

UNI-T[®]

Instruments.uni-trend.com



User's Manual

UTE9806+ Smart Digital Power Meter

Preface

Thank you for purchasing this brand new UNI-T product. In order to use this product safely and correctly, please read this manual thoroughly, especially the safety notes.

After reading this manual, it is recommended to keep the manual at an easily accessible place, preferably close to the device, for future reference.

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If the product is proved to be defective within the warranty period, UNI-T reserves the rights to either repair the defective product without charging of parts and labor, or exchange the defected product to a working equivalent product. Replacement parts and products may be brand new, or perform at the same specifications as brand new products. All replacement parts, modules, and products become the property of UNI-T.

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This warranty shall not apply to any defects or damages caused by accidental, machine parts' wear and tear, improper use, and improper or lack of maintenance. UNI-T under the provisions of this warranty has no obligation to provide the following services:

- a) Any repair damage caused by the installation, repair, or maintenance of the product by non UNI-T service representatives.
- b) Any repair damage caused by improper use or connection to an incompatible device.
- c) Any damage or malfunction caused by the use of a power source which does not conform to the requirements of this manual.
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Safety Instructions

To avoid possible electric shock and personal safety problem, please follow the instructions below. Uni-Trend will not be responsible for the personal safety and property damage caused by the user's failure to comply with the following terms.

1. Do not use the damaged instrument. Before using, please check the outer shell whether has crack or plastic lack. Do not use the instrument in flammable and explosive gas, steam or dusty environment.
2. Only trained personnel can execute maintain procedure to avoid fire and personal injury; there must be personnel supervision in use, otherwise it should be turned off the instrument and its power supply.
3. Before connecting the instrument, observe all marks on the instrument to learn more about the rated value, warnings and Notes.
4. The power supply of the instrument is 100-240VAC, 50/60Hz.
5. The instrument is equipped with three core power cord, only use the power cord provided by the manufacturer to avoid accidental injury; do not plug and unplug the power cord when the instrument is energizing; do not put other objects on the power cable when using it, and ensure that the power cable is away from heat source.
6. Instrument grounding: To prevent the risk of electric shock, please connect the power ground wire.
7. Do not install substitutes or perform unauthorized changes; do not use the instrument when the outer shell opened or looseness.
8. During the test, do not touch terminal blocks and test line to prevent from electric shock; do not plug the

communication port; do not put article on the instrument to protect the instrument, especially pay attention not to let metal chips, water, oil and other liquids into the internal the interior of the instrument, otherwise, it may cause unpredictable and serious consequences.

9. Avoid exposed circuits, do not touch exposed connectors and components after the power is turned on.
10. Use the appropriate fuse, only with the fuse type and rating indicator specified for this product.
11. Do not use the instrument that work abnormally; if you suspect that the product has malfunctioned, let qualified maintenance personnel to check the instrument.
12. Unplug the power cord from the power outlet if the instrument is not to be used for a long time. Please do not pull the power cord to unplug it; if the instrument need to move, please make sure the power line and other connecting line is pulled out and use the carrying handle on the side of the instrument, be gentle with it to prevent collision.

Environmental Condition

The instrument can only use indoors and non-condensing area, the general environmental requirements shown as below table.

Environmental Condition	
Operating Environment	5°C ~ 40°C , 20% ~ 80%RH (non-condensing)
Accuracy guaranteed temperature and humidity temperature	23°C±5°C , 30% ~ 75% R.H.
Storage temperature	-10°C ~ 50°C , non-condensing below 80% R.H.
Operating altitude	≤2000 meters

Explanation: In order to ensure the measurement accuracy, it is recommended to start the operation after half an hour to warm-up the machine.

Chapter 1 Inspection and Installment

1.1 Check Packing List

Check with packing list to confirm that accessories has no loss or abnormal. If there have any problem, please contact with UNI-T distributor or manufacture.

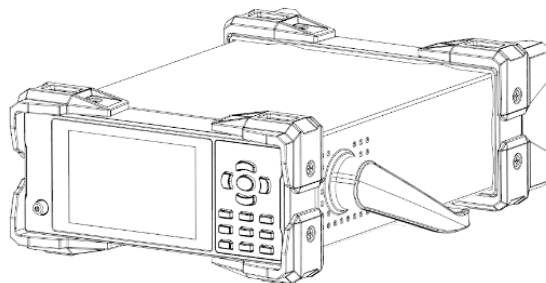
No.	Components	Quantity	Remark
1	Digital power meter	1	UTE9806+
2	Power cord	1	
3	RS-232 communication line	1	
4	User's manual	/	Please download from official website. http://www.uni-trend.com

Explanation: After confirming that the contents of the package are consistent and there are no problems, please keep the box and related contents properly, the instrument should meet the encasement requirements if it return to the factory for service.

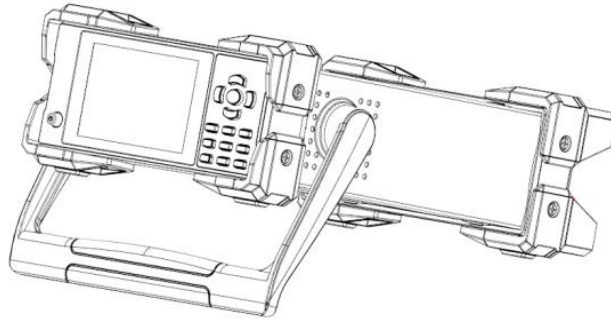
1.2 Hand Shank

The hand shank can be adjustment, hold the hand shank in both hands and then pull out two flanks to twist it, it can be adjust to four positions shown as the following figure.

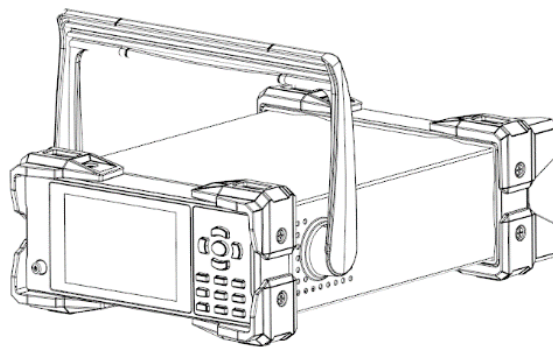
1. Original Position (Factory Setting)



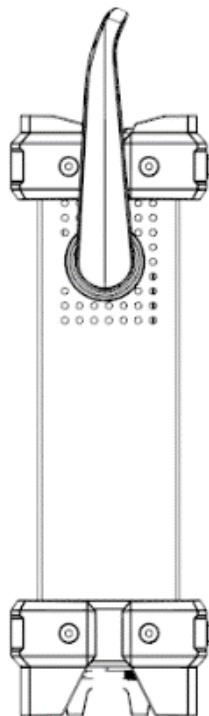
2. Testing Position



3. Remove Hand Shank



4. Lift Position



Chapter 2 Product Introduction

2.1 Product Overview

UTE9806+ smart digital power meter is an economic and portable measuring instrument. It is a multi-functional measuring instrument which integrating voltage, current, power, active power, apparent power, power factor, voltage peak, current peak, voltage frequency and current frequency. The products is widely used in production, testing, evaluation and scientific research and multi-field.

