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Make Measurement Better
IP PRODUCT
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Appearance patent number
ZL202530265792.4
CAUTION
CAUTION

NEW

High precision
Fast response
Stable communication

Three-Phase AC Module

Voltage:50~220/380V Current:0~100A Network port CT

Multi	DIN35	MODBUS RTU	UART RS485
Multi-parameter acquisition	Guide rail installation	Standard Protocol	Standard interface

- Voltage
- Current
- Frequency
- Active power
- Energy
- Power factor
- Reactive power
- Apparent power

Appearance Design
New Standard of Electronic Aesthetics

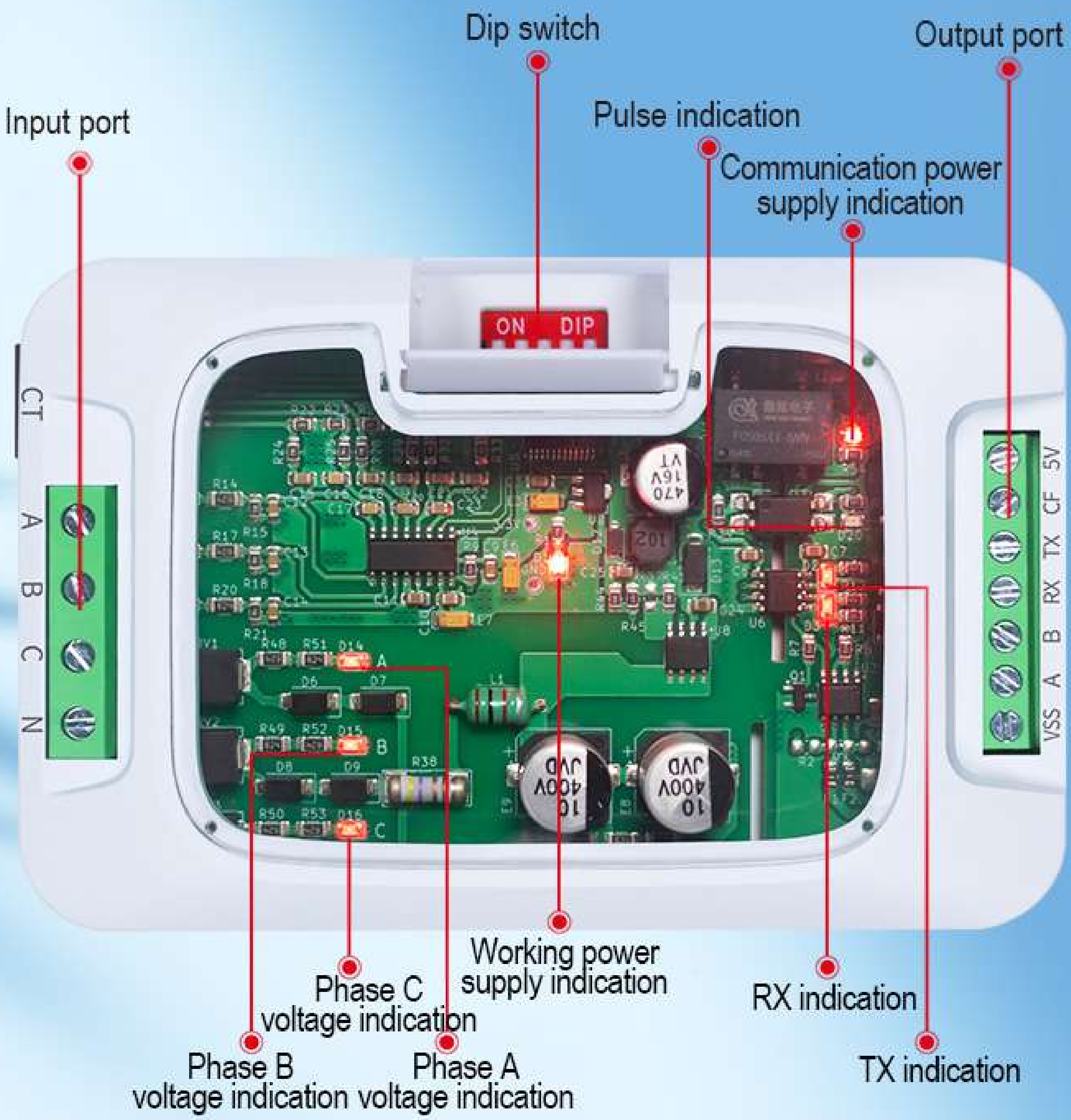
High integration circuit, minimalist profile, transparent window, frosted base, PC fire-resistant material

High integrated circuit design

Efficient space utilization

The transparent window offers a clear view

Transparent mask, real-time visibility of operating status



PC-grade flame retardants prevent fire

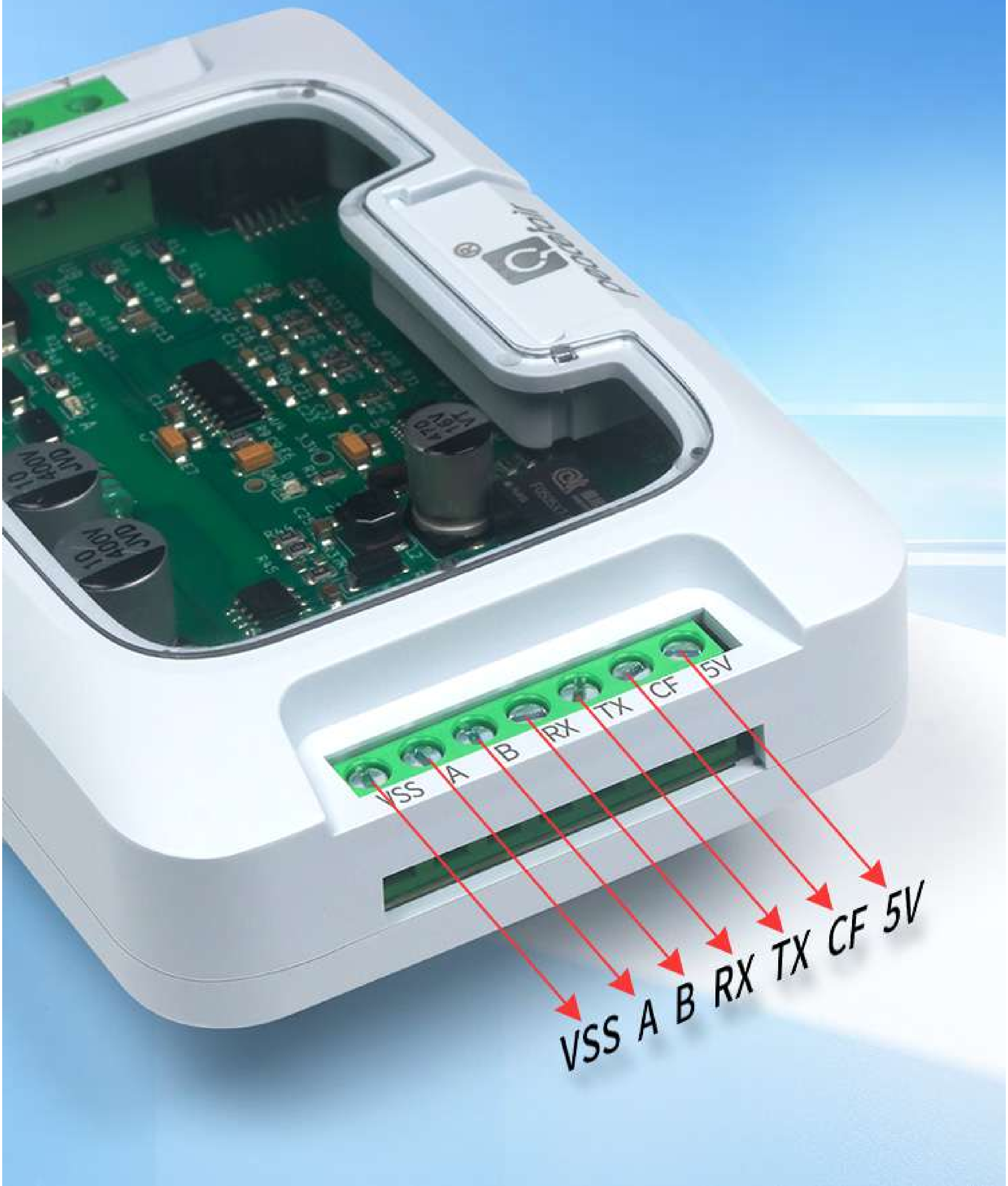
It has good impact resistance and heat resistance

