

Wireless Three-phase Current Detection

R718N3xxxD(E) Series User Manual

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1. Introduction

The R718N3xxxD/DE series is 3-Phase Current Meter device for Netvox Class C type devices based on the LoRaWAN open protocol and is compatible with the LoRaWAN protocol. R718N3xxxD/DE series have different measuring range for different variety of CT. It is divided into:

Model	Name	CT cables
R718N37D	Wireless 3-Phase Current Meter with 3 x 75A Clamp-On CT	-
R718N37DE		Detachable cables
R718N315D	Wireless 3-Phase Current Meter with 3 x 150A Clamp-On CT	-
R718N315DE		Detachable cables
R718N325D	Wireless 3-Phase Current Meter with 3 x 250A Clamp-On CT	-
R718N325DE		Detachable cables
R718N363D	Wireless 3-Phase Current Meter with 3 x 630A Clamp-On CT	-
R718N363DE		Detachable cables
R718N3100D	Wireless 3-Phase Current Meter with 3 x 1000A Clamp-On CT	-
R718N3100DE		Detachable cables

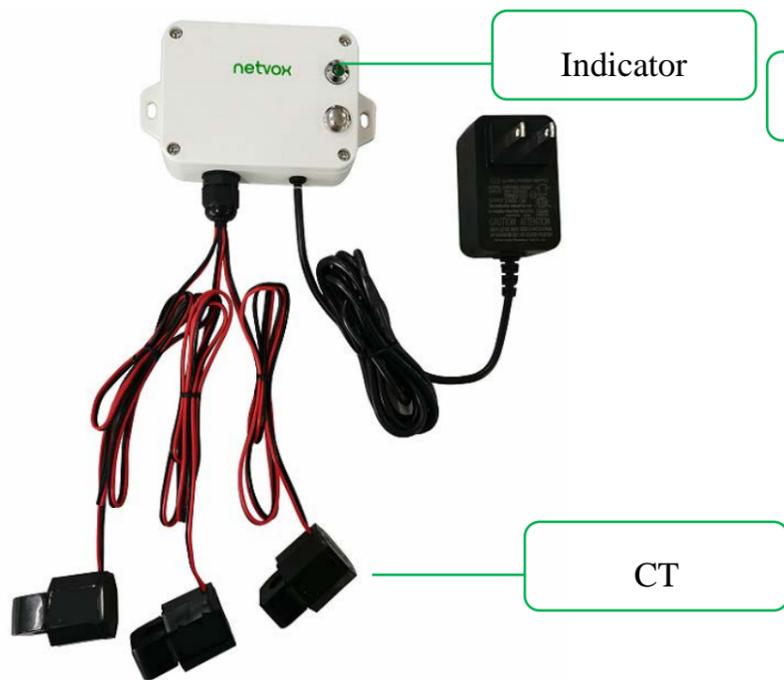
LoRa Wireless Technology:

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



R718N37D (Non-detachable cables)



R718N37DE (Detachable cables)



R718N315D (Non-detachable cables)



R718N315DE (Detachable cables)



R718N325D (Non-detachable cables)



R718N325DE (Detachable cables)



R718N363D (Non-detachable cables)



R718N363DE (Detachable cables)



R718N3100D (Non-detachable cables)



R718N3100DE (Detachable cables)

3. Features

- Adopt SX1276 wireless communication module.
- DC power supply (3.3V/1A)
- Only support AC current measuring
- 3-phase current meter detection
- The base is attached with a magnet that can be attached to a ferromagnetic material object.
- IP30 rating
- 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 platform: Actility/ThingPark, TTN, MyDevices/Cayenne

4. Set up Instruction

On/Off

Power On	Connect the power supply
Factory Reset and Restart	Press and hold the function key for 5 seconds until green indicator flashes 20 times.
Power Off	Disconnecting the power supply
Note	<ol style="list-style-type: none"> 1. The device will be off in default after disconnecting the power supply. 2. It is suggested to wait for at least 10 seconds between turning the device on and off. 3. At 1st -5th second after power on, the device will be in engineering test mode.

Network Joining

Never Joined the Network	<p>Turn on the device, and it will search for the network to join.</p> <p>The green indicator remains on joins the network successfully</p> <p>The green indicator light remains off: fail to join the network</p>
Had Joined the Network (Not Back to Factory Setting)	<p>Turn on the device, and it will search for the previous network to join.</p> <p>The green indicator remains on: joins the network successfully</p> <p>The green indicator light remains off: fail to join the network</p>
Fail To Join the Network	Check the device verification information on the gateway or consult your platform server provider.