UTE9806+ smart digital power meter adopts high speed CPU for data processing, the sampling resistance of voltage and current are all use low temperature drift resistor, therefore, the stability and accuracy of measurement data are guaranteed.

The instrument can measure voltage, current, power, active power, apparent power, power factor, voltage peak, current peak, voltage frequency and current frequency.

The instrument has perfect functions, superior performance and simple operation. It meets the needs of high-speed measurement in production sites, as well as laboratory and R&D measurements. It is widely used in in the fields of lighting appliances, power tools, household appliances, electric motors and electric heating appliances of production lines, laboratories and quality inspection departments.

Characteristics

1. VA broken code screen display for intuitive reading.
2. Multi-window simultaneous display of voltage, current, power, active power, apparent power, power factor, voltage peak, current peak, voltage frequency and current frequency.
3. Measurement parameter of each window can be switched. It designs for user to set the reading order by custom.
4. Voltage and current range can switch by auto and manual.
5. Average filter function can make the reading more stable and it suitable for measuring the load or power supply with large variations.
6. Data update cycle can be set. User can select a faster upgrade period according to the test needs, so as to improve the test efficiency.
7. Communication interface supports RS-232 and RS-485. Communication protocol supports SCPI and Modbus for communicating with computer and PLC.
8. It can freely set the upper and lower limit of current and power, the digital power meter will automatic judge whether the test value is exceed. Sound and light alarm indication, it is convenient for batch detection to improve the measurement efficiency.
9. Operating power supports AC 100V~240V, frequency 50/60Hz.

2.2 Technical Index

Note: f represent the frequency of input signal in the below table.

Model	UTE9806+	Remarks
Display	VA broken code display, 5 digits, four windows	Accuracy guarantee range of voltage/current: range of 1%~10%.
Display Update Rate	0.1S, 0.25S, 0.5S, 1S, 2S, 5S	
Measuring Object	V, A, W, VA, PF, HZ, Vpeak, Apeak	
Measuring Mode	AC	
Measuring Range of Voltage	0.5V-600V	
Voltage Range	60V/600V	
Accuracy of Voltage	40Hz≤f≤66Hz: ±(0.4% reading+ 0.1 range+1 character) 66Hz≤f≤400Hz: ±(0.3% reading+ 0.2 range+1 character)	
Voltage Resolution	0.01V/0.1V	
Measuring Range of Current	0.05mA~10A	
Current Range	0.05A/0.1A/10A	
Accuracy of Current	40Hz≤f≤66Hz: ±(0.4% reading+ 0.1 range+1 character) 66Hz≤f≤400Hz: ±(0.3% reading+ 0.2 range+1 character)	
Current Resolution	0.1mA/0.1 mA/1 mA	
Switching Range	Auto/Manual	
Power Range	1W~6000W	
Accuracy of Power	40Hz≤f≤66Hz: ±(0.4% reading+ 0.1 range+1 character) 66Hz≤f≤400Hz: ±(0.3% reading+ 0.2 range+1 character)	Voltage value is higher than range of 10%. Current value is higher than range of 1%.

Power Resolution		0.001W/0.01W/0.1W/1W		
Power Factor Range		-1.000~1.000		
Accuracy of Power Factor		± 0.01		
Measuring Range of Frequency		40Hz~400Hz	Voltage value is higher than range of 10%. Current value is higher than range of 10%.	
Accuracy of Frequency		±0.1% reading		
Auto Range Switching	Voltage Range Increasing	Measured value exceeds the measuring range about 120 %.		
	Voltage Range Decreasing	Measured value is less than the lower part range about 100 %.		
	Current Range Increasing	Measured value exceeds the measuring range about 120 %.		
	Current Range Decreasing	Measured value is less than the lower part range about 100 %.		
Pre-heating Time		>30 minutes		
Current Peak		The maximum display 12A		
Maximum of Allowed Input for Continuous		Voltage 720V, Current 12A		
Maximum of Allowed Input for Instant		1000V, 20A (1 minute)		
Input Impedance		Voltage about 2 MΩ, Current is less than 0.02Ω		
Upper/Lower limit		Upper/Lower limit of voltage (U)		
		Upper/Lower limit of current (I)		
		Upper/Lower limit of active power (P)		
		Upper/Lower limit of apparent power (VA)		
		Upper/Lower limit of power factor (PF)		
Alarm Delay		√		

Average Function	√
Interface	RS232 (DB9 ; 2-pin: TX, 3-pin: RX, 5-pin: GND)
	RS485(DB9 ; 8-pin: A , 9-pin: B)
Baud Rate	1200, 2400, 4800, 9600, 19.2K, 38.4K, 57.6K, 115.2K, default 9600. It follows communication protocol of standard SCPI and Modbus.
Display Hold	√
Mute Key	√
Lock Key	√
Power Source	Input power: AC 100V~240V Frequency 50/60Hz
Precision Environment	18°C~28°C , 30%~75%RH (28°C < operating temperature <18°C(when in 18°C, it needs to add temperature coefficient): reading of 0.005%/°C)
Storage Temperature	-10°C~50°C , non-condensing below 80% RH
Operating Altitude	≤2000 meters
General Characteristic	
Color	Gray
Weight	3.2kg
Size	214mm×88mm×340mm
Standard Accessories	Specialized power cord x1 RS232 serial port line x1
Optional Accessories	UTE-L10A 10A three-pronged plug convert banana head plug connection cable x1

	UTE-L16C 16A connection cable with alligator clip x1	
	UTE-L16A 16A three-pronged plug convert banana head plug connection cable x1	
Standard Packing Quantity	2	
Standard Packing Size	400mm*300m*325mm	
Gross Weight of Standard Packing	9kg	

2.3 Front Panel

The front panel and function of UTE9806+, as shown in the following figure.