Network Interface Design
Plug and play

Transformer current sampling is convenient and safe

Rich communication interfaces

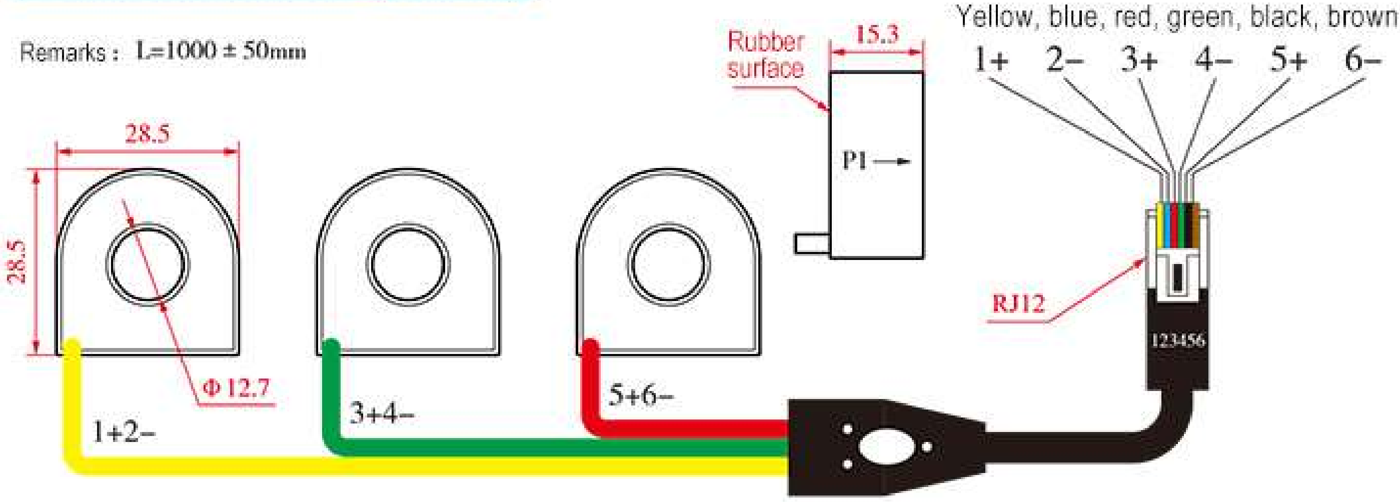
The application layer adopts the Modbus-RTU protocol,
the physical layer uses UART or 485 communication interfaces



Equipped with a high-current transformer
Measure directly without conversion

It can measure a current of 3 phases ×100A

External dimensions drawing (unit: mm)



