ME431
Multi circuit three phase multi function intelligent electricity meter

V1.1.251112

ROGOWSKI TECHNOLOGY (SHANGHAI) CO., LTD.

目录

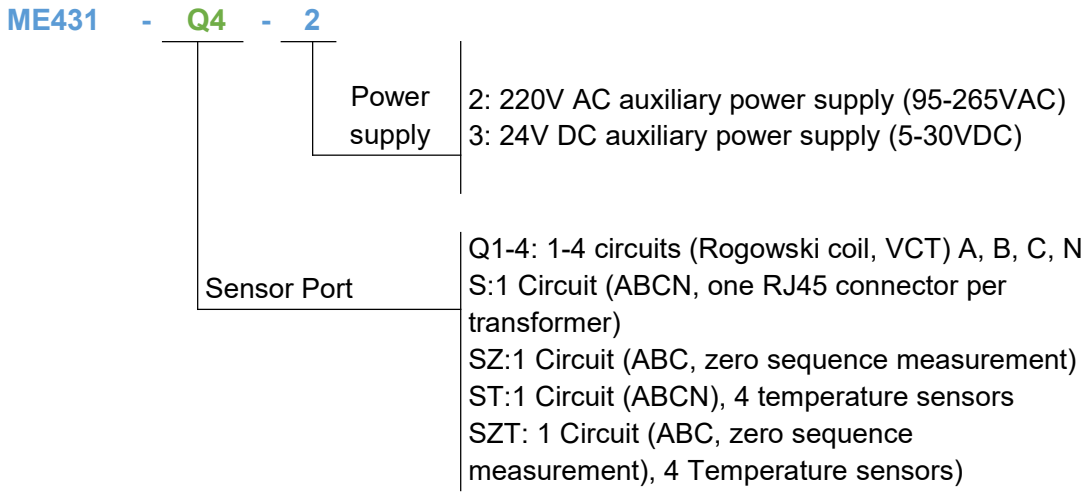
1 Product description

The ME431 DIN-Rail three-phase multifunction power meter can be externally connected to an open-ended Rogowski coil or a voltage-type CT to realise testing without dismantling the wiring, which simplifies the testing process and effectively saves construction costs.The ME431 supports simultaneous access to a maximum of four three-phase circuits, which requires that the voltage signals are kept the same while the current signals are accessed to the meter through the RJ45 connector. The meter is compatible with three-phase three-wire and three-phase four-wire systems; it is capable of measuring a wide range of electrical parameters such as current, voltage, power factor, harmonics, power, electrical energy, etc., in three-phase grids A, B and C. The ME431 is also available in zero sequence detection and temperature detection versions.

The ME431 is equipped with RS485 and Ethernet interfaces as standard, supports Modbus-RTU and Modbus-TCP protocols, and is compatible with a wide range of configuration systems, enabling real-time transmission of collected electrical parameters to the system data centre.

1.1 Model naming rules

The meter adopts the external power supply mode. The default power supply voltage range is: 95~265VAC/110~260VDC, 45~60Hz, or can be customized 24V DC, etc.



1.2 Parameters

Summary			
Model	ME431		
Typology	Multi-circuit three-phase multi-function smart meter		
Type	DIN Rail type		
Characteristic			
Current Transformer	Suitable for wide current range, Voltage output current transformer, Rogowski coil		
Current Channels	Q series, supports up to 4 circuits (ABCN), 16 current measurements		
Temperature Measurement	ST series, supports 4-way temperature measurement		
Zero Sequence Current	SZ series, support zero sequence current measurement		
Expansion Module	Supports extended IO control		
Power-down Protection	Uses a supercapacitor to power the real-time clock, no internal batteries		
Application			
Application area	Power analyses, electrical energy measurements, multi-circuit power parameter measurements, power data logging, temperature measurements, zero sequence current measurements		
Wiring system			
Wiring	3P4W 4CT，3P4W 3CT，3P3W 3CT，3P3W 2CT，1P3W，1P2W		
Current	Rogowski Coil, Voltage output type current clamp		
Voltage	Direct access via voltage transformer		
Storage			
Type	Built-in eMMC		
Capacity	Default 32GB		
Data export	Built-in FTP server, can use FTP software FileZilla to export data		
Communication			
RS485 communication	One RS485 communication interface, Interface type: two line half duplex Communication rate: 2400bps~115200bps Protocol: Modbus-RTU		
Ethernet communication	The whole way is RJ45-Ethernet Protocol: Modbus-TCP		
Supply electricity			
Power supply	2: 95-265VAC	3: 5-30VDC	8: 90-528VAC
Maximum power dissipation	5VA		
Display			
Screen Size	2.0 inch		
Screen Type	TFT color LCD display		
Resolution	320*240		

Mechanical	
Size	L*W*D：9.0*8.9*6.6cm
Weight	300g
Ambient condition	
Operating temperature range	Temperature -20℃～+70℃, humidity below 90% RH
Storage temperature range	Temperature -40°C to +70°C, humidity below 95% RH (non-condensing)
Height	≤2km
Overvoltage capability	CAT III 600V
Pollution prevention level	IP30
Warranty	
Warranty Time	12 months

1.3 Data display

Instantaneous value	
Phase voltage	U1, U2, U3, AVG, U0 (zero sequence voltage)
Line voltage	U12,U23,U31,AVG
Current	I1, I2, I3, AVG, In, I0 (zero-sequence current)
Grid frequency	F1, F2, F3, ∑ (comprehensive)
Power factor PF	PF1, PF2, PF3, ∑ (comprehensive)
Base power factor DPF	DPF1, DPF2, DPF3, ∑ (comprehensive)
Active power	P1, P2, P3, ∑ (total)
Reactive power	Q1, Q2, Q3, ∑ (total)
Apparent output	S1, S2, S3, ∑ (total)
Energy (When the total power 10^9 reaches 1.0 xkWh, the power of each phase will be automatically cleared to zero)	
Active energy Pos.	EP1, EP2, EP3, ∑ (total)
Active Energy Neg.	EP1, EP2, EP3, ∑ (total)
Reactive Energy Pos.	EQ1, EQ2, EQ3, ∑ (total)
Reactive energy Neg.	EQ1, EQ2, EQ3, ∑ (total)
Apparent Energy	ES1, ES2, ES3, ∑ (total)
Tariff Energy	ET1,ET2, ET3,ET4, ET5,ET6
Harmonic wave	
Percentage of voltage harmonics	Total harmonic (U1, U2, U3), odd order total harmonic (U1, U2, U3), even order total harmonic (U1, U2, U3) Subharmonics 1-50 (U1, U2, U3)
Percentage of current Harmonics	Total harmonic (I1, I2, I3), odd order total harmonic (I1, I2, I3), even order total harmonic (I1, I2, I3), K coefficient (I1, I2, I3) Subharmonic 1-50 (I1, I2, I3)
Voltage harmonic value	Total harmonic (U1, U2, U3) Subharmonics 1-50 (U1, U2, U3)

Current harmonic value	Total harmonic (I1, I2, I3) Subharmonics 1-50 (I1, I2, I3)
Phase diagram	
Phase diagram	Phase diagram between voltage and current is shown
Phase sequence	Voltage, current
Voltage Angle	U1,U2,U3
Current Angle	I1,I2,I3
Voltage Angle	UI1,UI2,UI3
Demand	
Demand	There is always the total reactive power, the total reactive power, the total apparent power
There is always a maximum power demand	Maximum demand and time
Maximum total active power demand	Maximum demand and time
The total view is the maximum power demand	Maximum demand and time
Degree of unbalance	
Voltage imbalance	Negative sequence, zero sequence
Current imbalance	Negative sequence, zero sequence
Maximum and minimum values	
Phase voltage	Each is related to the average
Line voltage	Each is related to the average
Current	Each is related to the average
Active power	The sum of all the parts
Reactive power	The sum of all the parts
Apparent output	The sum of all the parts

1.4 Accuracy and certification

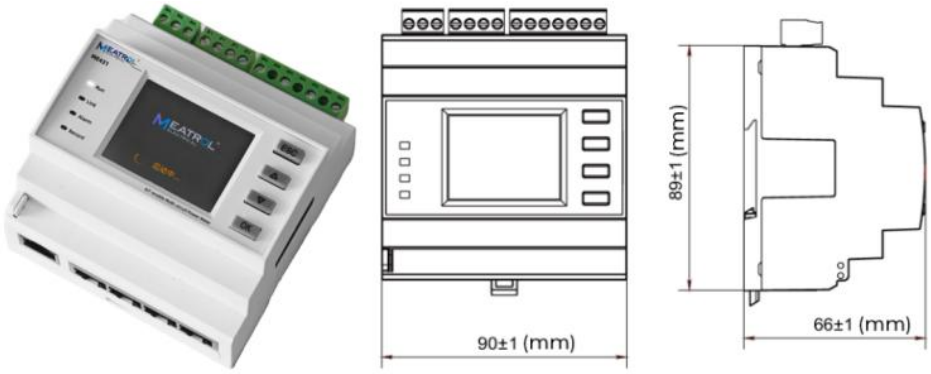
Accuracy of measurement	
Current measurement accuracy	0.1%(0-420mV AC)+ current sensor accuracy
Voltage measurement accuracy	±0.2%(0~720V AC)
Grid frequency	±0.01%(45~65Hz)
Power factor	±0.005
Active power and apparent power	IEC62053-22 Grade 0.5S
Reactive power	IEC62053-21 Grade 1S
Active energy	IEC62053-22 Grade 0.5S
Reactive energy	IEC62053-21 Grade 1S
Ambient condition	
Operating temperature range	-20℃~+70℃
Storage temperature range	-40℃~+85℃
Humidity range	5~95% RH, 50℃ (no condensation)
Class of pollution	2
Overvoltage capability	III. Suitable for distribution systems below 277/480VAC
Insulation strength	IEC61010-1

EMC (Electromagnetic Compatibility)	
Electrostatic discharge	Level IV(IEC61000-4-2)
Radiation immunity	Level III (IEC61000-4-3)
EFT electrical fast pulse group immunity	Level IV (IEC61000-4-4)
Wave surge resistance	Level IV (IEC61000-4-5)
Conduction resistance to harassment	Level III (IEC61000-4-6)
Industrial frequency magnetic field immunity	0.5mT (IEC61000-4-8)
Conduction and radiation	Class B (EN55022)
metric	
EN 62052-11, EN61557-12, EN 62053-21, EN 62053-22, EN 62053-23, EN 50470-1, EN 50470-3, EN 61010-1, EN 61010-2, EN 61010-031, GB/T 18216.12——2025/IEC 61557-12:2021	

Note: rdg.: read value, F.S.: full scale

2 Wiring

2.1 Dimensions



2.2 Buttons & indicator lights

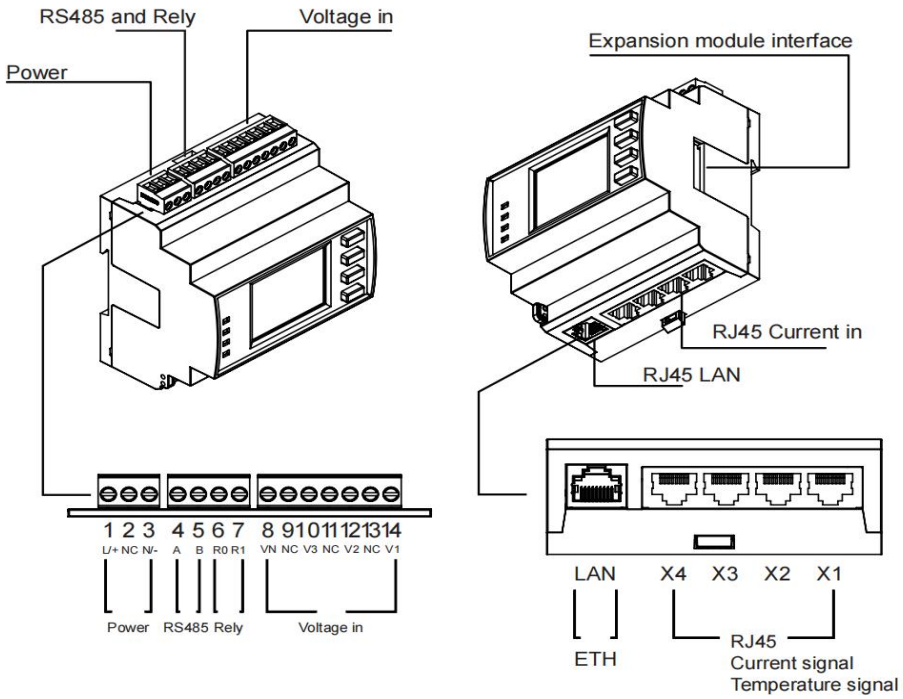
ME431 features four buttons and four indicator lights, with the following functional definitions:

Button		Function
ESC	Return	To exit the current interface
▲	Up	For switching pages or data
▼	Down	For switching pages or data
OK	Confirm	Used to access sub-interfaces or confirm data modifications

Indicator lights	Function
Run	Indicates whether the equipment is operating normally. When functioning correctly, the indicator light flashes.
Link	Indicates RS485 communication; the indicator flashes when the device is receiving or transmitting data.
Alarm	Indicates alarm output; when an alarm occurs, the indicator illuminates.
Record	Used to indicate status; when data logging is activated, this indicator flashes.

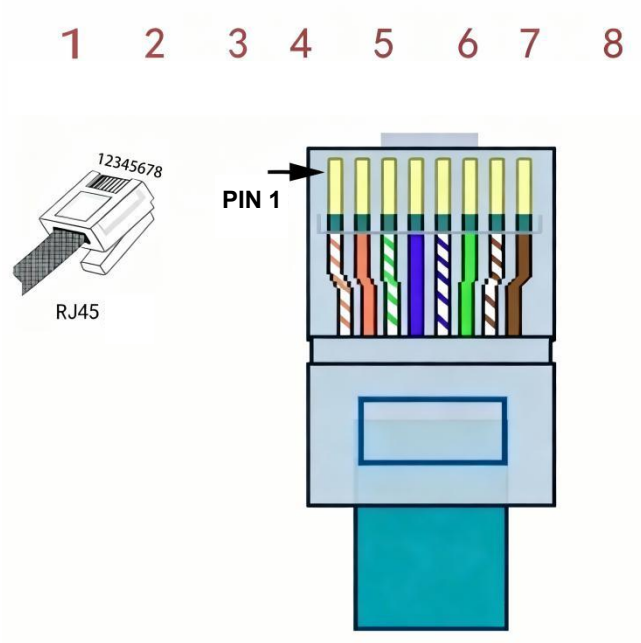
2.3 Interface definitions

The meter is equipped with a variety of interfaces to achieve different functions.



Interface number	Interface name	Interface definition	Interface type	Remarks
1	L/+	power input +	Power port	When alternating current is supplied, there is no polarity. When direct current is supplied, pay attention to the positive and negative polarity.
2	NC	empty		
3	N/-	power input -		
4	R0	The relay outputs dry contacts	Electric relay	
5	R1			
6	A	RS485 A	RS485	RS485 communication
7	B	RS485 B		
8	VN	N-phase voltage input	Voltage input port	Voltage input channel
9	NC	empty		
10	V3	C-phase voltage input		
11	NC	empty		
12	V2	B-phase voltage input		
13	NC	empty		
14	V1	A phase voltage input		
-	LAN	RJ45 Ethernet	RJ45 port	Ethernet communication
-	X1-X4	Current input	RJ45 port	Current input channel

2.4 Current Input Channel Interface Definition



Pin	Function		
	Q1-4	S,SZ	ST,SZT
1	Coil L1 (-)	/	Temperature sensor
2	Coil 1 (+)	/	
3	Coil N (-)	/	/
4	CoilL2 (-)	Coil (+)	Coil (+)
5	Coil L2 (+)	Coil (-)	Coil (-)
6	Coil N (+)	/	/
7	Coil L3 (-)	/	/
8	Coil L3 (+)	/	/

2.5 Supply electricity

The meter adopts the external power supply mode. The default power supply voltage range is: 95~265VAC/110~260VDC, 45~60Hz, or can be customized 24V DC, etc.

- Do not connect the meter while the cable is live
- Before connecting the power supply, it is necessary to confirm whether the power voltage is within the required range, otherwise the electricity meter can not work normally

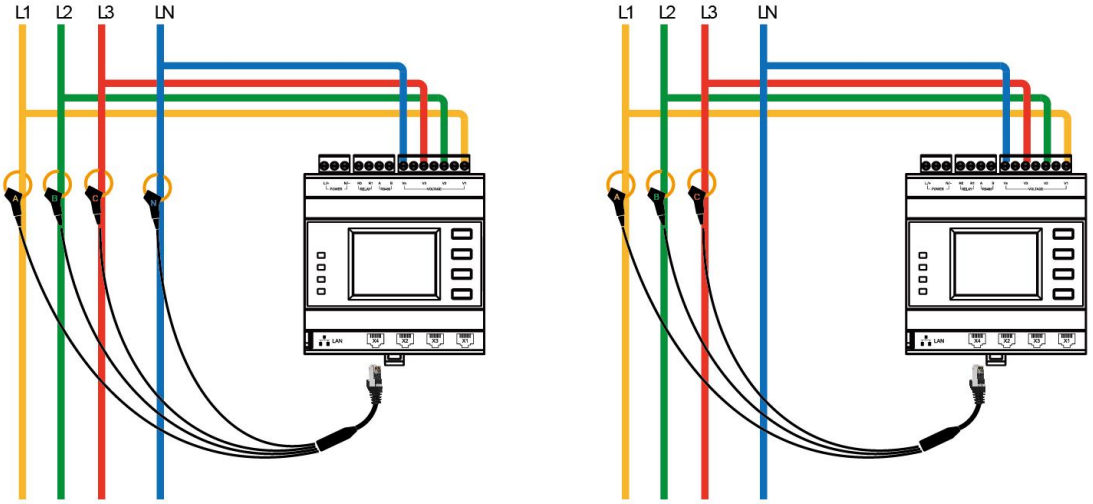
2.6 Voltage and current input

The meter supports three types of wiring: 3-phase four-wire 4CT (3P4W_4CT), 3-phase four-wire 3CT (3P4W_3CT), 3-phase three-wire 3CT (3P3W_3CT), 3-phase three-wire 2CT (3P3W_2CT), one-phase three-wire (1P3W), and one-phase two-wire (1P2W)

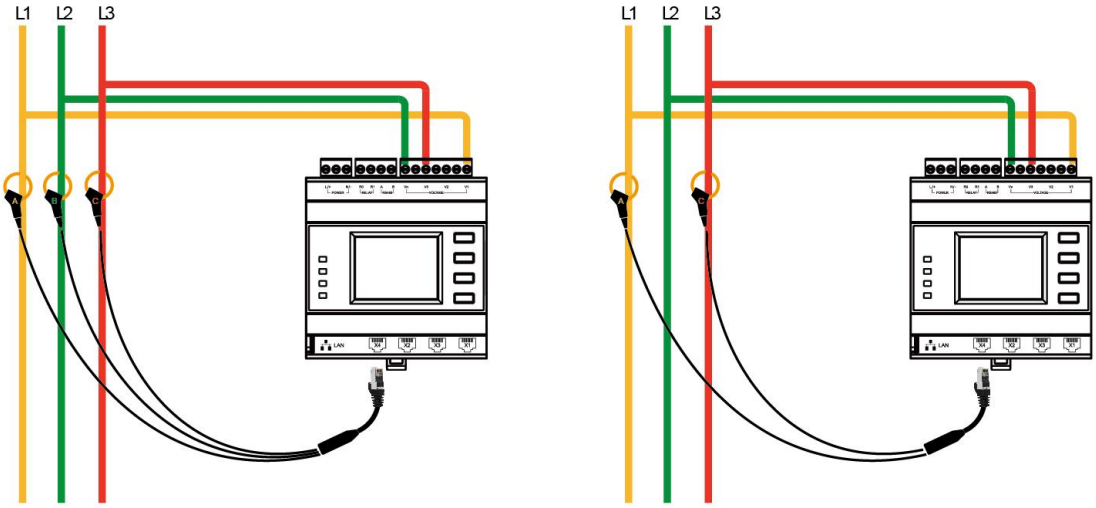
- The actual wiring mode of the meter must be consistent with the wiring mode configured inside the meter

- Three-phase four-wire 4CT (3P4W_4CT) requires four current sensors, and the current of N phases is measured through the sensors
- Three-phase four-wire 3CT (3P4W_3CT) requires three current sensors, and the current of N phases is calculated
- Three-phase three-wire 3CT (3P3W_3CT) requires three current sensors, and the current of phase B is measured by the sensor
- Three-phase three-wire 2CT (3P3W_2CT) requires two current sensors, and the current of phase B is calculated
- The phase sequence of voltage and current must be in accordance with the ABC phase sequence, otherwise the meter will show the wrong phase sequence of voltage and current
- When using a current sensor, note that the direction of the current arrow on the sensor must be consistent with the actual current flow, that is, the arrow on the sensor connector points to the load end

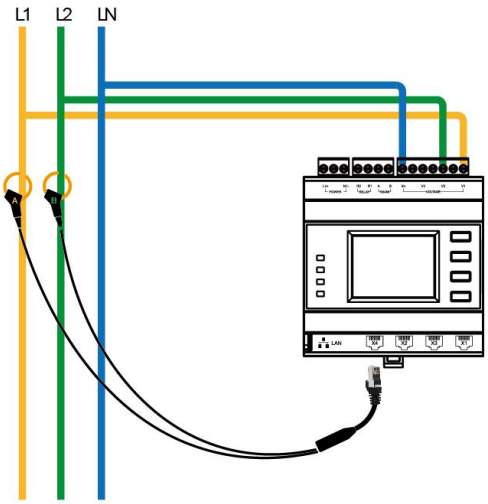
The multi-circuit voltage and current wiring is as follows:

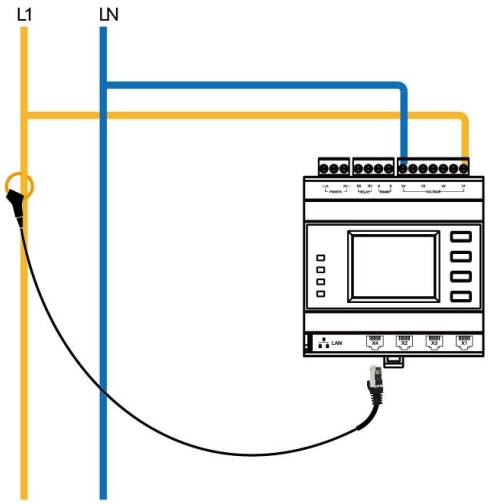


Three-phase four-wire 4CT three-phase four-wire 3CT
Three-phase four-wire 4CT three-phase four-wire 3CT



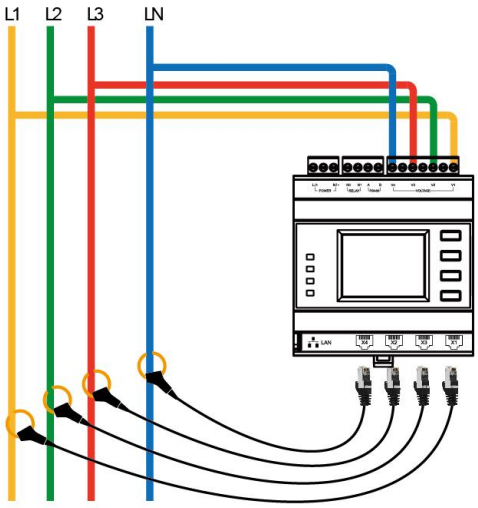
Three-phase three-wire 3CT and three-phase three-wire 2CT
Three-phase three-wire 3CT and three-phase three-wire 2CT

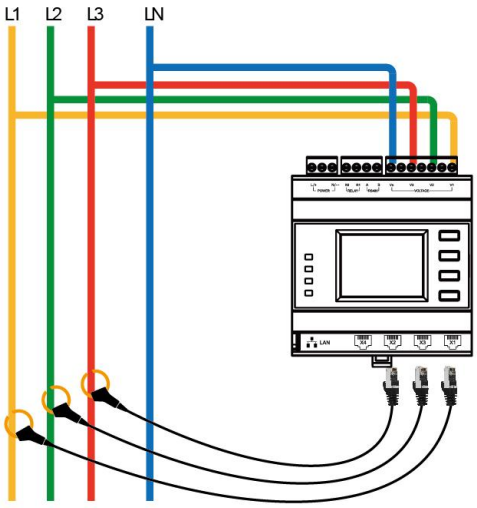




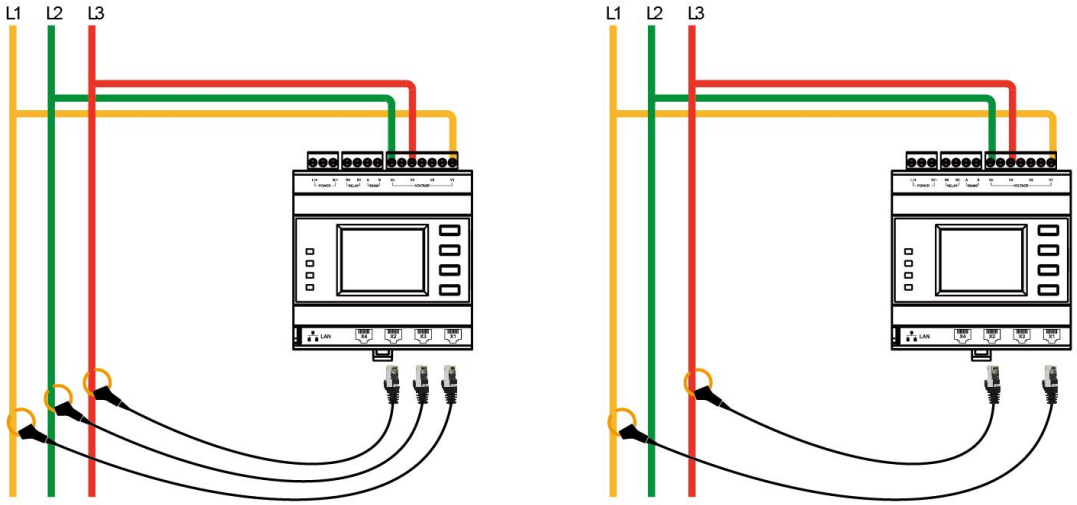
One phase three line, one phase two line
One phase, three lines, one phase, two lines

When the version with temperature or zero sequence detection is used, only one coil is connected to the RJ45 port. In this case, the circuit voltage and current wiring mode is as follows:

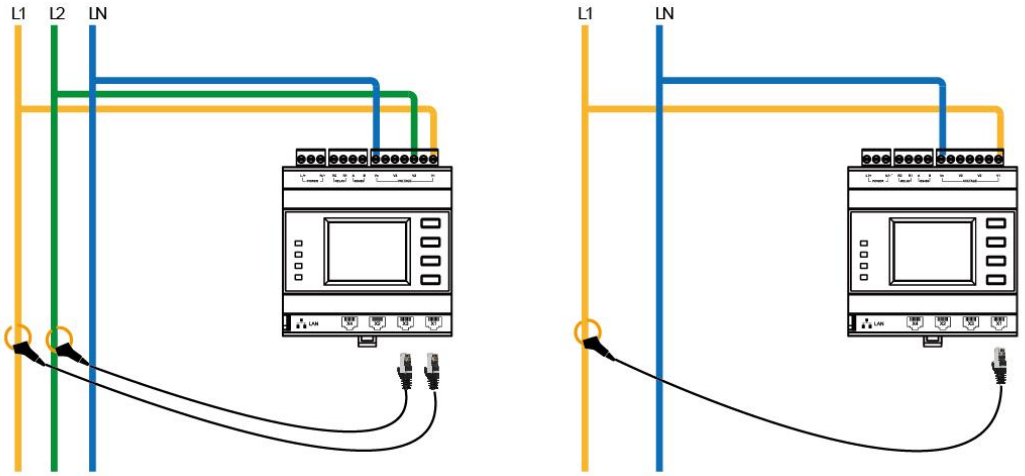




Three-phase four-wire 4CT three-phase four-wire 3CT
Three-phase four-wire 4CT three-phase four-wire 3CT



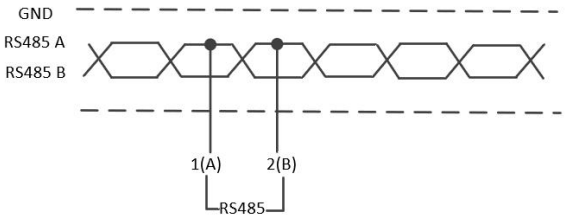
Three-phase three-wire 3CT and three-phase three-wire 2CT
Three-phase three-wire 3CT and three-phase three-wire 2CT



One phase, three lines, one phase, two lines
One phase three line, one phase two line

2.7 RS485

The meter is equipped with a RS485 communication interface, which supports the ModBus-RTU protocol. The RS485 communication port requires the use of shielded twisted pair cable connection in the form of chrysanthemum chain. In the case of long distance and high speed, a 120Ω resistor should be connected in parallel at both ends of the chrysanthemum chain.



