netvox Wireless Light Sensor and 3-Phase Current Meter R718NL3 User Manual

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3-Phase Current Meter

R718NL3
User Manual

Contents

Introduction

The R718NL3 series is a Light Sensor and 3-Phase Current Meter device for Netvox ClassA type devices based on the
LoRaWAN open protocol and is compatible with the LoRaWAN protocol. R718NL3 series have different

measuring range for different variety of CT.
It is divided into:
R718NL3 Wireless Light Sensor and 3-Phase Current Meter with 3 x 50A Solid Core CT
(Range:100mA-50A , Accuracy ±1% within 300mA~50A)
R718NL37 Wireless Light Sensor and 3-Phase Current Meter with 3 x 75A Clamp-On CT
(Range: 100mA -75A ±1%, Accuracy ±1% within 300mA~50A)
R718NL315 Wireless Light Sensor and 3-Phase Current Meter with 3 x 150A Clamp-On CT (Range:1A-150A ±1%)
R718NL325 Wireless Light Sensor and 3-Phase Current Meter with 3 x 250A Clamp-On CT (Range:1A-250A ±1%)
R718NL363 Wireless Light Sensor and 3-Phase Current Meter with 3 x630A Clamp-On CT (Range:10A-630A ±1%)
* When the current of the device that is 75A or below is less than 100mA, the current is reported as 0.
When the current of the device that is above 75A is less than 1A, the current is reported as 0.

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 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.

Appearance

Main Features

- Compatible with LoRaWAN protocol
- 2 sections ER14505 3.6V Lithium AA battery
- Current detection
- Illuminance detection

- Protection level: Main body IP53, Sensor IP30
- Compatible with LoRaWAN TM Class A
- Frequency-hopping spread spectrum technology
- 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)
- Available third-party platform: Actility / ThingPark, TTN, MyDevices/Cayenne
- Low power consumption and long battery life

Note:
Battery life is determined by the sensor reporting frequency and other variables, please refer to **http://www.netvox.com.tw/electric/electric_calc.html** On this website, users can find battery lifetime for varied models at different configurations.

Set up Instruction

On/Off

Power on	Insert batteries. (users may need a flat blade screwdriver to open)
Turn on	Press and hold the function key for 3 seconds till the green indicator flashes once.
Turn off (Restore to factory setting)	Press and hold the function key for 5 seconds till the green indicator flashes 20 times.
Power off	Remove Batteries.
Note	1. The device will be off after removing the battery and inserting it again. 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	
If the device has never joined the network	Turn on the device, and it will search for the network to join. The green indicator light stays on for 5 seconds: joins the network successfully The green indicator light remains off: fail to join the network
If the device has joined the network and it is not set to default	Turn on the device, and it will search for the previous network to join. The green indicator light stays on for 5 seconds: joins the network successfully The green indicator light remains off: fail to join the network

If the device fails to join t he network (when the device is turned on)	**Note:** It is suggested to remove the batteries if the device is not in use to save pow er. It is suggested to check the device verification information on the gateway or consult your platform server provider when the device fails to join the network.
Function Key	
Press the function key a nd hold the pressing for 5 seconds	The device will be set to default and turned off The green indicator light flashes 20 ti mes: success The green indicator light remains off: fail
Press the function key on ce	The device is in the network: green indicator light flashes once and sends a report The device is not in the network: the green indicator light remains off
Sleeping Mode	
The device is turned on a nd in the network	Sleep period: Min Interval. When the report change exceeds the setting value or the state changes: send a dat a report according to Min Interval.
The device is turned on b ut not in the network	**Note:** Suggest removing batteries if the device is not used. Suggest checking devic e verification on the gateway.

Low Voltage Warning

Low Voltage	3.2V

Data Report

The device will immediately send a version packet report along with an uplink packet including current, illuminance and battery voltage.
The device sends data in the default configuration before any configuration is done.