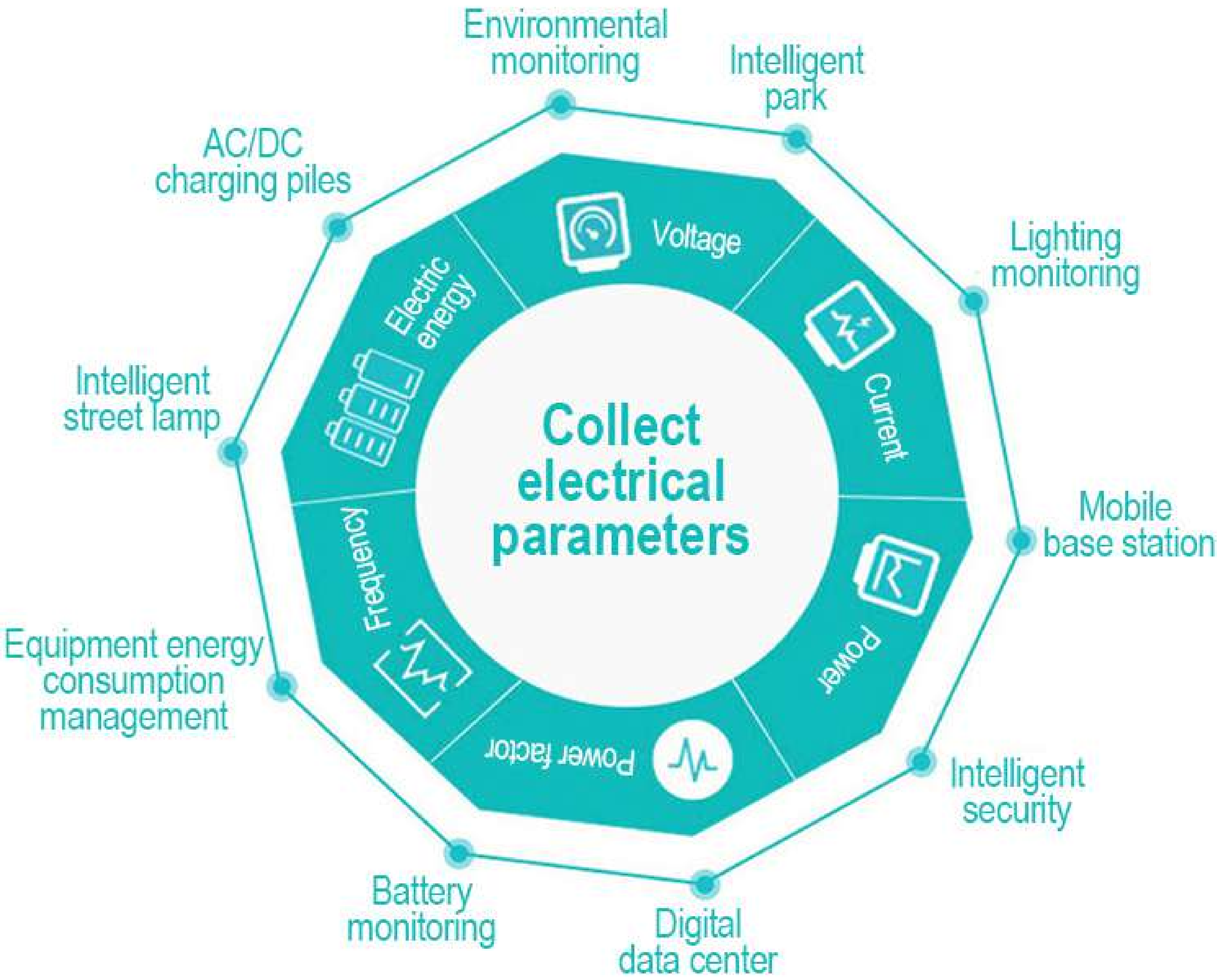
Specification parameters

	PZXQCT-100A-RJ12-3P1 network port	Unit
Rated input	50	A(AC)
Rated output	50	mA(AC)
Transformation ratio	1000:1	Magnification
Phase difference	≤ 10 ′ (RL=0.5Ω)	points
Linear range	0~110 (RL=0.5Ω)	A(AC)
Linearity	0.2%	%
Direct current resistance	37 ± 8Ω	Ω
Net weight of the product	/	g
Dimensional tolerance	0.5	mm
Usage method	The primary current flows into the transformer from P1, and the secondary winding current flows into the external circuit from S1	/

Note: Current transformers must not be used in an open circuit, nor should fuses be connected. When using a current transformer, please be sure to connect the load device at the output end of the transformer first.

