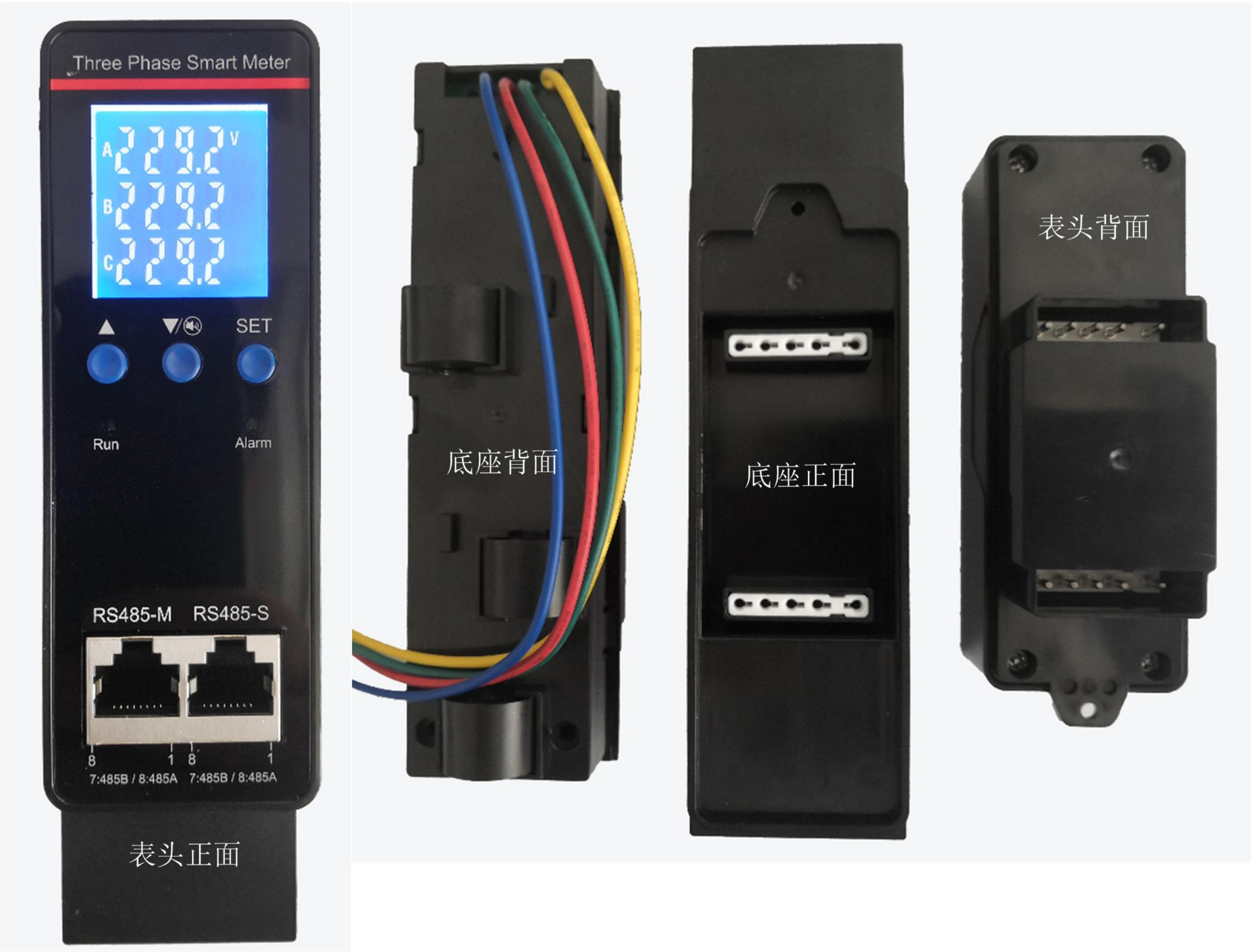
VK-MPDU-TM60 Three-phase 485 Smart Meter