2.8 Ethernet ETH

Equipped with a LAN communication interface supporting Modbus-TCP, with built-in web server and FTP server.
Modbus-TCP is used for reading real-time meter data.
The built-in web server displays data in a browser.
The FTP server handles data download logging.

When communicating via LAN between a computer and the meter, two connection methods are available:

1. Direct connection

When the computer and electricity meter are directly connected, both must be configured with static IP addresses. After configuring the IP addresses for the meter and computer, you can perform Modbus-TCP communication, access the web interface, and download FTP data on the computer based on the meter's IP address.

Electric Meter Static IP Configuration:

• The electric meter ships with a default static IP address: 192.168.1.31, Subnet Mask: 255.255.255.0

• The device IP and subnet mask can be configured within the meter's communication interface.

2. Connection through a router.

When the computer connects to the electricity meter via a router, both the computer and meter receive IP addresses assigned by the router.

After configuring the IP addresses for both the meter and computer, you can perform Modbus-TCP communication, access web pages, and download FTP data on the computer using the meter's IP address.

• Obtaining the Meter's Dynamic IP:

The meter ships with a static IP by default. To obtain a dynamic IP, navigate to "Settings -> Communication -> LAN" and change the DHCP setting from Disabled to Enabled.

Once DHCP is enabled, the meter will acquire an IP assigned by the router. The device's IP address can be viewed under "Device Information -> LAN".

• Dynamic IP Acquisition for Computers:

Computers typically obtain IP addresses dynamically. No modifications or configuration are required for the computer's IP address.

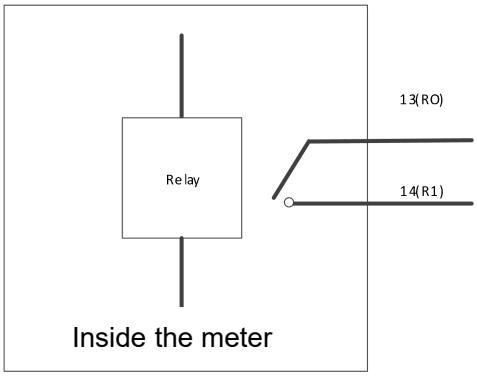
2.9 Relay output

The meter is equipped with a relay output, which is a normally open contact. The terminal is marked as R1 and R0, where R0 is the common contact and R1 is the normally open contact. The maximum load capacity of the relay is 3A 30V DC and 3A 250V AC

The meter display interface shows the closed state of the normally open contact of the relay.

There are two output control modes of the relay, which can be modified through the meter operation interface or Modbus.

Relay output control mode	explain
manual mode	Output through the operation interface of the electricity meter or Modbus control relay
Alarm mode	The relay output is controlled by the set alarm parameters



Relay Output Interface Connection Diagram

3 Function

3.1 Multi-tariff

The meter provides multi-tariff cumulative energy measurement functionality, supporting up to 6 different tariff .
Two tariff switching control modes are available, which can be modified via the meter's operation interface or Modbus.
Tariff Switching Control Mode Description
Manual Mode : Switch tariffs via the meter's operation interface or Modbus
RTC Mode : Trigger tariff switching based on RTC time periods

Tariff Switching Control Mode	Description
Manual mode	Switch tariffs via the meter's operation interface or Modbus
RTC mode	Trigger tariff switching based on RTC time periods

3.1.1 Manual control mode

Method 1: Switch the tariff through the meter setting interface "Settings-> Tariff-> Switch mode"
Method 2: Switch the tariff through Modbus configuration instruction 1071

3.1.2 RTC control model

In RTC control mode, tariff switching is triggered by the real-time clock.
The RTC control mode supports 6 time periods (Ta, Tb, Tc, Td, Te, Tf) and 6 tariff (T1, T2, T3, T4, T5, T6). Any tariff can be specified for the 6 time periods (Ta, Tb, Tc, Td, Te, Tf).
The time period and target tariff can be modified through the meter operation interface or Modbus.
The time period is set according to 24 hours, starting from Ta start time. Tc start time cannot be located between Ta start time and Tb start time, Td start time cannot be located between Ta start time and Tc start time, and so on.

3.2 Demand

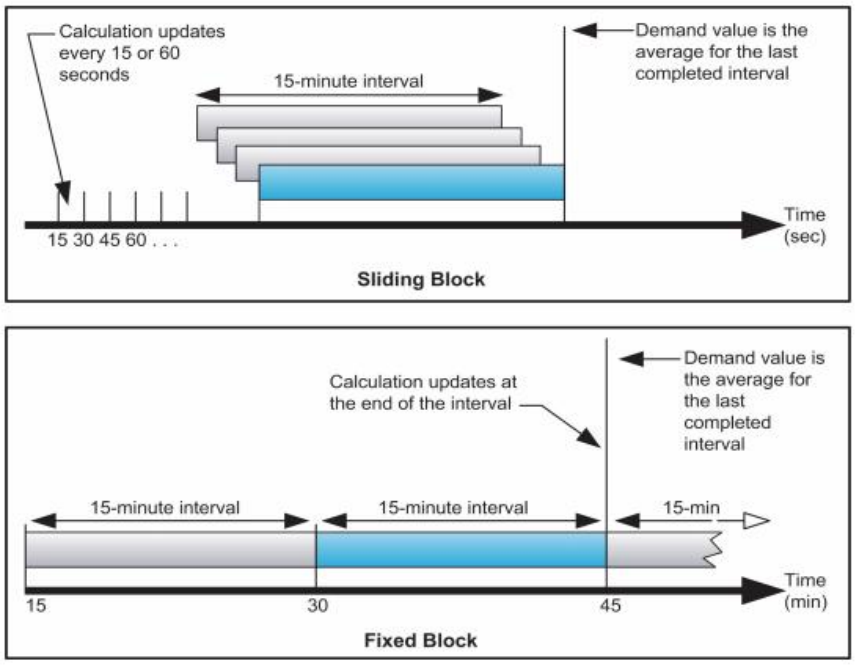
The meter provides active power, reactive power, apparent power demand and maximum demand.
The required demand calculation method and required demand calculation interval can be configured through the meter operation interface or Modbus.

3.2.1 Demand calculation method

The meter supports two kinds of demand calculation methods: fixed and sliding.

Demand calculation method	explain
stationary type	The meter calculates and updates the demand at the end of each interval
Sliding type	Update the demand every minute

The following figure shows two methods of demand calculation, taking a demand interval of 15 minutes as an example:



3.3 Alarm

The meter provides a variety of alarm parameter Settings and alarm output, which can be configured through the meter setting interface or Modbus.

Type of alarm	explain
Overcurrent, phase by phase	An alarm is generated when the value exceeds the alarm threshold, When all the phases are less than the release threshold, the alarm is released
Phase-to-phase leakage current	An alarm is generated when the value exceeds the alarm threshold, When all the phases are greater than the release threshold, the alarm is released
Phase overvoltage, phase by phase	An alarm is generated when the value exceeds the alarm threshold, When all the phases are less than the release threshold, the alarm is released
Phase voltage, phase by phase	An alarm is generated when the value exceeds the alarm threshold, When all the phases are greater than the release threshold, the alarm is released
Overvoltage, phase by phase	An alarm is generated when the value exceeds the alarm threshold, When all the phases are less than the release threshold, the alarm is released
Low line voltage, phase by phase	An alarm is generated when the value exceeds the alarm threshold, When all the phases are greater than the release threshold, the alarm is released
Overpower, always active (absolute value)	
Overpower, total reactive power (absolute value)	
Overpower, total apparent	
Current demand, total active power (absolute value), current	
Current demand, total reactive power (absolute value), current	
Current demand, total apparent power, current	
Pass through THD-U, phase by phase	An alarm is generated when the value exceeds the alarm threshold, When all the phases are less than the release threshold, the alarm is released
Pass through THD-I, phase by phase	An alarm is generated when the value exceeds the alarm threshold, When all the phases are less than the release threshold, the alarm is released

3.3.1 Alarm output

The alarm output can be connected to the buzzer and relay (the relay control mode should be configured as the alarm mode). After the alarm is released, the corresponding output will also be released.

3.4 Phase sequence detection

The meter supports three-phase voltage and current phase sequence detection. The phase sequence can be viewed in the meter interface "Measure-> Phase diagram-> Phase sequence" or read through Modbus.

Phase state icon	explain
	Phase sequence correct
	The phase sequence is wrong The channel detected the signal, but in the wrong order
	The phase sequence is wrong Phase loss or weak signal

Note: The correct phase sequence of voltage and current can only ensure the correct phase sequence of their respective phases, but cannot guarantee the corresponding relationship between voltage and current, so attention should be paid to the wiring mode

3.5 Data recording/download

The meter has 32GB of built-in storage space, and the recording interval time can be set arbitrarily within the range of 5s to 9999s. Note that the setting cannot be modified during the recording period. Data can be downloaded during the recording period, but the current recorded data can only be downloaded after stopping the recording. The download must be done through FTP server or Web server.

3.5.1 Parameter Configuration

Recording-related parameters can be configured via the "Main menu->Data Recorder -> Pass word (3000) ->Recording Configuration" interface.

3.5.2 Data Download

The electricity meter has a built-in FTP server for downloading recorded data.

Data can be downloaded using the FTP software FileZilla.

• Install FileZilla software

FileZilla can be downloaded and installed from the website (FileZilla - The free FTP solution).

• Log in to the electricity meter's FTP server

The IP address of the electricity meter can be found under "Device Information -> LAN".

The port number, username, and password can be found under "Settings -> Communication -> FTP Server" on the electricity meter interface.

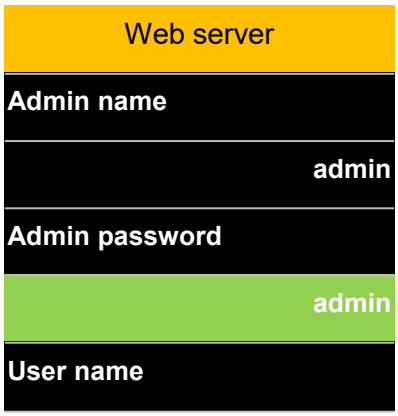
The recording interval can be set anywhere between 5 seconds and 9999 seconds. Note that settings cannot be modified during the recording period. Data can be downloaded during recording, but currently recorded data can only be downloaded after recording stops. Downloading requires access via the FTP server or Web server.

• Data Download

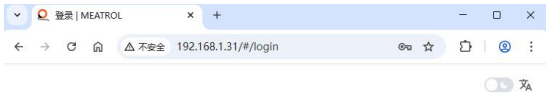
Select the file to download, right-click, and choose "Download" to save the log file locally.

3.6 Web Server

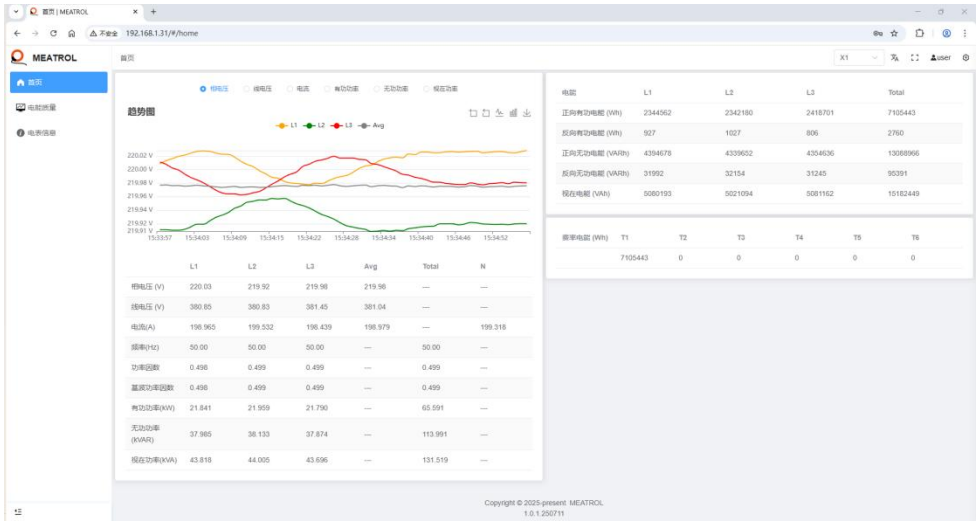
The meter incorporates a built-in web server for viewing meter data via a web browser. The meter's IP address can be found under "Device Information -> LAN".
The web server uses port 80 by default, which can be modified in the meter interface under "Settings -> Password (1000) ->Communication -> Web Server".

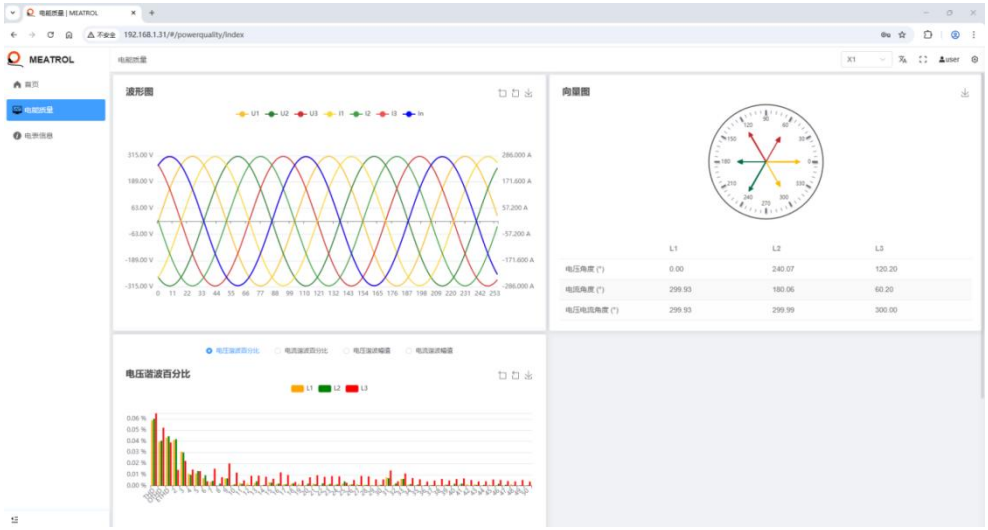


The Admin name and Admin password can be viewed in the meter interface under "Web Server".



In the website, enter the meter's IP address to access the login page, then input the name and password.





Data Viewing

Homepage: Displays basic data such as voltage, current, power, and energy consumption.

Power Quality: Shows waveform diagrams, harmonic data, and angle data.

Meter Information: Presents the meter's basic details.

4 Operation and interface display

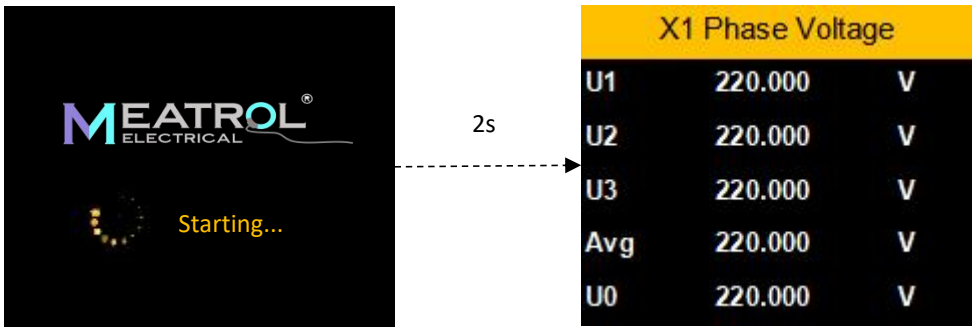
This section describes the display of the interface, key combinations, and device configuration.
In the meter, X1, X2, X3 and X4 correspond to different circuits. This section takes X1 as an example.
The four keys of the meter are as follows:

4.1 Key function display description:

Key symbols	description
ESC	Return key: used to exit the current operation interface
△	Up key: used to switch the interface display and change the value size when setting, long press can be shifted
▽	Down key: used to switch the interface display and change the value size when setting, long press can be shifted
OK	Confirmation key: used to confirm the operation

4.2 Meter start-up interface

After the power is started on the meter, the following interface will be displayed:

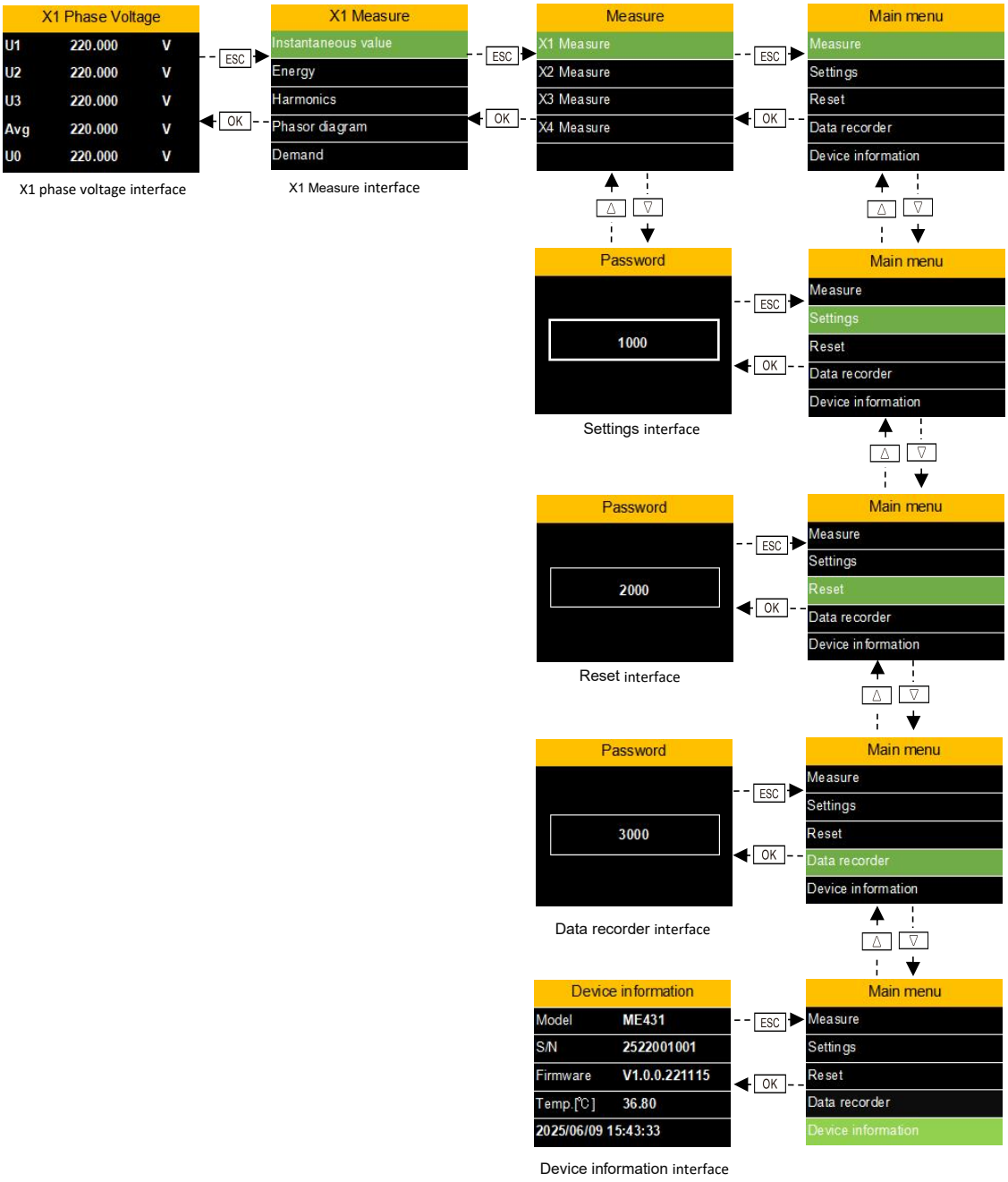


Power on screen

X1 phase voltage interface

4.3 Switch the secondary menu

There are a total of 4 secondary menus under the main menu of the electricity meter: measurement menu, setting menu, reset menu and device information menu. The switching between menus is shown as follows:



X1 phase voltage interface

X1 Measure interface

Settings interface

Reset interface

Data recorder interface

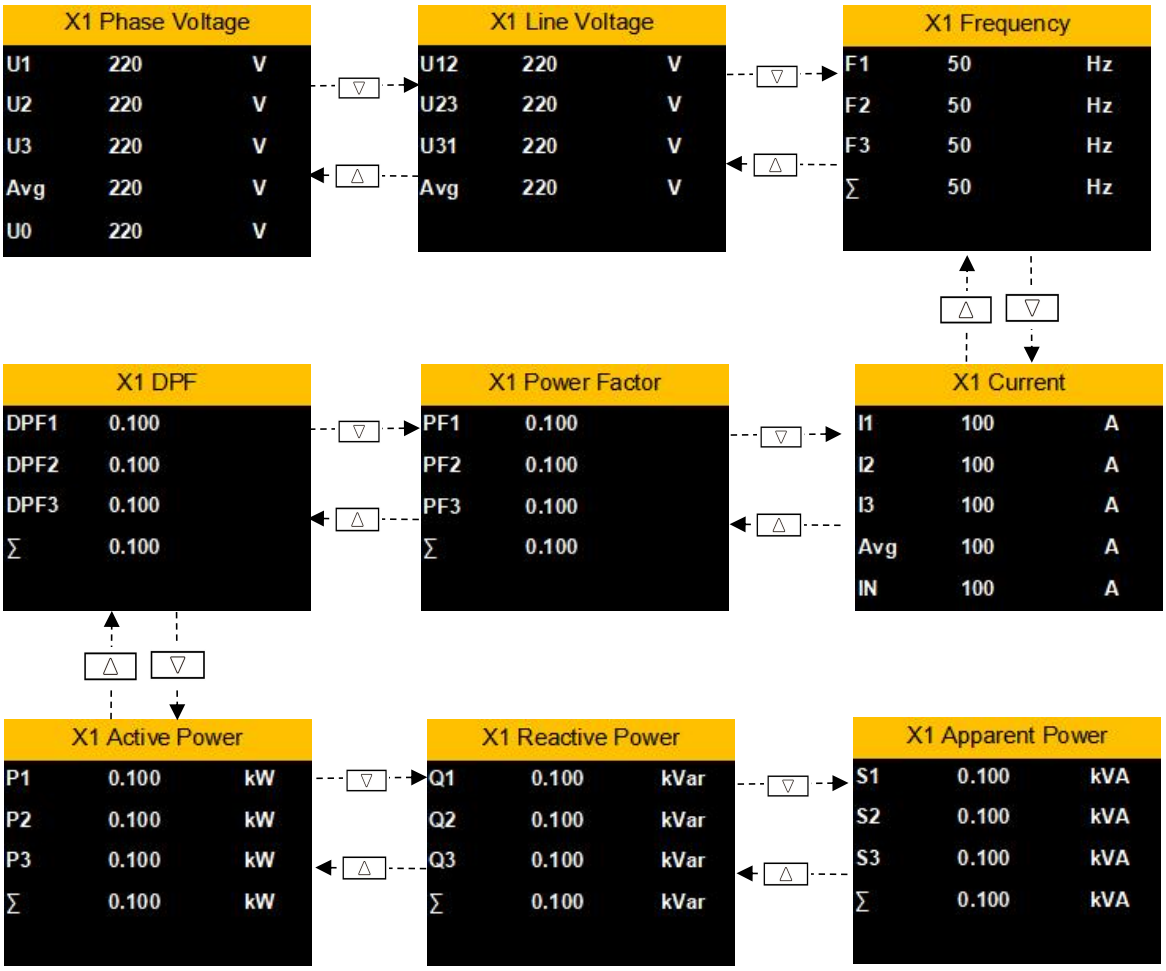
Device information interface

4.4 Measure menu interface

There are 7 submenus in the measurement menu: instantaneous value, energy, harmonics, phase diagram, demand, unbalance, max&min. The selected content can be switched by pressing a key or a key.

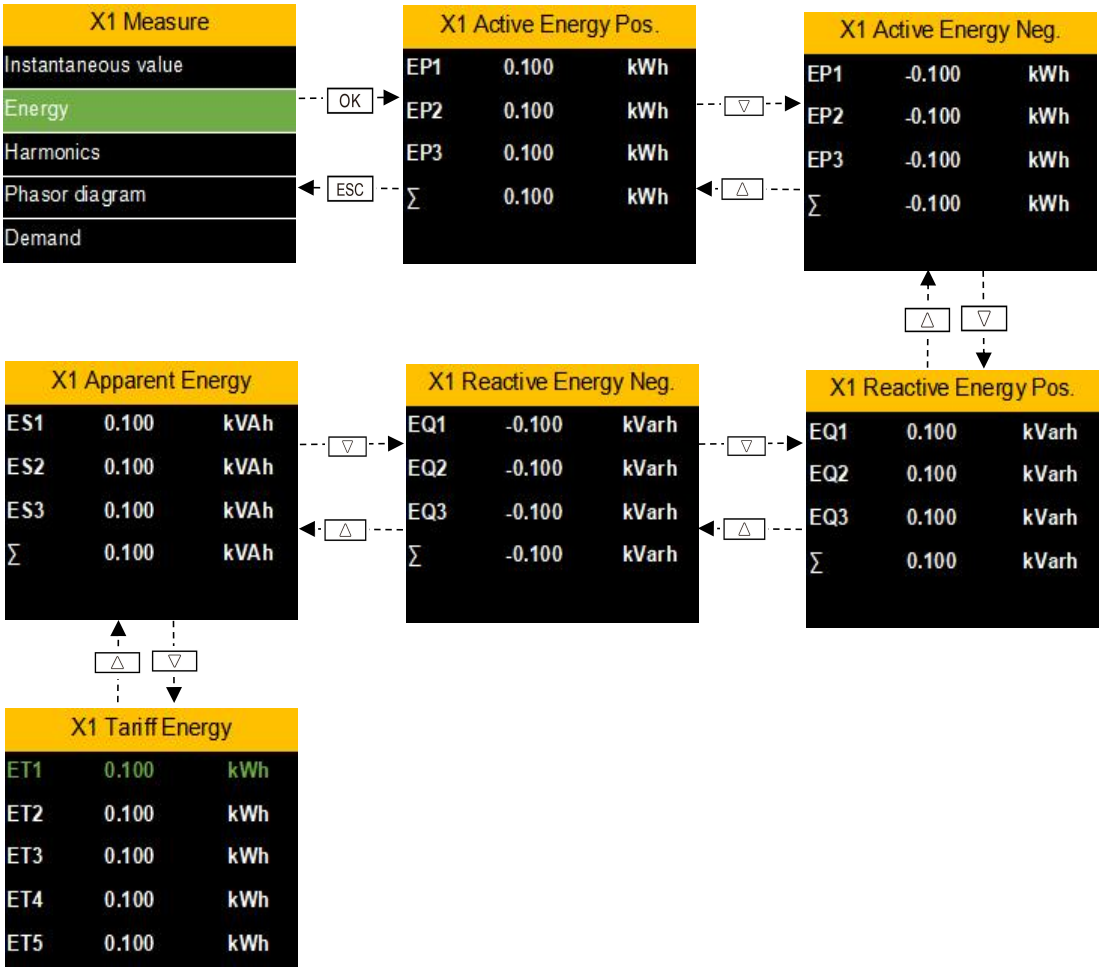
4.4.1 Measure menu-Instantaneous value submenu

The instantaneous value submenu is used to display data such as voltage, current, power, power factor, frequency, etc.