More application scenarios

Monitor the electrical parameters and power consumption of AC equipment

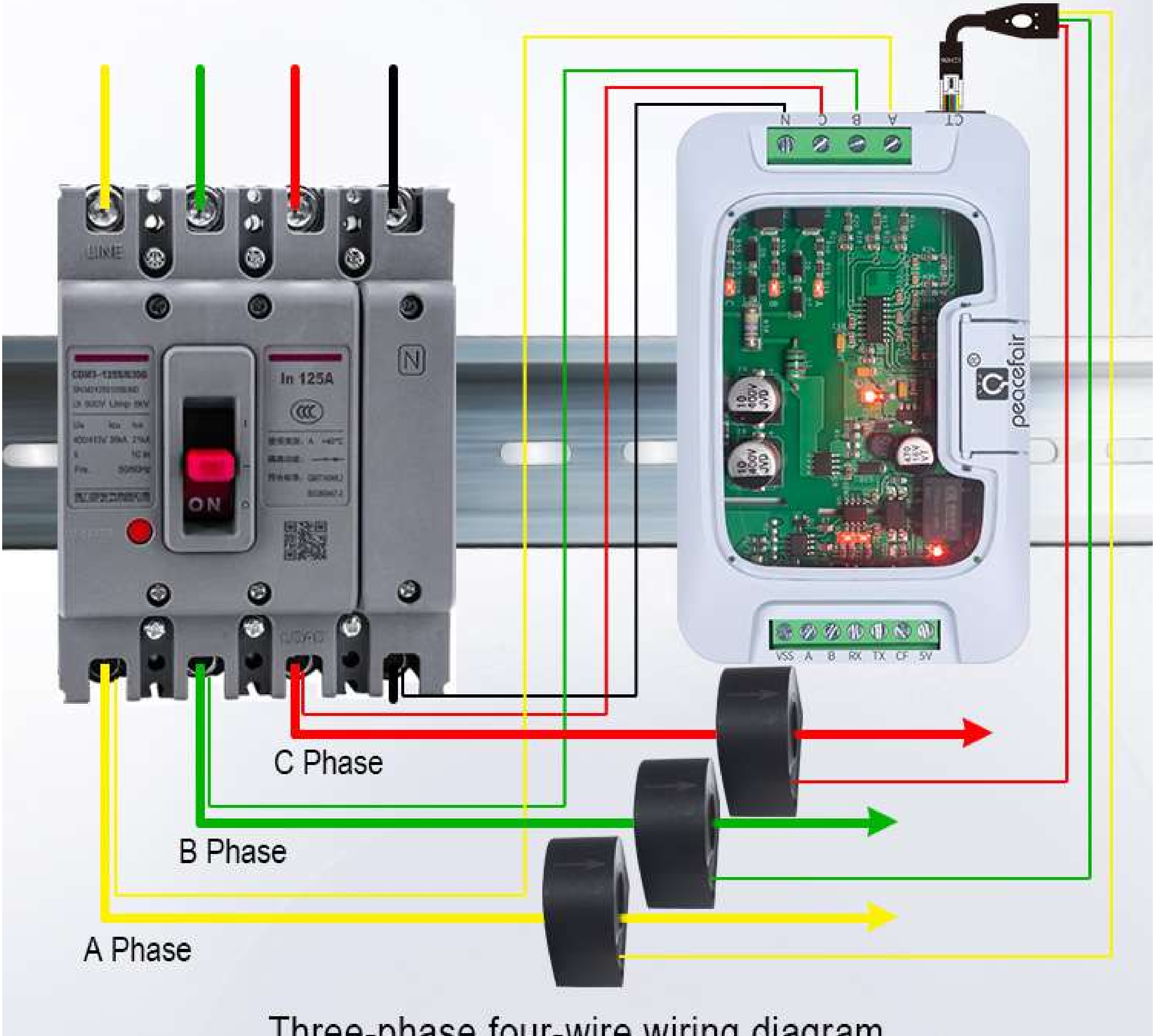


The guide rail design makes installation more convenient

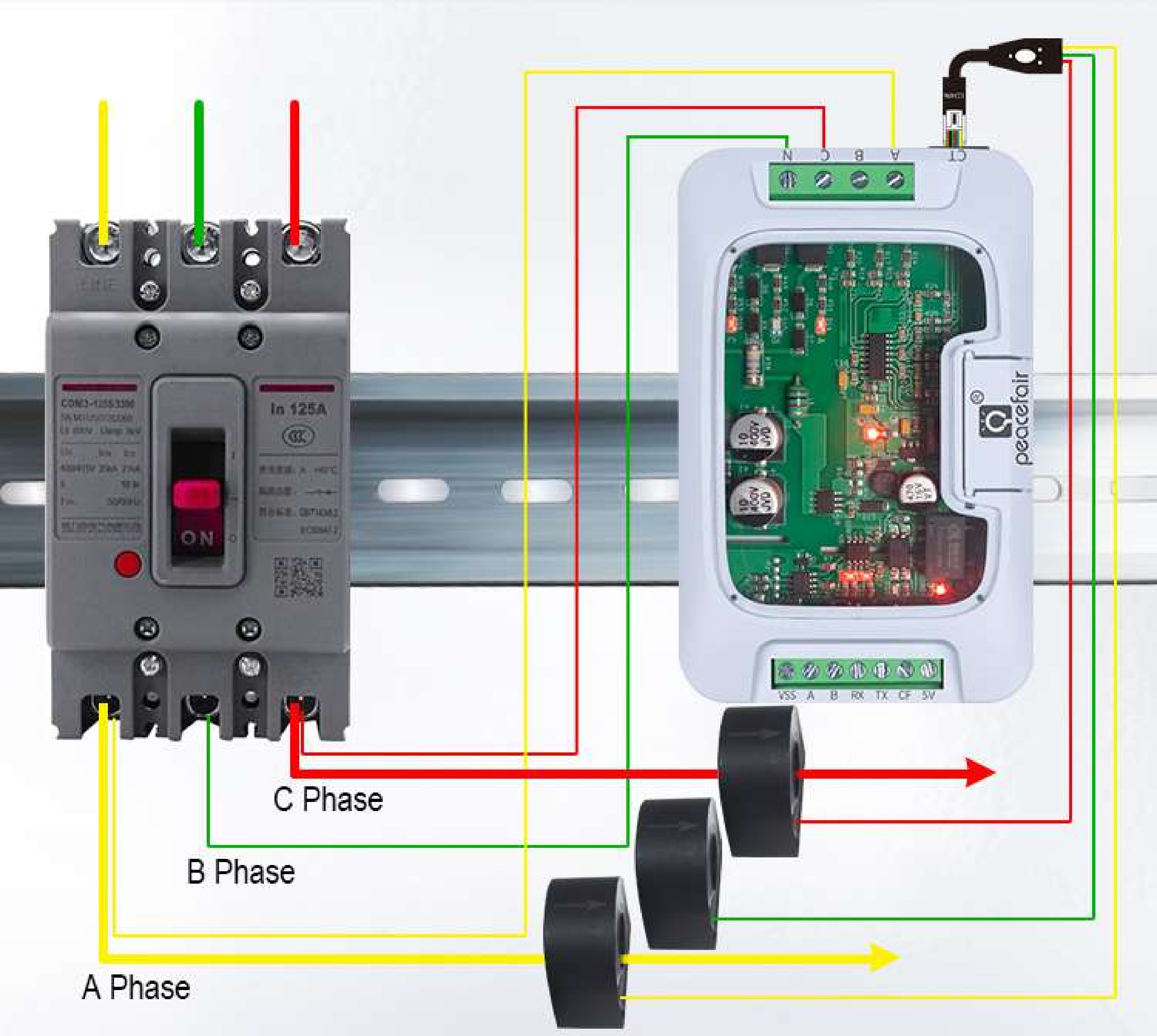
35mm standard guide rail slot

Compatible with three-phase three-wire/four-wire

The wiring is compatible



Three-phase four-wire wiring diagram



Three-phase three-wire wiring diagram

Product dimension drawing

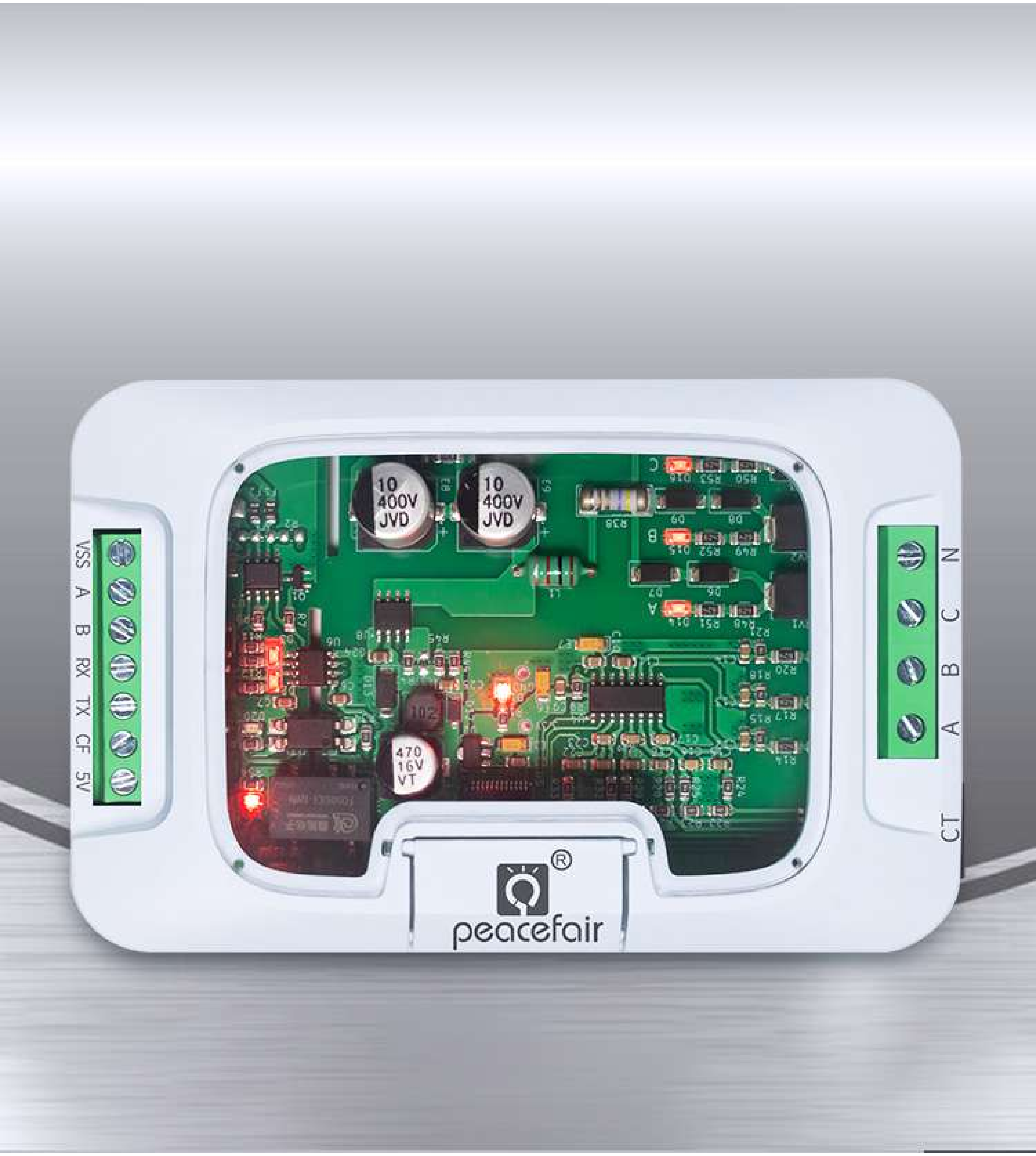
Length×Width×height: 116×76×27.8mm

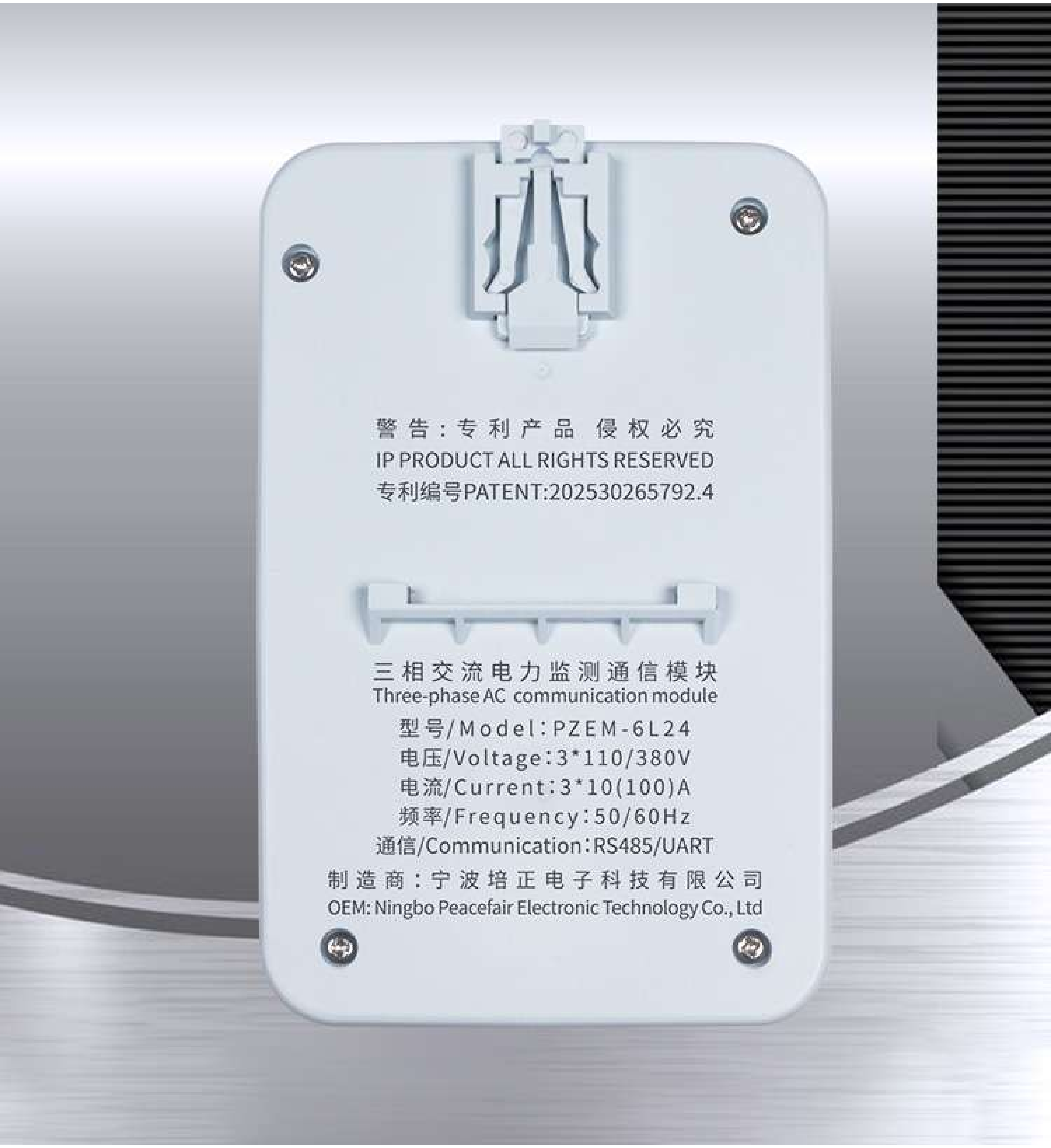
Product Photography

360° all-round display


N C B A CT
peacefair
VSS A B RX TX CF 5V


VSS A B RX TX CF 5V
A B C N
CT
peacefair


VSS
A
B
RX
TX
CF
5V
N
C
B
A
CT
10 400V JVD
10 400V JVD
470 16V VT
peacefair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专利编号PATENT:202530265792.4
三 相 交 流 电 力 监 测 通 信 模 块
Three-phase AC communication module
型号/Model：PZEM-6L24
电压/Voltage：3*110/380V
电流/Current：3*10(100)A
频率/Frequency：50/60Hz
通信/Communication：RS485/UART
制 造 商：宁 波 培 正 电 子 科 技 有 限 公 司
OEM: Ningbo Peacefair Electronic Technology Co., Ltd


VSS
A
B
RX
TX
CF
5V

Three-Phase AC Module User Manual

Overview

This document describes the technical specifications and usage instructions for the PZEM-6L24 three-phase AC module. The module is designed to measure electrical parameters in three-phase power grids, it has no display screen, you can read the data via UART or RS485 interfaces.

