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User's Manual

UTE9800+ Series 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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Warranty Service

UNI-T warrants that the product will be free from defects for one year. If the product is re-sold, the warranty period will be from the date of the original purchase from an authorized UNI-T distributor. Probes, other accessories, and fuses are not included in this warranty.

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.

The "customer" refers to the individual or entity that is declared in the guarantee. In order to obtain the warranty service, "customer" must inform the defects within the applicable warranty period to UNI-T, and to perform appropriate arrangements for the warranty service. The customer shall be responsible for packing and shipping the defective products to the designated maintenance center of UNI-T, pay the shipping cost, and provide a copy of the purchase receipt of the original purchaser. If the product is shipped domestically to the location of the UNI-T service center, UNI-T shall pay the return shipping fee. If the product is sent to any other location, the customer shall be responsible for all shipping, duties, taxes, and any other expenses.

Guarantee Limit

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.

d) Any maintenance on altered or integrated products (if such alteration or integration leads to an increase in time or difficulty of product maintenance).

This warranty is written by UNI-T for this product, and it is used to substitute any other express or implied warranties. UNI-T and its distributors do not offer any implied warranties for merchant ability or applicability purposes.

For violation of this guarantee, regardless of whether UNI-T and its distributors are informed that any indirect, special, incidental, or consequential damage may occur, UNI-T and its distributors shall not be responsible for any of the damages.

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 notices.

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 needs to move, please make sure the power line and other connecting line is pulled out and uses the carrying handle on the side of the instrument, be gentle with it to prevent collision.

Environmental Condition

UTE9800+ series digital power meter can only use indoors and non-condensing area, the general environmental requirements shown as below table.

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

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.
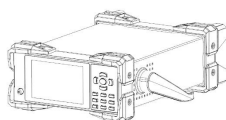

No.	Components	Quantity	Remark
1	Digital power meter	1	UTE9802+/UTE9806+/UTE9811+
2	Power cable	1	
3	RS232 communication line	1	
4	User's manual, software download guide	1	

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 returns to the factory for service.

1.2 Hand Shank

The hand shank can be adjusted. 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
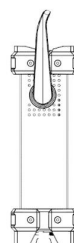
1.   Original Position (Factory Setting)   2. Testing Position
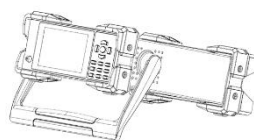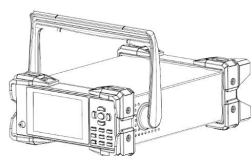
3.Remove Hand Shank   4. Lift Position

Chapter 2   Product Introduction

2.1   Product Overview

The smart digital power meter is an economic and portable measuring instrument. It is a multi-functional measuring instrument which integrating voltage, current, power, power factor, frequency and harmonic wave. The product is widely used in production, testing, evaluation and scientific research and multi-field.

UTE9800+ series include three models: UTE9802+, UTE9806+, and UTE9811+. It 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.

UTE9800+ series has true RMS measurement; it can adjust to the electric parameter measurement of various occasions such as full wave, half wave (AC/DC type) and irregular waveform. This instrument can measure voltage (V), current (A), active power (W), apparent power (VA), voltage peak (Vpk), current peak (Apk), power factor (PF), frequency (Hz), harmonic wave and wave crest ratio. It has perfect functions, superior performance and simple operation.

The instrument can meet 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

◆ VA broken code screen display，reading intuitive, it adopts high speed A/D transformer and 32-bit MCU operation.

◆ The parameters measured in each window can be switched (UTE9806+ only).

◆ Multi-window simultaneous display of voltage, current, power, power factor/frequency.

◆ The voltage and current peak ratios can be measured (UTE9811+ only).

◆ The range of voltage and current has manual range and automatic range.

◆ AC, DC, AC+DC (T-RMS) mode (UTE9802+ only).

◆ The harmonic measurement can be taken. The harmonic testing uses phase-locked loop (PLL) synchronization method, and the harmonic analysis is up to 50 times (UTE9811+ only).

◆ Average function can make the reading more stable and it suitable for measuring the load or power with large variations.

◆ Data upgrade period can be set. User can select a faster upgrade period according to the test needs, so as to improve the test efficiency.

◆ Communication interface supports RS-232 and RS-485. Communication protocol supports SCPI and Modbus for communicating with computer and PLC.

◆ 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 (UTE9806+ can also set and check the upper and lower limit of voltage, apparent power and power factor).

2.2   Technical Index

* f represent the frequency of input signal in the below table.

Model	UTE9802+	UTE9806+	UTE9811+
Display	VA broken code display, 5 digits，four windows		
Display Update Rate	0.1S, 0.25S, 0.5S, 1S, 2S, 5S		
Measuring Object	V,A,W,PF/HZ	V,A,W,VA,PF,V Hz/A Hz,Vpk/Apk	V,A,W,PF/HZ/THD/CF
Measuring Mode	AC/ DC /AC+DC(T-RMS)	AC	AC
Measuring Range of Voltage	3.0V-600V	0.5V-600V	3.0V-600V
Voltage Range	75V/150V/300V/600V	60V/600V	75V/150V/300V/600V
Accuracy of Voltage (1% ～ 100% of range)	DC：±(0.4% reading+ 0.1% range+1 character） 40Hz≤f≤66Hz：±(0.4% reading+ 0.1% range+1 character） 66Hz＜f≤400Hz：±(0.3% reading+ 0.2% range+1 character）	40Hz≤f≤66Hz：±(0.4% reading+ 0.1% range+1 character） 66Hz＜f≤400Hz：±(0.3% reading+ 0.2% range+1 character）	40Hz≤f≤70Hz：±(0.4% reading+ 0.1% range+1 character）
Voltage Resolution	0.01V/0.1V		
Measuring Range of Current	0.5mA-20A	0.05mA-10A	5.0mA~20A
Current Range	500mA/2A/8A/20A	50mA/100mA/10A	200mA/1A/4A/20A
Accuracy of Current (1% ～ 100% of range)	DC：±(0.4% reading+ 0.1% range+1 character） 40Hz≤f≤66Hz：±(0.4% reading+ 0.1% range+1 character） 66Hz＜f≤400Hz：±(0.3% reading+ 0.2% range+1 character）	40Hz≤f≤66Hz：±(0.4% reading+ 0.1% range+1 character） 66Hz＜f≤400Hz：±(0.3% reading+ 0.2% range+1 character）	40Hz≤f≤70Hz：±(0.4% reading+ 0.1% range+1 character）
Current Resolution	0.1mA/1mA	0.01mA/0.1mA/1mA	1mA
Switchin	Auto/Manual	Auto/Manual	Auto

g Range				
Power Range	1W~12kW		1W~6000W	1W~12kW
Accuracy of Power （PF=1）	DC：±(0.4% reading+ 0.1% range+1 character） 40Hz≤f≤66Hz：±(0.4% reading+ 0.1% range+1 character） 66Hz＜f≤400Hz：±(0.3% reading+ 0.2% range+1 character）		40Hz≤f≤66Hz：±(0.4% reading+ 0.1% range+1 character） 66Hz＜f≤400Hz：±(0.3% reading+ 0.2% range+1 character） （voltage > 10% of range, current > 1% of range,）	40Hz≤f≤70Hz：±(0.4% reading+ 0.1% range+1 character）
Power Resolution	0.001W/0.01W/0.1W/1W		0.001W/0.01W/0.1W/1W	0.01W/0.1W/1W
Power Factor Range	-1.000~1.000		-1.000~1.000	-1.000~1.000
Accuracy of Power Factor	±(0.004 + 0.001* reading +1 character)		±0.01	±(0.004 + 0.001* reading +1 character)
Frequency Range	DC, 40Hz ~ 400Hz （voltage > 10% of range）		40Hz ~ 400Hz （amplitude > 10% of range）	40Hz~70Hz （voltage > 10% of range）
Accuracy of Frequency	±(0.1% reading +1 character)		±0.1% reading	±(0.1% reading +1 character)
Auto Range	Voltage Range Increasing	Urms exceeds the measuring range about 110% (CF < 2)	Urms exceeds the measuring range about 120%	Urms exceeds the measuring range about 110% (CF < 2)
	Voltage Range Decreasing	Urms is less than the lower part range about 80% (CF < 2)	Urms is less than the lower part range about 100%	Urms is less than the lower part range about 80% (CF < 2)
	Current Range Increasing	Irms exceeds the measuring range about 110% (CF < 2)	Irms exceeds the measuring range about 120%	Irms exceeds the measuring range about 110% (CF < 2)
	Current Range Decreasing	Irms is less than the lower part range about 60% (CF < 2)	Irms is less than the lower part range about 100%	Irms is less than the lower part range about 60% (CF < 2)
Pre-heating Time	>30 min		>30 min	>30 min
Current Peak	The maximum display 24A		The maximum display 12A	The maximum display 24A
Maximum of Allowed Input for Continu	Voltage 700V，Current 24A		Voltage 720V，Current 12A	Voltage 700V，Current 24A