Power switch

Display screen

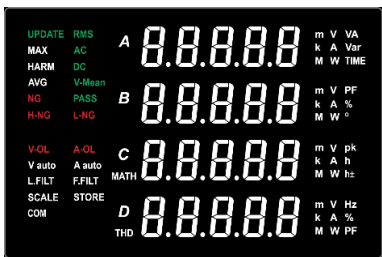


Function key

2.3.1 Key function on the front panel

Key Function	Symbol	Description
Power Switch		Press one time to turn "ON", the power source is enabled, press it again to turn "OFF", the power source is disabled.
Left, Right Key		Number editing: Use left, right key to select the data bit that need to be edited.
Up, Down Key		Menu editing: Use up, down key to select function item. Number editing: Use up, down key to increase or decrease the numerical value.
Enter Key	OK	Save the currently setting.
Hold Key	Hold	Data hold key for keep display the current data. When in setup page, press Hold key can return to the previous.
Mute Key	Mute	Mute key indicates the key sound is muted (blue indicator is illuminated indicates the mute key is enabled.)

A Key	A	Switching the measurement parameter of Window A (V/A/W/VA)
B Key	B	Switching the measurement parameter of Window B (V/A/W/PF)
C Key	C	Switching the measurement parameter of Window C (V/A/W/±Vpk/±Apk)
D Key	D	Switching the measurement parameter of Window D (V/A/W/V Hz/A Hz/PF)
Setup Key	Setup	Press Setup key to enter the setting menu of average filter and display the update cycle.
Shift Key	Shift	Secondary function auxiliary key: Shift + A to enter voltage range setting; Shift + B to enter current range setting; Shift + Setup to enter the secondary menu setting; Shift + Hold to move decimal point to right (only valid when number editing) .
Lock Key	LOCK	Press this key and the indicator will be illuminated, it indicates other key cannot be used. Long press to unlock the key and the indicator will be extinguished.

2.3.2 Display and Symbol

Display and Symbol	Description
	<p>A,B,C,D four windows can be simultaneous measurement</p> <p>Window A can measure V, A, W, VA;</p> <p>Window B can measure V, A, W, PF;</p> <p>Window C can measure V, A, W, ±Vpk, ±Apk;</p> <p>Window D can measure V, A, W, V Hz, A Hz, PF.</p>
	Update symbol of measured data / refresh symbol of display
	<p>Alarm Symbol</p> <p>A-OL: It indicates the measurement value of current exceeds 12A or the measurement value exceeds 120% of the currently measurement range.</p> <p>V-OL: It indicates the measurement value of voltage exceeds 720V or the measurement value exceeds 120% of the currently measurement range.</p> <p>NG: It indicates the measurement range is not within the range.</p> <p>PASS: It indicates the measurement range is in the range.</p>

RMS	The display data is RMS.
V	The measured parameter in the current window is RMS voltage.
m A A	The measured parameter in the current window is RMS current.
W	The measured parameter in the current window is active power.
VA	The measured parameter in the current window is apparent power.
PF	The measured parameter in the current window is power factor.
V pk	The measured parameter in the current window is voltage peak (maximum, minimum).
m A pk A pk	The measured parameter in the current window is current peak (maximum, minimum).
V Hz	The measured parameter in the current window is voltage frequency.
Hz A	The measured parameter in the current window is current frequency.

2.4 Digital and Character Display






The data display format of data display window is nixie tube. Due to the limitation of the format, special symbols are needed to represent each character, as shown in the following figure.

A	B	C	D	E	F	G	H	I	J
K	L	M	N	O	P	Q	R	S	T
U	V	W	X	Y	Z	1	2	3	4
5	6	7	8	9	0				

2.5 Rear Panel

The rear panel and function of UTE9806+, as shown in the following figure and table.



No.	Picture of parts	Description
1		Under test load/LOAD terminal, it usually used to connect to the input port of the product to be test.
2		Under test input terminal /SOURCE terminal, it usually used to connect to the output port of AC power.
3		Three-wire power socket and fuse
4		Ground terminal
5		RS232/RS485 communication interface

Chapter 3 Operating Preparation and Measurement Display

3.1 Operating Preparation

3.1.1 Connecting Power Cable

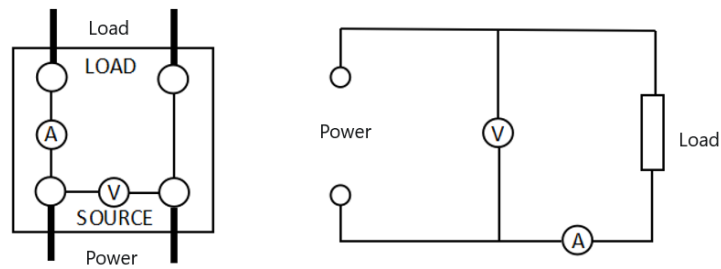
The operating voltage of the instrument is 100V~240V(50/60Hz), please make sure the power supply is within the rated voltage of this instrument, and make sure the instrument is well grounded.

Warning: Please make sure that the power supply voltage matches the supply voltage before turning on the power supply, otherwise the instrument will be burned out.

Notes: The instrument should be used under the recommended working conditions. Never use the instrument in a place where have flammable or explosive materials, it may cause safety injuries.

3.1.2 Connecting Test Circuit

Please follow the following figure to connect the power and load, and make sure voltage and current is within the measurement range of the instrument.



Warning:

1. The load current flows along the thick wire in the above diagram, so these wires should have a large enough safe load capacity.
2. The power supply of the load and the power supply of the instrument should be turned off when wiring at the load end.

Notes:

- 1) When measuring large current/voltage or the current includes high frequency, it should pay attention to possible mutual interference and noise problems when wiring.
- 2) The lead wire should as short as possible.
- 3) Use heavy gauge wire as can as possible when measuring current.
- 4) To reduce the distributed capacitance to ground, the wire and grounding wire should be as far away from the instrument housing as possible.

3.1.3 Turn ON/OFF Power Supply

Turn on: Start self-check program when the instrument is enabled, the instrument will enter the measuring state if the check result is correct.

Turn off: The upper/lower limit of current and power will be saved when the power has been turned off.

Notes: After turn off the power, wait for 5 seconds to turn on again, otherwise the instrument may abnormally display.

3.1.4 Power-on Measurement

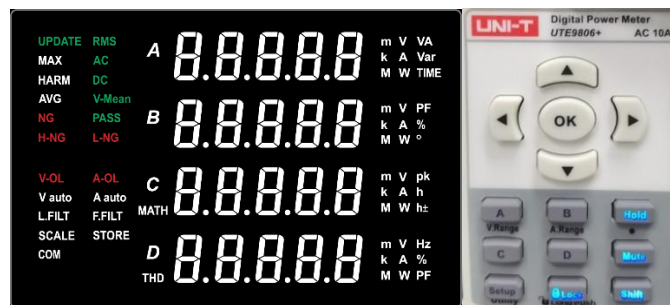
Firstly, plug in the power socket on the rear panel, and use the specified voltage, the power socket should be with a ground wire. After checking the wiring is connect rightly, turn on the instrument switch located at the front panel, and the instrument will enter the measurement state. Apply power to the load and read out the required measurement value from the display on the front panel of the instrument after the load has been working stably.