Dimensions Diagram

Length × Width × height:116×76×27.8mm

Figure 1 Dimension Diagram

Features & Technical Specifications

Parameter	Min	Typical	Max	Accuracy	Unit	Remarks
Voltage	50	220/380	566	1%	V	
Current	0		100	1%	A	
Frequency	45	50/60	65	1%	HZ	
Active Power	0		38	1%	kW	
Reactive Power	0		38	1%	kVar	
Apparent Power	0		38	1%	kVA	
Power Factor(PF)	0		1	1%	PF	
Active Energy	0		399999999.9	1%	kWh	
Reactive Energy	0		399999999.9	1%	kVarh	
Apparent Energy	0		399999999.9	1%	kVAh	
Phase	0		360		°	
Pulse Constant (CF)		1000			imp/kWh	10ms open-drain output (pull-up resistor required)
Baud Rate	2400	9600	115200			
UART Working Voltage		3.3			V	
RS485 Working Voltage		3.3			V	
UART Working Voltage(External)	3	5	5.5		V	when needed
RS485 Working Voltage(External)	3	5	5.5		V	when needed
UART Output Current	60	80	100		mA	
RS485 Output Current	60	80	100		mA	
Device Address (dialing code)	1	1	32			
Device Address (Software Setting)	1	1	247			0 broadcast 248-255 reserved
Whole machine power consumption	0.2	0.3	0.5		W	
Operating Temperature	-20	23	60		°C	
Weight(Only PCB)		51			g	
Weight(Only Host)		107			g	

Communication Protocol

1. Physical Layer

Interfaces: UART or RS485

Settings: Configurable baud rate, 8 data bits, 1 stop bit, no parity.