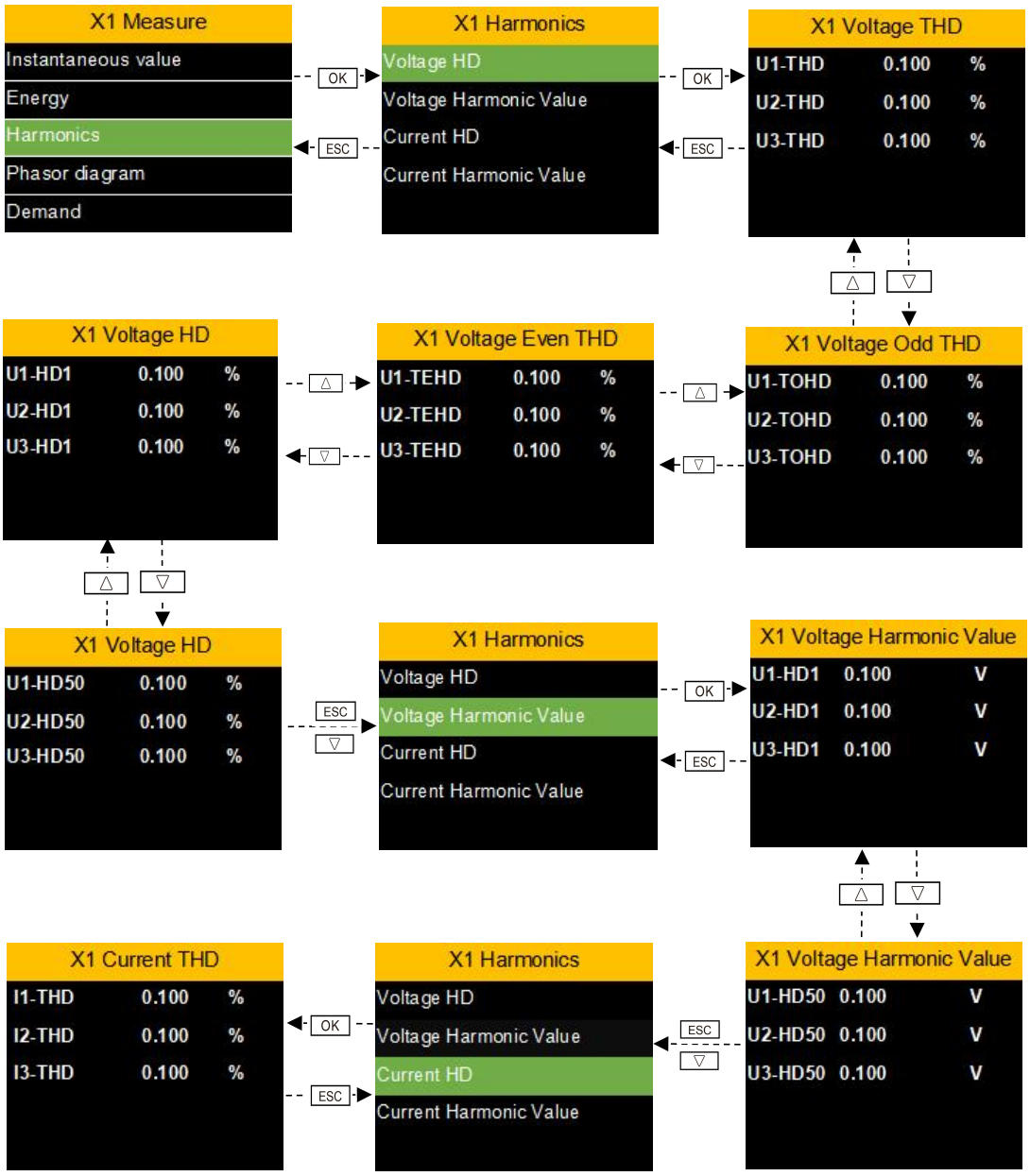
4.4.2 Measure menu-Energy submenu

The energy submenu is used to display data such as active power, reactive power and apparent power.



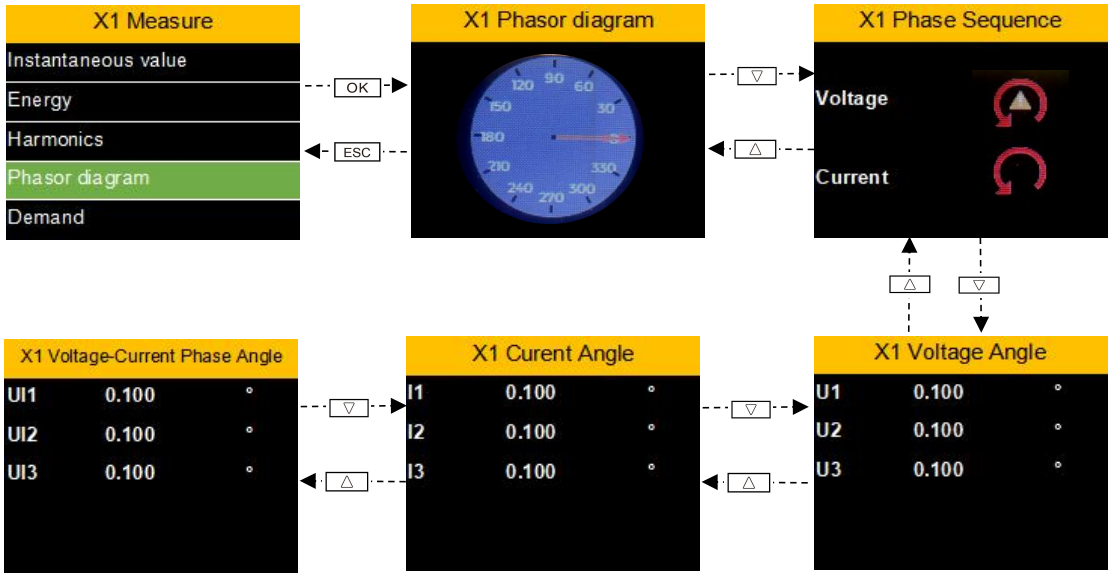
4.4.3 Measure menu-Harmonics submenu

The harmonics submenu is used to display data such as voltage harmonic and current harmonic.



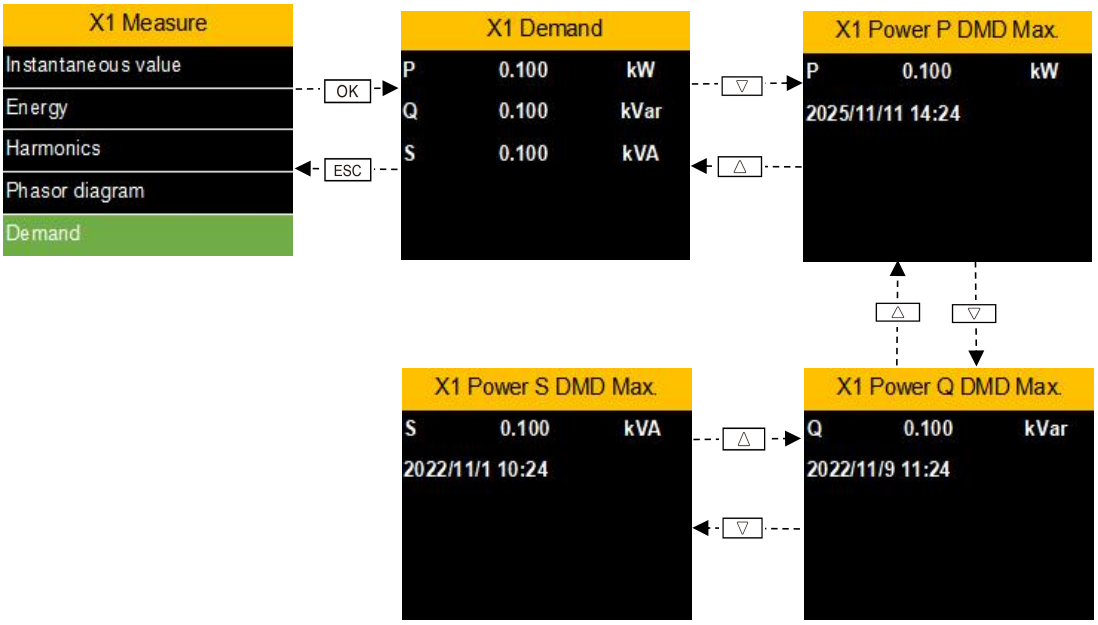
4.4.4 Measure menu-Phasor diagram submenu

The phasor diagram submenu is used to display data such as phase diagram, phase sequence, voltage Angle, and current Angle.



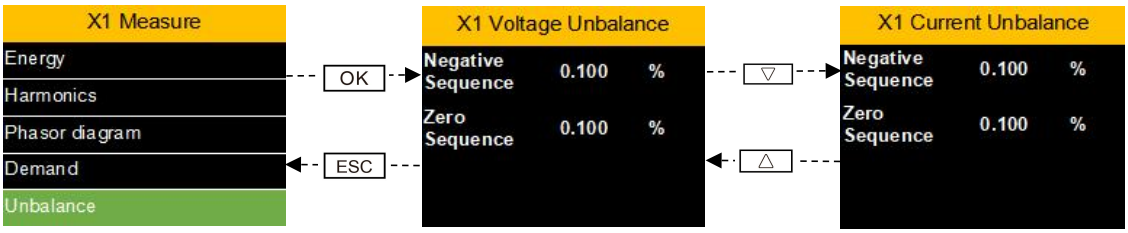
4.4.5 Measure menu-Demand submenu

The demand submenu is used to display data such as demand and maximum demand.



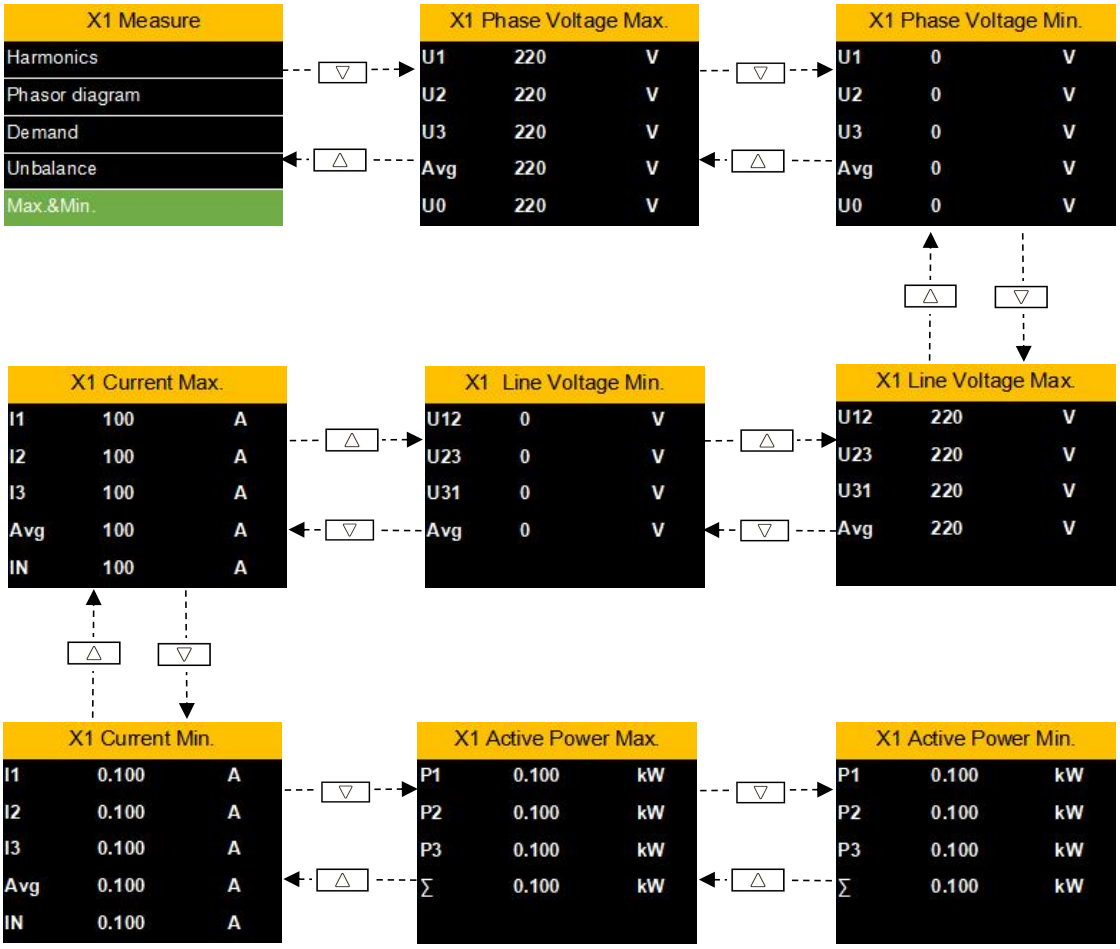
4.4.6 Measure menu-Unbalance submenu

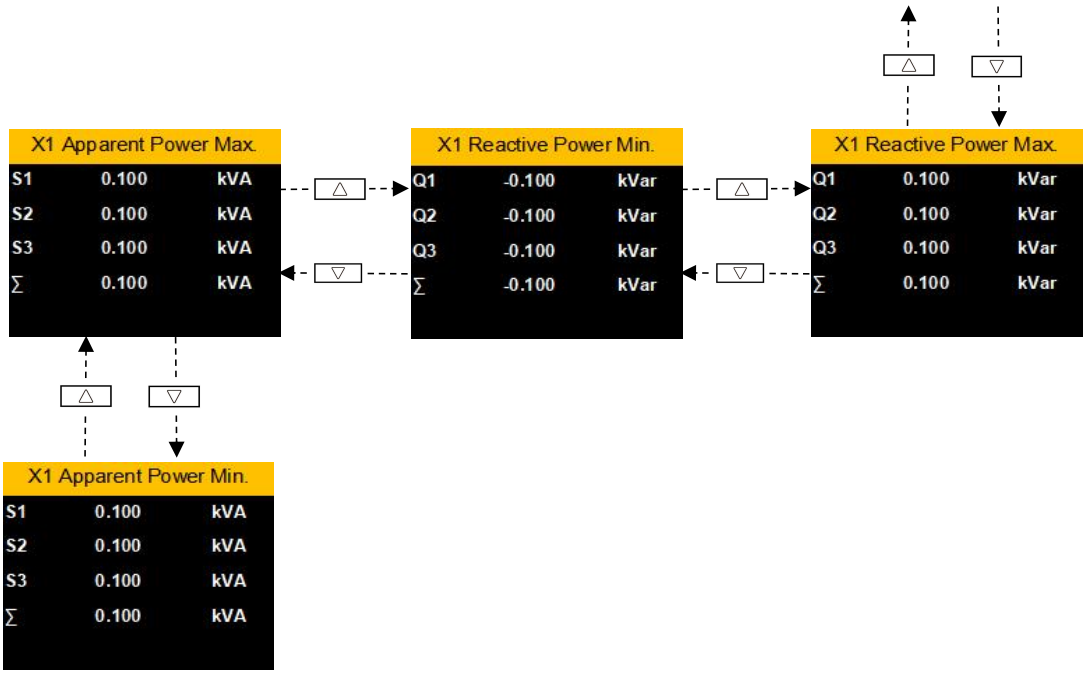
The unbalance submenu is used to display data such as voltage unbalance and current unbalance.



4.4.7 Measure menu-Max.&Min. submenu

The Max.&Min. submenu is used to display the maximum and minimum values of voltage, current, etc.




X1 Apparent Power Max.
S1 0.100 kVA
S2 0.100 kVA
S3 0.100 kVA
Σ 0.100 kVA
X1 Reactive Power Min.
Q1 -0.100 kVar
Q2 -0.100 kVar
Q3 -0.100 kVar
Σ -0.100 kVar
X1 Reactive Power Max.
Q1 0.100 kVar
Q2 0.100 kVar
Q3 0.100 kVar
Σ 0.100 kVar
X1 Apparent Power Min.
S1 0.100 kVA
S2 0.100 kVA
S3 0.100 kVA
Σ 0.100 kVA

4.5 Settings menu interface

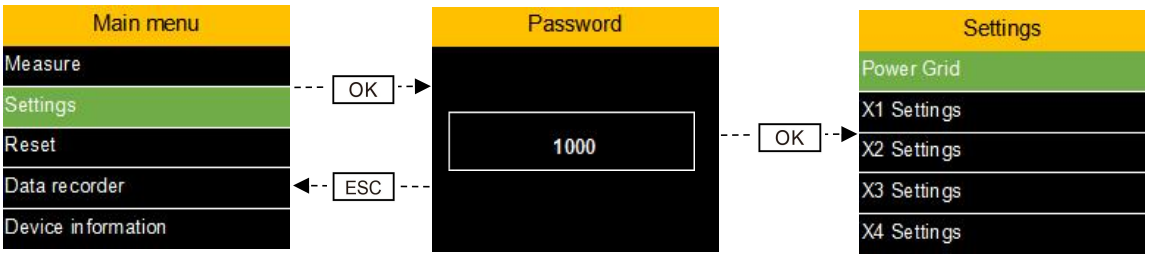
The settings menu is used to set: wiring mode, current sensor type and ratio, voltage transformer ratio, communication parameters, demand, backlight control, equipment time, password and other parameters.

Before entering the Settings page, you need to enter the password (default 1000).

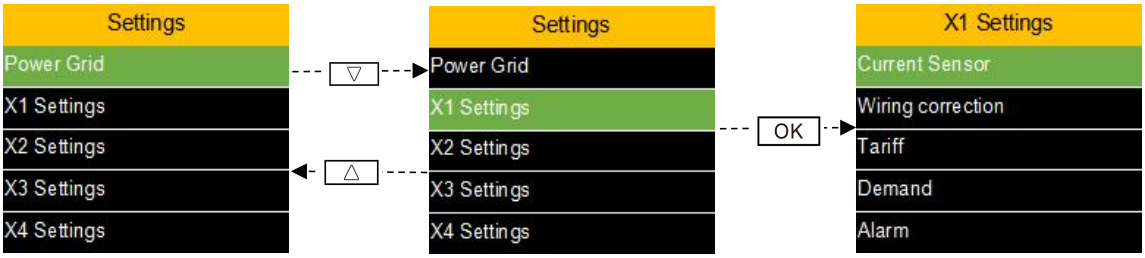
Press OK to enter the password input. Press or keys to modify the value size, and long press or keys to shift (the corresponding value will flash).

If the password is correct, pressing OK will enter the Settings interface.
If incorrect, remain in the password input interface.

If you forget the password, you can enter the last four digits of the device serial number to enter the Settings interface.

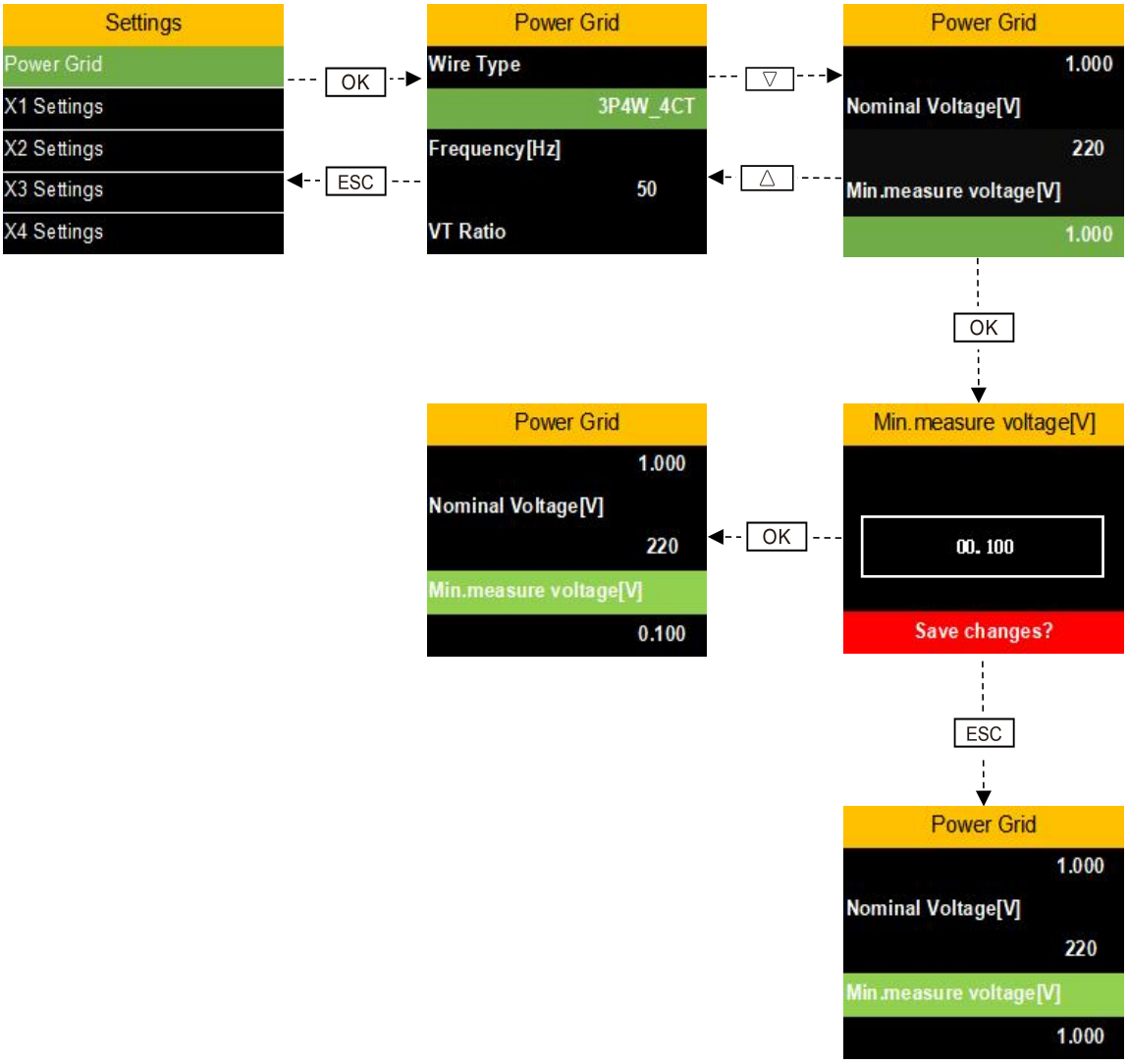


Use the key or key to switch the selected content, and use the OK key to enter the parameter setting.



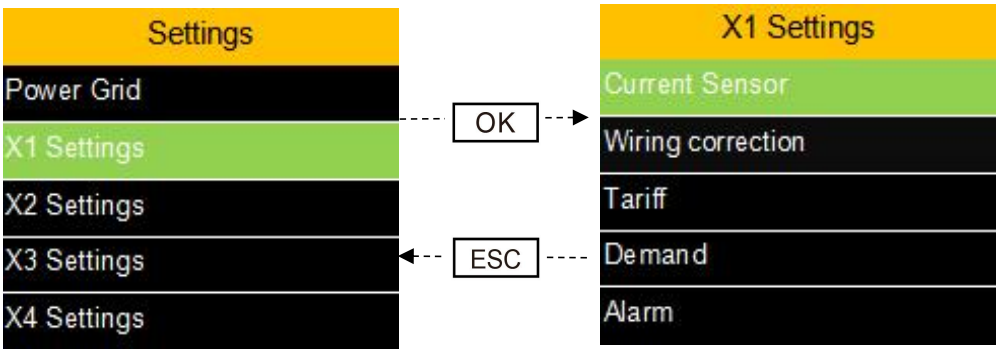
4.5.1 Settings menu-Power Grid submenu

Wiring type: 3P4W-4CT\ 3P4W-3CT\ 3P3W-3CT\3P3W-2CT\1P3W\1P2W.
Frequency[Hz]: 50\60.
VT ratio can be configured from 1 to 10000 (primary terminal voltage/secondary terminal voltage value).
Nominal Voltage[V]:00001-65535
Min.measure voltage[V]:0.000-65.535



4.5.2 Settings menu-X1 Settings submenu

The X1 Settings submenu can set Current Sensor, Wiring correction,Tariff, Demand, Alarm, Current K Factor .

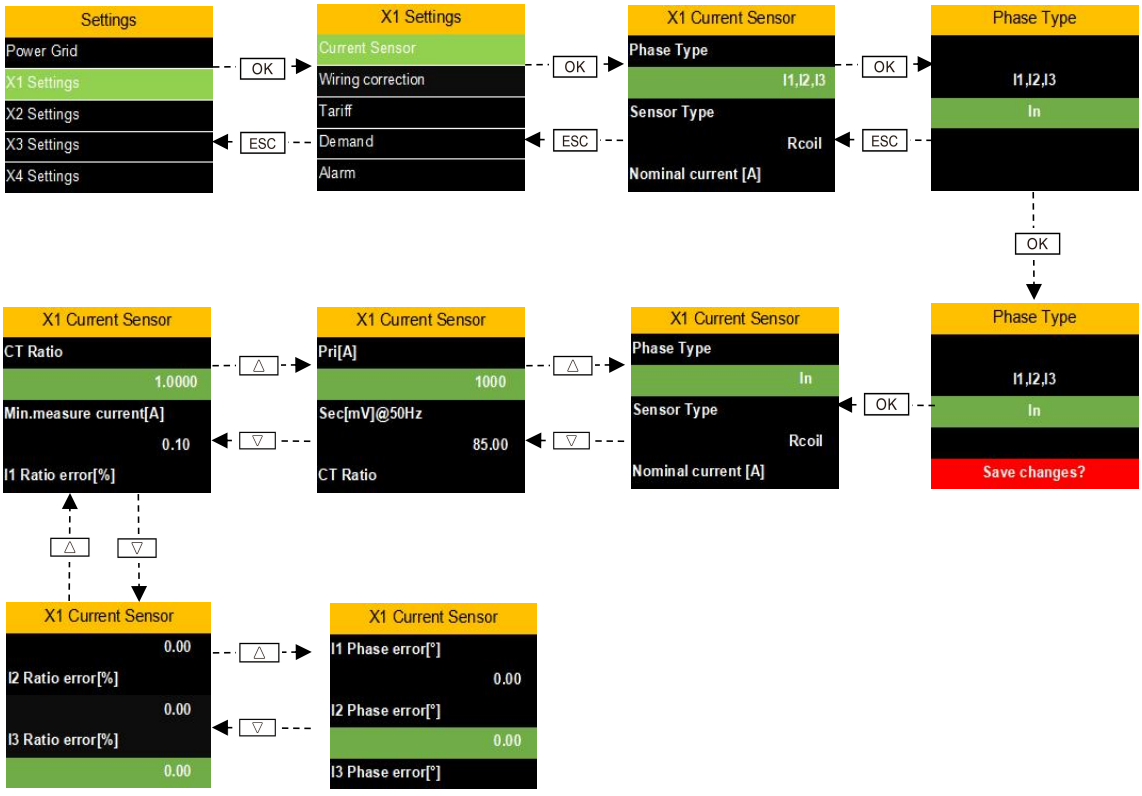


1.1.1 X1 Settings submenu-Current Sensor submenu

The current sensor submenu can set phase type, sensor type, nominal current, Pri, Sec, Min.measure current, I123 ratio error, I123 phase error.

