RK9800N series

AC power meter

Introduction

- ◆ AC power meter *1
- ◆ Power cord   *1
- ◆ Manual
- ◆ RS232 communication cable and CD(Optional accessories)

Used for measuring ac common parameters, such as voltage, current, power, power factor, power (energy) and frequency, and this manual is about the function of the instrument, Settings, connection mode and operation instructions.

RK9800N series products are RK9800 series of upgrading products, relative to the RK9800 series, the new product has the following advantages：

- ◆ increase large current and low current two product.
- ◆ increase power (energy) display.
- ◆ all series communication function is optional（RS232）.
- ◆ current overrun and power transfinite adjustment process more intuitive, more convenient operation.
- ◆ current and power of the upper limit and lower limit alarm function can be set up respectively whether to enable.
- ◆ can adjust the transfinite alarm time.

1： Product performance comparison

Model	9800N	9901N	9940N	9980N	9813N
category	Basic type	Alarm type	Large current type		Small current type
Test project	Single-phase ac voltage, current, power, power factor ,frequency and KW/H				
voltage range	0－600V				
Current range	0－4A	0－4A	0－8A	0－16A	0－0.1A
	3.5－20A	3.5－20A	7－40A	15－80A	0.08－4A
					3.5－20A
Warning function	N	Current and power over upper limit and lower limit alarm (transfinite time adjustable)			
communication	RS232（DB9）				
Measuring Speed	2times / sec				
Basic Accuracy	±（0.4%（reading）+ 0.1%（range）+ 1digital）				
frequency	45Hz － 65Hz				
working power	AC 220V ±20%，50/60Hz				
consumed power	<8W（220V，50Hz）				
size	301mm × 241mm× 118mm				
accessory	The power cord, fuse, specifications, RS232 communication cable and CD(Optional accessories)				

Measuring limit	Due to the nonlinear characteristics of inherent measuring element when the input voltage or current is lower than a certain value, the measured value will be a larger deviation, at this point, the display of data will be 0, it is not a failure.Corresponds to the voltage, the minimum is 2 v.Corresponds to the current, the minimum value is 5 ma (for small current type RK9813N, minimum value is 250 ua).

In the five product RK9800N have all measurement and display, on the basis of the original RK9800, strengthen the function of keeping data, frequency and power (energy) parameters display.

RK9901N is on the basis of RK9800N , increased current and power of transfinite alarm function.

RK9940N and RK9980N is on the basis of RK9901N， scaling up the current range (maximum is 40 A and 80A).

On the basis of RK9901N，RK9813N Increase the small current range（The current resolution is 10 ua）.

According to the need of the products ， increase communication adapter plate, can link with computer through RS232 interface, can long-distance observation data and set parameters.

Below is the product of technical indicators：

2（Suitable for RK9800N)：

	voltage	current
Input impedance	>3MΩ	<0.001Ω
Range	0－600V	0－4A
		3.5－20A
Resolution	0.1V	1mA（less than 10A）
		10mA（greater than 9.999A）

➢ Why power factor shows negative?

A: depending on the type of load (resistance, sensibility, capacitive), power factor can be positive, can also be negative, which represents the current phase is pull ahead or lags behind the voltage phase.

If determine ia load of power factor is positive , but showed a negative (or vice versa), should make sure in the rear of the testing instrument connections, whether the measured power supply reversed the input line and output line.

➢ Why the energy display data for a long time no change ？

A: may is the consumption of load power is too small, makes the energy accumulation is too slow, due to the limitation of the display digits, low energy data cannot be displayed.But the data is not lost, still were added energy, only to meet minimum display data, can be displayed.

Instrument can display the energy is the smallest unit of 1 MWH, namely the energy consumption for 1 mw load energy consumed by a continuous work for an hour.

Although energy shows the smallest unit of 1 MWH, but if the energy accumulation is relatively large, with the increase of data, moves to the right of the decimal point, its lowest level cannot be displayed (but still will be accumulative), at this time, although the equipment under test power is greater than 1 MWH, but energy data still for a long time did not change.In this case,make the energy eliminate to 0.

A better approach is to use the computer, through RS232 communication interface and communication parameter tester, PC powerful computing and display ability in order to obtain more information, energy data can be fully displayed, is not restricted by tester digital digits.

Common problems

➢ Why a certain data show "-- --"?

A: during the current switch gear, current value and power values become unreliable, so use this symbol to represent.

➢ Why no change data on the screen?

