp | | 0x82 | | MinTime (2 Bytes, unit: s) | MaxTime (2 Bytes, unit: s) | CurrentChange (2 Bytes, unit: 1mA) | TemperatureChange (2 Bytes, unit: 0.1°C) |
| SetShock Sensor Sensitivity Req | | 0x03 | | ShockSensorSensitivity (1 Byte) | | | |
| SetShock Sensor Sensitivity Rsp | | 0x83 | | Status (0x00_success) | | | |
| GetShock Sensor Sensitivity Req | | 0x04 | | | | | |
| GetShock Sensor Sensitivity Rsp | | 0x84 | | ShockSensorSensitivity (1 Byte) | | | |
| ConfigDigital OutPutReq | | 0x05 | | DigitalOutPutType (1 Byte) 0x00_NormallyLowLevel, 0x01_NormallyHighLevel | OutPulseTime (1 Byte, unit: s) | BindAlarmSource (3 Bytes) Bit0_LowCurrent1Alarm, Bit1_High Current1Alarm, Bit2_LowCurrent2Alarm, | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | Bit3_High Current2Alarm,<br>Bit4_LowCurrent3Alarm,<br>Bit5_High Current3Alarm,<br>Bit6_LowCurrent4Alarm,<br>Bit7_High Current4Alarm,<br>Bit8_LowCurrent5Alarm,<br>Bit9_High Current5Alarm,<br>Bit10_LowCurrent6Alarm,<br>Bit11_High Current6Alarm,<br>Bit12_LowTemp1Alarm,<br>Bit13_HightTemp1Alarm,<br>Bit14_LowTemp2Alarm,<br>Bit15_HightTemp2Alarm,<br>Bit16_LowTemp3Alarm,<br>Bit17_HightTemp3Alarm,<br>Bit18_LowTemp4Alarm,<br>Bit19_HightTemp4Alarm,<br>Bit20-23: Reserved |
| ConfigDigital OutPutRsp | | 0x85 | | Status (0x00_success) | | |
| Read ConfigDigital OutPutReq | | 0x06 | | | | |
| Read ConfigDigital OutPutRsp | | 0x86 | | DigitalOutPutType<br>(1 Byte)<br>0x00_NormallyLowLevel,<br>0x01_NormallyHighLevel | OutPulseTime<br>(1 Byte,<br>unit: s) | BindAlarmSource<br>(3 Bytes)<br>Bit0_LowCurrent1Alarm,<br>Bit1_High Current1Alarm,<br>Bit2_LowCurrent2Alarm,<br>Bit3_High Current2Alarm,<br>Bit4_LowCurrent3Alarm,<br>Bit5_High Current3Alarm,<br>Bit6_LowCurrent4Alarm,<br>Bit7_High Current4Alarm,<br>Bit8_LowCurrent5Alarm,<br>Bit9_High Current5Alarm,<br>Bit10_LowCurrent6Alarm,<br>Bit11_High Current6Alarm,<br>Bit12_LowTemp1Alarm,<br>Bit13_HightTemp1Alarm,<br>Bit14_LowTemp2Alarm,<br>Bit15_HightTemp2Alarm,<br>Bit16_LowTemp3Alarm,<br>Bit17_HightTemp3Alarm,<br>Bit18_LowTemp4Alarm,<br>Bit19_HightTemp4Alarm, |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | Bit20-23: Reserved) |
| TriggerDigital OutPutReq | | 0x07 | | OutPulseTime (1 Byte, unit: s) | | |
| TriggerDigital OutPutRsp | | 0x87 | | Status (0x00_success) | | |

(1) Configure device parameters

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

CurrentChange = 0x0064 (100mA), TemperatureChange = 0x001E (3°C)

Downlink: 010105003C003C0064001E

Response: 81010500 (configuration success)

81010501 (configuration fail)

Read device parameters

Downlink: 020105

Response: 820105003C003C0064001E

(2) Configure ShockSensorSensitivity = 0x14 (20)

Downlink: 03010514

Response: 83010500 (configuration success)

83010501 (configuration fail)

Note: ShockSensorSensitivity range = 0x01 to 0x14

0xFF (disables vibration sensor)

Read ShockSensorSensitivity

Downlink: 040105

Response: 84010514 (device's current parameters)

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

OutPulseTime = 0xFF (disable pulse duration),

BindAlarmSource = 0x002000 = 0010 0000 0000 0000 (BIN)  Bit13_HightTemp1Alarm = 1

(when HightTemp1Alarm is triggered, DO outputs signals)

Downlink: 05010500FF002000

Response: 85010500 (configuration success)

85010501 (configuration fail)

Read DO parameters

Downlink: 060105

Response: 86010500FF002000

### 5.3 Example of SetSensorAlarmThresholdCmd

FPort: 0x10 (The above is in hexadecimal. To use decimal, please convert it to port 16.)

| CmdDescriptor | CmdID (1 Byte) | Payload (10 Bytes) | | | |
|---|---|---|---|---|---|
| SetSensorAlarmThresholdReq | 0x01 | Channel (1 Byte) 0x00_Channel1, 0x01_Chanel2, 0x02_Channel3, etc. | SensorType (1 Byte) 0x00_Disable ALL 0x01_Temperature 0x27_ Current | SensorHighThreshold (4 Bytes) unit: Current – 1mA Temperature – 0.1˚C | SensorLowThreshold (4 Bytes) unit: Current – 1mA Temperature – 0.1˚C |
| SetSensorAlarmThresholdRsp | 0x81 | Status (0x00_success) | Reserved (9 Bytes, Fixed 0x00) | | |
| GetSensorAlarmThresholdReq | 0x02 | Channel (1 Byte) 0x00_Channel1, 0x01_Chanel2, 0x02_Channel3, etc. | SensorType (1 Byte) 0x00_Disable ALL 0x01_Temperature 0x27_ Current | Reserved (8 Bytes, Fixed 0x00) | |
| GetSensorAlarmThresholdRsp | 0x82 | Channel (1Byte) 0x00_Channel1, 0x01_Chanel2, 0x02_Channel3, etc. | SensorType (1 Byte) 0x00_Disable ALL 0x01_Temperature 0x27_ Current | SensorHighThreshold (4 Bytes) unit: Current – 1mA Temperature – 0.1˚C | SensorLowThreshold (4 Bytes) unit: Current – 1mA Temperature – 0.1˚C |

Note:

a. Current Channel: 0x00 – 0x05; SensorType: 0x27

Temperature Channel: 0x00 – 0x03; SensorType: 0x01

b. Set SensorHigh/LowThreshold as 0xFFFFFFFF to disable threshold.

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

(1) Configure parameters

Channel = 0x00, SensorType = 0x27 (Current),

SensorHighThreshold = 0x000003E8 (1000mA), SensorLowThreshold = 0x00000064 (100mA)

Downlink: 010027000003E800000064

Response: 810000000000000000000 (configuration success)

810100000000000000000 (configuration fail)

(2) Read parameters

Downlink: 020027000000000000000

Response: 820027000003E800000064 (device’s current parameters)

(3) Configure parameters

Channel = 0x00, SensorType = 0x01 (Temperature),

SensorHighThreshold = 0x000003E8 (100°C), SensorLowThreshold = 0x00000064 (10°C)

Downlink: 010027000003E800000064

Response: 810000000000000000000 (configuration success)

810100000000000000000 (configuration fail)

(4) Read parameters

Downlink: 020001000000000000000

Response: 820001000003E800000064 (device's current parameters)

## 5.4 Example of GlobalCalibrateCmd

Fport: 0x0E

| Description | Cmd ID | SensorType | PayLoad (Fix =9 Bytes) | | | | |
|---|---|---|---|---|---|---|---|
| SetGlobalCalibrate Req | 0x01 | 0x01_Temperature 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) |
| SetGlobalCalibrate Rsp | 0x81 | | Channel (1 Byte) 0_Channel1 1_Channel2, etc. | Status (1 Byte) 0x00_success) | Reserved (7 Bytes, Fixed 0x00) | | |
| GetGlobalCalibrate Req | 0x02 | | Channel (1 Byte) 0_Channel1 1_Channel2, etc. | Reserved (8 Bytes, Fixed 0x00) | | | |
| GetGlobalCalibrate Rsp | 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) |

SensorType: 0x01_Temperature Sensor; Channel: 0x00 – 0x03

(1) SetGlobalCalibrateReq

Calibrate temperature sensor by increasing 10°C

Channel: 0x00 (channel1); Multiplier: 0x0001 (1); Divisor: 0x0001 (1); DeltValue: 0x0064 (100)

Downlink: 0101000001000000640000

Response: 8101000000000000000000 (configuration success)

8101000100000000000000 (configuration fail)

(2) Read parameters

Downlink: 0201000000000000000000

Response: 8201000001000000640000 (configuration success)

## 5.5 Example of NetvoxLoRaWANRejoin

Fport:0x20 (The above is in hexadecimal. To use decimal, please convert it to port 32.)

