KMB000 series

Multi-function power meter

Installation Manual V1.0

https://kimelectric.kr

Contents

Chapter I: Product description

1.1,product introduction

This series of multifunctional power meters is an ideal equipment for power monitoring. The meter has the function of simultaneously measuring current, voltage, frequency, active power, reactive power, apparent power, forward and reverse active energy, forward and reverse reactive energy, power factor, etc. in the power grid. It is suitable for distributed detection of transformers, generator sets, capacitor banks and motors, and on-site monitoring and display of power grids and automation control systems.

This series of multifunctional power meters can replace many traditional analog or digital measuring instruments (such as ammeters, voltmeters, power meters, power factor meters, frequency meters, etc.), which can greatly reduce system costs, facilitate field wiring, and improve system reliability sex. The multi-function power monitor is equipped with a serial port, allowing to connect to an open-structure computer network; using Modbus communication protocol, it is convenient for computer programming or reading data.

1.2,product features

- Multi-function parameter measurement,providing rich measurement data such as voltage,current,active power,reactive power,apparent power,power factor,frequency,etc.
- Embedded installation,product panel size 96*96mm.
- Plug-in wiring method,convenient for construction wiring.
- Break code LCD screen display,white backlight,adjustable backlight lighting time.
- LCD refresh time: 1 second,the display mode is manual display.
- Support multi-channel digital input and output interface.
- Support RS485 wired communication function,baud rate up to 19200bps,support Modbus RTU,MBus,DL/T645-2007 protocol.

1.3,product parameters

1. The measurement parameters that can be displayed on the LCD (supporting communication reading at the same time)	
Instantaneous value (RMS effective value)	
Current	Three-phase current
Voltage	Phase voltage (L-N),line voltage (L-L)
F requency	45-65Hz
Active power	Total power,split-phase power
Reactive power	Total power,split-phase power
On power	Total power,split-phase power
Power factor	Total power factor,split-phase power factor
Power value (including: forward, reverse, forward + reverse)	
Active power level	Scope: 0 ~ 1.0 * 10^{14} Wh
Reactive power	Scope: 0 ~ 1.0 * 10^{14} varh
Maximum and minimum value	
Voltage	Phase voltage (L-N), line voltage (L-L)
Current	Three-phase electric current
Active power	Total power, phase-separation power
Reactive power	Total power, phase-separation power
On power	Total power, phase-separation power
2, Communicate the measurement parameters for the read only	
Power supply parameters	
Voltage	Three-phase phase voltage, three-phase line voltage,
Current	Three-phase electric current
Power supply	Three phase active power, three phase reactive power, three phase treated at power, power cause, etc
Electric Parparameters	
Active electric power	Forward and reverse active electric power
Reactive electric power	Forward and reverse reactive electrical energy
SSetable parameters	
Change ratio	CT change ratio, PT change ratio
Address address	1-253 (Default 1)
The Porter rate	4800 / 9600 (Default) / 19200

Chapter II: Technical specification and parameters

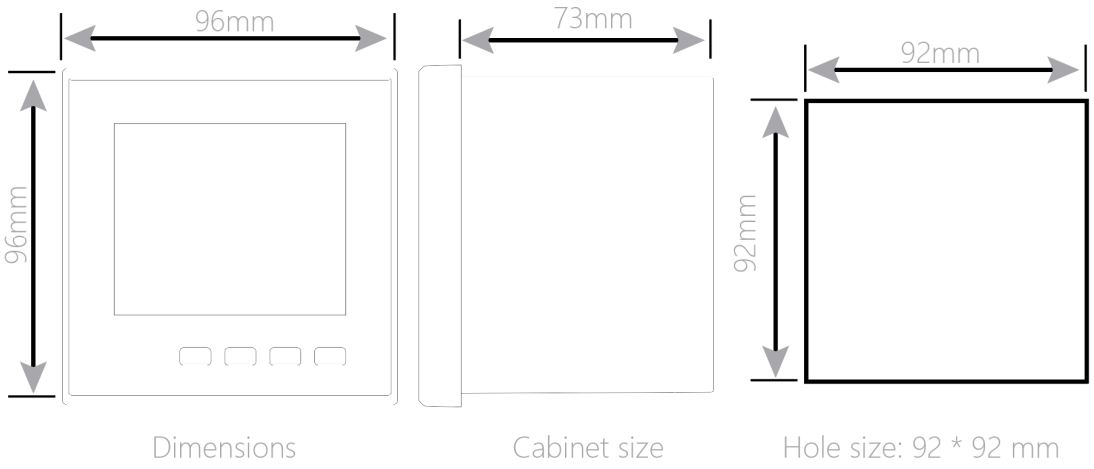
2.1, Specification and parameters

Electrical performance		
Measurement type		Effective value measurement (RMS), supporting three-phase four lines, three-phase three lines. The number of sampling points per cycle was 128 points.
Measurement accuracy	Voltage, current current	The Class 0.2, reference standard is the IEC 61557-12
	Active power	The Class 0.5, reference standard is the IEC 61557-12
	Reactive power	The Class 2, reference standard is the IEC 61557-12
	On power	The Class 0.5, reference standard is the IEC 61557-12
	Active power level	Class 0.5S, Reference Standard IEC 62053-22;Class 0.5, Reference Standard IEC 61557-12
	Reactive power	Class 2, Reference Standard IEC 62053-23;Class 2, Reference Standard IEC 61557-12
	Power factor	The Class 0.5, reference standard is the IEC 61557-12
	Frequency	The Class 0.05, reference standard is the IEC 61557-12
Measure the data update rate		1 second.
Measure the input voltage	Rated voltage	230 VAC(L-N)/ 400 VAC(L-L)
	Direct access	Measuring range: 30 ~ 350 VAC (L-N); 30 ~ 660 VAC (L-L)
	PT access	Max imum side value for PT: 600000 VAC
	Measure the circuit impedance	1MΩ
	Measure the frequency range	45 ~ 65 Hz
	Overload capacity	1.2-x Continuous, 2-x (10s)
Measure the input current	CT quadratic-side output	Rated: 1A/5A(default), 100mA/mV(optional)
	CT primary side range	1 ~ 9999 A
	Current measurement range	0.005 ~ 6 A, Rated at 5A
	Measure the circuit impedance	<0.01 ohm
	Overload capacity	20 x maximum current for 0.5 seconds
Auxiliary	Operating	805~ 265 VAC / 100 ~ 420 VDC

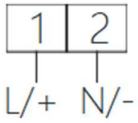
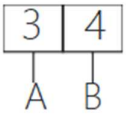
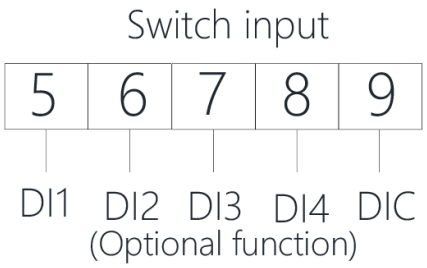
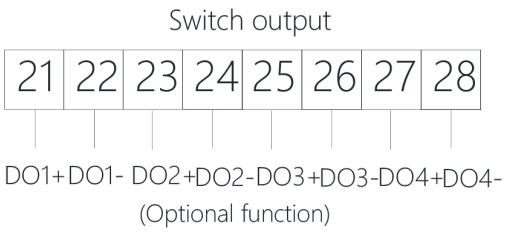
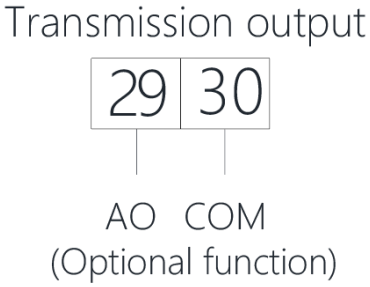
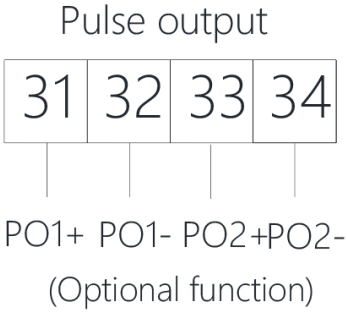
power supply supply	voltage range	
	Operating frequency range	45 ~ 65 Hz
	Power consumption	<4VA/0.5W
Digital input (Switch volume input)	Quantity	Road 4
	Type	Support for dry connection input (built-in power supply: 20 ~ 24VDC)
	Input the impedance	>10kΩ
	Maximum input frequency	250Hz
	Response time	2ms
	AC pressure resistance	2.5kVAC lasted for 1 min
Digital output (Relay output)	Quantity, type	The 4-way relay output
	Switch frequency	Max to 10Hz
	Contact capacity	5A/250VAC,5A/30VDC
	AC pressure resistance	2.5kVAC lasted for 1 min
Simulation quantity output		1 analog transmission output, 0~20mA/0~5V(optional settings)
Power pulse output	Outmode	Photocoupled pulse of an open collector circuit
	Pulse constant	5000imp/kwh
	Pulse width	200ms
	Pulse output type	Positive total active power or positive total reactive power
	Output level	The Class A, reference standard is the IEC 62053-31
	Input the voltage	DC5V
Mechanical properties		
IP protection rating		Display panel section: IP51; instrument body: IP30
Outline dimensions		Display panel: 96X96 mm; aperture: 92X92 mm; Panel thickness: 14 mm; body depth (including supporting terminals): 81 mm
Weight		310g
Installation mode		Vertical installation
Plate thickness of the mounting box		1 ~ 5 mm
Fire prevention grade of instrument housing material		UL 94 V-0
Environmental characteristics		
Operating temperature		-25 ~ +70℃