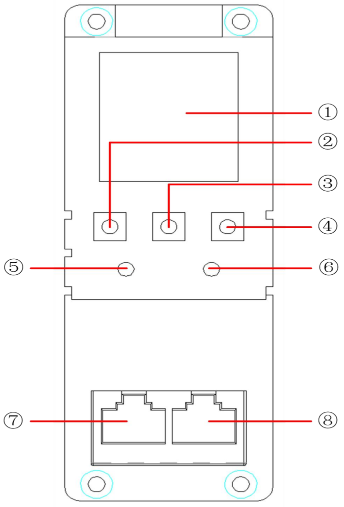

Three Phase Smart Meter
A 229.2 V
B 229.2
C 229.2
▲
▼/🔇
SET
Run
Alarm
RS485-M
RS485-S
8 1 8 1
7:485B / 8:485A 7:485B / 8:485A
表头正面
底座背面
底座正面
表头背面

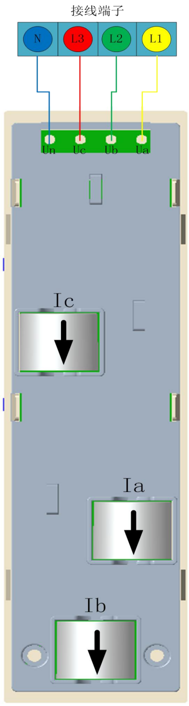
1. Features

Real-time measurement	
Current	Three-phase current
Phase voltage	Three-phase phase voltage, line voltage
Active power	Three-phase active power, total active power
Power factor	Three-phase power factor, total power factor
Frequency	Power system frequency
Electric energy metering	
Electricity	Split-phase active energy, total active energy
Real-time alert	
Overvoltage warning	If the voltage is greater than the set over-voltage value (0V does not turn on, the default is 0V), an alarm will be triggered immediately (the voltage display line flashes + the buzzer

	sounds + the indicator light is always on)
Undervoltage alarm	If the voltage is less than the set under-voltage value (0V does not turn on, the default is 0V), an alarm will be triggered immediately (the voltage display line flashes + the buzzer sounds + the indicator light is always on)
Overcurrent warning	If the current is greater than the set overcurrent value (0A does not turn on, the default is 0A), an alarm will be triggered immediately (current display line flashes + buzzer sound + indicator light is always on)
Current interruption alarm	When the current is less than the set undercurrent value (0A does not turn on, the default is 0A), an alarm will be triggered immediately (current display line flashes + buzzer sound + indicator light is always on)
Display	
Real-time data	Three-phase voltage, three-phase current, three-phase active power, three-phase reactive power, three-phase power factor, total reactive power/total power factor/total power, frequency, total active energy, split-phase active energy, and communications Address/Baud rate/Check digit.
Warning prompt	Alarm information prompt (the corresponding display line of the alarm item flashes), the buzzer sounds, and the red Led light is always on.
Operation instructions	When the machine is running normally, the green Led light flashes (0.5S on and 0.5S off), when there is communication (0.1S flashes for 0.1 second off).
Communication	
RS485	1 RS485 interface (2 RJ45 type interfaces)

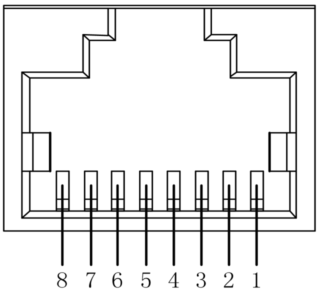
2. Panel diagram





No	Function	Describe
①	LCD display	View measurement data, alarm information and configuration items
②	Up	Display page turning, flashing bit shift right, return to measurement page
③	Down	Display page turning, flashing digit decreasing value, silence
③	Set	Enter the setting menu, confirm setting items, confirm save
④	Run	The indicator light (green light) flashes for 0.5 seconds and goes off for 0.5 seconds, indicating that the machine is operating normally. When there is communication, it flashes for 0.1 seconds and goes off for 0.1 seconds.
⑥	Alarm	When the indicator light is red, it indicates that there is an alarm message
⑦	RS485-M	RJ45 type interface, RS485 output
⑧	RS485-S	RJ45 type interface, RS485 output
Ua	A phase voltage input line	A phase voltage sampling and machine power supply
Ub	B phase voltage input line	B-phase voltage sampling
Uc	C phase voltage input line	C-phase voltage sampling
Un	N phase voltage input line	N-phase voltage input and machine power supply
Ia	A phase current transformer	For A-phase current sampling, inner hole diameter
Ib	B phase current transformer	For B-phase current sampling
Ic	C phase current transformer	For C-phase current sampling