ous			
Maximum of Allowed Input for Instant	1000V, 40A (1 min)	1000V, 20A (1 min)	1000V, 40A (1 min)
Input Impedance	Voltage about 2 MΩ，Current is less than 0.02Ω	Voltage about 2 MΩ，Current is less than 0.02Ω	Voltage about 2 MΩ，Current is less than 0.02Ω
Upper/Lower Limit	Four settings for the upper/lower limit of power and current	Ten settings for voltage, current, active power, apparent power and power factor	Four settings for the upper/lower limit of power and current
	P Hi (Power high), P Lo(Power low), A Hi(Current high), A Lo(Current low)	Voltage/U Hi and Lo Current/I Hi and Lo Active power/P Hi and Lo Apparent power/VA Hi and Lo Power factor/PF Hi and Lo	P Hi (Power high), P Lo(Power low), A Hi(Current high), A Lo(Current low)
Average Function	√	√	√
Harmonic Analysis	/	/	1～50 times
Peak Measurement	/	√ (voltage peak measurement, current peak measurement)	/
Display Hold	√	√	√
Mute Alarm	√	√	√
Mute Key	/	√	/
Lock Key	√	√	√
Interface	RS232（DB9；2-pin: TX, 3-pin: RX, 5-pin: GND）	RS232（DB9；2-pin: TX, 3-pin: RX, 5-pin: GND）	RS232（DB9；2-pin: TX, 3-pin: RX, 5-pin: GND）
	RS485 (DB9；8-pin: A , 9-pin: B)	RS485 (DB9；8-pin: A , 9-pin: B)	RS485 (DB9；8-pin: A , 9-pin: B)
Baud Rate	4800，9600，19.2K，38.4K，57.6K，115.2K，default 9600. It follows communication protocol of standard SCPI and Modbus-RTU.	1200, 2400, 4800, 9600, 19.2K, 38.4K, 57.6K, 115.2K, default 9600. It follows communication protocol of standard SCPI and Modbus-RTU.	4800，9600，19.2K，38.4K，57.6K, 115.2K, default 9600. It follows communication protocol of standard SCPI and Modbus-RTU.
Power Source	Input power：AC 100V~240V Frequency 50/60Hz		
Precision Environment	18℃~28℃，30%~75%RH (28℃ < operating temperature < 18℃ (when in 18℃, it needs to add temperature coefficient)：reading of 0.05%/℃)		

Storage Temperature	-10℃~50℃，non-condensing below 80% RH		
Operating Altitude	≤2000 meters		
General Characteristic			
Color	Gray		
Weight	3.3kg	3.2kg	3.2kg
Size	214mm×88mm×340mm		
Standard Accessories	Specialized power cable 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 （Outer Box）	2		
Standard Packing Size	400mm*300m*325mm		
Gross Weight of Standard Packing	9kg		

2.3   Front Panel

2.3.1 UTE9802+ Front Panel and Keys

The front panel of UTE9802+ is as shown in the figure 2.3.1.
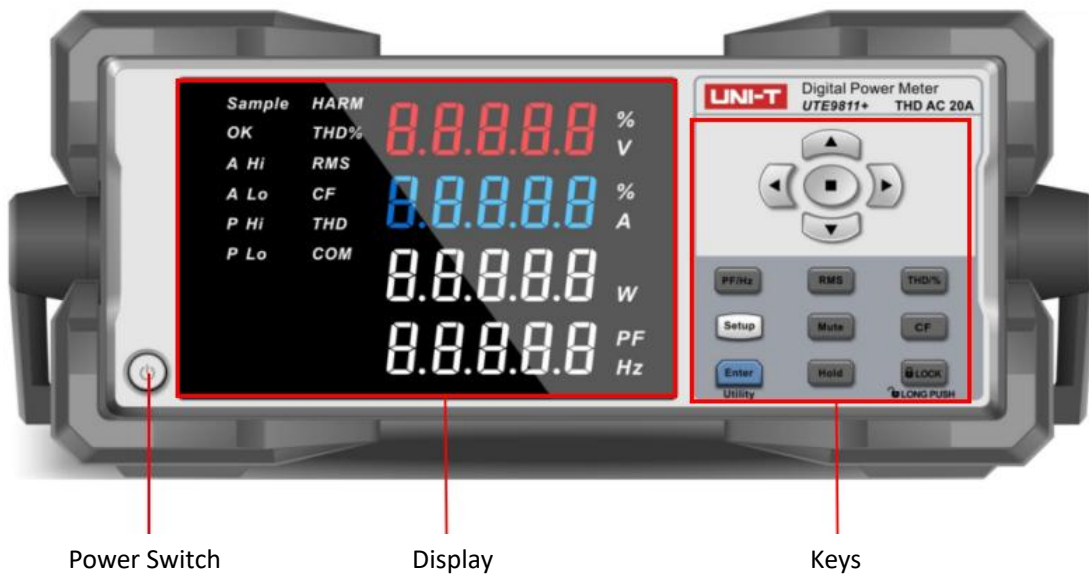
Figure 2.3.1 UTE9802+ Front Panel
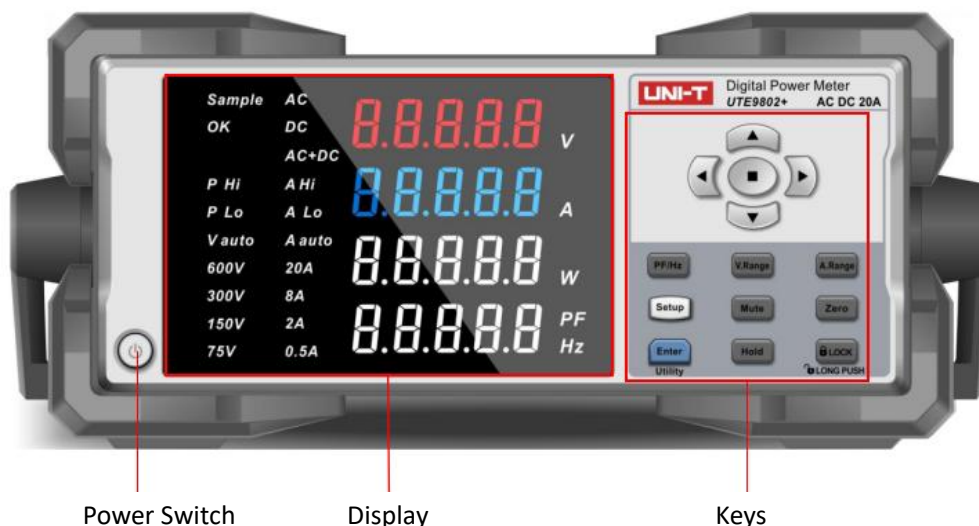
Power Switch   Display   Keys

Description of UTE9802+ keys

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	◀ ▶	Switch sub-menu：Use left, right key to select the sub-menu that need to be edited. 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.
Decimal Point Key	▣	Number editing: To move decimal point
Display Hold	Hold	Data hold key, when the key is activated, it will keep display the current data.
PF/Hz	PF/Hz	To select the fourth line to display power factor or frequency.
Voltage Range	V.Range	To select fixed range or auto range. Vauto is auto range.
Current Range	A.Range	To select fixed range or auto range. Aauto is auto range.
Setup Key	Setup	Enter Setup menu, this menu is to editing the configuration data of measurement, alarm and communication.
Mute Key	Mute	The beeper can be mute when over the limit (mute alarm). Press the key to activate mute key and the indicator will be illuminated; press it again to relieve the mute and the indicator will be extinguished.
Zero (Clear)	Zero	Press this key to enter zero correction state. Zero function is to recalibrate zero bit value of voltage and current channel.
Enter or Utility Key	Enter Utility	Enter Key: Short press is to activate confirm key to save the currently edited data. Utility Key: Long press is to activate Utility key to enter Utility menu.
Lock Key	LOCK	Press this key and the indicator will be illuminated. Long press to unlock the key and the indicator will be extinguished.