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 (5 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)

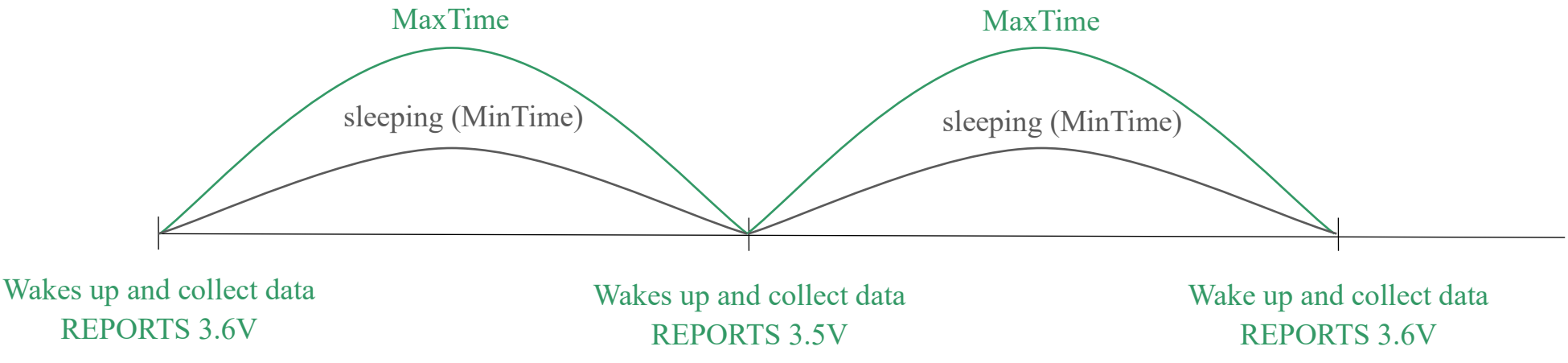
(4) Read Rejoin Time parameter

Downlink: 040000000000000000000000000000

Response: 840001000200030004000500060007

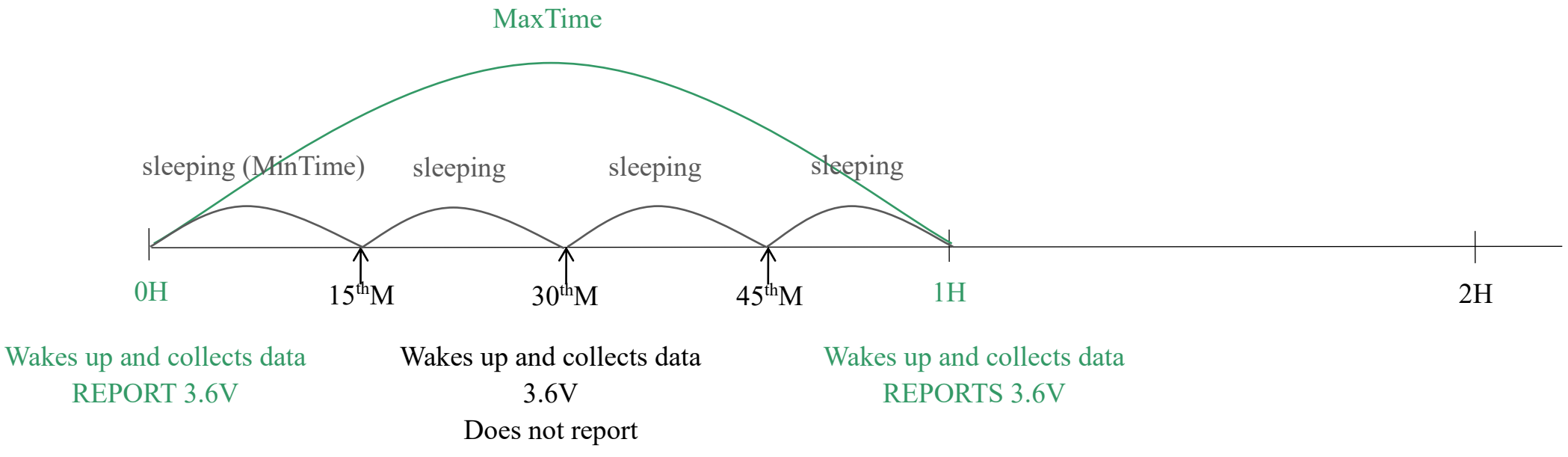
## 5.6 Example for MinTime/MaxTime logic

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

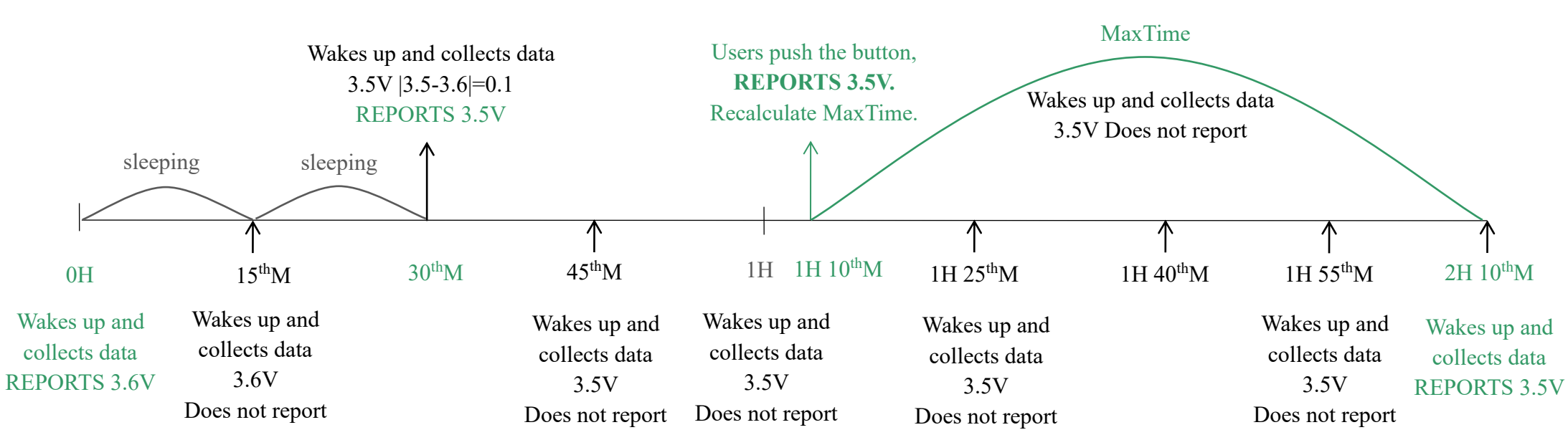



Note: MaxTime = MinTime. Data will only be reported according to MaxTime (MinTime) duration regardless BatteryVoltageChange value.