Function Key

Press the Function Key for 5 Seconds	<p>The device will be set to default and restart.</p> <p>The green indicator light flashes 20 times: success</p> <p>The green indicator light remains off: fail</p>
Press the Function Key Once	<p>The device is in the network: green indicator light flashes once and sends a report</p> <p>The device is not in the network: green indicator light flashes 3 times</p>

Sleeping Mode

The Device is Turned On and In the Network	<p>Sleep period: Min Interval.</p> <p>When the reportchange exceeds setting value or the state changes: send a data report according to Min Interval.</p>
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5. Data Report

The device will immediately send a version packet report along with two uplink packets including 3 current, 3 multiplier and battery voltage.

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

Default Setting:

Max Interval: 0x0384 (900s)

Min Interval: 0x0002 (2s) (Detect per Min Interval)

CurrentChange: 0x0064 (100 mA)

Three-phase Current Detection:

The device would detect and send report of the current value as the function key is triggered or in configuration.

Range and Accuracy:

	CT	Measurement Range	Accuracy
R718N37D(E)	Clamp-on	100mA to 75A	±1% (measurement range: 300mA to 50A)
R718N315D(E)	Clamp-on	1A to 150A	±1%
R718N325D(E)	Clamp-on	1A to 250A	±1%
R718N363D(E)	Clamp-on	10A to 630A	±1%
R718N3100D(E)	Clamp-on	10A to 1000A	±1%

Note: Current transformer (measurement range $\leq 75A$): report data as 0 when the current $< 100mA$.

Current transformer (measurement range $> 75A$): report data as 0 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 follows:

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

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– Var (Fix =8bytes)

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 014A000A02202405160000, the firmware version is 2024.05.16.

3. 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.

4. Multiplier:

When ReportTypeSet=0x00 (reporttype1&2), R718N3xxxD(E) will report two data packets, and the multiplier will be either 1 or 10;

When ReportTypeSet=0x01 (reporttype3), R718N3xxxD(E) will report one data packet, and the multiplier will be either 1,5,10 or 100.

(1) When ReportTypeSet=0x00 (reporttype1&2), R718N3xxxD(E) will report two data packets.

Device	Device Type	Report Type	NetvoxPayLoadData				
R718N3xxxD(E) Series	0x4A	0x00	SoftwareVersion (1Byte) Eg.0x0A—V1.0	HardwareVersion (1Byte)	DateCode (4Bytes, eg 0x20170503)		Reserved (2Bytes, fixed 0x00)
		0x01	Battery (1Byte, unit:0.1V)	Current1 (2Bytes, unit:1mA)	Current2 (2Bytes, unit:1mA)	Current3 (2Bytes, unit:1mA)	Multplier1 (1Byte)
		0x02	Battery (1Byte, unit:0.1V)	Multplier2 (1Byte)	Multplier3 (1Byte)		Reserved (5Bytes, fixed 0x00)

Uplink:

Packet 1: 014A010005DD05D41B5801

Packet 2 : 014A0200010A0000000000

1st byte (01): Version

2nd byte (4A): DeviceType - R718N3xxxD(E) Series

3rd byte (01): ReportType

4th byte (00): Battery – DC power

5th-6th byte (05DD): Current1 –05DD (Hex) = 1501 (Dec), 1501* 1mA = 1501mA

7th-8th byte (05D4): Current2 – 05D4 (Hex) = 1492 (Dec), 1492* 1mA = 1492mA

9th-10th byte (1B58): Current3 – 1B58 (Hex) = 7000 (Dec), 7000mA*10=70000mA (70A)

11th byte (01): Multiplier1 – 1

1st byte (01): Version

2nd byte (4A): DeviceType – R718N3xxxD(E) Series

3rd byte (02): ReportType

4th byte (00): Battery – DC power

5th byte (01): Multiplier2 – 1

6th byte (0A): Multiplier3 – 10

7th-11th byte (0000000000): Reserved



(2) When ReportTypeSet=0x01 (reporttype3), R718N3xxxD(E) will report one data packet.