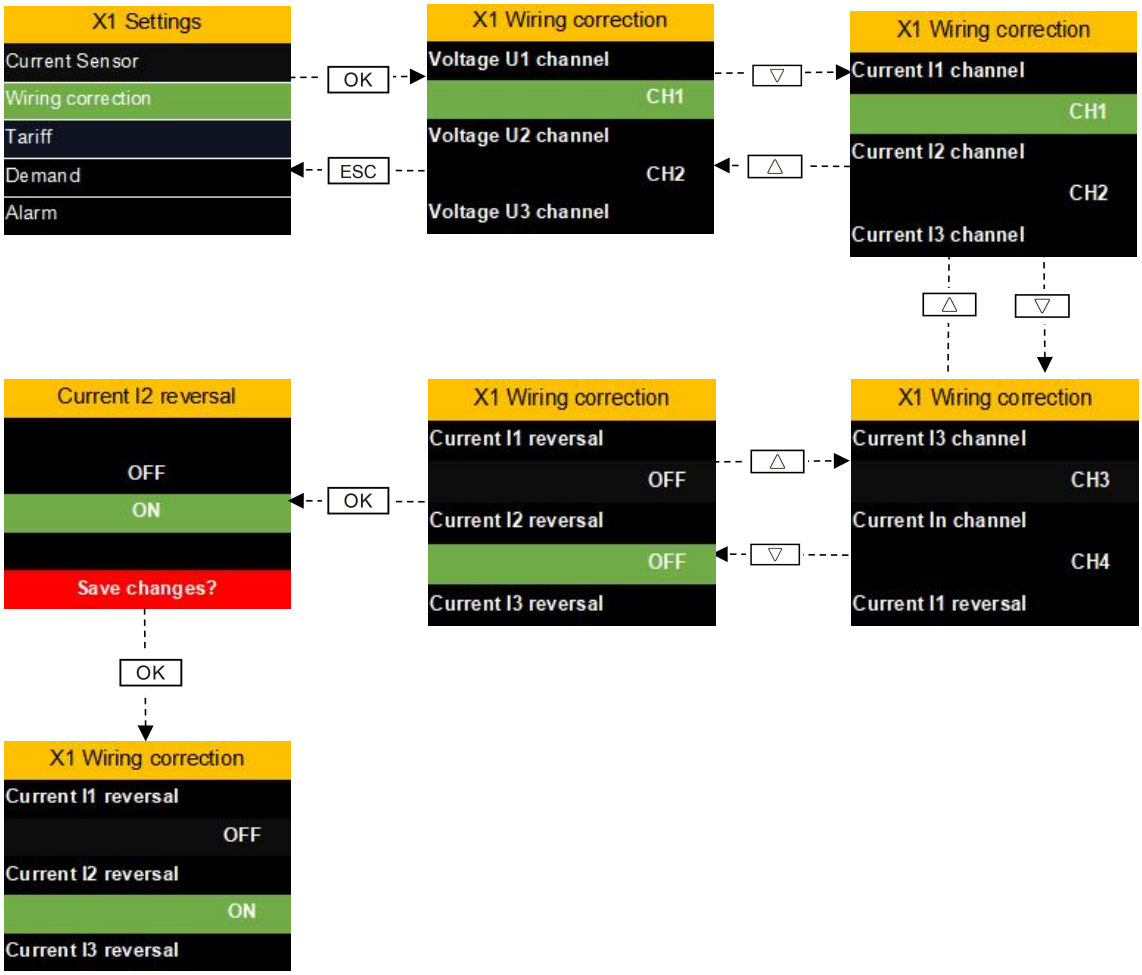
Phase type: I1, I2, I3 \ In
Sensor type: Rcoil \ VCT
Nominal current [A] : 1-99999
Pri[A]: 1-999999
Sec[mV] (@50Hz/@60Hz) configurable parameter: 1-99999

Parameter name	explain
Rcoil Pri	A single rated input current for a single Rogowski coil
Rcoil Sec	The value of the secondary output corresponding to the rated primary current
nominal current	The rated current value measured in practice *2
85mV/kA@50Hz coil, initial value is Rcoil Pri =1000A, Rcoil Sec=85mV, If you want to measure 2000A, please set the nominal current =4000A to avoid measurement misalignment caused by excessive harmonics. If you want to measure 100A, in order to maintain higher accuracy, you need to change to nominal current =200A.	
If the coil with different variation ratio is replaced, the variation ratio must be reset.	



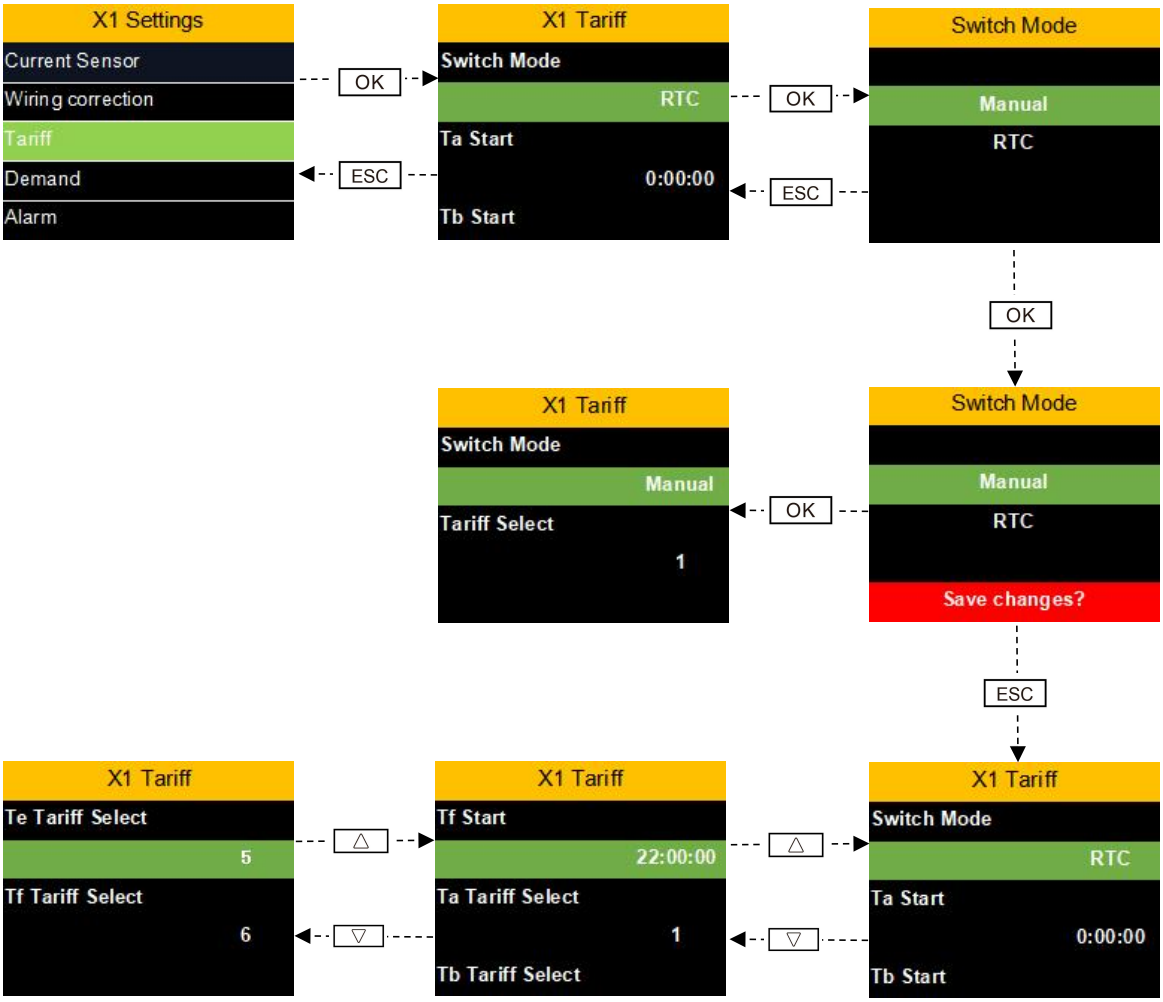
2.1.1 X1 Settings submenu-Wiring correction submenu

In the menu, you can set the wiring correction.



3.1.1 X1 Settings submenu-Tariff submenu

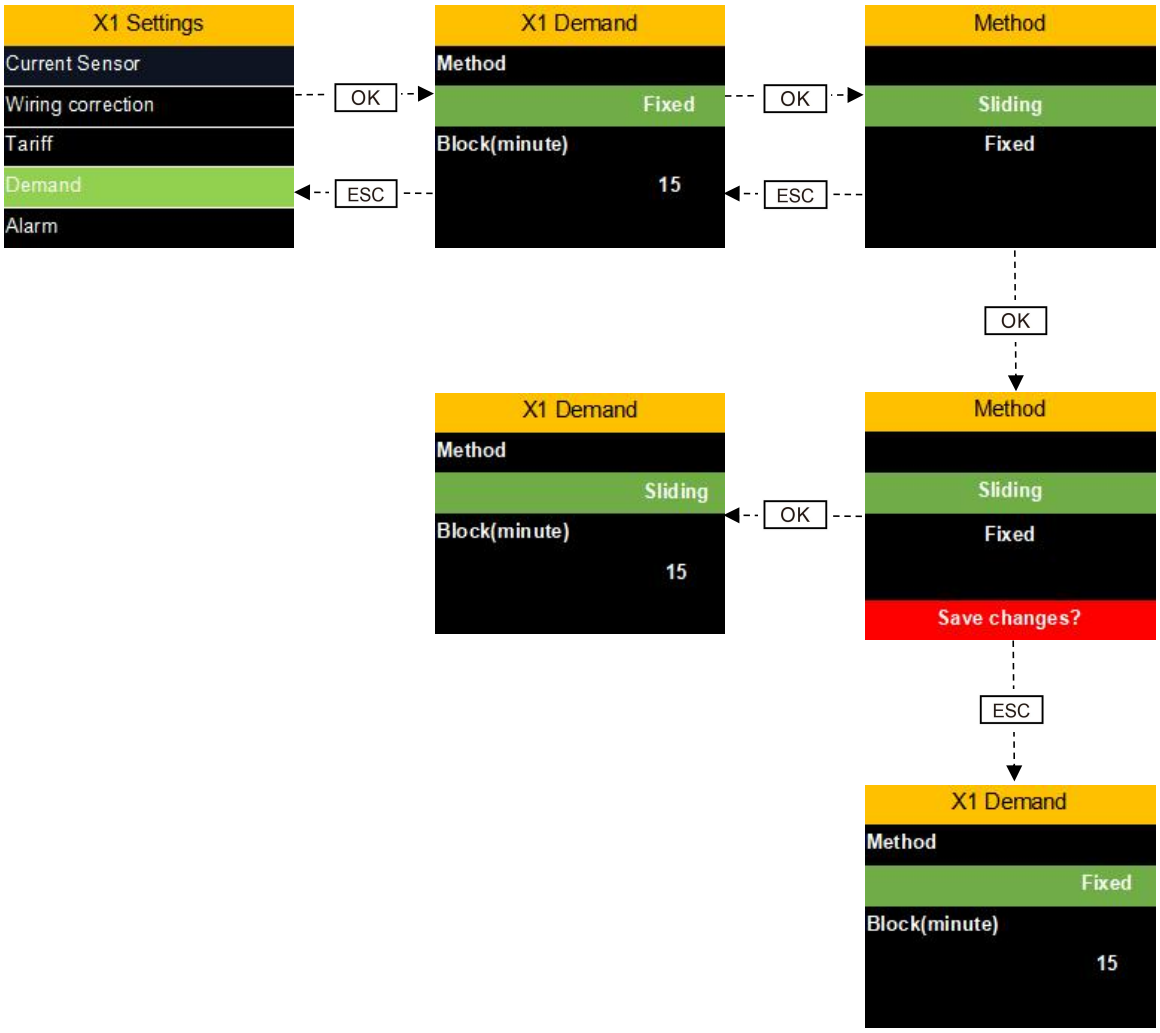
The rate submenu can set the switching mode and rate selection.
Switch mode can be configured as manual or RTC
In RTC mode:
You can set the start time of 6 tariff, Ta, Tb, Tc, Td, Te and Tf, and the corresponding 6 tariff options.
In manual mode:
Only 6 tariff can be set: Ta, Tb, Tc, Td, Te and Tf, but the start time cannot be set



4.1.1 X1 Settings submenu-Demand submenu

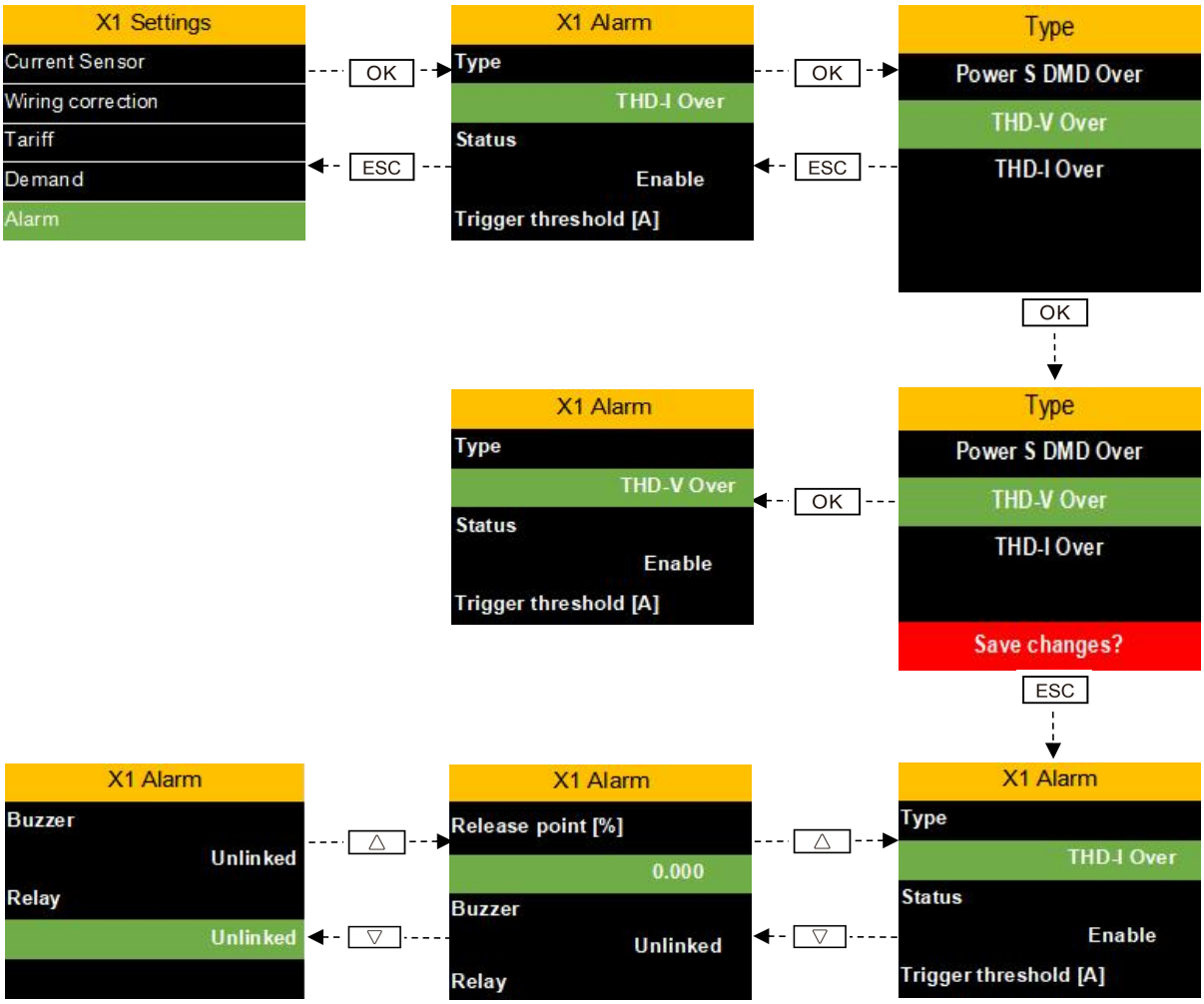
The demand submenu can set the method and interval (minutes).

Parameter name	Explain
computational method	Fixed: Update demand according to calculated time interval Sliding: Update demand every 1 minute
counting period	Unit: minutes Range: 1-60, default 15 minutes



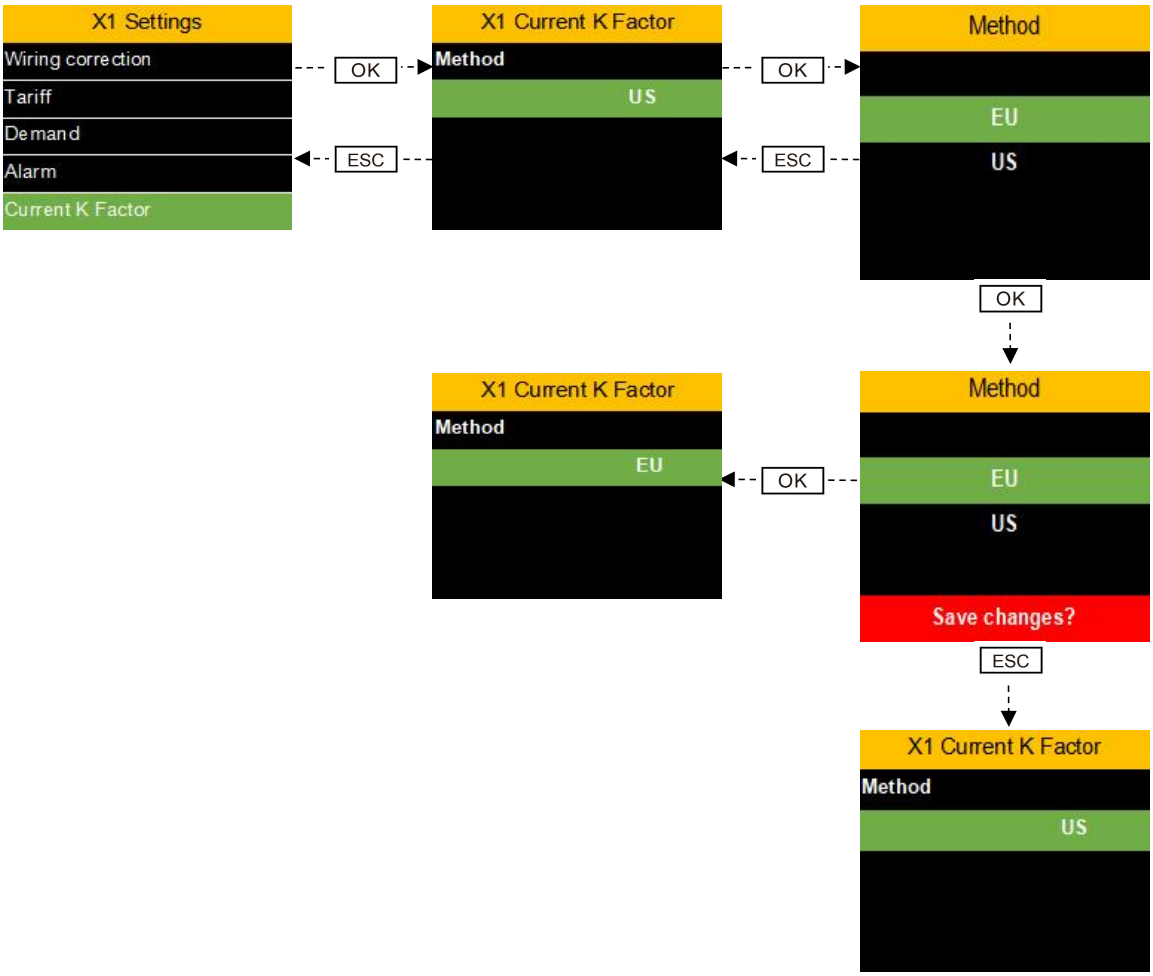
5.1.1 X1 Settings submenu-Alarm submenu

The alarm submenu can set the type, status, trigger threshold, release point, buzzer, relay.
Type: current over, current under, phase voltage over, phase voltage under, line voltage over, line voltage under, power P over, power Q over, power S over, power P DMD over, power Q DMD over, power S DMD over, THD-U over, THD-I .
Status: disable \ enable
Trigger threshold [A] : 999999.999-000000.000
Release point [%]: 999999.999-000000.000
Buzzer: unlinked \ linked
Relay: unlinked\linked



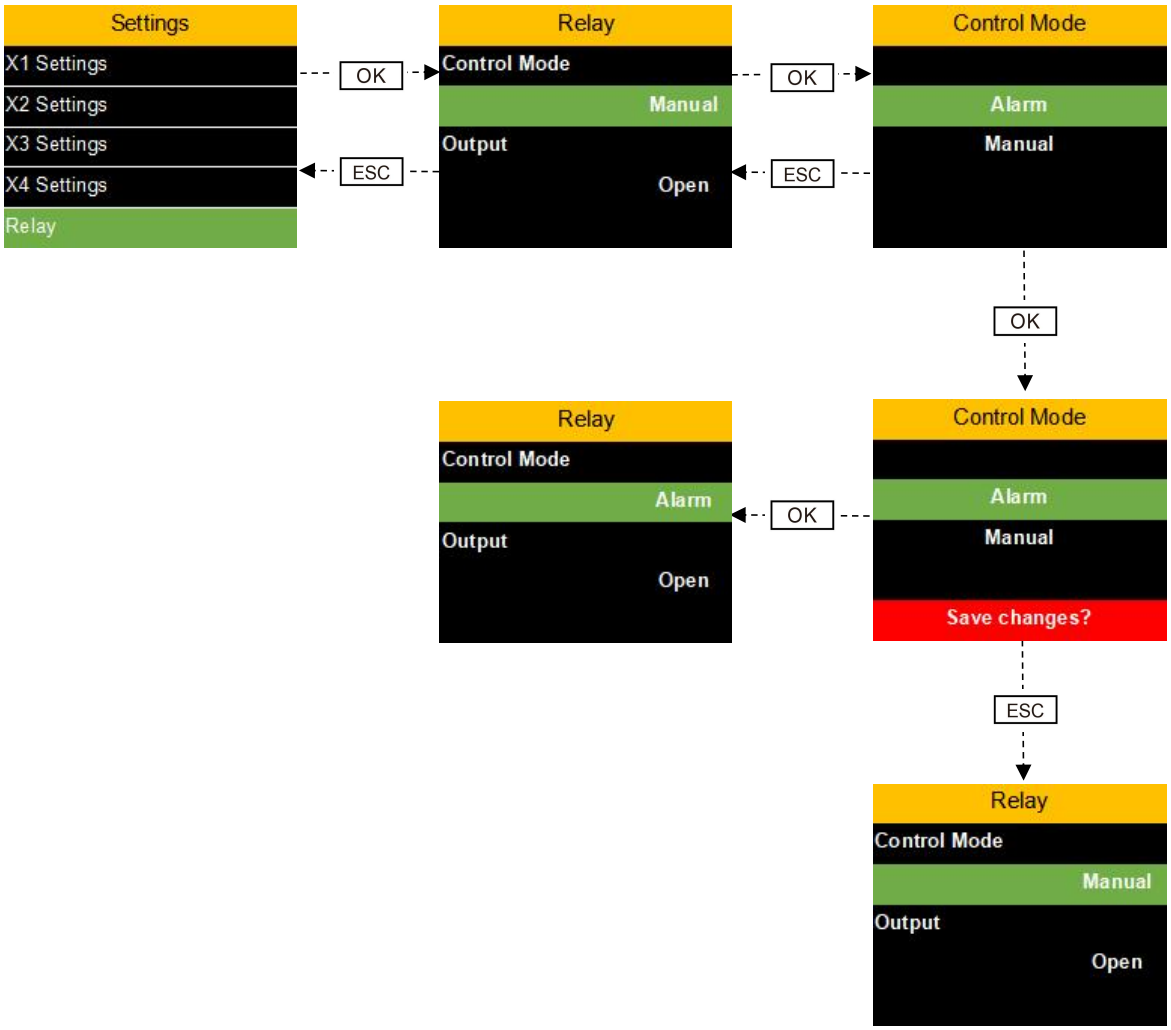
6.1.1 X1 Settings submenu-Current K Factor submenu

The Current K Factor: US\EU.



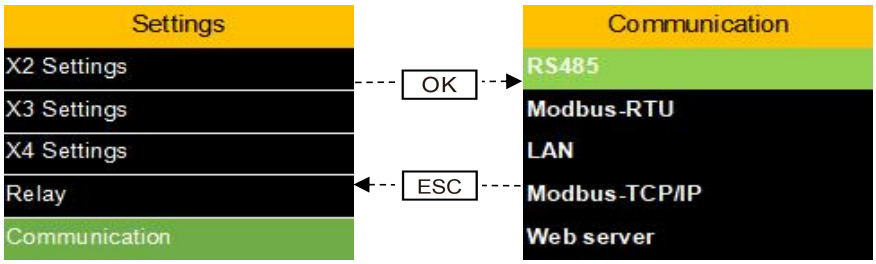
4.5.3 Settings menu-Relay submenu

The relay submenu allows you to configure the control mode.
Control Mode: manual\alarm.
Output: open\close



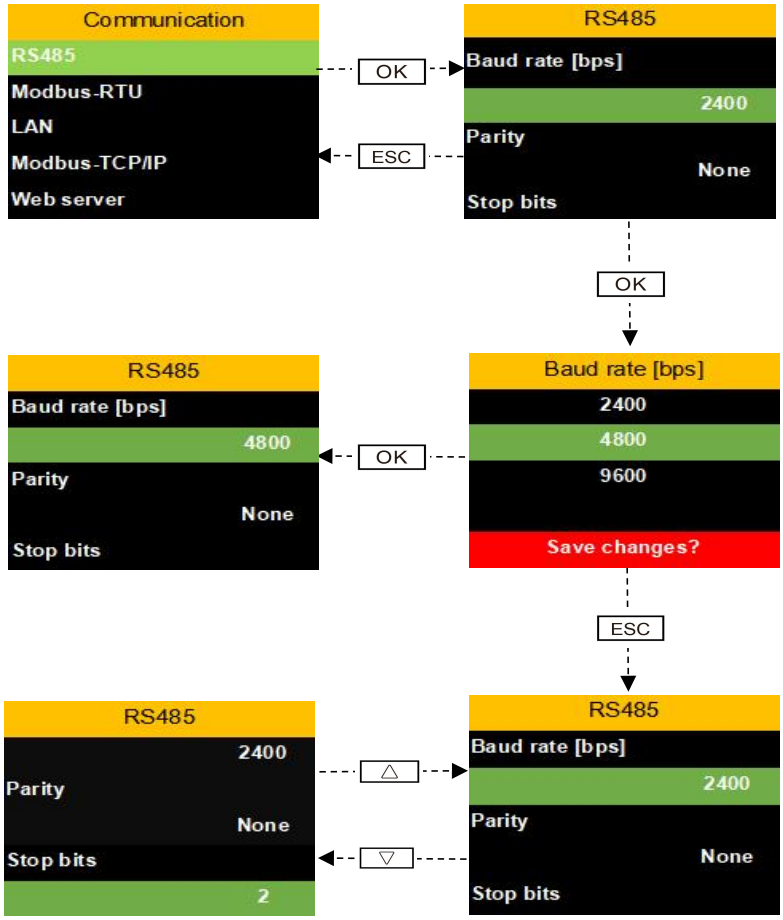
4.5.4 Settings menu-Communication submenu

The communication submenu can set RS485, Modbus-RTU, LAN, Modbus-TCP/IP, Web server, FTP server.