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.

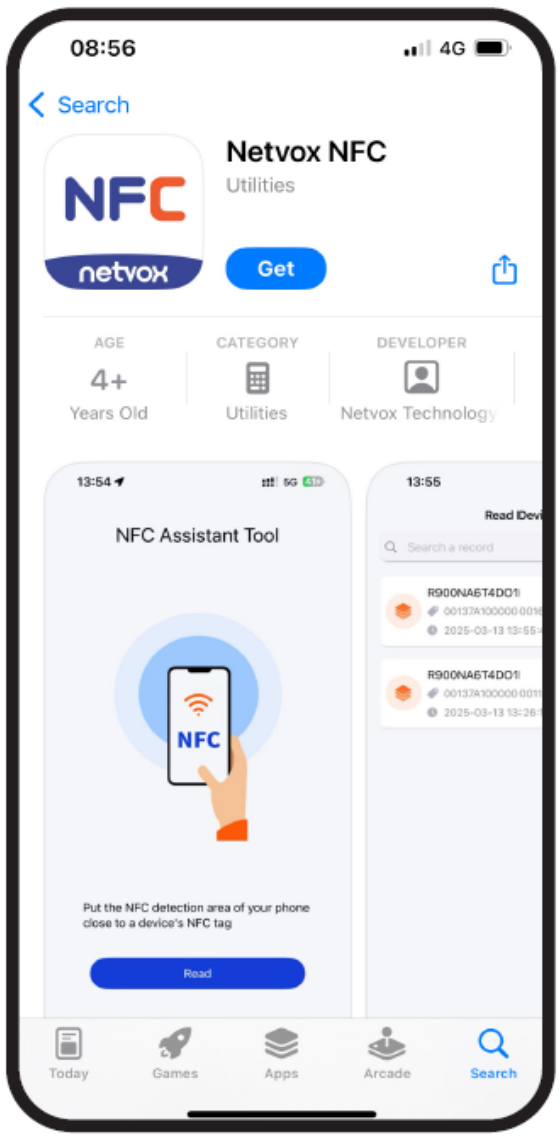
c. We do not recommend setting the MinTime Interval value too low. If the MinTime Interval is too low, the device wakes up frequently and the battery will be drained soon.

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 R900NAB's Data on NFC App

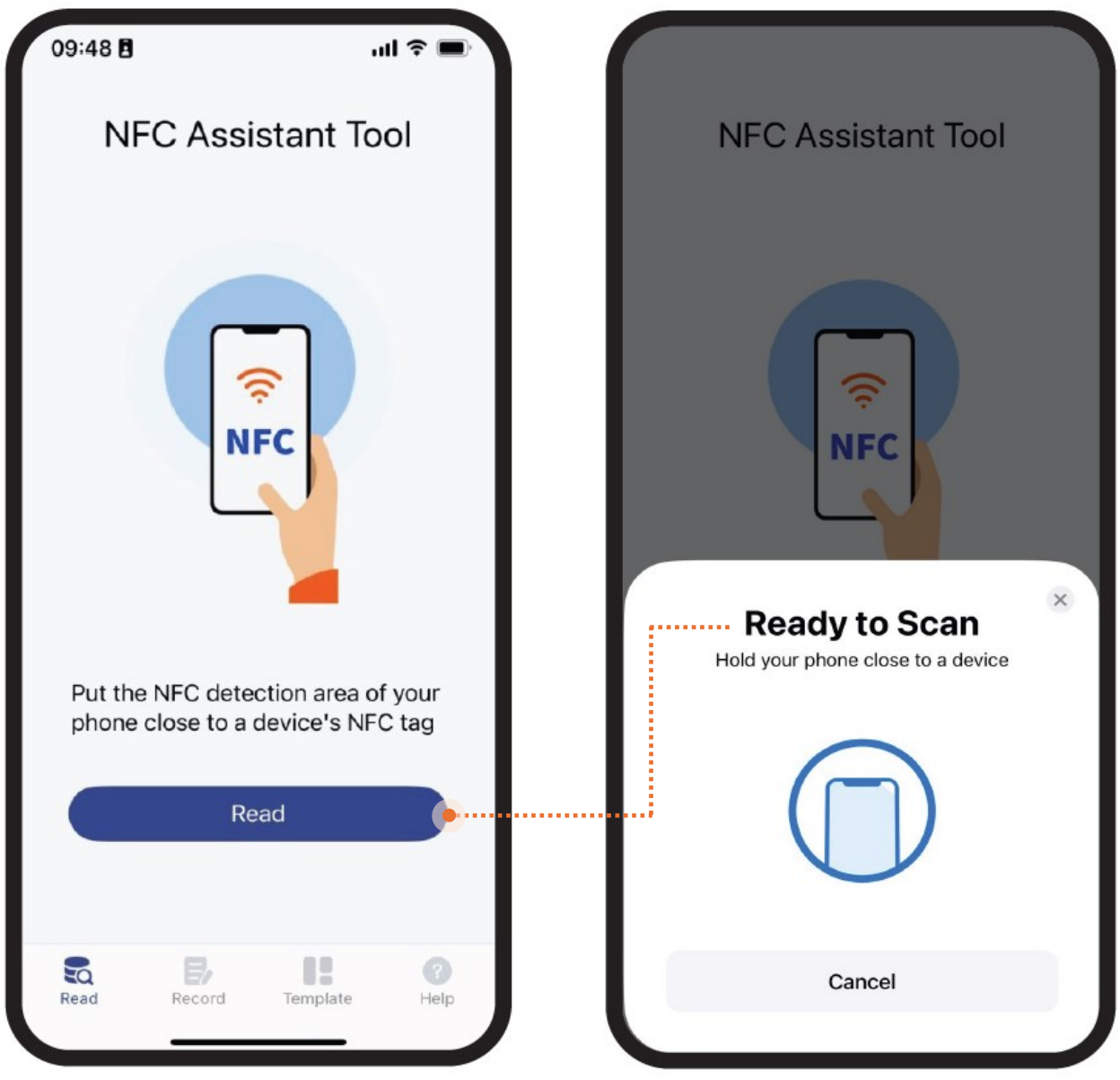
(1) Download Netvox NFC app.

Please make sure your phone supports NFC.

