

# **Wireless Single-Phase Current Meter**

**(DC- Powered)**

## **R718N1xxxD(E) Series User Manual**

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# Table of Contents

1. Introduction.....	2
2. Appearance.....	3
3. Features.....	4
4. Set up Instruction.....	5
5. Data Report.....	6
5.1 Example of ReportDataCmd.....	7
5.2 Example of ConfigureCmd.....	9
5.3 Example of Set/GetSensorAlarmThresholdCmd.....	10
5.4 Example of NetvoxLoRaWANRejoin.....	11
6. Installation.....	12
7. Important Maintenance Instruction.....	14

## 1. Introduction

The R718N1xxxD(E) series is single-phase current meter device (DC-powered) for Netvox Class C type devices based on the LoRaWAN open protocol and is compatible with the LoRaWAN protocol.

R718N1xxxD(E) series has different measuring range for different variety of CT. It is divided into:

Model	Name	CT cables
R718N17D	Wireless Single-Phase Current Meter with 1 x 75A Clamp-On CT	-
R718N17DE		Detachable cables
R718N115D	Wireless Single-Phase Current Meter with 1 x 150A Clamp-On CT	-
R718N115DE		Detachable cables
R718N125D	Wireless Single-Phase Current Meter with 1 x 250A Clamp-On CT	-
R718N125DE		Detachable cables
R718N163D	Wireless Single-Phase Current Meter with 1 x 630A Clamp-On CT	-
R718N163DE		Detachable cables
R718N1100D	Wireless Single-Phase Current Meter with 1 x 1000A Clamp-On CT	-
R718N1100DE		Detachable cables