2.3.2 UTE9806+ Front Panel and Keys

The front panel of UTE9806+ is as shown in the figure 2.3.2.
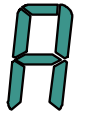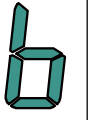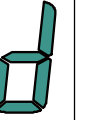
Figure 2.3.2 UTE9806+ Front Panel

Power Switch   Display   Keys
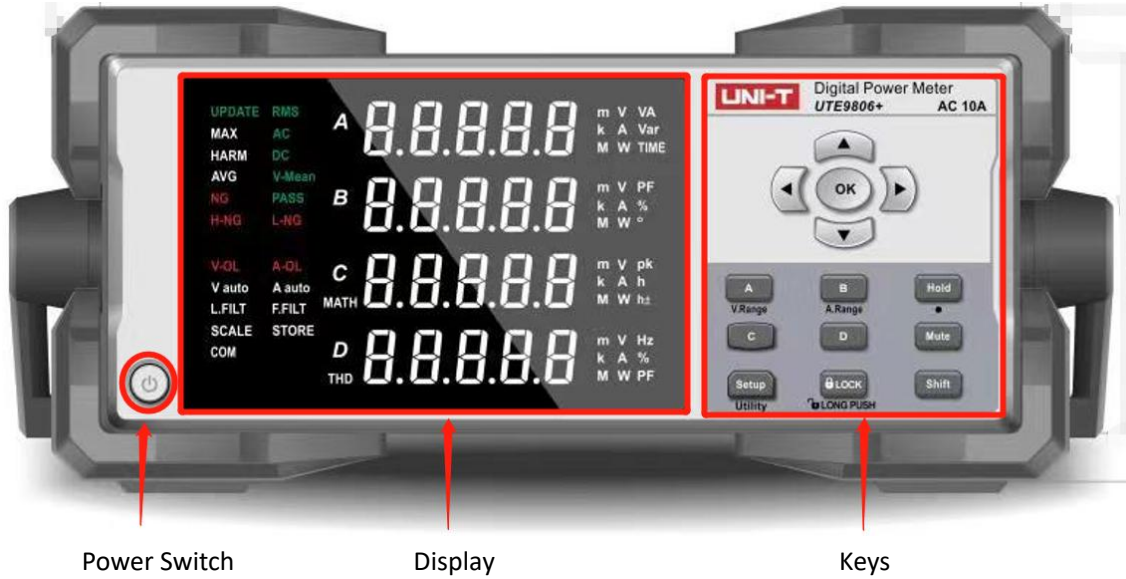
Description of UTE9806+ keys

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.

2.3.3 UTE9811+ Front Panel and Keys

The front panel of UTE9811+ is as shown in the figure 2.3.3.

Figure 2.3.3 UTE9811+ Front Panel

Power Switch   Display   Keys
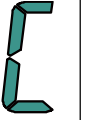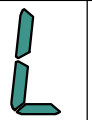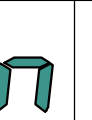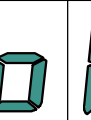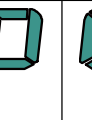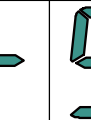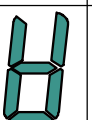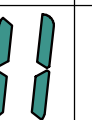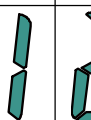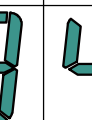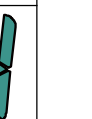
Description of UTE9811+ keys

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	◀▶	Switch sub-menu：Use left, right key to select the sub-menu that need to be edited. Number editing: Use left, right key to select the data bit that need to be edited. For description, use"◀","▶"to indicate the two keys in the manual.
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. For description, use "▲", "▼" to indicate the two keys in the manual.
Decimal Point Key	⊙	Number editing: To move decimal point
Display Hold	**Hold**	Data hold key, when the key is activated, it will keep display the current data.
PF/Hz	**PF/Hz**	To select the fourth line to display power factor or frequency.
TRMS/ Total RMS of Harmonic	**RMS**	Press this key to enter TRMS display interface, press it again to enter total RMS of harmonic display interface.
Measurement value of Harmonic/ Harmonic Distortion Factor	**THD/%**	Press this key to enter harmonic distortion factor display interface, press it again to enter measurement value of harmonic display interface.
Setup Key	**Setup**	Enter Setup menu, this menu is to editing the configuration data of measurement, alarm and communication.
Mute Key	**Mute**	The beeper can be mute when over the limit (mute alarm). Press the key to activate mute key and the indicator will be illuminated; press it again to relieve the mute and the indicator will be extinguished.
Crest Factor	**CF**	To enter crest factor display interface.
Enter or Utility Key	**Enter** **Utility**	Enter Key: Short press is to activate confirm key to save the currently edited data. Utility Key: Long press is to activate Utility key to enter Utility menu.
Lock Key	**LOCK**	Press this key and the indicator will be illuminated. Long press to unlock the key and the indicator will be extinguished.

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.
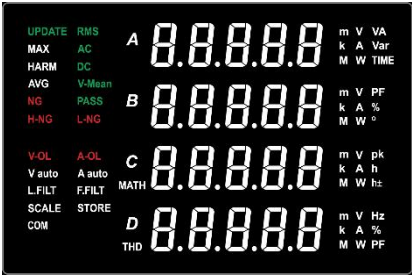
5	6	7	8	9	0				

2.4.1 UTE9802+ Display and Symbol

Display and Symbol	Description
	Four display windows； Display measurement data: The display screen can display V (voltage), A (current), W (power), PF (power factor)/Hz (frequency) at the same time. Menu editing: Display menu
Sample	An upgrade symbol of measurement data.
OK , A Hi , A Lo , P Hi , P Lo	Alarm Symbol OK：Measurement value of the current and power within the upper/lower limit. A Hi：Measurement value of current is higher than the upper limit. A Lo：Measurement value of current is lower than the upper limit. P Hi：Measurement value of power is higher than the upper limit. P Lo：Measurement value of power is lower than the upper limit.
AC , DC , AC+DC	Measuring mode
V auto 600V 300V 150V 75V	The currently voltage range, when it displays V auto, it is auto range.

A auto 20A 8A 2A 0.5A	The currently current range, when it displays A auto, it is auto range.

2.4.2 UTE9806+ Display and Symbol

Display and Symbol	Description
	A,B,C,D four windows can be simultaneous measurement Window A can measure V, A, W, VA； Window B can measure V, A, W, PF； Window C can measure V, A, W, ±Vpk, ±Apk； Window D can measure V, A, W, V Hz, A Hz, PF.
UPDATE	Update symbol of measured data
A-OL V-OL NG PASS	Alarm Symbol A-OL: It indicates the measurement value of current exceeds 12A or the measurement value exceeds 120% of the currently measurement range. V-OL：It indicates the measurement value of voltage exceeds 720V or the measurement value exceeds 120% of the currently measurement range. NG: It indicates the measurement range is not within the range. PASS：It indicates the measurement range is in the range.
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 pk pk A A	The measured parameter in the current window is current peak (maximum, minimum).

Display and Symbol	Description
V Hz	The measured parameter in the current window is voltage frequency.
Hz A	The measured parameter in the current window is current frequency.

2.4.3   UTE9811+ Display and Symbol

Display and Symbol	Description
8.8.8.8.8 %V **8.8.8.8.8** %A **8.8.8.8** W **8.8.8.8** PF Hz	Four display windows； Display measurement data: The display screen can display V (voltage), A (current), W (power), PF (power factor)/Hz (frequency) and measurement value of harmonic at the same time. Menu editing: Display menu
Sample	An upgrade symbol of measurement data.
OK, **A Hi**, **A Lo**, **P Hi**, **P Lo**	Alarm Symbol OK：Measurement value of the current and power within the upper/lower limit. A Hi：Measurement value of current is higher than the upper limit. A Lo：Measurement value of current is lower than the upper limit. P Hi：Measurement value of power is higher than the upper limit. P Lo：Measurement value of power is lower than the upper limit.
RMS	The current display data is RMS.
HARM	The current display data is the measurement data of harmonic.
CF	The current display data is crest factor.
THD	The current display data is the measurement value of harmonic.
THD%	The current display data is the harmonic distortion factor.
COM	It's a symbol of communication; it represents the upper computer communicating with power meter.

2.5 Rear Panel

The rear panel of UTE9802+/UTE9811+ is as shown in the following figure.

The rear panel of UTE9806+ is as shown in the following figure.

The function description of UTE9802+/UTE9806+/UTE9811+ rear panel is as shown in the following 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.
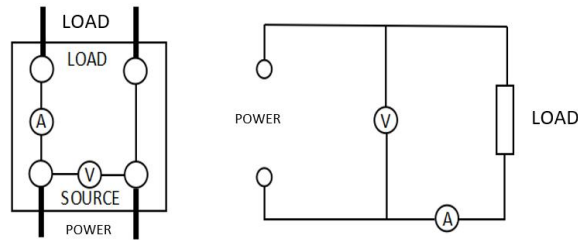
Warnings:

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 turning 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 connected 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 (UTE9806+ only)

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 【Hold】, 【Mute】, 【Shift】,

【Lock】, as shown in the following figure.
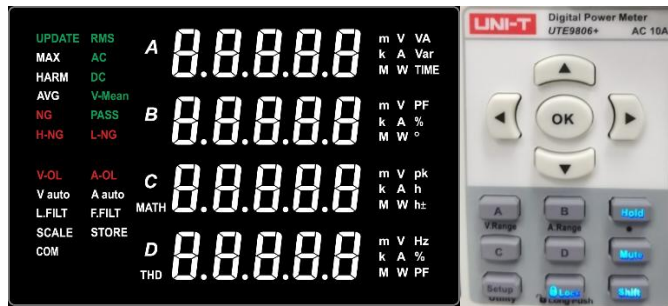
2. The second interface displays system information, including firmware and hardware version as shown in the following figure.
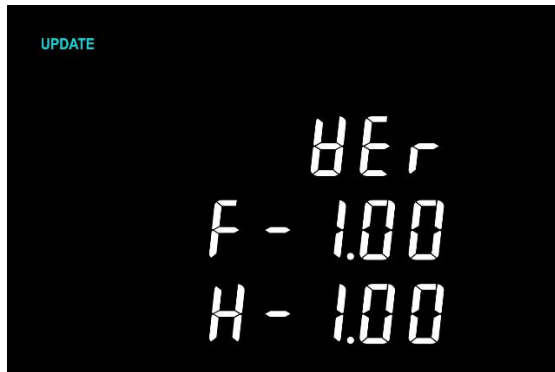
F-1.00 represents firmware version. H-1.00 represents hardware version.