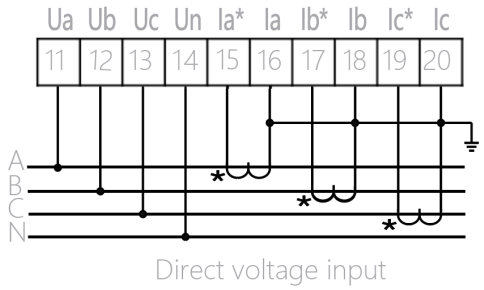
Storage temperature	-40 ~ +80℃
Humidity	<90%, no condensate, no corrosive gas
Pollution rating	2
Elevation of	<2500m
Vibration resistance indicator	Vibration frequency range: 10~150Hz, reference standard IEC 60068-2-6
Communication characteristics	
Communication Interfaces and protocols	Two-line RS485;Modbus RTU(by default), DL/T645-2007,MBus (optional)
The Porter rate	4,800,9,600 (Default), 19,200 bps
Check the check bit	None(by default), Even,Odd
Stop the bit	1 (Default), 2
Communication response time	<100ms
Transport mode	Half-duplex
Transmission distance	Max. of 1,000 m

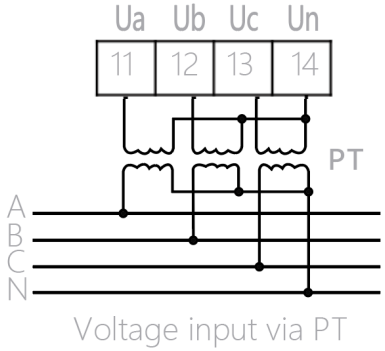
2.2, Outline and installation dimensions



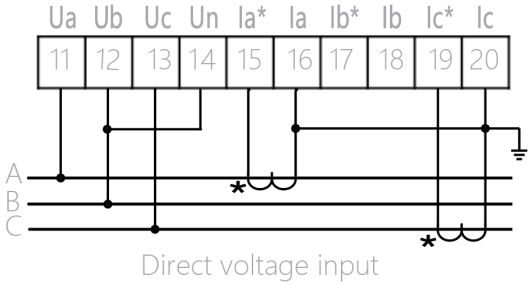
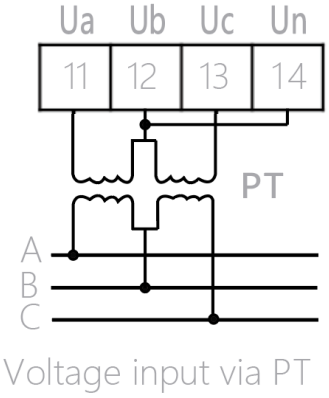
2.3, Wiring diagram

<table>
<tr><td>Working power supply</td><td>RS485</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>Switch quantity input</td><td>Switch volume output</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>Transmission output</td><td>Pulse output</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td colspan="2">Wiring diagram of three-phase and four-wire terminals</td></tr>
<tr><td>Voltage is directly input</td><td>Voltage is input via PT</td></tr>
</table>





The three-phase and three-line terminal wiring diagram

Voltage is directly input	Voltage is input via PT
	

Product terminal specification parameters	
Voltage measurement input port	Line diameter: 0.82 ~ 3.31 mm^2(18 ~ 12 AWG) Torque: 0.5 ~ 0.6 N.m
Current measurement input port	Line diameter: 0.82 ~ 3.31 mm^2(18 ~ 12 AWG) Torque: 0.5 ~ 0.6 N.m
Auxiliary power supply input port	Line diameter: 0.82 ~ 3.31 mm^2(18 ~ 12 AWG) Torque: 0.5 ~ 0.6 N.m
Communication port	Line diameter: 0.82 ~ 3.31 mm^2(18 ~ 12 AWG) Torque: 0.5 ~ 0.6 N.m
Pulse output port	Line diameter: 0.82 ~ 3.31 mm^2(18 ~ 12 AWG) Torque: 0.5 ~ 0.6 N.m
Digital input / output port	Line diameter: 0.82 ~ 3.31 mm^2(18 ~ 12 AWG) Torque: 0.5 ~ 0.6 N.m

Chapter III: General function description of the instrument

3.1, LCD indicator icon description

The 3.1.1, power bar indicates the icon

Power bar indicates that the icon represents the percentage of the actual measurements of the current instrument on the rated value. The rated value total on power is equal to the effective phase number * rated voltage value * rated current value.

Description:

1), in three phase four wire 3CT, three phase three line 3CT, effective phase number equal to 2.

2), the rated voltage value is equal to the variable ratio of the rated voltage value on the secondary side.

3), the rated current value is equal to the variable ratio of the rated current value on the quadratic side.

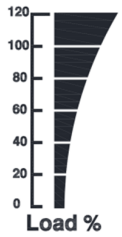


Figure 1: Power bar icon

The 3.1.2, digital input-output indicator icon

Digital input-output icon is the status of the digital input-output interface indicating the current instrument, and if the icon appears, the currently displayed path is the ON status.The OFF status is present if it is not displayed.

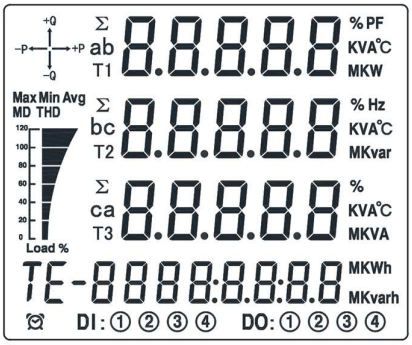
DI:① ② ③ ④ DO:① ② ③ ④

Figure 2: Schematic diagram of the DIDO status indication

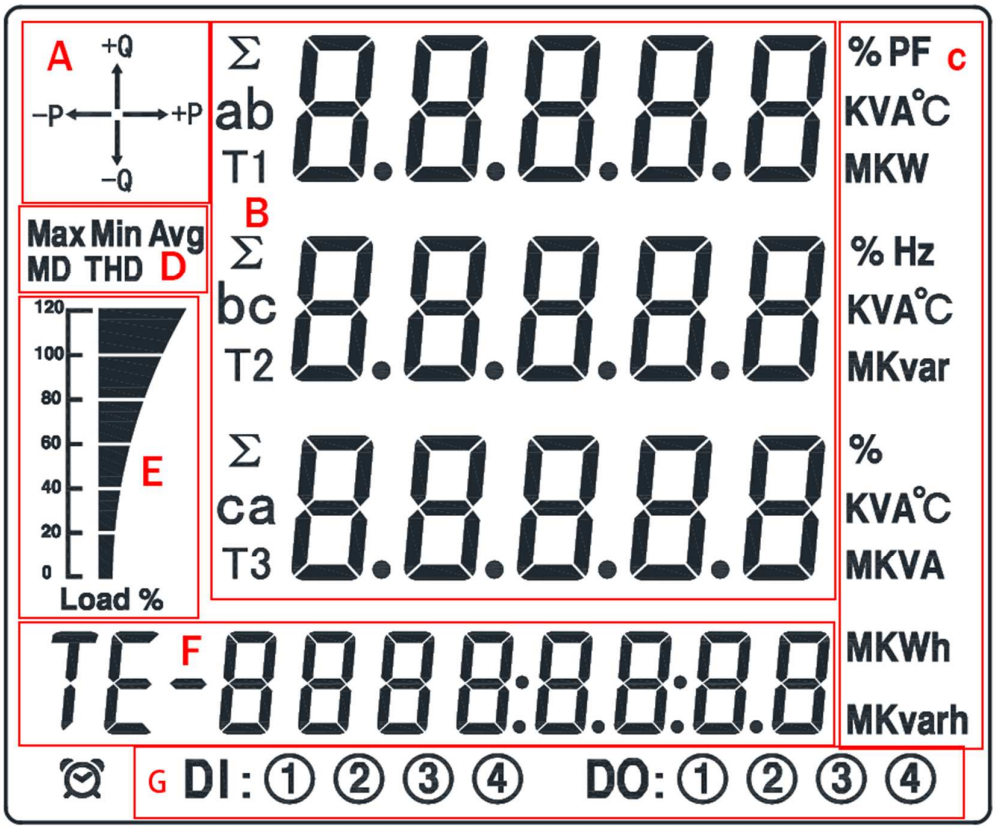
Chapter IV: Operating instructions

4.1. Product startup description

The series, correctly connected and powered, displays the full screen characters as shown:



4.2, LCD display instructions



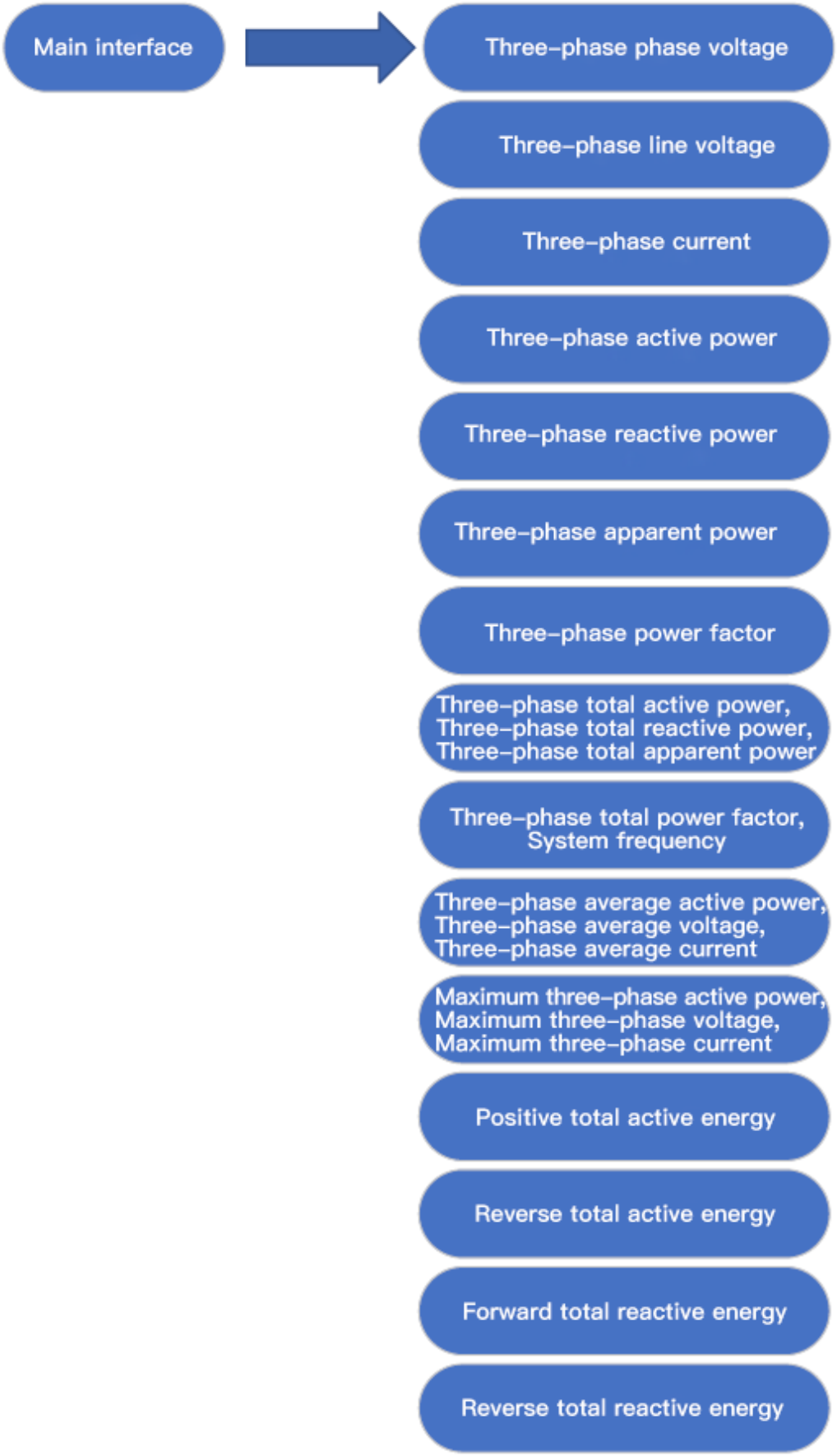
The indicator icon of the A: four-quadrant, indicating the quadrant region to which the current load belongs.
Measurement data display area for B: products.
Unit display area of the C: product measurement data.
The D: product test data type.
Power bar indicator icon for the E: product.
Power data display area of F: products.
Digital input / output status display area of the G: product.

4.3. Key button definition description

Key	Definition	Function
 Bs	Key key # 1: The Bs key	1，Under the setup interface: Exit or return to the previous interface. 2，When the parameter is set, if at the last level menu, used as the shift key to move the flicker bit.
 Up	Key key # 2: The Up key	1. Under the main display interface: view the display screen on the power level. 2. Under the setting interface: turn up the increment of the page or number.
 Dn	Key key # 3: The Dn key	1. Under the main display interface: view the next display picture of power. 2. Under the settings interface: Turn down the page or number.
 St	Key key # 4: The St key	1，Under the main display interface: Go to the next level menu. 2，When setting the parameters, if at the last level menu, act as Save and Back to the previous level menu. 3，When the current menu is the password input menu, judge whether the password is correct, correct will enter the next level menu, otherwise return to the previous level menu.

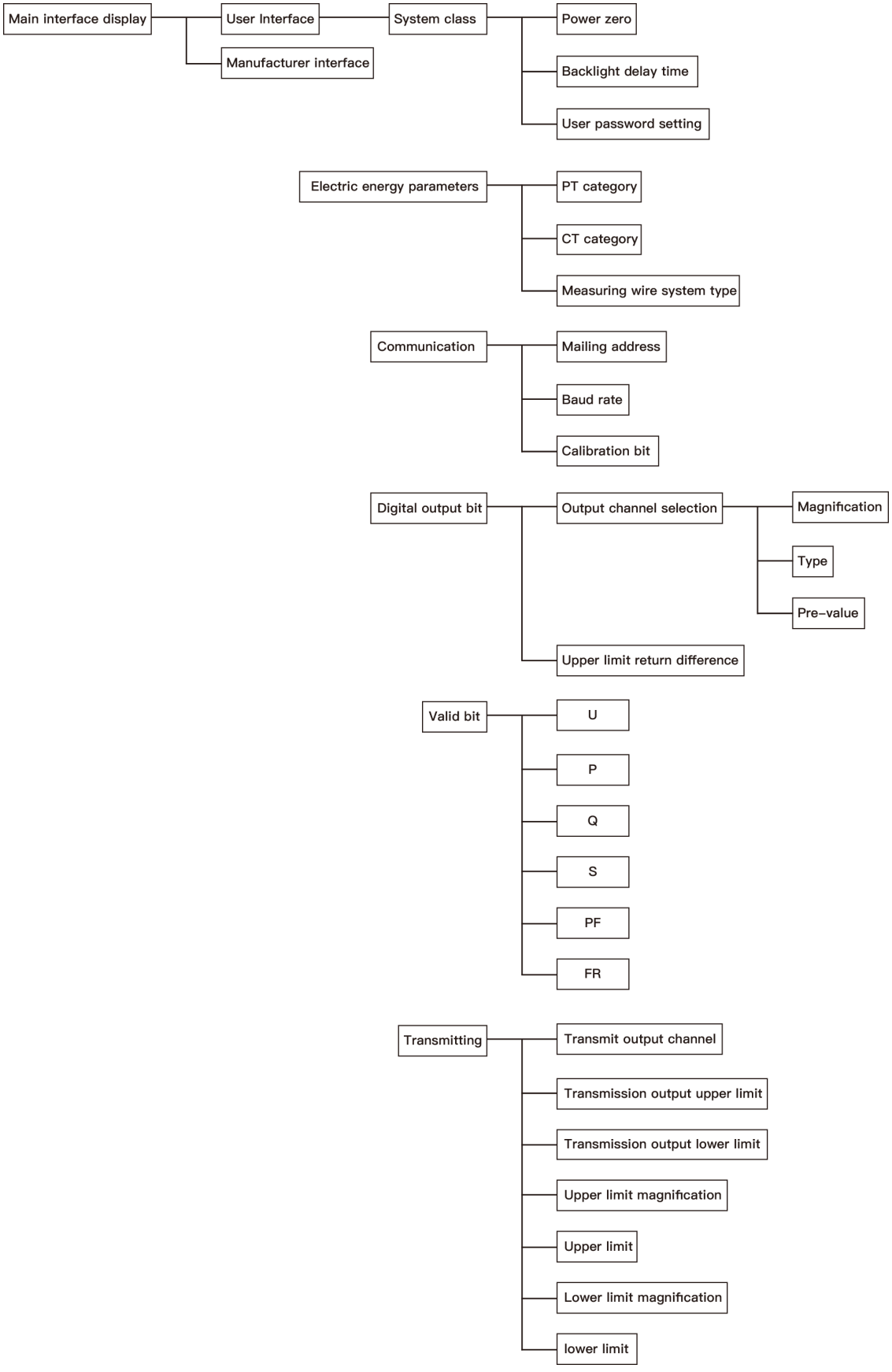
4.4. Description of the main display interface

The interface entering the product through the self-inspection process is defined as the main display interface, which is used to display the main measurement parameters and power data of the product. Users can check the page by clicking the button. Under the main display interface, the following interface is shown to Appendix 3.


Main interface
Three-phase phase voltage
Three-phase line voltage
Three-phase current
Three-phase active power
Three-phase reactive power
Three-phase apparent power
Three-phase power factor
Three-phase total active power,
Three-phase total reactive power,
Three-phase total apparent power
Three-phase total power factor,
System frequency
Three-phase average active power,
Three-phase average voltage,
Three-phase average current
Maximum three-phase active power,
Maximum three-phase voltage,
Maximum three-phase current
Positive total active energy
Reverse total active energy
Forward total reactive energy
Reverse total reactive energy

4.5. Setting operation of product parameters

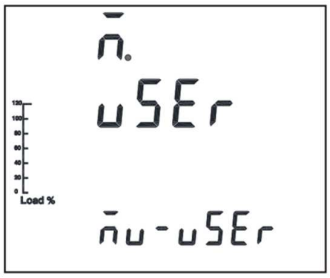
The hierarchy diagram of the parameter Settings menu is as follows:



To entering the User Reference Menu Items interface:

1), under the initial interface display interface, press the "ST" button to find the "DN" key and "Up" key.

Note: The user setting menu item interface is shown on the right:



2), press the "ST" button to confirm, display the password input interface, input the correct password to enter the setting parameter interface, the factory initial password bit "0001".

Enter the password:

A, increases numbers or decreases through the "Dn" and "Up" keys.