Device	Device Type	Report Type	NetvoxPayLoadData				
R718N3xxxD(E) Series	0x4A	0x03	Battery (1Byte, unit:0.1V)	Current1 (2Bytes, Unit:1mA)	Current2 (2Bytes, Unit:1mA)	Current3 (2Bytes, Unit:1mA)	Multiplier (1Byte) BIT0-1: Multiplier1 (0b00_1,0b01_5,0b10_10,0b11_100) BIT2-3: Multiplier2 (0b00_1,0b01_5,0b10_10,0b11_100) BIT4-5: Multiplier3 (0b00_1,0b01_5,0b10_10,0b11_100) BIT6-7: Reserved

Uplink:

Packet: 014A030005DD05D436B010

1st byte (01): Version

2nd byte (4A): DeviceType – R718N3xxxD(E) Series

3rd byte (03): ReportType

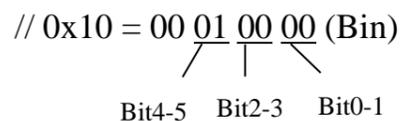
4th byte (00): Battery – DC power

5th-6th byte (05DD): Current1 – 05DD (Hex) = 1501 (Dec), 1501* 1mA = 1501mA

7th-8th byte (05D4): Current2 – 05D4 (Hex) = 1492 (Dec), 1492* 1mA = 1492mA

9th-10th byte (36B0): Current3 – 36B0 (Hex) = 14000(Dec), 14000mA*5 = 70000mA (70A)

11th byte (10): Multiplier1=1 Multiplier2 = 1, Multiplier3 = 5



5.2 Example of Threshold Alarm

FPort: 0x06

Device	Device Type	Report Type	NetvoxPayloadData		
R718N3xxxD(E) Series	0x4A	0x04	Battery (1Byte, unit:0.1V)	ThresholdAlarm(1Byte, Bit0_LowCurrent1Alarm, Bit1_HighCurrent1Alarm, Bit2_LowCurrent2Alarm, Bit3_HighCurrent2Alarm, Bit4_LowCurrent3Alarm, Bit5_HighCurrent3Alarm	Reserved (5Bytes, fixed 0x00)

Uplink:

014A040001000000000000

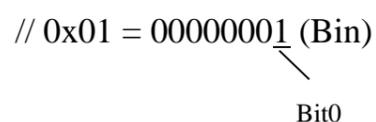
1st byte (01): Version

2nd byte (4A): DeviceType – R718N3xxxD(E) Series

3rd byte (04): ReportType

4th byte (00): Battery – DC power

5th byte (01): ThresholdAlarm – bit 0=1 LowCurrent1Alarm



6th-11th byte (000000000000): Reserved

5.3 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	R718N3xxxD(E) Series	0x01	0x4A	MinTime (2bytes Unit:s)	MaxTime (2bytes Unit:s)	CurrentChange (2byte Unit:1mA)	Reserved (3Bytes,Fixed0x00)
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 (2byte Unit:1mA)	Reserved (3Bytes,Fixed 0x00)

(1) Configure device parameters MinTime = 60s (0x003C), MaxTime = 60s (0x003C), CurrentChange = 100mA (0x0064)

Downlink: 014A003C003C0064000000

The device returns:

814A00000000000000000000 (Configuration successful)

814A01000000000000000000 (Configuration failed)

(2) Read Configuration

Downlink: 024A000000000000000000

The device returns:

824A003C003C0064000000 (Current device configuration parameters)

5.4 Example of SetRportType

FPort: 0x07

Set the R718N3xxxD(E) data to send either one or two packets.

Description	Device	CmdID	Device Type	NetvoxPayloadData	
SetRportTypeReq	R718N3xxxD(E) Series	0x03	0x4A	ReportTypeSet (1Byte) 0x00_reporttype1&2 0x01_reporttype3	Reserved (8Bytes,Fixed 0x00)
SetRportTypeRsp		0x83		Status (0x00_success)	Reserved (8Bytes,Fixed 0x00)
GetRportTypeReq		0x04		Reserved (9Bytes,Fixed 0x00)	
GetRportTypeRsp		0x84		ReportTypeSet (1Byte) 0x00_reporttype1&2 0x01_reporttype3	Reserved (2Bytes,Fixed 0x00)

Note :

- a. Remain the last configuration when the device is reset back to factory setting.
- b. Report Type = 0x00 is two packets. (Default)
- c. Report Type = 0x01 is one packet.

(1) Configure ReportTypeSet =0x01

Downlink: 014A010000000000000000 // 0x01 Uplink return one packet.

The device returns:

834A000000000000000000 (Configuration successful)

834A010000000000000000 (Configuration failed)

(2) Read device configuration parameters.