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

UTE9802+/UTE9811+ has four display windows, it can display different measurement value at the same time, as shown in the following table.

No.	Window Display	Name	Measurement Range
1	V	Voltage (volt)	U: 3.0V ~ 600V (UTE9802+,UTE9811+)
2	A	Current（Ampere/milliampere）	I: 0.0005A ~ 20A (UTE9802+)
			I: 0.005A ~ 20A (UTE9811+)
3	W	Active power（Watt）	P: 0.001W ~ 12kW (UTE9802+,UTE9811+)
4	PF	Power factor	PF: -1.000~1.000 (UTE9802+,UTE9811+)
	Hz	Frequency（Hertz）	Hz: 40Hz ~ 400Hz (UTE9802+)
			Hz: 40Hz ~ 70Hz (UTE9811+)

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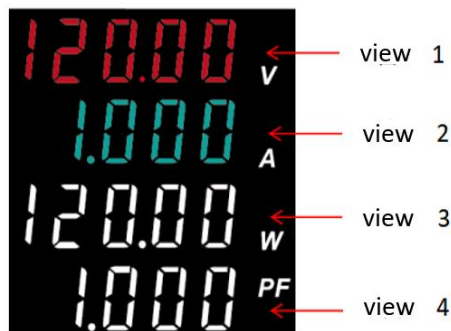
UTE9806+ has four display windows, it can display different measurement value at the same time and the parameter of each window can be switch freely, as shown in the following table. (Tick"√"indicates the window can measure the parameter. "/"indicates the window cannot measure the parameter.)

Para-Meter \ 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).
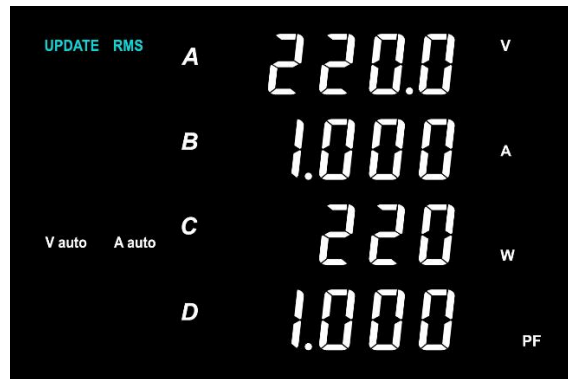
3.2.2 Alarm for Over Range

These situations will be regarded as over range.

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

2. The peak value of voltage and current exceeds 170% of the rated range (UTE9802+ and UTE9811+ only).

"--OL-"will be appear when the range is exceeded (for UTE9806+, "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

UTE9802+/UTE9811+: The alarm will be appear if the measured value of voltage is less than 3V or the measured value of current is less than rated value 0.1%.

1. Voltage, current, power displays "0".

2. Power factor displays "-----".

UTE9806+: 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 "-----".

Note:

UTE9806+: When the measured frequency is lower than 40Hz, it will display as "0".

3.2.4 Alarm for Break Off

When switch measurement range and function, "-----"will be appear for a while (UTE9802+ only).

UTE9811+ supports auto range; it can adjust the range according to the size of input signal. The adjustment interface as shown in the following figure.

Window 2: the current voltage range, "600V","300V" , "150V" , "75V".

Window 4: the currently current range, "20A" , "4A" , "1A" , "0.2A".

When the instrument is only adjust the voltage range, window 3, 4 will display"-----".

When the instrument is only adjust the current range, window 1, 2 will display "-----".

3.2.5 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.

3.2.6 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 light will be illuminated. This key will be no response. It need to long press Lock key for 1s and the indicator light will be extinguished. After that, the key will turn to enable state.

3.2.7 Mute Key (UTE9806+ only)

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.

3.3   Display Measurement Value (UTE9811+ only)

UTE9811+ supports multiple parameter measurement. Press different keys to enter different parameter measurement interface.

3.3.1 TRMS

After the instrument is boot-up, the instrument will automatic enter TRMS display interface. In other interface,

press 【RMS】 key to enter TRMS display interface.

Notes: If press 【RMS】 key multiple times, the system switches between the TRMS display interface and the total

RMS of harmonic display interface, please select the appropriate interface. The following figure is TRMS display interface.
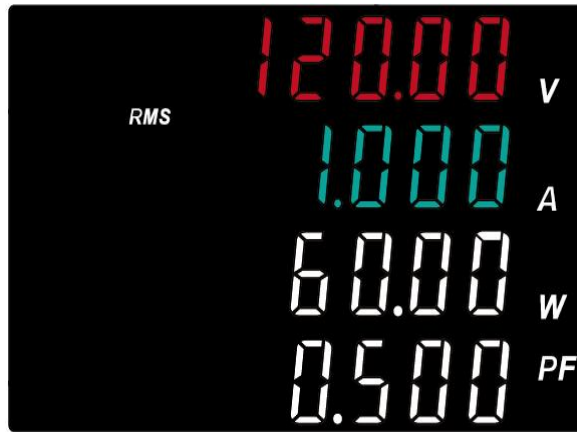
Window 1: the measured value of voltage, the unit is V.

Window 2: the measured value of current, the unit is A.

Window 3: the measured value of power, the unit is W.

Window 4: the measured value of power factor (PF) or frequency（Hz）, it can be switch by press【PF/HZ】key.

3.3.2 Crest Factor

Press【CF】key to enter crest factor display interface, as shown in the following figure.

Window 1: the measured value of voltage crest factor, no unit. The measured value of voltage crest factor= Voltage crest value/ TRMS Voltage. When no voltage signal is input, it displays "-----".

Window 2: the measured value of current crest factor, no unit. The measured value of current crest factor= Current crest value/ TRMS Current. When no current signal is input, it displays "-----".

Window 3: the measured value of power, the unit is W.

Window 4: the measured value of power factor (PF) or frequency（Hz）, it can be switch by press【PF/HZ】key.

3.3.3 Total RMS of Harmonic

Press【RMS】key to enter the total RMS of harmonic display interface.

Notes: If press【RMS】key multiple times, the system switches between the TRMS display interface and the total

RMS of harmonic display interface, please select the appropriate interface. The following figure is the total RMS of harmonic display interface.

Window 1: the total RMS voltage (operation value) of 1~50 times，the unit is V.

Window 2: the total RMS current (operation value) of 1~50 times，the unit is A.

Window 3: the total RMS active power (operation value) of 1~50 times, the unit is W.

Window 4 is fixed to display "RMS".

•**When no voltage signal is input or voltage frequency is over the range,**

Window 1, 2, 3 displays"-----".

3.3.4 Measured Value of Harmonic

Press【THD/%】key to enter the measured value of harmonic display interface.

Notes: If press 【THD/%】 key multiple times, the system switches between the measured value of harmonic

display interface and the harmonic distortion display interface, please select the appropriate interface. The following figure is the measured value of harmonic display interface.

Window 4 displays "tHD"or "or01"~"or50". "tHD"represents the total harmonic distortion; "or01"~"or50" represents the currently selected harmonic times. The display item of window 4 can switch by【▲】or【▼】.【▲】

or【▼】key supports continuous press function, long press the two keys to quickly switch the display item.

When window 4 displays"tHD",

Window 1: the measured value of the voltage total harmonic distortion，the unit is V.

Window 2: the measured value of the current total harmonic distortion，the unit is A.

Window 3: the total RMS power (operation value) of 1~50 times，the unit is W.

•**When window 4 displays"or01"~"or50",**

Window 1: the voltage measured value of the current harmonic times，the unit is V.

Window 2: the current measured value of the current harmonic times，the unit is A.

Window 3: the total RMS power (operation value) of 1~50 times，the unit is W.

•**When no voltage signal is input or voltage frequency is over the range,**
Window 1, 2, 3 displays"-----".

•**When no current signal is input,**
Window 2 displays"-----".

3.3.5 Harmonic Distortion Factor

Press【THD/%】key to enter harmonic distortion factor display interface.