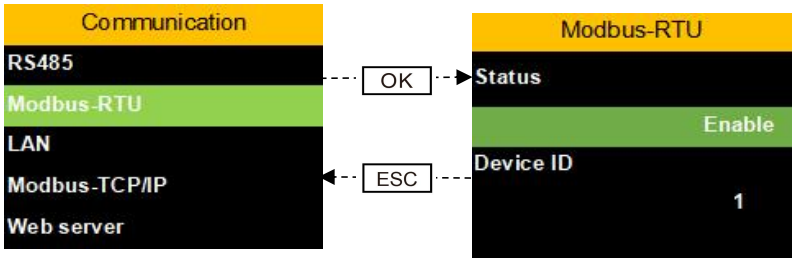
1.1.1 Communication submenu-RS458 submenu

RS485 Settings submenu can set baud rate, parity, stop bits.
Baud rate [bps]:2400,4800,9600,19200,38400,57600,115200
Parity:none, odd, even
Stop bits:1\2



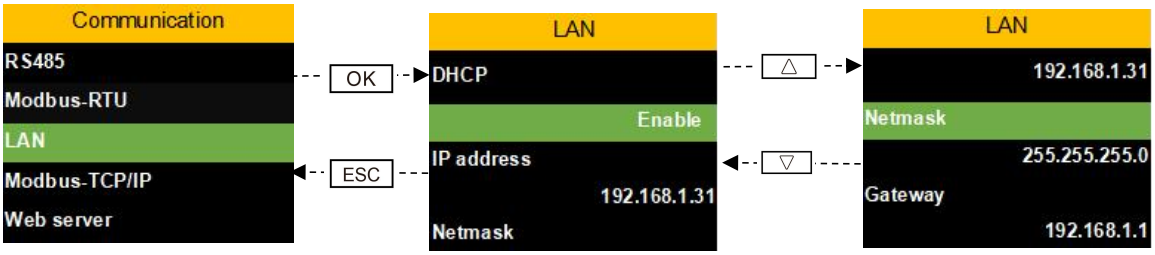
2.1.1 Communication submenu-Modbus submenu

Status: enable \ disable
Device ID:001-247



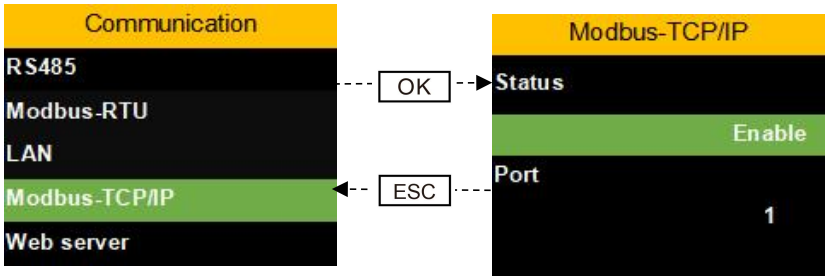
3.1.1 Communication submenu-LAN submenu

DHCP: enable \ disable
IP address:Configurable (user-adjustable)
Netmask:Configurable (user-adjustable)
Gateway:Configurable (user-adjustable)



4.1.1 Communication submenu-Modbus-TCP/IP submenu

Status: enable \ disable
Port:Configurable (user-adjustable)

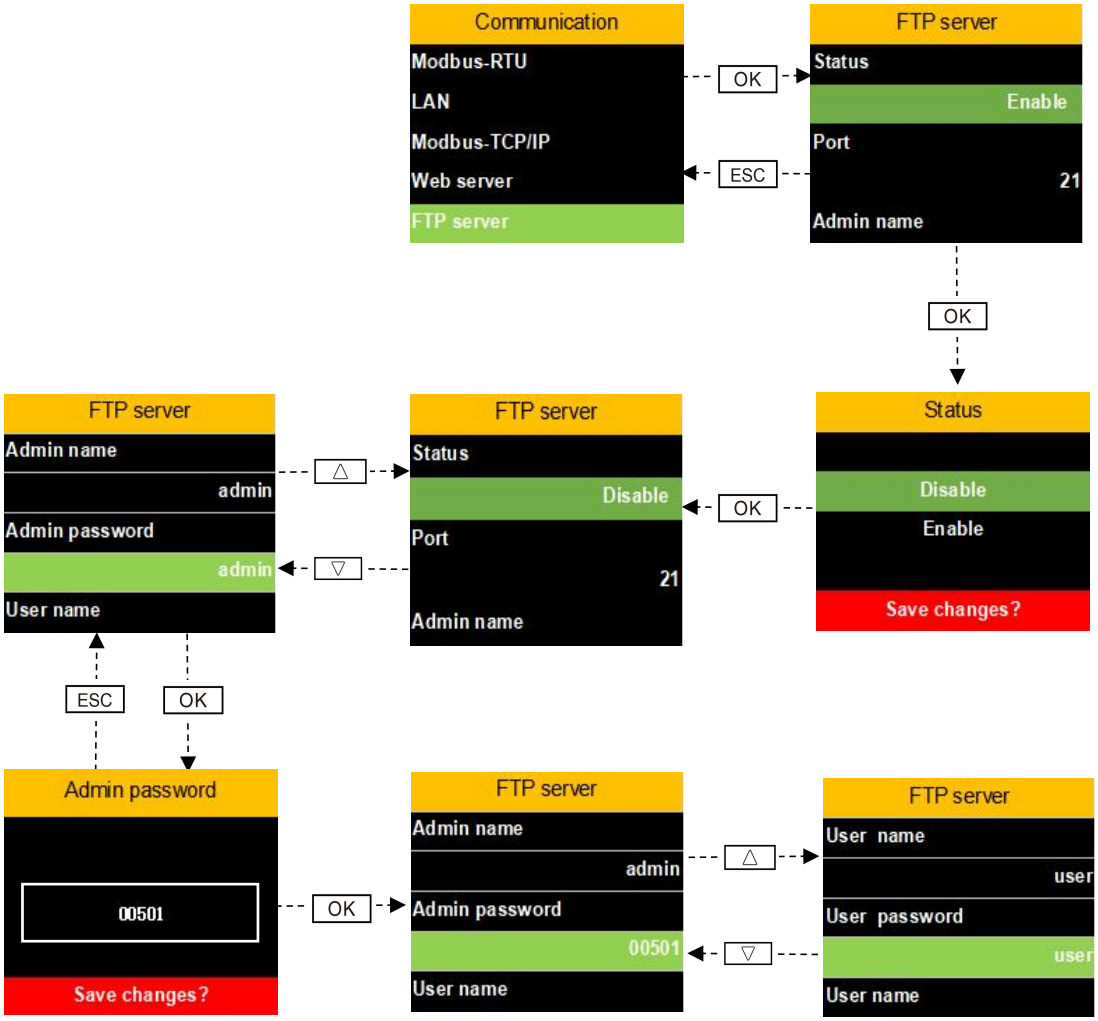


5.1.1 Communication submenu-Web server submenu

Status: enable \ disable
Port:Configurable (user-adjustable)
Admin name:Configurable (user-adjustable)
Admin password:Configurable (user-adjustable)
User name:Configurable (user-adjustable)
User password:Configurable (user-adjustable)

6.1.1 Communication submenu-FTP server submenu

Status: enable \ disable
Port:Configurable (user-adjustable)
Admin name:Configurable (user-adjustable)
Admin password:Configurable (user-adjustable)
User name:Configurable (user-adjustable)
User password:Configurable (user-adjustable)

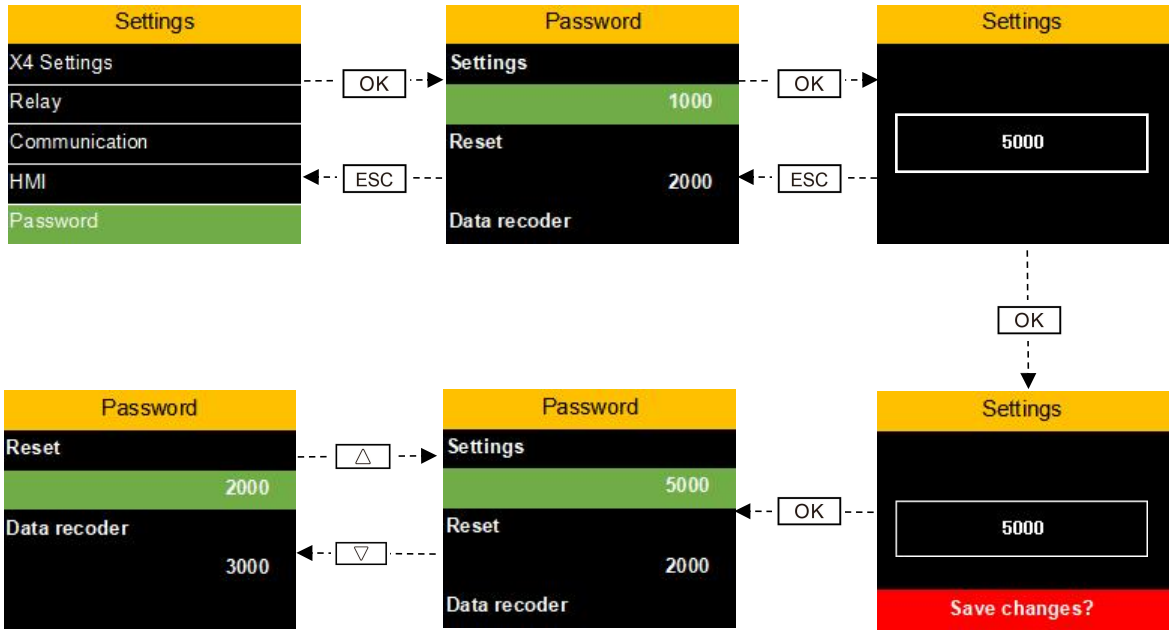


4.5.5 Settings menu-HMI submenu

The HMI submenu can set the language, clock,power-on sound, key tone, backlight off, backlight brightness.
Language: Chinese\ English\French\Polisch
Clock : year/month/day hour: minute: second
Power-on sound: enable \ disable
Key tone: enable \ disable
Backlight off: never \ 1 minute \ 2 minutes \ 3 minutes \ 4 minutes \ 5 minutes
Backlight brightness: 1 to 5

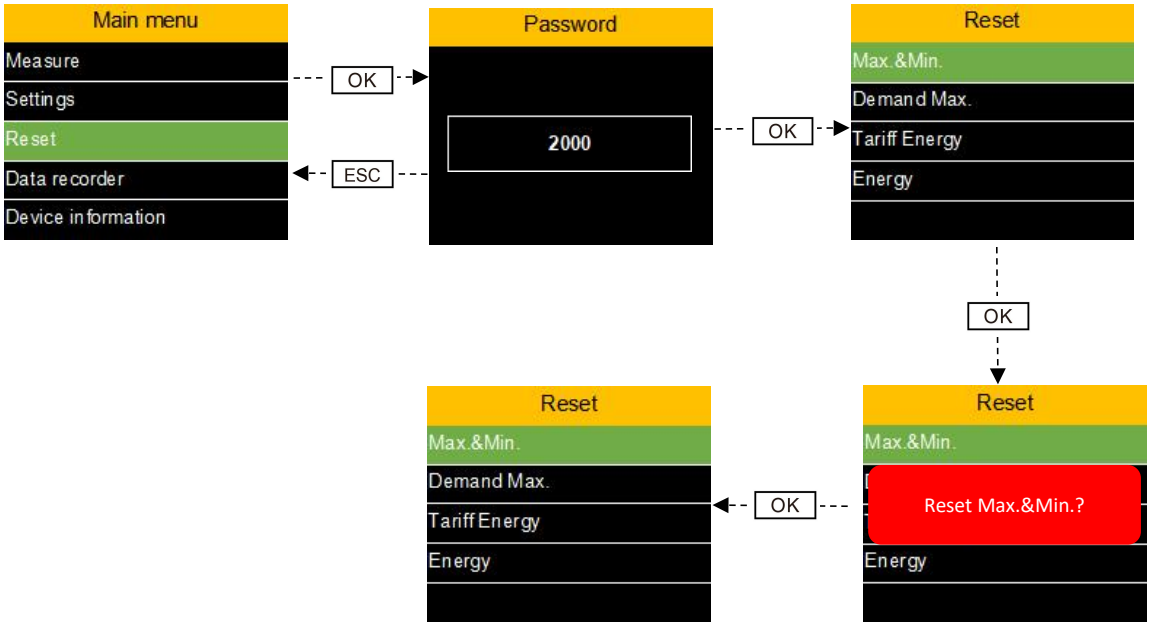
4.5.6 Settings menu-Password submenu

The password submenu can set the settings, reset, data recoder passwords.
Settings: default:1000, Configurable (user-adjustable)
Reset: default:2000, Configurable (user-adjustable)
Data recoder: default:3000, Configurable (user-adjustable)



4.6 Reset interface

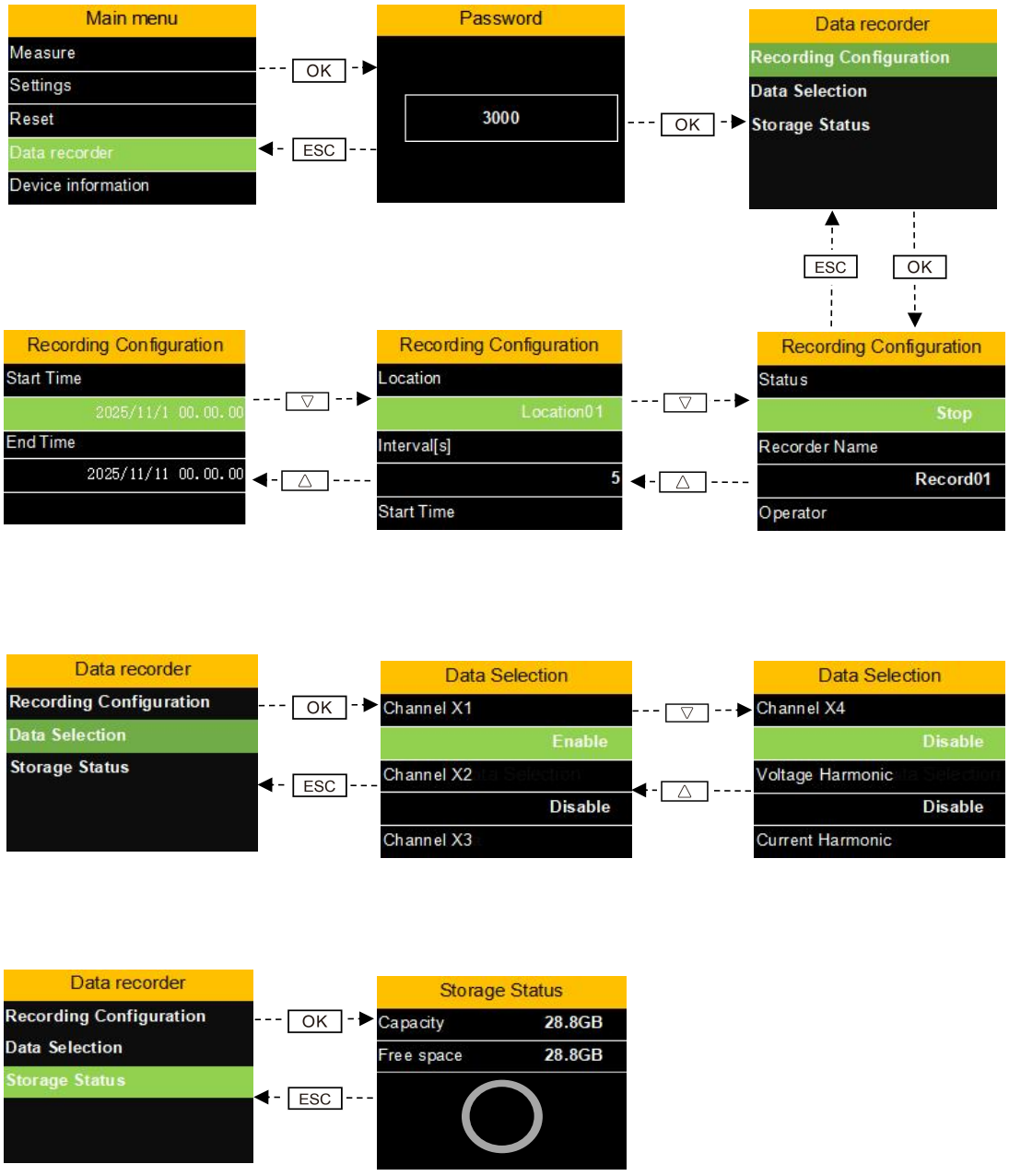
The reset menu is used to reset parameters such as maximum value minimum value, maximum demand, tariff energy, energy.
Before entering the reset page, you need to input the reset password (default: 2000).
If you forget the password, you can enter the last four digits of the device serial number to enter the reset interface.



4.7 Data recorder interface

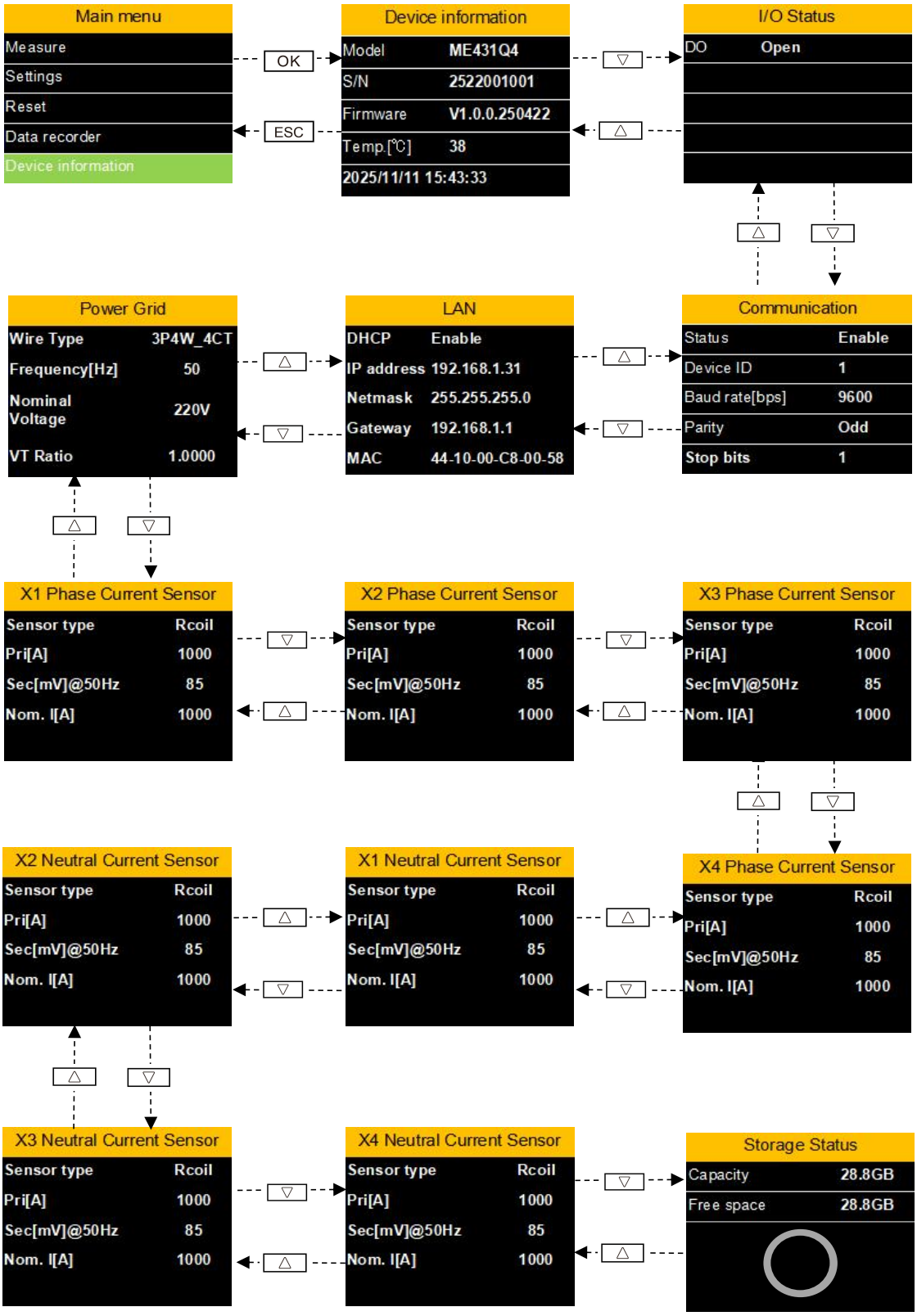
The data recorder menu is used for data recording. It can be set: status, recorder name, operator, location, start time, end time, and record interval.
Before entering the record page, you need to enter the reset password (default 3000), press OK to enter the password input.
If you forget the password, you can enter the last four digits of the device serial number to enter the reset interface.

Interval:5-9999s



4.8 Device information interface

The device information menu is used to display the device model, program version number, communication parameters, power grid parameters, device time and other data.



5 Modbus communication

Communication	protocol
RJ45 Ethernet	Modbus-TCP/IP
RS485	Modbus-RTU

The equipment is standard with an RJ45 Ethernet communication interface and an RS485 communication interface, which can be used for Modbus-TCP and Modbus-RTU communication. The standard communication protocol Modbus-TCP and Modbus-RTU are adopted.

5.1 Function code

Function codes are used to indicate how the device handles the instruction. The following table shows the available function codes and their descriptions.

FC		Function code name	act on	remarks
decimal system	hexadecimal			
3	03H	Read the hold register	Used to read device parameters	
16	10H	Write to multiple registers	Used to configure device parameters	

5.2 Data type

The following table lists the data types used in this document:

type	description	scope
UInt16	An unsigned 16-bit integer	0–65535
Int16	There is a 16-bit integer symbol	-32768–+32767
UInt32	An unsigned 32-bit integer	0–4 294 967 295
UInt64	An unsigned 64-bit integer	0–18 446 744 073 709 551 615
UTF8	8-bit UTF encoding	Multibyte Unicode encoding
Float32	32-bit floating point type	Standard IEEE floating point data (single precision)
Date Time	Date time type	-
Time	Time type	-
IPaddr	IP address	-

Detailed explanation of Date Time:

character	Position															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1	Years (2000-2099)															
2	Moy (1-12)								Day (1-31)							
3	Time (0-23)								Subgroup (0-59)							
4	seconds (0-59)															

Detailed explanation of Time type:

character	Position															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1	Time (0-23)															
2	Subgroup (0-59)															
3	seconds (0-59)															

IP address format

character	Position															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1	addr1(0–255)								addr2(0–255)							
2	addr3(0–255)								addr4(0–255)							

Example: 192.168.1.31

character	Position															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1	192								168							
2	1								31							

5.3 Register byte order

The device uses MSB, a high byte priority order, and when a data type exceeds 1 byte, the high byte is in front whether it is sent or received.
For example, if the data type of IA is Float32 (ABCD) and the length is 4 bytes, then the byte order received is ABCD, first A, then B, then C, and finally D; that is, the high byte is in front.

5.4 Register address description

The Modbus register address of the device is a real address without offset. When using the PLC device to read this device, the read address needs to be added by 1. Because the PLC device address is based on 1, the address will be automatically reduced by 1 when sent.

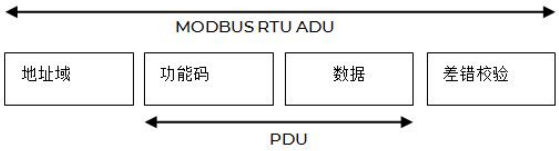
5.5 Modbus-RTU communication

Before Modbus-RTU communication, the following parameters need to be set through the device interface:

parameter	effective value	Windows default
address	1–247	1
Baud rate	-2400 -4800 -9600 -19200 -38400 -57600 -115200	9600
data bit	8	8
verification mode	--No verification – odd – even parity check	No verification
stop bit	1-2	1

5.5.1 Modbus-RTU data frame

Modbus RTU data frame contains four parts: address field, function code, data and error check.



The PDU requests the data format

FC	instruct
8-Bits	N×8-Bits

5.5.2 Function code (0x03=3) operation instructions

Function code (0x03=3) is used to read device register parameters. The request data and return data format are as follows:
Request data format:

order number	name	type	Range (decimals)	description
1	device address	UInt8	1~247	
2	FC	UInt8	3	
3	Starting register address	UInt16	-	High byte first (send order)

order number	name	type	Range (decimals)	description
4	Number of registers	UInt16	1~125	High byte first (send order)
5	CRC-16 verification	UInt16	-	Low byte first (sending order)

Return data format:

order number 。	name	type	Range (decimals)	description
1	device address	UInt8	1~247	
2	FC	UInt8	3	
3	Read the number of register bytes	UInt8	-	Number of read registers * 2
4	The value of register 1		-	The high byte comes first
5	…		-	The high byte comes first
6	The value of register n		-	The high byte comes first
7	CRC-16 verification	UInt16	-	Low byte first

give an example ：

Read the voltage values of A, B and C (the starting address of the voltage register is 1010):

order number 。	name	type	Range (decimals)	Range (hex)	description
1	device address	UInt8	1	0x01	
2	FC	UInt8	3	0x03	
3	Starting register address	UInt16	1010	0x03F2	
4	Number of registers	UInt16	6	0x0006	
5	CRC-16 verification	UInt16	32612	0x7F64	Low byte first (sending order)

The byte order is sent as follows:

01 03 03 F2 00 06 64 7F

Return data:

01 03 0C 43 5C 00 00 43 5D 00 00 43 5E 00 00 14 AC

order number 。	name	type	hexadecimal	decimal system
1	device address	UInt8	01	1
2	FC	UInt8	03	3
3	Read the number of	UInt8	0C	12

order number。	name	type	hexadecimal	decimal system
	register bytes			
4	A phase voltage	float32	435C0000	220V
5	B phase voltage	float32	435D0000	221V
6	C phase voltage	float32	435E0000	222V
7	CRC-16 verification	UInt16	14AC	

5.5.3 Function code (0x10=16) operation instructions

The device is configured through Modbus-RTU.
You can use function code 16 to write instructions to the device and configure the device parameters.
Device parameters can only be configured by writing the corresponding data to the "configuration instruction register", that is, writing the corresponding data to the address starting from 300 to configure the corresponding parameters.

Configuration results:

The configuration results can be read through registers 424 and 425.