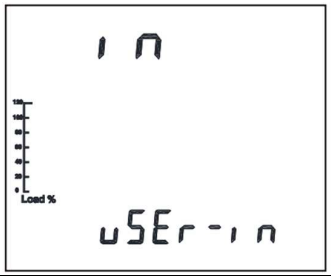
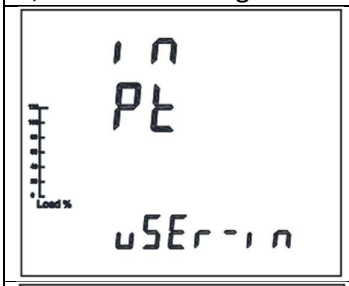
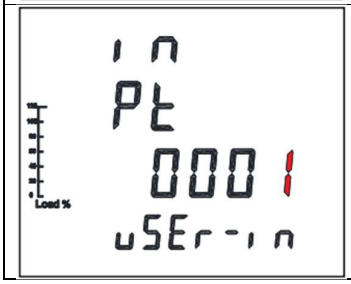
The B, performs a digital flicker displacement via the "Bs" key.

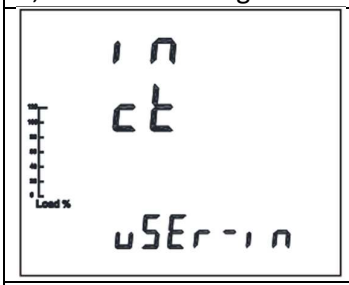
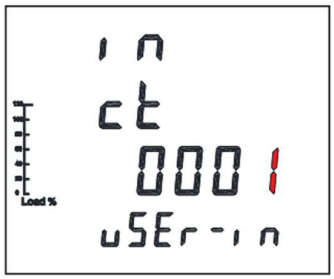
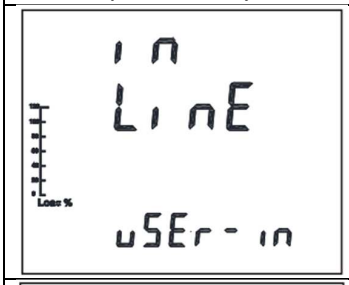
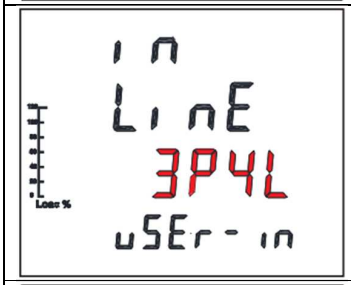
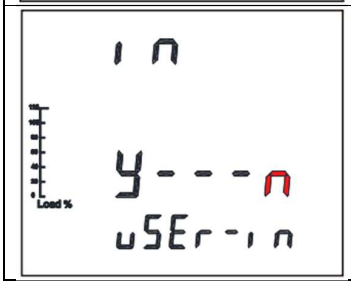
After C, enters the correct password, press "St" key to confirm that if the password is correct, the instrument will perform the "User Reference Menu Item" interface.

Description: After 1 minute, the instrument will automatically return to the main display interface.

The 4.5.1, sets the power parameters

Power parameters include: PT ratio, CT ratio, line system and other parameters.

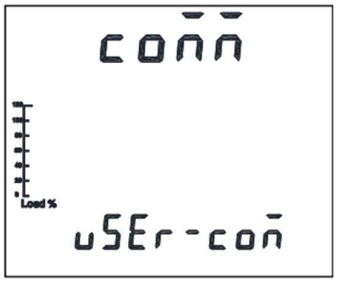
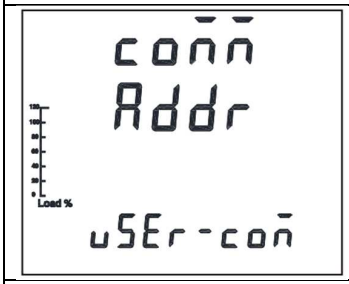
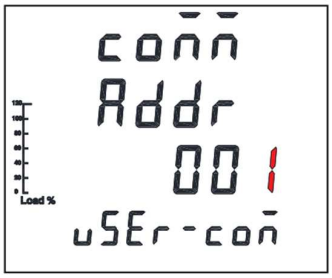
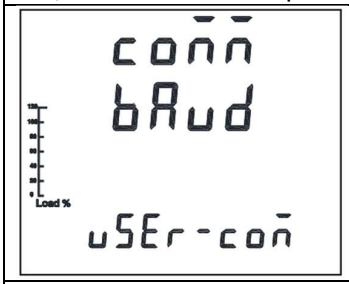
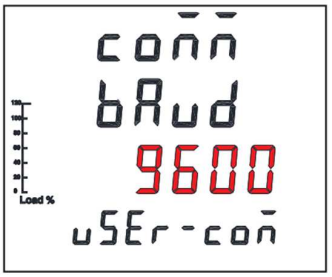
1. After entering the "User setting parameter" interface, press the "Dn" key to find the power parameter setting parameter menu item interface (shown in the figure below). 	
2, Set the PT change ratio	
	Press the "St" key to display the power parameter parameter interface and find the "Up" and "Dn" keys.
	Press "St" key to display the PT ratio parameter interface and increase the PT ratio value set by the Up "and the Bs" displacement key (set value: 1-5000).

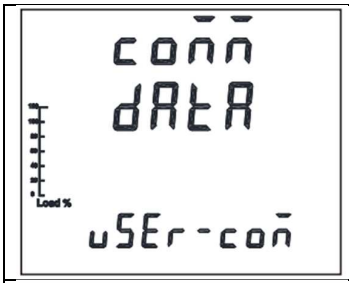
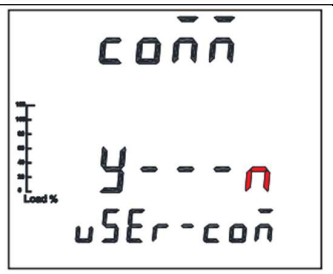
3, Set the CT change ratio	
	Press the "St" key to return to the power parameter parameter interface and find the "Up" and "Dn" keys.
	Press "St" key to display the CT ratio parameter interface and increase the CT ratio value set by the Up "and the Bs" displacement key (set value: 1-5000).
4. Set up the line system	
	Press the "St" key to return to the power parameter setting parameter interface, and use the "Up" and "Dn" keys to find the line setting parameter menu keys.
	Press "St" key to display the line parameter parameter interface and set the required line values through "Up" and "Dn" keys (set option: 3P4L,3P3L).
	After the setting is complete, press "St" key, confirm the setting, continuously press "Bs" key to select "y" flashing, and press "St" key to confirm the saving parameters.

The 4.5.2, sets the communication class parameters

Communication class parameters include: communication address, port rate, verification and other parameters.

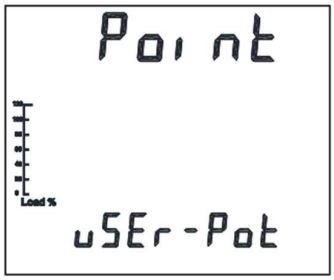
1. After entering the "User setting parameter" interface, press the "Dn" key to find the communication parameter setting parameter menu item interface (shown in the figure below).

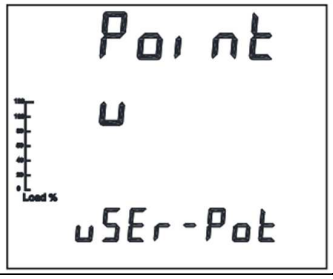
<table>
<tr><td colspan="2"> 
</td></tr>
<tr><td colspan="2">2.1. Set the communication address parameters</td></tr>
<tr><td> 
</td><td>Press the "St" key to display the communication parameter setting interface, and find the communication address setting menu item through the "Up" and "Dn" keys.</td></tr>
<tr><td> 
</td><td>Press the "St" key to display the communication address setting interface, and set the required communication address through the "Up" and "Dn" keys (setting value: 1-253).</td></tr>
<tr><td colspan="2">2.2, set the Baud rate parameters</td></tr>
<tr><td> 
</td><td>Press the "St" key to return to the communication parameter option interface and find the "Up" and "Dn" keys.</td></tr>
<tr><td> 
</td><td>Press the St "key to display the port rate setting interface and set the required communication port rate via the Up" and Dn" keys (setting option: 4800 / 9600 / 19200).</td></tr>
<tr><td>2.3. Set the check bit</td><td></td></tr>
</table>

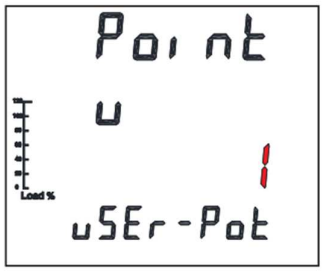
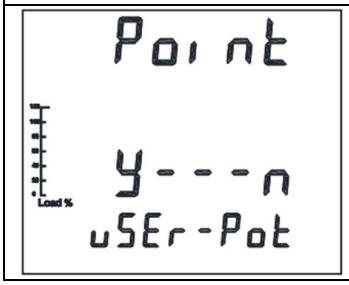
	Press "St" to return to the communication parameter option interface and find the communication school setting menu item through "Up" and "Dn" keys.
	Press the "St" key to display the communication calibration setting interface and set the required check bit through the "Up" and "Dn" keys (setting option: no/even/odd).
	After the setting is complete, press "St" key, confirm the setting, continuously press "Bs" key to select "y" flashing, and press "St" key to confirm the saving parameters.

The 4.5.3, displays the valid bit settings

1. After entering the "User setting parameter" interface, press the "Dn" key to find the valid bit parameter menu item interface (shown in the figure below).