Default setting:
Maximum time: Max Interval =15 min (900 s)
Minimum time: Min Interval =15 min (900 s) *Please configure more than 30 seconds
CurrentChange:0x0064 (100 mA)
IlluminanceChange: 0x0064 (100 Lux)

ight sensor support 3 ranges of Illuminance:
0x00, 3~65000 Lux (default)
0x01, 3~130000 Lux
0x02, 3~220000 Lux

Note:

(1) The device report interval will be programmed based on the default firmware which may vary.
(2) The interval between two reports must be the minimum time.
(3) If the Minime configuration is less than 30 seconds, it will configure 30 seconds.
(4) R718NL3 series would take about 15 seconds for the CT to sample and process the collected value, If the current changes frequently, the sampling result might be wrong.

Please refer to Netvox LoRaWAN Application Command document and Netvox Lora Command Resolver **http://www.netvox.com.cn:8888/page/index** 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 30~65535	Any number between Min.~65535	Can not be 0.	Report per Min. Interval	Report per Max. Interval

Example of Report configuration
FPort 0x07

Bytes	1 Byte	1 Byte	Var(Fix =9 Bytes)
	CmdID	Device Type	NetvoxPayLoadData

CmdID– 1 byte
DeviceType– 1 byte – Device Type of Device
NetvoxPayLoadData– var bytes (Max=9bytes)

Description	Device	Cmd ID	Device Type	NetvoxPayLoadData

ConfigReport Req	R718NL3	0x01	0x99	MinTime (2bytes Unit:s)	MaxTime (2bytes Unit:s)	CurrentChange (2byteUnit: 1mA)	Illuminancechange (2bytes Unit: 1Lux)	Reserved (1Bytes, Fixed 0x00)
ConfigReport Rsp		0x81		Status (0x00_success)		Reserved (8Bytes,Fixed 0x00)		
ReadConfigReportReq		0x02		Reserved (9Bytes,Fixed 0x00)				
ReadConfigReportRsp		0x82		MinTime (2bytes Unit:s)	MaxTime (2bytes Unit:s)	CurrentChange (2byteUnit: 1mA)	Illuminancechange (2bytes Unit: 1Lux)	Reserved (1Bytes, Fixed 0x00)

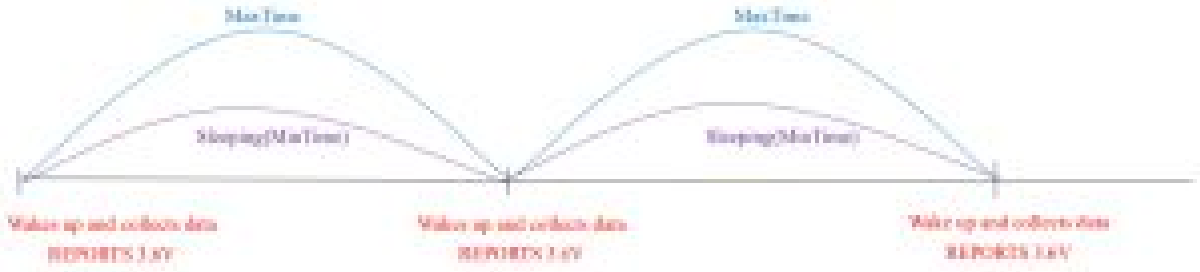
(1) Configure report parameters MinTime = 1min, MaxTime = 1min, CurrentChange = 100mA, IlluminanceChange = 100Lux
Downlink: 0199003C003C0064006400
The device returns:

819900000000000000000 (Configuration succeeded)
819901000000000000000 (Configuration failed)
(2) Read device configuration parameters
Downlink: 029900000000000000000
The device returns:
8299003C003C0064006400 (current device configuration parameters)

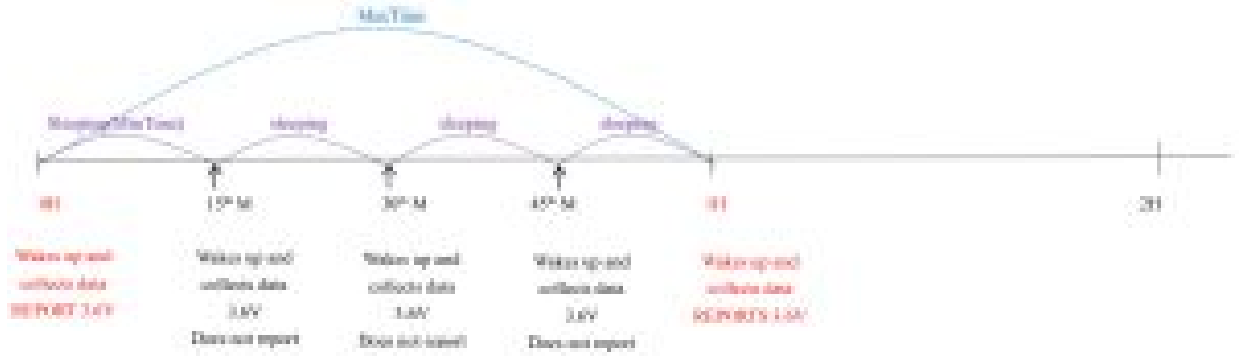
Report Current and Illuminance Data Example