A: check whether the 'HOLD' indicator light is flashing, determine whether to enter the data maintain state, if it is, press 'HOLD' key to exit.

➢ I pick up the load is resistive, why don't show the power factor by '1'.

A: when the voltage or current value extremely small, or voltage and current during the period of rapid change, instrument measured power factor value is not normal, this is normal phenomenon.

A number of transfinite alarm function can be enabled at the same time?

A: yes, four alarm function can be enabled at the same time, if there are a variety of alarm situation, the corresponding indicator light will be flashing.

➢ Regardless of the range of the current value, if it is not 0, buzzer has been ringing always, what is the reason?

A: after opening any alarm functions, detected in the load current flows through, after the delay time, if the instrument detects current or power out of the limit data, will be issued a "NG" prompt, if not, will be issued a "PASS" prompt, therefore, there was always prompt.If you don't want to hear a chime, can turn off the alarm function.

Maximum allowable input	800V	25A
Transfinite alarm	N	

3（Suitable for RK9901N）：

	voltage	current
Input impedance	>3MΩ	<0.001Ω
Range	0－600V	0－4A
		3.5－20A
Resolution	0.1V	1mA (less than10A)
		10mA (greater than 9.999A)
Maximum allowable input	800V	25A
Transfinite alarm	Y	

4（Suitable for RK9940N）：

	voltage	current
Input impedance	>3MΩ	<0.001Ω
Range	0－600V	0－8A
		7－40A
Resolution	0.1V	1mA (less than 10A)
		10mA (greater than 9.999A)
Maximum allowable input	800V	45A
Transfinite alarm	Y	

5（Suitable for RK9980N）：

	voltage	current
Input impedance	>3MΩ	<0.001Ω
Range	0－600V	0－16A
		15－80A
Resolution	0.1V	1mA（less than 10A）
		10mA（greater than 9.999A）
Maximum allowable input	800V	85A
Transfinite alarm	Y	

6（Suitable for RK9813N）：

	voltage	current
Input impedance	>3MΩ	<0.05Ω（100mA）
		<0.001Ω（other range）
Range	0－600V	0－100mA
		0.08－4A
		3.5－20A
Resolution	0.1V	10uA（less than 100mA）
		1mA（less than 10A）
		10mA（greater than 9.999A）
Maximum allowable input	800V	25A
Transfinite alarm	Y	

- The actual power value is greater than the maximum power value(upper limit value)
- The actual power value is less than the lower limit value.

At this point, will enter a state of alarm prompt, buzzer, a short prompt "NG" indicator light flashing, the function of the corresponding indicator light is flashing at the same time, indicate which parameters are overweight.

If any of these conditions occur, that is, current and power within the normal range of products, the "PASS" indicator light flashing, buzzer, a longer prompt prompt product qualified.

That is to say, after a time delay, there must be a sound and light hint, to prove that the product is qualified, "NG" or "PASS" tooltips cannot be interrupted, until the load is disconnected, or cut off the load power supply, the load current to 0 will lift the prompt.

If you don't intend to use the alarm function, can enter the alarm Settings, close the corresponding alarm function;Or, set the upper limit of alarm data to the maximum, the lower limit is set to 0.

- Area A display "5", said it is set alarm delay time data
- B area and C area no display
- D area display alarm delay time, the unit is in seconds

Scope of data set, the minimum value is 1, the maximum value is 99.If set to 10, when detected in the load current, and then after 10 seconds, determine whether current and power values overrun.

Exit the Settings

In the 'Alarm delay time SET' state，click on the 'SET' button，can exit 'alarm delay time Set' state, return to 'normal work' state.

At the same time of exit，store the newly created data，in the next time open the instrument，automatically bring up the settings data, and put these data as the basis of alarm prompt.
After returning from setting state, according to the setting of the state, open the corresponding indicator light.

Alarm instructions
According to the instructions in the previous section, set the alarm data value, and then exit the set state, at the same time of saving data, indicator light "I - H", "I - L", "P - H" and "P - L" will light up according to whether to enable the corresponding function.
If current is zero, said there was no load (of course, may also be a load circuit breaker, power off, and so on), at this time not alarm, if current is not 0, after the specified time, if one of following cases detected:
- The actual current value is greater than the maximum current value(upper limit value).
- The actual current value is less than the lower limit value.