Notes: If press 【THD/%】 key multiple times, the system switches between the measured value of harmonic display interface and the harmonic distortion display interface, please select the appropriate interface. The following figure is harmonic distortion factor display interface.

Window 4 displays "tHD"or "or01"~"or50". "tHD"represents the total harmonic distortion; "or01"~"or50" represents the currently selected harmonic times. The display item of window 4 can switch by【▲】or【▼】.【▲】

or 【▼】key supports continuous press function, long press the two keys to quickly switch the display item.

•**When window 4 displays"tHD",**

Window 1: voltage total harmonic distortion factor，the unit is %.

Window 2: current total harmonic distortion factor，the unit is %.

Window 3: the total RMS power (operation value) of 1~50 times，the unit is W.

•**When window 4 displays"or01"~"or50",**

Window 1: voltage distortion factor of the current harmonic times，the unit is %.

Window 2: current distortion factor of the current harmonic times, the unit is %.

Window 3: the total RMS power (operation value) of 1~50 times，the unit is W.

•**When no voltage signal is input or voltage frequency is over the range,**
Window 1, 2, 3 displays"-----".

•**When no current signal is input,**
Window 2 displays"-----".

Chapter 4 Measurement

4.1 UTE9802+ Measurement Range

4.1.1 Voltage Range

·**Step**

Press【V.Range】key to switch to voltage range.

·**Explanation**

The range can set to Auto, 600V, 300V, 150V or 75V.
The display interface will synchronous display the current selected voltage range.

4.1.2 Current Range

·**Step**

Press【A.Range】key to switch to current range.

·**Explanation**

The range can set to Auto, 20A, 8A, 2A or 0.5A.
The display interface will synchronous display the current selected current range.

4.1.3 Manual/Auto Range

•**Manual Range**

If the measurement range is set to manual range, the selected range will not be change even if the size of input signals changes.
The manual range can select from the following options.

Voltage range：600V, 300V, 150V, 75V.

Current range：20A, 8A, 2A, 0.5A.

Auto Range

If the measurement range is set to auto range, the instrument will synchronous switch range according to the size of input signal.
Voltage Range Increasing
The voltage range will increase when any one of the following condition is met.
Urms exceeds measurement range about 110%.

Upk exceeds measurement range about 170%.

Voltage Range Decreasing

The voltage range will decrease when any one of the following condition is met.

Urms is less than the lower part range about 80%.

Upk is less than the lower part range about 170%.

Current Range Increasing

The current range will increase when any one of the following condition is met.

Irms exceeds measurement range about 110%.

Ipk exceeds measurement range about 170%.

Current Range Decreasing

The current range will decrease when any one of the following condition is met.

Irms is less than the lower part range about 60%.

Ipk is less than the lower part range about 170%.

4.2 UTE9806+ Measurement Range

4.2.1 Manual Range

If the measurement range is set to manual range, the selected range will not be change even if the size of input signals 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;
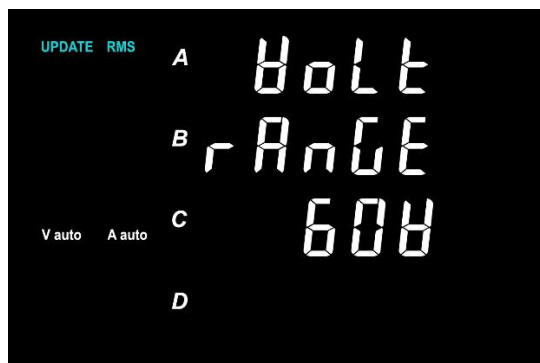
2. Press【▲】or【▼】key to switch 60V, 600V, Auto;

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.

4.2.2 Auto Range

Follow 4.2.1 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.

4.3 UTE9811+ 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 signals changes.

The manual range can select from the following options.

Voltage range：600V, 300V, 150V, 75V.

Current range：20A, 4A, 1A, 0.2A.

*Notes：UTE9811+ is only supports auto range in normal mode, not support manual range. If need to set

manual range in some condition, please refer to UTE9811+ Auxiliary Function.

4.3.2 Auto Range

If the measurement range is set to auto range, the instrument will synchronous switch range according to the size of input signal. UTE9811+ is only supports auto range in normal mode.

Voltage Range Increasing

The voltage range will increase when any one of the following condition is met.

Urms exceeds measurement range about 110%.

Upk exceeds measurement range about 170%.

Voltage Range Decreasing

The voltage range will decrease when any one of the following condition is met.

Urms is less than the lower part range about 80%.

Upk is less than the lower part range about 170%.

Current Range Increasing

The current range will increase when any one of the following condition is met.

Irms exceeds measurement range about 110%.

Ipk exceeds measurement range about 170%.

Current Range Decreasing

The current range will decrease when any one of the following condition is met.

Irms is less than the lower part range about 60%.

Ipk is less than the lower part range about 170%.

4.4 Measurement Mode (UTE9802+ only)

Steps

1. Press【SETUP】key to enter SETUP menu，the current submenu is "MODE", as shown in the following figure;

2. Press【ENTER】key to enter the next option, and then press【▲】or【▼】key to select ACDC，AC or DC;

3. Press【ENTER】key to select the current selected option and save it；

4. Press【◀】or【▶】key to select other submenu, or press【SETUP】key to exit SETUP menu.

Explanation

Measurement Mode

Measurement Mode	Voltage	Current

ACDC （AC+DC）	TRMS	TRMS
AC	AC component	AC component
DC	Simple average	Simple average

Theoretical Equation

ACDC (AC+DC): Select this mode to display the TRMS value of the voltage and current.

$$\sqrt{\frac{1}{T}\int_0^T f(t)^2\,dt}$$

f(t): input signal
T: a period of input

DC：This mode is for inputting DC voltage and current, it will execute simple average for input signal.

$$\frac{1}{T}\int_0^T f(t)\,dt$$

f(t): input signal
T: a period of input

AC：Display the AC component of voltage or current.

$$U_{ac} = \sqrt{U_{rms}^2 - U_{dc}^2} \quad 或 \quad I_{ac} = \sqrt{I_{rms}^2 - I_{dc}^2}$$

Urms，Irms：TRMS of voltage ad current

Udc，Idc：Simple average of voltage ad current

4.5   Average

4.5.1 UTE9802+/UTE9811+ Average

Steps

1. Press【SETUP】key to enter SETUP menu，press【◀】or【▶】key to select submenu"AVG"as shown

in the following figure；

2. Press【ENTER】key to enter the next option, and the press【▲】or【▼】key to select OFF, 8, 16, 32

or 64;

3. Press【ENTER】key to select the current selected option and save it；

4. Press【◀】or【▶】key to select other submenu, or press【SETUP】key to exit SETUP menu.

·**Explanation**

OFF represents the average function is disabled. 8, 16, 32, 64 represents the average function is enabled and the number of average.

4.5.2 UTE9806+ Average

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.
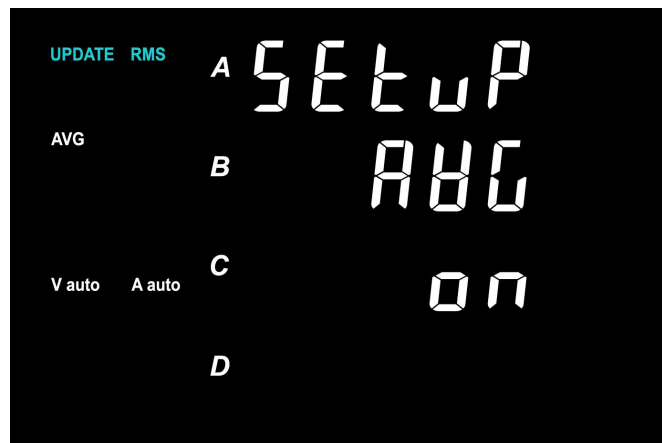
Explanation

OFF represents AverageOFF (the average function is disabled). ON represents the average function is enabled, 8, 16, 32, 64 represent 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, reading is difficult when the frequency of input signal is low.

The average measurement functions are U, I, P, S, Q and λ (power factor) calculated by the average value of Urms, Irms, P, S, Q.

*Notes: S (apparent power), 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.

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

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

4.6 Data Update Cycle

Steps

1. Press【SETUP】key to enter SETUP menu，press【◀】or【▶】key (for UTE9806+:【▲】or【▼】key)

   to select submenu"u.rate"as shown in the following figure；

2. Press【ENTER】/【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【ENTER】/【OK】key to select the currently selected option and save the setting；

4. Press【SETUP】key to exit SETUP menu.
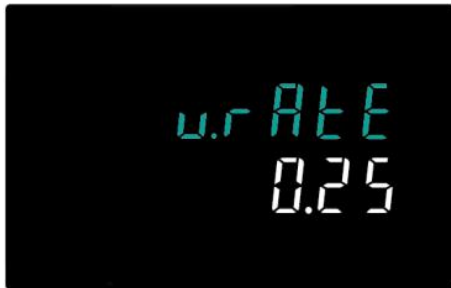
UTE9802+/UTE9811+ u.rate interface   UTE9806+u.rate interface

··**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.