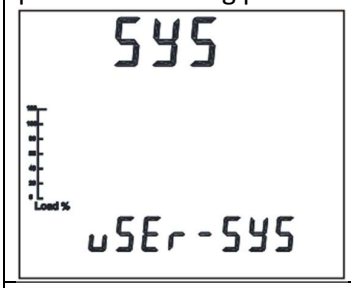


	Press the "St" key to display the active bit parameter option interface and find the voltage active bit menu item through the "Up" and "Dn" bit keys (set option: U/P/Q/S/PF/FR).

	Press the "St" key to display the valid bit parameter setting interface and set the required effective position through the "Up" and "Dn" keys (setting value: 0-3).
	After the setting is complete, press "St" key, confirm the setting, continuously press "Bs" key to select "y" flashing, and press "St" key to confirm the saving parameters.

The 4.5.4, electric power reset setting

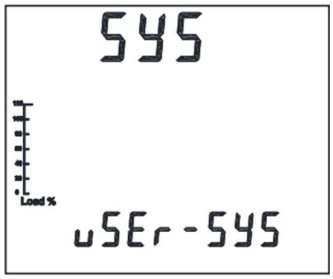
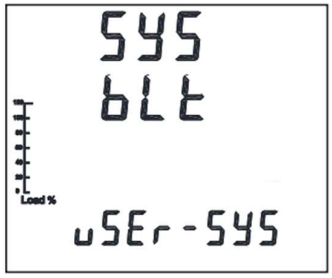
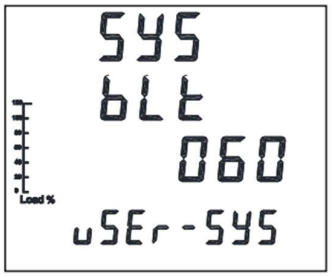
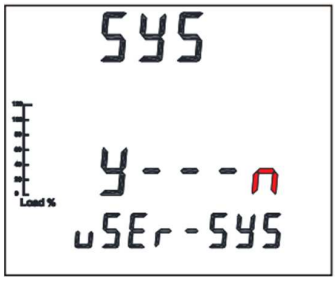
1. After entering the "User setting parameter" interface, press the "Dn" key to find the system parameter setting parameter menu item interface (shown in the figure below).



	Press the "St" key to display the system parameter settings interface via the "Up" and "Dn" keys, Find the power zero clearance menu item.
	Press "St" to display the power reset setting interface, as shown on the left, via "Up" Switch with the Dn "key between yes" and no ", to select yes".

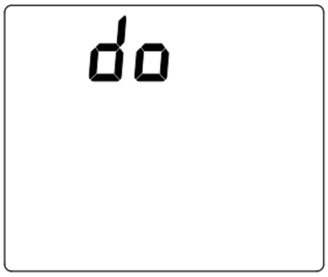
The 4.5.5, backlight delay time setting

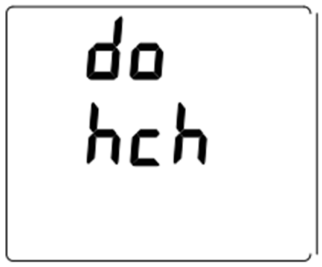
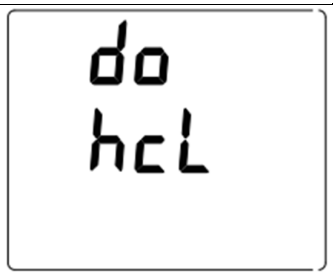
1. Enter the user parameter interface, press "Dn" key to find the system parameter parameter menu item interface (shown in the figure below).

	
	Press the "St" key to display the system parameter settings interface via the "Up" and "Dn" keys, Locate the backlight time-lapse menu item.
	Press "St" to display the backlight delay time setting interface, default delay 60S, through "Up" and "Dn" keys, set the required backlight delay time (the backlight is normally bright when the backlight is set to 0).
	After the setting is complete, press "St" key, confirm the setting, continuously press "Bs" key to select "y" flashing, and press "St" key to confirm the saving parameters.

The 4.5.6, quantity parameter setting

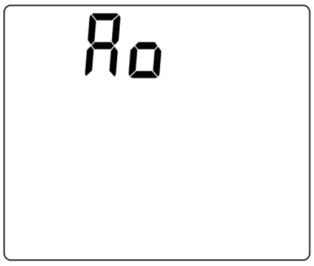
1. After entering the "User Reference" interface, press the "Dn" key to find the opening Reference menu item interface (shown in the figure below).

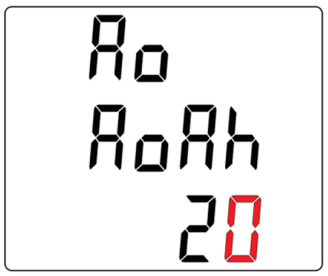
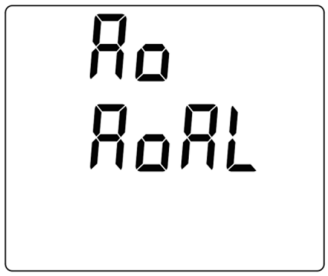
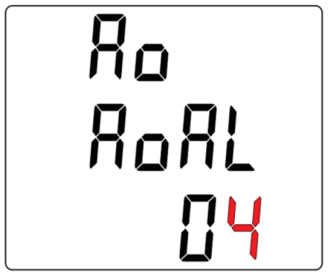


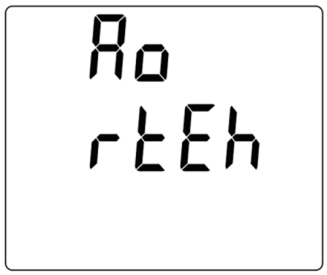
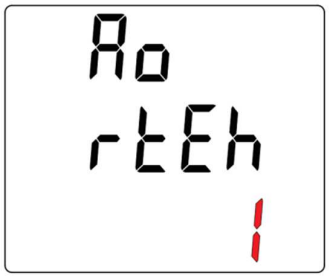
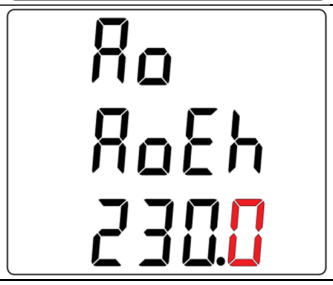
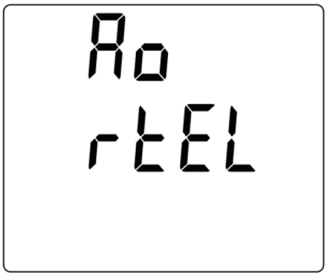
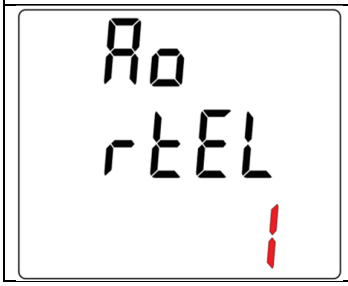
	Press the "St" key to display the open quantity setting option interface, and find the upper limit margin return parameter setting menu item through the "Up" and "Dn" keys.
	Press the "St" key to display the upper limit return parameter setting interface, through the "Up" and "Dn" keys, set Set the upper limit return value (the default is 0.9: the action value is 0.9 times the set value).
	Press "St" to return to the quantity setting option interface, and locate the lower limit to the "Up" and "Dn" parameter setting menu item.
	Press the "St" key to display the lower margin return parameter setting interface, through the "Up" and "Dn" keys, set the lower margin return value (the default is 1.1: that is, the action value is 1.1 times the set value),.
2, DO settings	
	Press "St" to return to the open volume settings options interface via "Up" and "Dn" Key to find the DO1 volume settings menu item, as shown on the left.
	Press the "St" key to display the DO1 volume parameter setting interface, the default is the DO1 volume parameter channel selection menu items, as shown in the left figure.

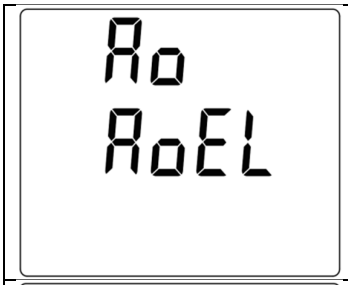
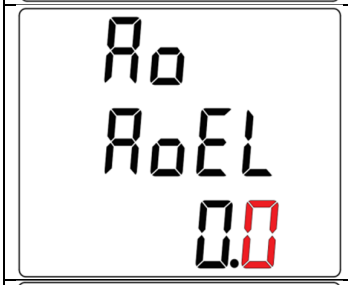
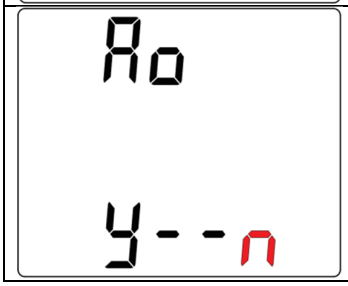
	Press the 'St' key to display the DO1 parameter channel setting interface, through the 'Up' and "Dn" keys, set the required channel parameters (setting value: UH/UL/IH/IL, etc. optional; no is remote control output).
	Press the 'St' key to return to the DO1 open quantity parameter setting interface, through the 'Up' and 'Dn' key, find the DO1 parameter ratio setting menu item, as shown in the left figure.
	Press the 'St' key to return to the DO1 open quantity parameter setting interface, through the 'Up' and 'Dn' keys, to find the DO1 parameter setting menu item, as shown in the left figure.
	Press 'St' to display the parameter setting options interface, through the 'Up' and'Dn" keys, to set the DO1 Channel parameter (set value: change based on default parameter value, such as default upper voltage limit is 250V)