Notes: The instrument should be preheated for 30 minutes before entering the stable state. After cutting off the instrument power, it should wait for more than 5 seconds before powering it on again. It is strictly forbidden to switch the power on and off repeatedly within a short period of time, which will cause the instrument life to shorten and may cause instrument failure. When the measurement is finished, turn off the instrument power and unplug it to prevent possible damage to the instrument caused by lightning strikes.

3.1.5 Boot-up

1. The instrument will self-inspection and display three interfaces when it boot up. The first interface is to light up all segment codes of LCD and all key indicators (some segment codes that are lit up are not used in this model, it subject to the actual function). UTE9806+ has four keys with indicator, which is

【Mute】 , 【Shift】 , 【Lock】 , as shown in the following figure.



2. The second interface displays system information, including firmware and hardware version as shown in the following figure.



F-1.00 represents firmware version. H-1.00 represents hardware version.

3. The third interface displays the system communication information, including baud rate, communication address and communication protocol, as shown in the following figure.



Baud Rate: 9600 Communication Address 000 Communication Protocol: SCPI

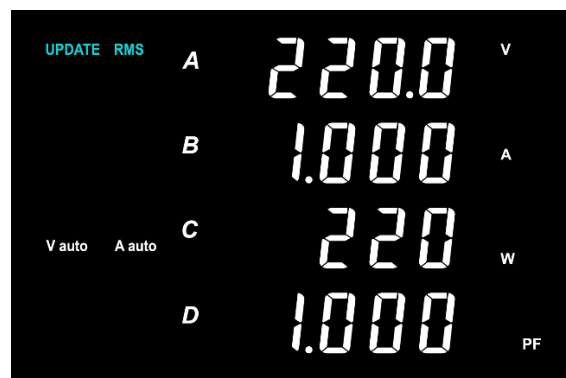
3.2 Measurement Display

3.2.1 Window Display

UTE9806+ has four display windows, it can display different measurement value at the same time and the parameter of each window can be switch freely, as shown in the following table. (Tick"√"indicates the window can measure the parameter. Cross"x"indicates the window cannot measure the parameter.)

Parameter Window	V (Voltage)	A/mA (Current)	W (Active Power)	VA (Apparent Power)	PF (Power Factor)	V pk (Voltage Peak)	A pk (Current Peak)	V Hz (Voltage Frequency)	A Hz (Current Frequency)
A	√	√	√	√	×	×	×	×	×
B	√	√	√	×	√	×	×	×	×
C	√	√	√	×	×	√	√	×	×
D	√	√	√	×	√	×	×	√	√

The following figure shows the display interfaces of the four display windows (Take the measurement of electrical parameters when the voltage is 220V, the current is 1A and the power factor is 1 as an example).



3.2.2 Alarm for Over Range

These situations will be regarded as over range.

1. The measured value of voltage exceeds 120% of the rated range.
2. The measured value of current exceeds 120% of the rated range.

Fixed (manual) range measurement: "--OL--" will be displayed in the measurement window if the measured value exceeds 120% of the range, and "V-OL" indicator will be displayed for voltage over range, and "A-OL" indicator will be displayed for current over range.

Automatic range measurement: When the measured value exceeds 120% of the range, the measurement range will be automatically switched. When the range switches to the maximum range, "--OL--" will be displayed in the measurement window if the measured value exceeds 120% of the range, and "V-OL" indicator will be displayed for voltage over range, and "A-OL" indicator will be displayed for current over range.

3.2.3 Alarm for Lower Measured Value

The alarm will be appear if the measured value of voltage is less than 0.5V or the measured value of current is less than rated value 0.1%.

1. Voltage, current, power displays "0".
2. Power factor displays "-----".

3.2.4 Hold (Data-Hold)

Press Hold key and the indicator will be illuminated, the measurement value will keep display and the data will not refresh. Press it again, the indicator will be extinguished and the data will be update.

3.2.5 Lock (Lock Key)

To prevent from error operating during measurement, lock key function can set other key be invalid (Lock state). Press Lock key and the indicator will be illuminated. This key will be no response. It need to long press Lock key for 1s and the indicator will be extinguished. After that, the key will turn to enable state.

3.2.6 Mute (Mute Key)

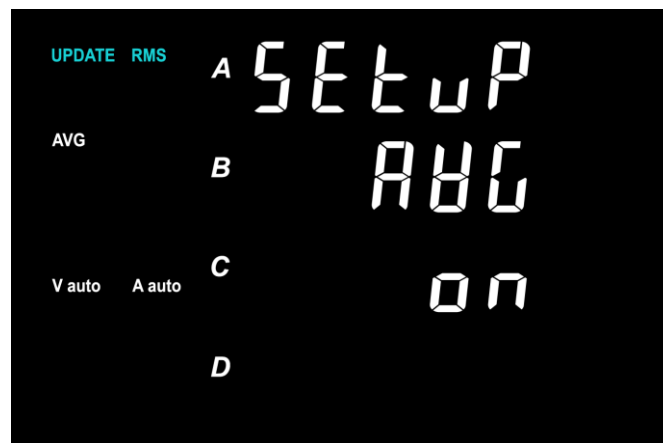
For key operation of the instrument on different occasions, UTE9806+ set the mute key function, press **【Mute】** key before any key operation and then it will not have the key sound, the blue key indicator indicates that the key mute function has been enabled, press the key mute again to disable the function.

Chapter 4 Measurement

4.1 Average Filter

Steps

1. Press **【SETUP】** key to enter SETUP menu, press **【▲】** or **【▼】** key to select submenu "AVG" as shown in the following figure;
2. Press **【OK】** key to enter the next option, and the press **【▲】** or **【▼】** key to switch OFF, ON, DATA;
3. Press **【OK】** key to select the currently selected option and save the setting;
4. If the third step is select DATA then it enters next menu setting, press **【▲】** or **【▼】** key to switch 8, 16, 32, 64 and then press **【OK】** key to select the currently selected option and save the setting;
5. Press **【▲】** or **【▼】** key to select other submenu or press **【SETUP】** key to exit SETUP menu.



Explanation

OFF represents Average OFF (the average function is disabled). ON represents the average function is enabled, 8, 16, 32, 64 represents the number of average.