3. RJ45 type interface pin definition

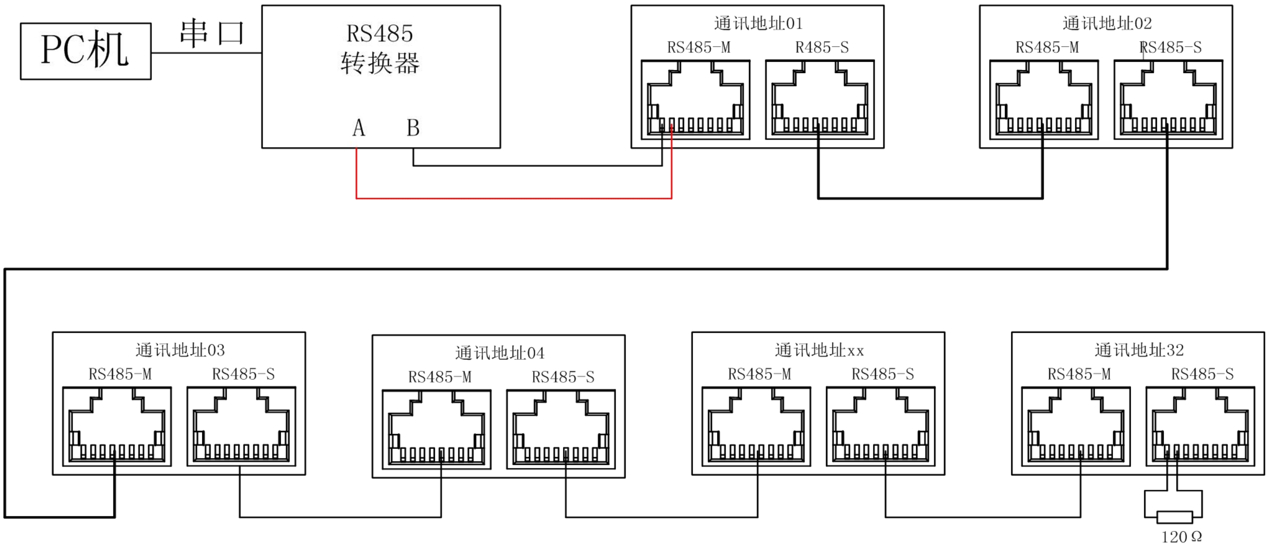
<table>
<tr><th>Schematic diagram</th><th colspan="2">RJ45 port PIN definition</th></tr>
<tr>
<td>

Note: RS485-M and R485-S are the same 485 communication bus, providing two interfaces to facilitate cascading;</td>
<td>
<table>
<tr><th colspan="2">RS485-M</th></tr>
<tr><td>PIN</td><td>Definition</td></tr>
<tr><td>1</td><td>Empty</td></tr>
<tr><td>2</td><td>Empty</td></tr>
<tr><td>3</td><td>Empty</td></tr>
<tr><td>4</td><td>Empty</td></tr>
<tr><td>5</td><td>Empty</td></tr>
<tr><td>6</td><td>Empty</td></tr>
<tr><td>7</td><td>RS485-A</td></tr>
<tr><td>8</td><td>RS485-B</td></tr>
</table>
</td>
<td>
<table>
<tr><th colspan="2">RS485-S</th></tr>
<tr><td>PIN</td><td>Definition</td></tr>
<tr><td>1</td><td>Empty</td></tr>
<tr><td>2</td><td>Empty</td></tr>
<tr><td>3</td><td>Empty</td></tr>
<tr><td>4</td><td>Empty</td></tr>
<tr><td>5</td><td>Empty</td></tr>
<tr><td>6</td><td>Empty</td></tr>
<tr><td>7</td><td>RS485-A</td></tr>
<tr><td>8</td><td>RS485-B</td></tr>
</table>
</td>
</tr>
</table>

4.Communication

RS485-M and RS485-S are the same RS485 communication bus, providing two interfaces to facilitate cascading;

The RS-485 communication mode allows up to 32 instruments to be connected to a bus, which is connected to the host computer through an RS-485 converter. The communication cable can use ordinary shielded twisted pair, and the total length should not exceed 1200 meters. The positive and negative polarity of the RS-485 ports of each device must be connected correctly. If the shielded twisted pair is long, it is recommended to connect a resistance of about 120Ω at its end to improve the reliability of communication.