The 4.5.7. Setting of transmission parameters

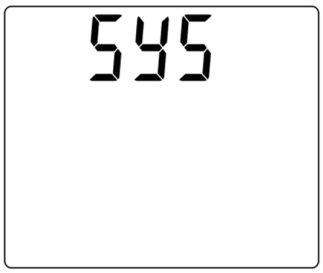
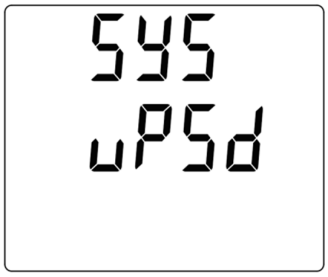
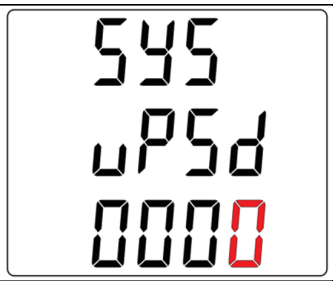
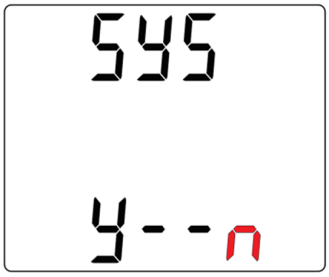
1. Enter the user setting parameter interface, press the'Dn" key to find the transmission parameter setting parameter menu item interface (shown in the figure below). 	
	Press the 'St' key to display the transmitter setting option interface, and go through the 'Up' and 'Dn' keys to find the transmitter output channel setting menu item, as shown in the left figure.

	Press the "St' key to display the transmission parameter channel setting interface, and set the required channel parameters through the" Up "and" Dn" keys (setting value: all power parameters are optional).
	Press the 'St' key to display the transmitter setting option interface, through the 'Up' and 'Dn' keys, find the transmitter output, upper limit setting menu items, as shown in the left figure.
	Press the " St' key to display the transmission output upper limit setting interface, and set the required upper limit parameters (setting value: 4-20; default 20).
	Press the 'St' key to return to the transmitter setting option interface and find the 'Up' and transmitter output Dn" keys, as shown in the left figure.
	Press "St" key to display the transmission output lower limit setting interface, and set the'Up "and" Dn" key with the required lower limit parameters (setting value: 4-20; default 4).

	Press the 'St' key to return to the transmitter setting option interface, and find the 'Up' and 'Dn' keys, as shown in the left figure.
	Press the 'St' key to display the transmission upper limit doubling rate setting interface, and set the required parameters to be set (set value: 1, K (i. e., the actual value = set value x 1000), the default is 1).
	Press the 'St' key to return to the transmitter setting option interface and find the 'Up' and 'Dn' keys for the transmitter channel parameters, as shown in the left figure.
	Press the 'St' key to display the upper limit setting interface of the transmission parameters, and set the required parameters through the "Up" and "Dn" keys (setting value: based on the default parameter value change, such as the transmission upper limit default is 230V).
	Press the 'St' key to return to the transmitter setting option interface, and go through the 'Up' and 'Dn' keys to find the transmitter channel parameter lower limit multiplier setting menu item, as shown in the left figure.
	Press the 'St' key to display the transmission lower limit doubling rate setting interface, and set the required parameters (set value: 1, K (i. e., the actual value = set value x 1000), the default is 1).

	Press the 'St' key to return to the transmitter setting option interface and find the 'lower limit of the transmitter channel parameters through the' Up 'and' Dn" keys, as shown in the left figure.
	Press the 'St' key to display the lower limit setting interface of the transmission parameters, and set the required parameters through the "Up' and" Dn" keys (setting value: based on the default parameter value change, such as the transmission lower limit default is 0.0V).
	After setting, press 'St' key to confirm the setting, continuously press 'Bs' key to select 'y' flashing, and press 'St' key to confirm the saving parameters as shown in the left figure.

The 4.5.8, User password setting

1. Enter the user parameter interface, press 'Dn' key to find the system parameter parameter menu item interface, as shown in the left figure. 	
	Press the 'St' key to display the system parameter setting interface, and use the 'Up' and'Dn" keys to find the user password menu item, as shown in the left figure.
	Press the 'St' key to display the user password settings interface and set the required new user password via the 'Up' and'Dn" keys to the user, as shown in the left figure.
	Press the 'St' key to display the user password settings interface and set the required new user password via the 'Up' and'Dn" keys to the user, as shown in the left figure.

Chapter V: The Digital Input (DI) interface

The KMB000 Series can support 4-channel digital input, respectively DI1, DI2, DI3, DI4.The digital input interface circuit has a built-in power supply inside the product and can support passive switching volume signal detection, such as contact mechanical switch, dry clarinet, pulse output port with open collector, etc. The digital input interface can detect the switching amount status of the input (ON or OFF). The digital input interface can be applied to detect the switch state of the circuit breaker, the pulse count of water output of the water meter.

Chapter VI: The Digital Output (DO) interface

The KMB000 Series can support 4-channel digital output, respectively DO1, DO2, DO3, DO4. Digital output has two working modes: manual control and alarm control.

1), Manual control mode: Support remote communication control.

2), Alarm control mode: by connecting the alarm monitoring object, the product can automatically control the digital output interface according to the value of the monitoring object (refer to the alarm function introduction in Chapter 7).

Digital output interface supports level output mode: after the digital output is set to ON state, they remain ON and switch to OFF state until set to OFF state.

Description: ON represents that the relay is closed; OFF means that the relay is disconnected.

Chapter VII: Alarm function

The KMB000 Series products can support the 2-channel alarm function, the alarm action is related to the digital output interface, and the digital output interface automatically switches to the corresponding state (ON or OFF) according to the real-time measurement data of the monitoring object. The alarm function is to bind a monitoring object on the alarm channel and compare the measurement data of the monitoring object with the alarm threshold once every second to determine whether the alarm threshold triggers the alarm action.

Note: If the measurement line type of the product is modified, CT and PT parameters, all alarm functions will be disabled to prevent unnecessary alarm events, necessary to confirm whether the alarm parameters are correct, then the alarm function will be turned on.

7.1. Description of the alarm parameters

1), Alarm monitoring object: alarm related measurement parameters, and the product compares the measurement parameter data once per second to determine whether to exceed the alarm threshold, and thus determine whether to trigger the alarm. Alarm monitoring object supports 37 measurement parameters.

2), high threshold alarm trigger value: when the measurement data of the monitoring object is greater than the trigger value, the high threshold alarm event is triggered.

3), high threshold alarm release value: when the high threshold alarm event is triggered, the alarm status will be withdrawn only after the measurement data of the monitoring object is less than the release value.

4), low threshold alarm release value: when the low threshold alarm event is triggered, the alarm status will be withdrawn only after the measurement data of the monitoring object is greater than the release value.

5), low threshold alarm trigger value: when the measurement data of the monitoring object is less than the trigger value, the low threshold alarm event is triggered.

6), Alarm enabling control value: used to control the alarm function is on or off, and only after the alarm enabling control value is set to the open state, can the product run the alarm workflow normally.

7.2. Alarm parameter setting process

1), select the alarm channel.

2), set the high threshold alarm trigger value and the high threshold alarm release value.

3), set the low threshold alarm release value and the low threshold alarm trigger value.

4), turn on the alarm function.

Note: 1. The setting of alarm parameters supports key setting and communication command setting.

2. When readjusting the alarm threshold, please turn off the alarm function to prevent mistakenly triggering the alarm events during the value adjustment.

3. After each reset of the alarm monitoring object, the alarm function will automatically turn off in order to prevent mistakenly triggering the alarm, and needs to be set in the alarm monitoring object

Later, restart the alarm function.

4. The setting process of alarm threshold needs to ensure that: high threshold alarm trigger value> high threshold alarm release value> low threshold alarm release value>

Low threshold alarm trigger value, otherwise the alarm function execution process will occur an error.

7.3. Alarm monitoring and judgment rules

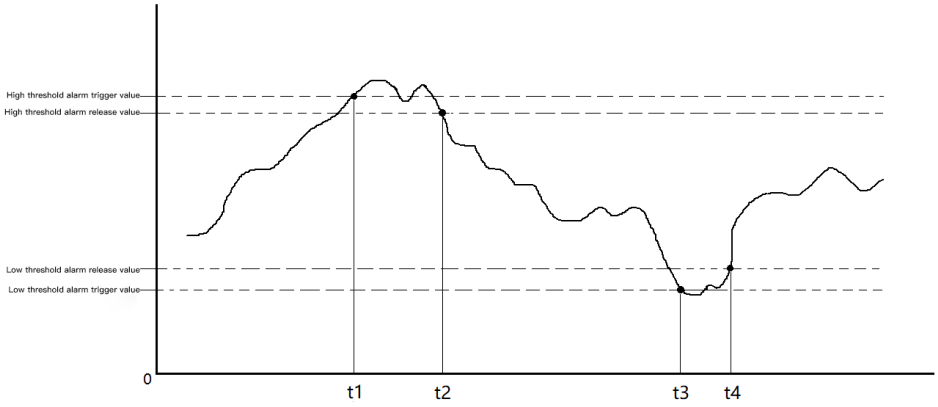


Figure 7: Schematic diagram of the alarm monitoring

As shown in Figure 7 above:

1), at the t 1 time point, the instrument detects that the value of the monitoring object is greater than the high threshold alarm trigger value, and then the high threshold alarm event of the instrument triggers at this time.