Average

The average method is moving average, it is for power supply or load with great variation or the numerical value display is unstable and reading is difficult when the frequency of input signal is low.

Executing average measurement function as follows,

(1) U, I, P, S, Q;

(2) λ is calculated by the average value of U_{rms} , I_{rms} , P, S and Q.

***Notes:** Q (reactive power) is only for the operation, it will not show on the display interface.

Moving Average

According to the following formula, use the specified average number to calculating the moving average.

$$D_n = \frac{M_{n-(m-1)} + \dots + M_{n-2} + M_{n-1} + M_n}{m}$$

D_n : Display the numerical value after linear average of m item data from the $n-(m-1)$ to the n th order

$M_{n-(m-1)}$: The numerical value data of $n-(m-1)$ order

M_{n-2} : The numerical value data of $n-2$ order

M_{n-1} : The numerical value data of $n-1$ order

M_n : The numerical value data of n order

m : The number of average

4.2 Data Update Cycle

Steps

1. Press **【SETUP】** key to enter SETUP menu, press **【▲】** or **【▼】** key to select submenu "u.rate" as shown in the following figure;
2. Press **【OK】** key to enter the next option, and the press **【▲】** or **【▼】** key to switch 0.1, 0.25, 0.5, 1, 2, 5;
3. Press **【OK】** key to select the currently selected option and save the setting;
4. Press **【▲】** or **【▼】** key to select other submenu or press **【SETUP】** key to exit SETUP menu.



Explanation

The data update cycle is the update interval of the sampled data of the measurement function.

The data update cycle can set to 0.1s, 0.25s, 0.5s, 1s, 2s or 5s. The default is 0.25s.

4.3 Measurement Range

4.3.1 Manual Range

If the measurement range is set to manual range, the selected range will not be change even if the size of input signal changes.

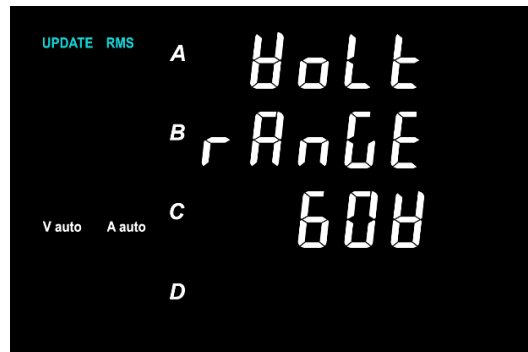
The manual range can select from the following options.

Voltage range: 60V, 600V

Current range: 0.05A, 0.1A, 10A

Step for setting the manual range of voltage

1. Press the secondary auxiliary key **【Shift】** in the measurement interface, and press **【A/V.Range】** key to enter the setting interface of voltage range (the first display interface indicates the current range) as shown in the following figure;



2. Press **【▲】** or **【▼】** key to switch 60V, 600V, Auto;
3. Press **【OK】** key to save the current option and return to the measurement interface.

Step for setting the manual range of current

1. Press the secondary auxiliary key **【Shift】** in the measurement interface, and press **【B/A.Range】** key to enter the setting interface of current range (the display is the current range) as shown in the following figure;



2. Press **【▲】** or **【▼】** key to switch 0.05A, 0.1A, 10A, Auto;
3. Press **【OK】** key to save the current option and return to the measurement interface.

4.3.2 Auto Range

Follow 4.3.1 section to set the range, select Auto (automatic range) at first. A auto/V auto will display on the left side of the screen when the instrument is in Auto range.

If the measurement range is set to auto range, the instrument will synchronous switch range according to the size of input signal. The default setting is auto range.

Voltage Range Increasing

Voltage range will be increased when Urms exceeds 120% of the measurement range.

Voltage Range Decreasing

Voltage range will be decreased when Urms is less than 100% of the low range.

Current Range Increasing

Current range will be increased when Irms exceeds 120% of the measurement range.

Current Range Decreasing

Current range will be decreased when Irms is less than 100% of the low range.

Chapter 5 Alarm

5.1 Turn ON/OFF Alarm Function

Steps

1. Press **【Shift】** and **【Setup】** key to enter Utility menu;
2. Press **【▲】** or **【▼】** key to select ALARM, as shown in the following figure;



3. Press **【OK】** key to enter ALARM menu, press **【▲】** or **【▼】** key to select ON or OFF;
4. Press **【OK】** key to save the currently selected and return to previous menu.

Explanation

ON represent the alarm function is enabled.

OFF represent the alarm function is disabled.

5.2 Alarm Parameter

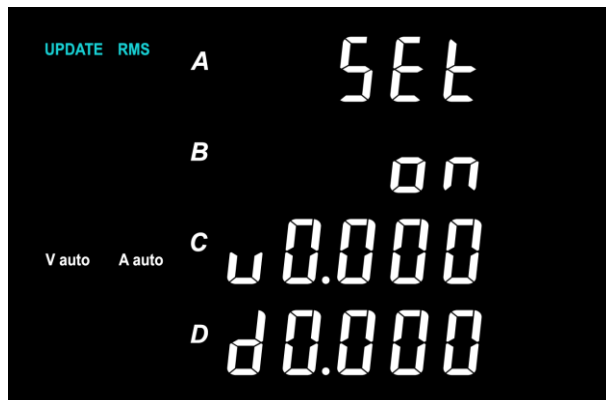
5.2.1 Set Voltage, Current, Power and Power Factor

1. Press **【Shift】** and **【Setup】** key to enter Utility menu;
2. Press **【▲】** or **【▼】** key to select ALARM, as shown in the following figure;



3. Press **【OK】** key to enter ALARM menu, press **【▲】** or **【▼】** key to select SET;

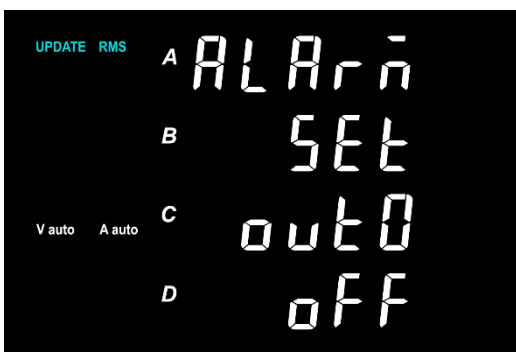
4. Press **【OK】** key to enter alarm parameter menu, press **【▲】** or **【▼】** key to select U, I, P, VA, PF;
5. Press **【OK】** key to enter the setting menu of parameter, as shown in the following figure;



6. Press **【▲】** or **【▼】** key to select ON or OFF in window B, and press **【OK】** key to save the currently selected and enter Window C;
7. Press **【▲】**, **【▼】**, **【◀】**, **【▶】** key to edit data and press **【Shift】** + **【Hold/·】** key can move the decimal point from left to right.