### LoRa Wireless Technology

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

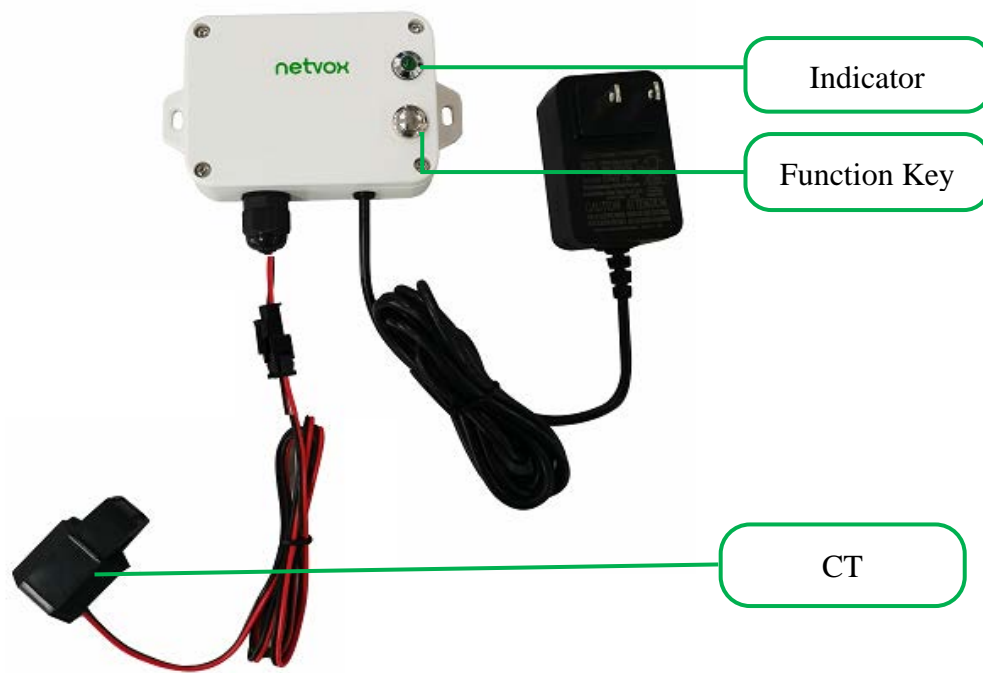
### LoRaWAN

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

## 2. Appearance



**R718N17D** (Non-detachable cables)



**R718N17DE** (Detachable cables)



**R718N115D** (Non-detachable cables)



**R718N115DE** (Detachable cables)



**R718N125D** (Non-detachable cables)



**R718N125DE** (Detachable cables)



**R718N163D** (Non-detachable cables)



**R718N163DE** (Detachable cables)



**R718N1100D** (Non-detachable cables)



**R718N1100DE** (Detachable cables)

### 3. Features

- Power supplied by DC 3.3V/1A power adapter
- Only support AC current measuring
- IP30
- LoRaWAN™ Class C compatible
- Frequency Hopping Spread Spectrum (FHSS)
- Configuring parameters and reading data via third-party software platforms, and set alarms via SMS text and email (optional)
- Available third-party platforms: Actility/ThingPark, TTN, MyDevices/Cayenne

## 4. Set up Instruction

### On/Off

Power on / Turn on	Plug in and the device turns on. The indicator flashes once.
Turn off / Power off	Pull out the plug and the device turns off.

### Network Joining

Never joined the network	<u>Turn on the device and search for the network to join.</u> The green indicator light stays on: Success The green indicator light remains off: Fail
Had joined the network (without factory resetting)	<u>Turn on the device and search for the previous network to join.</u> The green indicator light stays on: Success The green indicator light remains off: Fail
Fail to Join the Network	1 <sup>st</sup> – 2 <sup>nd</sup> minutes: Wake up every 15 seconds to send request for joining the network After 2 <sup>nd</sup> minutes: The device is in sleeping mode and wakes up every 15 minutes to send request for joining the network

### Function Key

Press the function key and hold for 5 seconds	<u>The device will be set to default and reboot</u> The green indicator light flashes 20 times: Success The green indicator light remains off: Fail
Short press the function key	The device is in the network: green indicator light flashes once and sends a report after sampling. The device is not in the network: green indicator flashes 3 times.

Note: Please check the device verification information on the gateway or consult your platform server provider.

## 5. Data Report

The device will immediately send a version packet report along with two uplink packets including current value (mA).

The device sends data in the default configuration before any configuration is done.

### Default setting:

Min Interval = 0x0002 (2s)

Max Interval = 0x0384 (900s)

ReportChange= 0x0064 (100 mA)

### Measurement Range and Accuracy:

	CT	Measurement Range	Accuracy
R718N17D(E)	Clamp-on	100mA – 75A	±1%
R718N115D(E)	Clamp-on	1A – 150A	
R718N125D(E)	Clamp-on	1A – 250A	
R718N163D(E)	Clamp-on	5A – 630A	
R718N1100D(E)	Clamp-on	10A – 1000A	

Note:

(1) R718N1D(E), R718N13D(E), and R718N17D(E): report data as 0A when the current < 0.1A .

(2) R718N115D(E), R718N125D(E), R718N163D(E), and R718N1100D(E): report data as 0A when the current < 1A .

Please refer 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 following:

Min. Interval (Unit: second)	Max. Interval (Unit: second)	Reportable Change	Current Change ≥ Reportable Change	Current Change < Reportable Change
Any number between 2 to 65535	Any number between Min Interval to 65535	Can not be 0	Report per Min. Interval	Report per Max. Interval



**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 0149000A02202208210000, the firmware version is 2022.08.21.

**3. Data Packet:**

When Report Type=0x01 is data packet.

**4. Current Value:**

The maximum payload of Current is 2 bytes, which means the maximum value that can be shown is 65535mA. To get the actual current value, the current needs to time Multiplier as it exceeds 65535mA.

**5. Multiplier**

The Multiplier would be 1 or 10 when R718N1xxx(E) reports data.