Downlink: 044A0000000000000000

The device returns:

844A010000000000000000 (Current device configuration parameters)

5.5 Example of SetSensorAlarmThresholdCmd

Fport:0x10

CmdDescriptor	CmdID (1Byte)	Payload (10Bytes)			
SetSensorAlarm ThresholdReq	0x01	Channel(1Byte) 0x00_Channel1 0x01_Chanel2 0x02_Channel3	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 0x01_Chanel2 0x02_Channel3	SensorType(1Byte) 0x00_Disable ALL 0x27_Current	Reserved (8Bytes,Fixed 0x00)	
GetSensorAlarm ThresholdRsp	0x82	Channel(1Byte) 0x00_Channel1 0x01_Chanel2 0x02_Channel3	SensorType(1Byte) 0x00_Disable ALL 0x27_Current	SensorHighThreshold (4Bytes,Unit: 1mA)	SensorLowThreshold (4Bytes, Unit: 1mA)

Note :

- Set SensorHigh/LowThreshold as 0xFFFFFFFF to disable threshold.
- Remain the last configuration when the device is reset back to factory setting.
- Current1 uses channel 1 (0x00), Current2 uses channel 2 (0x01), and Current3 uses channel 3 (0x02).

(1) SetSensorAlarmThresholdReq

Set Current1 HighThreshold to 500mA, LowThreshold to 100mA

Downlink: 010027000001F400000064 //1F4 (Hex) = 500 (Dec), 500* 1mA = 500mA;

64 (Hex) = 100 (Dec), 64* 1mA = 64mA

Response: 81000000000000000000

(2) GetSensorAlarmThresholdReq

Downlink: 0200270000000000000000

Response: 820027000001F400000064

(3) Disable all sensor thresholds for channel 1.

Configure the Sensor Type to 0

Downlink: 0100000000000000000000

Response: 8100000000000000000000

5.6 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:

- Set RejoinCheckThreshold as 0xFFFFFFFF to stop the device from rejoining the network.
- Remain the last configuration when the device is reset back to factory setting.
- Default setting: RejoinCheckPeriod = 2 (hr) and RejoinThreshold = 3 (times)
- Firmware after 2023.12.07 supports SetNetvoxLoRaWANRejoinReq.

(1) Command Configuration

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

Downlink: 0100000E1003

Response:

810000000000 (Configuration success)

810100000000 (Configuration failure)

(2) Read current configuration

RejoinCheckPeriod, RejoinThreshold

Downlink: 020000000000

Rthe esponse: 8200000E1003

6. Installation

1. The 3-phase current meter R718N3xxxD(E) 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:

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

➤ 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.

➤ 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.

4. The 3-phase current meter R718N3xxxD(E) samples the current according to MinTime. If the current value sampled this time relatively exceeds the set value (the default is 100mA) more than the current value reported last time, the device will immediately report the current value sampled this time. If the current variation does not exceed the default value, the data will be reported regularly according to MaxTime.

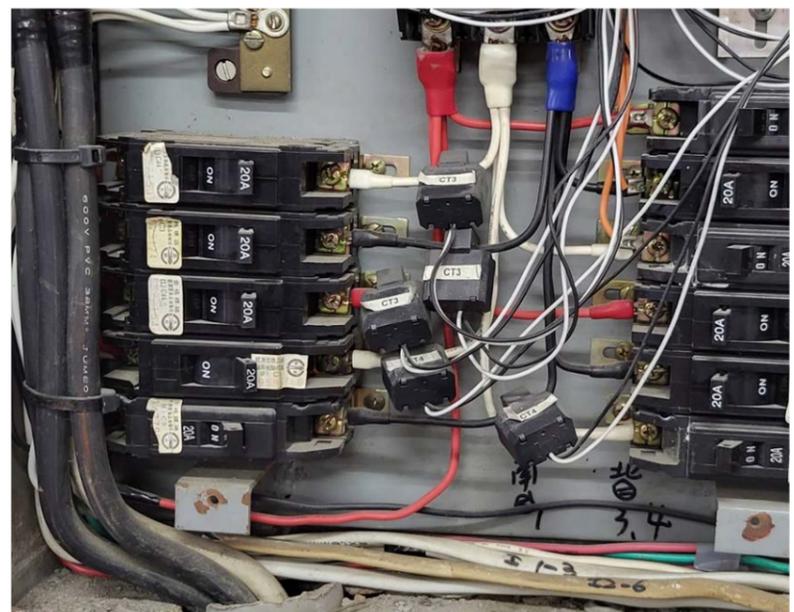
5. Press the function key of the device to start sampling data and report the data after 3 to 5 seconds.