5.2.2 Alarm Mode

1. Press **【Shift】** and **【Setup】** key to enter Utility menu;
2. Press **【▲】** or **【▼】** key to select ALARM;
3. Press **【OK】** key to enter ALARM menu, press **【▲】** or **【▼】** key to select SET;
4. Press **【OK】** key to enter alarm parameter menu, press **【▲】** or **【▼】** key to select DELY, OUT0, LEDF, BEEP
5. Press **【OK】** key to enter the parameter setting window, press **【▲】**, **【▼】**, **【◀】**, **【▶】** key to select ON or OFF; If the previous step is select DELY or BEEP, then this step is to edit the numerical value as shown in the following figure;





6. Press **【OK】** key to save the currently selected and return to previous menu;

7. Press **【Hold】** key to return to previous menu and back to the measurement interface at last.

·Explanation

Alarm function is for detecting whether the measured data is within the set range. UTE9806+ supports alarm of U (voltage), I (current), P (active power), VA (apparent power) and PF (power factor).

Alarm Condition

1. Only set the upper limit, if the measured value is greater than the upper limit U----alarm will be triggered;
2. Only set the lower limit, if the measured value is less than the upper limit D----alarm will be triggered;
3. Set the upper and lower limit, if the measured value is greater than the upper limit U or the measured value is less than the upper limit D----alarm will be triggered;
4. If set he upper limit is less than the lower limit, then the current parameter is valid, alarm will not be activated.

Alarm Method

UTE9806+ supports audible and visual alarm. When the measurement value of any parameter exceeds the set range, the instrument will trigger an alarm and show the NG identifier on the display screen.

OUT0

0: input alarm switch

ON: If the measured data is 0, alarm will be activated.

OFF: If the measured data is 0, alarm will not be activated.

BEEP

The number of audible alarms, with a frequency of about three alarms per second.

1~9999: Beep will sound when the alarm is triggered.

0: Beep does not sound when the alarm is triggered.

DELAY

The number of alarm delay, it is related to the interval between data updates.

It starts to count when a measured value is not within the set range at some point. The alarm will be triggered only when the measured value exceeds the set range for several consecutive times.

Range of delay times: 0000 ~ 9999

LEDF

Blinking switch of the instrument

ON: Blinking function is enabled.

OFF: Blinking function is disabled.

When the measured data is greater than the upper limit, measured data and " — — — — " will alternate blinking.

When the measured data is less than the lower limit, measured data and " _ _ _ _ " will alternate blinking.

Chapter 6 Communication

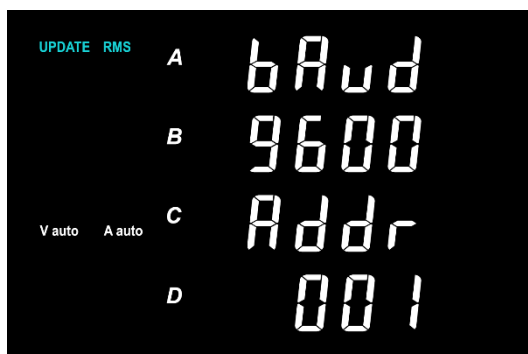
6.1 Baud Rate and Modbus Communication Address

·Steps

1. Press **【Shift】** and **【Setup】** key to enter Utility menu;
2. Press **【▲】** or **【▼】** key to select if and press **【OK】** key to enter if menu;
3. Press **【▲】** or **【▼】** key to select Com, as shown in the following figure;



4. Press **【OK】** key to enter Baud menu, and press **【▲】** or **【▼】** key to select 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 (the default is 9600);
5. Press **【OK】** key to save the currently selected and enter the communication address, as shown in the following figure;



6. Press **【▲】**, **【▼】**, **【◀】**, **【▶】** key to edit address, the range is: 000 ~ 255;
7. Press **【OK】** key to save the currently selected and return to previous menu;
8. Press **【Hold】** key to return to previous menu.

·Explanation

UTE9806+ supports RS232 and RS485 interface. Both interfaces have the same baud rate and are set using the methods described in this section.

6.2 Communication Command

·Steps

1. Press **【Shift】** and **【Setup】** key to enter Utility menu;
2. Press **【▲】** or **【▼】** key to select if and press **【OK】** key to enter if menu;
3. Press **【▲】** or **【▼】** key to select type, as shown in the following figure;



4. Press **【▲】** or **【▼】** key to enter type submenu and press **【▲】** or **【▼】** key to switch "SCPI" or **modb**;
5. Press **【OK】** key to save the currently selected and return to previous menu;
6. Press **【Hold】** key to return to previous menu.

·Explanation

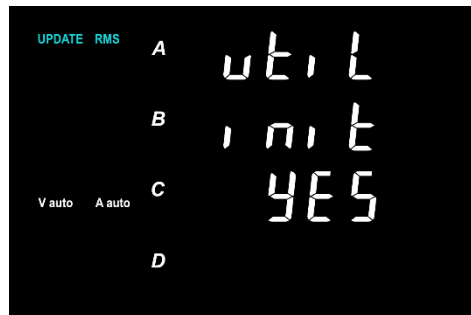
UTE9806+ supports SCPI and Modbus communication command. **modb** represents "Modbus" communication command. Modbus is only support RTU mode. The detailed command can refer to *UTE9806+ Smart Digital Power Meter -SCPI Programming Manual* and *UTE9806+ Smart Digital Power Meter -Modbus Programming Manual*

Chapter 7 System Function

7.1 Initialization

Steps

1. Press **【Shift】** and **【Setup】** key to enter Utility menu;
2. Press **【▲】** or **【▼】** key to select init;
3. Press **【OK】** key to enter init submenu, and press **【▲】** or **【▼】** key to switch NO or YES, as shown in the following figure;



4. Press **【OK】** key to save the currently selected and return to previous menu;
5. Press **【Hold】** key to return to previous menu.

Explanation

The setting parameter can be initialize and restore to the factory setting. This function is very useful for cancelling all the setting or restarting execute measurement function. The factory setting can see the following table.