**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

**ReportType** – 1 byte –the presentation of the NetvoxPayLoadData, according the devicetype

**NetvoxPayLoadData**– Fixed bytes (Fixed =8bytes)

Device	Device Type	Report Type	NetvoxPayLoadData				
R718N1xxxD(E) Series	0x49	0x00	SoftwareVersion (1Byte) Eg.0x0A-V1.0	HardwareVersion (1Byte)	DateCode (4 Bytes) eg 0x20170503	Reserved (2Bytes)	
		0x01	Battery (1Byte, unit:0.1v)	Current (2Bytes, unit: mA)	Multiplier (1Byte)	ThresholdAlarm (1Byte) Bit0_LowCurrentAlarm Bit1_HighCurrentAlarm Bit2-7:Reserved	Reserved (3Bytes)



**(1) Example 1 of Uplink: 014901000E150100000000**

1<sup>st</sup> byte (01): Version

2<sup>nd</sup> byte (49): DeviceType – R718N1xxxD(E) Series

3<sup>rd</sup> byte (01): ReportType

4<sup>th</sup> byte (00): Battery - DC power supply

5<sup>th</sup> – 6<sup>th</sup> byte (0E15): Current – 3605 mA 0E15 (Hex) = 3605 (Dec),  $3605 * 1\text{mA} = 3605\text{mA}$

7<sup>th</sup> byte (01): Multiplier – 1

8<sup>th</sup> byte (00): Threshold Alarm – No alarm

9<sup>th</sup>-11<sup>th</sup> byte (000000): Reserved

**(2) Example 2 of Uplink: 014901001B580A02000000**

1<sup>st</sup> byte (01): Version

2<sup>nd</sup> byte (49): DeviceType – R718N1xxxD(E) Series

3<sup>rd</sup> byte (01): ReportType

4<sup>th</sup> byte (00): Battery – DC power supply

5<sup>th</sup> – 6<sup>th</sup> byte (1B58): Current – 7000 mA 1B58 (Hex) = 7000 (Dec),  $7000\text{mA} * 10 = 70000\text{mA}(70\text{A})$

7<sup>th</sup> byte (0A): Multiplier – 10

8<sup>th</sup> byte (02): Threshold Alarm – HighCurrentAlarm, 02(Hex)=0000 00010(Bin), bit1=1 HighCurrentAlarm

9<sup>th</sup>-11<sup>th</sup> byte (000000): 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	R718N1xxxD(E) Series	0x01	0x49	MinTime (2Bytes Unit: s)	MaxTime (2Bytes Unit: s)	CurrentChange (2Bytes Unit:1mA)	Reserved (3Bytes, 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)	CurrentChange (2Bytes Unit: 1mA)	Reserved (3Bytes, Fixed 0x00)

### (1)Configure device parameters

MinTime = 60s (0x003C), MaxTime = 60s (0x003C), CurrentChange = 100mA (0x0064)

Downlink: 0149003C003C0064000000

The device returns:

81490000000000000000000 (Configuration successful)

814901000000000000000000 (Configuration failed)

### (2)Read device configuration parameters

Downlink: 0249000000000000000000

The device returns:

8249003C003C0064000000 (Current device configuration parameters)

### 5.3 Example of Set/GetSensorAlarmThresholdCmd

Fport: 0x10

CmdDescriptor	CmdID (1Byte)	Payload (10Bytes)			
SetSensorAlarm ThresholdReq	0x01	Channel(1Byte) 0x00_Channel 1	SensorType(1Byte) 0x00_Disable ALL 0x27_Current	SensorHighThreshold (4Bytes,Unit:1mA)	SensorLowThreshold (4Bytes,Unit:1mA)
SetSensorAlarm ThresholdRsp	0x81	Status (0x00_success)		Reserved (9Bytes,Fixed 0x00)	
GetSensorAlarm ThresholdReq	0x02	Channel (1Byte, 0x00_Channel1)	SensorType(1Byte) 0x00_Disable ALL 0x27_Current	Reserved (8Bytes,Fixed 0x00)	
GetSensorAlarm ThresholdRsp	0x82	Channel (1Byte) 0x00_Channel 1	SensorType(1Byte) 0x00_Disable ALL 0x27_Current	SensorHighThreshold (4Bytes,Unit:1mA)	SensorLowThreshold (4Bytes,Unit:1mA)

Note:

- a. Set SensorHigh/LowThreshold as 0xFFFFFFFF to disable threshold.
- b. The last configuration would be kept as user reset the device back to the factory setting.
- c. Firmware after 2023.07.24 supports threshold alarm.