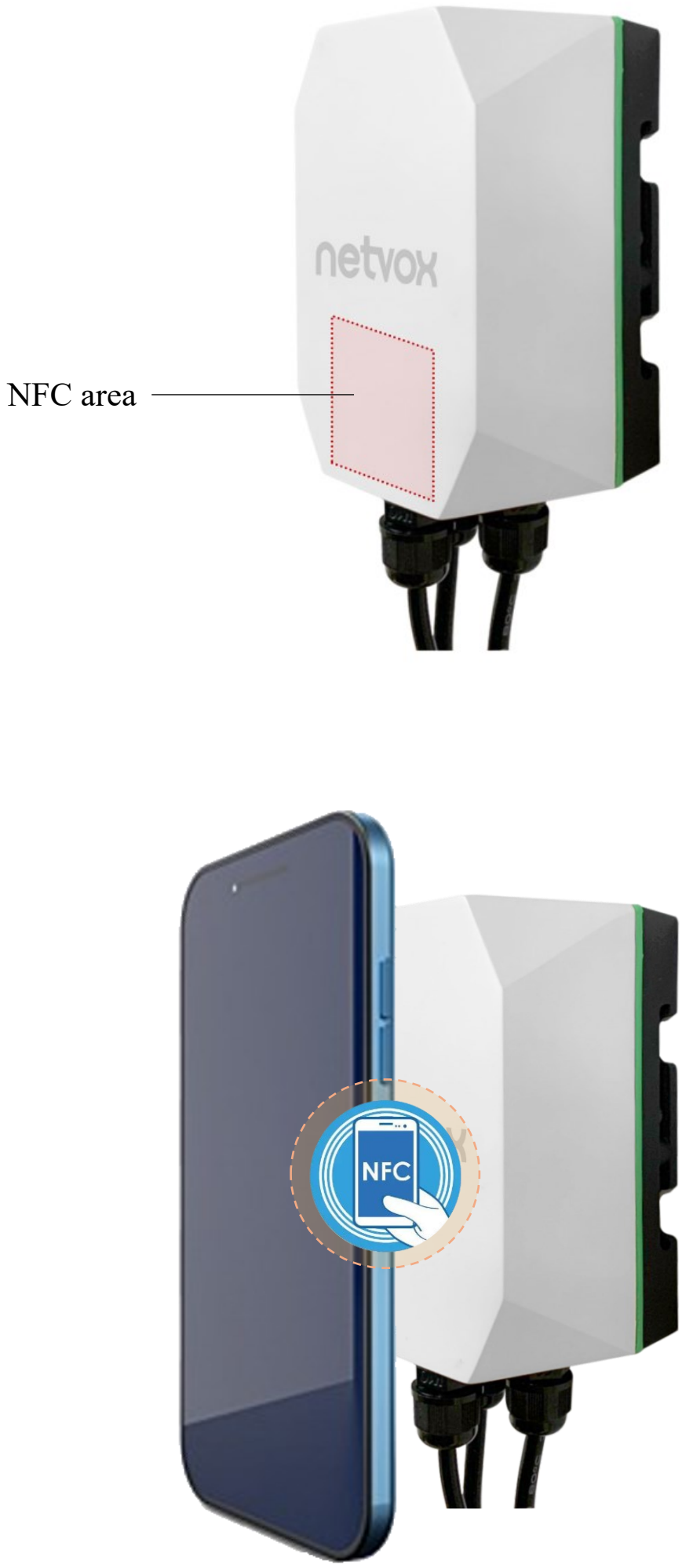



(2) Enable NFC in Settings and find your phone's NFC area.

Open the app and click Read.

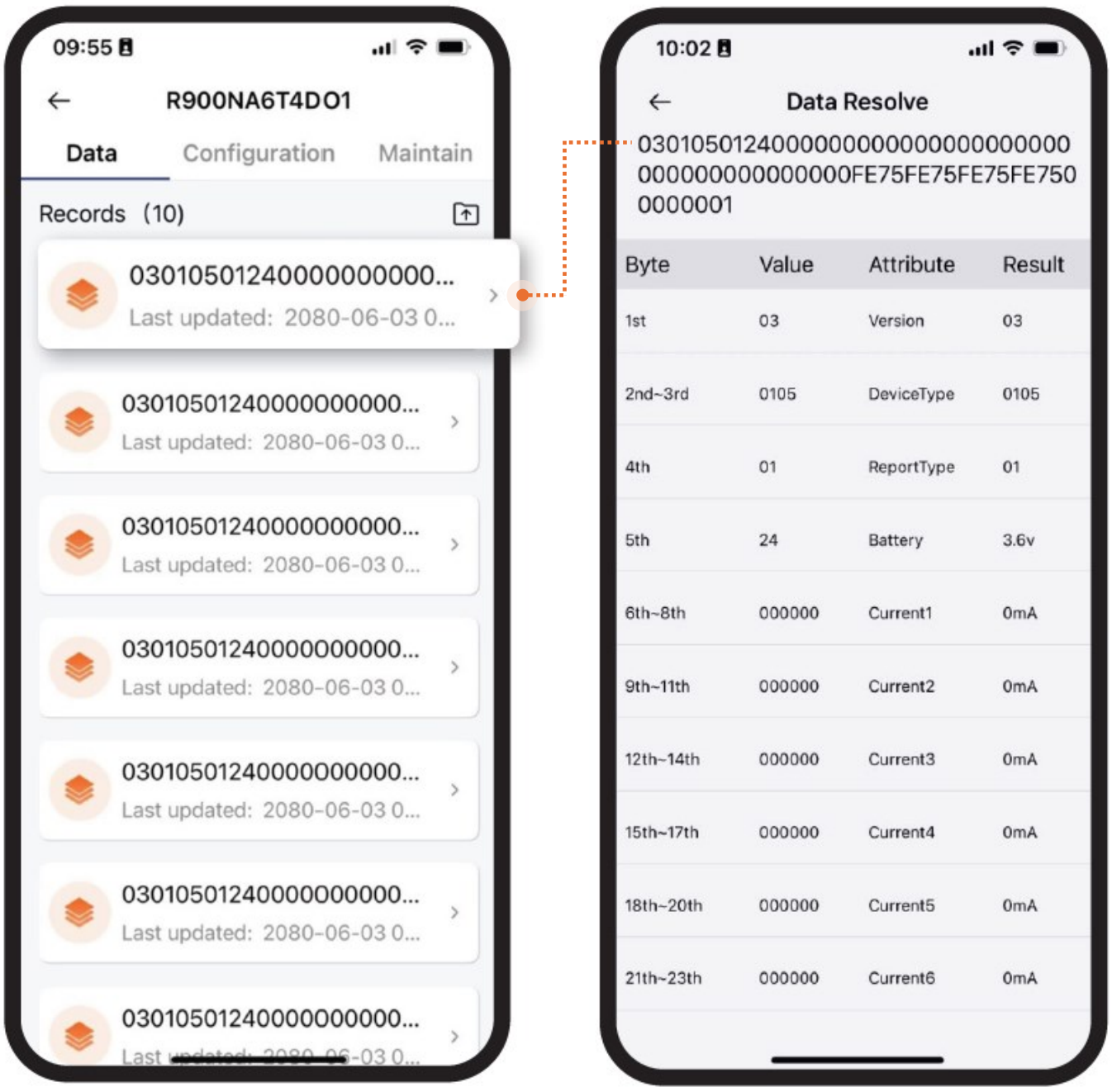


(3) Hold your phone near R900’s NFC tag.



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

Select a data and go to the Data processing.