5. Use and operation

5.1 Button definition

Logo	Name	Function
▲	UP	1. When measuring, short press to scroll up to display; 2. When setting, in the parameter screen, short press to exit the menu; 3. When setting, in the editing screen, short press the flashing bit to move to the right.
▼	DOWN	1. When measuring, short press to scroll down to display; 2. When setting, in the parameter screen, short press to turn the screen to display; 3. When setting, in the editing screen, short press the flashing digit to decrease the value. 4. When alarming, press and hold for 3 seconds to enter the "silence" state;
SET	SET	1. Measuring screen, short press to enter the parameter screen; 2. When setting, in the parameter screen, short press to enter the edit screen; 3. When setting, in the edit screen, short press to confirm and save;

5.2 Show description

5.2.1 Display function description

1) It adopts segment code liquid crystal display and white text display on blue background. The display mode is automatic cycle display and key switch display.

- Automatic cycle display, each page stays for 3 seconds;
- You can switch to the page you want to view by pressing or.

2) Can view electrical parameters and communication parameters

- Cycle display content: three-phase voltage, three-phase current, three-phase active power, three-phase reactive power, three-phase power factor, total reactive power/total power factor/total active power, frequency, total active energy, A-phase active energy, B-phase active energy, C-phase active energy and communication address/check digit/baud rate, etc.

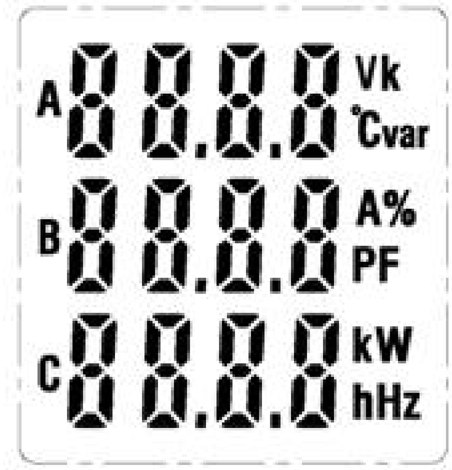
- Inquire and set the communication address, baud rate, parity bit, high voltage alarm value, low voltage alarm value, high current alarm value, low current alarm value, high power alarm threshold, buzzer switch, LCD Parameters such as delay extinguishing:

3) Indicator light

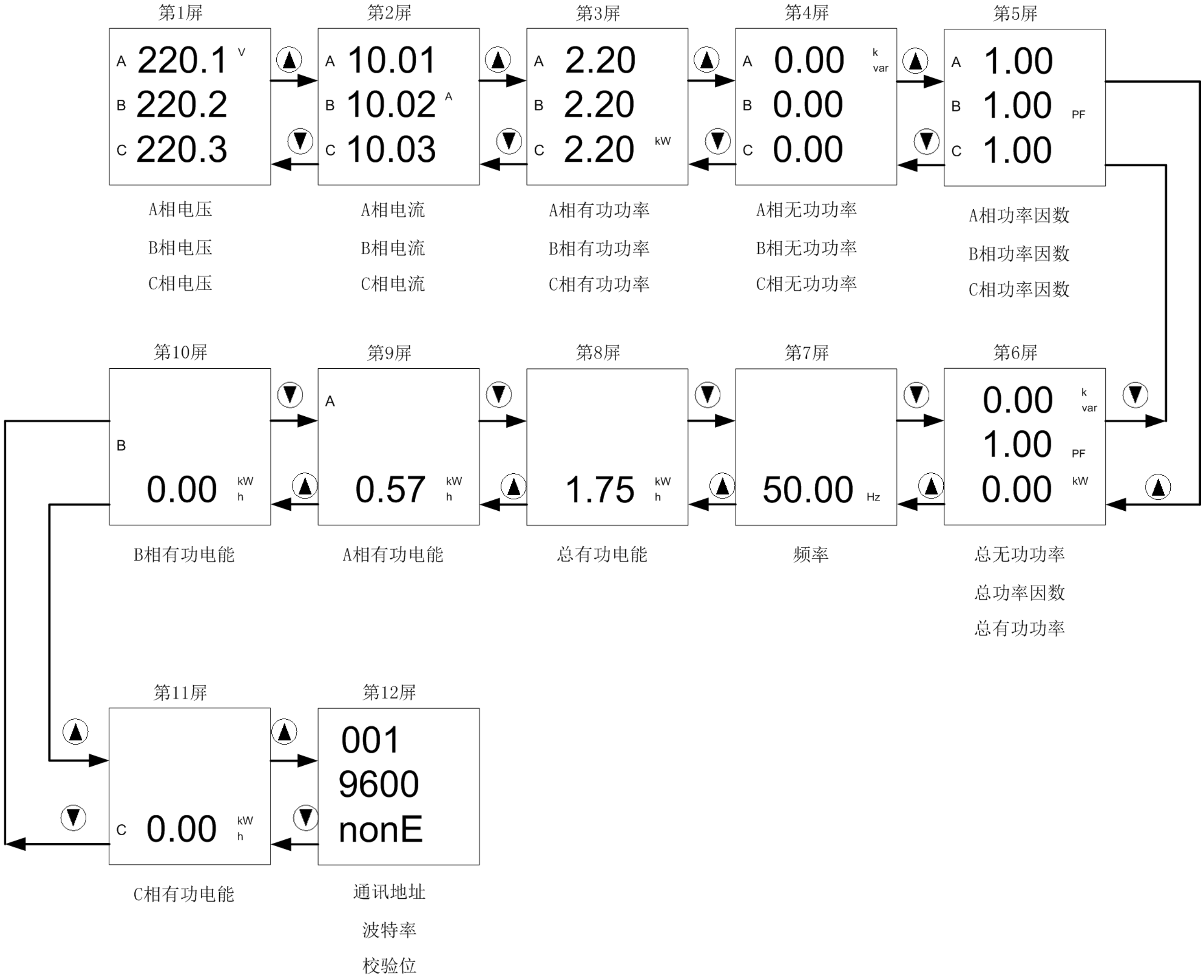
- RUN (green): in normal operation, 0.5S on and 0.5S off, when there is communication, 0.1S on and 0.1S off.
- ALARM (alarm) (red): always on when there is an alarm, and usually off.