2), in the time period between t1~t2, although the value of the monitoring object is less than the high threshold alarm trigger value, it is still greater than the high threshold alarm release value, so the instrument is still in the high threshold alarm state.

3), at the t2 time point, the instrument detects that the value of the monitoring object is less than the high threshold alarm release value, and then the instrument will exit the high alarm state.

4), at the t3 time point, the instrument detects that the value of the monitoring object is less than the low threshold alarm trigger value, then the instrument low threshold alarm event is triggered.

5), in the time period between t3~t4, although the value of the monitoring object is greater than the low threshold alarm trigger value, it is still less than the low threshold alarm release value, so the instrument is still in the low threshold alarm state.

6), at the t4 time point, the instrument detects that the value of the monitoring object is greater than the release value of the low threshold alarm, and then the instrument will exit the low alarm state.

Chapter VIII: The Modbus register address table

KMB000 Series instruments use standard MODBUS-RTU communication protocol showing the transmission mode, information frame format, function code, etc.

1. transmission mode:

Information transmission is asynchronous and in bytes. The communication information between the host and the slave is 10-bit format, including 1 start bit, 8 data bits (minimum valid bit sent first), no even check bit, and 1 stop bit.

2. Information Frame format:

Address code	Function code	Data zone	CRC validity code
1 Bytes	1 Bytes	n bytes	2 Bytes

Address code: The address code is at the beginning of the frame, composed of a byte (8-bit binary code), decimal is 1-254, the rest is invalid. These bits indicate the address of the user-specified terminal device that will receive host data connected to it.

Function code: the function code tells the addressed terminal to perform the function. The following table lists the function codes used for the series of instruments, as well as their meaning and functionality.

Function	Definition	Operation
03H	Read the data register	Get the current binary values for one or more registers
06H	Write a single register	Set the binary value into a specified register
10H	Preset the multi-register	Set the binary values into a series of multiple registers

Data zone: The data area contains the data required for the terminal to perform specific functions or the data collected when the terminal responds to a query. The contents of these data may be numerical values, reference addresses, or set values.

CRC validity code: Error check (CRC) domain occupies two bytes with a 16-bit binary value.The CRC value is calculated by the transmission device and then attached to the data frame, which recalculates the CRC value when receiving the data and then compared to the value in the received CRC domain, and an error occurs if the two values are not equal.

The process for generating a CRC is:

1), presets a 16-bit register as 0FFFFH (full 1), called the CRC register.

2), calculates the 8 bits of the first byte in the data frame to the low byte in the CRC register, and saves the results back to the CRC register.

3), moves the CRC register one bit to the right, the highest bit filled with 0, the lowest displaced out and detected.

4), If the lowest bit is 0, repeat the third step (the next shift); if the lowest bit is 1, vary the CRC register with a preset fixed value (0A001H).

5), repeats the third and fourth steps until eight shifts. This completes a full eight-bit process.

6), repeats steps 2 through 5 to process the next octet until the end of all byte processing.

The value of the 7), final CRC register is the value of the CRC.

There is also a method of calculating the CRC using a preset table. Its main feature is the fast computing speed, but the table requires a large storage space. This method is not repeated here, please see the relevant information.

3. Introduction to the 3. function code:

1) function code 03H: read register

This function allows the user to obtain data collected and recorded data and system parameters. There is no limit on the number of data requested by the host at a time, but it cannot exceed the defined address range.

The following example is the three basic data collected from 01 (2 bytes per address in the data frame) UA, UB, UC, where the address of 0000H,UB is 00001 H,U C is 0002H. The following table is specific host sending and return frame structure.

Host sends data:

Send the data	Address code	Function code	Start address High bytes	Start address Low bytes	Number of registers High bytes	Number of registers Low bytes	CRC check Code is low bytes	CRC check Code-high bytes
For example	01H	03H	00H	00H	00H	03H	/	/

Return data from machine:

Returns the data	Address code	Function code	Number of bytes	Number of registers According to the high bytes	Number of registers According to the low bytes	CRC check Code is low bytes	CRC check Code-high bytes
For example	01H	03H	06H	/	/	/	/

2) function code 06H: write register

The function code 06H allows the user to change the contents of multiple registers where the system parameters can be written with this function number. The following table is specific host sending and return frame structure.

Host sends data:

Send th	Address code	Function code	Start address High	Start address Low	Write to the data with high	Write to the data with low	CRC check Code is	CRC check Code-

e data			bytes	bytes	bytes	bytes	low bytes	high bytes
For example	01H	06H	00H	00H	/	/	/	/

Return data from machine:

Returns the data	Address code	Function code	Start address High bytes	Start address Low bytes	Write to the data with high bytes	Write to the data with low bytes	CRC check Code is low bytes	CRC check Code-high bytes
For example	01H	06H	00H	00H	/	/	/	/

3) Function code 10H: write multiregister

The function code 10H allows the user to change the contents of a plurality of registers, and parameters such as electricity in the instrument can be written with this function number. The following table is specific host sending and return frame structure.

Host sends data:

Send the data	Address code	Function code	Start address High bytes	Start address Low bytes	High number of registers for bytes	Number of registers is low in bytes	Number of bytes	30H is to be written Enter the high bytes	30H is to be written Enter the high bytes	CRC check code for low bytes	CRC checkcode with high bytes
For example	01H	10H	00H	30H	00H	01H	02H	/	/	/	/

Return data from machine:

Returns the data	Address code	Function code	Start at the Address High bytes	Start at the Address Low bytes	Register data with high bytes	Register data with low bytes	CRC check code Low bytes	CRC checkcode with high bytes
For example	01H	10H	00H	0030H	00H	01H	/	/

4. Address address list:

Address	Parameters	Read	Data range	Data	Positi	Calculculati	Defaul

		and Write properties		Type	ve or negative	on formula	t value
03H functional data address							
Power supply parameters							
0000H	Phase voltage is Ua	Read	/	Double words	None	U=Ux×0.1	/
0002H	Phase voltage is Ub	Read	/	Double words	None		/
0004H	Phase voltage is Uc	Read	/	Double words	None		/
0006H	Line voltage is Uab	Read	/	Double words	None		/
0008H	Line voltage is Ubc	Read	/	Double words	None		/
000AH	Line voltage is Uca	Read	/	Double words	None		/
000CH	Current is Ia	Read	/	Double words	None	I=Ix×0.001	/
000EH	Current is Ib	Read	/	Double words	None		/
0010H	Current is Ic	Read	/	Double words	None		/
0012H	A phase active Pa	Read	/	Single-precision floating-point		P=Px	/
0014H	B phase active Pb	Read	/	Single-precision floating-point			/
0016H	C phase active Pc	Read	/	Single-precision floating-point			/
0018H	Total active P	Read	/	Single-precision floating-point			/
001AH	A phase-reactive Qa	Read	/	Single-precision floating-point		Q=Qx	/
001CH	B phase-reactive Qb	Read	/	Single-precision floating-point			/
001EH	C phase-reactive Qc	Read	/	Single-precision floating-point			/
0020H	Total reactive Q	Read	/	Single-precision floating-point			/
0022H	The A phase function is the PFa	Read	/	Double words	Yes	PF=PFx×0.001	/

0024H	The B phase function is the PFb	Read	/	Double words	Yes		/
0026H	The C phase function is the PFc	Read	/	Double words	Yes		/
0028H	Total function factor is PF	Read	/	Double words	Yes		/
002AH	The A sees each other in the Sa	Read	/	Single-precision floating-point		S=Sx	/
002CH	The B sees each other in the Sb	Read	/	Single-precision floating-point			/
002EH	The C sees each other in the Sc	Read	/	Single-precision floating-point			/
0030H	Always viewed in S	Read	/	Single-precision floating-point			/
0032H	Frequency, F	Read	/	Double words	None	F=Fx×0.01	/
Electric Parparameters							
0100H	Positive active electric power, +EP	R/W	/	Double words	None	E=Ex×0.1	/
0102H	Reverse active Power-EP	R/W	/	Double words	None		/
0104H	Positive reactive power energy +EQ	R/W	/	Double words	None		/
0106H	Reverse reactive power-EQ	R/W	/	Double words	None		/
03 / 06H functional data address							
Set the parameters							
0200H	CT change ratio	R/W	1-5000	W ord	None	/	1
0201H	PT change ratio	R/W	1-5000	W ord	None	/	1
0202H	Address address	R/W	1-254	W ord	None	/	1
0203H	Communication port rate	R/W	0：4800；1：9600；2：19200	W ord	None	/	1
Remote remote control							
0300H	On monitoring	Read	BIT0-BIT15(1 valid)	W ord	None	Route 1-16	0
0301H	Leave a remote letter / control	R/W	BIT0-BIT15(1 valid)	W ord	None	Route 1-16	0