Chapter 5 Alarm

5.1 Upper/Lower Limit of Current and Power (UTE9802+/UTE9811+)

·**Steps**

1. Press【SETUP】key to enter SETUP menu，press【◀】or【▶】key to select one of submenu"A-Hi","A-Lo" ，

"P-Hi" or"P-Lo" as shown in the following figure；

2. Press【ENTER】key to enter numerical value editing state, press【▲】【▼】【◀】【▶】【 ⦿ 】key

to edit the numerical value；

3. Press【ENTER】key save the setting；

4. Press【◀】or【▶】key to select other submenu, or press【SETUP】key to exit SETUP menu.
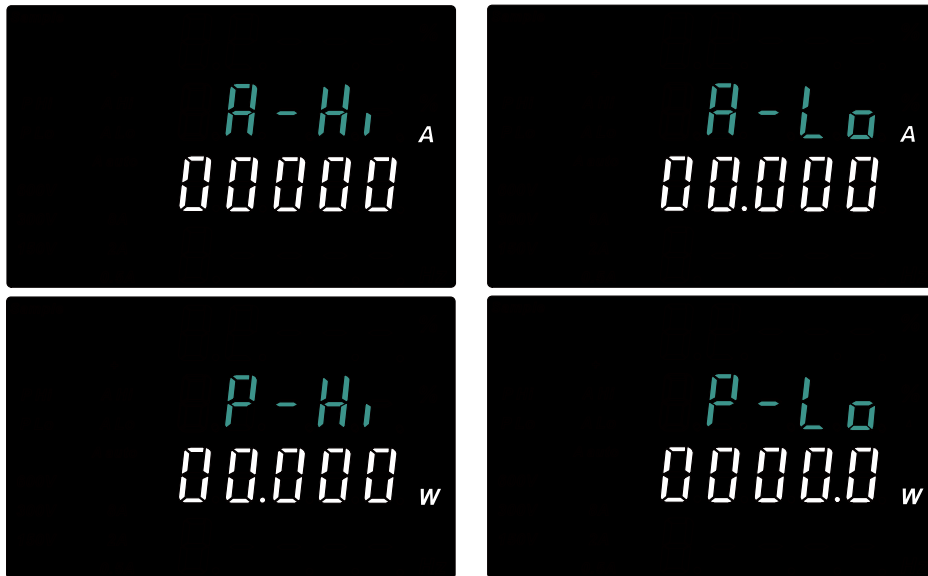
Explanation

"A-Hi"represents the upper limit of current."A-Lo" represents the lower limit of current.

"P-Hi" represents the upper limit of power. "P-Lo" represents the lower limit of power.

*Notes: when editing the numerical value, the lower limit cannot greater than the upper limit.

Otherwise it will prompt "--oF-"and the setting cannot be saved when press【Enter】key.

5.2 Alarm Delay (UTE9802+/UTE9811+)

·Steps

1. Press【SETUP】key to enter SETUP menu，press【◀】or【▶】key to select submenu "tiME" as shown

in the following figure；

2. Press【ENTER】key to enter numerical value editing state, press【▲】【▼】【◀】【▶】key to edit

the numerical value；

3. Press【ENTER】key save the setting；

4. Press【◀】or【▶】key to select other submenu, or press【SETUP】key to exit SETUP menu.

Explanation

   The unit of alarm delay is S，the range can set to 0~99.9.

5.3 Alarm Function

5.3.1 Turn on/off Alarm Function of UTE9802+/UTE9811+

When the upper/lower limit is different but as "0", it represents the alarm function is enabled.

When the upper/lower limit is "0"at the same time, it represents the alarm function is forbidden.

Alarm Function

   After the alarm function is enabled, the system waits to connect the load. When the system detects the voltage and current are both greater than "0", it will recognize the load is connected and start to count the time. After the alarm delay, the system will compare the measured value with the upper/lower limit, if the measured value is within the upper/lower limit, the interface displays "OK"; if the measured value is higher than the upper limit, the interface displays "Hi", and the beeper will alarm; if the measured value is lower than the lower limit, the interface displays "Lo", and the beeper will alarm. When the load is removed, the system waits for load access again, the alarm sign is eliminated, and the beeper is turned off.

5.3.2 Turn on/off Alarm Function of UTE9806+
·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.

5.4 Alarm Parameter (UTE9806+ only)

·5.4.1 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;
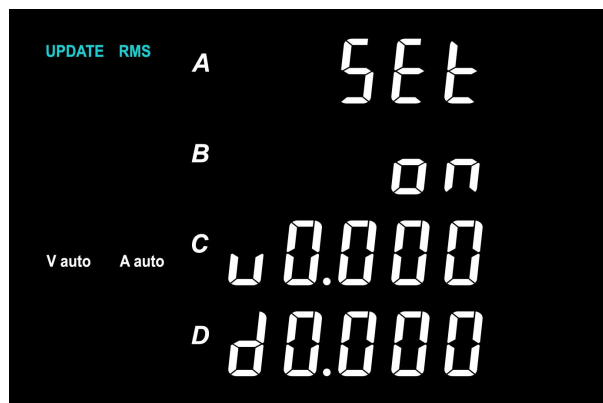
6. Press【▲】or【▼】key to select ON or OFF in window B, and press【OK】key to save the currently selected and enter Window C;

7. Press【▲】,【▼】,【◀】,【▶】key to edit data and press【Shift】+【Hold/·】key can move the decimal point from left to right.

8. Press【OK】key to save the currently set upper limit and enter Window D to set the lower limit.

9. Press【▲】,【▼】,【◀】,【▶】key to edit data and press【Shift】+【Hold/·】key can move the decimal

point from left to right.

10. Press【OK】key to finish the setting and return to the previous menu.

·5.4.2 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 selecting DELY or BEEP, then this step is to edit the numerical value as
shown in the following figure;
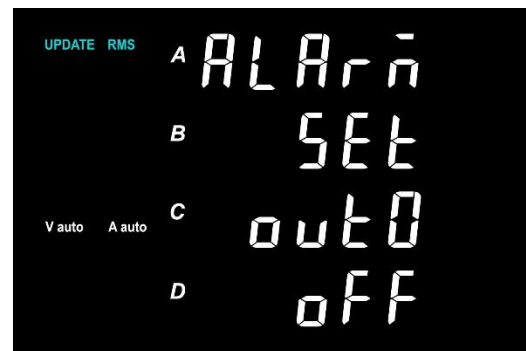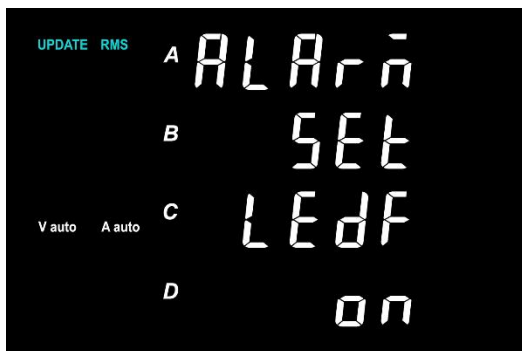
6. Press【OK】key to save the currently selected and return to previous menu;

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   Communication Command

6.1.1 Communication Command Setting of UTE9802+/UTE9811+

Steps

1. Press【SETUP】key to enter SETUP menu，press【◄】or【►】key to select submenu "CoMAd"as shown

in the following figure；

2. Press【ENTER】 key to enter the next option, and the press【▲】or【▼】key to select "SCPI" or

"**ṁobu5**";

3. Press【ENTER】key to select the current selected option and save the setting；

4. Press【◄】or【►】key to select other submenu, or press【SETUP】key to exit SETUP menu.

6.1.2 Communication Command Setting of UTE9806+

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 "**ṁodb**" ;

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

6. Press【Hold】key to return to previous menu.

·Explanation

   UTE9802+/UTE9806+/UTE9811+ supports SCPI and Modbus communication command. "**ṁobu5**" or"**ṁodb**" represents"Modbus" communication command. Modbus is only support RTU mode. The detailed   command can refer to **UTE9800+ Series Smart Digital Power Meter –Programming Manual**

6.2 Baud Rate and Modbus Communication Address

6.2.1 Baud Rate Setting of UTE9802+/UTE9811+

Steps

1. Press【SETUP】key to enter SETUP menu，press【◀】or【▶】key to select submenu"bAud" as shown

   in the following figure；

2. Press【ENTER】key to enter the next option, and the press【▲】or【▼】key to select 4800, 9600, 19200,

   38400, 57600 or 115200；

3. Press【ENTER】key to select the current selected option and save the setting；

4. Press【◀】or【▶】key to select other submenu, or press【SETUP】key to exit SETUP menu.

Explanation

UTE9802+/UTE9811+ supports RS232 and RS485 interface，both interfaces have the same baud rate, so it can

be set by the method in this section.