5.2.2 Data display screen description

1) When the device is powered on, the LCD enters the full display state, the ALARM light is always on for 3 seconds, the backlight is on (it will automatically turn off after a delay of 60 seconds if there is no key operation), and the full LCD display is as follows:



2) When the device is displaying automatically in a loop, it will automatically switch between the following screens 1 to 12, and each page of the automatic loop display will stay fixed at 3 seconds. You can short press the up and down keys to view the desired page, as follows:

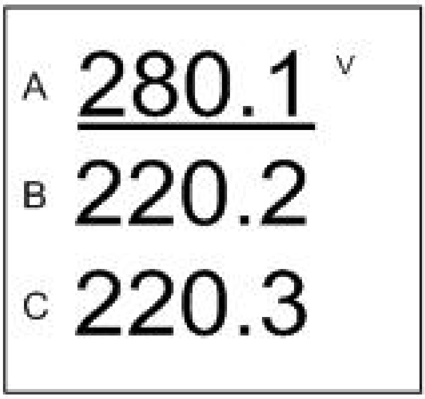

第1屏
A 220.1 V
B 220.2
C 220.3
A相电压
B相电压
C相电压
第2屏
A 10.01
B 10.02 A
C 10.03
A相电流
B相电流
C相电流
第3屏
A 2.20
B 2.20
C 2.20 kW
A相有功功率
B相有功功率
C相有功功率
第4屏
A 0.00 k var
B 0.00
C 0.00
A相无功功率
B相无功功率
C相无功功率
第5屏
A 1.00
B 1.00 PF
C 1.00
A相功率因数
B相功率因数
C相功率因数
第6屏
0.00 k var
1.00 PF
0.00 kW
总无功功率
总功率因数
总有功功率
第7屏
50.00 Hz
频率
第8屏
1.75 kW h
总有功电能
第9屏
A
0.57 kW h
A相有功电能
第10屏
B
0.00 kW h
B相有功电能
第11屏
C 0.00 kW h
C相有功电能
第12屏
001
9600
nonE
通讯地址
波特率
校验位