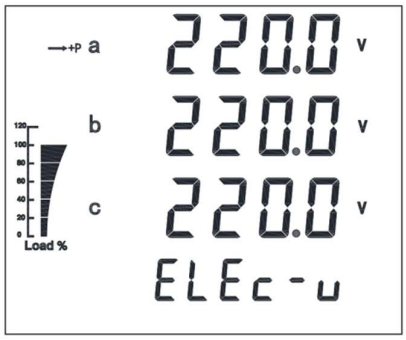
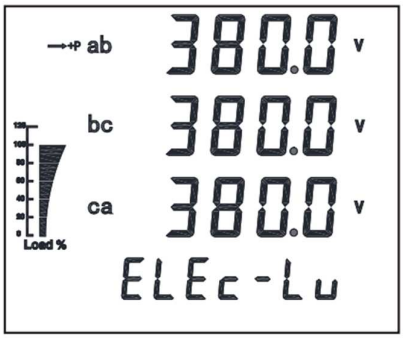
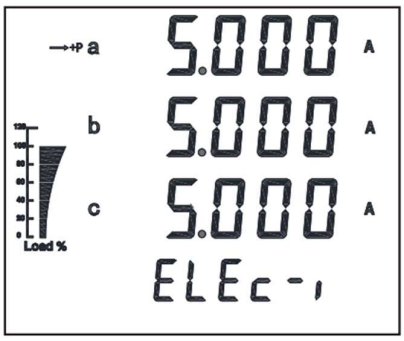
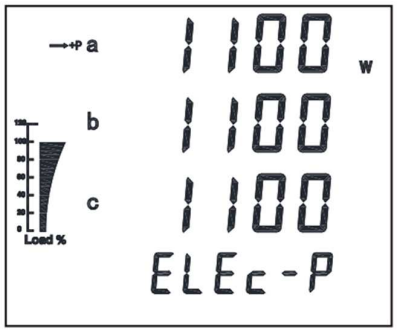
* Ux, Ix, Px, Qx, Sx, Fx, PFx, Ex in the communication address table are communication naked

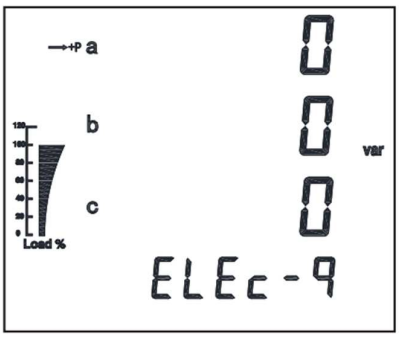
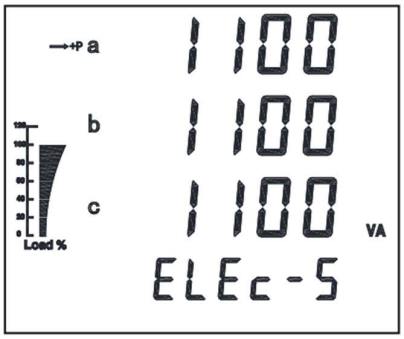
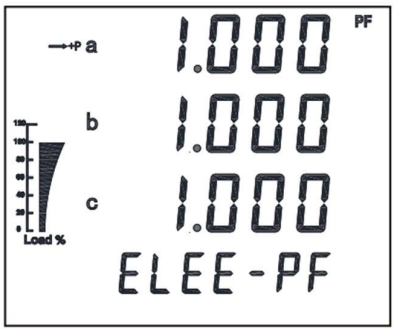
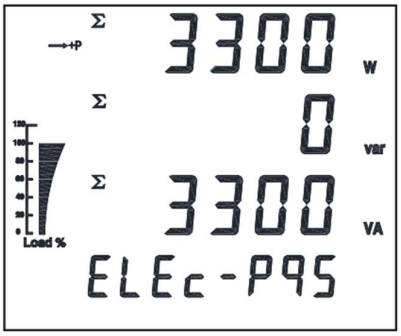
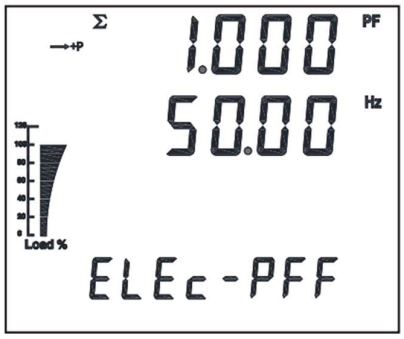
data; U,I,P,Q,S,F,PF,E are actual data;
* Note when reading and placing the register, register data low byte in the front, high byte in the back; low word in the front and high word in the back;

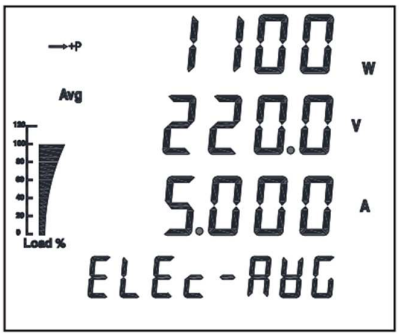
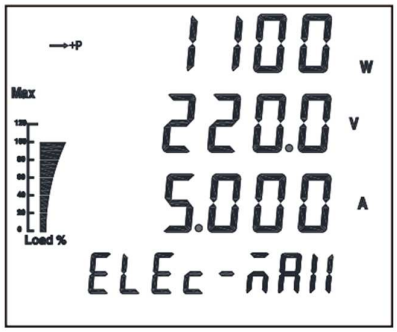
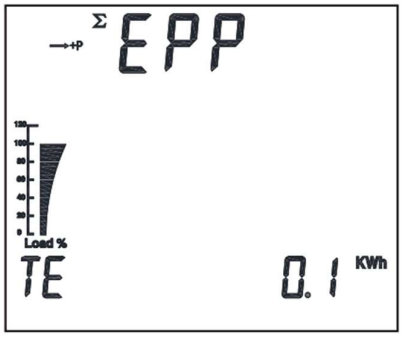
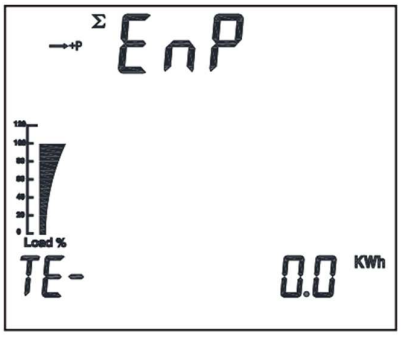
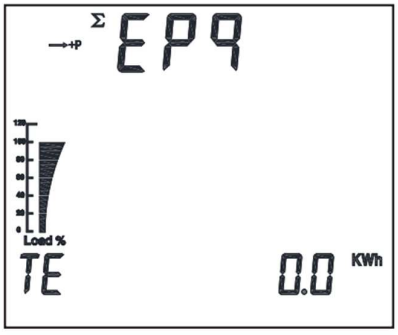
Example: (Call A phase voltage)
Send data: 01 03 00 0000002 C40B
Received received: 01 03 04 B6 08 00 00 19 B5
The register value of 000008B6, corresponds to Ua=223.0V.

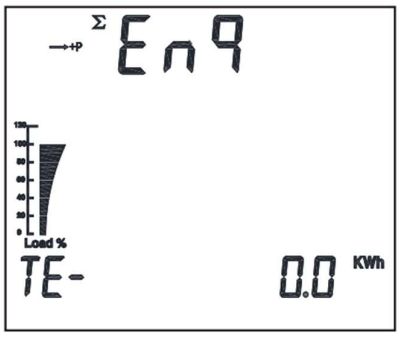
Appendix

Appendix 1: Introduction to the main display interface

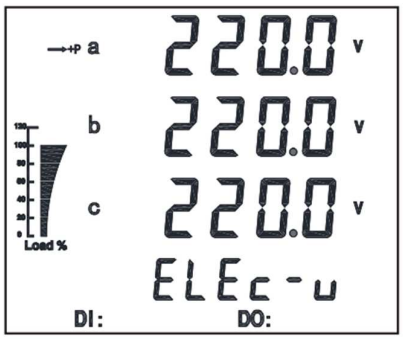
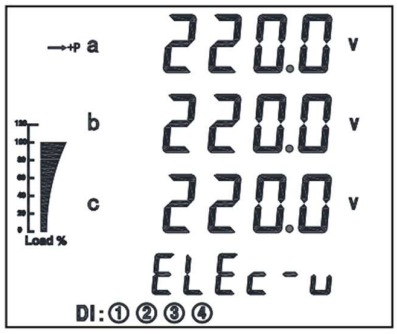
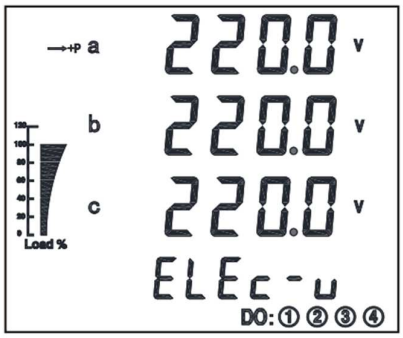
1, Display example of the measured data	
	Display interface of the phase voltage of the three phases
	Display interface for the three-phase line voltage and the three-phase system by default
	Display interface for the three-phase current
	Display interface for the active power of the three phases

	Display interface of reactive power for the three-phase
	Three phases look on the power display interface
	Display interface for the power factor of the three phases
	Display interface of three phase total active power, three phase total reactive power and three term total active power
	Display interface of the three-phase total power factor and the system frequency

	Display interface of three-phase average active power, three-phase average voltage, and three-phase average current
	Display interface of three-phase active power maximum, three-phase voltage maximum, and three-phase current maximum
2. Example of the display of the power data	
	Display interface for the positive total active electrical energy
	Display interface for the reverse total active electrical energy
	Display interface for positive total reactive electrical energy

	Display interface for the reverse total reactive electrical energy

Appendix 2: Other parameter query (optional function)

	The instrument with on-in-out function is below any parameter interface as in Figure DIDO. on the left
	Under any parameter interface, the left figure shows the on, indicating that the current 4 on is valid.
	At any parameter interface, the left figure shows the open in, indicating that the current 4-way open is valid.