Register address	content	Size (16 bits)	Data (e.g.)
424	Configure the instruction code	1	1001 (set time)
425	bear fruit	1	0 = valid operation 80 = Invalid instruction code 81 = Invalid instruction parameter 82 = Number of invalid instruction parameters 83 = The operation was not performed

Function code (0x10=16) is used to configure device parameters. Its request and return data formats are as follows:
Request data format:

order number	name	type	scope (decimal system)	description
1	device address	UInt8	1~247	
2	FC	UInt8	16	
3	Register starting address	UInt16	-	High byte first (send order)
4	Number of registers	UInt16	1~123	High byte first (send order)
5	Number of register bytes	UInt8		Number of registers * 2
6	Write value to register 1	UInt16	-	High byte first (send order)

order number	name	type	scope (decimal system)	description
7	…	UInt16	-	High byte first (send order)
8	Write value to register n	UInt16	-	High byte first (send order)
9	CRC-16 check code	UInt16	-	Low byte first (sending order)

Return data format:

order number	name	type	scope (decimal system)	description
1	device address	UInt8	1~247	
2	FC	UInt8	16	
3	Register starting address	UInt16	300	The high byte comes first
4	Number of registers	UInt16	1~123	The high byte comes first
5	CRC-16 check code	UInt16	-	Low byte first

pay attention to ！

Function code (0x10=16) can only write data to the "configuration instruction register" and can only write data to the registers starting from address 300.

for instance ：

Configure the device time (instruction =1200, set to: 2022-11-1 12:20:00).

order number	meaning	type	Value (decimal)	Value (hex)	description
1	device address	UInt8	1	01	
2	FC	UInt8	16	10	
3	Register starting address	UInt16	300	012C	Configures the starting address of the register
4	Number of configuration registers	UInt16	7	0007	Configuration time instruction + parameters A total of 7 registers are occupied
5	DL	UInt8	14	0E	Number of configuration registers * 2
6	Write a value to register 300	UInt16	1200	04B0	Instruction code 1200 for configuration time
7	Write a value to register 301	UInt16	2022	07E6	The year is 2022
8	Write the value to register 302	UInt16	11	000B	The moon is 11
9	Write the value to register 303	UInt16	1	0001	The daily rate is 1

order number	meaning	type	Value (decimal)	Value (hex)	description
10	Write the value to register 304	UInt16	12	000C	Time =12
11	Write a value to register 305	UInt16	20	0014	The score was 20
12	Write a value to register 305	UInt16	0	0000	Let's say 0 seconds
13	CRC-16 check code	UInt16	35524	8AC4	Low byte first (sending order)

The byte order is sent as follows:
01 10 01 2C 00 07 0E 04 B0 07 E6 00 0B 00 01 00 0C 00 14 00 00 C4 8A
If the configuration data is correct, the following data will be returned:
01 10 01 2C 00 07 41 FE

order number 。	name	type	Range (hex)	Range (decimals)
1	device address	UInt8	01	1
2	FC	UInt8	10	16
3	Register starting address	UInt16	012C	300
4	Number of registers	UInt16	0007	7
5	CRC-16 check code	UInt16	41FE	

5.5.4 Error response

Error response data format:

order number 。	name	type	decimal system	hexadecimal	remarks
1	device address	UInt8	1~247	0x01-0xF7	
2	FC	UInt8	(128+3) (128+16)	(0x80+0x03) (0x80+0x10)	
3	error code	UInt8			
4	CRC-16 verification	UInt16			Low byte first

Modbus error code:

code	name	meaning
0x01	illegal function code	The function code used is not supported by the device, 3 or 16
0x02	Illegal data addresses	The register data written or read is outside the address range supported by the device
0x03	Illegal data values	The data value written into the register does not meet the requirements
0x04	Device error	An unknown error occurred
0x10	In the device data record	Do not modify this parameter when the device is recording data

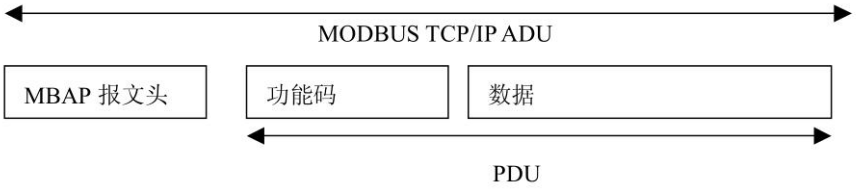
5.6 Modbus TCP/IP communication

Before Modbus-TCP/IP communication, the following parameters need to be set through the device interface:

parameter	effective value	Windows default
IP address	-	192.168.1.31
subnet mask	-	255.255.255.0
Gateway address	-	192.168.1.1
Modbus protocol port number	-	502

5.6.1 Modbus TCP/IP data frame

In TCP/IP Ethernet transmission, Modbus-TCP/IP data frame contains three parts: header, function code and data.



The MBAP message header (MBAP, Modbus Application Protocol, Modbus application protocol) is divided into four fields and a total of 7 bytes

MBAP heading

land within certain boundaries	length	description	nt	server
Transaction ID	Two bytes	The identification code for the processing of MODBUS request/response transactions	Client machine started	The server replicates the request from the received request
protocol identifier	Two bytes	0 Modbus protocol	Client machine started	The server replicates the request from the received request
length	Two bytes	The number of bytes below	Client startup (request)	Server (response) started
element ID	One byte	The identification code of a remote station connected to a serial link or other general line	Client machine started	The server replicates the request from the received request

The message header is 7 bytes long:

- Transaction processing identifier: Used for transaction processing pairing. In the response, the MODBUS server copies the transaction processing identifier of the request.
- Protocol identifier: Used for multiplexing within the system. The value 0 identifies the MODBUS protocol.

- Length: The length field is the number of bytes in the next field, including the unit identifier and data fields.
- Unit identifier: This field is used for system routing. It is specifically used for Ethernet TCP/IP networks and MODBUS serial.
- The gateway between the line links communicates with the MODBUS or MODBUS+ serial link slave. The MODBUS client is set in the request.
- This domain, the server must use the same value to return this domain in response.
- A PDU consists of two parts: a function code and data. The function code is used to distinguish functions, and the data is used to specify the meaning

FC	data
8-Bits	N×8-Bits

5.6.2 Function code (0x03=3) operation instructions

Function code (0x03=3) is used to read device register parameters. The request data and return data format are as follows:

Request data format:

order number	name	type	Range (decimals)	description
1	Transaction unit ID	UInt16		High byte first (send order)
2	protocol identifier	UInt16	0=MODBUS	High byte first (send order)
3	Data byte length	UInt16		High byte first (send order)
4	element ID	UInt8		
5	FC	UInt8	3	
6	Starting register address	UInt16	-	High byte first (send order)
7	Number of registers	UInt16	1~125	High byte first (send order)

Return data format:

order number 。	name	type	Range (decimals)	description
1	Transaction unit ID	UInt16		High byte first (send order)
2	protocol identifier	UInt16	0=MODBUS	High byte first (send order)
3	Data byte length	UInt16		High byte first (send order)
4	element ID	UInt8		
5	FC	UInt8	3	
6	Read the number of register bytes	UInt8	-	Number of read registers * 2
7	The value of register 1		-	The high byte comes first
8	…		-	The high byte comes first
9	The value of register n		-	The high byte comes first

give an example ：

Read the voltage values of A, B and C (the starting address of the voltage register is 1010)

order number 。	name	type	Range (decimals)	Range (hex)	description
1	Transaction unit ID	UInt16	0	0000	
2	protocol identifier	UInt16	0	0000	
3	Data byte length	UInt16	6	0006	
4	element ID	UInt8	1	01	
5	FC	UInt8	3	03	
6	Starting register address	UInt16	1010	03F2	
7	Number of registers	UInt16	6	0006	

The byte order of the TCP/IP packet is as follows:
00 00 00 00 00 06 01 03 03 F2 00 06
Return data:
00 00 00 00 00 0F 01 03 0C 43 5C 00 00 43 5C 00 00 43 5C 00 00

order number 。	name	type	hexadecimal	decimal system
1	Transaction unit ID	UInt16	0000	0
2	protocol identifier	UInt16	0000	0
3	Data byte length	UInt16	0006	6
4	element ID	UInt8	01	1
5	FC	UInt8	03	3
6	Read the number of register bytes	UInt8	0C	12
7	A phase voltage	float32	435C0000	220V
8	B phase voltage	float32	435C0000	220V
9	C phase voltage	float32	435C0000	220V

5.6.3 Function code (0x10=16) operation instructions

Function code (0x10=16) can be used to write instructions to the device and configure device parameters.
Device parameters can only be configured by writing the corresponding data to the "configuration instruction register", that is, writing the corresponding data to the address starting from 300 to configure the corresponding parameters.
The configuration results can be read through registers 424 and 425.

Register address	content	Size (16 bits)	Data (e.g.)
424	Configure the instruction code	1	1001 (set time)

Register address	content	Size (16 bits)	Data (e.g.)
425	bear fruit	1	0 = valid operation 80 = Invalid instruction code 81 = invalid instruction parameter 82 = Number of invalid instruction parameters 83= The operation was not performed

The request and return data format of Modbus-TCP is as follows:

Request data format:

order number	name	type	scope	description
1	Transaction unit ID	UInt16		High byte first (send order)
2	protocol identifier	UInt16	0=MODBUS	High byte first (send order)
3	Data byte length	UInt16		High byte first (send order)
4	element ID	UInt8		
5	FC	UInt8	16	
6	Register starting address	UInt16	300	High byte first (send order)
7	Number of registers	UInt16	1~123	High byte first (send order)
8	Number of register bytes	UInt8		Number of registers * 2
9	Write value to register 1	UInt16	-	High byte first (send order)
10	…	UInt16	-	High byte first (send order)
11	Write value to register n	UInt16	-	High byte first (send order)

Return data format:

order number	name	type	scope	description
1	Transaction unit ID	UInt16		High byte first (send order)
2	protocol identifier	UInt16	0=MODBUS	High byte first (send order)
3	Data byte length	UInt16		High byte first (send order)
4	element ID	UInt8		
5	FC	UInt8	16	
6	Register starting address	UInt16	300	The high byte comes first
7	Number of registers	UInt16	1~123	The high byte comes first

pay attention to ！

Function code (0x10=16) can only write data to the "configuration instruction register", that is, can only write data to the registers starting from address 300.

for instance ：

Configure the device time (instruction =1200, set to: 2022-7-1 12:23:25).

order number。	name	type	Value (decimal)	Value (hex)	description
1	Transaction unit ID	UInt16	0	0000	
2	protocol identifier	UInt16	0	0000	
3	Data byte length	UInt16	21	0015	
4	element ID	UInt8	1	01	
5	FC	UInt8	16	10	
6	Starting register address	UInt16	300	012C	Write the register starting address 300
7	Number of registers	UInt16	7	0007	
8	Number of register bytes	UInt8	14	0E	
9	Write a value to register 300	UInt16	1200	04B0	Set the time command to 1200
10	Write a value to register 301	UInt16	2022	07E6	The year is 2022
11	Write the value to register 302	UInt16	7	0007	The moon is 7
12	Write the value to register 303	UInt16	1	0001	The daily rate is 1
13	Write the value to register 304	UInt16	12	000C	Time =12
14	Write a value to register 305	UInt16	23	0017	The score was 23
15	Write the value to register 306	UInt16	25	0019	25 seconds

The byte order of the TCP/IP packet is as follows:
00 00 00 00 00 15 01 10 01 2C 00 07 0E 04 B0 07 E6 00 07 00 01 00 0C 00 17 00 19
If the configuration data is correct, the following data will be returned:
00 00 00 00 00 06 01 10 01 2C 00 07

order number。	name	type	Range (hex)	Range (decimals)
1	Transaction unit ID	UInt16	0000	0
2	protocol identifier	UInt16	0000	0
3	Data byte length	UInt16	0006	6
4	element ID	UInt8	01	1
5	FC	UInt8	10	16
6	Starting register address	UInt16	012C	300
7	Number of registers	UInt16	0007	7

5.6.4 Error response

Error response data format:

order number 。	name	type	decimal system	hexadecimal	description
1	Transaction unit ID	UInt16	0	0	
2	protocol identifier	UInt16	0	0	
3	Data byte length	UInt16	3	0003	
4	element ID	UInt8	1	01	
5	FC	UInt8	(128+3) (128+16)	(0x80+0x03) (0x80+0x10)	
6	error code	UInt8			

Modbus error code:

code （hexadecimal）	name	meaning
0x01	illegal function code	The function code used is not supported by the device
0x02	Illegal data addresses	The register data written or read is not in the supported address range
0x03	Illegal data values	The data value written into the register does not meet the requirements
0x04	Device error	An unknown error occurred

5.7 Configuration instruction list

By using the function code (0x10=16) to write data to the "configuration instruction register", data can only be written to the registers starting from address 300.
The configuration instruction requires that all parameters be configured at once, and one parameter cannot be configured separately.

5.7.1 Configure the power grid system

When the device is recording data, you need to close the data recording first and then configure the parameters. Otherwise, the configuration instruction will return an error.

Configure the address	name	big or small	type	unit	scope (decimal system)	description
300	instruct	1	UInt16	-	1001	1001: Set system parameters
301	Parameter 1	1	UInt16	-	0,1,2,3,4,5	mode of connection 0=3P4W_4CT 1=3P4W_3CT 2=3P3W_3CT 3=3P3W_2CT 4=1P3W 5=1P2W
302	Parameter 2	1	UInt16	Hz	50,60	Grid frequency
303	Parameter 3	1	UInt16	V	1-65535	nominal voltage (Excludes VT ratio) The default value is 220
304-305	Parameter 4	2	UInt32	-	1-99999999	VT ratio, magnified 10,000 times =Pri/Sec *10000 The default value is 10,000
306	Parameter 5	1	UInt16	V	0~65535	Minimum measured voltage, amplified 1000 times = Actual value * 1000 The default value is 1000

5.7.2 Configure the type of current transformer

When the device is recording data, you need to close the data recording first and then configure the parameters. Otherwise, the configuration instruction will return an error.

Configure the address	name	big or small	type	unit	scope (decimal system)	description
300	instruct	1	UInt16	-	1004,11004, 21004,31004	1004: Configure X1 channel 11004: Configure X2 channel 21004: Configure X3 channel 31004: Configure X4 channel

Configure the address	name	big or small	type	unit	scope (decimal system)	description
301	Parameter 1	1	UInt16	-	0,1	ABC phase current transformer type 0 = Rogowski coil 1 = VCT
302	Parameter 2	1	UInt16	-	0,1	Type of N-phase current transformer 0 = Rogowski coil 1 = VCT

5.7.3 Configure the AC phase voltage channel

When the device is recording data, you need to close the data recording first and then configure the parameters. Otherwise, the configuration instruction will return an error

Configure the address	name	big or small	type	unit	scope (decimal system)	description
300	instruct	1	UInt16	-	1006,11006, 21006,31006	1006: Configure X1 channel 11006: Configure X2 channel 21006: Configure X3 channel 31006: Configure X4 channel
301	Parameter 1	1	UInt16	-	0,1,2	A phase voltage channel selection 0 = Voltage channel 1 (default value) 1 = voltage channel 2 2 = Voltage channel 3
302	Parameter 2	1	UInt16	-	0,1,2	Selection of phase B voltage channel 0 = Voltage channel 1 1 = Voltage channel 2 (default value) 2 = Voltage channel 3
303	Parameter 3	1	UInt16	-	0,1,2	Selection of phase C voltage channel 0 = Voltage channel 1 1 = voltage channel 2 2 = Voltage channel 3 (default value)

5.7.4 Configure the AC phase current direction

This configuration can be used to modify the direction of current when the coil direction is not consistent with the actual direction

When the device is recording data, you need to close the data recording first and then configure the parameters. Otherwise, the configuration instruction will return an error

Configure the address	name	big or small	type	unit	scope (decimal system)	description
300	instruct	1	UInt16	-	1010,11010, 21010,31010	1010: Configure X1 channel 11010: Configure X2 channel 21010: Configure X3 channel 31010: Configure X4 channel
301	Parameter 1	1	UInt16	-	0,1	Direction of A-phase current 0 = Positive (default value) 1 = Reverse
302	Parameter 2	1	UInt16	-	0,1	Direction of B phase current 0 = Positive (default value) 1 = Reverse
303	Parameter 3	1	UInt16	-	0,1	Direction of C-phase current 0 = Positive (default value) 1 = Reverse

5.7.5 Configure the AC phase current channel

When the current and voltage do not correspond, this configuration can be used to modify the selection of the current channel so that the current and voltage correspond to each other

When the device is recording data, you need to close the data recording first and then configure the parameters. Otherwise, the configuration instruction will return an error

Configure the address	name	big or small	type	unit	scope (decimal system)	description
300	instruct	1	UInt16	-	1011,11011, 21011,31011	1011: Configure X1 channel 11011: Configure X2 channel 21011: Configure X3 channel 31011: Configure X4 channel
301	Parameter 1	1	UInt16	-	0,1,2	A phase current channel selection 0 = Current channel 1 (default value) 1 = Current channel 2 2 = Current channel 3
302	Parameter 2	1	UInt16	-	0,1,2	Selection of B phase current channel 0 = Current channel 1 1 = Current channel 2 (default value) 2 = Current channel 3
303	Parameter 3	1	UInt16	-	0,1,2	C-phase current channel selection 0 = Current channel 1 1 = Current channel 2

Configure the address	name	big or small	type	unit	scope (decimal system)	description
						2 = Current channel 3 (default value)

5.7.6 Configure ABC phase current transformer correction

When the device is recording data, you need to close the data recording first and then configure the parameters. Otherwise, the configuration instruction will return an error

Configure the address	name	big or small	type	unit	scope (decimal system)	description
300	instruct	1	UInt16	-	1012,11012, 21012,3101 2	1012: Configure X1 channel 11012: Configure X2 channel 21012: Configure X3 channel 31012: Configure X4 channel
301	Param eter 1	1	UInt16	-	0,1	ABC phase current transformer type 0 = Rogowski coil 1 = VCT
302	Param eter 2	1	Int16	%	-9999~9999	The A comparison difference correction value is magnified by 100 times = Actual value * 100
303	Param eter 3	1	Int16	%	-9999~9999	The B is 100 times larger than the difference correction value = Actual value * 100
304	Param eter 4	1	Int16	%	-9999~9999	The C comparison difference correction value is magnified by 100 times = Actual value *100
305	Param eter 5	1	Int16	°	-9999~9999	The A phase difference correction value is magnified by 100 times = Actual value * 100
306	Param eter 6	1	Int16	°	-9999~9999	The B phase difference correction value is magnified by 100 times = Actual value * 100
307	Param eter 7	1	Int16	°	-9999~9999	The C phase difference correction value is magnified by 100 times = Actual value * 100

5.7.7 Configure N-phase current transformer correction

When the device is recording data, you need to close the data recording first, and then configure the parameters. Otherwise, the configuration instruction will return an error

Configure the address	name	big or small	type	unit	scope (decimal system)	description
300	instruct	1	UInt16	-	1013,11013, 21013,31013	1013: Configure X1 channel 11013: Configure X2 channel 21013: Configure X3 channel 31013: Configure X4 channel
301	Parameter 1	1	UInt16	-	0,1	Type of N-phase current transformer 0 = Rogowski coil 1 = VCT
302	Parameter 2	1	Int16	%	-9999~9999	The N is 100 times larger than the difference correction value = Actual value * 100

5.7.8 Configure the required parameters

When the device is recording data, you need to close the data recording first and then configure the parameters. Otherwise, the configuration instruction will return an error

Configure the address	name	big or small	type	unit	scope (decimal system)	description
300	instruct	1	UInt16	-	1060,11060, 21060,31060	1060: Configure X1 channel 11060: Configure X2 channel 21060: Configure X3 channel 31060: Configure X4 channel
301	Parameter 1	1	UInt16	-	0,1	Demand calculation method 0 = Fixed 1 = Sliding type
302	Parameter 2	1	UInt16	minute	1-60	Demand calculation interval

5.7.9 Configure the rate model

When the device is recording data, you need to close the data recording first and then configure the parameters. Otherwise, the configuration instruction will return an error

Configure the address	name	big or small	type	unit	scope (decimal system)	description

Configure the address	name	big or small	type	unit	scope (decimal system)	description
300	instruct	1	UInt16	-	1070,11070, 21070,31070	1070: Configure X1 channel 11070: Configure X2 channel 21070: Configure X3 channel 31070: Configure X4 channel
301	Parameter 1	1	UInt16	-	0,1	Rate switching mode 0 = Manual switching 1 = RTC switch

5.7.10 Configure manual rates

When the device is recording data, you need to close the data recording first and then configure the parameters. Otherwise, the configuration instruction will return an error

Configure the address	name	big or small	type	unit	scope (decimal system)	description
300	instruct	1	UInt16	-	1071,11071, 21071,31071	1071: Configure X1 channel 11071: Configure X2 channel 21071: Configure X3 channel 31071: Configure X4 channel
301	Parameter 1	1	UInt16	-	0~5	Manual rate setting 0 = Rate 1 1 = Rate 2 … 5 = Rate 6 (Note: This setting is only valid when the rate mode is manually switched)

5.7.11 Configure the RTC rate time period

When the device is recording data, you need to close the data recording first and then configure the parameters. Otherwise, the configuration instruction will return an error

Configure the address	name	big or small	type	unit	scope (decimal system)	description
300	instruct	1	UInt16	-	1072,11072, 21072,31072	1072: Configure X1 channel 11072: Configure X2 channel 21072: Configure X3 channel 31072: Configure X4 channel
301-303	Parameter 1	3	Time	-	-	Ta start time

Configure the address	name	big or small	type	unit	scope (decimal system)	description
304-306	Parameter 2	3	Time	-	-	Tb start time
307-309	Parameter 3	3	Time	-	-	Tc start time
310-312	Parameter 4	3	Time	-	-	Td start time
313-315	Parameter 5	3	Time	-	-	Te start time
316-318	Parameter 6	3	Time	-	-	Tf start time

5.7.12 Configure RTC rate selection

When the device is recording data, you need to close the data recording first and then configure the parameters. Otherwise, the configuration instruction will return an error

Configure the address	name	big or small	type	unit	scope (decimal system)	description
300	instruct	1	UInt16	-	1073,11073, 21073,31073	1073: Configure X1 channel 11073: Configure X2 channel 21073: Configure X3 channel 31073: Configure X4 channel
301	Parameter 1	1	UInt16	-	0~5	Ta rate setting 0 = Rate 1 1 = Rate 2 … 5= Rate 6
302	Parameter 2	1	UInt16	-	0~5	Tb rate setting
303	Parameter 3	1	UInt16	-	0~5	Tc rate setting
304	Parameter 4	1	UInt16	-	0~5	Setting the TD rate
305	Parameter 5	1	UInt16	-	0~5	Te pricing Settings
306	Parameter 6	1	UInt16	-	0~5	Tf rate setting

5.7.13 Configure the minimum measurement value of AC phase current

When the device is recording data, you need to close the data recording first and then configure the parameters. Otherwise, the configuration instruction will return an error.

Configure the address	name	big or small	type	unit	scope (decimal system)	description
300	instruct	1	UInt16	-	1100,11100, 21100,31100	1100: Configure X1 channel 11100: Configure X2 channel 21100: Configure X3 channel 31100: Configure X4 channel
301	Parameter 1	1	UInt16	A	0~65535	ABC phase Loewang coil minimum measured current, magnified 1000 times = Actual value * 1000 The default value is 500
302	Parameter 2	1	UInt16	A	0~65535	The minimum measured current of ABC relative to VCT is amplified by 1000 times = Actual value * 1000 Default value 10

5.7.14 Set the minimum measurement value of N-phase current

When the device is recording data, you need to close the data recording first and then configure the parameters. Otherwise, the configuration instruction will return an error.

Configure the address	name	big or small	type	unit	scope (decimal system)	description
300	instruct	1	UInt16	-	1101,11101, 21101,31101	1101: Configure X1 channel 11101: Configure X2 channel 21101: Configure X3 channel 31101: Configure X4 channel
301	Parameter 1	1	UInt16	A	0~65535	The minimum measured current of N-phase Rogowski coil is amplified by 1000 times = Actual value * 1000 The default value is 500
302	Parameter 2	1	UInt16	A	0~65535	The minimum measured current of N-phase VCT is amplified by 1000 times = Actual value * 1000 Default value 10

5.7.15 Configure the AC phase current conversion coefficient

When the device is recording data, you need to close the data recording first and then configure the parameters. Otherwise, the configuration instruction will return an error.

Configure the address	name	big or small	type	unit	scope (decimal system)	description
300	instruct	1	UInt16	-	1110,11110, 21110,31110	1110: Configure X1 channel 1110: Configure X2 channel 21110: Configure X3 channel 31110: Configure X4 channel
301-302	Parameter 1	2	UInt32	-	1-99999999	The ABC phase Rogowski coil measures the current conversion coefficient and is magnified 10,000 times = Actual value * 10,000 The default value is 10,000 The current measured by the Rogowski coil is multiplied by this coefficient (Note: This coefficient should be set when measuring CT secondary terminal current with a Rogowski coil)
303-304	Parameter 2	2	UInt32	-	1-99999999	The ABC to VCT measurement current conversion coefficient is amplified by 10,000 times = Actual value * 10,000 The default value is 10,000 The current measured by VCT will be multiplied by this coefficient (Note: This coefficient should be set when VCT measures CT secondary terminal current)

5.7.16 Configure the N-phase current conversion coefficient

When the device is recording data, you need to close the data recording first and then configure the parameters. Otherwise, the configuration instruction will return an error.