3) Display resolution and displayable range

No	Display item	Resolution	Display range	Note
1	V	0.01	0.00～99.99	/
		0.1	100.0～999.9	/
2	A	0.01	0.00～99.99	/
		0.1	100.0～999.9	/
3	kW	0.01	-9.99～99.99	Signed, 4 digits can be displayed in total
		0.1	-100.0～999.9	Signed, 4 digits can be displayed in total
		1	-999～9999	Signed, 4 digits can be displayed in total
4	kWh	0.01	0.00～42949672.95	>42949672.95kWh, Will start counting from 0 again
5	Power factor	0.01	-1.00～1.00	/
6	Hz	0.01	/	/
7	kvar	0.01	0.00～99.99	/
		0. 1	100. 0～999. 9	/
		1	1000～9999	/

5.2.3 Alarm screen

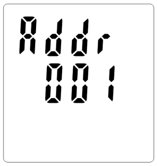
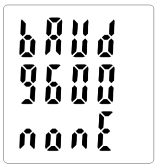
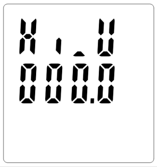
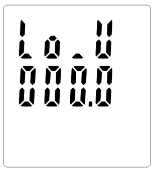
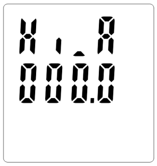
1) When voltage and current alarms are generated, the corresponding display line flashes, and the gray part is added to the following screen:

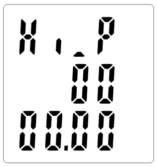
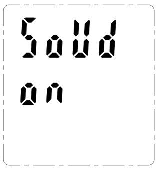
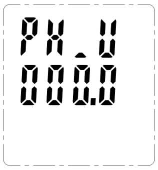
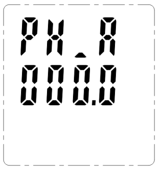
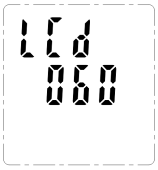
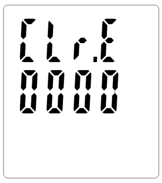
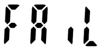

A 280.1 V
B 220.2
C 220.3

2) When U>high voltage alarm threshold or I>high current alarm threshold or U<low voltage alarm threshold or P>high power alarm threshold, the system enters the alarm, the buzzer sounds, the corresponding display line flashes, ALARM The light is always on;

3) The buzzer alarm sound corresponds to the output fixed frequency, the output frequency is 1Hz (di-di-);

5.2.4 Parameter setting screen

No	Menu screen	Meaning	Settable range	Factory default
1	 Addr 001	Communication address	001- 247	001
2	 bAUd 9600 nonE	Baud rate and parity bit	1200 2400 4800 9600	9600
			nonE Odd Even	nonE
3	 Hi_U 000.0	High voltage alarm threshold	000.0～600.0	Set to 0, turn off the alarm, Factory default: 0
4	 Lo_U 000.0	Low voltage alarm threshold	000.0～600.0	Set to 0, turn off the alarm, Factory default: 0
5	 Hi_A 000.0	High current alarm threshold	000.0～600.0	Set to 0, turn off the alarm, Factory default: 0

6		High power alarm threshold	Unlimited	Set to 0, turn off the alarm, Factory default: 0
7		Buzzer switch	On Off	Factory default: on
8		Phase voltage threshold	000.0～600.0	Reserved function
9		Phase failure current threshold	000.0～600.0	Reserved function
10		LCD turn off delay time	0~250 秒	Default: 60 seconds
11		Power zero	Fixed 3366	The default is 0000, and the password is incorrectly entered.

Note:

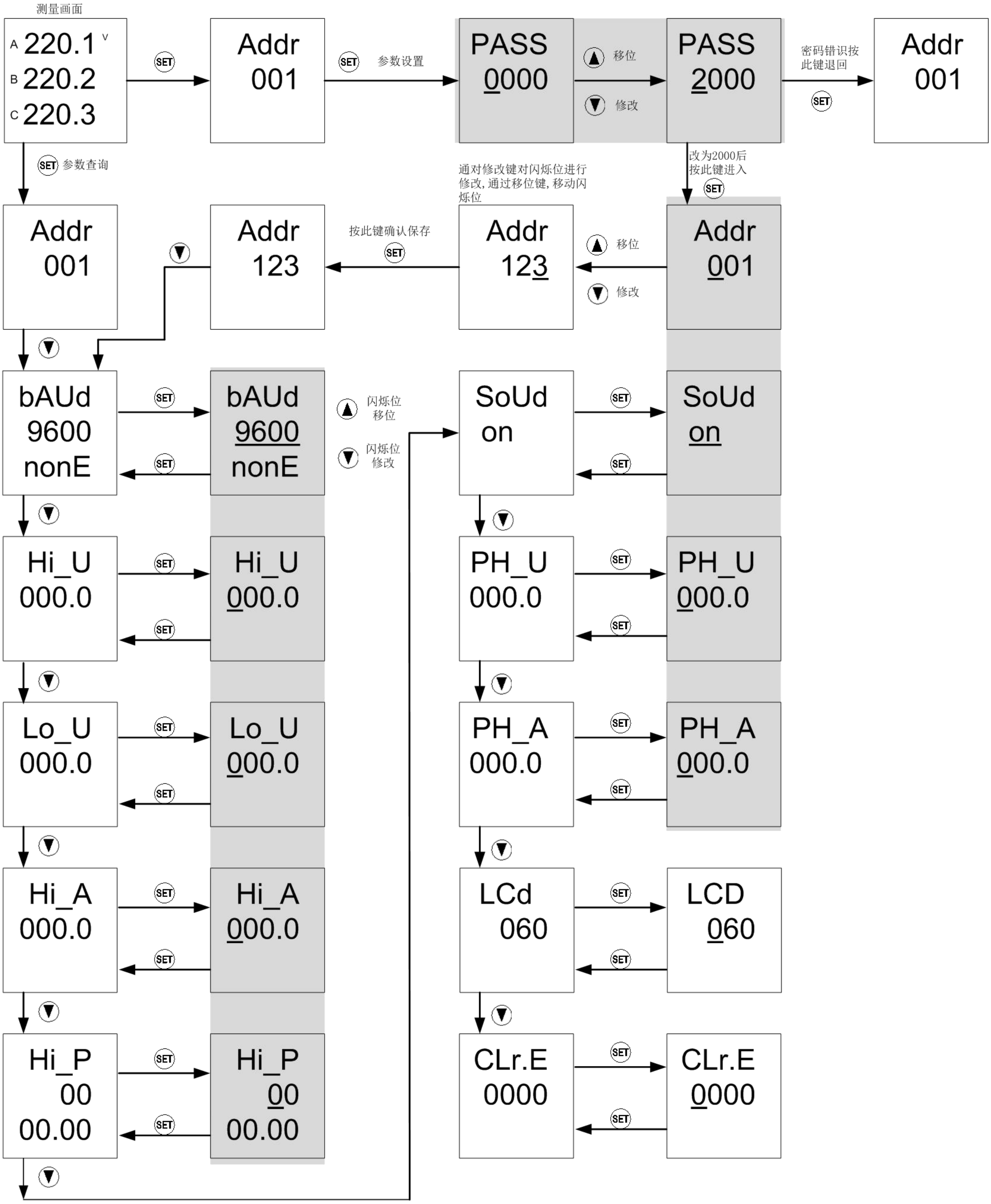
① The factory default value, if there are special requirements, it should be noted when ordering, and it will be set according to the requirements before leaving the factory;

② Alarm threshold. When it is set to 0, this function does not work. To alarm, other corresponding values must be set.

③ The high power alarm value means that any phase of A phase, B phase, and C phase exceeds this value and an alarm will be generated.

5.2.5 Parameter query and setting

In the measurement screen, short press the SET key to enter the first-level setting screen, short press the scroll key to view the specific value of the parameter item, select the parameter item to be set, and short press the SET key to enter the edit page, as follows:


测量画面
A 220.1 V
B 220.2
C 220.3
SET
Addr 001
SET 参数设置
PASS 0000
▲ 移位
▼ 修改
PASS 2000
密码错误按此键退回
SET
Addr 001
SET 参数查询
通对修改键对闪烁位进行修改，通过移位键，移动闪烁位
改为2000后按此键进入
SET
Addr 001
▼
Addr 123
按此键确认保存
SET
Addr 123
▲ 移位
▼ 修改
Addr 001
bAUd 9600 nonE
bAUd 9600 nonE
▲ 闪烁位移位
▼ 闪烁位修改
SoUd on
SoUd on
Hi_U 000.0
Hi_U 000.0
PH_U 000.0
PH_U 000.0
Lo_U 000.0
Lo_U 000.0
PH_A 000.0
PH_A 000.0
Hi_A 000.0
Hi_A 000.0
LCd 060
LCD 060
Hi_P 00 00.00
Hi_P 00 00.00
CLr.E 0000
CLr.E 0000

Note:

1) In the figure, if the 0 of the communication address 001 is marked with an underline, it is only to show that this bit is in a blinking state;

2) The display with the bottom shadow is the second-level menu, and the others are the first-level menu. Under this menu, the blinking digit can be shifted by ▲, and the blinking digit can be modified by ▼.