The front panel layout
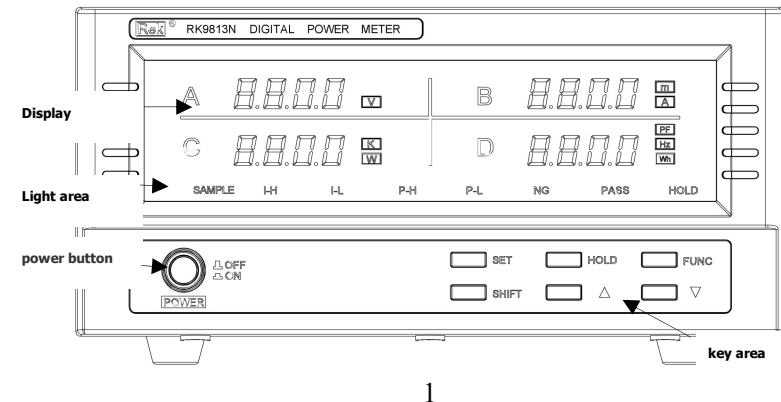
1

In the upper portion of the front panel is display window, the window is divided into five display area, the above four areas, A, B, C and D respectively, corresponding parameter is used to display an alternating current;Below is light area, used to display the working state of the instrument.
In the bottom of the front panel is a key area, among them, the power button for instrument on the left and the right six buttons (RK9800N only two buttons), they are used in switching function or change the Settings.

Rear panel show

Left for the measured power input terminal and output terminal (used to connect the power supply and ac load).
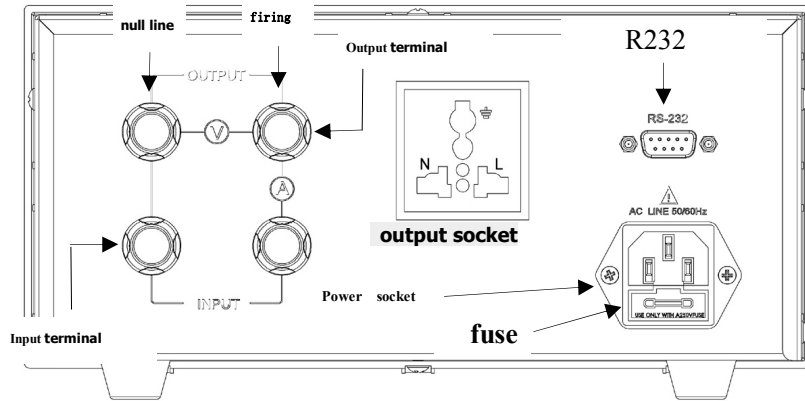
Intermediate for auxiliary output socket，when need to measure with a smaller load power plug , you can directly insert the socket.Note that this socket can withstand the largest 10 a , cannot be used long time overload.

The top right is a communication interface，if you need to remote communication，A   RS232 type DB9 connector (instrument for the negative side) can be connected to this port，And then connected to the other controller to long-range observation, record data, or operating equipment.

The back panel right below the line, is the   power socket for instrument   , used to provide power supply, power supply specifications for: AC 220 v + 20%, 50/60 hz.

On the lower end of the socket parts is the location of the power fuses and spare fuse, if the fuse is damaged, you can use items picked out A fuse design of plastic parts, replace the specified specifications of the fuse (capacity of 0.5 A).

Scope of data set, the minimum value is 00000.000, the maximum value is 99999.999,shows   0 W and 99999.999 W respectively（or 99.999999KW）.

P - L (power lower limit data) SET status

In the 'power upper limit data set' state，click on the 'SET' button, enter a state of 'power lower limit data SET'，in this state:

- Area A display "4", indicator light "P -" L ", said the   power data is set the lower limit   data.
- According to whether to enable the alarm function, B area shows 'ON' or 'OFF'.
- C and D area joint display power lower limit alarm value
- The last flicker, said can modify the data

In this state, press 'HOLD' open or close the alarm function;Press 'SHIFT' keys move the cursor,，'▲and▼' modify datas.

Scope of data set, the minimum value is 00000.000, the maximum value is 99999.999,shows   0 W and 99999.999 W respectively（or 99.999999KW）.

Alarm delay time SET status

In the 'power lower limit data set' state，click on the 'SET' button, enter a state of 'Alarm delay time SET '，in this state:

set lower limit   data.

- According to whether to enable the alarm function, B area shows
  'ON' or 'OFF'.
- C and D area joint display current lower limit alarm value
- The last flicker, said can modify the data

In this state, press 'HOLD' open or close the alarm function;Press 'SHIFT'
keys move the cursor,, '▲and▼' modify datas.