R718NL3	0x99	0x01	Battery (1Byte, unit:0.1V)	Current1 (2Bytes, Unit:1ma)	Current2 (2Bytes, Unit:1ma)	Current3 (2Bytes, Unit:1ma)	Mulitplier1 (1Byte), the real current1 should convert with Current* Multiplier
		0x02	Battery (1Byte, unit:0.1V)	Mulitplier2(1Byte), the real current2 should convert with Current* Multiplier	Mulitplier3 (1Byte), the real current3 should convert with Current* Multiplier	Illuminance (4Bytes, Unit:1Lux)	Reserved (1Bytes, fixed 0x00)

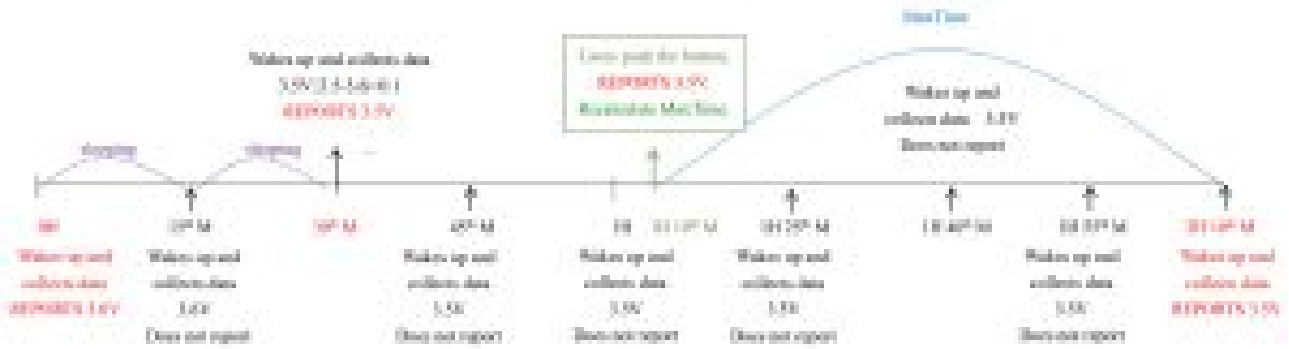
FPort 6 Report Data (1): 01990124 03E8 03E8 03E8 01
(2): 01990124 01 01 00000003 00
Current1=Current1*Mulitplier1 Current2=Current2*Mulitplier2 Current3=Current3*Mulitplier3
When illuminance less than 3 lux, the reported value is 3 lux.
Example for MinTime/Maxime logic
Example#1 based on MinTime = 1 Hour, MaxTime= 1 Hour, Reportable Change i.e. BatteryVoltageChange=0.1V



Note: MaxTime=MinTime. Data will only be reported according to Maxime (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.