#### (1) Configure device parameter

Channel = 0x00 (fixed value), SensorType = 0x27 (fixed value), SensorHighThreshold = 1000mA (0x000003E8),

SensorLowThreshold=100mA (0x00000064)

Downlink: 010027000003E800000064

The device returns:

81000000000000000000000 (Configuration successful)

81100000000000000000000 (Configuration failed)

#### (2) Read device configuration parameters.

Downlink: 0200270000000000000000

The device returns:

820027000003E800000064 (Current device configuration parameters)

## 5.4 Example of NetvoxLoRaWANRejoin

Check if the device is still in the network. If the device is disconnected, it will automatically rejoin back to the network.

Fport: 0x20

CmdDescriptor	CmdID (1 byte)	Payload (5 bytes)	
SetNetvoxLoRaWANRejoinReq	0x01	RejoinCheckPeriod (4 Bytes, Unit: 1s)	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)	RejoinThreshold (1Byte)

Note:

- a. Set RejoinCheckThreshold as 0xFFFFFFFF to stop the device from rejoining the network.
- b. The last configuration would be kept as user reset the device back to the factory setting.
- c. Default setting: RejoinCheckPeriod = 2 (hr) and RejoinThreshold = 3 (times)
- d. Firmware after 2023.11.06 supports SetNetvoxLoRaWANRejoinReq.

### (1) Command Configuration

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

Downlink: 0100000E1003

Response:

810000000000 (Configuration success)

811000000000 (Configuration failure)

### (2) Read current configuration

RejoinCheckPeriod, RejoinThreshold

Downlink: 020000000000

Rthe esponse: 8200000E1003

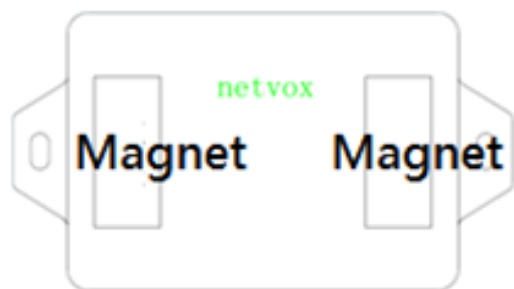
## 6. Installation

1. The single-phase current meter R718N1xxxD(E) series has a built-in magnet (see Figure 1 below). It can be attached to the surface of an object with iron during installation, which is convenient and quick.

To make the installation more secure, please use screws (purchased separately) to fix the device to the wall or other objects (such as the installation diagram).

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. Open the clamp-on current transformer, and then pass the live wire through the current transformer according to the installation.

Note: "L←K" is marked on the bottom of the CT.

3. Precautions:

3.1 Before using, users must check whether the appearance is deformed; otherwise, the test accuracy will be affected.

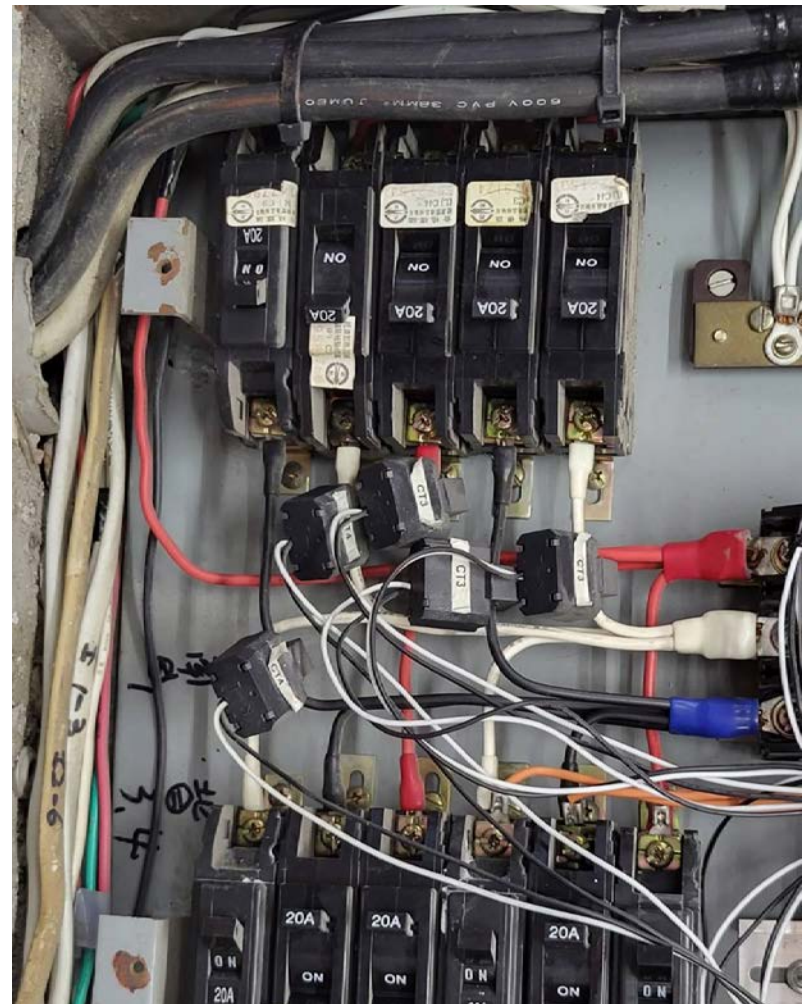
3.2 The using environment should be kept away from strong magnetic fields, so as not to affect the test accuracy. It is strictly forbidden to use in humid and corrosive gas environments.