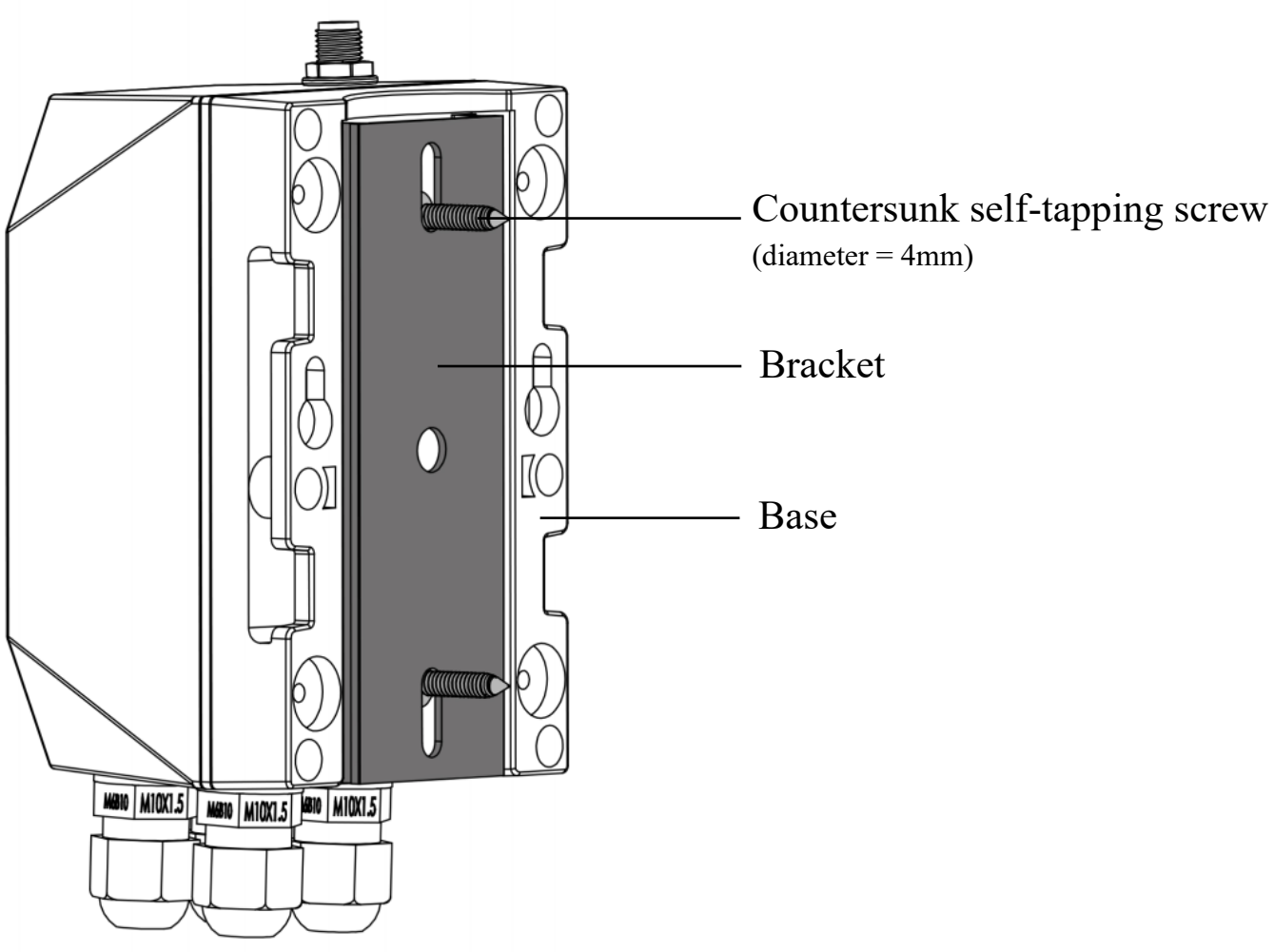


# 7. Installation

## R900

- Standard

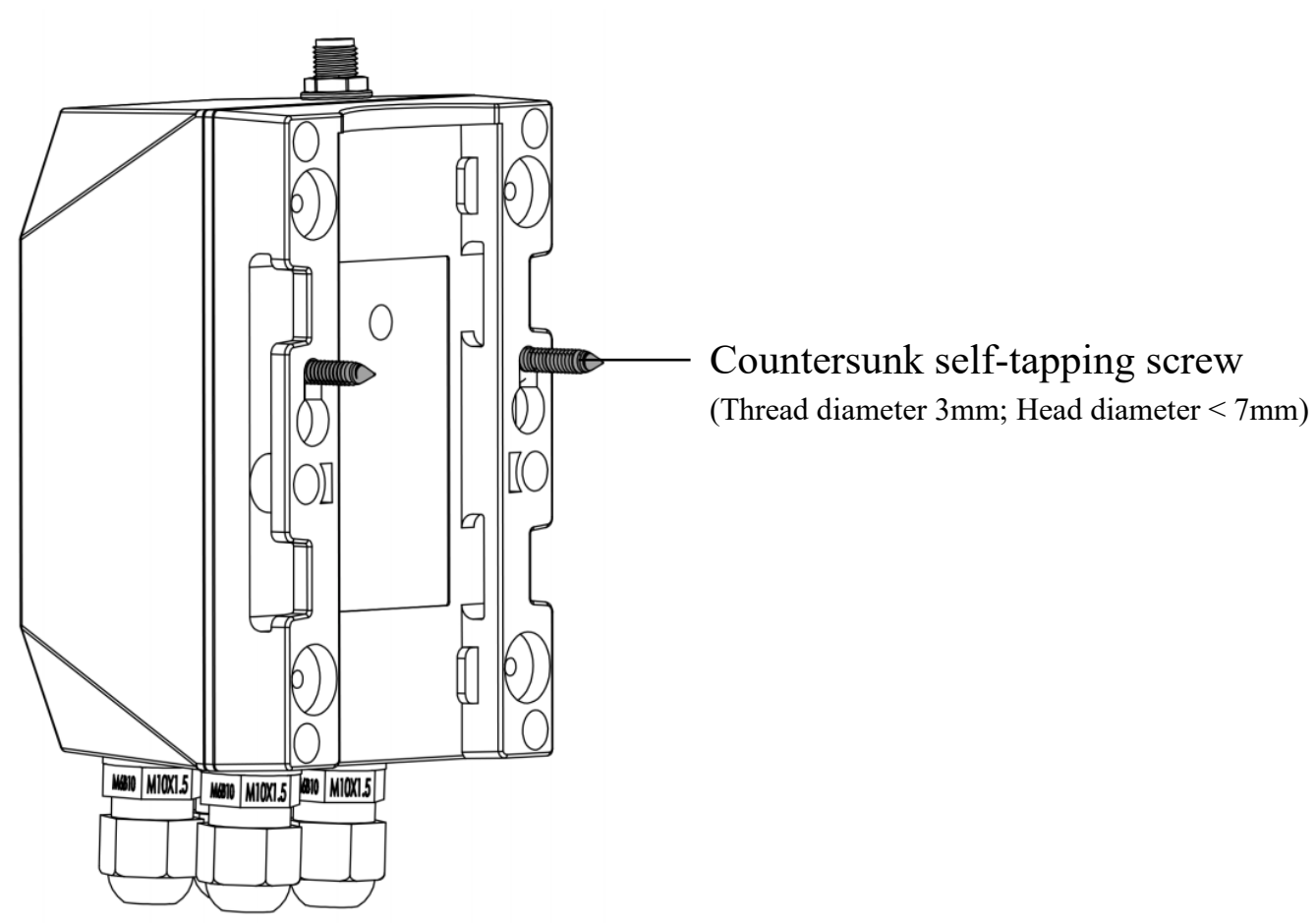
(1) Screws + Bracket




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



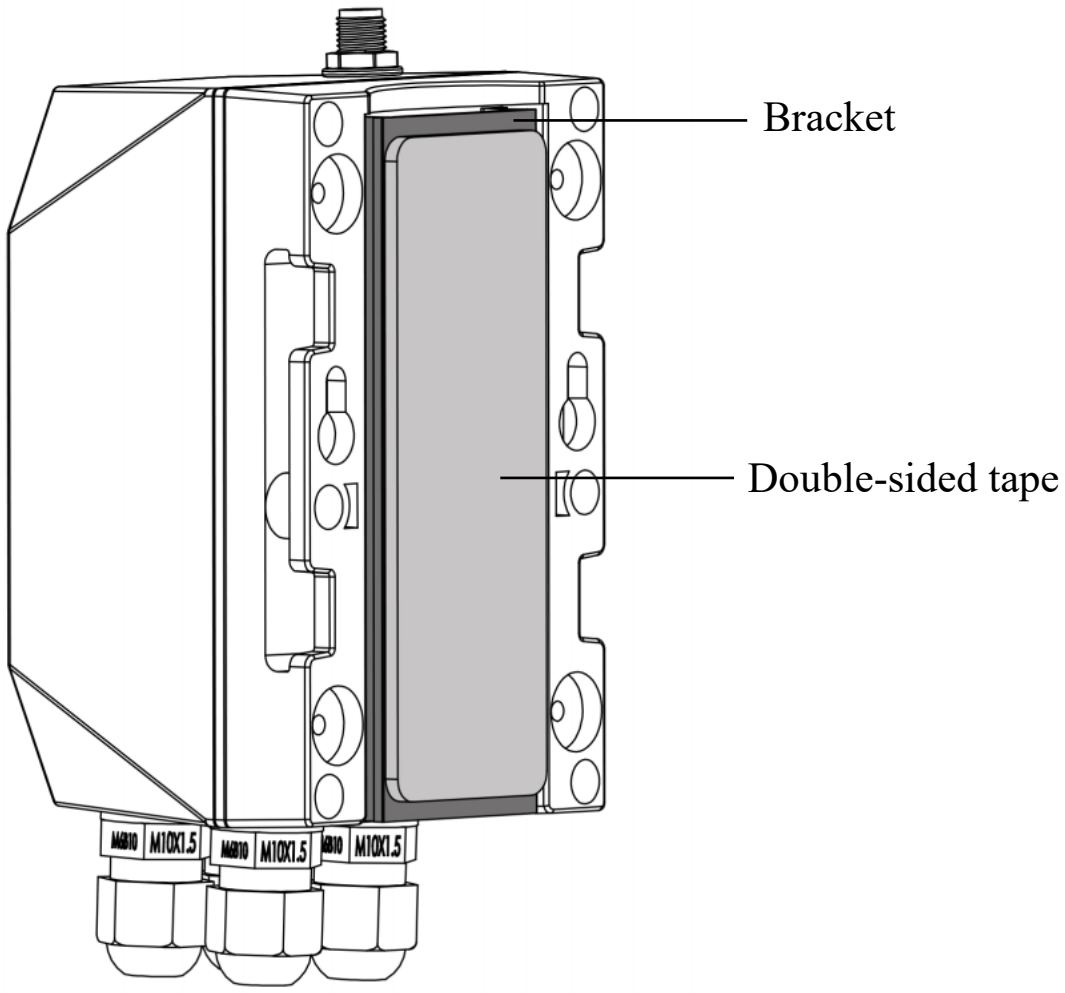

❶ Mount 2 countersunk self-tapping screws or expansion bolts on the wall.