Scope of data set, the minimum value is 00.000, the maximum value is
99.999,shows   0 A and 99.999 A respectively.

P - H (power upper limit data) SET status

In the 'current lower limit data set' state，click on the 'SET' button, enter
a state of 'power upper limit data SET', in this state:

- Area A show '3', indicator light "P - H", said the power data is set
  the upper limit data.
- According to whether to enable the alarm function, B area shows
  'ON' or 'OFF'.
- C and D area joint display power upper limit alarm value
- The last flicker, said can modify the data

In this state, press 'HOLD' open or close the alarm function;Press 'SHIFT'
keys move the cursor,, '▲and▼' modify datas.

Wiring instructions
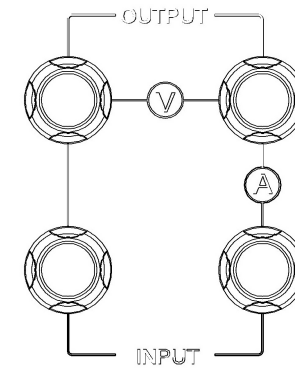
wiring scheme

Below two terminal power supply under test (marked as INPUT), black to null
line, red to live wire, the top two terminal (marked as OUTPUT) is used to
supply power to the load, black to null line, red to live wire.

Inside the instrument, the two black terminal are short meet together, two red
terminal, has also been a relatively thick cable (used as the current line)
connected together, also is equivalent to short circuit, therefore, not to take
the power cord at the same time on the two black or red terminal, cause a
short-circuit fault.

If the input and output terminal reverse，when measuring the display of
voltage, current, power, frequency, power is still correct，just power factor will
be the correct value of opposite.

Display and buttons

Display screen is divided into five areas, namely, A, B, C, D and light area.

Display screen

A, B, C, D four areas have four pieces of   LED digital screen, each area can display four data.

Under the normal state：

- A display voltage.
- B display current .
- C display power.
- according to the set, D area can display power factor, frequency and power (energy).When turning on ，D display the project last time turn off.

In the function setting state：

- A display the current which the parameters are set.
- depending on the setting up   project, B shows the status of the project be set.
- C and D together according to the data, among them, D shows low 4figure,   C shows   hight 4 figure (if present)

- A zone displays "1", indicator light "I - H" flashing, said the current is set maximum current data(upper limit data)
- According to whether to enable the alarm function, B area shows 'ON' or 'OFF' .
- C and D area joint display current upper limit alarm   value
- The last flicker, said can modify the data

In the process of parameter Settings, press the 'HOLD' key, can open or close the alarm function, open, B area shows 'ON' ;Closing, B area shows 'OFF' .

Press '▲or▼' can modify the flashing digits，'▲' Increase the data，'▼' Reduce the data。

In setting up state, press 'SHIFT' key to move the cursor, move from low to high, reach the highest level, press 'SHIFT' key once again, the cursor returns to its lowest level.After moving, the cursor of character flicker, said can modify the data, by moving a cursor, can complete the data change more quickly.

Scope of data set, the minimum value is 00.000, the maximum value is 99.999,shows   0 A and 99.999 A respectively.

I - L (current lower limit data) SET status

In the 'current upper limit data set' state，click on the 'SET' button, enter a state of 'current lower limit data SET' , in this state:

- Area A display '2' , indicator light 'I - L' , said the current   is

Parameter setting range and product factory default values：

Parameter range in the normal working state, press 'SET' key, can enter the SET state, press 'SET' key in turn, may separately into the 'I - H (current upper limit data) SET status', 'I - L (current lower limit data) SET status', 'P - H (power upper limit data) SET status', 'P - L (power lower limit data) SET status' and 'alarm delay time SET status', click on the 'SET' key again, exit status, return to normal working condition.

Item	Minimum	Maximum	Factory Default
Upper limit of current	0A	99. 999A	99. 999A
Lower limit of current	0A	99. 999A	0A
Upper limit of power	0W	99999. 999W	99999. 999W
Lower limit of power	0W	99999. 999W	0W
Alarm delay time	1S	99S	5S

I - H (current upper limit data) SET status

Work in a 'normal' state, click on the 'SET' key, enter a state of 'current upper limit data SET', in this state:

Data display

In each area will show the instrument work normally, the corresponding parameters, the parameters of display format as described below：

A：Voltage

Instrument display the ac voltage value is valid values，range is 0－600V，display format is 0.0 V to 600.0 V

If A zone shows "OVER", said the voltage is greater than the actual measuring range, shall be immediately disconnected or lower voltage circuit, otherwise, stay for a long time, may damage the instrument.