3) In the first level menu, press the ▲ key to return to the measurement screen.

5.2.6 Mute/unmute method

1) Long press the ▼ key to enter the "silence state", after silence, you can query the specific alarm item by pressing the button (the alarm item display line flashes);
2) An alarm has been generated and has not been released, and at the same time it has entered the silence mode. At this time, a new alarm type is generated, and the buzzer will sound again;
3) When an alarm is generated and the sound is not silenced, enter the setting menu at this time, and the buzzer is temporarily turned off. When returning to the measurement screen, the buzzer will continue to sound.

6. Technical specifications

6.1.Specification Parameters

Reference voltage (Un)	AC3×220/380V
Reference current In(Imax)	AC3×10(60)A
Accuracy Class (Power)	Level 1

6.2. Measurement accuracy

Project	Indicators	Measuring range
Electric current	±1%	0.05A~63A
Voltage	±0.5%	0.8Un~1.2Un
Power	±1%	/
Frequency	±0.02Hz	40Hz~65Hz
Power factor	±0.02	0~1
Electrical energy	Level 1	/
Note: 1. The accuracy is based on the measured value when the base is paired with the PDU meter; 2. Due to the limitation of liquid crystal display resolution, the accuracy is based on the communication readout data.		

6.3. Basic error of voltage and current

The basic error of the voltage and current of this meter does not exceed the absolute error of the measured value represented by the following formula. △:
△=±(0.8%Ux+0.2%Um)
In the formula:
Ux: the measured reading value;
Um: The full-scale value of the measured value, the full-scale value of the phase voltage of this meter is AC300V, and the full-scale value of the current is 72A.

6.4. Basic error of electric energy

Error limit due to input current change

Energy Metering			
Load current (I) variation range	Power factor	The error limits of each level of monitor expressed in percentage error	
		Level 0.5	Level 1
0.02In⩽I<0.05In	1	1.0	1.5
0.05In⩽I<Imax	1	0.5	1.0
0.05In⩽I<0.1In	0.5 sensibility 0.8 capacitive	1.0	1.5
0.1In⩽I<Imax	0.5 sensibility 0.8 capacitive	0.6	1.0

Error limit due to input voltage change

Energy Metering				
Measuring circuit input voltage	current value	Power factor	The error limit expressed by the percentage error of each grade of instrument	
			0.5	1
±10%	0.02In⩽I⩽Imax	1	0.2	0.7
	0.05In⩽I<Imax	0.5 sensibility	1.0	1.0

6.5. Communication parameters

Project	Parameter	Project	Parameter
Communication port	RS-485 (two-wire), isolated communication	Interface type	2 RJ45
Communication address	1～247	Check Digit	none/odd/even, no checksum by default
Baud rate	1200/2400/4800/9600 (default)	Data bit	8bits
Communication protocol	ModBus-RTU, content enterprise custom	Stop bit	1bit
Data upload	Data communication according to standard ModBus protocol	Response time	⩽500mS
Response success rate	⩾99.95%	Communication interval	The interval between sending two commands is >400mS.

7. Use environment

7.1. Power consumption

Project	Index
Voltage line (phase B, phase C)	≤0.5W
Current line	≤0.5W
Overall power consumption (phase A)	≤3W

7.2. Working environment conditions

Project	Index
Range of working temperature	-10℃~55℃
Storage and transportation temperature range	-40℃~70℃
Working relative humidity	5%~95%

7.3. Electromagnetic Compatibility

Project	Index
Electrostatic Discharge Immunity Test	Implementation standard GB/T 17626.2; IEC 61000-4-2 Contact discharge 4kV, air discharge 8kV
Fast Transient Burst Immunity Test	Implementation standard GB/T 17626.4; IEC 61000-4-4 Power port 4kV, communication port 2kV
Surge Immunity Test	Implementation standard GB/T 17626.5; IEC 61000-4-5 Power port 4kV, power supply to communication 2kV