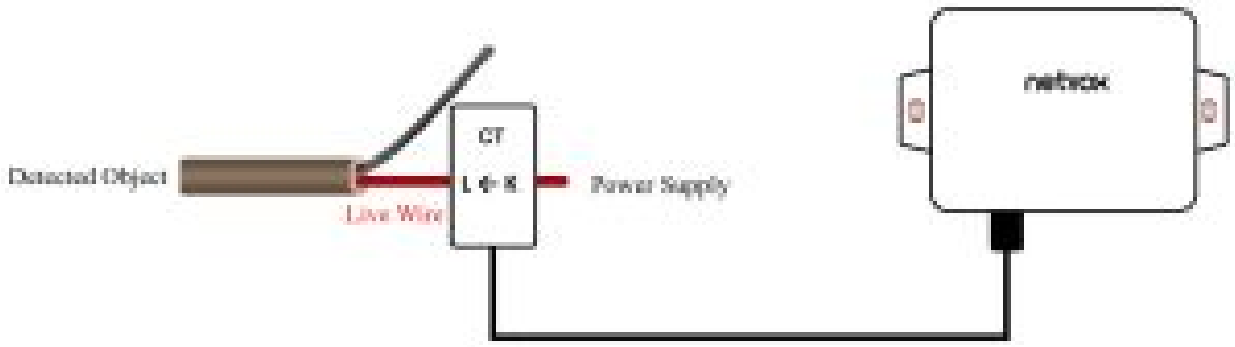


Notes :
1) The device only wakes up and performs data sampling according to MinTime Interval. When it is sleeping, it does not collect data.
2) The data collected is compared with the last data reported. If the data variation is greater than the ReportableChange value, the device reports according to MinTime interval. If the data variation is not greater than the last data reported, the device reports according to Maxime interval.
3) 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.
4) Whenever the device sends a report, no matter resulting from data variation, button pushed, or Maxime interval, another cycle of MinTime/Maxime calculation is started.

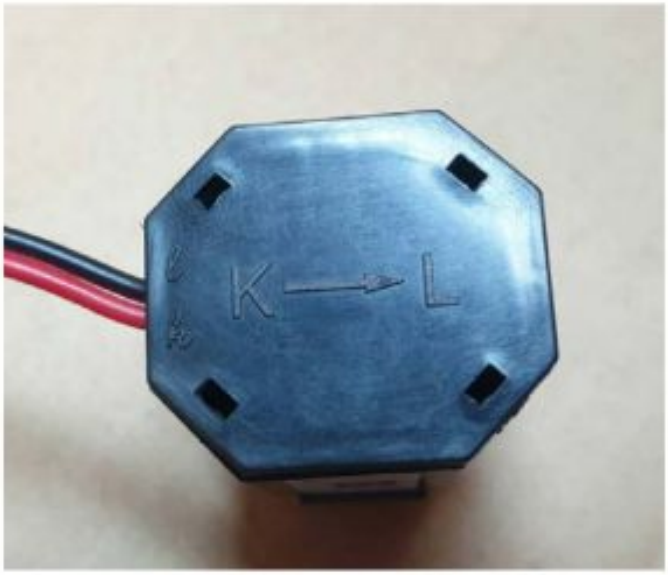
Installation

1. When using it, the back of it can be adsorbed on the iron surface, or the two ends can be fixed to the wall with screws.
2. When installing the R718NL3 series current transformer, please separate the live and neutral wires of the wire to be detected, and only take the live wire through the current transformer and start the measurement according to the wiring below:

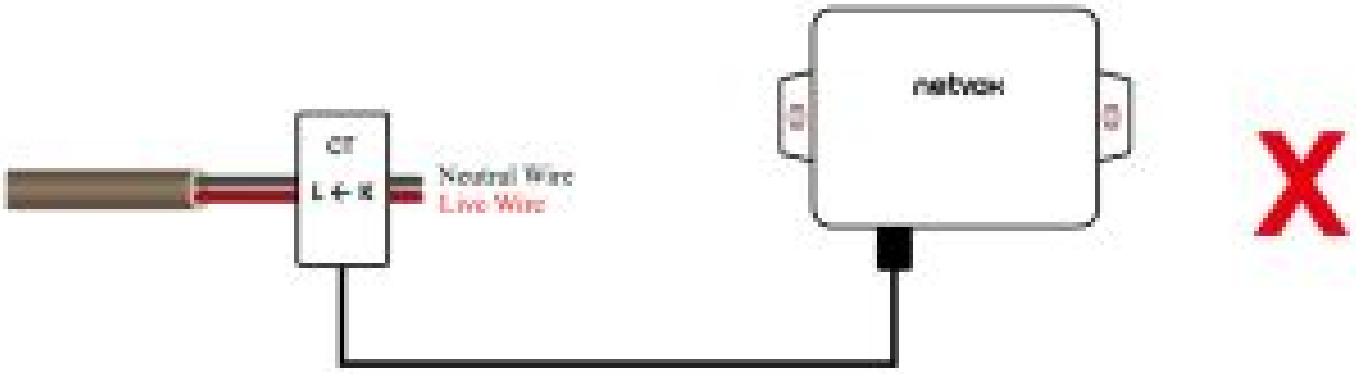
Neutral Wire



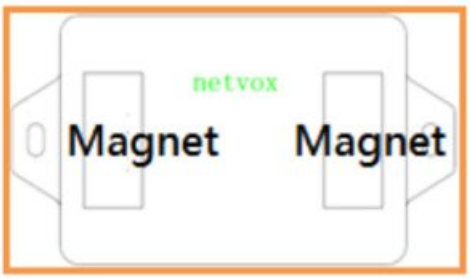
CT Wiring Schematic Diagram (Current direction K→L)



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.



1. The single-phase current detector (R718NL3) has a built-in magnet (as the figure 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 split 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, the 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.

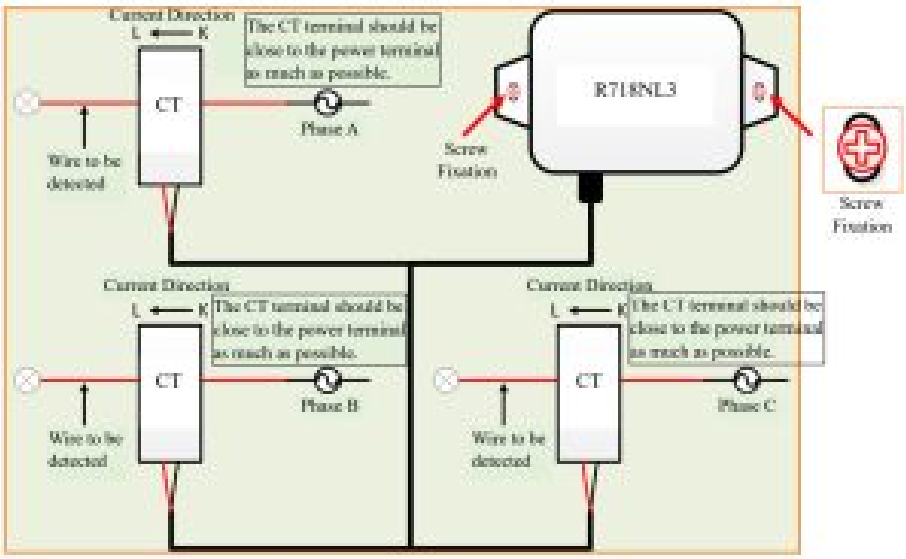
• Before installation, please confirm the current value of the load. If the current value of the load is higher than the measurement range, select a model with a higher measurement range

4. The three-phase current detector (R718NL3) 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.
   Press the [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 (R718NL3) is suitable for the following scenarios:

- School
- Factory
- The mall
- Office building
- Smart building

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



Installation Diagram

Note:
Please do not disassemble the device unless it is required to replace the batteries.
Do not touch the waterproof gasket, LED indicator light, function keys when replacing the batteries. Please use a suitable screwdriver to tighten the screws (if using an electric screwdriver, it is recommended to set the torque as 4kgf) to ensure the device is impermeable.

Information about Battery Passivation

Many of Netvox devices are powered by 3.6V ER14505 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 a continuous reaction 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 source batteries from reliable vendors, and the batteries should be produced within the last three months.

If encountering the situation of battery passivation, users can activate the battery to eliminate the battery hysteresis.

7.1 To determine whether a battery requires activation
Connect a new ER14505 battery to a 68ohm resistor in parallel, and check the voltage of the circuit.
If the voltage is below 3.3V, it means the battery requires activation.

7.2 How to activate the battery
a. Connect a battery to a 68ohm resistor in parallel
b. Keep the connection for 6~8 minutes
c. The voltage of the circuit should be ≧3.3V

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 getswet, 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 excessive heat conditions. 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 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 working properly, please take it to the nearest authorized service facility for repair.

Documents / Resources

	**netvox Wireless Light Sensor and 3-Phase Current Meter R718NL3** [pdf] User Manual netvox, Wireless, Light Sensor, and, 3-Phase, Current Meter, R718NL3