3.3 Before installation, please confirm the current value of the load. If the current value of the load is higher than the measurement range, select a model with a higher measurement range.

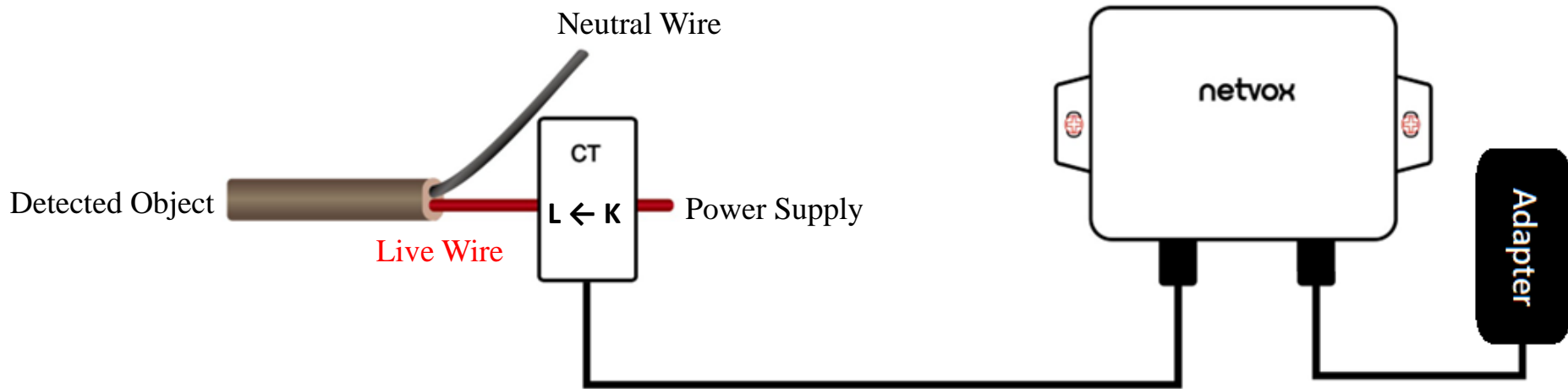
The single-phase current detector R718N1xxxD(E) is suitable for the following scenarios:

- School
- Factory
- Shopping mall
- Office building
- Smart building

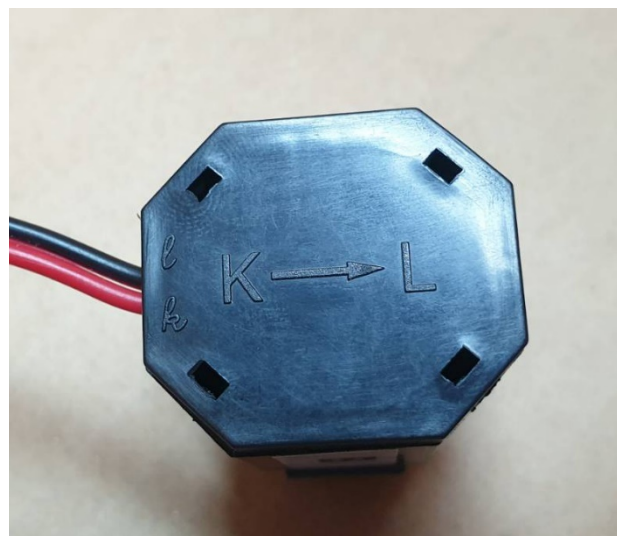
Where the electrical data of the device with the single-phase electricity needs to be detected.



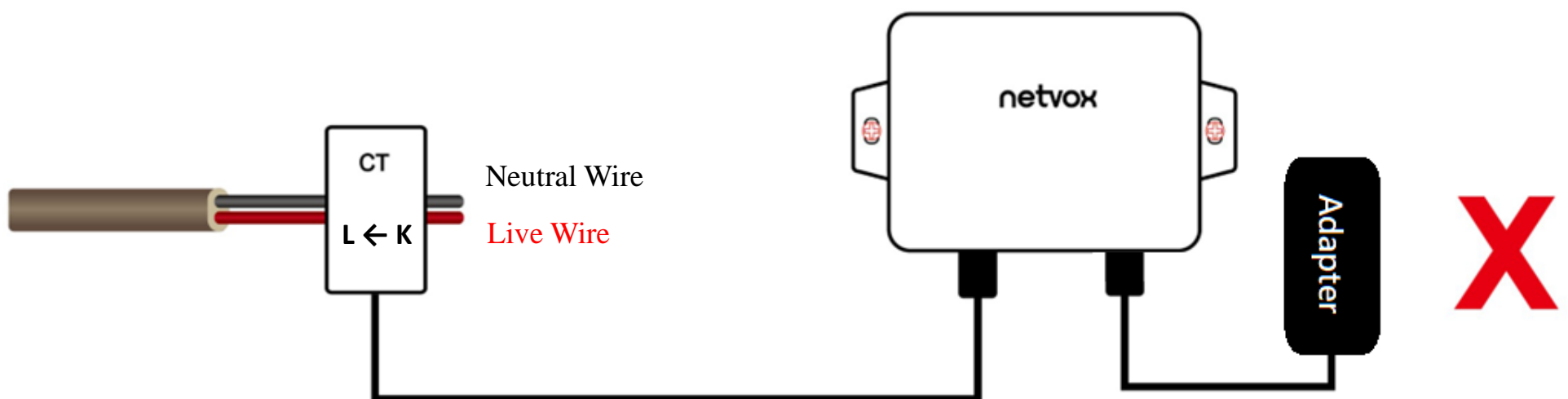
1. The back of R718N1xxxD(E) can be attached to iron surface or users can fix the two ends of device on the wall with screws.
2. When installing the R718N1xxxD(E) series current transformer, please separate the live and neutral wires of the wire to be detected, and only take the live wire through current transformer and start the measurement according to the wiring below:



CT Wiring Schematic Diagram (Current direction K→L)



If the live wire and the neutral wire are connected together at the same time, they will offset each other and the measurement is 0.



## 7. Important Maintenance Instruction

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

- Do not put the device near or submerge into water. Minerals in rain, moisture, and other liquids could cause corrosion of electronic components. Please dry the device, if it gets wet.
- Do not use or store the device in dusty or dirty environments to prevent damage to parts and electronic components.
- Do not store the device in high temperatures. This may shorten the lifespan of electronic components, damage batteries, and deform plastic parts.
- Do not store the device in cold temperatures. Moisture may damage circuit boards as the temperatures rise.
- Do not throw or cause other unnecessary shocks to the device. This may damage internal circuits and delicate components.
- Do not clean the device with strong chemicals, detergents, or strong detergents.
- Do not apply the device with paint. This may block detachable parts and cause malfunction.

The instructions are applied to your device and accessories.

If any device is not working properly, please bring it to the nearest authorized service provider for repair.