2. Application Layer (Modbus-RTU)

Application layer use Modbus-RTU protocol to communicate. At present, it only supports function codes such as 0x03 (Read Holding Register), 0x04 (Read Input Register), 0x10 (Write Multiple Registers), 0x41 (Calibration), 0x42 (Reset energy).etc.

0x41 function code is only for internal use (address can be only 0xF8), used for factory calibration and return to factory maintenance occasions, after the function code to increase 16-bit password, the default password is 0x3721

The address range of the slave is 0x01 ~ 0xF7. The address 0x00 is used as the broadcast address, the slave does not need to reply the master. The address 0xF8 is used as the general address, this address can be only used in single-slave environment and can be used for calibration and setting etc. operation.

3. Read the Measurement Result

The command format of the master reads the measurement result is (total 8 bytes):

Slave Address + 0x04 + Register Address High Byte + Register Address Low Byte + Register quantity High Byte + Register quantity Low Byte + CRC High Byte + CRC Low Byte.

There are two types for the command format of the reply from the slave:

Correct Reply: Slave Address + 0x04 + Number of Bytes + Register 1 Data Low Byte + Register 1 Data High Byte + ... + CRC High Byte + CRC Low Byte

Error Reply: Slave address + 0x84 + Abnormal code + CRC High byte + CRC Low byte

Abnormal code analyzed as following (the same below)

- 0x01, Illegal function
- 0x02, Illegal address
- 0x03, Illegal data
- 0x04, Slave error

The register of the measurement results is arranged as the following table

Register address	Description	Resolution
0x0000	A Phase Voltage Value	1LSB corresponds to 0.1V, no signed number low byte first (same below)
0x0001	B Phase Voltage Value	1LSB corresponds to 0.1V, no signed number
0x0002	C Phase Voltage Value	1LSB corresponds to 0.1V, no signed number
0x0003	A Phase Current Value	1LSB corresponds to 0.01A, no signed number
0x0004	B Phase Current Value	1LSB corresponds to 0.01A, no signed number
0x0005	C Phase Current Value	1LSB corresponds to 0.01A, no signed number
0x0006	A Phase Voltage Frequency Value	1LSB corresponds to 0.01Hz
0x0007	B Phase Voltage Frequency Value	1LSB corresponds to 0.01Hz
0x0008	C Phase Voltage Frequency Value	1LSB corresponds to 0.01Hz
0x0009	B Phase Voltage Phase	1LSB corresponds to 0.01 °, relative to A phase voltage
0x000A	C Phase Voltage Phase	1LSB corresponds to 0.01 °, relative to A phase voltage
0x000B	A Phase Current Phase	1LSB corresponds to 0.01 °, relative to A phase voltage
0x000C	B Phase Current Phase	1LSB corresponds to 0.01 °, relative to A phase voltage
0x000D	C Phase Current Phase	1LSB corresponds to 0.01 °, relative to A phase voltage
0x000E	A Phase Active Power 16 Bits Low	1LSB corresponds to 0.1W, with a signed number
0x000F	A Phase Active Power 16 Bits High	
0x0010	B Phase Active Power 16 Bits Low	1LSB corresponds to 0.1W, with a signed number
0x0011	B Phase Active Power 16 Bits High	
0x0012	C Phase Active Power 16 Bits Low	1LSB corresponds to 0.1W, with a signed number
0x0013	C Phase Active Power 16 Bits High	
0x0014	A Phase Reactive Power 16 Bits Low	1LSB corresponds to 0.1Var, with a signed number
0x0015	A Phase Reactive Power 16 Bits High	
0x0016	B Phase Reactive Power 16 Bits Low	1LSB corresponds to 0.1Var, with a signed number
0x0017	B Phase Reactive Power 16 Bits High	
0x0018	C Phase Reactive Power 16 Bits Low	1LSB corresponds to 0.1Var, with a signed number
0x0019	C Phase Reactive Power 16 Bits High	
0x001A	A Phase Apparent Power 16 Bits Low	1LSB corresponds to 0.1VA, with a signed number
0x001B	A Phase Apparent Power 16 Bits High	
0x001C	B Phase Apparent Power 16 Bits Low	1LSB corresponds to 0.1VA, with a signed number
0x001D	B Phase Apparent Power 16 Bits High	

0x001E	C Phase Apparent Power 16 Bits Low	1LSB corresponds to 0.1VA, with a signed number
0x001F	C Phase Apparent Power 16 Bits High	
0x0020	Combined Active Power 16 Bits Low	1LSB corresponds to 0.1W, with a signed number
0x0021	Combined Active Power 16 Bits High	
0x0022	Combined Reactive Power 16 Bits Low	1LSB corresponds to 0.1 Var, with a signed number
0x0023	Combined Reactive Power 16 Bits High	
0x0024	Combined Apparent Power 16 Bits Low	1LSB corresponds to 0.1VA, with a signed number
0x0025	Combined Apparent Power 16 Bits High	
0x0026	A Phase and B Phase Power Factor	1LSB corresponds to 0.01, high byte is A phase, low byte is B phase
0x0027	C Phase and Combined Power Factor	1LSB corresponds to 0.01, high byte is C phase, low byte is combined phase
0x0028	A Phase Active Energy 16 Bits Low	1LSB is 0.1kWh
0x0029	A Phase Active Energy 16 Bits High	
0x002A	B Phase Active Energy 16 Bits Low	1LSB is 0.1kWh
0x002B	B Phase Active Energy 16 Bits High	
0x002C	C Phase Active Energy 16 Bits Low	1LSB is 0.1kWh
0x002D	C Phase Active Energy 16 Bits High	
0x002E	A Phase Reactive Energy 16 Bits Low	1LSB is 0.1kVar
0x002F	A Phase Reactive Energy 16 Bits High	
0x0030	B Phase Reactive Energy 16 Bits Low	1LSB is 0.1kVar
0x0031	B Phase Reactive Energy 16 Bits High	
0x0032	C Phase Reactive Energy 16 Bits Low	1LSB is 0.1kVar
0x0033	C Phase Reactive Energy 16 Bits High	
0x0034	A Phase Apparent Energy 16 Bits Low	1LSB is 0.1kVA
0x0035	A Phase Apparent Energy 16 Bits High	
0x0036	B Phase Apparent Energy 16 Bits Low	1LSB is 0.1kVA
0x0037	B Phase Apparent Energy 16 Bits High	
0x0038	Phase Apparent Energy 16 Bits Low	1LSB is 0.1kVA
0x0039	C Phase Apparent Energy 16 Bits High	
0x003A	Combined Active Energy 16 Bits Low	1LSB is 0.1Kw
0x003B	Combined Active Energy 16 Bits High	
0x003C	Combined Reactive Energy 16 Bits Low	1LSB is 0.1kVar
0x003D	Combined Reactive Energy 16 Bits High	
0x003E	Combined Apparent Energy 16 Bits Low	1LSB is 0.1kVA
0x003F	Combined Apparent Energy 16 Bits High	

The command format of the master to read the slave parameters and read the measurement results are same(see section 3.3 for details), only change the function code from 0x04 to 0x03.