B：Current

Instrument display the ac current value is valid values，according to the different type of products，display format is ：

0.00－99.99mA　RK9813N，the measured current under 100 ma

0.080－9.999A　Current is less than 10 a

10.00－99.99A　Current greater than or equal to 10 a

If the current parameters are shown as "----", said the current measurement circuit is in the range during the period of transformation, the measured current value is unreliable;If the area B shows "OVER", said the actual current is greater than the measurement range, shall be immediately disconnect circuit, otherwise, keep for a long time, may damage the instrument.

C：Power

Instrument display power for active power, when the power factor is 1, it is equal to the apparent power;When the power factor isnt 1, active power is equal to the apparent power multiplied by the absolute value of power factor.

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0.000—9.999W    Power is less than 10 w
10.00—99.99     Power is less than 100 w
100.0—999.9     Power is less than 1kw
1000—9999       Power is less than 10kw
10.00—99.99     Power is greater than or equal to 10 kw.
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Note：

If is shown as "-- -", said the current measurement circuit is in the range during the period of transformation, or voltage and current parameters more than measurable range, at this point, the measured power data is not reliable.

D：Power Factor

Power factor is the ratio of active power and apparent power，When it is positive，load is impedance load or inductive load（when it is Impedance load, power factor is 1 or close to 1, inductive load is less than 1），negative shows for capacitive loads。

Under normal working state, click on the "HOLD" button, you can stop the refresh screen data, according to the data at the moment of press buttons, said data maintain state, can make the operator leisurely calculation or record data.

In the condition of keeping data(data maintain state), only screen data remains the same, but the interior of the instrument of the data acquisition, parameter calculation, energy accumulation is not to stop, so, can ensure energy data is always correct.

Press "HOLD" button again, can close maintain state, screen to refresh data.

Alarm setting

This instrument has the current upper limit and lower limit, power upper limit and lower limit ，four kinds of alarm function, and the product qualified prompt functions, to facilitate screening of product.

In the old products (RK9800 series), if have the phenomenon of overrun , instrument will immediately alarm, for some equipment that need long time to launch , the false situation is almost a certainty.

In the new design of the tester (RK9800N series), alarm time can be adjusted，to adapt the electrical appliances that have different startup time.

again press the "HOLD" button.During the data remains, "HOLD" light is flashing.

Note that during the period of "data keeping", even though the screen data remains the same, but the instrument within the sample did not stop, the energy data is still in accumulation, not break off.

Instrument internal data acquisition chip, uninterrupted data sampling voltage and current, over a period of time, it will get the data sampling arithmetic, and get the effective value of voltage and current, and according it to calculated power and power factor value.

Sampling chip of the sampling frequency is 4000 hz, calculate the frequency is 2 hz, per 2000 data, calculating a   effective value of voltage and current, active power value, power factor, etc., the calculation of 2 hz frequency can be in both the refresh rate at the same time, also has the high accuracy data.

Switch display parameters and clean energy

Display on the screen of region D, electricity project, the last time to turn it off, click on the button "FUNC", you can switch display project, power factor, frequency and energy.

When the screen is showing the region D energy, long press "FUNC" key (the time is more than 1 second), energy can be 0, and then began to measure,cumulative again.

Data maintain and unlocked

When the ac current changing incessant(may be caused by power supply, may also be caused by the load change), data observation becomes not easy, especially to observe or record   a number of parameters at the same time, so set up parameters remain functional.

Note：If the power input line and output line exchange , the conclusion should be the other way around

The power factor of the display format below：

-.001－—.999   Power factor from the negative of the minimum to the maximum

0.000－1.000   Power factor from 0 to the maximum

Note：

If shown as "-- -", said the current measurement circuit is in the range during the period of transformation, or voltage value is 0, or current value is 0, the measured power factor values are not reliable

E：Frequency

Ac parameter tester can test the input ac power frequency, range is 45 hz - 65 hz.

display format below:

45.00－65.00   Said the frequency values of the measured power

F：Power (energy)

The instrument has the function of power (energy) measurement.However, energy (power) unit is not commonly used KWh (KWh, namely the phrase - kilowatt hour), but Wh, it's one over one thousand of KWh.