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.

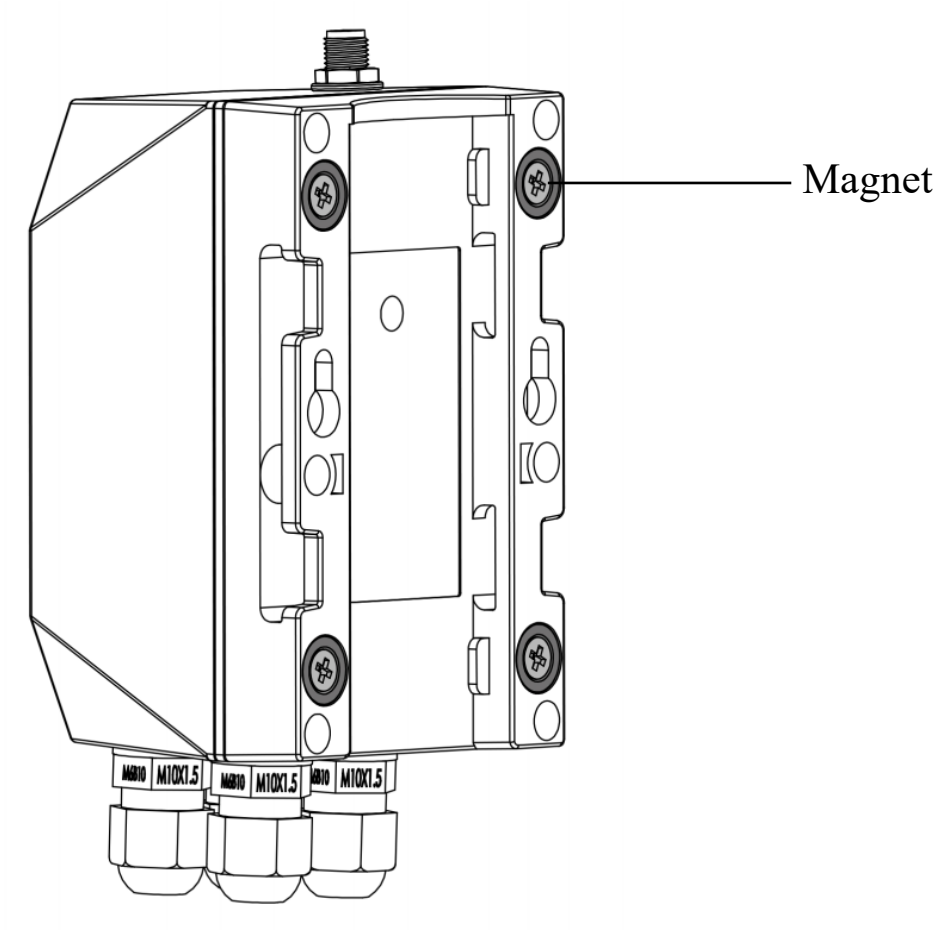
❷ Peel the liner and fix R900 on the surface.

❸ Press to ensure R900 is firmly installed.

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

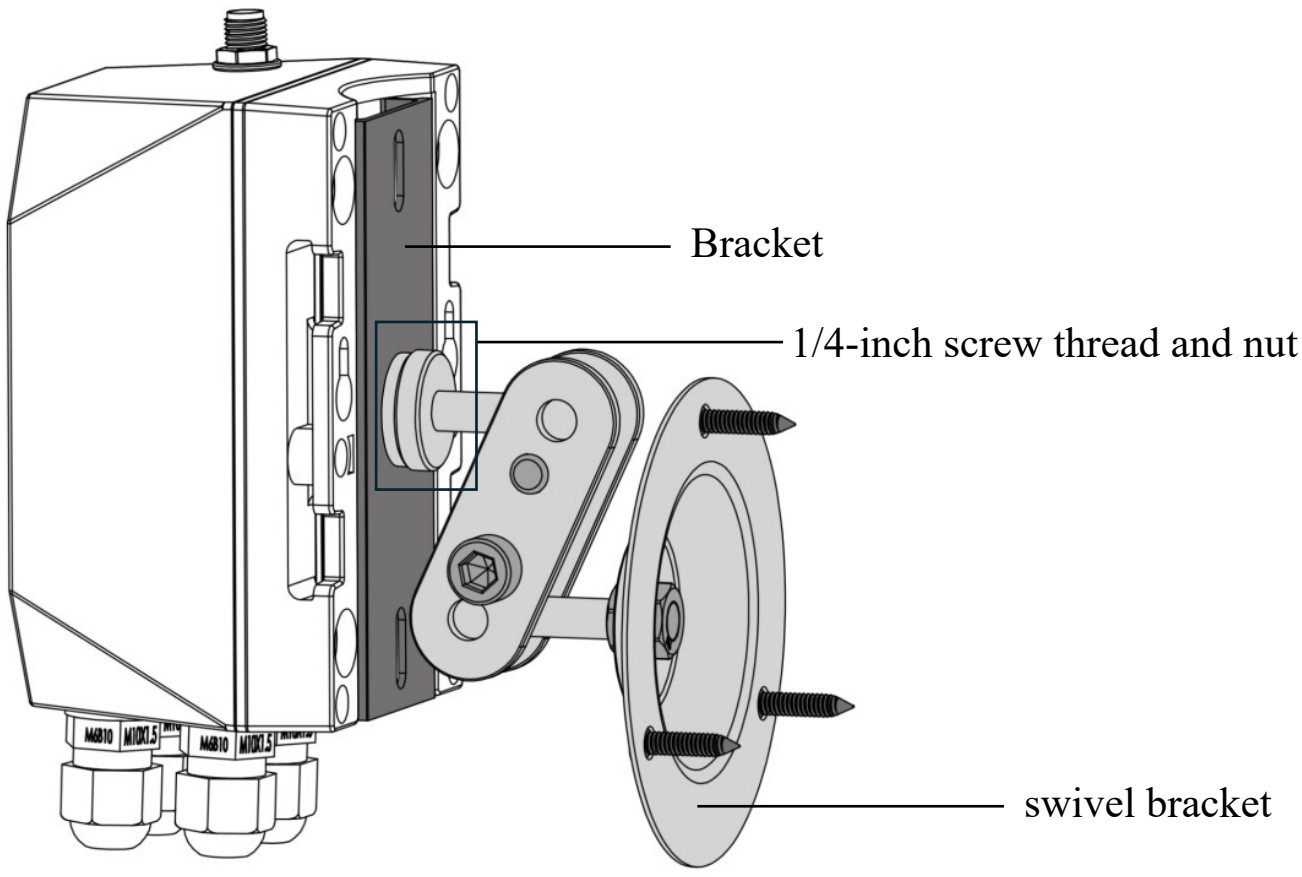
- Optional

(1) Magnet




❶ Fix the R900 on a metal surface.