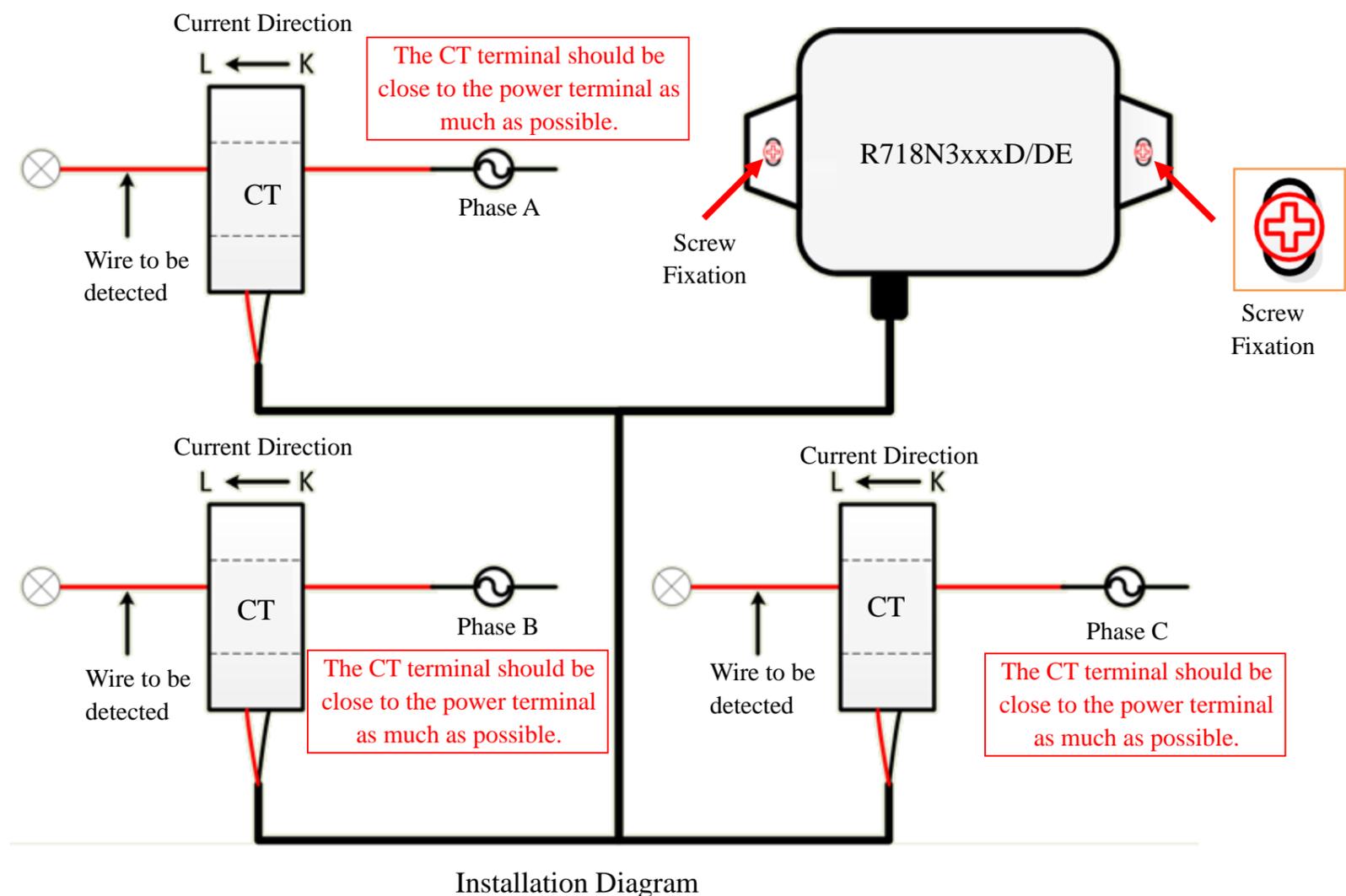
Note: MaxTime must be set greater than Min Time.

The three-phase current detector R718N3xxxD(E) is suitable for the following scenarios:

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

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





7. Important Maintenance Instruction

Kindly pay attention to the following in order 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 dusty or dirty environment. It might damage its detachable parts and electronic components.
- Do not store the device under excessive hot condition. High temperature 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 to normal temperature, moisture will form inside, which will destroy the board.
- Do not throw, knock or shake the device. Rough handling of device 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 in the device and affect the operation.

All of the above applies to your device, battery and accessories.

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