Configure the address	name	big or small	type	unit	scope (decimal system)	description
300	instruct	1	UInt16	-	1111,11111, 21111,31111	111: Configure X1 channel 111: Configure X2 channel 21111: Configure X3 channel 31111: Configure X4 channel
301-302	Parameter 1	2	UInt32	-	1-99999999	The N-phase Rogowski coil measures the current conversion coefficient and is magnified 10,000 times = Actual value * 10000

Configure the address	name	big or small	type	unit	scope (decimal system)	description
						The default value is 10,000 The current measured by the Rogowski coil is multiplied by this coefficient (Note: This coefficient should be set when measuring CT secondary terminal current with a Rogowski coil)
303-304	Parameter 2	2	UInt32	-	1-99999999	The N-phase VCT measures the current conversion coefficient and amplifies it by 10,000 times = Actual value * 10,000 The default value is 10,000 The current measured by VCT will be multiplied by this coefficient (Note: This coefficient should be set when VCT measures CT secondary terminal current)

5.7.17 Configuring device time

When the device is recording data, you need to close the data recording first and then configure the parameters. Otherwise, the configuration instruction will return an error

Configure the address	name	big or small	type	unit	scope (decimal system)	description
300	instruct	1	UInt16	-	1200	1200: Configuration device time
301	Parameter 1	1	UInt16	-	2000~2099	year
302	Parameter 2	1	UInt16	-	1~12	moon
303	Parameter 3	1	UInt16	-	1~31	sun
304	Parameter 4	1	UInt16	-	0~23	time
305	Parameter 5	1	UInt16	-	0~59	component
306	Parameter 6	1	UInt16	-	0~59	second

5.7.18 Configure RS485 communication

Configure the address	name	big or small	type	unit	scope (decimal system)	description
300	instruct	1	UInt16	-	1210	1210: Configure RS485 communication
301	Parameter 1	1	UInt16	-	1~247	From the machine address
302	Parameter 2	1	UInt16	-	0~6	Baud rate 0 = 2400 1 = 4800 2 = 9600 3 = 19200 4 = 38400 5 = 57600 6 = 115200
303	Parameter 3	1	UInt16	-	0，1，2	even-odd check 0 = No check 1 = Chi-test 2 = Parachallenge
304	Parameter 4	1	UInt16	-	1，2	stop bit 1 = 1bit 2 = 2bit

5.7.19 configure LAN

Configure the address	name	big or small	type	unit	scope (decimal system)	description
300	instruct	1	UInt16	-	1220	1220: Configure LAN communication
301	Parameter 1	1	UInt16	-	0,1	DHCP 0= disabled (default value) 1= enabled Note: When DHCP is enabled, the IP configured automatically is invalid
302-303	Parameter 2	2	IPaddr	-	-	IP address Default: 192.168.1.31
304-305	Parameter 3	2	IPaddr	-	-	subnet mask Default: 255.255.255.0
306-307	Parameter 4	2	IPaddr	-	-	Gateway address Default: 192.168.1.1

5.7.20 Configure Modbus-TCP/IP

Configure the address	name	big or small	type	unit	scope (decimal system)	description
300	instruct	1	UInt16	-	1221	1221: Configure Modbus-TCP/IP
301	Parameter 1	1	UInt16	-	0,1	state 0= disabled 1= enabled (default value)
302	Parameter 2	1	UInt16	-	-	port number Default: 502

5.7.21 Configure the web server

Configure the address	name	big or small	type	unit	scope (decimal system)	description
300	instruct	1	UInt16	-	1223	1223: Configure the web server
301	Parameter 1	1	UInt16	-	0,1	state 0= disabled 1= enabled (default value)
302	Parameter 2	1	UInt16	-	-	port number Default: 80

5.7.22 Configure the FTP server

Configure the address	name	big or small	type	unit	scope (decimal system)	description
300	instruct	1	UInt16	-	1224	1224: Configure the FTP server
301	Parameter 1	1	UInt16	-	0,1	state 0= disabled 1= enabled (default value)
302	Parameter 2	1	UInt16	-	-	port number Default: 21

5.7.23 Configure zero data

When the device is recording data, you need to close the data recording first and then configure the parameters. Otherwise, the configuration instruction will return an error

Configure the address	name	big or small	type	unit	scope (decimal system)	description
300	instruct	1	UInt16	-	1301	1301: Configure zero data
301	Parameter 1	1	UInt16	-	1~5	1: Zero maximum minimum 2: Zero maximum demand 3: Zero rate power 4: Zero power 5: Clear all values above zero

5.7.24 Configure relay control mode

Configure the address	name	big or small	type	unit	scope (decimal system)	description
300	instruct	1	UInt16	-	2000	2000: Configure relay control mode
301	Parameter 1	1	UInt16	-	0,1	Relay control mode 0 = Manual control mode 1 = Alarm output control mode

5.7.25 Configure the relay for manual output

Configure the address	name	big or small	type	unit	scope (decimal system)	description
300	instruct	1	UInt16	-	2001	2001: Configure relay control mode
301	Parameter 1	1	UInt16	-	0,1	Relay outputs control 0 = Relay output open circuit 1 = Relay output closed (Note: This setting is only valid when the relay output control mode is manual control mode)

5.7.26 Configure alarm parameters

When the device is recording data, you need to close the data recording first and then configure the parameters. Otherwise, the configuration instruction will return an error

Configure the address	name	big or small	type	unit	scope (decimal system)	description
300	instruct	1	UInt16	-	3000,13000, 23000,33000	3000: Configure X1 channel 13000: Configure X2 channel 23000: Configure X3 channel 33000: Configure X4 channel
301	Parameter 1	1	UInt16	-	-	report to the police ID
302	Parameter 2	1	UInt16	-	0,1	Alarm function 0= disabled 1= enabled
303	Parameter 3	1	UInt16	-	-	continue to have
304-305	Parameter 4	2	Float32	-	0,1000000	Alarm activation threshold
306-307	Parameter 5	2	Float32	%	-	Alarm release point Percentage error relative to alarm activation threshold *give an example :* *Overcurrent alarm activation threshold =100A* *Alarm release point =5%* *When the current value is less than 100,100*5%=95A, the alarm is released*
308	Parameter 6	1	UInt16	-	0,1	Beeper output correlation 0= no association 1= Associated
309	Parameter 7	1	UInt16	-	0,1	Relay output association 0= no association 1= Associated

5.7.27 Configure data record parameters

When the device is recording data, you need to close the data recording first, and then configure the parameters. Otherwise, the configuration instruction will return an error

Configure the address	name	big or small	type	unit	scope (decimal system)	description
300	instruct	1	UInt16	-	3100	3100: Configure data recording parameters

Configure the address	name	big or small	type	unit	scope (decimal system)	description
301~310	Parameter 1	10	UTF8	-	-	Record name Note: 20 ASCII characters, less than 20 are filled with empty characters (0x00) You can set the characters as follows: ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz0123456789-_
311-320	Parameter 2	10	UTF8	-	-	console operator Note: 20 ASCII characters, less than 20 are filled with empty characters (0x00) You can set the characters as follows: ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz0123456789-_
321-330	Parameter 3	10	UTF8	-	-	position Note: 20 ASCII characters, less than 20 are filled with empty characters (0x00) You can set the characters as follows: ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz0123456789-_
331	Parameter 16	1	UInt16	second	5-9999	interrecord gap
332	Parameter 4	1	UInt16	-	2000~2099	Record the start time-year
333	Parameter 5	1	UInt16	-	1~12	Record the start time-month
334	Parameter 6	1	UInt16	-	1~31	Record the start time-day
335	Parameter 7	1	UInt16	-	0~23	Record the start time-hours
336	Parameter 8	1	UInt16	-	0~59	Record the start time in minutes
337	Parameter 9	1	UInt16	-	0~59	Record the start time in seconds
338	Parameter 10	1	UInt16	-	2000~2099	Record the start time-year
339	Parameter 11	1	UInt16	-	1~12	Record the start time-month
340	Parameter 12	1	UInt16	-	1~31	Record the start time-day
341	Param	1	UInt16	-	0~23	Record the start time-hours

Configure the address	name	big or small	type	unit	scope (decimal system)	description
	eter 13					
342	Parameter 14	1	UInt16	-	0~59	Record the start time in minutes
343	Parameter 15	1	UInt16	-	0~59	Record the start time in seconds

5.7.28 Configures data record status

Configure the address	name	big or small	type	unit	scope (decimal system)	description
300	instruct	1	UInt16	-	3101	3101: Configure data recording status
301	Parameter 1	1	UInt16	-	0,1	Data record status 0. Stop 1= Enable

5.7.29 Restart the configuration

Configure the address	name	big or small	type	unit	scope (decimal system)	description
300	instruct	1	UInt16	-	6000	6000: Configure the device and restart
301	Parameter 1	1	UInt16	-	6485	Restart the device

5.8 Register list

The register list contains the following entries:

Register alias	Register address	Operation Read/write	big or small	type	unit	description

• Register alias: the meaning used to refer to a register.
• Register address: The first address of Modbus register. The data address in this document is in decimal format.
• Operation: The operation that can be performed by the instruction register. R: Read only; W: writable; WC: writable through the instruction register.
• Size: indicates how many 16-bit data are occupied.
• Type: The type of data encoding.
• Unit: The unit of a register value.
Description: Introduce the function of this register.

5.8.1 plant parameter

Register alias	register start address (decimal system)	operate Read /write	big or small	type	unit	description
Internal temperature of the equipment	50	R	2	Float32	℃	
unit type	60	R	10	UTF8	-	
serial number	70	R	2	UInt32	-	
APP version number	72	R	1	UInt16	-	form ： X.Y
Date and time	75	R/WC	4	Date time	-	Reg.75:2000-2099 Reg.76: Month (b15: b8), Day (b7: b0) Reg. 77: Time (b15: b8), Part (b7: b0) Reg. 78: Seconds

5.8.2 RS485 communication parameters

Register alias	register start address (decimal system)	operate Read /write	big or small	type	unit	description
From the machine address	80	R/WC	1	UInt16	-	1~247

Register alias	register start address (decimal system)	operate Read /write	big or small	type	unit	description
Baud rate	81	R/WC	1	UInt16	-	0 = 2400 1 = 4800 2 = 9600 3 = 19200 4 = 38400 5 = 57600 6 = 115200
verification mode	82	R/WC	1	UInt16	-	0 = No check 1 = Chi-test 2 = Parachallenge
stop bit	83	R/WC	1	UInt16	-	1 = 1 bit 2 = 2 bit

5.8.3 LAN communicational parameter

Register alias	register start address (decimal system)	operate Read /write	big or small	type	unit	description
DHCP state	90	R/WC	1	UInt16	-	DHCP: 0= disabled 1= enabled Default: Disabled
IP address	91	R/WC	2	IPaddr	-	IP address : Default: 192.168.1.31
subnet mask	93	R/WC	2	IPaddr	-	subnet mask : Default: 255.255.255.0
Gateway address	95	R/WC	2	IPaddr	-	Gateway address Default: 192.168.1.1

5.8.4 Modbus-TCP/IP

Register alias	register start address (decimal system)	operate Read /write	big or small	type	unit	description
state	100	R/WC	1	UInt16	-	state : 0= disabled

Register alias	register start address (decimal system)	operate Read /write	big or small	type	unit	description
						1= enabled By default: enabled
port number	101	R/WC	1	UInt16	-	port number : Default: 502

5.8.5 Web server

Register alias	register start address (decimal system)	operate Read /write	big or small	type	unit	description
state	110	R/WC	1	UInt16	-	state : 0= disabled 1= enabled By default: enabled
port number	111	R/WC	1	UInt16	-	port number : Default: 80

5.8.6 FTP server

Register alias	register start address (decimal system)	operate Read /write	big or small	type	unit	description
state	120	R/WC	1	UInt16	-	state : 0= disabled 1= enabled By default: enabled
port number	121	R/WC	1	UInt16	-	port number : Default: 21

5.8.7 Data recorder parameters

Register name	register start address (decimal system)	operate	big or small	type	unit	description
state	150	R/WC	1	UInt16	-	state ： 0= Not recorded 1= Recorded
Record name	151	R/WC	10	UTF8	-	Record name: Note: 20 ASCII characters, less than 20 are filled with empty characters (0x00)
Operator name	161	R/WC	10	UTF8	-	console operator ： Note: 20 ASCII characters, less than 20 are filled with empty characters (0x00)
position	171	R/WC	10	UTF8	-	position ： Note: 20 ASCII characters, less than 20 are filled with empty characters (0x00)
interrecord gap	181	R/WC	1	UInt16	s	interrecord gap
Record the start time	182	R/WC	4	Date time	-	Start time of recording: Reg.75:2000-2099 Reg.76: Month (b15: b8), Day (b7: b0) Reg.77: Time (b15: b8), Part (b7: b0) Reg.78: Millisecond
Record the end time	186	R/WC	4	Date time	-	Start time of recording: Reg.75:2000-2099 Reg.76: Month (b15: b8), Day (b7: b0) Reg.77: Time (b15: b8), Part (b7: b0) Reg.78: Millisecond

5.8.8 electric relay

Register alias	register start address (decimal system)	operate Read /write	big or small	type	unit	description

Register alias	register start address (decimal system)	operate Read /write	big or small	type	unit	description
Output control mode	200	R/WC	1	UInt16	-	Relay output control mode 0 = Manual control mode 1 = Alarm output control mode
Relay outputs control	201	R/WC	1	UInt16	-	Relay outputs control 0 = Relay output open circuit 1 = Relay output closed (Note: This setting is only valid when the relay output control mode is manual control mode)
Output status of relay	202	R	1	UInt16	-	Output status of relay 0 = open circuit 1 = closed

5.8.9 Configure the instruction register

Register alias	register start address (decimal system)	operate Read/ write	big or small	type	unit	description
instruction code	300	R/W	1	UInt16	-	
Instruction parameter 001	301	R/W	1	UInt16	-	
Instruction parameter 002	302	R/W	1	UInt16	-	
…	…	R/W	1	UInt16	-	
Instruction parameter 123	423	R/W	1	UInt16	-	
Configure the instruction code	424	R	1	UInt16	-	
Configuration results	425	R	1	UInt16	-	0 = valid operation 80 = Invalid instruction code 81 = invalid instruction parameter 82 = Number of invalid instruction parameters 83= The operation was not performed

5.8.10 Power grid parameters

Register alias	register address (decimal system)	operate Read/ write	big or small	type	unit	description
mode of connection	500	R/WC	1	UInt16	-	0= three-phase four-wire 4CT 1= three-phase four-wire 3CT 2= three-phase three-wire 3CT 3= three-phase three-wire 2CT 4= one phase and three lines 5= one phase and two lines
Grid frequency	501	R/WC	1	UInt16	Hz	
nominal voltage	502	R/WC	1	UInt16	V	VT ratio is not included
VT no-load voltage ratio	503	R/WC	2	UInt32	-	Actual value = read value / 10,000
-	505	R	2	UInt32	-	continue to have
Minimum measurable voltage	507	R/WC	1	UInt16	-	Actual value = read value / 100

5.8.11 current transformer

The list register address is X1 channel data
The address of the X2 channel data register is X1 channel data register address +10000
The address of the X3 channel data register is X1 channel data register address +20000
The address of the X4 channel data register is X1 channel data register address +30000

Register alias	register address (decimal system)	operate Read/ write	big or small	type	unit	description
ABC phase current access mode	510	R/WC	1	UInt16	-	0 = Rogowski coil 1 = VCT
ABC phase Rogowski coil Pri	511	R	2	UInt32	A	
ABC phase Rogowski coil Sec	513	R	2	UInt32	mV@50 Hz mV@60 Hz	Actual value = read value / 100

Register alias	register address (decimal system)	operate Read/ write	big or small	type	unit	description
ABC phase line nominal current	515	R	2	UInt32	A	
ABC versus VCT Pri	517	R	2	UInt32	A	
ABC versus VCT Section	519	R	2	UInt32	mV	Actual value = read value / 100
Nominal current of ABC versus VCT	521	R	2	UInt32	A	
N-phase current transformer						
N-phase current access type	530	R/WC	1	UInt16	-	0 = Rogowski coil 1 = CT
N-phase Rogowski line Pri	531	R	2	UInt32	A	
N-phase Rogowski coil section	533	R	2	UInt32	mV@50 Hz mV@60 Hz	Actual value = read value / 100
Nominal current of N-phase Rogowski wire	535	R	2	UInt32	A	
N-phase VCT Pri	537	R	2	UInt32	A	
N-phase VCT section	539	R	2	UInt32	mV	Actual value = read value /100
Nominal current of N-phase VCT	541	R	2	UInt32	A	

5.8.12 direction of current

The list register address is X1 channel data
The address of the X2 channel data register is X1 channel data register address + 10000
The address of the X3 channel data register is X1 channel data register address +20000
The address of the X4 channel data register is X1 channel data register address +30000

Register alias	register start address (decimal system)	operate Read/ write	big or small	type	unit	description
Direction of A-phase current	550	R/WC	1	UInt16	-	Direction of A-phase current 0= Positive (default value) 1= reverse

Register alias	register start address (decimal system)	operate Read/ write	big or small	type	unit	description
Direction of B phase current	551	R/WC	1	UInt16	-	Direction of B phase current 0= Positive (default value) 1= reverse
Direction of C-phase current	552	R/WC	1	UInt16	-	Direction of C-phase current 0= Positive (default value) 1= reverse

5.8.13 Current channel selection

The list register address is X1 channel data
The address of the X2 channel data register is X1 channel data register address + 10000
The address of the X3 channel data register is X1 channel data register address +20000
The address of the X4 channel data register is X1 channel data register address +30000

Register alias	register start address (decimal system)	operate Read/ write	big or small	type	unit	description
Phase A current channel	553	R/WC	1	UInt16	-	Phase A current channel Channel 01 (default value) 1= channel 2 2= channel 3
B phase current channel	554	R/WC	1	UInt16	-	B phase current channel 0= channel 1 1= channel 2 (default value) 2= channel 3
Phase C current channel	555	R/WC	1	UInt16	-	Phase C current channel 0= channel 1 1= channel 2 2= channel 3 (default value)

5.8.14 Voltage channel selection

The list register address is X1 channel data
The address of the X2 channel data register is X1 channel data register address + 10000
The address of the X3 channel data register is X1 channel data register address +20000
The address of the X4 channel data register is X1 channel data register address +30000

Register alias	register start address (decimal system)	operate Read/ write	big or small	type	unit	description
Phase A voltage channel	557	R/WC	1	UInt16	-	Phase A voltage channel Channel 01 (default value) 1= channel 2 2= channel 3
B phase voltage channel	558	R/WC	1	UInt16	-	B phase voltage channel 0= channel 1 1= channel 2 (default value) 2= channel 3
Phase C voltage channel	559	R/WC	1	UInt16	-	Phase C voltage channel 0= channel 1 1= channel 2 2= channel 3 (default value)

5.8.15 Current transformer correction factor

The list register address is X1 channel data
The address of the X2 channel data register is X1 channel data register address + 10000
The address of the X3 channel data register is X1 channel data register address +20000
The address of the X4 channel data register is X1 channel data register address +30000

Register alias	register address (decimal system)	operate Read/ write	big or small	type	unit	description
ABC phase current transformer						
A phase correction of the Rogowski coil is made	560	R/WC	1	UInt16	%	Actual value = read value / 100
B phase Rogowski coil ratio correction	561	R/WC	1	UInt16	%	Actual value = read value / 100
Phase C Rogowski coil ratio correction	562	R/WC	1	UInt16	%	Actual value = read value / 100
Phase corner correction of A-type Rogowski coil	563	R/WC	1	UInt16	°	Actual value = read value / 100
Phase angle correction of B type coil	564	R/WC	1	UInt16	°	Actual value = read value / 100
Phase correction of Rogowski coil in C	565	R/WC	1	UInt16	°	Actual value = read value / 100

Register alias	register address (decimal system)	operate Read/write	big or small	type	unit	description
A-phase VCT ratio correction	566	R/WC	1	UInt16	%	Actual value = read value / 100
B-phase VCT ratio correction	567	R/WC	1	UInt16	%	Actual value = read value / 100
C-phase VCT ratio correction	568	R/WC	1	UInt16	%	Actual value = read value / 100
A phase VCT angle difference correction for A	569	R/WC	1	UInt16	°	Actual value = read value / 100
B-phase VCT angular difference correction	570	R/WC	1	UInt16	°	Actual value = read value / 100
Phase VCT angle difference correction for C	571	R/WC	1	UInt16	°	Actual value = read value / 100
N-phase current transformer						
N-phase Rogowski coil ratio correction	572	R/WC	1	UInt16	%	Actual value = read value / 100
N-phase VCT ratio correction	573	R/WC	1	UInt16	%	Actual value = read value / 100

5.8.16 Voltage and current phase sequence

The list register address is X1 channel data
The address of the X2 channel data register is X1 channel data register address + 10000
The address of the X3 channel data register is X1 channel data register address +20000
The address of the X4 channel data register is X1 channel data register address +30000

Register alias	register start address (decimal system)	operate Read /write	big or small	type	unit	description
Voltage and current phase sequence	605	R	1	UInt16	-	0 = The phase sequence of voltage is correct and the phase sequence of current is correct 1 = The voltage phase sequence is wrong, the current phase sequence is correct 2 = The voltage phase sequence is correct, but the current phase sequence is wrong 3 = Voltage phase sequence error, current phase sequence error

Note: When the current is less than 1% of the nominal current, the phase sequence of the current may be displayed incorrectly

5.8.17 Minimum measurable current

The list register address is X1 channel data
The address of the X2 channel data register is X1 channel data register address + 10000
The address of the X3 channel data register is X1 channel data register address +20000
The address of the X4 channel data register is X1 channel data register address +30000

Register alias	register address (decimal system)	operate Read/ write	big or small	type	unit	description
ABC phase current transformer						
ABC phase Loewang coil minimum measured current	610	R/WC	1	UInt16	A	Actual value = read value / 100
The minimum measured current of ABC versus VCT	611	R/WC	1	UInt16	A	Actual value = read value / 100
N-phase current transformer						
Minimum measured current of N-phase Rogowski coil	612	R/WC	1	UInt16	A	Actual value = read value / 100
N-phase VCT minimum measured current	613	R/WC	1	UInt16	A	Actual value = read value / 100

5.8.18 Current conversion coefficient

The list register address is X1 channel data
The address of the X2 channel data register is X1 channel data register address + 10000
The X3 channel data register address is X1 channel data register address +20000
The address of the X4 channel data register is X1 channel data register address +30000

Register alias	register address (decimal system)	operate Read/ write	big or small	type	unit	description
ABC phase current transformer						

Register alias	register address (decimal system)	operate Read/ write	big or small	type	unit	description
The ABC phase Rogowski coil measures the current conversion coefficient	620	R/WC	2	UInt32	A	Actual value = read value / 10,000
The ABC to VCT measurement current conversion coefficient	622	R/WC	2	UInt32	A	Actual value = read value / 10,000
N-phase current transformer						
Minimum measured current of N-phase Rogowski coil	624	R/WC	2	UInt32	A	Actual value = read value / 10,000
N-phase VCT minimum measured current	626	R/WC	2	UInt32	A	Actual value = read value / 10,000

5.8.19 Rate parameters

The list register address is X1 channel data
The address of the X2 channel data register is X1 channel data register address + 10000
The address of the X3 channel data register is X1 channel data register address +20000
The address of the X4 channel data register is X1 channel data register address +30000

Register alias	register start address (decimal system)	operate Read/ write	big or small	type	unit	description
Current rates	800	R	1	UInt16	-	Current rates 0~5= Rate 1 to Rate 6
Rate switching mode	801	R/WC	1	UInt16	-	Rate switching mode 0 Manual switching 1=RTC switch
Manual rate selection	802	R/WC	1	UInt16	-	Manual rate selection 0~5= Rate 1 to Rate 6
RTC Ta starts	803	R/WC	3	Time	-	RTC Ta starts
RTC Tb Start time	806	R/WC	3	Time	-	RTC Tb Start time
RTC Tc start time	809	R/WC	3	Time	-	RTC Tc start time

Register alias	register start address (decimal system)	operate Read/ write	big or small	type	unit	description
RTC Td start time	812	R/WC	3	Time	-	RTC Td start time
RTC Te start time	815	R/WC	3	Time		RTC Te start time
RTC Tf start time	818	R/WC	3	Time	-	RTC Tf start time
RTC Ta rate selection	821	R/WC	1	UInt16	-	Ta rate selection 0~5= Rate 1 to Rate 6
RTC Tb rate selection	822	R/WC	1	UInt16	-	Tb rate selection 0~5= Rate 1 to Rate 6
RTC Tc rate selection	823	R/WC	1	UInt16	-	Tc rate selection 0~5= Rate 1 to Rate 6
RTC Td rate selection	824	R/WC	1	UInt16	-	TD rate selection 0~5= Rate 1 to Rate 6
RTC Te rate selection	825	R/WC	1	UInt16	-	Te rate selection 0~5= Rate 1 to Rate 6
RTC Tf rate selection	826	R/WC	1	UInt16	-	Tf rate selection 0~5= Rate 1 to Rate 6

5.8.20 Voltage, current, power, power factor

The list register address is X1 channel data
The address of the X2 channel data register is X1 channel data register address + 10000
The address of the X3 channel data register is X1 channel data register address +20000
The address of the X4 channel data register is X1 channel data register address +30000

Register alias	register start address (decimal system)	operate Read/ write	big or small	type	unit	description
current						
IA	1000	R	2	Float32	A	A phase current
IB	1002	R	2	Float32	A	B phase current
IC	1004	R	2	Float32	A	C phase current
Current Avg	1006	R	2	Float32	A	Average value of ABC three-phase current
IN	1008	R	2	Float32	A	N phase current
phase voltage						
UA	1010	R	2	Float32	V	UA-UN voltage

Register alias	register start address (decimal system)	operate Read/ write	big or small	type	unit	description
UB	1012	R	2	Float32	V	UB-UN voltage
UC	1014	R	2	Float32	V	UC-UN voltage
Phase Voltage Avg	1016	R	2	Float32	V	Average value of ABC three-phase phase voltage
U0	1018	R	2	Float32	V	residual voltage
line voltage						
UAB	1020	R	2	Float32	V	UA-UB voltage
UBC	1022	R	2	Float32	V	UB-UC voltage
UCA	1024	R	2	Float32	V	UC-UA voltage
Line Voltage Avg	1026	R	2	Float32	V	Average three-phase line voltage
active power						
PA	1028	R	2	Float32	kW	A phase has active power
PB	1030	R	2	Float32	kW	B-phase active power
PC	1032	R	2	Float32	kW	C-phase active power
PTotal	1034	R	2	Float32	kW	There's always power
reactive power						
QA	1036	R	2	Float32	kVAR	A phase reactive power
QB	1038	R	2	Float32	kVAR	B-phase reactive power
QC	1040	R	2	Float32	kVAR	C phase reactive power
QTotal	1042	R	2	Float32	kVAR	Total reactive power
apparent output						
SA	1044	R	2	Float32	kVA	A phase view of power
SB	1046	R	2	Float32	kVA	B phase is viewed in power
SC	1048	R	2	Float32	kVA	Phase C is viewed in power
STotal	1050	R	2	Float32	kVA	Total view power
power factor						
PFA	1052	R	2	Float32	-	A phase power factor
PFB	1054	R	2	Float32	-	Power factor of phase B
PFC	1056	R	2	Float32	-	Phase C power factor
PFTotal	1058	R	2	Float32	-	Total power factor
phasor power factor						
DPFA	1060	R	2	Float32	-	A phase base power factor
DPFB	1062	R	2	Float32	-	B-phase fundamental power factor

Register alias	register start address (decimal system)	operate Read/ write	big or small	type	unit	description
DPFC	1064	R	2	Float32	-	Phase C fundamental power factor
DPFTotal	1066	R	2	Float32	-	Total fundamental power factor
frequency						
FreqA	1068	R	2	Float32	Hz	Phase frequency of A
FreqB	1070	R	2	Float32	Hz	Phase frequency of B
FreqC	1072	R	2	Float32	Hz	Phase frequency of C
FreqTotal	1074	R	2	Float32	Hz	Three-phase composite frequency

5.8.21 Electric energy

There are two types of electrical energy data: Int64 and UInt32, which have different unit sizes.
When the total power 10^9 10^9 10^9reaches 1.0 xkWh, 1.0 x kVarh, or 1.0 x kVah, the power of each phase will be automatically cleared to zero.
The list register address is X1 channel data
The address of the X2 channel data register is X1 channel data register address + 10000
The address of the X3 channel data register is X1 channel data register address +20000
The address of the X4 channel data register is X1 channel data register address +30000

Register alias	register start address (decimal system)	operate Read /write	big or small	type	unit	description
Active power-Int64						
EPAImp	2500	R	4	Int64	Wh	A phase forward active power
EPBImp	2504	R	4	Int64	Wh	B-phase forward active power
EPCImp	2508	R	4	Int64	Wh	C-phase forward active power
EPImp	2512	R	4	Int64	Wh	The total is positive for active electrical energy
EPAExp	2516	R	4	Int64	Wh	A is the opposite of active electrical energy
EPBExp	2520	R	4	Int64	Wh	B is the opposite of active electrical energy
EPCExp	2524	R	4	Int64	Wh	C is the opposite of active electrical energy
EPExp	2528	R	4	Int64	Wh	Total reverse active power

Register alias	register start address (decimal system)	operate Read /write	big or small	type	unit	description
Int64-Power-free energy						
EQAImp	2532	R	4	Int64	VARh	A phase forward reactive power
EQBImp	2536	R	4	Int64	VARh	B-phase forward reactive power
EQCImp	2540	R	4	Int64	VARh	C-phase positive reactive power
EQImp	2544	R	4	Int64	VARh	The total is positive reactive power
EQAExp	2548	R	4	Int64	VARh	A is opposite to reactive power
EQBExp	2552	R	4	Int64	VARh	B is opposite to reactive power
EQCExp	2556	R	4	Int64	VARh	C is opposite to reactive power
EQExp	2560	R	4	Int64	VARh	Total reverse reactive power
See power-Int64						
ESA	2564	R	4	Int64	VAh	A phase is in electric energy
ESB	2568	R	4	Int64	VAh	Phase B is electric energy
ESC	2572	R	4	Int64	VAh	Phase C is electric energy
ES	2576	R	4	Int64	VAh	The total is viewed in terms of electricity
32-bit power						
Active power-UInt32						
EPAImp	2600	R	2	UInt32	kWh	A phase forward active power
EPBImp	2602	R	2	UInt32	kWh	B-phase forward active power
EPCImp	2604	R	2	UInt32	kWh	C-phase forward active power
EPImp	2606	R	2	UInt32	kWh	The total is positive for active electrical energy
EPAExp	2608	R	2	UInt32	kWh	A is the opposite of active electrical energy
EPBExp	2610	R	2	UInt32	kWh	B is the opposite of active electrical energy
EPCExp	2612	R	2	UInt32	kWh	C is the opposite of active electrical energy
EPExp	2614	R	2	UInt32	kWh	Total reverse active power
Power-free energy-UInt32						
EQAImp	2616	R	2	UInt32	kVARh	A phase forward reactive power
EQBImp	2618	R	2	UInt32	kVARh	B-phase forward reactive power
EQCImp	2620	R	2	UInt32	kVARh	C-phase positive reactive power
EQImp	2622	R	2	UInt32	kVARh	The total is positive reactive power
EQAExp	2624	R	2	UInt32	kVARh	A is opposite to reactive power
EQBExp	2626	R	2	UInt32	kVARh	B is opposite to reactive power