(2) Swivel Bracket



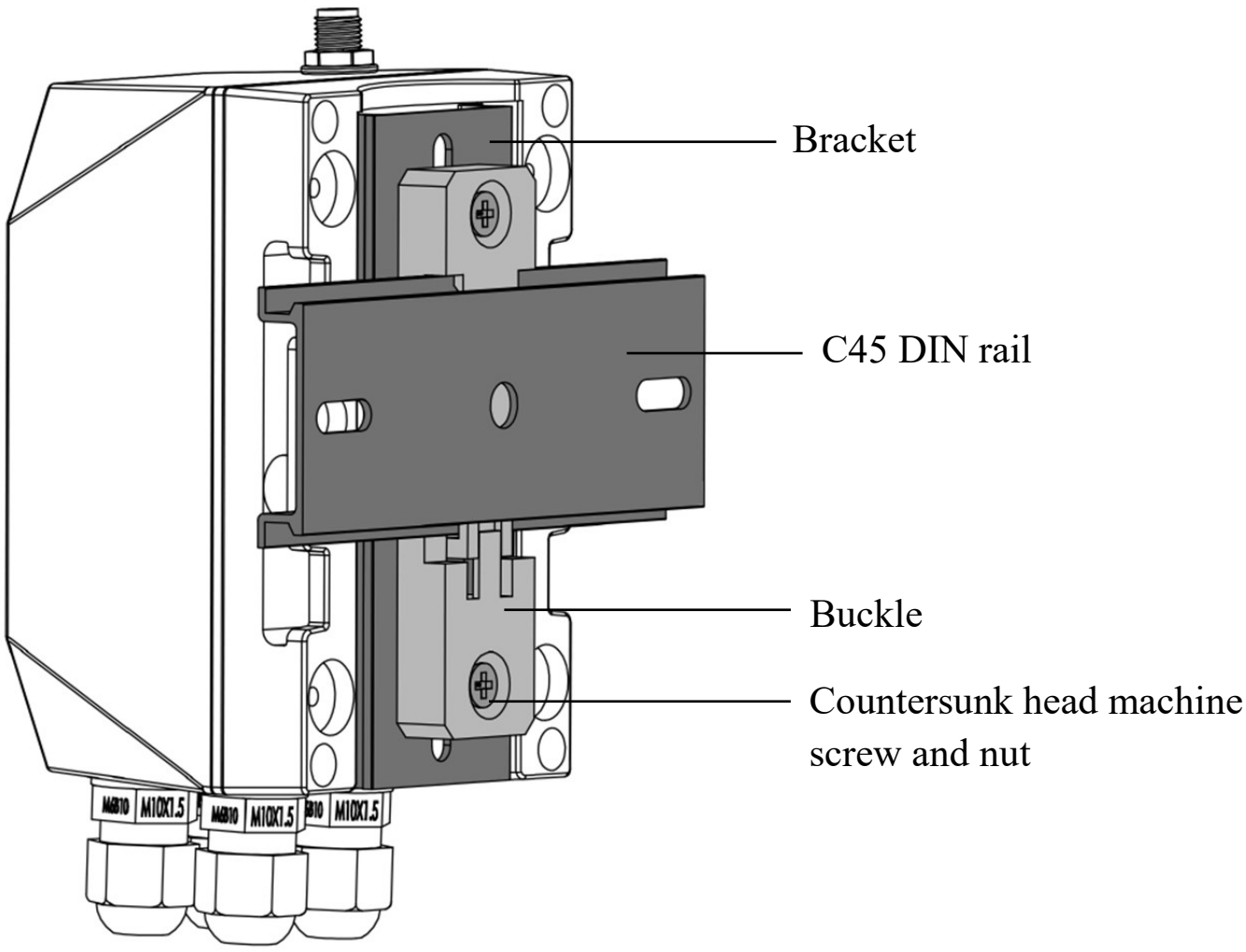

❶ Insert a 1/4-inch screw thread into the hole of the bracket.

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



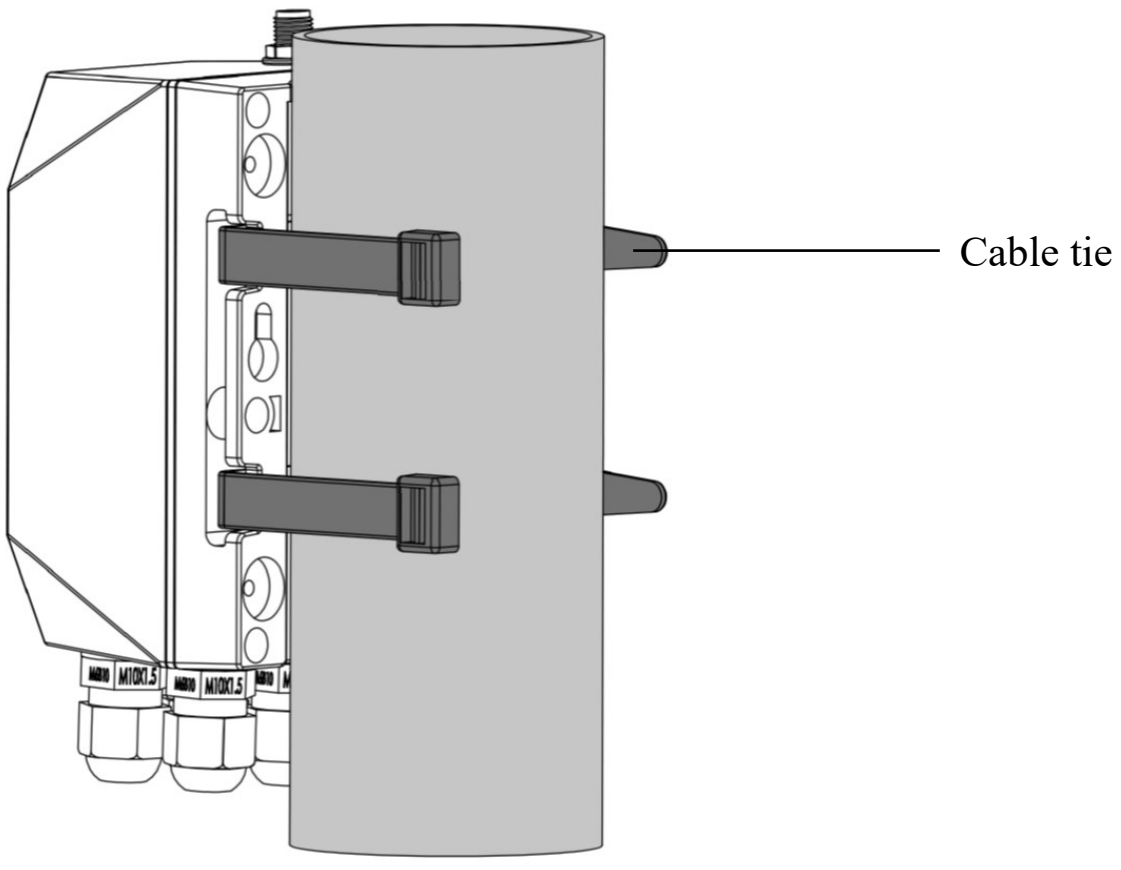

❶ Mount the rail buckle onto R900’s bracket with countersunk head machine screws and nuts.