6.2.2 Modbus Communication Address Setting of UTE9802+/UTE9811+

Steps

1. Press【SETUP】key to enter SETUP menu，press【◀】or【▶】key to select submenu"Addr" as shown

   in the following figure；

2. Press【ENTER】key to enter numerical value editing state，press【▲】【▼】【▶】【◀】key to editing

   numerical value；

3. Press【ENTER】key to save the setting；

4. Press【◀】or【▶】key to select other submenu, or press【SETUP】key to exit SETUP menu.

Explanation

Only when the communication command sets to Modbus, submenu"Addr" can display. The setting method of communication command can refer to section 6.1

The Modbus communication address range of UTE9802+ is 1-99.

6.2.3 Baud Rate and Modbus Communication Address Setting of UTE9806+

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;
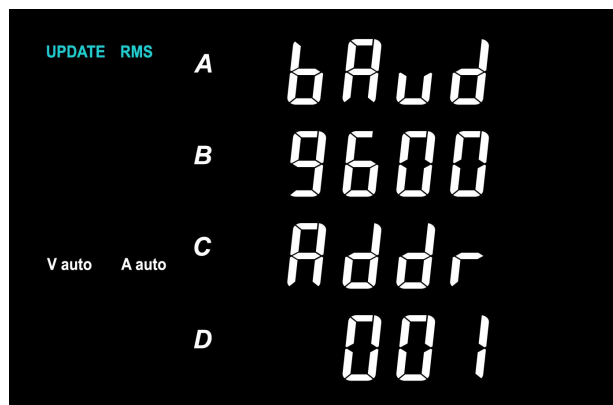
6. Press【▲】,【▼】,【◀】,【▶】key to edit address, the range is: 000 ~ 255;

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.

Chapter 7 System Function

7.1 Initialization

7.1.1 Initialization Setting of UTE9802+/UTE9811+

Steps

1. Long press【ENTER】(Utility) key to enter Utility menu, and the submenu is "init" as shown in the following figure；

2. Press【ENTER】key to enter the next option, and the press【▲】or【▼】key to select NO or YES；

3. Press【ENTER】key to select the current option；

4. Press【◀】or【▶】key to select other submenu, or press【SETUP】key to exit Utility menu.

Explanation

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

Item	Default Setting

Display Window 4	Display function：PF
Date Update Cycle	0.25s
Measurement Range	Auto range
Measurement Mode	AC+DC
Average	Average function：OFF
Upper/lower limit of current and power	"0"
Alarm Delay	"0"

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

7.1.2 Initialization Setting of UTE9806+

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 exit Utility menu.

·Explanation

The setting parameter can be initializing and restore to the factory setting. This function is very useful for cancelling all the setting or restarting executes measurement function. The factory setting can see the following table.
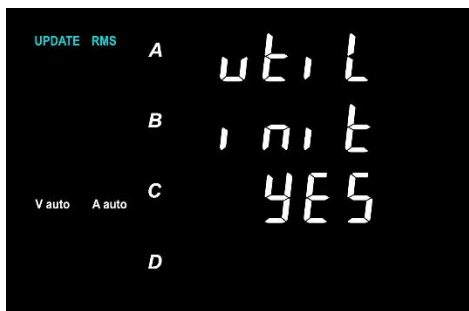
Item	Default Setting
Display Window A	V
Display Window B	mA/A
Display Window C	W
Display Window D	PF
Data Update Cycle	0.25s
Average Function	OFF
Alarm Function	OFF

Voltage, Current, Active Power, Apparent Power, Power Factor	OFF，the upper and lower limit is"0"
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).

7.2 View Software Information

7.2.1 Software Information of UTE9802+/UTE9811+

·Steps

    1. Long press【ENTER】(Utility) key to enter Utility menu, press【◀】or【▶】key to select submenu"Ver"

       as shown in the following figure；

    2. Press【◀】or【▶】key to select other submenu, or press【SETUP】key to exit Utility menu.

·Explanation

    " F - 1.03 "represents firmware version；" H - 1.01 " represents hardware version.

7.2.2 Software Information of UTE9806+

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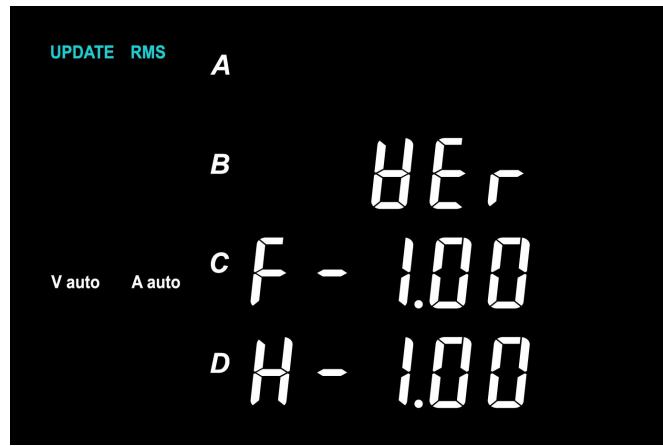
4. Press【Hold】key to exit Utility menu.

Explanation

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

7.3.1 Firmware Update of UTE9802+/UTE9811+

Steps

1. Long press【ENTER】(Utility) key to enter Utility menu, press【◀】or【▶】key to select submenu"boot"as
   shown in the following figure;

2. Press【ENTER】key to enter secret code editing, press【▲】【▼】【▶】【◀】key to edit secret code；

3. Press【ENTER】key to confirm the setting，if the secret code is correct, then it can enter firmware update
   interface;

4. Press【◀】or【▶】key to select other submenu, or press【SETUP】key to exit Utility menu.

7.3.2 Firmware Update of UTE9806+

Steps

1. The instrument is turned off.
2. Press and hold the [D] key and press the power switch to turn on the instrument.
3. It will enter the calibration/upgrade interface after the buzzer beeps twice. Release the [D] key at this
   time.

4. Press【▲】【▼】【▶】【◀】key to edit secret code；

5. Press【OK】key to confirm the setting，if the secret code is correct, then it can enter firmware update interface.

6. If the upgrade is successful, it will automatically restart and enter the test interface. If the upgrade is not successful, the instrument will not start normally.

Note:

Please use this function with caution, otherwise the firmware will be lost and the instrument will not start again.

7.4 Calibration

7.4.1 Calibration of UTE9802+/UTE9811+

Steps

1. Long press【ENTER】(Utility) key to enter Utility menu, press【◀】or【▶】key to select submenu "CALib" as shown in the following figure;

2. Press【ENTER】key to enter secret code editing, press【▲】【▼】【▶】【◀】key to edit secret code；

3. Press 【ENTER】 key to confirm the setting，if the secret code is correct, then it can enter calibration interface;

4. Press 【◀】 or 【▶】 key to select other submenu, or press【SETUP】 key to exit Utility menu.

7.4.2 Calibration of UTE9806+

·Steps

1. The instrument is turned off.
2. Press and hold the [D] key and press the power switch to turn on the instrument.
3. It will enter the calibration/upgrade interface after the buzzer beeps twice. Release the [D] key at this time.

4. Press 【▲】 【▼】 【▶】 【◀】 key to edit secret code；

5. Press【OK】key to confirm the setting，if the secret code is correct, then it can enter calibration interface

6. Restart the instrument to exit the calibration interface.

Note:

Do not operate this function at will, otherwise the calibration data will be lost, resulting in abnormal instrument measurement.

7.5 User's Grade (UTE9811+ only)

Steps

1. Long press【ENTER】(Utility) key to enter Utility menu, press【◀】or【▶】key to select submenu"LEVEL" as shown in the following figure;

2. Press【ENTER】key to enter secret code editing, press【▲】【▼】【▶】【◀】key to edit secret code；

3. Press【ENTER】key to confirm the setting，if the secret code is correct, then it can enter next step;

4. Press 【▲】or【▼】key to switch "High" or "norm"；

5. Press【ENTER】key to select the current option and save it;

6. Press【◀】or【▶】key to select other submenu, or press【SETUP】key to exit Utility menu.

Explanation

"norm"represents that the instrument is only support normal function. "High"represents that the instrument supports other auxiliary function except only support normal function. The default is "norm". The auxiliary function can refer to *UTE9811+ Auxiliary Function.* After the user's grade is complete, reboot the instrument for the setting to take effect.
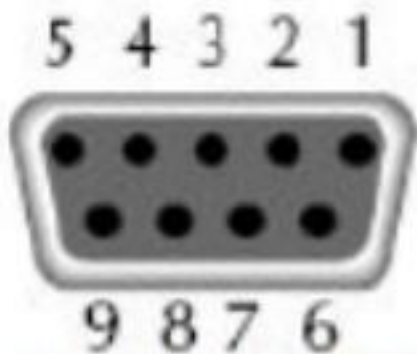
Chapter 8 Communication Interface

8.1 RS232 and RS485 Interface

UTE9800+ series has standard RS232 and RS485 communication interface，PC or PLC can remote control

UTE9800+ series via SCPI or Modbus command.