This is because the KWh of unit is too big, if displayed in it as a unit, in the case of display four data, minimum number is 0.001 KWh, with 100 w load, for example, 36 seconds to change a word.If the load power smaller (such as mobile phone charger), in a long time, the data did not change, this for small power consumption products, energy metering has no meaning.

In Wh, display precision can be improved.Divided by 1000 with display data, can be in KWh as the unit of data.

The energy display format is as follows:

0.000－9.999 Energy is less than 10 wh

10.00－99.99 Energy is less than 100 wh.

100.0－999.9 Energy is less than 1KWh。

1000－9999   Energy is less than 10KWh。

Note：

Energy accumulation to greater than 9.999 KWh will be automatic clear zero, and then start measuring again.

Restricted by four display digits, according to the range of the energy, the

About these parameters data are listed in the table below shows the specification:

Parameter data display mode

	Display Accuracy	
Voltage	0. 1V	
Current	1mA	For RK9813, when the current is less than 100 ma, accuracy is 10 ua.
Power	1mW	
Power Factor	0. 001	
Energy	1mWh	Less than 1 MWH energy cannot display, but still will be cumulative and the minimum accuracy of energy accumulation： 0.1V×0.001A×0.5S = 0.00005WS （watt-sec） When the energy accumulation 1 MWH, display data can add 1
Frequency	0. 01Hz	

If you want to stop the refresh screen data, in order to observe and record, you can press "HOLD" key, the screen data remains the same, until once

Instructions and feature set

1. Turning off the instrument, the three core cable inserted in the rear of the instrument power socket, connect to the power adapter.

2. The ac power source being measured connect with the two terminal behind the instruments below，If the power have live wire and neutral wire,then the live wire with red terminal, neutral wire access to the black terminal.

3. Electrical load link with the tow terminal at the top of the back

4. After test is correct, press the power button on the instrument, full screen light, is used to check the screen quality, next, depending on the type of instrument, according to the corresponding model and version number, for the product RK9813N, above shows RK9813, below shows VER1.00.Connect the power of the equipment under test, instrument began to display the measured data，among them：

   - Area A shows voltage (RMS).
   - Area B shows load current (RMS)
   - Area C shows load power(Display value of active power)
   - Area D shows power factor, frequency, or work
     (According to the last time when outage).

   At this point is called the normal state of instrument

5. If you need to check the frequency values or the energy dissipations of the load, can press 'FUNC'，D area shows that the contents can be switch between the power factor, frequency and energy data.

position of the decimal point is floating, from 0.001Wh to 9999 Wh, the data is greater than 9.999 Wh (e.g., 10.001 Wh), can only display high four, in this case, will display 10.00, but in internal energy data is 10.001, and this accumulation, is not a mistake, if you want to see the full data, through RS232 data cables are connected to the PC to the instrument, through the PC to get more detailed data.

Indicator light：

The lower part of the display window, a row of lights, according to the different function setting and operating state, a flashing light and provide the corresponding instructions.Below is a brief description：

Indicator light show

	normal state	Set State
SAMPLE	Flash is collecting the data	close
I—H	bright said enabled current upper limit alarm function;Flashing(at the same time a buzzer hint) said current upper limit	Flashing display to show is setting upper limit current
I—L	bright said enabled current lower limit alarm function;Flashing (at the same	Flashing display to show is setting lower limit current

	time a buzzer hint) said current lower limit.	
P—H	bright said enabled power upper limit alarm function;Flashing(at the same time a buzzer hint) said power upper limit.	Flashing display to show is setting upper limit power
P—L	bright said enabled power lower limit alarm function;Flashing (at the same time a buzzer hint) said power lower limit.	Flashing display to show is setting lower limit power
NG	Flashing display says the product is unqualified.	close
PASS	Flashing display said products qualified.	close
HOLD	Flashing display said data is locked，no longer update，close that allows you to update	close

Key Description

	normal state	Set State
POWER	main power switch, press on 220 v power circuit	
SET	enter into setstate	Switching between setting up the project or exit setting state
HOLD	To lock or unlock the screen	In some project used to set the status of the project

	display of data.	accordingly
FUNC	Short on time to switch the screen display content in section D, followed by power factor, frequency and power (energy).In according to the conditions of work, long press this button (the time is more than 1 second), energy counter 0, and then start measuring	No effect
SHIFT	No effect	Move the cursor, select which one to modify data
▼and▲	No effect	Increment or decrement parameter data