The command format of the master to modify the slave parameters is:

Slave Address + 0x10 + Register Address High Byte + Register Address Low Byte + Register Quantity High Byte + Register Quantity Low Byte + N Byte + The Data of N Byte + CRC High Byte + CRC Low Byte.

There are two types of command formats for the following reply from the slave:

Correct Response: Slave Address + 0x10 + Register Address High Byte + Register Address Low Byte + Register Quantity High Byte + Register Quantity Low Byte + CRC High Byte + CRC Low Byte.

Error Reply: Slave address + 0x90 + Abnormal code + CRC High Byte + CRC Low Byte.

For example, the master sets the slave:

0x01 + 0x10 + 0x00 + 0x00 + 0x00 + 0x03 + 0x06 + 0xXX + 0xXX + 0xXX + 0xXX + 0xXX + 0xXX + 0xHH + 0xLL

Indicates that the master needs to set the 0x0000~0x0002 register.

The correct response from the master is as follows:

0x01 + 0x10 + 0x00 + 0x00 + 0x00 + 0x03 + 0xHH + 0xLL

5. Reset energy

The command format of the master to reset the slave's energy is(total 6 bytes):

Slave address + 0x42 + 0x00 + Phase Sequence + CRC High Byte + CRC Low Byte.

Correct Reply: Slave address + 0x42 + 0x00 + Phase Sequence + CRC High Byte + CRC Low Byte.

Error Reply: Slave address + 0xC2 + Abnormal code + CRC High Byte + CRC Low Byte

Phase Sequence:

- A Phase: 0x00
- B Phase: 0x01
- C Phase: 0x02
- Combined Phase: 0x03
- All Energy: 0x0F

6. Calibration

The command format of the master to calibrate the slave is (total 6 bytes):

0xF8 + 0x41 + 0x37 + 0x21 + CRC High Byte + CRC Low Byte.

Correct Reply: 0xF8 + 0x41 + 0x37 + 0x21 + CRC High Byte + CRC Low Byte.

Error Reply: 0xF8 + 0xC1 + Abnormal code + CRC High Byte + CRC Low Byte

It should be noted that the calibration takes 3~4 seconds, after the master sends the command, if the calibration is successful, it will take 3~4 seconds to receive the response from the slave.

7. CRC Check

CRC check use 16bits format, occupy two bytes, the generator polynomial is X16 + X15 + X2 +1, the polynomial value used for calculation is 0xA001.

The value of CRC check is the result of checking all bytes of a frame of data except the CRC check value.