Item	Default Setting
Display Window A	V
Display Window B	mA/A
Display Window C	W
Display Window D	PF
Data Update Cycle	0.25s
Average Function	OFF
Alarm Function	OFF
Voltage, Current, Active	OFF, the upper and lower limit is "0"

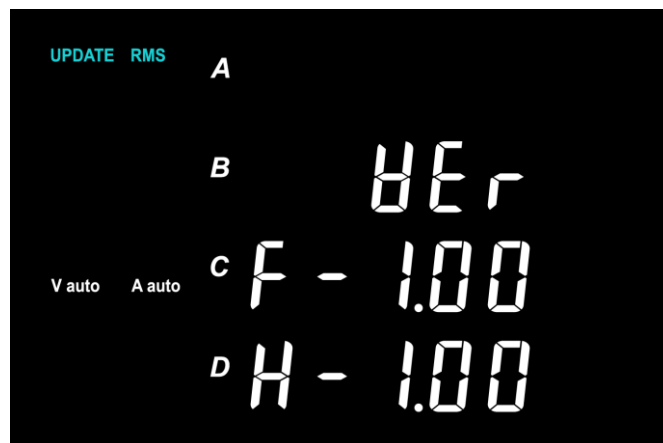
Power, Apparent Power, Power Factor	
0 Input Alarm	OFF
Blinking	OFF
Alarm Delay Times	"0010"
Beep	Beep times"0005"
Data Hold	OFF
Mute Key	OFF

*Notes: The item cannot be restore to the factory setting: the relevant setting of communication (communication command, baud rate, Modbus communication address) and user's grade.

7.2 Software Information

·Steps

1. Press **【Shift】** and **【Setup】** key to enter Utility menu;
2. Press **【▲】** or **【▼】** key to select inFo;
3. Press **【OK】** key to enter the version interface as shown in the following figure;



4. Press **【Hold】** key to exit Utility menu.

·Explanation

"F - 1.00" represents firmware version;"H - 1.00" represents hardware version.

Chapter 8 Communication Interface

8.1 RS232 and RS485 Interface

UTE9806+ has standard RS232 and RS485 communication interface, PC or PLC can remote control UTE9806+ via SCPI or Modbus command.

·The Definition of Pin

UTE9806+ communication interface is DB9 female head, the definition of pin as shown in the following figure.



1	NC
2	TXD (RS232)
3	RXD (RS232)
4	NC
5	GND (RS232)
6	NC
7	NC
8	A(RS485)
9	B(RS485)

Communication Setting

Before operating communication, UTE9806+ should match with the following parameters of the control host.

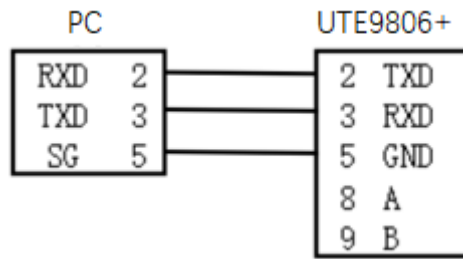
- (1) Baud Rate
1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200.
The setting method of baud rate for UTE9806+ can refer to section 6.1.
- (2) Check bit: NONE (fixed value)
- (3) Data bit: 8 (fixed value)
- (4) Stop bit: 1 (fixed value)

8.2 Connecting Example

8.2.1 PC connect to UTE9806+ via RS232

- The number in block diagram represents the pin number of DB9 interface.
- Use direct serial port line to connect PC and UTE9806+. The factory provides direct serial port line.
- This connecting method supports SCPI and Modbus instruction.

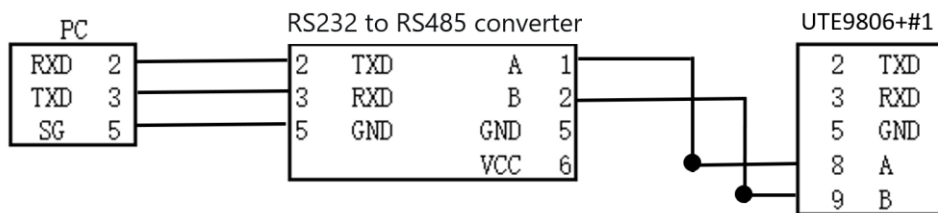
As shown in the following figure.



8.2.2 PC connect to a single UTE9806+ via RS485

- The number in block diagram represents the pin number of DB9 interface.
- Use direct serial port line to connect PC and the RS232 to RS485 convertor.
- This connecting method is only support Modbus instruction.

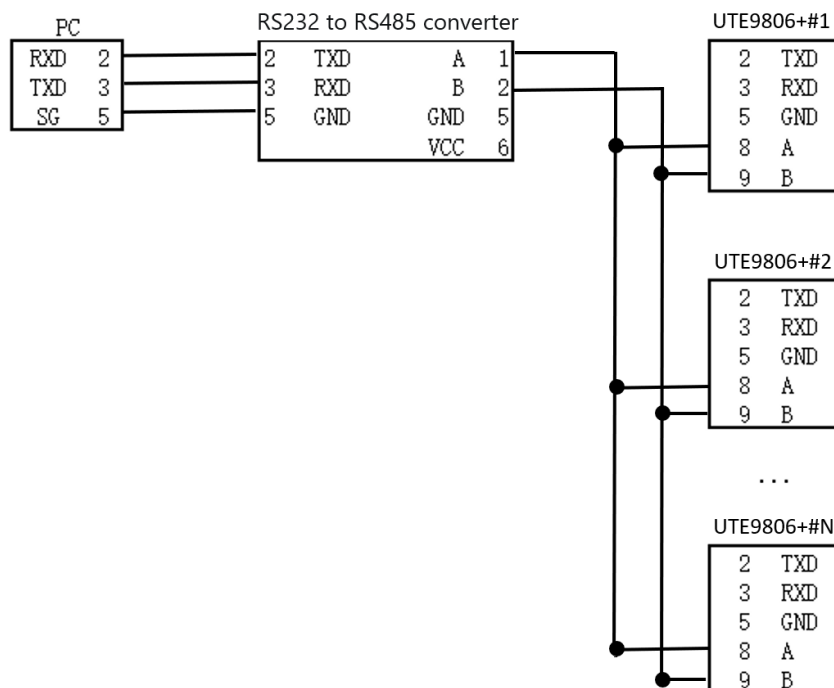
As shown in the following figure.



8.2.3 PC connect to multiple UTE9806+ via RS485

- The number in block diagram represents the pin number of DB9 interface.
- Use direct serial port line to connect PC and the RS232 to RS485 convertor.
- A , B port of the RS232 to RS485 convertor parallel connect to A , B port of multiple UTE9806+.
- This connecting method is only support Modbus instruction. The baud rate of the PC must be the same as that of each UTE9806+, and the IP address of each UTE9806+ must be different.

As shown in the following figure.