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



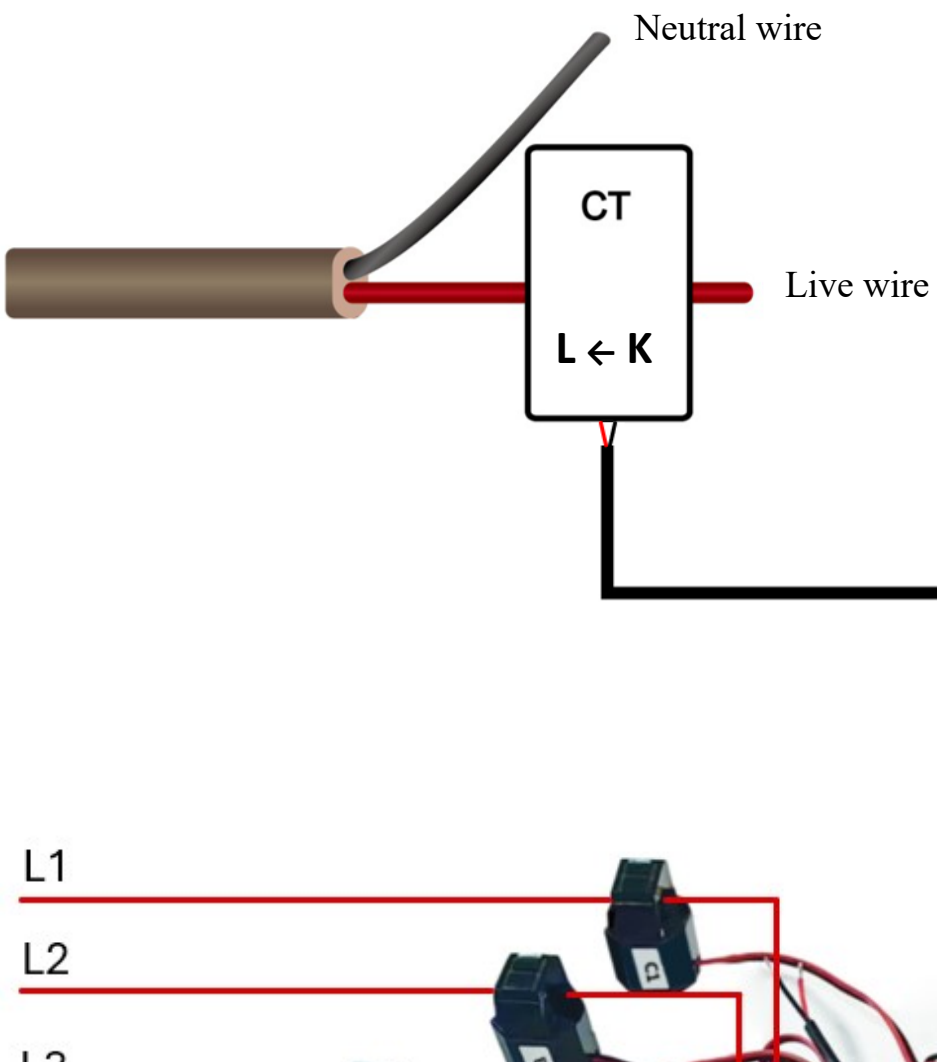

❶ Insert cable ties through the holes of the base.

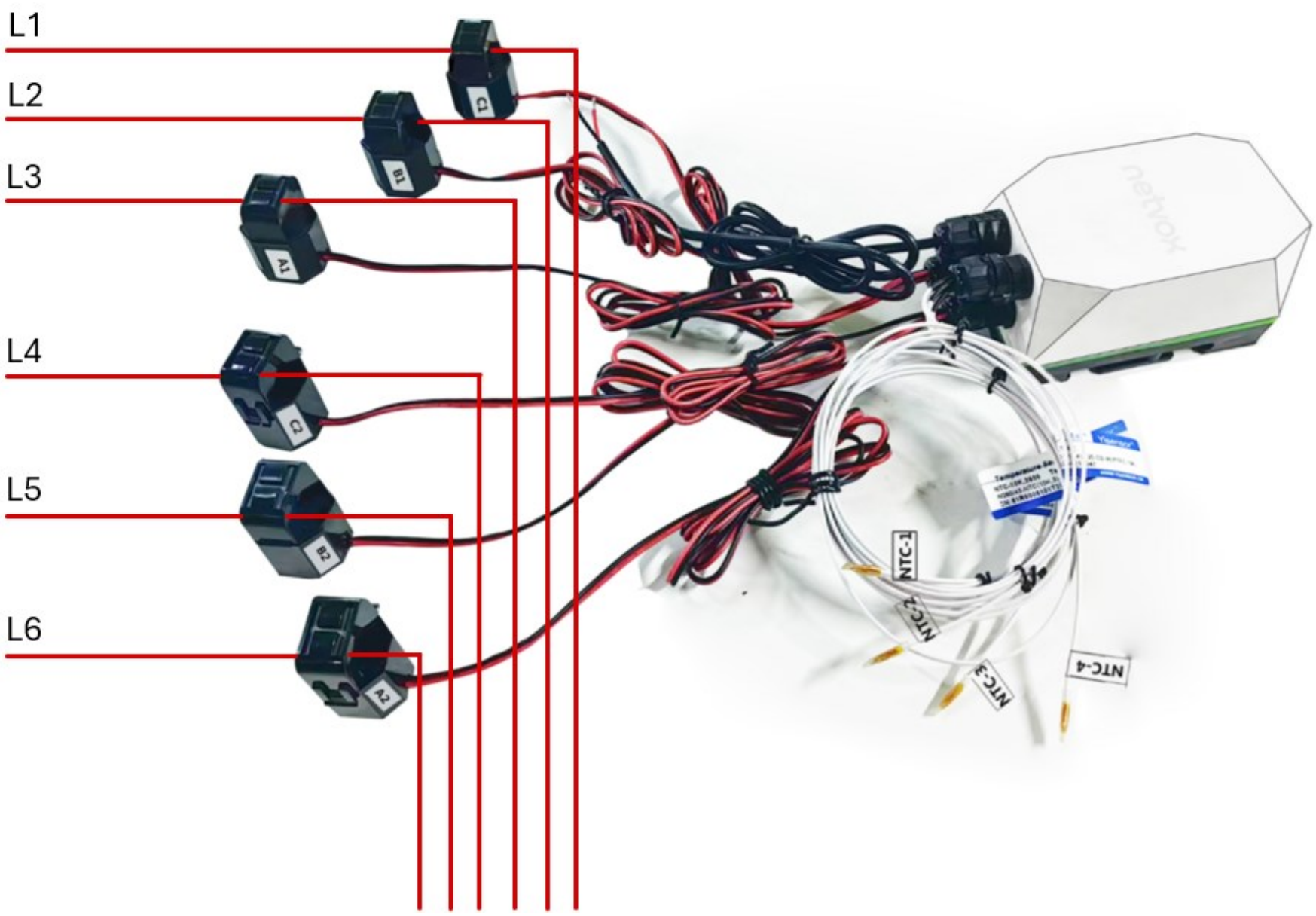
❷ Insert the pointed end through the slot.

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

## Current Transformer

1. Open the clip of a current transformer.
2. Separate live and neutral wires.
3. Put a live wire in a clip and close it.



## NTC thermistor

❶ Put the probe on the surface of a motor or any electrical device.

❷ Fix the probe with PTFE tape.

## 8. Battery Passivation

Many Netvox devices are powered by 3.6V ER14505 / ER18505 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 reactions 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 purchase 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, please **activate the battery with 68Ω load resistance for 1 minute** to eliminate hysteresis in batteries.

## 9. 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