The Definition of Pin

UTE9800+ series 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, UTE9800+ series should match with the following parameters of the control host.

(1) Baud Rate：

4800, 9600, 19200, 38400, 57600, 115200.
The setting method of baud rate can refer to section 6.2.

(2) Check bit：NONE (fixed value)

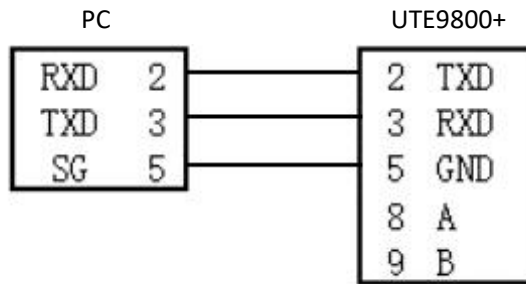(3) Data bit：8 (fixed value)

(4) Stop bit：1 (fixed value)

8.2 Connecting Example

8.2.1 PC connect to UTE9800+ series via RS232

·The number in block diagram represents the pin number of DB9 interface.
·Use direct serial port line to connect PC and UTE9811+. The factory provides direct serial port line.
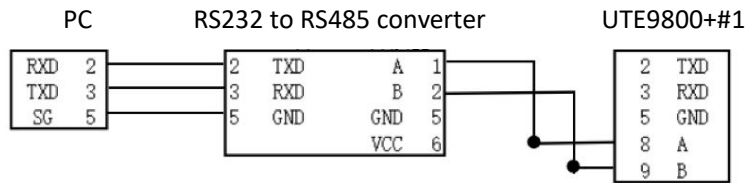·This connecting method supports SCPI and Modbus instruction.
As shown in the following figure.

PC   UTE9800+

```
RXD   2 ───────────── 2   TXD
TXD   3 ───────────── 3   RXD
SG    5 ───────────── 5   GND
                       8   A
                       9   B
```

8.2.2 PC connect to a single UTE9800+ series 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.

PC   RS232 to RS485 converter   UTE9800+#1

```
RXD  2 ──── 2  TXD      A  1 ──────────── 2  TXD
TXD  3 ──── 3  RXD      B  2 ──────────── 3  RXD
SG   5 ──── 5  GND     GND  5              5  GND
                       VCC  6              8  A
                                           9  B
```

8.2.3 PC connect to multiple UTE9800+ series 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 UTE9800+ series.
· This connecting method is only support Modbus instruction. The baud rate of the PC must be the same as that
  of each UTE9800+ series, and the IP address of each UTE9800+ series must be different.
  As shown in the following figure, connect to PC by using multiple UTE9802+.

PC   RS232 to RS485 converter   UTE9802+#1
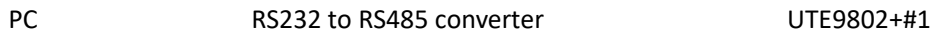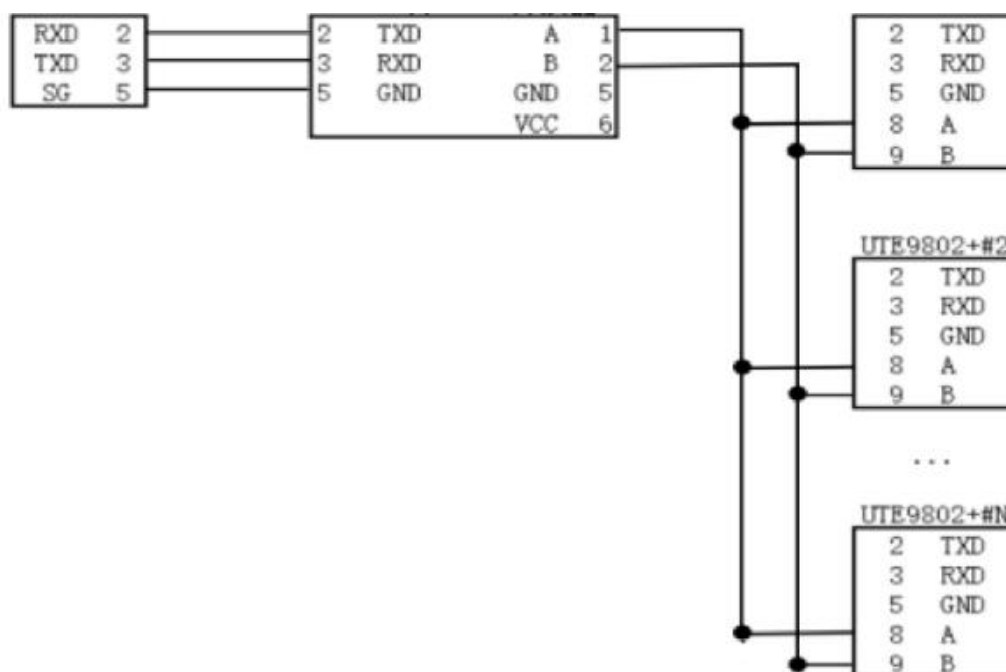
Explanation

For UTE9806+ or UTE9811+, the connection method is the same as UTE9802+.

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 Troubleshooting

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,（T X / R X 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 situations 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 minutes 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 are as the following table.

Item	Reference Value or Range	Reference Value or Range
Environment temperature ℃	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	ß= 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 is as shown in the following figure.

Standard power meter
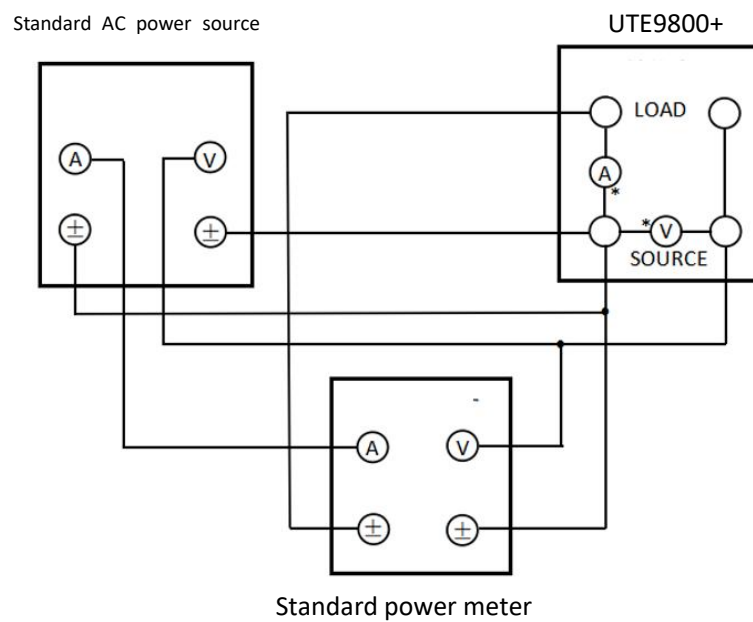
Chapter 10 Optional and Fuse

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.
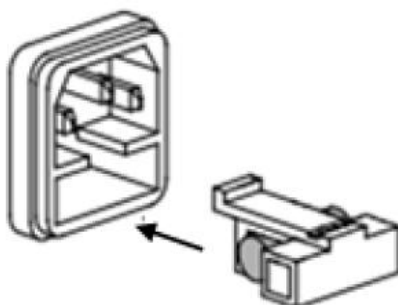

If the fuse was burned out, please replace the same specification fuse with the instrument.
The specification fuse with the instrument, see the following table.

Model	Specification of Fuse
UTE9802+/UTE9806+/UTE9811+	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

Measurement Function [Unit]	Operation Formula	Explanation
Voltage TRMS [V]	$$\text{Urms} = \sqrt{\frac{1}{N} \cdot \sum_{n=1}^{N} u(n)^2}$$	
Voltage DC Component [V]	$$\text{Udc} = \frac{1}{N} \cdot \sum_{n=1}^{N} u(n)$$	
Voltage AC Component [V]	$$\text{Uac} = \sqrt{\text{Urms}^2 - \text{Udc}^2}$$	u(n) represents instantaneous value of voltage；
RMS current [A]	$$\text{Irms} = \sqrt{\frac{1}{N} \cdot \sum_{n=1}^{N} i(n)^2}$$	i(n) represents instantaneous value of current；
Current DC Component [A]	$$\text{Idc} = \frac{1}{N} \cdot \sum_{n=1}^{N} i(n)$$	N represents ADC sampling time within the measurement range.
Current AC Component [A]	$$\text{Iac} = \sqrt{\text{Irms}^2 - \text{Idc}^2}$$	
Active power P [W]	$$P = \frac{1}{N} \cdot \sum_{n=1}^{N} [u(n) * i(n)]$$	
Power Factor [PF]	$$\frac{P}{\text{Urms} \cdot \text{Irms}}$$	