Functional Block Diagram

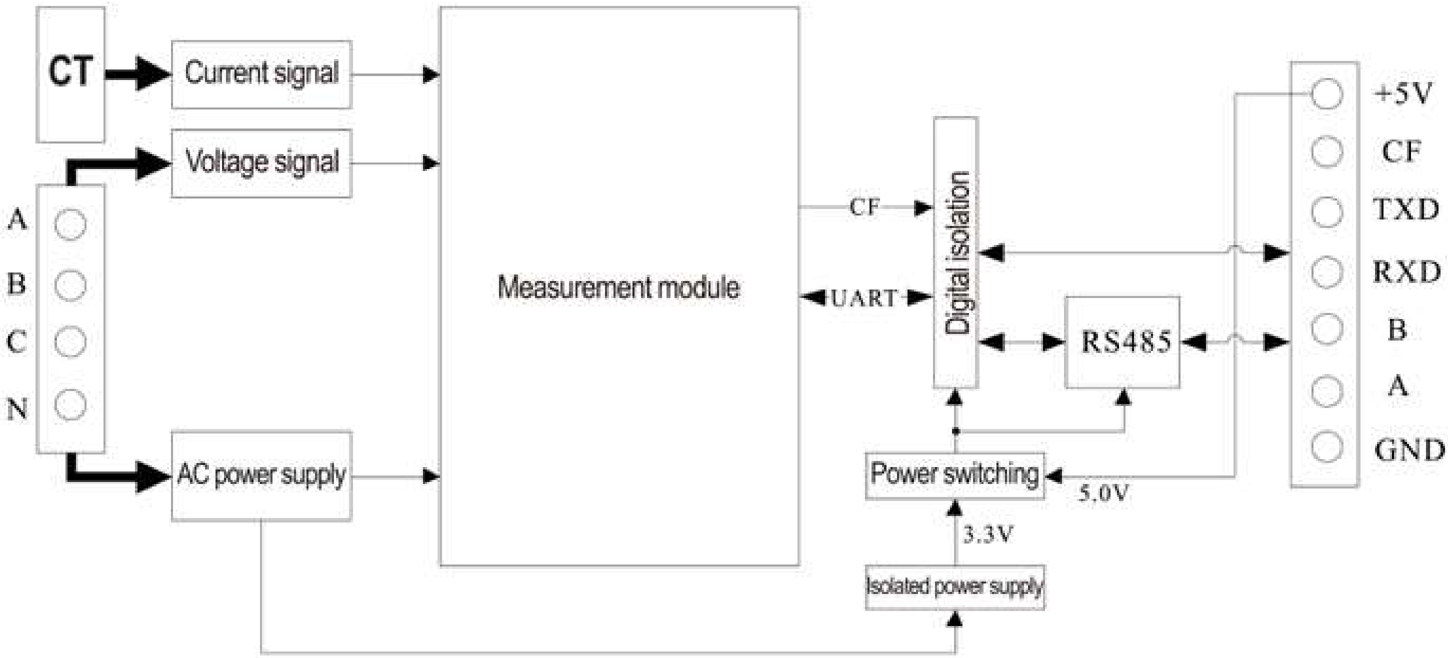

Figure2 Functional Block Diagram

Wiring Diagram

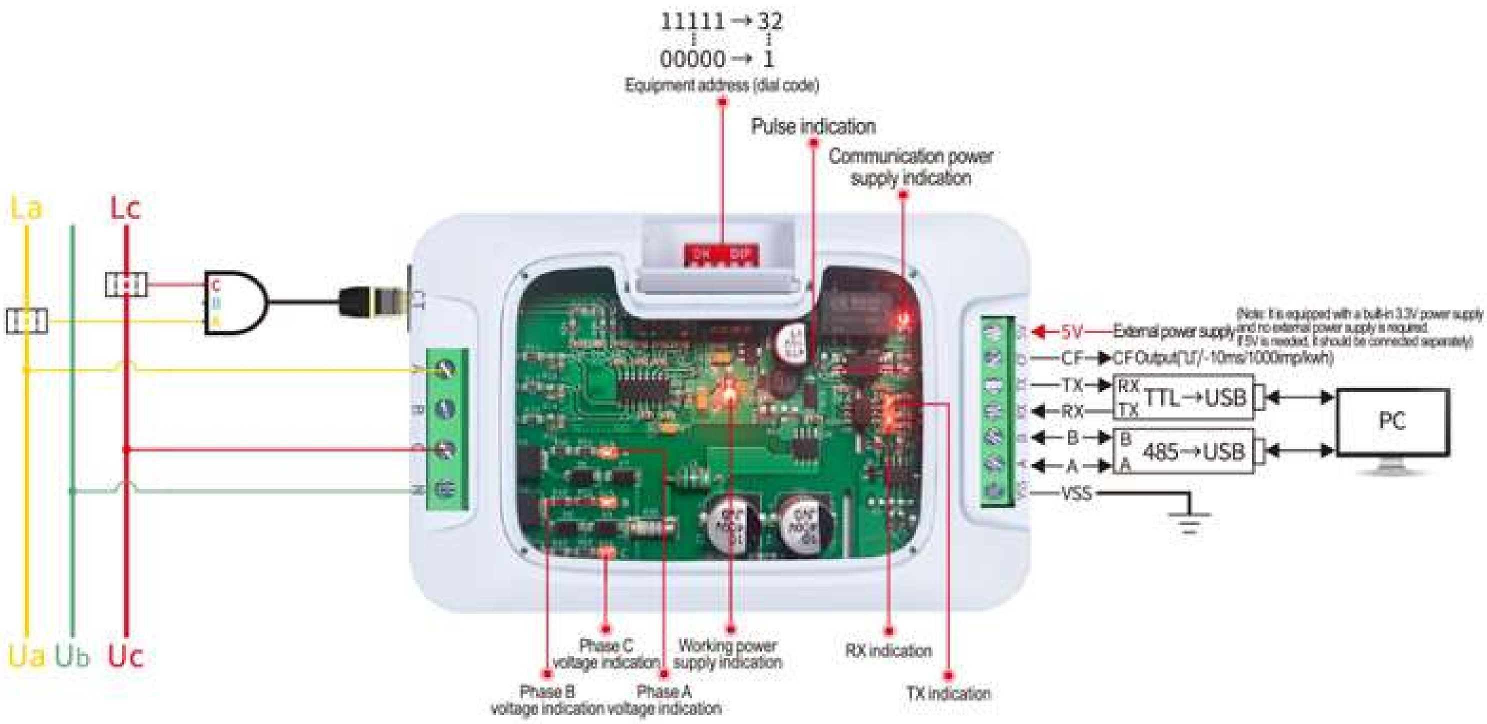

Figure3 Three Phase Three-Wire Connection

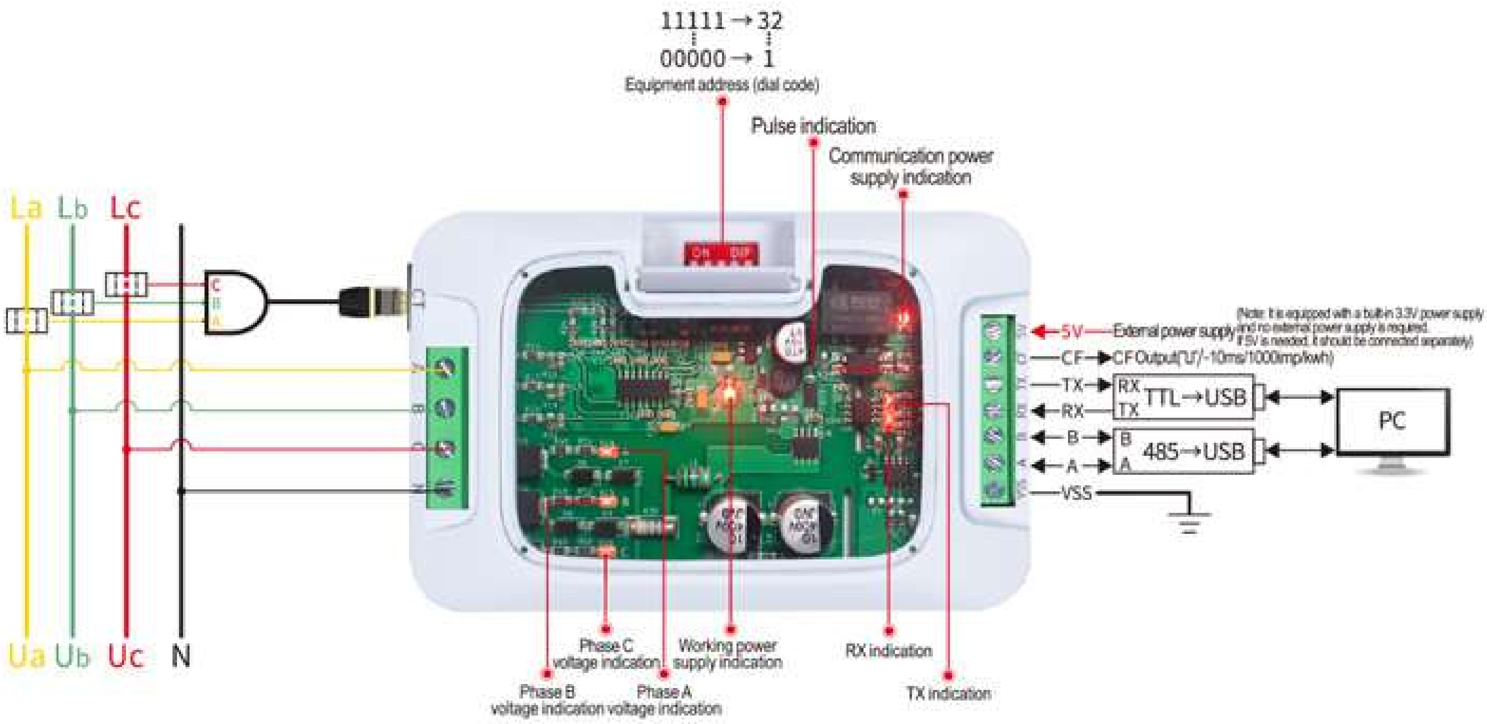

Figure4 Three Phase Four-Wire Connection

Note:

1. CF is a 10mS negative pulse open drain output, and external testing requires a pull-up resistor
2. 50Hz/60Hz can be set, please set it before measurement, default is 50Hz
3. Three phase three wire/four wire can be set, please set it before measurement, default is three-phase four wire
4. After completing the frequency and wire system settings, it is necessary to power on again, otherwise the data cannot be automatically refreshed