Chapter 9 Storage and Calibration

9.1 Notice Matters for Storage

9.1.1 The instrument should be stored in the environment which specified in the user manual, refer to Chapter 2.2 storage temperature in Technical Index table. Do not store the instrument in a place with high temperature, high humidity, temperature rapid change or easy condensation. The recommended storage environment is dry and at a temperature of about 20°C.

9.1.2 Keep product's packaging materials (cardboard boxes, padding, plastic bags, etc.) for later delivery of instruments. Using packaging materials to transport instruments can protect them from sudden temperature changes, shocks and vibrations, and protect them from damage during transportation.

9.1.3 Do not store the instrument in an environment with dust, fumes or chemical gases.

9.1.4 Avoid direct sunlight.

9.2 Trouble-shooting

No.	Problem	Solution
1	No widow display when enable the instrument	(1) Make sure the power cable is well connecting. (2) Make sure the supply power is within the allowed power range.
2	Displayed measurement value is incorrect	(1) Make sure the operating temperature and humidity within the allowed range. (2) Make sure the display is away from noise interference. (3) Check whether the test wire is well connecting. (4) Check whether the wire is connect correctly. (5) Check whether data display is in the lock state. (6) Reboot the instrument.
3	Key function failure	(1) Check whether key is stuck.
4	Communication failure	(1) Check whether communication cable is well connecting, (TX / RX or A / B signal is connect correctly) . (2) Check whether the instrument address, communication mode and baud rate is match with the upper computer.

Other situation refer to Notes in each chapter.

9.3 Notice Matters for Calibration

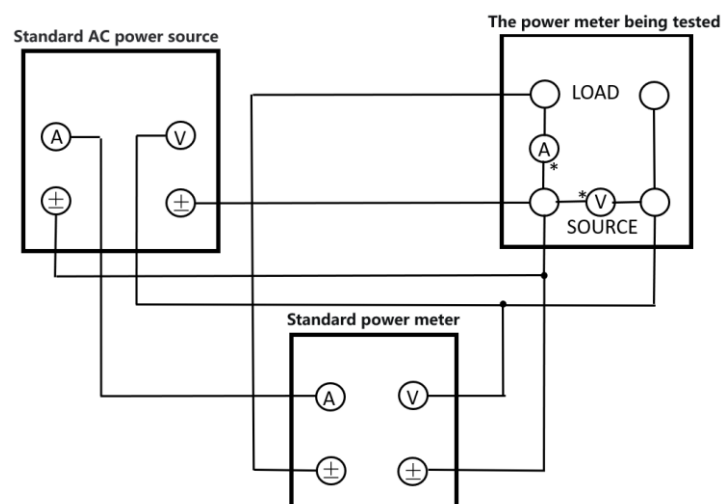
Verification and Calibration

The precision of standard meter should over a grade than measured meter, standard source should be stable. All the instrument power on 15 minute and wait it to stabilize, and then slowly adjust the output voltage or current of the standard AC source. Observing the standard meter to reading out the required value precisely, record the data of the standard meter and measured meter after the data is stable, and calculating the measuring error value to judge whether is within the error range. The requirements of environment temperature of verification and calibration as the following table.

Item	Reference Value or Range	Reference Value or Range
Environment temperature °C	23	±5
Environment humidity % RH	45 ~ 75	
Barometric pressure KPa	86 ~ 106	
AC power supply voltage V	100 ~ 240	±2%
AC power supply frequency Hz	50	±1%
Ac power supply waveform	Sine	$\beta = 0.05$
External electromagnetic field interference	Avoid	
Ventilation	Well-condition	
Sunlight	Avoid direct sunlight	

Notes: The inspect equipment should meet the specifications of the regular metrological verification, measurement period is one year.

Wiring scheme of verification and calibration as shown in the following figure.



Chapter 10 Optional and Fuse

10.1 Optional Testing Wire

Uni-trend company provides optional testing wire, there are three model UTE-L16A, UTE-L10A, UTE-L16C, as shown in the following figure. User can purchase one or multiple testing wires according your own needs. The following table is match solution for user to reference. Please note the specifications and the maximum current and voltage in the table.



Notes: The above figure is optional testing wire, not equipped with the instrument. It should purchase by your own.

Match Solution of Testing Wire

Match Solution	Name	Component and Name	Specification of Voltage/Current	Length	Recommended Appliance
Solution 1	10A testing wire and accessories	UTE-L10A 10A three-pronged plug convert banana head connect wire	250V/10A	1.2m	Small appliances, such as fan, hairdryer, rice cooker and other appliances with a current not exceeding 10A
		UTE-L16C 16A connect wire with alligator clip	220V/16A		
Solution 2	16A testing wire and accessories	UTE-L16A 16A three-pronged convert banana head connect wire	250V/16A	1.2m	High power appliances, such as air conditioner, electric water heater and other appliances with a current not exceeding 16A
		UTE-L16C 16A connect wire with alligator clip	220V/16A		

Connect scheme of testing wire as shown in the following figure.



Warning: Before connect with circuit, please make sure the power is cut off to prevent from electric shock.

10.2 Specification of Fuse

This instrument has 1 spare fuse stored in the fuse box. If the fuse was burned out, replace the fuse as the follow steps.

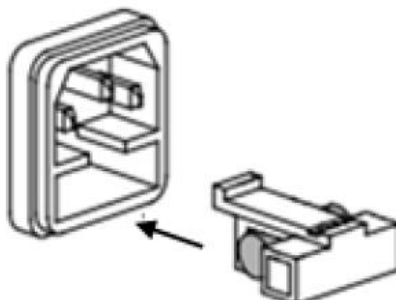
- 1) Pull out the power cable, use small screwdriver to take out the fuse box, as shown in the following figure.



If the fuse was burned out, please replace the same specification fuse with the instrument. The specification fuse with the instrument, see the following table.

Model	Specification of Fuse
UTE9806+	AC250V F0.5A

- 3) After the replacement, please put the fuse box back , as shown in the following figure.



Appendix 1 Symbol and Formula of Measurement

Normal Measurement

Measurement Function [Unit]	Operation Formula	Explanation
Voltage U [V]	$U = \sqrt{\frac{1}{N} \cdot \sum_{n=1}^N u(n)^2}$	u(n) represents instantaneous value of voltage; i(n) represents instantaneous value of current; N represents ADC sampling time within the measurement range.
Current I [A]	$I = \sqrt{\frac{1}{N} \cdot \sum_{n=1}^N i(n)^2}$	
Active power P [W]	$P = \frac{1}{N} \cdot \sum_{n=1}^N [u(n) \cdot i(n)]$	
Power Factor [PF]	$\frac{P}{U \cdot I}$	