Register alias	register start address (decimal system)	operate Read /write	big or small	type	unit	description
EQCExp	2628	R	2	UInt32	kVARh	C is opposite to reactive power
EQExp	2630	R	2	UInt32	kVARh	Total reverse reactive power
See electric energy-UInt32						
ESA	2632	R	2	UInt32	kVAh	A phase is in electric energy
ESB	2634	R	2	UInt32	kVAh	Phase B is electric energy
ESC	2636	R	2	UInt32	kVAh	Phase C is electric energy
ES	2638	R	2	UInt32	kVAh	The total is viewed in terms of electricity

5.8.22 Rate power

There are two types of rate power data: Int64 and UInt32, which have different unit sizes. When the rate power reaches 10^9 1.0 xkWh, each rate power will be automatically cleared.
The list register address is X1 channel data
The address of the X2 channel data register is X1 channel data register address + 10000
The address of the X3 channel data register is X1 channel data register address +20000
The address of the X4 channel data register is X1 channel data register address +30000

Register alias	register start address (decimal system)	operate Read /write	big or small	type	unit	description
Rate power-Int64						
ET1	2700	R	4	Int64	Wh	Rate 1 active power
ET2	2704	R	4	Int64	Wh	Rate 2 active power
ET3	2708	R	4	Int64	Wh	Rate 3 active power
ET4	2712	R	4	Int64	Wh	Rate 4 active power
ET5	2716	R	4	Int64	Wh	Rate 5 active power
ET6	2720	R	4	Int64	Wh	Rate 6 active power
Rate power-UInt32						
ET1	2750	R	2	UInt32	kWh	Rate 1 active power
ET2	2752	R	2	UInt32	kWh	Rate 2 active power
ET3	2754	R	2	UInt32	kWh	Rate 3 active power
ET4	2756	R	2	UInt32	kWh	Rate 4 active power
ET5	2758	R	2	UInt32	kWh	Rate 5 active power
ET6	2760	R	2	UInt32	kWh	Rate 6 active power

5.8.23 Demand parameters

The list register address is X1 channel data
The address of the X2 channel data register is X1 channel data register address + 10000
The address of the X3 channel data register is X1 channel data register address +20000
The address of the X4 channel data register is X1 channel data register address +30000

Register alias	register start address (decimal system)	operate Read/ write	big or small	type	unit	description
Basic parameters of demand						
DMDMethod	3000	R/WC	1	UInt16	-	Demand calculation method: 0= Sliding type 1= Fixed
DMD block	3001	R/RC	1	UInt16	minute	Demand range
PDMD Reset Time	3002	R	4	Date time	-	Maximum demand reset date and time
power demand						
PADemand	3020	R	2	Float32	kW	A phase current active power demand
PAPeakDemand	3022	R	2	Float32	kW	Maximum active power demand of phase A
PAPeakDemandDate	3024	R	4	Date time	-	Time when the maximum active power demand of phase A occurs
PBDemand	3028	R	2	Float32	kW	B-phase active power demand
PBPeakDemand	3030	R	2	Float32	kW	Maximum active power demand for phase B
PBPeakDemandDate	3032	R	4	Date time	-	Time when the maximum active power of phase B occurs
PCDemand	3036	R	2	Float32	kW	C-phase active power demand
PCPeakDemand	3038	R	2	Float32	kW	Maximum active power demand of phase C
PCPeakDemandDate	3040	R	4	Date time	-	Time when the maximum active power demand of phase C occurs
PSUMDemand	3044	R	2	Float32	kW	There is always a reactive power demand
PSUMPeakDemand	3046	R	2	Float32	kW	There is always a maximum power demand

Register alias	register start address (decimal system)	operate Read/ write	big or small	type	unit	description
PSUMPeakDemandDate	3048	R	4	Date time	-	There is always a time when the maximum power demand occurs
QADemand	3052	R	2	Float32	kVar	A phase current reactive power demand
QAPeakDemand	3054	R	2	Float32	kVar	A phase reactive power maximum demand
QAPeakDemandDate	3056	R	4	Date time	-	Time when the maximum reactive power demand of phase A occurs
QBDemand	3060	R	2	Float32	kVar	B-phase current reactive power demand
QBPeakDemand	3062	R	2	Float32	kVar	Maximum reactive power demand of phase B
QBPeakDemandDate	3064	R	4	Date time	-	Time when the maximum reactive power demand of phase B occurs
QCDemand	3068	R	2	Float32	kVar	C phase current reactive power demand
QCPeakDemand	3070	R	2	Float32	kVar	C phase maximum reactive power demand
QCPeakDemandDate	3072	R	4	Date time	-	Time when the maximum reactive power demand of phase C occurs
QSUMDemand	3076	R	2	Float32	kVar	Current total reactive power demand
QSUMPeakDemand	3078	R	2	Float32	kVar	Maximum total active power demand
QSUMPeakDemandDate	3080	R	4	Date time	-	Time when the total active power maximum demand occurs
SADemand	3084	R	2	Float32	kVa	A is the apparent power demand at a time
SAPeakDemand	3086	R	2	Float32	kVa	A phase view is the maximum power demand
SAPeakDemandDate	3088	R	4	Date time	-	A phase is at the time when the maximum power demand occurs
SBDemand	3092	R	2	Float32	kVa	B phase current apparent power demand
SBPeakDemand	3094	R	2	Float32	kVa	Phase B is in view of maximum power demand
SBPeakDemandDate	3096	R	4	Date time	-	Phase B is at the time of maximum power demand

Register alias	register start address (decimal system)	operate Read/ write	big or small	type	unit	description
SCDemand	3100	R	2	Float32	kVa	C phase apparent power demand
SCPeakDemand	3102	R	2	Float32	kVa	Phase C is rated at maximum power demand
SCPeakDemandDate	3104	R	4	Date time	-	Phase C is at the time of maximum power demand
SSUMDemand	3108	R	2	Float32	kVa	Current total visual power demand
SSUMPeakDemand	3110	R	2	Float32	kVa	The total view is the maximum power demand
SSUMPeakDemand Date	3112	R	4	Date time	-	The total view is the time when the maximum power demand occurs

5.8.24 Voltage current harmonics

The list register address is X1 channel data
The address of the X2 channel data register is X1 channel data register address + 10000
The address of the X3 channel data register is X1 channel data register address +20000
The address of the X4 channel data register is X1 channel data register address +30000

Register name	register start address (decimal system)	operate	big or small	type	unit	description
Percentage of current harmonics						
IATHD	4000	R	2	Float32	%	A percentage of total harmonic current in phase A
IBTHD	4002	R	2	Float32	%	Percentage of total harmonic of phase B current
ICTHD	4004	R	2	Float32	%	Percentage of total harmonics in phase C current
IATOHD	4006	R	2	Float32	%	Percentage of odd total harmonics in phase A current
IBTOHD	4008	R	2	Float32	%	Percentage of odd order total harmonics in phase current B
ICTOHD	4010	R	2	Float32	%	Percentage of odd total harmonics in phase current C
IATEHD	4012	R	2	Float32	%	Percentage of even total harmonics in phase A current

Register name	register start address (decimal system)	operate	big or small	type	unit	description
IBTEHD	4014	R	2	Float32	%	Percentage of even total harmonics in phase B current
ICTEHD	4016	R	2	Float32	%	Percentage of even total harmonics in phase C current
IAHD1	4018	R	2	Float32	%	A percentage of the primary harmonic current in phase A
IBHD1	4020	R	2	Float32	%	Percentage of primary harmonic current in phase B
ICHD1	4022	R	2	Float32	%	Percentage of primary harmonic of C-phase current
…	4024-4311	…	…	…	…	ABC phase current 2nd to 49th harmonic percentage
IAHD50	4312	R	2	Float32	%	Percentage of 50th harmonic of A-phase current
IBHD50	4314	R	2	Float32	%	Percentage of 50th harmonic of B phase current
ICHD50	4316	R	2	Float32	%	Percentage of 50th harmonic of C-phase current
Current harmonic value						
IAHDV1	4400	R	2	Float32	A	A is the fundamental current value of phase A current
IBHDV1	4402	R	2	Float32	A	Base wave current value of B-phase current
ICHDV1	4404	R	2	Float32	A	C is the fundamental current value of the phase current
…	4406-4693	…	…	…	…	ABC phase current 2nd to 49th harmonic current value
IAHDV50	4694	R	2	Float32	A	A phase current 50th harmonic current value
IBHDV50	4696	R	2	Float32	A	Value of 50th harmonic current in phase B current
ICHDV50	4698	R	2	Float32	A	Value of 50th harmonic current in phase C
Percentage of voltage harmonics						
UATHD	5000	R	2	Float32	%	A percentage of total harmonics in phase voltage
UBTHD	5002	R	2	Float32	%	Percentage of total harmonic of phase B voltage
UCTHD	5004	R	2	Float32	%	Percentage of total harmonics in phase C voltage
UATOHD	5006	R	2	Float32	%	Percentage of odd total harmonics in phase A voltage
UBTOHD	5008	R	2	Float32	%	Percentage of odd order total harmonics in phase B voltage

Register name	register start address (decimal system)	operate	big or small	type	unit	description
UCTOHD	5010	R	2	Float32	%	Percentage of odd total harmonics in phase C voltage
UATEHD	5012	R	2	Float32	%	Percentage of even total harmonics in phase A voltage
UBTEHD	5014	R	2	Float32	%	Percentage of even total harmonic of phase B voltage
UCTEHD	5016	R	2	Float32	%	Percentage of even total harmonics in phase C voltage
UAHD1	5018	R	2	Float32	%	A phase voltage 1st harmonic percentage
UBHD1	5020	R	2	Float32	%	Percentage of primary harmonic of B phase voltage
UCHD1	5022	R	2	Float32	%	Percentage of primary harmonic of C-phase voltage
…	5024-5311	…	…	…	…	ABC phase voltage 2nd to 49th harmonic percentage
UAHD50	5312	R	2	Float32	%	Percentage of 50th harmonic of A-phase voltage
UBHD50	5314	R	2	Float32	%	Percentage of 50th harmonic of B phase voltage
UCHD50	5316	R	2	Float32	%	Percentage of 50th harmonic of C-phase voltage
Voltage harmonic value						
UAHDV1	5400	R	2	Float32	V	A phase voltage value of the first harmonic voltage
UBHDV1	5402	R	2	Float32	V	B phase voltage value of first harmonic voltage
UCHDV1	5404	R	2	Float32	V	C phase voltage value of first harmonic voltage
…	5406-5693	…	…	…	…	ABC phase voltage 2-49 harmonic voltage value
UAHDV50	5694	R	2	Float32	V	A phase voltage 50th harmonic voltage value
UBHDV50	5696	R	2	Float32	V	Voltage value of 50th harmonic of B phase voltage
UCHDV50	5698	R	2	Float32	V	C-phase voltage 50th harmonic voltage value

5.8.25 Maximum and minimum values

The list register address is X1 channel data
The address of the X2 channel data register is X1 channel data register address + 10000
The address of the X3 channel data register is X1 channel data register address +20000

The address of the X4 channel data register is X1 channel data register address +30000

Register name	register start address (decimal system)	operate	big or small	type	unit	description
Maximum/minimum current						
IA Max	6000	R	2	Float32	A	Maximum value of A-phase current
IB Max	6002	R	2	Float32	A	Maximum value of B phase current
IC Max	6004	R	2	Float32	A	Maximum value of C-phase current
IAVG Max	6006	R	2	Float32	A	Maximum value of three-phase average current
IN Max	6008	R	2	Float32	A	Maximum value of N-phase current
IA Min	6010	R	2	Float32	A	Minimum value of A-phase current
IB Min	6012	R	2	Float32	A	Minimum value of B phase current
IC Min	6014	R	2	Float32	A	Minimum value of C-phase current
IAVGMin	6016	R	2	Float32	A	Minimum value of three-phase average current
IN Min	6018	R	2	Float32	A	Minimum value of N-phase current
Maximum/minimum voltage						
UA Max	6020	R	2	Float32	V	Maximum UA-UN phase voltage
UB Max	6022	R	2	Float32	V	UB-UN maximum phase voltage
UC Max	6024	R	2	Float32	V	UC-UN maximum phase voltage
Phase UAVGMax	6026	R	2	Float32	V	Maximum value of three-phase voltage average
UA Min	6030	R	2	Float32	V	UA-UN minimum phase voltage
UB Min	6032	R	2	Float32	V	UB-UN minimum phase voltage
UC Min	6034	R	2	Float32	V	UC-UN minimum phase voltage
UAVGMin	6036	R	2	Float32	V	The minimum value of the average three-phase voltage
UAB Max	6040	R	2	Float32	V	Maximum line voltage of UA-UB
UBC Max	6042	R	2	Float32	V	Maximum UBU-UC line voltage
UCA Max	6044	R	2	Float32	V	Maximum UCA line voltage
LineUAVGMax	6046	R	2	Float32	V	Maximum value of three-phase line voltage average
UAB Min	6050	R	2	Float32	V	Minimum line voltage of UA-UB
UBC Min	6052	R	2	Float32	V	Minimum UBU-UC line voltage
UCA Min	6054	R	2	Float32	V	Minimum UCA line voltage

LineUAVGMin	6056	R	2	Float32	V	The minimum value of the average three-phase line voltage
Maximum/minimum power						
PA Max	6060	R	2	Float32	kW	A phase has maximum active power
PB Max	6062	R	2	Float32	kW	Maximum active power of phase B
PC Max	6064	R	2	Float32	kW	The maximum active power of phase C
PSUMMax	6066	R	2	Float32	kW	The maximum active power of the three phases is
PA Min	6070	R	2	Float32	kW	A phase has the minimum active power
PB Min	6072	R	2	Float32	kW	The minimum active power of phase B
PC Min	6074	R	2	Float32	kW	The minimum active power of phase C is obtained
PSUMMin	6076	R	2	Float32	kW	The minimum value of the three-phase total active power
Maximum/minimum unpowered power						
QA Max	6080	R	2	Float32	kVar	A phase has maximum reactive power
QB Max	6082	R	2	Float32	kVar	Maximum reactive power of phase B
QC Max	6084	R	2	Float32	kVar	C phase has maximum reactive power
QSUMMax	6086	R	2	Float32	kVar	Maximum value of three-phase reactive power
QA Min	6090	R	2	Float32	kVar	A phase has the minimum reactive power
QB Min	6092	R	2	Float32	kVar	Minimum reactive power of phase B
QC Min	6094	R	2	Float32	kVar	C phase minimum reactive power
QSUMMin	6096	R	2	Float32	kVar	Minimum value of three-phase reactive power
Maximum/minimum value of apparent power						
SA Max	6100	R	2	Float32	kVa	Phase A is at the maximum power
SB Max	6102	R	2	Float32	kVa	Phase B is at the maximum power
SC Max	6104	R	2	Float32	kVa	Phase C is at the maximum power
SSUMMax	6106	R	2	Float32	kVa	Maximum three-phase apparent power
SA Min	6110	R	2	Float32	kVa	Phase A is at the minimum power
SB Min	6112	R	2	Float32	kVa	Phase B is at the minimum power

SC Min	6114	R	2	Float32	kVa	Phase C is at the minimum power
SSUMMin	6116	R	2	Float32	kVa	Minimum value of three-phase total apparent power

5.8.26 Degree of unbalance

The list register address is X1 channel data
The address of the X2 channel data register is X1 channel data register address + 10000
The address of the X3 channel data register is X1 channel data register address +20000
The address of the X4 channel data register is X1 channel data register address +30000

Register name	register start address (decimal system)	operate	big or small	type	unit	description
Voltage negative sequence imbalance	7000	R	2	Float32	%	Voltage negative sequence imbalance
Voltage zero sequence imbalance	7002	R	2	Float32	%	Voltage zero sequence imbalance
Current negative sequence imbalance	7004	R	2	Float32	%	Current negative sequence imbalance
Current zero sequence imbalance	7006	R	2	Float32	%	Current zero sequence imbalance

5.8.27 Current K coefficient

The list register address is X1 channel data
The address of the X2 channel data register is X1 channel data register address + 10000
The address of the X3 channel data register is X1 channel data register address +20000
The address of the X4 channel data register is X1 channel data register address +30000

Register name	register start address (decimal system)	operate	big or small	type	unit	description
Current K coefficient						
KFIA	8000	R	2	Float32	-	A phase current K coefficient
KFIB	8002	R	2	Float32	-	K coefficient of phase current in B

Register name	register start address (decimal system)	operate	big or small	type	unit	description
KFIC	8004	R	2	Float32	-	Phase C current K coefficient

5.8.28 Voltage Angle

The list register address is X1 channel data
The address of the X2 channel data register is X1 channel data register address + 10000
The address of the X3 channel data register is X1 channel data register address +20000
The address of the X4 channel data register is X1 channel data register address +30000

Register name	register start address (decimal system)	operate	big or small	type	unit	description
Voltage Angle: Taking phase A voltage as the reference, it is the leading phase A voltage Angle						
UA	8100	R	2	Float32	°	Phase A voltage Angle
UB	8102	R	2	Float32	°	Phase B voltage Angle
UC	8104	R	2	Float32	°	Phase C voltage Angle
Current Angle: Taking phase A voltage as the reference, it is the leading angle of phase A voltage						
IA	8106	R	2	Float32	°	Angle of A-phase current
IB	8108	R	2	Float32	°	Angle of phase current in B
IC	8110	R	2	Float32	°	Angle of phase current C
Angle between voltage and current: is the voltage angle of current leading						
UIA	8112	R	2	Float32	°	Angle between voltage and current of phase A
UIB	8114	R	2	Float32	°	Angle between voltage and current of phase B
UIC	8116	R	2	Float32	°	Angle between voltage and current in phase C

5.8.29 Report to the police

The list register address is X1 channel data
The address of the X2 channel data register is X1 channel data register address +10000
The address of the X3 channel data register is X1 channel data register address +20000
The address of the X4 channel data register is X1 channel data register address +30000

Register name	register start address (decimal system)	operate	big or small	type	unit	description
Alarm bitmap						
Enable the alarm bitmap						
Enable alarm bitmap 1	9000	R	1	bitmap	-	0= Alarm disabled 1= Alarm enabled Bit N (0,15) = Alarm ID N (1-16)
Enable alarm bitmap 2	9001	R	1	bitmap	-	0= Alarm disabled 1= Alarm enabled Bit N (0,15) = Alarm ID N (17-32)
Activate the alarm bitmap						
Activate alarm bitmap 1	9010	R	1	bitmap	-	0= Alarm not activated 1= Alarm activation Bit N (0,15) = Alarm ID N (1-16)
Activate alarm bitmap 2	9011	R	1	bitmap	-	0= Alarm not activated 1= Alarm activation Bit N (0,15) = Alarm ID N (17-32)
Current alarm output position **(Note: There is at most one alarm output at a time)**						
Current alarm output bitmap 1	9020	R	1	bitmap	-	0 Alarm not output 1= Alarm output Bit N (0,15) = Alarm ID N (1-16)
Current alarm output bitmap 2	9021	R	1	bitmap	-	0 Alarm not output 1= Alarm output Bit N (0,15) = Alarm ID N (17-32)
Alarm parameters						
Overcurrent, phase by phase **(Note: An alarm will be generated if one phase exceeds the activation threshold, and all phases are below the alarm release point, and the alarm will be released)**						**Alarm ID=1**
Enabled state	9100	R/WC	1	UInt16	-	Enabled state 0= disabled 1= enabled
Activation threshold	9102	R/WC	2	Float32	A	Alarm activation threshold

Register name	register start address (decimal system)	operate	big or small	type	unit	description
Alarm release point	9104	R/WC	2	Float32	%	Alarm release point Percentage error relative to alarm activation threshold *give an example :* *Alarm activation threshold =100A* *Alarm release point =5%* *When the current value is less than 100,100*5%=95A, the alarm is released*
Beeper output correlation	9106	R/WC	1	UInt16	-	Beeper output correlation 0= no association 1= Associated
Relay output association	9107	R/WC	1	UInt16	-	Relay output association 0= no association 1= Associated (Note: The control is only valid when the relay output mode is alarm output mode)
Phase-to-phase leakage current						**Alarm ID=2**
Enabled state	9120	R/WC	1	UInt16	-	Enabled state 0= disabled 1= enabled
Activation threshold	9122	R/WC	2	Float32	A	Alarm activation threshold
Alarm release point	9124	R/WC	2	Float32	%	Alarm release point Percentage error relative to alarm activation threshold
Beeper output correlation	9126	R/WC	1	UInt16	-	Beeper output correlation 0= no association 1= Associated
Relay output association	9127	R/WC	1	UInt16	-	Relay output association 0= no association 1= Associated
Phase voltage, L-N						**Alarm ID=3**
Enabled state	9140	R/WC	1	UInt16	-	Enabled state 0= disabled 1= enabled
Activation threshold	9142	R/WC	2	Float32	V	Alarm activation threshold
Alarm release point	9144	R/WC	2	Float32	%	Alarm release point Percentage error relative to alarm activation threshold

Register name	register start address (decimal system)	operate	big or small	type	unit	description
Beeper output correlation	9146	R/WC	1	UInt16	-	Beeper output correlation 0= no association 1= Associated
Relay output association	9147	R/WC	1	UInt16	-	Relay output association 0= no association 1= Associated
Phase voltage, L-N						**Alarm ID=4**
Enabled state	9160	R/WC	1	UInt16	-	Enabled state 0= disabled 1= enabled
Activation threshold	9162	R/WC	2	Float32	V	Alarm activation threshold
Alarm release point	9164	R/WC	2	Float32	%	Alarm release point Percentage error relative to alarm activation threshold
Beeper output correlation	9166	R/WC	1	UInt16	-	Beeper output correlation 0= no association 1= Associated
Relay output association	9167	R/WC	1	UInt16	-	Relay output association 0= no association 1= Associated
Overvoltage, L-L						**Alarm ID=5**
Enabled state	9180	R/WC	1	UInt16	-	Enabled state 0= disabled 1= enabled
Activation threshold	9182	R/WC	2	Float32	V	Alarm activation threshold
Alarm release point	9184	R/WC	2	Float32	%	Alarm release point Percentage error relative to alarm activation threshold
Beeper output correlation	9186	R/WC	1	UInt16	-	Beeper output correlation 0= no association 1= Associated
Relay output association	9187	R/WC	1	UInt16	-	Relay output association 0= no association 1= Associated
Line voltage, L-L						**Alarm ID=6**
Enabled state	9200	R/WC	1	UInt16	-	Enabled state 0= disabled 1= enabled

Register name	register start address (decimal system)	operate	big or small	type	unit	description
Activation threshold	9202	R/WC	2	Float32	V	Alarm activation threshold
Alarm release point	9204	R/WC	2	Float32	%	Alarm release point Percentage error relative to alarm activation threshold
Beeper output correlation	9206	R/WC	1	UInt16	-	Beeper output correlation 0= no association 1= Associated
Relay output association	9207	R/WC	1	UInt16	-	Relay output association 0= no association 1= Associated
Overpower, always active (absolute value)						**Alarm ID=10**
Enabled state	9220	R/WC	1	UInt16	-	Enabled state 0= disabled 1= enabled
Activation threshold	9222	R/WC	2	Float32	kW	Alarm activation threshold
Alarm release point	9224	R/WC	2	Float32	%	Alarm release point Percentage error relative to alarm activation threshold
Beeper output correlation	9226	R/WC	1	UInt16	-	Beeper output correlation 0= no association 1= Associated
Relay output association	9227	R/WC	1	UInt16	-	Relay output association 0= no association 1= Associated
Overpower, total reactive power (absolute value)						**Alarm ID=14**
Enabled state	9240	R/WC	1	UInt16	-	Enabled state 0= disabled 1= enabled
Activation threshold	9242	R/WC	2	Float32	kVar	Alarm activation threshold
Alarm release point	9244	R/WC	2	Float32	%	Alarm release point Percentage error relative to alarm activation threshold
Beeper output correlation	9246	R/WC	1	UInt16	-	Beeper output correlation 0= no association 1= Associated
Relay output association	9247	R/WC	1	UInt16	-	Relay output association 0= no association 1= Associated
Overpower, total apparent						**Alarm ID=18**

Register name	register start address (decimal system)	operate	big or small	type	unit	description
Enabled state	9260	R/WC	1	UInt16	-	Enabled state 0= disabled 1= enabled
Activation threshold	9262	R/WC	2	Float32	kVA	Alarm activation threshold
Alarm release point	9264	R/WC	2	Float32	%	Alarm release point Percentage error relative to alarm activation threshold
Beeper output correlation	9266	R/WC	1	UInt16	-	Beeper output correlation 0= no association 1= Associated
Relay output association	9267	R/WC	1	UInt16	-	Relay output association 0= no association 1= Associated
Excess demand, total active (absolute value), current						**Alarm ID=20**
Enabled state	9280	R/WC	1	UInt16	-	Enabled state 0= disabled 1= enabled
Activation threshold	9282	R/WC	2	Float32	kW	Alarm activation threshold
Alarm release point	9284	R/WC	2	Float32	%	Alarm release point Percentage error relative to alarm activation threshold
Beeper output correlation	9286	R/WC	1	UInt16	-	Beeper output correlation 0= no association 1= Associated
Relay output association	9287	R/WC	1	UInt16	-	Relay output association 0= no association 1= Associated
Current demand, total reactive power (absolute value), current						**Alarm ID=21**
Enabled state	9300	R/WC	1	UInt16	-	Enabled state 0= disabled 1= enabled
Activation threshold	9302	R/WC	2	Float32	kVar	Alarm activation threshold
Alarm release point	9304	R/WC	2	Float32	%	Alarm release point Percentage error relative to alarm activation threshold
Beeper output correlation	9306	R/WC	1	UInt16	-	Beeper output correlation 0= no association 1= Associated

Register name	register start address (decimal system)	operate	big or small	type	unit	description
Relay output association	9307	R/WC	1	UInt16	-	Relay output association 0= no association 1= Associated
Excess demand, total apparent, current						**Alarm ID=22**
Enabled state	9320	R/WC	1	UInt16	-	Enabled state 0= disabled 1= enabled
Activation threshold	9322	R/WC	2	Float32	kVA	Alarm activation threshold
Alarm release point	9324	R/WC	2	Float32	%	Alarm release point Percentage error relative to alarm activation threshold
Beeper output correlation	9326	R/WC	1	UInt16	-	Beeper output correlation 0= no association 1= Associated
Relay output association	9327	R/WC	1	UInt16	-	Relay output association 0= no association 1= Associated
Pass through THD-U (total harmonic of voltage) for each phase						**Alarm ID=30**
Enabled state	9340	R/WC	1	UInt16	-	Enabled state 0= disabled 1= enabled
Activation threshold	9342	R/WC	2	Float32	%	Alarm activation threshold
Alarm release point	9344	R/WC	2	Float32	%	Alarm release point Percentage error relative to alarm activation threshold
Beeper output correlation	9346	R/WC	1	UInt16	-	Beeper output correlation 0= no association 1= Associated
Relay output association	9347	R/WC	1	UInt16	-	Relay output association 0= no association 1= Associated
Pass through THD-I (total harmonic of current) for each phase						**Alarm ID=31**
Enabled state	9360	R/WC	1	UInt16	-	Enabled state 0= disabled 1= enabled
Activation threshold	9362	R/WC	2	Float32	%	Alarm activation threshold

Register name	register start address (decimal system)	operate	big or small	type	unit	description
Alarm release point	9364	R/WC	2	Float32	%	Alarm release point Percentage error relative to alarm activation threshold
Beeper output correlation	9366	R/WC	1	UInt16	-	Beeper output correlation 0= no association 1= Associated
Relay output association	9367	R/WC	1	UInt16	-	Relay output association 0= no association 1= Associated

6 Revision log

edition	date	revise content	modifier
V1.0	2025/6/6	Create a document	Hu
V1.1	2025/11/12	Edit the document	CAROL